

Juvêncio Manuel Nota

Women and Biological Research Careers
in Higher Education in Mozambique
A Case Study of Two Public Universities



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Abstract

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The issue of women's experiences in biological research careers in academia in Mozambique is under-researched. This lack of knowledge does not enable the country to design structural tools that can help women to overcome the obstacles and challenges they face and hence boost their career progression in academia. This thesis aims to fill this knowledge gap by examining the reported experiences of senior and junior women in biological research careers located in two different sociocultural and academic settings in Mozambique. My concern is with how the societal and institutional features of the academic settings in which female biologists are situated shape their biological research careers and how they made sense of these experiences. Inspired by feminist institutional ethnography and the concept of inequality regimes, I conducted face-to-face qualitative interviews with 39 people, the majority of whom were married women with dependent children and at different stages in their careers. The findings show that due to the local socio-cultural factors deeply rooted in a patriarchal culture and local conventions regarding marriage, the careers of many women were socially, culturally and institutionally vulnerable due to tensions between their academic work and the women's ascribed family duties. These women were unable to go abroad and get a PhD which meant that most of them were stuck at the lower stages of their careers, even when they were the majority of the workforce in the Department of Biological Sciences. Such a social barrier was institutionally recreated through the absence of a set of institutional supportive frameworks for women's careers. As part of the inequality regime governing the universities, there was no concern and commitment at faculty or departmental level with promoting gender equality or with tackling the prevailing gender inequalities in academic careers. Most academic managers of both sexes (though they were predominantly men) revealed a lack of gender awareness and commitment to tackling gender inequalities due to their adherence to the supposedly gender-neutral ideology of meritocracy. This suggests a passive resistance towards gender issues that contributed to maintaining and perpetuating women's disadvantaged position in terms of career advancement possibilities. Women from different generations reacted differently in the face of these obstacles at societal and institutional levels; older women were more gender-conforming while juniors were more progressive in terms of their attitudes and willingness to contribute to institutional changes and moving forward. Women's careers were also affected by a pervasive lack of adequate material work conditions and incentives for experimental research.

Keywords: women, biological research careers, higher education, institutional ethnography, inequality regimes

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Resumo

As experiências das mulheres nas carreiras de investigação em biologia na academia em Moçambique são pouco estudadas/conhecidas. Esta ausência/carência de conhecimento não permite ao país desenhar instrumentos estruturais que possam apoiar as mulheres a ultrapassar os obstáculos e desafios que enfrentam e consequentemente/deste modo impulsionar a sua progressão na carreira académica.

A tese procura preencher esta lacuna do conhecimento examinando as experiências relatadas de mulheres seniores e júniores em carreiras de pesquisa biológica localizadas em dois ambientes sócio-culturais e académicos distintos em Moçambique

Preocupou-me conhecer como as características sociais e institucionais dos ambientes académicos em que as biólogas estão inseridas moldam as suas carreiras de pesquisa nessa área e como deram sentido a essas experiências. Inspirado na etnografia institucional feminista e no conceito de regimes de desigualdade realizei entrevistas qualitativas presenciais com 39 pessoas, a maioria mulheres casadas com filhos dependentes e em diferentes fases das suas carreiras

Os resultados revelam que devido a factores sócio-culturais locais enraizados na cultura patriarcal e nas convenções locais em relação ao casamento, as carreiras de muitas mulheres eram social, cultural e institucionalmente vulneráveis devido às tensões entre o trabalho académico e os deveres familiares atribuídos às mulheres. Essas mulheres não puderam ir para o exterior e obter um doutoramento, o que significava que a maioria delas estava presa nos estágios mais baixos das suas carreiras, mesmo sendo a maioria da força de trabalho do Departamento de Ciências Biológicas.

Tal barreira social foi institucionalmente recriada pela ausência de um quadro institucional de apoio às carreiras dessas mulheres. Como parte dos regimes de desigualdade que regem as universidades, não havia preocupação e cometimento a nível da faculdade ou departamento com a promoção da igualdade de género ou em combater as desigualdades de género prevalentes nas carreiras académicas. A maioria dos gestores académicos de ambos os sexos (embora fossem predominantemente homens) revelou falta de consciência de género e compromisso com o enfrentamento das desigualdades de género devido à sua adesão à ideologia da meritocracia supostamente neutra em termos de género.

Isto sugere uma resistência passiva às questões de género, contribuindo para manter e perpetuar a posição desfavorecida das mulheres em termos de possibilidades de progressão na carreira. Mulheres de diferentes gerações reagiram de forma diferente perante uma série de obstáculos em níveis sociais e institucionais; as mulheres mais velhas revelaram-se mais conformadas e passivas diante das normas de género prescritas de si esperadas enquanto as mais novas eram mais progressistas em termos das suas atitudes e vontade de contribuir para mudanças institucionais e avançar nas suas carreiras.

As carreiras das mulheres também foram afectadas pela falta generalizada de condições materiais adequadas de trabalho e de incentivos para a pesquisa experimental.

Palavras-chave: mulheres, carreiras de investigação biológica, ensino superior, etnografia institucional e regimes de desigualdade.

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Abbreviations

AIDS	<i>Acquired Immunodeficiency Syndrome</i>
AU	African Union
DCB	<i>Department of Biological Sciences</i>
FNC	<i>Faculty of Natural Sciences</i>
FNI	National Fund for Research
Frelimo	<i>Mozambique Liberation Front (a political party)</i>
HEI	<i>Higher Education Institution</i>
IE	<i>Institutional Ethnography</i>
INE	<i>National Institute of Statistics</i>
MCTESTP	<i>Ministry of Science and Technology, Higher Education and Technical Professional</i>
MINED	<i>Ministry of Education</i>
NEPAD	New Partnership for Africa's Development
OECD	Organisation for Economic Co-operation and Development
Renamo	<i>Mozambican National Resistance (a political party)</i>
SADC	<i>The Southern African Development Community</i>
SSI	Semi-Structured Interviews
ST	Standpoint Theory
STEM	Science, Technology, Engineering and Mathematic
TA	Thematic Analysis
UEM	Eduardo Mondlane University
UNESCO	<i>United Nations Educational, Scientific and Cultural Organization</i>
UniLurio	Lurio University
USD	<i>United States Dollar</i>

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Uppsala, May, 2022

Juvêncio Nota

1. Introduction

The purpose of this thesis is to explore the obstacles and challenges that women face in pursuing biological research careers at two public universities in Mozambique. The research project is situated in a socio-educational context marked by the expansion of higher education across the country since the establishment of the first university in 1962, and growing concerns about gender issues in different domains of Mozambique's political, social and economic life. The empirical data collection was carried out during 2019-2020. To date (2022) there are few studies on gender inequalities in the science field within the academic milieu of Mozambique (but see Givá & Santos, 2020; Uamusse et al., 2020).

The available data on Mozambique show that although women's access to higher education has increased, there are still strong gender disparities in the field of science and technologies where, as in many other countries, they are under-represented among students, faculty and researchers (Antonio & Hunguana, 2014; MCTESTP, 2016). In addition, little is known about the career paths and experiences of women engaged in biological research careers within the Mozambican academic environment which has historically been marked by a strong male presence. Thus, based on a qualitative and feminist approach, I have sought to investigate these experiences. My main research question is the following: How do the societal and institutional environments in which female biologists are located shape their research careers within Mozambican public universities? My research project is located within the context of gender studies, and in particular in the area of gender and higher education.

Objective of the thesis

The overall objective of this thesis is to explore the reported experiences of women in academic research careers in biological sciences in Mozambican academia from their perspectives. This objective was motivated in part by the lack of studies of these experiences. As part of my own experiences in educational practice and biological research alongside such academic women both in Maputo and Cabo Delgado, I noticed over the years that my female colleagues tended to teach rather than conduct research. My purpose

here is to analyse why this is the case. A second reason for this objective is my activism on gender issues in higher education and my desire to contribute to greater gender awareness among academics and politicians regarding gender inequalities in academic research careers. My research findings are intended to contribute to structural policies to combat this phenomenon. Through this study I also wish to contribute to the - in Mozambique emerging - interdisciplinary field of research on women in higher education in STEM (science, technology, engineering and mathematics) from a gender studies perspective. The latter is not yet established as an epistemological domain in Mozambique. Gender and women's issues have not been part of the traditional concerns within the sciences in Mozambican universities, and the numbers of young women choosing to pursue undergraduate courses in science are reducing (MINEDH, 2016). This retards the progress of the country which needs scientists locally, capable of undertaking excellent research.

My study was guided by the following research questions:

Research questions

1. How have gender issues been part of higher education institutions' concerns in general and regarding biological research specifically?
2. What are the main obstacles and challenges women face in their biological research careers?
3. How have the women's research career trajectories been shaped by these obstacles and challenges?

Theoretical Framing

In this section, I present the theories that have guided my research. I employ a combination of three frameworks: critical insights from standpoint theory (Collins, 1997; Smith, 1997a, b; Harding, 2004), feminist organizational sociology, where I utilize gendered organization theory (Acker, 1990, 2016) and also I use Joan Acker's concept of inequality regimes (Acker, 2006, 2009, 2016) to account for the inequalities women face in Mozambican academe. Acker emphasizes that these inequalities are socially constructed and institutionally organized through gendered processes (Acker, 1990, 2006, 2009). Dorothy Smith (2005) explains them in terms of relations of ruling. Gendered organization theory is thus critical for examining how women come to understand their academic research careers.

Standpoint theory (ST) is rooted in feminist critiques of the production of knowledge and practices of power in traditional epistemologies and philosophy of sciences (Hartsock, 1983; Collins, 1997; Smith, 1997b; Harding,

2004). The latter are guided by ideals of 'objectivity' and 'replicability' in ways that devalue the embodied experiences of women as sources of evidence in scientific knowledge production (Harding, 1993, 1997; Gurung, 2020). ST was inspired by the recognition of women's exclusion from knowledge production. Smith expanded ST to sociological practices (Smith, 1990, 1991, 2007) by emphasizing women's embodied experiences as a point of departure for social enquiry in order to understand their social reality.

One engagement with standpoint theory in Gender Studies is institutional ethnography (IE) which my research was inspired by. Smith's institutional ethnography brings women's experiences to the centre of the interpretation of social reality (2005a, 2007). These experiences constitute strong evidence regarding certain processes and phenomena within society at large as well as in academia (Smith, 1987). In seeking to grasp the social reality of the daily lives of women, standpoint theory wants 'women [to] have their understandings of the world legitimated' (Alcoff & Potter, 1993:2).

As a theoretical tool, feminist standpoint theory enabled me to explore the lived experiences of Mozambican women biologists located in two different social and academic settings, shaped by 'complex and organized practices that interpenetrate the multiple sites of power' (Smith, 1987:3). Silvia Gherardi (2005) asserts that 'gender assumptions are embedded in societal expectations and interact with gendering organizational rules and practice [...] that legitimize gender inequalities and differences' (217). Thus, the experiences of women in academic research careers are informed both by societal and by institutional forces.

Sandra Harding (1993) stresses that

the activities of those at the bottom of [...] social hierarchies can provide starting points for thought [...] the experience and lives of marginalized peoples, as they understand them, provide particularly significant problems to be explained ... (54).

Exploring women's experiences as a marginalized group among faculty and researchers in academic biology environments gave me access to social realities previously unavailable, indeed repressed' (Smith, 1990:12). It also gave me the opportunity to reflect on my positionalities in relation to such women and other participants that is to 'think critically about commonalities, differences and relations' (Harding, 1998:190) between the women (and men) I interviewed and myself Both Harding's and Smith's stances had methodological implications for my research, for instance when I was interviewing participants by using a bottom-up strategy, as I will explain later in my methodology chapter.

According to feminist organizational theory, institutions are not neutral; rather, they are gendered organizations (Acker, 1990, 2016) and gender is embedded in their processes and practices. By gender Acker (2016) means

'that advantage and disadvantage, exploitation and control, action and emotion, meaning and identity, are patterned through and in terms of distinction between male and female, masculine and feminine' (420). Acker highlights that the notion of a 'gendered organization' implies that its structure, power, hierarchy, the activities that people do and their thoughts are permeated by gender dimensions, (re)creating social and institutional hierarchies, that is dominance and subordination, alliances and exclusions (Acker, 2016). In my research, I adopted Acker's stance by looking at Mozambican universities as highly gendered and hierarchical institutions that reflect their surrounding society in particular ways. It means that there is an entanglement between the larger society and academic institutions through which inequality regimes are reproduced, operate and are maintained (Acker 2006, 2009).

Acker (2006) proposes the notion of inequality regimes 'as an analytic approach to understanding the creation of inequalities in work organization' (441). This is a useful concept for my research as it provides a ground for exploring how institutional practices and processes, part of inequality regimes, operate in creating and reproducing career-related obstacles and inequalities between women and men in the university at different levels and in different careers in academia. The participation of women in academic research careers is shaped by many intersecting factors - individual, social, political, cultural and organizational (Calás & Smircich, 2016). These vary considerably across cultures and according to different norms, gender role expectations, family and peer networks (Zhang, 2018).

Acker claims that 'these processes and patterns vary in different organizations; the severity of inequalities, their visibility and legitimacy, and the possibilities for change toward less inequality also vary from organization to organization' (459). Due to the androcentric nature of Mozambican academic institutions, there are pervasive gender imbalances where women almost always end up being at a disadvantage compared to their male counterparts in terms of access to resources, opportunities for training, advancement in their careers and other areas. In other words, inequality regimes have created a systematic masculine stratification of academic life (Sprague & Kobrynowicz, 1999; Acker, 2009). They do this by reproducing the social hierarchy that exists in wider society.

In order to explore how political and sociocultural context may influence gender differences in biology research careers, I will provide some background information about my field site. I start by drawing a picture of the socio-political and cultural profile of Mozambique. Next, I discuss the higher education system in the country. Finally, I provide an overview regarding gender imbalances in biological sciences.

Mozambique: The context for my research

To understand wider Mozambican society, it is useful to know something about the country before the colonial era, during the Portuguese occupation and when the Portuguese withdrew in 1975, as well as the period after independence. My purpose in this section is to give an overview of my study site, describing its origins, historical and political trajectories, its social and cultural particularities and logics of power as a way to understand its current challenges and constraints. Beyond culture and religion, political issues have been an important influence on gender issues within Mozambican institutions, especially the public sector to which the two universities where I carried out my research, Eduardo Mondlane University (UEM) and Lurio University (UniLurio), belong.

Mozambique: a brief socio-political and cultural profile

Mozambique is a multi-ethnic and multicultural country extending 2500km along the south east coast of Africa. The country's name most likely derives from the Islamic name *Musa Mbiki*, adopted phonetically by the Portuguese upon arrival at Mozambique Island in 1498 (Ellert, 2013). From the beginning of the seventh century the east coast of Africa was an important maritime zone for international trade, with strong influence from Arabic traders in the north of Mozambique, who propagated Muslim culture and religion (Briggs, 2011). One of the effects of this was the implantation of Islam as well as the incorporation of elements of Arab vocabulary into Swahili, a language of Bantu origin spoken along the coastal regions (Briggs, 2011). Philip Briggs (2011) suggests that before the Portuguese occupation of Mozambique, Arabs were well-established in East Africa but this 'was altered dramatically in the 16th century following the arrival of Portuguese on the Indian Ocean' (7).

The first Portuguese arrived in Mozambique in 1498. However, only in 1507 did they establish a permanent settlement on Mozambique Island, after killing and expelling their Muslim rivals from the centres of commerce along the east coast of Africa, Pemba and Zanzibar. Gradually the Portuguese colonial regime infiltrated the interior of Mozambique, imposing a dictatorial, exploitative and slavery regime for five hundred years. During this regime Mozambique was considered an 'overseas province' of Portugal (Funada-Classen, 2012: 2), and all its inhabitants were to be Portuguese citizens (Newitt, 2017), which in fact they were not since they did not have the same rights as Portuguese citizens. Due to the segregationist policies of the Portuguese colonial regime, more than ninety percent of Mozambicans remained illiterate until liberation in 1975.

Under the Portuguese colonial regime women were considered commodities and private properties, hence sexually exploited and required to work on

large sisal plantations, for example. (Romero, 2015) while men as slaves were subjected to forced labour, locally known as Xibalo, in the mining areas, road construction, bridges, railways and other infrastructures (Newitt, 2017). Malyn Newitt (1995) argues that the sociocultural influence of the Muslim immigrants and Portuguese colonizers did not significantly alter gender relations in Mozambique since the culture of male domination was historically already pronounced among the Mozambican population prior to the Arab influence and Portuguese colonization. Thus, Newitt suggests that the Arabs and the Portuguese merely contributed to and perpetuated already established gender-based structures and power relations.

Towards the end of the Portuguese occupation, in 1962, under the influence of Eduardo Chivambo Mondlane, Frelimo, the Front for the Liberation of Mozambique (*Frente de libertação de Moçambique*¹) was founded, years after the armed struggle for national liberation against the Portuguese colonial regime had begun (Marcum, 2018). After the assassination of Mondlane in 1969, Samora Machel, a military commander, was asked to lead Frelimo. Under his command the war that had begun in the north of the country spread to other regions. Mozambicans faced two main challenges simultaneously: first, they had to fight against the colonial regime for national liberation, and second, they had to unify a nation with a vast territory and many diverse ethnic and religious groups (Funada-Classen, 2012).

Malyn Newitt (2017) underlines that one notable feature of Mozambique's social development was the comparative absence of marked ethnic conflict. The ideological strategy adopted by Frelimo was to organize all different ethnic and religious groups around the idea of national unity. Using the notion of 'one people and one nation' Frelimo controlled the various tribal groups for a long time, reducing ethnic conflicts. On June 25, 1975, after ten years of armed struggle, the country gained independence from the Portuguese. Samora Machel became President of the People's Republic of Mozambique, and the Frelimo government adopted a Marxist-Leninist political regime with strong support from the Soviet Union (Briggs, 2011). During this time, called the First Republic, Frelimo established a one-party state without a clear separation of political, legislative and judiciary powers. Simultaneously, the regime began to persecute and assassinate all its internal political opponents. Many fled the country for fear of being killed.

According to Briggs (2011) the party's most notable successes were on the social front, in the first few years of independence, when access to primary and secondary education doubled, facilitated by the slogan: 'making the school the basis for the people to take power'. During this period the Frelimo government 'attempted to combat the appalling literacy rate of less than 5% by initiating adult literacy schemes [...] and sought to undermine the prob-

¹ This is the original translation from Portuguese of the Liberation Front of Mozambique.

lem of ethnicity by spreading the use of Portuguese as a common language' (Briggs, 2011: 15).

The struggle between Frelimo and Renamo

As part of the socio-political profile of Mozambique I shall briefly discuss the civil war between Frelimo and Renamo here although I do not discuss political affiliations further in my thesis as I did not explore their influence as part of my analytical categories. However, I still think that it is important to discuss this here as it helps one to understand contemporary Mozambique.

A few years after independence, the minority Apartheid regime in South Africa and the Southern Rhodesia intelligence services founded Renamo², the Mozambican National Resistance (*Resistência Nacional Moçambicana*), a guerrilla movement. This rebel movement was initially constituted mostly by people from central Mozambique (Funada-Classen, 2012). From 1977 onwards, a new civil war led by Renamo began which lasted for 16 years (Genoud et al, 2018). The war in part exploited historical ethnic tensions between peoples from the central region against those from the south and the north. This civil war was a kind of regionalist front, pitting people from the centre and north against those from the south. The latter constituted the majority of the Frelimo government. Renamo had strong acceptance in central and northern Mozambique (Funada-Classen, 2012; Genoud et al., 2018). This is also the historical root of current social stratifications and discriminations based on political affiliation; women and men from the Mozambican opposition parties, even if they are highly skilled and competent, are less likely to hold public office or to be nominated for senior posts than those who are members of Frelimo. There is strong social, economic and gender segregation on the basis of political affiliation. Frelimo's women are more likely to advance quickly in their careers than women belonging to the opposition. The same holds true for men. Consistent with this statement, Jasmin Lorch and Bettina Bunk (2016) maintain that the selection of women for leadership positions frequently occurs according to criteria of adaptation and loyalty to Frelimo's leadership. At this point gender inequalities intersect with political factors (Karberg, 2015).

The civil war in Mozambique is commonly called 'the war of destabilization' by the Frelimo government, while Renamo's members refer to this war as the 'struggle for democracy', to abolish communism and the dictatorial regime of Frelimo (Genoud et al., 2018). However, and regardless of the terminology one uses, the fact is that for sixteen years the newly liberated country had more than half of its infrastructure sabotaged and destroyed (Funada-Classen, 2012). After sixteen years of civil war and millions of deaths, a Peace Agreement was signed on 4th October 1992 by the govern-

² The Mozambique National Resistance, originally MNR or RNM.

ment of Mozambique represented by Joaquim Chissano³ and Afonso Dhlakama, the former president of Renamo, ending the armed conflict. A democratic multi-party political regime was adopted. Mozambique undertook its first general election in 1994. It was won overwhelmingly by Frelimo. There remain the historical legacies of the colonial war, and the tensions between the south and the centre/north. Newitt argues that 'Mozambique's history had created deep divisions between the north, the central Zambezi Valley, and the south' (2017:176). Since 1992, Mozambique has enjoyed relative internal stability in comparison with many African countries and for long periods has been considered a successful model of national reconciliation (Newitt, 2017). With the support of the international community, Mozambique has been able to hold successive elections.

Peace and multi-party democracy brought new challenges for Mozambique in the economy, health and education, as well as its political-governmental system with the need for a clear separation of powers between the executive, the judiciary and the legislative. More recently the development of public policies sensitive to gender equality, with the adoption of gender mainstreaming in some key sectors such as health and education, have been important tools for the country's development.

Due to the historical reasons cited above, political affiliation or partisan membership have been a source of many social inequalities. According to Jason Sumich (2018) since Mozambique's independence the Frelimo government has contributed to the appearance of 'a new aristocracy composed of the top party leadership, their families and their close business associates' (5). This author maintains that individual closeness to elite politicians paves the way to occupying privileged positions in Mozambique (Sumich, 2018). Being a member of the Frelimo party means, among other things, having a competitive advantage in the workplace for promotion (Mabongo, 2015). Antonio Mabongo (2015) argues that with the introduction of the multi-party regime, there was an attempt to combat ethnic exclusion, but the sense of exclusion based on party affiliation was reinforced. He argues that there is political discrimination promoted by the Frelimo government in the access to goods and resources for economic and social development. Most government initiatives for economic empowerment are oriented mainly to the members of Frelimo, and the people who benefit from these funds also think that the facilities they obtain derive from their party affiliation (Mabongo, 2015). Women and men affiliated to the opposition parties, regardless of whether or not they have a university degree, have less social visibility and fewer opportunities to access functional roles (Paulo et al, 2011). People are allocated to rank positions according to the logic of political trust rather than

³ Former President of Mozambique (1986-2004). He belonged to the *Changana*, also described as *Tsonga*. This is an ethnic group from the Province of Gaza in southern Mozambique.

their technical, professional and scientific skills and competences. In public institutions gender relations and inequalities are masked by political/partisan power (Paulo et al., 2007, 2011). Studies carried out by Margarida Paulo et al. (2007, 2011) in Maputo confirm this overlap between party and state, both in terms of functions and also in terms of infrastructure, and exclusion based on party affiliation. These authors argue that individuals from the opposition parties are systematically excluded from higher positions in their workplaces. This has contributed significantly to a strong partisanization of the state apparatus to the benefit of Frelimo and its government. Mabongo asserts that 'the consequences of such a state are social, economic and political exclusion and control of political and economic power and resources by the elites and the ruling party, because the criterion of party membership is the one that dominates the most' (2015: 37). Regardless of academic degree and productivity, marital status and social class, women and men who belong to the Frelimo party with some position within the party tend to have greater possibilities for success and reaching top positions in their careers than those belonging to the opposition parties or without partisan membership (Mabongo, 2015; Sumich, 2018).

Apart from these party-political struggles, cultural patterns and inheritance have a great impact on the status of women in Mozambique, both in formal and informal settings. For example, the high illiteracy rate of women in the rural areas (González, 2015; World Economic Forum, 2021) is also associated with cultural constructions and beliefs about the roles of women and the social expectations generated around them. Mozambique is one of the countries in the world where gender inequality in the work place is very high.

Recognizing the importance and influence of the ethnic-cultural contexts, in the following section I briefly describe of the cultural contexts of the regions where I conducted my fieldwork.

Social and cultural attributes of the population under study

Ethnicity refers to 'the specific social and cultural attributes such as language, religion, beliefs of origin, social and cultural boundary between two or more self-identifying collectives' (Yadav, 2009:1). Thus, ethnic groups have members who identify with each other through common heritage (Yadav, 2009). Mozambique is a multi-ethnic country. There is still no agreement regarding a generic name for its social groups. The peoples of Mozambique group together according to cultural characteristics that appear more or less common in a given region kinship regimes. According to Linda Stone (2014) the system of kinship regimes reflects different patterns of familial relationships between persons.

In Mozambique as elsewhere in Africa there are particular socio-cultural arrangements and configurations of kinship based on gender (Bonate, 2006;

Arnfred, 2011, 2020). For instance, among the Makhua in their matriclan⁴ it is quite common that individuals from the same tribe, ethnicity or female line, albeit distanced by consanguinity, consider themselves as having kinship ties (clanship) due to their spiritual connection through 'an ... entity [*Nihimo*] which is transmitted by women only' (Arnfred, 2020:330). Therefore, they usually consider those from the same *Nihimo* as relatives.

Mozambique has a traditionally and traditional male culture, both in its patrilineal and matrilineal societies. The south is patrilineal and the north is matrilineal, but both are effectively dominated by men (Karberg, 2015). One of my research sites was located in the north the other in the south. The social, cultural and religious differences between these sites provide distinct personal, institutional and structural challenges for women in their academic careers. The main characteristics of the matrilineal kinship system within the Makhua group in the north of Mozambique are:

The offspring are either maternal or uterine. It is only the mothers who transmit the offspring. Marriage compensation does not exist, although it is known that every man ends up compensating the in-laws in different forms and levels, in any system of kinship, throughout the duration of the marriage; the marriage residence is attached to the woman's group. Thus, the man is obliged to go and build his house in the territory of the woman's relatives. In these societies prevail the avunculate that is the maternal uncle (mother's brother) exercises greater authority over the nephews. This power is much greater and, in addition to other spheres, it covers social, legal, educational and religious aspects. In practice, the maternal uncle is the most respected of the nephews. He is the greatest in charge of education, judge and responsible for the religious aspects concerning the children of his sister, the nephews. As for succession, the power passes from the maternal uncle to the nephew, usually the son of the older sister; Levirate is not frequent in matrilineal peoples. But in case of need, the maternal cousin inherits the wife of the deceased... (Mataruca, 2011:17).

In this matrilineal scenario there is no bride price (*lobolo*). Here goods pass from generation to generation through the male relatives of the mother (Arnfred, 2015). Maria Arthur et al. (2011) argue that matrilineal descent strengthens the position of women in society because after divorce the woman returns to the mother's home and the children continue to belong to the woman's family. However, matrilineal descent does not mean that women have formal power. In fact the power of decision is with the elder brother of the mother (maternal uncle) who holds the right to distribute goods and resources. Matrilineality is thus no guarantor of greater equality for women.

⁴ Bonate (2006:141) reminds us that in the Nampula Province, 'people claim matrilineal clanship, *Nihimo*, *lihimo* or *nloko* descending from a common female ancestor symbolically identified as *errukulo* (a womb) or *nipele* (a breast)'. This contributes greatly to building a sense of belonging, cohesion and a spirit of familiarity among the *Amakwa* people.

In Mozambique most adults are married (INE-Moçambique, 2019). According to family law (Anon., 2019), married people have equal rights with those considered married by civil marriage which is officially recognized. Regarding education, there are strong gender imbalances. For example, in 2019 illiteracy in rural areas was much higher than in urban areas, and more prominent among women than among men (INE-Moçambique, 2019). This highlights the need to invest in the schooling of girls and women. Irrespective of the area of residence, the rate of illiterate women is always higher than that of men in both urban and rural areas (INE, 2018). From the point of view of access to, continuity and completion of successful schooling, women are at a great disadvantage. According to INE-Moçambique (2019) among the population with higher education men constitute the majority (60.9%). Further, women's participation in higher education tends to decrease drastically at Masters and doctoral levels.

I chose two field sites for my research. The first is located in the northern region, which encompasses the provinces of Niassa, Cabo Delgado and Nampula, and it is predominantly Muslim (INE-Moçambique, 2010) thanks to the Arab influences during the pre-colonial period, with the exception of those districts of the Cabo Delgado province located in the interior lands, where the majority of the population are Catholic. Most northern ethnic groups are matrilineal (Ellert, 2013).

The northern region of Mozambique has one of the highest illiteracy rates in the country with strong gender disparities in schooling in favour of males, whereas Maputo province and Maputo city, in the south, show a balance (INE, 2018). In the northern region girls' schooling tends to be less prioritized than boys', due to the domestic roles that girls are given from an early age. There is a high prevalence of early marriages and school dropout (Helgesson, 1999; González, 2015). However, that does not necessarily mean that the provinces in the south are more egalitarian than in the north. Importantly, also, most of the teaching staff at the Faculty of Natural Sciences at the research site in the north of Mozambique are not from the northern region but from Nampula and Zambezia provinces. This means that these trained people have migrated from other regions to Cabo Delgado and therefore have different socio-cultural backgrounds from the local population in the north.

My second research site was located south of the Save River and incorporates the provinces of Inhambane, Gaza and Maputo. It has several ethnolinguistic groups. The most common mother tongue among the population of Maputo City is Portuguese, spoken by 42.9% of the population. The tribes south of the Save River are mainly cattle-rearing, Christian, and also adhere to traditional African religions (Briggs, 2011). They are patrilineal:

The offspring is by paternal or agnatic means. This means that it is only the men who transmit the offspring. Matrimonial compensation is established by

which the groom makes payment of economic goods in relation to the marriage, according to customary rules. The concrete formal details of this practice vary [...] The marriage residence is virilocal, therefore, the spouses establish themselves near the group of kinship of the husband [...] Authority over the children is exercised by the father. In the event of his death, the orphaned children are under the authority of the brothers of the deceased (Mataruca, 2011:18).

Given this patriarchal culture, marital status and motherhood are factors of great sociocultural importance (Costa, 2005; Agy, 2017). They define the social status of women within the family as well as in wider society. Therefore, as Ana Costa (2005) argues, a woman without children, unmarried and 'with an economic situation that allows her to own a home and enjoy a certain independence, is not necessarily considered more socially valued than another woman in a polygamous family with no income of her own' (212). There is a sense that women achieve their social value when they have a man, a husband, with whom they live, independently of the nature of the relationship, whether formally married or not. Even in family contexts where women are the main income generators, men have the power to decide how the financial resources should be managed. Women have to surrender their income to the husband, but the opposite is rarely the case.

Gender equality is viewed by hegemonic males as potentially disruptive to the traditional power of Mozambican men and those cultural dispositif that legitimize such power. It has also been considered foreign to the sociocultural reality of Mozambicans, something imposed by western countries (Casimiro & Andrade, 2009). This is despite the fact that the country has a communist history and a constitution that asserts equality. The supposed imposition of gender equality from outside has been one argument used to oppose gender equality and women's empowerment. As men in Mozambique control most positions of power both nationally and locally (Tvedten, 2011), their cultural resistance to gender awareness in the public sector may explain why the idea of mainstreaming gender has failed and 'made gender into a non-issue for the majority of government institutions' (Tvedten, 2011:7).

To summarize, as Tables 1.1 and 1.2 show, the two regions where my study took place have more differences (see Table 1.1) than similarities (Table 1.2).

Table 1.1. Sociocultural particularities of the research sites: north and south Mozambique with emphasis on Cabo Delgado and Maputo City.

	North	South
Religion	Mostly Muslim	Mostly Christian
Geographical makeup	Less urbanised (Pemba)	More urban (Maputo)
Main ethnic groups	Makua, Makonde, Mwaní	Changana, Ronga
Languages	Emakua, Shimakonde, Kimwani	Xichangana, Xi-Ronga
Political affiliation	Renamo	Frelimo
Literacy	Low literacy levels	Higher literacy levels
Society organization	Mostly matrilineal	Patrilineal
Education infrastructure	Few education institutions/resources	Most education institutions and resources
HEI, researchers and scientific production	Few researchers and HEIs. Lowest record of scientific production/publication.	Higher concentration of HEIs and senior researchers. More research projects and scientific production.

Source: the author

Table 1.2. Common traits of research sites.

	North	South
Culture	Diverse ethnic groups and local languages.	
Social structure	Highly gendered social structures. The traits of patriarchy are present in both field sites, even in the matrilineal societies.	
Religion	Existence of local African religions and ancestor spirits worship.	
Higher education	Private and public higher education institutions.	

Ruling relations in the public sector	Age, gender, race, ethnicity, political affiliation and hierarchical positions dominate relations in the public sector.
Other influences (foreign population)	Strong presence of African immigrants, mostly Malawians, South Africans, Zimbabweans, Tanzanians, as well as Portuguese and Indians.

Source: the author.

Apart from the sociocultural particularities of the north and south, Mozambique has strong regional socioeconomic and political imbalances between the south and other regions (centre and north). The southern region remains the major industrial site of the country and has the greatest economic growth (Beverwijk, 2005). The north and centre are the regions with the greatest natural resources, but they remain less developed. Jasmeen Beverwijk (2005) highlights that there is also an unequal distribution of the Gross Domestic Product (GDP). This author stresses that despite a minority (25%) of Mozambicans being located in the south, they have benefited from 47.6% of total GDP, while the rest of the people (75%), living in the centre and north, and share the remaining 52.4%.

The gender relations and the position of women and men within universities in contemporary Mozambique 'can only be understood as the articulation between the historical and cultural complexity of gender relations' (Tvedten, 2011:5) as I outlined above, the local or contextual characteristics of the higher education. Thus, in the following I elaborate on some of the main historical and contextual characteristics of higher education in the country and some challenges it faces in order to provide an understanding of the context and situated experiences of women in biological research careers in the university where they are located.

Higher education in Mozambique and its colonial heritages

In Sylvia Tamale's (2020) words, 'universities in Africa represent the example par excellence of the continued sustenance of the colonial project' (235). The establishment of higher education in Mozambique is a legacy of the Portuguese colonial regime. Only in 1962 did they create the first higher education institution, the now named Eduardo Mondlane University, in Maputo (MCTE, 2014). Access to that single higher education (HE) institution in the country was exclusively for the children of the Portuguese colonizers. Due to international criticism of this racist regime, Portugal began to allow the entry of some Mozambicans into higher education in the late 1960s, but by 1975 less than 2 percent of the students enrolled (40 students) were of Mozambican origin (Mario et al., 2003; MCTE, 2014).

Following independence, higher education faced many issues. These included brain drain (many university professors and researchers were Portuguese and left the country), deteriorating teaching conditions, a lack of local research capacity, few indigenous Mozambicans qualified to teach at university, a drop in the number of students enrolled in higher education, and a weak capacity to finance the system (Mario et al., 2003). As Jasmeen Beverwijk (2005) states, 'after independence 90% of the Portuguese colonists left the country taking most of the 80% of the skilled labour force' (46). According to Tamale (2020), 'higher education was forced to fight for its very survival' (241). The consequences for the country's economy were severe as well as for the 'newborn' higher education which lacked personnel. This led Mozambique to appeal to its partners in the socialist and Soviet bloc, such as the German Democratic Republic (RDA), Cuba, etc., to train its technicians and human resources at various levels while at the same time prioritizing the training of teachers for secondary education with the creation of the Faculty of Education of Eduardo Mondlane University (UEM). In general, all this meant that people with very limited qualifications such as just a licentiate (equivalent to a Bachelor degree) were invited to teach at university level (MCTESTP, 2016), and this remains the case even in 2022.

The expansion of HE across the country, without enough local, well-trained staff has contributed significantly to numerous problems regarding HE's infrastructure, work conditions, shortage of experienced teaching staff/workforce, etc. (Haller, 2017). Tertiary education has become the first job opportunity for educated young people (recruited from among the best students) shortly after their *licenciatura* (Bachelor's degree). At the same time as they are developing professionally in their academic careers, many of these young recruits (both females and males) get married, have children and start building their own homes. Some start to undertake postgraduate training quite soon. But this has largely to be done abroad and is therefore not an option for many people. It also means that many do not begin postgraduate studies until quite a few years after they have completed their first degree and begun working in academe. Many also start immediately and without postgraduate qualifications to conduct research internationally, funded by NGOs or other organizations. The order in which all this happens depends a lot on individual planning and opportunities. At the same time, it is common among those working in academe to set up diverse forms of private business (consultancies, so-called 'associations', etc.) to make a viable income since academic earnings are very low. This reduces their ability to spend time in their supposedly primary place of work, the university.

In 2022 Mozambique has 56 HE institutions (HEIs) of which 22 are public and 34, private. These include universities, schools, higher institutes and academies (MCTES, 2021). Universities are considered the top higher education institutions followed by higher institutes and schools. Nine universities are public and the other 12 private (MCTES, 2021). Among the public

universities, Eduardo Mondlane University (UEM) is the oldest university in the country and the Pedagogical University (UP), the first public HEI created after the independence of Mozambique. Lurio University (UniLurio) was the third HEI to be set up, followed by the University of Zambezi (Unizambeze). Basically the academic careers are divided into two main careers: teaching and research. The former are expected to be involved in teaching and research while the second one are only engaged in research. Moreover it is important to stress that the academic ranks within these HEIs in descending hierarchical order for teaching careers are: full professor, associate professor, assistant professor, assistant, and finally trainee assistant (UniLurio, 2011; UEM, 2016b). For researcher careers they are: research coordinator, principal investigator, auxiliary investigator, assistant researcher and trainee researcher (Anon., 2006a; UEM, 2014a). There are sub-levels within each rank and progression from one sub-level to the next is automatic based on satisfactory performance. Marta Mendonça (2014) remind us that 'higher education has very high prestige in Mozambique but its access and quality are issues of concern'(5). The quality of teaching and research among HEIs has been criticized due to the poor teachers' academic qualifications, lack of infrastructural conditions such as well-equipped classrooms, libraries and laboratories supplies and equipment, etc., to support teaching and research (UEM, 2019d). Mozambican HEIs are teaching based 'with a curriculum organized around learning that [supposedly] could be immediately and productively applied' (Samoff & Carrol, 2003:4) and very little research, especially in science and technology, because of that lack of infrastructure and well-trained staff, and because of the need to educate the population at large to at least a basic level.

To conduct research one needs to acquire research grants (Cloete et al., 2017b, 2018; MCTESTP, 2017). This acts as a constraint in low-income countries such as Mozambique. Nico Cloete et al. (2018) argue that many African universities which lack sufficient funds for staff to engage in research are extremely dependent on external donors. As mentioned above, to augment their low academic salaries, most academics, especially women, take on extra teaching and external consultancies (Wangenge-Ouma, et al., 2015). Mozambican universities remain largely teaching-oriented as the overall educational levels of the population are low. Hence academic staff mostly teach. Yousaf and Schmiede (2017) argue that high teaching loads reduce available time for research. In developing countries universities are often mainly or exclusively teaching-oriented. Jacques Gaillard notes that 'research is a subordinate function to teaching, the main or even exclusive function of some of the [African] universities' (2010:105). This is also the case among Mozambican HEIs and elsewhere in Africa (Cloete et al., 2017). Teaching is the primary source of income in these universities.

In sub-Saharan African countries women faculty and researchers in public higher education institutions are, generally speaking, underpaid.

In 2021 an assistant lecturer in Mozambique earned less than 800 USD per month, a full professor not more than 2500 USD/month (see: <http://www.salaryexplorer.com/salarysurvey.php?loc=147&loctype=1&job=50&jobtype=1>). But full professors are few. Due to the low pay, staff tend to take on extra teaching to increase their monthly earnings (Wangenge-Ouma et al., 2015) rather than research. The general lack of research funding also means that there are 'no direct incentives for knowledge production and research dissemination through publications' (Wangenge-Ouma et al., 2015:134). Well-trained teachers also often seek to occupy management posts within HEIs which are better paid and give access to more benefits, or they leave academe, positioning themselves in better remunerated positions as senior consultants in NGOs or international organizations.

Teaching-oriented institutions without differentiated careers (into teaching and research) or appropriate recognition of research in teachers' workloads, lead to an overload in teaching of undergraduate students (Jung, 2015; Oforiwa & Broni, 2018), often among women. However, research and publications are nonetheless one of the main conditions for gaining senior positions (Altbach, 2013; Gasser & Shaffer, 2014; Cloete et al., 2017). Hence women can be precluded from advancing in their careers because they lack the publications and research necessary to qualify for promotion. The upshot of all this is that in general research remains a low institutional priority relative to teaching.

Gender inequalities within Mozambican universities are a very complex issue, influenced by different factors (MINEDH, 2016; Uamusse et al., 2020). Overall women have fewer educational chances than men. The societal construction of gender roles and women's social identities have contributed to the gender gap within university courses as well as their limited professional career prospects (Uamusse et al., 2020). Gender disparities that exist in higher education and specifically within science disciplines in Mozambique are a reflection of what occurs at previous education levels, e.g. in the secondary schools where despite the increasing number of women enrolled (49%), women's participation in science disciplines continues to remain lower than that of men (MINEDH, 2016, 2020).

Some scholars have argued that the pervasive gender inequalities that still exist within tertiary education in sub-Saharan Africa are partly the inheritance of colonial imperialism (Tamale, 2020). A study on gender in HE carried out in Mozambique in 2013 indicates that by 2012 only 0.5 percent of the Mozambican population accessed higher education. Of the students enrolled in that year, 61 percent were men and 39 percent women (MINED, 2014). This rate drops sharply when one considers women as staff, especially in science disciplines (UNESCO, 2017).

Paulo Seixas (2017) has pointed out that in Eduardo Mondlane University (UEM), the largest higher education institution in the country, gender disparities also occur with scholarships. Seixas (2017) shows that in 2015, UEM

had 1.912 students receiving scholarships, with 1.372 (72 percent) going to men. This was explained by the fact that men are the majority who apply and are admitted to UEM (Seixas, 2017).

Overall, between 2017 and 2018 the number of people involved in research increased slightly from 5,530 in 2017 to 5,701 in 2018, representing an increase of 3.1% (MCTESTP, 2020). According to this governmental report, men still constitute the majority in all categories of administrative and academic/research staff. Women were more represented in the lowest categories (48% in the category of technicians and assistants; 45.1% in the category of administrative staff and the rest were researchers). Overall, in 2017-2018 women's participation in higher education in Mozambique remained stationary while their participation in Science, Technology, Engineering and Mathematics (STEM) fell sharply from 22 percent in 2017 to 18 percent in 2018 (SADC, 2017, 2018).

The report offers no clear reasons for this situation. In most SADC countries, girls and boys enter primary education in roughly equal numbers. However, at progressively higher levels of education, the rate of girls' enrolment and retention dramatically decreases. In addition, the segregation of teaching staff into stereotypical subject areas reinforces the gender divisions of labour within schools. At the tertiary education level, significant inequalities still exist; women dominate in the Arts and Humanities while men dominate in STEM subjects (SADC, 2011, 2015, 2018). According to the SADC gender protocol barometer (SADC, 2018) inequalities range from the small number of women in fields traditionally considered male, such as engineering, to the faculty and leadership of higher education institutions where men are the majority.

Regardless of gender, the overall participation of students in STEM is extremely low in Mozambique; since 80% of students are enrolled in social sciences and humanities courses, a trend that has been increasing considerably. Between 2017 and 2018 the number of women who entered natural science courses for the first time dropped dramatically from 47% to 29% (INE-Mozambique, 2020). This is partly a function of infrastructure and resource issues: social sciences and humanities subjects traditionally rely on 'chalk and talk' whilst this is not the case in the natural sciences. This shows that overall women remained poorly represented among researchers and are instead still extensively involved in bureaucratic tasks (administrative). Further, the distribution of researchers across the national territory is highly asymmetrical; the majority of them (58%) are located in Maputo. The capital has more than half of the existing researchers in the country, and the remaining 42% are distributed in the other provinces. The northern region has the lowest number of researchers, both female and male. More than half of all female researchers with a PhD reside in Maputo. This means that the rest of this huge country is underserved in terms of well qualified female researchers, and this, as will become evident in the Methodology chapter, was indeed

the case for my sample from the north of Mozambique (MCTESTP, 2018). This is partly due to the existence of a relatively better life and research conditions in the city of Maputo. This asymmetrical distribution of researchers across the country is also deeply rooted in the historical context of higher education in Mozambique. A decade after the national independence, the only university existing in the country was located in Maputo. Consequently, people from different regions who wanted to obtain a higher academic degree in the country had to travel to Maputo and most of these, after concluding their studies, did not return to their region of origin where, among other things, their possibility of finding employment appropriate to their educational attainment was difficult.

In 2018, 35% of the research staff in higher education were women and 65% men. Within STEM women researchers were fewer than 16% while males were just over 83% males (MCTESTP, 2020). Most researchers (43%) only have a Bachelor's and possibly a Master's degree (39%); very few (13%) have a PhD. According to MCTESTP (2020:34) by 2018 the vast majority of research staff were in Agricultural Sciences (31%) and Social Sciences, Letters and Humanities (26%), Health Sciences and Biomedical Sciences (11%), Engineering Sciences and Technology (11%), Natural Sciences (10%) and Sciences of Education (7%). Direct governmental expenditures on research in science decreased sharply from 2015 (12%) to 2018 (7%) especially among HEIs that have been the main benefited. This profile of higher education in Mozambique highlights the challenges the country has to increase its research capacity by investing in STEM research (channeling different kinds of resources) and the training of researchers to doctoral degree to increase the overall level of academic competence. But it is important to stress that one cannot change this poor status of women in science and research careers if one does not understand the locally how they occur. However, as I already mentioned there is a lack of empirical research dealing with this matter in the country. I shall now examine how women's trajectories in academic careers have been shaped by the different political stages that contemporary Mozambique has undergone since the early days of independence.

Women's academic careers in post-independence Mozambique

This section explains the generational view of researchers that has shaped Mozambican academe. Although women's career paths are not homogeneous, they are all influenced by the specific historical and political processes of Mozambique. These political and educational changes are very complex, and I shall concentrate on those that are of particular importance for higher education and women's careers. There are three main generations of post-colonial Mozambicans whose presence has marked academia.

The beginning of a national education system and the challenges for women

In contemporary Mozambique three generations with specific names reflecting Mozambique's political history co-exist: the September 25⁵ generation called *geração 25 de Setembro*, the generation of March 8⁶ (*geração oito de Março*) and the 'New Generation' (*a nova geração*), usually called the generation of the changes or 'turning generation' (*geração da viragem*). The September 25 generation represents those people, considered heroes, who were involved in the anti-colonial struggle for national liberation. Nando Menete (2020) stresses that this generation is mostly made up of people with low levels of schooling, without much professional experience but who were actively involved in the colonial war, came to power through independence, and exercised it and controlled Mozambique from then until the present. These people were born around 1920 and are mostly no longer alive now.

The March 8 generation represents the post-independence generation. They are called this because, soon after independence, the first president recruited young and educated people to fill places in government (Menete, 2020). Others were sent abroad to train as teachers so that they could serve the country as I explain below. These people, born during the 1950s and '60s, are between 60 and 75 years old in 2022. Some of them are in the process of retiring.

The 'New Generation' or 'post-March 8' are mostly younger; they were born in the 1970s and are in their late 40s in 2022. I include myself here. This generation are trying to move the country forward, consolidating its democracy, multiparty system and development. They are the new professional class: politicians, engineers, doctors, university teachers and researchers.

The September 25 generation is formally absent from the corridors of academe but due to their political power and influence they have (had) the power to nominate or appoint individuals both from the March 8 generation, and the new generation, to occupy positions of power and leadership within public and private HEIs. In 2022 the top ranks of Mozambican academe were dominated by the March 8 generation who coexist at the immediately lower levels with the 'new generation'. It should be noted that the entry of this 'new generation' of young women and men into the faculty and as researchers in higher education institutions has changed the profile of faculties somewhat since it consists of women and men in their early and mid-career stages. Most of them, however, also do not have PhDs.

⁵ In honour of the women and men who were involved in the armed struggle for national liberation begun on September 25, 1964.

⁶ The day when the Frelimo government, led by President Samora Machel, on 8 March 1977 met with young students in Maputo to inform them that there were no options for individual careers for them.

During the colonial regime, education was structured to train individuals to fulfill different social functions: a classical education for the Portuguese colonial elite (organized to meet aristocratic values and standards), and a different one for Mozambican natives. This different education aimed to form docile and loyal subjects to service colonial interests. According to Eduardo Humbane (2017) this indigenous education 'was nothing more than technical instrumentalization' (12) since indigenous Mozambicans were only allowed to learn to read and write in order to be 'civilized'. This was extremely discriminatory, establishing the lower levels of primary education as the maximum schooling allowed. It was based on the colonial ideology that Mozambicans were socially and culturally backward, that is 'uncivilized' people, contemptuously called *indigenas*. They were meant to be civilized through a religious (Christian ideals) and minimal education that would still guarantee the colonial regime a servile and slave workforce (Isaacman & Isaacman, 1983; Mazula, 1995; Amâncio & Pastore, 2019). As Conceição Osório and Teresa Silva (2008) state: '[the] Portuguese colonization in Mozambique [had] in education one of the best illustrations of the way social exclusion was processed' (76). Thus gender issues and equity in accessing education were never part of Portuguese educational concerns (Arnfred, 2004). Instead, Christian religious teaching took place within 'Catholic missions'. Here Catholic missionaries mixed religious teaching and the rudiments of school education. Jasmeen Beverwijk (2005) more generally claims that 'during the colonial day Africans had hardly any access [...] to the formal education system' (26). Contrary to the British who offered an elaborated colonial HE to native Africans, Portugal provided only a limited HE in Mozambique from the later 1960s, reserved primarily for the children of colonialists. Beverwijk (2005) tells us that natural science courses were rarely offered throughout sub-Saharan Africa. This means that Mozambican HE does not have a tradition in science disciplines. Second, as a consequence, the few women and men with a doctorate in science have earned their degrees abroad. Hence the socio-educational and academic profile of Mozambican public HE staff has its roots both in the colonial regime as well as in a range of other factors that operated in the different historical moments which the country has gone through since post-independence. The academic careers of Mozambican women and their challenges are better understood when situated within an analytical model that integrates two main historical moments of the country, the first one that I call the 'First Republic' that goes from post-independence in 1975 to 1990, and the second that I have called 'Second Republic', which covers all political, social and economic events that took place from 1990 with the approval of the new constitution to date. I shall now discuss women's situation within each of these historical periods.

Women in the First Republic (1975-1990)

As already mentioned, the Mozambican national education system is very recent, dating from 1975, with the announcement by the government of the nationalization of education (Ibraimo, 2014). According to AfriMAP and OSISA (2012) the successes and challenges of the educational system in Mozambique, its structures and policies, 'lie in the colony's educational experience and Frelimo's political choices from the liberation struggle in the 1960s and 1970s, through the post-independence revolutionary and socialist period in the mid-1970s and 1980s, to the present phase of economic liberalism and political pluralism' (4). These different historical periods affected women's educational aspirations and expectations in particular ways.

Since 1975, and despite the challenges posed by the civil war which started in 1977 (for more details see the Mozambican context section above), changes in the education sector continued to take place in line with the directives of the state-party (Barnes, 1982). Thus, in 1983 the Ministry of Education and Culture issued The General Guidelines of the National Education System, approved as Law No. 4/83 (Mazula, 1995; Amâncio & Pastore, 2019). This law established the postcolonial national education system that prevailed between 1983-1992 and guaranteed education at all levels, with the state as the sole provider, guided by the vision of the *Homem novo*, the 'new man', free from the colonial capitalist mentality. The purpose of this education was to reinforce the position of the working class. This law presented the political-ideological foundations, principles, purposes, general and pedagogical objectives of education in Mozambique (Mazula, 1995) where,

a) the education [was] directed, planned and controlled by the State, which guarantees its universality and laity of achieving the fundamental objectives enshrined in the constitution; b) education is the main tool of the creation of the *homem novo* [New Man], a man freed from all the ideological and political burden of the colonial regime and the negative values of a traditional society capable of assimilating and using science and technique at the service of the revolution; c) education is a fundamental right and a duty of every citizen, which translates into equal opportunities for access to all levels of education and the permanent and systematic education of all people (Anon., 1983:14).

This educational law was organised to ensure the implementation of Frelimo's political vision regarding education. It, together with the first Republic Constitution of Mozambique (Anon., 1990), made the universal access to education a national imperative for the development of the country. At independence the illiteracy rate was over 90 percent among women (Kruks, 1983). Consequently the State assumed the role of providing the necessary conditions so that a greater number of Mozambicans could access education. This led to a reduction of the illiteracy rate to 70 percent in 1980.

The percentage of young women attending school increased considerably (AfriMAP & OSISA, 2012; Intanquê & Subuhana, 2018). Despite this remarkable progress and the fact that the constitution advocates that 'women and men have equal rights and duties, this equality extending to the political, economic, social and cultural spheres' (Isaacman & Isaacman, 1983:115), women continued to constitute the majority (84%) of the illiterate population in the country (AfriMAP & OSISA, 2012; Noa, 2019).

Interestingly, the Frelimo government did try to pay particular attention to the education of women and simultaneously emphasized their political commitment to women's social and political liberation (Kruks, 1983; Isaacman & Stephen, 1984). Through the Organization of Mozambican Women⁷ (O.M.M.) Frelimo conducted several campaigns encouraging women to leave their traditionally privatized domestic role and participate in their communities' public life (Kruks & Wisner, 1984). Paradoxically, as noted by Kruks and Wisner (1984), this occurred in the form of an intense 'socialization of domestic labour [though] crèches, public laundries and eating places, etc., [that] ha[ve] been part of the classic Marxist solution to the [women's question]' (120). Isabel Casimiro (2001) maintains that the political rhetoric regarding women's emancipation did not contribute to significant changes in the sexual division of labour or in the gender hierarchy in domestic life within communities at large, or in the public sphere where women continued to occupy less privileged positions. Although the 'scientific and cultural level of women [needed to] be raised...' (Kruks & Wisner, 1984:115), few women were able to increase their scientific or academic training since there was no planned policy support for women as 'when a decision [was] made on an aspect of social policy or an economic project [was] planned, its impact on women [was] not usually considered' (Kruks & Wisner, 1984:121). This contributed significantly to reproducing the social disadvantages of women in the public sphere, including in education.

The political rhetoric regarding women's emancipation was part of a macro-politics of the state to enable the project of the socialist revolution to create *homem novo*, a socialist entity (supposedly referring to both women and men), as opposed to traditional society and the colonial system (Anon., 1983; Casimiro, 2001; Müller, 2010; Noa, 2011; AfriMAP & OSISA, 2012; Intanquê & Subuhana, 2018). Alen Isaacman and Barbara Isaacman (1983) assert that with the project of *homem novo*, the aim of the Frelimo government was 'to create an independent black nation run by an educated black elite that would replace the white colonialist regime' (97). Despite this, women's careers continued to be an 'unstable personal enterprise' due to

⁷ This is part of Frelimo's overall structure, intended to reach women whose participation had hitherto been neglected. The main task of this organization since 1975 has been to mobilize women for the implementation of the economic and social policies outlined by Frelimo (see Casimiro, 2001:7).

these ideals' tensions with the cultural values of the country (Isaacman & Isaacman, 1983; Kruks, 1983; Kruks & Wisner, 1984). For instance, at the time of socialist rule, career choices were subordinated to state need, and were part of the revolutionary national project (Domingos, 2017). The state effectively defined the 'social destiny' of its educated population, as also happened with the March 8 generation (Chissale, 2012: 10).

Nando Menete (2020) describes how on March 8, 1977, in Maputo the President of the People's Republic of Mozambique, Samora Machel, met with the students who were to continue their studies to the 10th and 11th grade, and informed them that instead, immediately after completing the 9th grade, and without any pedagogical training, the best pupils, girls and boys, were to start teaching those with less education than they had, due to the lack of teachers at that time. In other words, education was dictated by the needs of the state, and individual aspiration was irrelevant (Menete, 2020). Most of this generation were sent to key sectors such as education, healthcare, industry/technical services, agriculture and national defense where for several decades they ensured the functioning of those institutions. This means that individuals could not choose to study specific subjects such as biological sciences. Instead they were told what subject to take.

The state's decision to dispose of individuals in terms of state-defined need was part of a set of internal solutions (Noa, 2019) to overcome the lack of teachers and qualified labour in the country. Some of the generation of March 8 were sent to train as teachers at the Faculty of Education at UEM, and others were trained abroad in Mozambique-friendly socialist countries (Isaacman & Isaacman, 1983; Müller, 2010). Horacio Zimba and Suzana Mueller (2010) stress that

these training opportunities abroad were not programmed but they arose and the young people were sent to those countries without knowing for sure what they would attend...when returned they sometimes struggled for integration into the state institutions due to incompatibilities of their training with national needs and conditions (17).

Following this massive 'migratory movement' many women were placed in the education sector as teachers mainly at the secondary education level, a fact that seems to have also influenced their concentration at the lower levels of the national education system, without advanced qualifications. This situation changed in the 1990s as I show next.

The 1990s onward: new opportunities for women's training and career paths

The Second Republic began with the new constitution of 1990, which saw the liberalization of Mozambique's education, economy and political orientation (Tvedten, 2011). Increasingly, individuals could pursue an education and career in line with their aspirations. In 1990 international agreements

between the Mozambican government and the Breton Woods Institutions led the country to move from a centralized socialist economy (Lavigne, 1999) to a market economy.

At this time the Mozambican government approved Law 6/92 revoking the former Law 4/83. This new law introduced educational reforms that were in place from 1992 onwards. According to Law 6/92 only primary education was mandatory and free. The providers were the state and civil society guided by a vision of training morally educated, civic, patriotic women and men. The 1990 Constitution of Mozambique also states that 'the State promotes, supports and values the development of women and encourages their growing role in society, in all spheres of the political, economic, social and cultural activity of the country' (Anon., 1990: art.122). Thus the 'access to public institutions of higher education should ensure equality and equity of opportunities and democratization of education, taking into account the needs of qualified staff and raising the educational and scientific level in the country' (Anon., 1990: art.114).

All this paved the way for a series of further educational reforms and, over the last three decades, for the establishment of private HEIs as well as the expansion of public HE across the country (Langa & Zavale, 2015; Gonçalves, 2018). This has contributed to decentralizing one of the government's functions, the provision of HE, and has created additional capacity for access (Beverwijk, 2005; Chissale, 2012; UNESCO, 2019). As a result, the New Generation has had easier access to academic training than the March 8 generation (Anon., 1990). However, Benedito Sapane (2014) notes that the proliferation of private education 'became a highway found by Mozambican elites to ensure a separate education for children and relatives' (9), thus increasing social class differences within the country.

Nonetheless, these changes in political ideals related to the economy and the educational system enabled the government, with support from their key international cooperation partners, to implement a series of educational projects and programs with a strong emphasis on girls' access to primary education (UNESCO, 2019). The national education policies in 1995 emphasized the need to promote greater female participation through curricular and material incentives, training of scientists and properly qualified specialists that would allow the development of scientific production and research (Anon., 1995).

However, it is important to note that the governmental concern about gender and equity in education was more evident at the lower levels of education than at secondary and tertiary levels where gender disparities are most pronounced. Although women accounted for 42% of staff in higher education in 2015, there is still a low capacity for absorbing graduates in the country (UNESCO, 2019). Despite the fact that 88 per cent of girls in Mozambique are enrolled in primary education, more than half drop out by fifth grade; not more than 12 per cent continue to study at the secondary level,

and only 1 per cent remain in tertiary education (Crouch, 2011; EPDC, 2018). This means that there is a very small proportion of women within 'the skilled and highly skilled labour force' (Tvedten, 2011:14). Nonetheless, it is worth noting that the results regarding primary education are very encouraging since they show how effective political will, together with a gender-sensitive legal framework, can generate transformative effects within the education system in increasing the number of girls.

According to UNESCO (2019), Mozambique's national education system 'is characterized by a broad base representing the primary level and an acute apex representing higher education' (39). Although the Mozambican government continues to legalize new private HEIs in order to increase access to HE, most of these private HEIs do not provide STEM courses which require expensive facilities, and hence the private HEIs do not contribute to a qualified labour force in this field. As Beverwijk (2005) states: 'with some exceptions [these] private institutions generally provide a limited range of programs and courses compared to public ones, generally rarely provide expensive courses such as natural sciences and engineering since these require expensive equipment that is often not available' (39). This increases the pressure on the few available science courses in a small number of public institutions. Public HEIs remain the main source of graduates in the science field yet with a lack of postgraduate programs in science disciplines (Master's and doctorate). This fact, in developing countries like Mozambique, slows down the effective advance of science but also influences the academic profile of women and men working in biological research careers.

Gender issues in higher education

Mozambican reports on the indicators of scientific research and experimental development have consistently shown that women are still underrepresented in science careers and those who are already there remain less qualified (MCTESTP, 2017, 2020). However, studies of women researchers in science are very recent and sparse despite support from international cooperation agencies. Gender issues have started to be part of the formal concerns higher education institutions only relatively recently. Only in 2013 did Mozambique carry out its first national study (António & Hunguana, 2014) on gender in higher education, focusing, for example, on inequalities and gender imbalances in access to higher education as well as gender imbalances in STEM. This can be considered the first large-scale exploratory study on gender in Mozambican higher education. However, the challenge remains to understand how the different higher education institutions have appropriated the results of this study in order to introduce changes within themselves.

Governmental national reports (MCTESTP, 2017, 2018) and studies (António & Hunguana, 2014; Uamusse et al., 2020) on women's underrepresentation so far tend to be quantitative. They do not provide details of the everyday experiences of discrimination that women, neither among the

student population nor faculty and administrative staff, might face. Such information can only be gleaned effectively from qualitative research.

The study conducted by Elisa António and Carolina Hunguana (2014) suggests that there is a lack of gender-related content in the teaching programmes at universities; low rates of women's enrolment in engineering and natural sciences courses; a low presence of women in leadership and management positions in higher education institutions; weak representation of women in faculty boards; low numbers of women with doctoral degrees, etc. In spite of this, their findings do not elucidate how social, cultural and economic variables affect individuals' willingness to pursue or persist in research careers. In addition to that, it is not clear, for example, how women's experiences reflect or are related to the structures and/or regimes of inequality in force in the wider society and in the research institutions to which they belong. In the last section, I showed that the country still needs a more comprehensive approach and scientific support on how to deal with gender imbalances in higher education careers, especially in STEM. The factors impacting on women's research careers remain unknown, ignored or at least hidden. Below I will discuss, in light of the existing literature, how gender imbalances in science (with the main focus on women in biological sciences) are being produced.

Literature Review

In this section I discuss the existing literature regarding women's participation in academic careers in sciences. I start by exploring the issue from the local context of Mozambique, then regionally in terms of literatures on sub-Saharan African countries, and finally in terms of research from other countries. There is a large body of literature that discusses women in sciences where there is a tendency for scholars to use the general term STEM. However, historically STEM disciplines vary in their gender segregation (Sonert, et al., 2007; Leslie et al., 2015), some demonstrating relatively higher and others low female participation rates. Scholars frequently discuss the participation of women in biological sciences as part of their concerns regarding the under-representation of women in STEM (Aguale & Agwagah, 2007; Zeleza, 2014; Buffington, 2016; Osagie & Alutu, 2016; Cavanaugh, 2017; Charlesworth & Banaji, 2019; Mukhwana et al., 2020). This includes biological sciences, but the data are not always differentiated in terms of the individual disciplines. Others use the term 'science' or 'the sciences' when discussing women's careers in science (Blickenstaff, 2005; Anagbogu & Ezeliora, 2008; Ceci et al., 2009; Ceci & Williams, 2011; Caprile et al., 2012; Frehill et al., 2015; Carli et al., 2016). These 'sciences', if they are the 'natural sciences', that is deal with the physical world, include biology, geology, physics and chemistry. Much of this literature does not specifically deal

with women in the biological sciences. For the purpose of my literature review I will utilize the phrase 'biological sciences' to refer to material that expressly mentions the biological sciences. Otherwise I use the term 'sciences' or I specify which disciplines are actually being discussed in the literature.

There are numerous studies discussing the situation of women in STEM and/or sciences. Regarding Mozambique, however, there is a lack of local empirical studies devoted to this topic (Anon., 2006b; Antonio & Hunguana, 2014). The few available studies (Givá & Santos, 2020; Uamusse et al., 2020) have endeavored to explore this issue through a review of the gender disparities in science and/or STEM, based on government reports (MCTESTP, 2017, 2018).

Elisa António and Carolina Hunguana (2014) found that family and sociocultural environment including the school affect students' choices in pursuing STEM. They argue that this is because of building gender identities and different expectations for girls and boys, where the former are systematically encouraged to pursue social sciences, medicine or biology, believed to be appropriate for them as women and 'caregivers'. For boys science and engineering are seen as appropriate, and as such closely related with manhood. Such views or beliefs are also common elsewhere in the world, including among university students, and certainly shape their interest and preferences and/or attitudes for studying science. A study by Anna Danielsson (2009) in Sweden found that even within the university, STEM disciplines such as physics were symbolically and stereotypically associated with men and masculinity.

A study by Amalia Uamusse, Eugenia Cossa and Tatiana Kouleshova (2020) in Maputo supports this position. They found that women are less interested than men in pursuing science careers due to their gendered socialization. Carole Leathwood and Barbara Read (2009) argue that the reasons for these gendered patterns in science are multiple and relate to historical and social constructions of masculinity and femininity as well as constructions of subjects and embodied knowledge. And in many African countries the research workforce, such as it is, has historically been dominated by males (NEPAD, 2014).

Uamusse and colleagues (2020:1) suggest that the socially constructed options for women are more related to cultural, socio-political and historical factors than to individual and organizational factors. These authors claim that the barriers to women's careers in the natural sciences in Mozambican higher education are associated with cultural issues in relation to the traditional role of women in society. They do not explore how these macrosocial and cultural factors are entangled at the meso level with institutional cultures and practices. Thus, it seems important to explore the relationship between macro level and meso level.

These studies indicate that there has been an increase in the number of academic staff involved in scientific research in Mozambique, yet they show a continued masculinization of research at the highest levels within all public research institutions including HEIs (MCTESTP, 2017). With respect to research outputs the data show that only a small number (8.5%) of researchers and university teachers engage in science/STEM research. Women constitute a minority within this (MCTESTP, 2016, 2018) and are less qualified compared to men in terms of postgraduate degree acquisition (MCTESTP, 2018). Most of the academic staff are male and have only a Bachelor's degree, some have Master's degrees, but the number of PhDs in Mozambican higher education is critically low. For example at UEM by 2020 within those with PhD degrees, 25% were women and 75% of men while 28% of academic staff with Master's degrees were women and 72% men, equally with a Bachelor's degree 28% were women and 72 % men. (UEM, 2021b). As can be noted women are underrepresented at all academic degrees, they remain less qualified. Further analysis of these data within departments of biological sciences was made difficult due to the fact that the report models adopted do not provide disaggregated data by gender, academic degrees and career category. The report only stated that there were 3 associate professors and 7 assistant professors in biological sciences, but information about the rest of the categories was absent (UEM, 2018). This made it difficult to explore the departmental gender structures. Nevertheless, the general report from the Faculty of Science, including all its departments, shows that in the professorial positions that include lecturers with a PhD, there were very few women, not quite 15% compared to 85% men (UEM, 2019c). Among the assistants and trainee assistants, women constituted nearly 30% while men were 70%. Women, therefore, clearly occupied lower academic positions. Nevertheless, the governmental reports do not endeavour to understand these gender imbalances or explain possible reasons behind of this.

Nicia Givá and Luísa Santos remind us that although Mozambique is a 'signatory to various international and regional conventions that promote the principles and practices of gender equity and equality' (2020:16), the gender-based science, technology and innovation (STI) ecosystem is still weak and consequently the participation of women in research and innovation remains extremely limited. In 2015 at the national level, regardless of disciplinary field, there were 704 female researchers involved in research and experimental development compared to 1730 men. For women this number increased slightly to 842 in 2016 while in the same period the number of men increased to 2326 (MCTESTP, 2018:23). Men's participation in research thus grew much faster than women's.

Even though there is a growing recognition of the importance of women in the development of science in Mozambique and elsewhere in the world, the country faces a pervasive lack of academic research on the participation of women in academic research careers in science disciplines. This prevents

the local scientific community from deepening their understanding of the factors that undermine women's academic research careers, and academic policy makers from designing effective interventions. The scarcity of empirical studies on this topic shows that it has received little attention among the local academic community. Interestingly, most of the available knowledge is provided by scholars from outside Mozambique. Among these scholars, sub-Saharan countries have featured in numerous, mostly quite or very recent studies on women in STEM (Anagbogu & Ezeliora, 2008; Osagie & Alutu, 2016; Maryann & Patience, 2017; Okeke et al., 2017; Boateng, 2018; Prozesky & Mouton, 2019; Mukhwana et al., 2020). Overall these studies show that women are more challenged than men by a complex set of interrelated factors mainly motivated by the contextual (sociocultural) specificities of the countries, their universities' features and individual factors. These studies have pointed to career-related challenges such as balancing work and family demands (Prozesky & Mouton, 2019). At the societal level the prevailing sociocultural values, beliefs and attitudes rooted in patriarchy work as a hindrance to women's career prospects. There is also a lack of family support for young women to pursue a career in science (Osagie & Alutu, 2016; Boateng, 2018; Mukhwana et al., 2020). In highly patriarchal societies women are forced to abandon their careers in science and establish themselves in other careers that require less time and energy (Anagbogu & Ezeliora, 2008) to conform to traditional societal gender ideals. This in turn, along with persistent gender stereotypes and biased views of science, contributes to a scarcity of female role models in science and technology (Maryann & Patience, 2017; Okeke et al., 2017).

At the workplace the results point to a lack of material and resources, high teaching workloads, unsupportive work environments for women, recruitment and promotion practices favouring men as well as very limited scholarship opportunities for women (Mukhwana et al., 2020). At the individual level the results suggest a perceived lack of commitment among women, difficulty in achieving a work-life balance, a lack of self-confidence, and a self-imposed fear of STEM (Mukhwana et al., 2020). Women in biology remain a minor discussion point, briefly referred to because the main interest is in other STEM disciplines. This is possibly because in those disciplines (e.g., engineering, mathematics) the gender discrepancies are even at undergraduate level much starker than they are in the biological sciences. It means that differences and similarities among the STEM subjects can be masked, and that the diversity of obstacles and challenges women may face in their research careers in biology are left unaddressed. This is precisely the knowledge gap that my thesis seeks to fill.

Most of the literature on women in STEM and/or science relates to Europe and the United States of America (Ceci & Williams, 2011; Caprile et al., 2012; Deemer et al., 2013; Dasgupta & Stout, 2014; Sheltzer & Smith, 2014; Fletcher, 2015; Frehill et al., 2015; Buffington, 2016; Carli et al.,

2016; Cavanaugh, 2017; Charlesworth & Banaji, 2019; Sarseke, 2018). These studies suggest that the underrepresentation of women in science results from sociocultural and institutional factors. For example, women's science career choices are undermined by negative gender stereotypes regarding women's self-efficacy in science (Deemer, 2013; Sarseke, 2018), and this comes both from family characteristics and parents' expectations of daughters, peer reactions and learning environments at school. A lack of female role models in STEM disciplines suggests to women to avoid this disciplinary field (Dasgupta & Stout, 2014). There are also harmful practices at the workplace such as the biased evaluation of women's scientific work, gendered preferences in hiring and employment practices, biased practices in promotion (Sheltzer & Smith, 2014; Cavanaugh, 2017), lack of mentoring, and high workloads in teaching and administrative duties (Cavanaugh, 2017). None of these studies have pointed to the material resources available for doing research. But in low-income countries such as Mozambique, this is an issue. Few authors have explored the experiences of women in biological sciences as such in depth (DesRoches et al., 2010; Adamo, 2013; Sheltzer & Smith, 2014). These studies show that women in biological science still suffer from biased hiring and promotion practices.

My goal is to lessen the research gap in higher education in Mozambique about women in STEM research careers by providing an empirical account of the reported experiences of women in biological research. It is the case that among STEM disciplines, biological sciences has traditionally been considered a field in which women are reasonably well established up until junior lecturer level (Sible et al., 2006), and as such biology is stereotyped as more 'feminized' than other natural sciences (Etzkowitz & Kemelgor, 2001; Sonnert et al., 2007; Günter et al., 2021). However, women struggle to maintain themselves in the related academic careers and reach the highest levels in biological sciences (Sheltzer & Smith, 2014). For example, in Mozambique there is a dearth of women among faculty in biological sciences occupying professorial positions (UEM, 2019c; MCTESTP, 2016; SADC, 2018; UniLurio, 2018). It is important to understand how the sets of obstacles and challenges women face in their biological research careers are interconnected with gender issues. Anna Danielsson (2009) reminds us that doing careers in science is also a matter of doing gender. From this viewpoint studying women in biological research careers involves situated experiences and different standpoints enacted and performed differently and also limited by local and contextual factors (Beoku-Betts, 2004).

So far, I have discussed the literature discussing the participation of women in STEM, gender segregation in science disciplines and the complexity of factors that explain these. In the next section I discuss how gender imbalances in science and research careers are socially constructed.

The social construction of gender imbalances in sciences

Sarah-Jane Leslie et al. (2015) show how stereotyped beliefs and social constructions of women's images in science undermine the participation of women in science disciplines. Indeed, this is one of the mechanisms acting at the macrosocial level that contributes to the internalization of the belief that science is not for women. In gender and feminist studies, gender differences in the field of science are viewed as socially constructed. Scholars have pointed to the particular effects of sociocultural contexts (Ceci et al., 2009; Carli et al., 2016; Okeke et al., 2017; Loverocka & Hart, 2018) and organizational characteristics (Acker, 2006; Sonnert et al., 2007) on women's interests in science as well as their possibilities to realize research careers. Virginia Valian (2014) points to the effects of environmental context (either physical or social) on women's and men's interests in science disciplines. This interest is malleable 'as a function of social class, ethnicity, region, sex, and other variables' (228). She argues that 'if we change the environment of math and science, we will change women's interest in math and science' (Valian, 2014:229). A previous study by Rowena Martineau (1997:392) concluded that 'the pressures of societal norms, parental expectations, educational environment, and popular images are apparently intensified for females who choose to pursue such careers'. Similarly Iruka Okeke et al. (2017) highlight that many of the factors limiting African women's attraction to and participation in sciences are structural, stemming from societal and institutional cultures and practices.

Stephen Ceci et al. (2009) claim that 'susceptibility to stereotypes at the individual level, and cultural bias at the societal level, may affect performance, irrespective of ability' (219). Shelley Correll argues that these stereotypes 'influence the early career-relevant decisions of women' (2001: 1691). This view is corroborated by Valian (2014) who suggests that women's interest in science disciplines increases if they have a feeling of belonging and an expectation of success in their research careers. However, as women are in male-oriented environments in academia they face strong disadvantages and social exclusion there (Leuschner, 2015) to the point of being positioned as outsiders in academic research careers. Hence women often have to work harder than men to gain recognition and earn a place in the so-called ivory tower of the science world. The high value that some patriarchal societies place on the roles played by men, including in science, makes men more visible and powerful than women. As women's roles are generally less valued than men's, women face more and stronger barriers in their work (Owusu, 2014).

As part of their socialization, people are encouraged to

adopt certain personality traits, behaviors and roles that are considered to be acceptable within their culture. Thus boys and girls are expected to follow a separated life style and carry on with that to adult stage. Children are made to

believe in what it means to be an ideal man or a woman and therefore are encouraged to develop towards that (Owusu, 2014:18).

This means that people are shaped to conform to normative gendered social and cultural expectations in a given context. Rather than gender itself, it is the social and cultural contexts that structure women's status in science. Laura Rhoton (2011) shows how both female and male scientists' gender practices reproduce gendered barriers in science. That is, women's attitudes, interests, lack of self-esteem, self-concept, stereotypical images, lack of self-confidence, career satisfaction, expectations and behaviors are some of the barriers that can only be understood in relation to the surrounding society and work environment within academic institutions. Part of Rhoton's findings is problematic as it can be read as blaming women by attributing 'problems' to them – that is, if the women would just change, then the problems (lack of interest in science, not succeeding in science careers, etc.) would be solved. This women-blaming also means that men can continue to hold prejudices and do not need to change; neither does the culture. To conclude, there is a great amount of research that shows that the obstacles faced by women in science/research careers are not related to their lack of science competence or abilities but the result of societal constraints at the macro and meso levels.

In the next section, which focuses on women's barriers in biological research careers, I discuss in more detail how specific obstacles at different levels undermine women's careers.

Women's barriers in biological research careers

According to the Mozambican National Fund for Research (FNI, 2016) the obstacles that women face in research careers within academia arise at the beginning of their careers and continue throughout. Some are specific to research careers and others result from the more general situation of women in society and academia (Krais, 2002; Ecklund et al., 2012; Schwanke, 2013; FNI, 2016).

Overall, the number of women pursuing science across the world has increased considerably in the last four decades or so (Fox, 2001; Sonnert et al., 2007; Ganguli & Launchbaugh, 2013; OECD, 2015; Elsevier, 2017). At undergraduate level in biology there are clear trends towards gender parity among undergraduate students (Sheltzer & Smith, 2014; Smyth & Nosek, 2015; Liftstream & MassBio, 2017; Funk & Parker, 2018), and in many cases, women outnumber men, up to early career level (Bal, 2002; Sible et al., 2006; Hill, Corbett, & St. Rose, 2010; Valian, 2010; Smyth & Nosek, 2015; Sarseke, 2018). In the USA, according to Frederick Smyth and Brian Nosek (2015), by 2006 women earned more than half of the undergraduate degrees in biology but only about 20% in physics. Similarly, they constituted

nearly half of USA scientists in biological sciences, but only 27% in physical sciences and 33% in chemistry. A similar trend can be observed in many OECD countries where women have received more than half of doctoral degrees in biological sciences in last two decades. Due to these facts some scholars consider biological sciences to be undergoing a rapid feminization with an 'overwhelmingly female' student body (Sonnert et al., 2007:1336). However, research by Mary Fox (2001) suggests that increasing the number of women in science at lower academic levels does not 'necessarily change patterns of gender, status and hierarchy in science' (662).

Thus, women's significant presence among undergraduate and graduate students in biological sciences has not coincided with proportional faculty appointments; women remain less represented among faculty and senior researchers (Ceci et al., 2009). This means that there is a female drop out between the undergraduate – early career - level and later stages, suggesting that women still face disadvantages and challenges, especially as their academic career progresses (Etzkowitz & Kemelgor, 2001; Kraiss, 2002; DesRoches et al., 2010; Hill et al., 2010; Sheltzer & Smith, 2014; Huyer, 2015; Lerchenmueller & Sorenson, 2018; Mukhwana et al., 2020).

Junming Huang et al. (2020) claim that more than males, 'female scientists have [a] higher risk [of leaving] academia, giving males [...] a major cumulative advantage over time' (4613). This situation contributes to the masculinization of the highest levels of teaching and research careers in biological sciences, creating vertical gender segregation. The dearth of women in the top ranks of biological research careers is commonly symbolized through the metaphor of the 'leaky pipeline' (Day et al., 2020: 2277). As Liftstream and MassBio (2017) put it, women participate in biological sciences 'in a pyramidal manner, with the greatest numbers at the bottom and diminishing at every level towards the top, for men, the distribution is more even throughout ' (14). This dearth of women in senior ranks of biological research careers is not just a question of the so-called meritocracy (Cech & Blair-Loy, 2010; Nielsen, 2016; Powell, 2016); it is due to complex sets of factors that undermine women's careers. One argument regarding the sciences is that when women move into disciplinary fields, men tend to leave them, thus inducing (in social and psychological terms) a sense of devaluation of the discipline and contributing to the hierarchy between and within disciplines in the science field (Fanelli & Glanzel, 2013). Roughly speaking it is not surprising that even within STEM, biological sciences have stereotypically and wrongly been treated by some people as 'soft sciences' that is emptying its status of the 'hard science' prestige that subjects such as physical and chemical sciences (Pigliucci, 2002) command. Unsurprisingly there are authors who have adopted terminologies such as 'hard biology' and 'soft biology' (Behzadi, 2020). Behzadi considers hard biology as those 'experimental (in vitro, in vivo, and in situ investigations) [biological disciplines] that deal with experimentation and workbench within the wet labs [and] soft

biology [those] based on desktop work and laptop biology' (2020:1). Such distinctions simply perpetuate certain forms of inequality by suggesting weighted differences between diverse areas of biology that do not inherently carry within them any notion of hierarchy. They are therefore unhelpful when it comes to issues of gender equality in the sciences. Below I discuss the obstacles that women face in their biological research careers which, for analytical purposes, I have grouped into three categories: societal (macro), institutional (meso) and individual (micro) (see also Yazilitas et al., 2013).

Macro-level (societal) barriers

One of the most powerful barriers for women in biological sciences is the sociocultural features of the settings in which women are located and socialized. By this I mean the ways in which social relations are organized (e.g. through marriage) and culturally constructed. Women, when seeking to study science, not infrequently experience a more hostile environment than their male counterparts, in which their 'gender [is] perceived as more of an impediment than an advantage to career success' (Funk & Parker, 2018:6). This has to do with pervasive gender stereotypes, biased beliefs and gender-based discrimination. For instance, numerous studies on African countries have emphasized the widespread 'ideology' that doing science is not for girls/women (Prah, 2002; Kitetu, 2008; Maryann & Patience, 2017; Mbano & Nolan, 2017; Boateng, 2018) and consequently, careers in science, especially in STEM subjects, are seen as something not 'appropriate' for women (Kitetu, 2008). This belief is associated with the tendency to reproduce the ideology of domesticity (Manuh et al., 2007). Because of this 'girls ... receive less encouragement to embark on higher education' (Prah, 2002:8). This affects their opportunities, self-concept, attitudes, interests and career aspirations, conditioning their participation and progression in biological research careers.

Amaália Uamusse et al. (2020), studying women in STEM in Mozambique, found that girls from primary school onwards are discouraged from pursuing such subjects due to cultural stereotypes and their expected social roles. These authors also note that the majority of teachers in STEM at secondary schools are men; consequently, girls have few female role models there and are demotivated in pursuing STEM disciplines. Their findings also suggest that family pressure on girls to marry relatively early prevents them from completing their studies or pursuing academic careers in science. Some of these findings are corroborated in a study by Givá and Santos (2020). They suggest that stereotypes regarding the professions explain differences between women's and men's decision to take STEM courses (Givá & Santos, 2020). Consistent with Uamusse et al. (2020) this study also mentions the lack of female role models in science disciplines as one factor inhibiting the participation of women in science.

Although family-based sociocultural factors are important, teachers and peers also play a key roles in women's careers choices, aspirations and academic achievements (Malach-Pines & Baruch, 2008; Bombuwela & Alwis, 2013; Deemer et al., 2013; Pfingst, 2015; Kumar, 2016; Osagie & Alutu, 2016; Meeussen et al., 2016; Ali et al., 2017; Tan, 2017; Lloyd et al., 2018; Makarova et al., 2019; González-Pérez et al., 2020; Nagdi & Roehrig, 2020). Girls' interests and attitudes toward science are a function of their interactions with the system that governs their social niches (Rhoton, 2011; Ngulube, 2018). Edgerton et al. (2014) explain that through its structures, institutions, norms, values, culture, representations, social conventions, society has produced and legitimated a cultural system that reinforces masculine privilege' (186). For this reason Rizwana Yousaf and Rudi Schmied (2017) suggest that men tend to discriminate against women because they do not want to share the power and privilege such as an education and career can provide. Instead women's competencies in science are almost always questioned as a subtle mechanism to discourage their persistence in this field.

Elisabeth Sherif (2008) carried out research in Niger about the under-representation of women in science disciplines. The findings suggest that in spite of a new scholarship system established by the government to encourage women's participation in science, most of the women who got these scholarships ended up prematurely leaving the university, not only because of associated high costs not covered by the scholarship, but also and more fundamentally due to the social pressure to marry and have children. According to Celestin Gbaguidi (2018) African women are culturally seen as the embodiment of fertility. When some young women persist in their scientific careers especially in very patriarchal countries such as Mozambique, their family burden and motherhood put their academic careers under pressure, pushing them backwards or leading them to drop out (Etzkowitz & Kemelgor, 2001). Although pregnancy can be planned and therefore controlled by a couple, the decision whether or not to have a child has more significant effects on women's careers than on men's. After marriage African women are strongly encouraged to privilege their family lives, to serve their husbands and to put their own career in second place (Ledin et al., 2007; Gbaguidi, 2018).

Ana Ledin et al. (2007) stress that

the fact that women bear children and take on the majority of child care responsibilities leads to career breaks and fewer weekly working hours for women, resulting in decreased productivity and consequently decreased competitiveness (Ledin et al., 2007:985).

Women's family-related career breaks impede the completion of their studies and advancement to senior positions in biological research careers. Ac-

cording to Dee-Ann Schwanke (2013:1), 'cultural expectations [of women's roles] deem it more appropriate for women to interrupt their careers due to family responsibilities such as caring for children or aging parents than for men to do the same' (1). Women who pursue research careers in biological sciences may face a double pressure: first, the social and cultural pressure to establish a family and to be a good mother and wife, secondly the professional pressure to be a successful scientist. Both require women's time and dedication (Park, 2007). Men, too, need to combine family and career - but for them this is not an obstacle since there are no significant expectations that men will participate in domestic tasks or childcare. Due to these cultural reasons the 'leaky pipeline has been the dominant problem' (Jesse, 2006:832) for the majority of female researchers in African academia, particularly in the social and cultural contexts dominated by a strong patriarchal culture such as Mozambique. This is because in many African societies marriage and children are a distinct and overvalued element of women's status, regardless of their educational level (Manuh et al., 2007). My research partially supports this thesis but, as will become clear in subsequent chapters, I also had informants who, despite marrying and having children, continued in their research careers.

Unsurprisingly across many OECD countries where women have more possibilities to negotiate and manage their fertility, they choose to marry later and delay having their first child, enabling them to invest more in their studies and academic careers (Vincent-Lacrin, 2008). Conversely, in most sub-Saharan African countries women's early marriage, fertility (children), and motherhood are insisted upon as the most important aspects of women's lives (Moore, 2013; Robinson, 2014). Thus, the majority of women are socially conditioned to prefer careers that do not conflict with their family responsibilities (Suter, 2006). Reproduction and marriage (or having a man, even if not married) are sociocultural imperatives for most Mozambican women which confirms their status as adult women (Cardoso, 2007). As a result, Mozambican women marry and become mothers early: the average age in both cases is 19 years and the average number of children per woman is five (MISAU, 2012). Women tend to have children at a time when they also need to go abroad to study to get a Masters or doctoral degree. Since most of these women start their postgraduate studies when they are already mothers and/or married, the clashes to reconcile their role as mothers and the demands of their studies/careers tend to be particularly high, as men are not expected to be involved in childcare (Beoku-Betts, 2004; Cardoso, 2007; Christiana, 2013; Anon., 2016). Josephine Beoku-Betts (2004) undertook a study with women from sub-Saharan Africa who did their PhDs in Europe and the USA between 1960 and 1990. When asked how they dealt with the demands of family/marriage and postgraduate studies, the majority of these women complained about 'the emotional costs, loss of opportunities, the

burden of domestic responsibilities, neglect of spouse and children, and shortchanging of their own leisure and study time' (129).

A national survey conducted by the Pew Research Center (2013) in the USA found that 'being a working mother has made it harder for [women] to advance in their job' (57). Similarly, the Massachusetts Biotechnology Council and Liftstream showed that more women took career breaks than men due to their family commitments (Liftstream & MassBio, 2017). Hence combining family with academic life has been one of the challenges for most academic women around the world, including African academics.

In sum, the societal factors I have outlined above contribute significantly to girls'/women's limited access to education and science. But beyond these, institutional factors also influence women's research careers in biological sciences. I focus on these now.

Meso-level (institutional) barriers

On the African continent there has been a significant growth in women's enrolment in higher education due to the expansionist policies of tertiary education adopted by the governments in the post-liberation age (Altbach et al., 2009; Mario et al., 2003; AU-NEPAD, 2010; MINED, 2012). Even so African universities still remain elite institutions for the few because 'these greater participation rates in higher education do not, by themselves, open the same opportunities equally to all' (Altbach et al., 2009: 41). Among other factors, institutional barriers reduce such opportunities. Andrea Deal (2019) states that 'institutional barriers are [those] that directly relate to the participant's employment experiences, they result from workplace policies, structural elements, or management practices that establish roadblocks for [females] either advertently or inadvertently' (86).

At this point, I focus on sub-Saharan Africa countries where Mozambique is located because the academic system and research in these developing countries share a number of common elements and challenges (Teferra & Altach, 2004; Altbach et al., 2009; Blom et al., 2016). However, it is difficult to make generalizations due to the sociocultural diversity and higher education particularities in each country.

The existing body of literature on women's careers and experiences in academia highlights a myriad of institutional variables which influence these careers, ranging from the institutional culture to its material conditions (Campion & Shrum, 2004; Gasser & Shaffer, 2014; Cloete et al., 2018). Due to the diversity of institutional barriers described in the literature I have divided these into two broad categories: i) *immaterial factors*; and ii) *material factors* (Sanz & Bergan, 2002). I shall first examine the immaterial factors and then the material ones.

Immaterial factors: The immaterial factors – and one might argue what precisely is meant by im/material – include institutional arrangements for

supporting science and career development, peer and mentor relationships, institutional policies, academic duties, research policies patterns of interpersonal relationships, the work environment, research management, rewards and recognition, research grants, budgets for research, and policies for research (Sanz & Bergan, 2002; Gasser & Shaffer, 2014).

Cloete et al. (2018) have described universities as a 'ruled-governed community of scholars' (7), considered autonomous and democratic, ruled by their own policies, tools, values and goals. The rules that govern this community reproduce the gender patterns of the wider society, consciously or unconsciously. This is certainly the experience in Mozambique. Many studies indicate that women are frequently confronted by a hostile environment in academia where they are discriminated against, stereotyped, and marginalized because they are entering a traditionally male-dominated institution (Adusah-Karikari, 2008; Anagbogu & Elora, 2008; Flicker et al., 2010; Settles, 2014; Shauman et al., 2018; Givá & Santos, 2020). Givá and Santos (2020) in Mozambique point to the institutional weakness in providing a supportive science, technology and innovation (STI) ecosystem for women, that ends up contributing to their limited participation in STI. Settles (2014) investigated some of the institutional barriers faced by women in STEM and found that female faculty members in STEM reported more perceived gender discrimination than men, related to hiring, sexual harassment, salaries, and lack of equipment. These findings suggest that the science field has been hostile to academic women. Consequently, African women in academia have to fight very hard to overcome gender biases from their peers and thus 'prove' that they are capable of being part of the academic environment (Boateng, 2018). Amina Mama (2003) asserts that 'the institutional and intellectual cultures of African institutions are, in fact, permeated with sexual and gender dynamics' (101).

Teresa Barnes (2007) considers the African university as 'a gendered space for the production of knowledge which privileges not only masculinist power, but certain kinds of masculinist power over others' (20). By masculinist power Barnes means the pervasive male domination in the academic environment, in which the majority of functional roles/power positions such as administrative, managerial and professorial positions are occupied by men (Barnes, 2007).

Augustina Adusah-Karikari (2008) studied women's experiences in Ghanaian public universities. The research findings showed that women face a lack of mentoring and networks, stereotyped views, discrimination and a pervasive patriarchal culture. The absence of a supportive environment and family-unfriendly policies affects women's careers (Yost et al., 2010; Gasser & Shaffer, 2014; Solomon, 2015). Shauman et al. (2018) demonstrate that workplace flexibility is inhibited by a lack of information about relevant policies. This institutional factor is crucial for female researchers to reconcile their involvement in child care and establish a work-life balance.

Elizabeth Yost et al. (2010) note that 'the lack of family-friendly university policies may be interpreted as a message to women [...] that it is not acceptable to incorporate a personal family life while focused on one's professional careers' (99). This contributes significantly to the 'leaky pipeline' and reflects a lack of awareness regarding gender equality at institutional level.

Finally, these studies suggest that through their culture, universities contribute to and promote discriminatory practices against female researchers, making them feel uncomfortable and marginalized. Such findings are consistent with many other studies that provide substantial evidence that academic hierarchies in science are systematically biased in terms of gender, race, position of power and ethnicity (Ibarra et al., 2010; Brink & Benschop, 2012; Oforiwaa & Broni, 2018; Sadiq et al., 2019; Stewart-Williams & Halsey, 2021), even considering the supposedly meritocratic promotion processes that exist. Discriminatory practices in science are evident in gender biases in academic recruitment and hiring processes that disadvantage women (Williams & Ceci, 2015; Rivera, 2017) and biased promotion/teacher appointments to senior positions (Linková, 2017; Oforiwaa & Broni, 2018; Sadiq et al., 2019; Eaton et al., 2020). These create patterns of gender inequalities in the composition of the professoriate, biased gendered performance-related expectations where women are expected to perform worse (Reuben et al., 2014); and bias in resource allocation decisions and research funding (Jung, 2015). All these act as barriers to women's progress in biological research careers.

Marieke Van den Brink and Yvonne Benschop (2012) in the Dutch academic career system analyzed how committees collectively evaluate merit and make hiring decisions. They found a gendered assessment of competence where the number of women appointed to the professoriate was low because the panel gave lower ratings to females. The authors concluded that most of the panel judgments were influenced by a stereotyped image they had of an ideal scientist. Van den Brink and Benschop (2012) claim that in 'the natural sciences women lose the competition in the final selection as their qualities are questioned and measured against a masculine standard' (87). This shows how masculine stereotypes are used as a standard measures in academic assessments. From this male viewpoint successful women in research/academic careers are those who manage to fit them into this stereotypical frame of masculine academic attributes.

Favouritism in hiring and career advancement was reported by Giovanni Abramo et al. (2015) regarding the process of recruitment of university professors in Italy. They found that the fact that the candidate had cooperated in research work with the president of the committee and other connections of this kind increased significantly the possibility of being hired. The study revealed that research collaboration between the candidates and their evaluators and the propensity to reward candidates of the same gender as the com-

mittee president were considered crucial in hiring (Abramo et al., 2015). Similarly, a study by Obaapanin Oforiwaa and Anthony Broni (2018) on promotion in Ghanaian higher education institutions refers to the gendered nature of academic promotions and positions. Their findings showed profound gender differences in teacher appointments to senior positions. For example, between 2007 and 2012 no women were promoted to the rank of Professor or Associate Professor. The study also stated that women were perceived as having a lack of interest in research and publications due to their family responsibilities (Oforiwaa & Broni, 2018). In South Africa Hassan Sadiq et al. (2019) analysed the process of academic promotion which, they argue, creates and reflects inequalities and patterns of discrimination against some groups, particularly black and female staff. According to Marc Junior and Ana Nunes (2012) these (un)conscious workplace discriminations act 'to preserve the power, status, and privilege of a dominant in-group [mostly men] against all alternative claimants' (251). Unsurprisingly, Debra Easterly and Cynthia Ricard (2011) argue that academia has always been an institution operating as male-stream that is created for and serves male interests.

The pattern of interaction between researchers, senior and junior, is an influential factor for juniors' career development. For instance, some scholars argue for the positive effects of female role models on women's performance in STEM (Sonnert et al., 2007; Young et al., 2013; Herrmann et al., 2016). However, there is a persistent lack of such female role models in science (Aguele & Agwagah, 2007; Cavanaugh, 2017; Sonnert et al., 2007; Funk and Parker, 2018; Givá & Santos, 2020; Uamusse et al., 2020), not least in Mozambique. This is particularly critical when considering that 'young women often find that they are negated as academics in day-to-day academia' (Krais, 2002:412). Thus, the research draws attention to the importance of the institutional culture regarding the role of mentors (Krais, 2002).

Material factors: The material factors include research resources such as libraries, collections, computers, laboratory equipment and reagents; and infrastructures needed for the development of research. The academic performances of female and male researchers in biological sciences are affected in the same way by their material working conditions but women in Mozambique are more likely to be particularly affected. This is because they are much more likely to be engaged in experimental/laboratory works since women are more likely to work in laboratories than go into the field due to the ruling gender order in the country, which makes it difficult for them to stay away from their family for a long period of time doing field research. Givá and Santos (2020) suggest that institutional factors inhibiting the participation of women in science include 'poorly equipped laboratories and research fields and low incentives for researchers compared to other employment sectors' (86). However, they do not provide any empirical evidence

to support this assertion. My research contributes significantly with empirical and original data regarding this (see Chapter 4).

According to Nico Cloete et al. (2018) research production is dependent on material conditions such as the existence of 'appropriate laboratories, libraries and other infrastructure which permit teaching and research at the highest possible level' (22). Two of the main problems that most universities in developing countries face are financial and infrastructural (Altbach et al., 2009; Gaillard, 2010). This is particularly critical in the context of public funding of Mozambican higher education since the country has been strongly affected by an economic crisis in 2016 when the gross domestic expenditure on research and experimental development was very low, at 0.36% of GDP, given that the fixed goal for African countries was 1% of GDP (MCTESTP, 2018). In Mozambique there is a significant lack of investment in research regarding infrastructures such as diverse specialized laboratories, equipment and other material needs related to applied research in science (MCTESTP, 2006). This triggers a number of other factors such as the low institutional capacity to promote research and publishing, and poor academic salaries. This cumulatively undermines the institutional capacity of the Mozambican universities to produce high-quality research outcomes (Wangenge-Ouma et al., 2015). Hence in a context of lack of financial resources 'appropriate strategies for the rational allocation of limited resources [are needed]' (Altbach et al., 2009:140).

A comparative study by Patricia Campion and Wesley Shrum (2004) on the experiences of women in science in Ghana, Kenya, and India found a lack of even more basic equipment than laboratories, such as telephones and other office equipment, which acted as one of the institutional constraints on research. Damtew Teferra and Philip Altbach (2004) assert that 'the general state of research in Africa is extremely poor, and its research infrastructure is inadequate, scarcity of laboratory equipment, chemicals and others [for research and teaching], poor and dilapidated libraries' (38). Overall most Sub-Saharan African universities have low research capacity and poor material conditions in science (Anon., 2006b; Blom et al., 2016; Cloete et al., 2017; Cloete et al., 2018).

Micro-level (individual) barriers

The existing body of literature discusses this level of barriers in terms of a number of personal attributes (e.g., gender, age, race, marital status, family responsibility, psychological traits, job experience, academic rank, productivity, etc.) to explain why women remain under-represented at the highest levels of biological research careers (Xu, 2008; Ceci, et al., 2011; Yazilintas et al., 2013; Gasser & Shaffer, 2014). These individual factors are used to predict/explain the (lack of) success of women in science and are sometimes partly utilized to 'blame' women for this. The micro-individual level includes a range of 'sociopsychological variables' (Xu, 2008:610) which articulate the

interaction between individual and contextual conditions, both societal and institutional (Settles et al., 2006; Yazilintas et al., 2013; Litzler et al., 2014).

A study by Yonghong Xu (2008) concluded that most of what is considered psychological variables are in fact personal responses to given situations, explained by an academic culture that provides limited opportunities and support to women. Substantial research outcomes demonstrate that work motivation is affected by the availability of resources and opportunities within institutions (Okiki, 2013; Zhang, 2014; Deressa & Zeru, 2019). For instance, the existence of a system of recognition and financial incentives contributes to external motivation, work performance and job satisfaction. An uncongenial and discriminatory academic/departmental climate can provide sources of demotivation for women in research careers (Settles et al., 2006; Gasser & Shaffer, 2014).

Isis Settles et al. (2006) conducted research with faculty in the USA. Their results showed that women's perceptions of a positive or supportive department climate were related to higher levels of job satisfaction and productivity. Similarly, the authors suggest that due to their negative experiences within departments, women scientists in the natural sciences perceived their work environments as more hostile due to their strongly masculinist cultures. Finally, this study demonstrated that all negative gender-related experiences within the department such as discrimination, sexual harassment sexist practices had a strong influence on women's job satisfaction and aspirations (Settles et al., 2006).

Scholars suggest that self-confidence and self-efficacy levels have a positive influence on research productivity, but the former are strongly affected by institutional research support (Zhang, 2014, Maree, 2017). Demet Yazilintas et al. (2013) state that 'most people will not venture into an activity unless they have enough confidence in their own ability to perform a certain task' (4). The low self-efficacy that women can experience in science is a response to prevailing stereotypes of sciences as more suitable for men. Women's self-concept, career expectations, self-confidence, and other related psychological variables are patterns of responses to the stimuli they continually receive (Ertl et al., 2017; Maree, 2017; Grata, 2019).

Some studies suggest that the individual confidence is shaped by the kind of information and support people receive within academia (Baker, 2010a, b; Maree, 2017). People who receive insufficient support from more experienced researchers (mentors) tend to express low levels of self-confidence. In general research outcomes suggest that women and men differ in perceived self-efficacy (Pajares, 2005; Maree, 2017; Grata, 2019) on the basis of information and perceived support they receive explicitly or implicitly. A similar trend has been observed regarding STEM, where women reported lower levels of confidence than men (Litzler et al., 2014). A study by Marinda Maree (2017) in South Africa indicates that individuals

who receive positive stimuli and support from their inner circle, from spouses or parents, feel more motivated to engage in science.

I shall now outline the structure of my thesis

Thesis outline

In this first, introductory chapter, I have provided an overview of the macro-social, political and cultural characteristics of Mozambique, of its higher education, and its challenges from a gender viewpoint, as well as some background to the gender disparities in biological sciences. In the next chapter, my 'Methodology', I discuss the theoretical framework that guided my methodology as well as my positionalities in the fields, and the methodological and ethical challenges and concerns I faced. The empirical results are presented in the three main chapters (3, 4 and 5). In Chapter 3 I discuss the main findings of my document analysis based on different official documents gathered in the two universities where my main focus was on how gender issues are addressed within these documents, especially in relation to research. The next analysis chapter, Chapter 4, is based on the results of the interviews and centres on the obstacles women face in their biological research careers. Here I focus on factors acting at the macro, meso and micro level. In Chapter 5 I analyse women's academic career paths, focusing on researcher career stories and exploring their career choices and decision-making to pursue biological sciences. In the concluding Chapter 6 I summarize the major findings and suggest some future research.

2. Methodology

This chapter centres on my methodology that is, the theoretical and epistemological bases that I used for the collection and analysis of my data. First, I discuss my methodological framework, then I explain how the participating institutions, my two case studies, and the research participants were chosen. I describe the sociodemographic data of the interviewees and how I gained access to the research sites and the participants. Then I discuss my positionalities in the fields, the data collection and analysis, and finally ethical considerations in relation to the research.

Methodological framework

In my research, I drew on insights from Smith's (2005, 2006) approaches to institutional ethnography. Dorothy Smith (2005) defines institutional ethnography as a means of:

... explor[ing] the social relations organising institutions as people participate in them and from their perspectives. People are the expert practitioners of their own lives, and the ethnographer's work is to learn from them, to assemble what is learned from different perspectives, and to investigate how their activities are coordinated. It aims to go beyond what people know to find out how what they are doing is connected with others' doings in ways they cannot see. (225)

Doing so, the overall objective of using IE as a method of inquiry in my work was to map how women's everyday experiences came out in and/or were co-articulated with institutional and translocal practices and processes (Smith, 2005, 2006; Doll, 2017; Lund & Tienari, 2019). Devault and McCoy (2006) stress that with IE the aim is not to discover people's everyday but to use their standpoints on their everyday world, moving beyond it in order to interpret or figure out 'how it came to happen as it does' (19). This means that women's reported experiences were an entrance in my scrutiny to figure out the ongoing processes and practices locally (university) and extra-locally (broader society) that produced career-related obstacles for women in biological research.

In other words, IE allowed me to 'map out translocal social relations to figure out how they impact on people's [women] daily doings in their local

environments' (Deveau, 2008:4). Marjorie Devault (2006) also maintains that IE seeks to discover how particular ways of knowing or doing are mediated by people's everyday engagement with texts and textually-mediated processes and discourses in which ruling relations are imbricated. Given its goals, I would argue that the IE approach was especially suited for my analysis of women's experiences in biological research careers since I was not only concerned to understand how career-related obstacles arose for women but also to suggest structured solutions to overcome them that obviously demand institutional changes (Devault, 2006). The critical insights of IE tell me that these women's experiences are socially constructed and institutionally organized (Wright et al., 2018) in the setting where they are located through what Smith has called 'ruling relations'.

Ruling relations are a question of power, the power of subordinating and subjugating people within social and working spaces producing inequalities (Smith, 2005a, b). An interesting point here is to understand how women as subjects in these places understand their routine in the institutional spaces and what we can learn from them. Jonathan Tummons (2017) argues that peoples' work activities and relations are shaped and coordinated through the ruling relations which are formally materialized through discourses mediated by different institutional materials. These materials include, for instance, administrative reports, strategic plans, public discourses, policy, legislation, application forms and other ordinary workplace texts and discourses of various sorts (Devault, 2006). At institutional level ruling relations are also part of what Joan Acker (2006) has called 'inequality regimes'. The functioning of this complex system (inequality regime) that produces, maintains and perpetuates inequalities between women and men in academia results from the interaction of the particularities of the wider society and features of academic institutions. A combination of Acker's depiction of inequality regimes and Smith's institutional ethnography enables one to figure out how women's experiences in biological research were socially produced and coordinated through ruling relations in the universities.

As a tool with a particular focus on people's everyday lives and how their lives are organized and coordinated by institutional forces IE was useful for exploring these ruling relations (Smith, 1997) including as textually based modes of work and social organization. These ruling relations goes beyond documents, they also coordinate people's activities outside the university. For example, for my fieldwork I had planned to stay two months in the field but I ended up staying there 30 days only due to the ways in which my institution and people in positions of power within it decided to pay my expenses. Those decisions cut short my days in the field. This is one empirical evidence of how ruling relations are performed and influence people every day within academia. Ruling relations were also, for example, evident in my document data collection through the limitations imposed on me by the gatekeepers regarding access to some annual reports in one of the departments.

According to Jean Deveau (2008:3) IE as method of inquiry begins with three assumptions: 'first people are experts in how they live their own lives. Second, subjects are located in sites throughout society (local settings). And third, powerful outside (translocal) forces shape how people live and experience their everyday lives'. It means that the women immediately affected by it were in a better position to talk about themselves, their embodied experiences and struggles within university when engaged in biological research. As a method of inquiry based on women's standpoint of people in work organizations (in this case women at the university), IE seems to me an appropriate research tool to investigate the larger social and institutional processes that shape women's experiences in biological research careers in academia.

In my research IE was operationalized through three activities: (1) talking to people individually or in small groups (interviewing them), (2) collecting texts for further analysis (document analysis), and (3) capturing the social world by observing what people are doing locally in their day-to-day work activities (Diamond, 2006; Rankin, 2017). However, scholars differ regarding how they use or prioritize these methods in their research practice (Malachowski et al., 2017; Balcom et al., 2021). In my work I combined document analysis and interviews as the core methods, complemented by observations. The set of documents I analysed address the policies, legislation, regulations and guidelines that drive and direct institutional. These texts provided relevant explanatory and background information about 'institutional processes and how they operate as the ground of the [women's] experiences' (Devault & McCoy, 2006:20).

In my case I began from the reported experiences and standpoints of women who worked as lecturers and researchers in biology research within two universities that I captured by interviewing them. Then I explored different kinds of documents at different levels to map the interconnectedness with what my participants said but strategically in my empirical chapters I will start by presenting findings from the document analysis then of the interviews. I also made observations throughout my fieldwork but not in an intensive manner due to the reason I explain it forward.

I now move on to describe the field sites, the selection of my case studies and the participants, their demographic data, and how I gained access to these sites and negotiated with my informants.

Location of my field sites

My research was undertaken in two different regions (south and north) of Mozambique with their social, economic, cultural and political specificities (see the background subsection in Chapter 1). In both regions, I selected the two largest public universities based on the criteria explained below.

Selecting institutions and participants

a) Institutions of Higher Education

My research took place in two public universities in Mozambique: Eduardo Mondlane University (UEM) and Lurio University (UniLurio). They constituted the case studies for this PhD. Given my research objective, at UEM I chose the Department of Biological Sciences (with a diversity of courses and its sections) and the Centre of Biotechnology (CB-UEM)⁸ that included a diversity of researchers (with different backgrounds) and students. These two units carry out research, training, extramural work and services. Since its structure and academic complexity are slightly different from UEM, at UniLurio I selected the Faculty of Natural Sciences in Pemba which has only one course in biological sciences that includes the Departments of Botany, Environmental Education and Zoology. Such differences in academic structure and complexity between the two universities also influenced the kind of academic staff they have.

The main criteria for choosing these institutions were: the public nature of the institution, the existence of biological sciences courses within them, and the possibility to have a teaching and a research career in this field. As already mentioned, private HEIs do not provide sciences courses because of the expense of the infrastructure. Further, there is an asymmetric distribution of researchers across Mozambique as a function of the geographic location and history of installation of higher education or research institutions (MCTESTP, 2018). A large concentration of researchers is found in the city and province of Maputo (south), Nampula in the north and Sofala in the central region. These areas are more strongly urbanized and have better material infrastructures than other parts of the country. In the southern region Eduardo Mondlane University (UEM) is the biggest and oldest Mozambican higher education institution (HEI) with well-established biological sciences departments. UEM was founded in 1962 by the Portuguese colonial regime, and until about 1985 was the only higher education institution in Mozambique. Currently the activities related to teaching and research in biology at UEM are developed by the Department of Biological Sciences (DCB) in the Faculty of Science, the Centre of Biotechnology, and the School of Marine and Coastal Sciences (in Quelimane, Zambezia Province). In 2017, the De-

⁸ It was founded in 2008 thanks to a partnership between Italian universities and UEM. This inter-faculty research centre integrates several UEM faculties (Agronomy, Medicine, Veterinary Sciences and Science). As such the CB-UEM has been involved in multidisciplinary research in the field of biological and/or biomedical sciences. It involves researchers with different backgrounds and experiences. The CB-UEM conducts research, training (Master's degree in biotechnology), extramural work and services. The UEM biotechnology center also provides technical assistance to other faculty laboratories and staff training (see Taviani et al., 2021).

partment of Biological Sciences had 51 teachers, 30 women and 21 men (see table 2.1). There were 3 associate professors and 3 auxiliary professors, the rest are assistants and 10 others are in researcher careers.

Table 2.1. Distribution of lecturers in the Department of Biological Science according to gender and academic degree.

Gender	Academic degree			Total
	<i>Licentiate</i> ⁹	<i>Master</i>	<i>PhD</i>	
Female	*	*	*	30
Male	*	*	*	21
Total	15	21	15	51

**Not specified:* the last annual report (2017) from the Faculty of Science and Department of Biological Science does not sex-segregate these numbers. Source: UEM homepage.

For the northern region, the University of Lurio (UniLurio), set up in 2007, was chosen. Based in Nampula city, it is one of the most important public universities in that region, offering courses in biological sciences through its Faculty of Natural Sciences (FNC) located in Pemba city (Province of Cabo Delgado). Hence my fieldwork was conducted in Nampula and Pemba. UniLurio has a Faculty of Natural Sciences (FNC) created in 2010 which teaches Biological Sciences courses in the City of Pemba. At the time of the interviews most of the teaching and research staff had a Master's and/or licentiate degree but only one had a PhD. The FNC offers Master's programs in biological sciences in partnership with Portuguese and other European universities. There is only one senior lecturer (a woman with a PhD); most staff are assistants as shown below in the Table 2.2.

Table 2.2. Teaching and research staff (UniLurio) Faculty of Natural Sciences (Pemba).

Gender	Academic degree			Total
	<i>Licentiate</i>	<i>Masters</i>	<i>PhD</i>	
Female	1	8	1	10
Male	16	11	0	27
Total	17	19	1	37

Source: FCN/UniLurio, Pedagogical Department.

⁹ In the Mozambican higher education system the licentiate or *Licenciatura* is the first degree awarded by institutions of higher education. The length of *licenciatura* programs ranges from four to six years. It is also the first degree in some countries of the European Higher Education Area and is designated a Bachelor's degree in other European countries.

These two case studies are thus very different in terms of age, numbers of staff, and staff educational levels.

b) Selection of the participants

In my research I adopted a purposive sampling approach combined with snowballing as explained below. According to Polkinghorne in the selection of individuals in qualitative research what really matters is 'the *experience*, not individuals or groups' (2005: 139 *emphasis added*). Tracy writes on purposeful methods and maintains that researchers 'purposefully choose data that fit the parameters of the project's research questions, goals, and purposes' (2013:134).

To recruit my potential participants I asked the heads of department for a list of all lecturers and researchers. In one of the universities this list was published in a public space but in the other I had to ask the deputy dean of the faculty for it. These lists were not always updated but even so they allowed me to have a pool of potential respondents that I could negotiate with. In order to make clear how I negotiated access to my participants I will discuss the issue of gatekeepers below.

To access some of my participants I engaged with informal gatekeepers, Alicia and Iracema¹⁰, to obtain their contacts. Alicia was a woman over 40 years of age with a PhD, while Iracema was a young female teacher under 35 years of age with a Master's degree. These differences were important in my insertion into the institutions since overall the participants of both institutions had quite different sociodemographic profiles: at one university they were mostly young, had Master's degrees, and were less experienced; at the other, they were older, with a higher number of doctorates and Master's degrees, and more experienced in their careers. The informal gatekeepers matched these parameters in the respective institutions. These informal gatekeepers provided me with the mobile phone numbers of the people on the lists. I then called each person, explained what I wanted and asked for a personal meeting to better discuss their participation in the interviews. When it was difficult to get into contact, I asked my informal gatekeepers to introduce me personally to the potential interviewee. By using this procedure new participants were added to the list.

I used snowballing in the form of asking my interviewees to indicate three other potential people who might also be willing to be interviewed. When I contacted these other interviewees, I referred back to their colleague but in order to protect my interviewees' identities I never said who those colleagues were, even if the potential interviewee asked. The women I contacted were happy to understand that their colleagues (both female and male) looked at them as a source for the kind of information I was seeking, some-

¹⁰ I use pseudonyms throughout the thesis.

thing that did not happen with their male counterparts. I also realized that such satisfaction came from the fact that the women felt that their experiences within the department were appreciated and valued by their colleagues to the point of being singled out for the interviews. This also helped to establish trust and rapport with my interviewees who had a sense that they needed to make their experiences known.

Marjorie DeVault and Liza McCoy (2006) suggest the selection of informants in terms of diversity of experience rather than categorically, that is involving as many different kinds of people as possible. My purposive approach focusing predominantly on women in diverse positions was useful to identify both common patterns and differences (Palinkas et al., 2015). However, Lawrence Palinkas et al. (2015) stress that as participants are not randomly chosen, this method can be affected by the researcher decision (biases) about participants and indeed as a non-probabilistic method the results are not generalizable for the whole population. This, i.e. generalization, was not my goal, in any event. By assuming an ethnographer position my goal was not to generalize women's experiences. On the contrary, it was 'to find and describe social processes that have generalizing effects' (DeVault & McCoy, 2006:18). The section that follows describes how I gained access in my case studies.

Gaining access to the case studies

Accessing fieldwork sites and potential informants is dependent on the local contexts (Vuban & Eta, 2019). As the fieldwork was undertaken in public universities it was necessary to obtain endorsements from the relevant authorities (formal gatekeepers) to conduct research in these settings. This involved a formal process of gaining entry followed by an informal process in which I became known to the gatekeepers as explained below. Thus, I initially contacted the dean of one faculty by phone and by e-mail, expressing my interest in carrying out the research at that institution. It was recommended that I formalize the request through a letter to the faculty board. This process constituted the way in which I obtained local ethical clearance to conduct my research.

Letters were submitted to both institutions through the respective secretariats, requesting authorization to carry out my research. The request letters for primary access contained information about the purpose of the research, who I was, my institutional affiliation, contact details of the supervisors, the kind of participants needed, and the length of the interviews. I also attached an information sheet (see Appendix A) containing a brief description of the research, its objectives and how it would be conducted. At one of the selected universities the response was quick (less than a week) while in the other the decision for the research permit took close to two weeks since the head

of department was absent and the female teacher who was replacing him told me that she had no discretionary power to authorize me to carry out the study. This situation immediately highlighted the gendered logic of power within this institution.

Obtaining a research permit from the university gatekeepers was the first challenge. In fact, it is almost always challenging to obtain research permissions from a university in many African contexts 'because of the lack of information available on who approves the letters, the duration of time for processing the permits, and how the decision is communicated back to the researcher' (Vuban & Eta, 2019:6). This is also quite common in Mozambique due to an excessive bureaucracy on the one hand and a strongly hierarchical institutional and academic culture on the other. This is one of the dilemmas with which researchers can be confronted.

While I waited for the research permits I also had an informal and exploratory conversation with two female teachers who were replacing the head of department and the dean of faculty. This conversation served the purpose of relationship-building in preparation for the interviews, testing preliminary attitudes and getting some details of the environment where I would collect my data. This conversation proved to be fruitful in the establishment of trust and rapport, helping my immersion within the department community. Ruth McAreavey and Chaitali Das (2013) explain that gatekeepers 'can help the researcher become more *culturally competent (...) within the community*' (116, *emphasis added*), facilitating her/his immersion at the research sites. Quinney et al. (2016) state that 'facilitation of trust in the participant–researcher relationship begins in the interactions prior to the actual interview and continues throughout' (7). I used that occasion for these purposes. Due to the good rapport established with those female teachers during our conversations, they later became informal gatekeepers who facilitated access to their colleagues, my potential informants.

Initially I had planned to gain access to the institutions and participants via formal gatekeepers (deans of faculty or heads of department), not informal ones. However, in the field accessing my participants via people in power positions proved to be counterproductive due to the potential adverse effects generated by the difference in power and position of the gatekeepers relative to most of my participants. Mozambican public institutions, as already mentioned, are very hierarchical (UEM, 2019a). Even with the assumption of collegiality, the everyday decisions in most of public institution are made top down and hence are mandatory. Any resistance or non-compliance with an order from a hierarchical superior is subject to a disciplinary penalty (Anon., 2018b). To overcome this situation I chose two female teachers as informal gatekeepers instead of the head of department or someone else with discretionary power. I thought that this would reduce any adverse effects (coercion, obligatoriness, or any kind of pressure) in relation to the participants.

At one of the universities the female teacher and my informal gatekeeper was older than me and a respected person among her colleagues. But in the other one my informal gatekeeper was younger than me. Due to the recognition of her strong engagement in research and academic consultancy this female gatekeeper was also respected among her colleagues and managers. Maybe because of these personal characteristics of my informal gatekeepers my access to their colleagues, both junior and senior in non-managerial positions, was easier than to more powerful people in functional roles. During the time I was at those universities I realised that both my informal gatekeepers had a trusting relationship with most of the women and their peers I intended to interview.

The formal gatekeepers' role in encouraging the participation of other members of the university raises some ethical questions about voluntary participation. Although participants were assured of their right to decline or withdraw from the study, Shenuka Singh and Douglas Wassenaar (2016) note that this can be difficult in practice, considering the power relations between the formal gatekeeper and other participants, especially when the interviews are conducted in the workplace. I mitigated this by choosing as informal gatekeepers lecturers with no functional roles. From the formal gatekeepers I only obtained the authorization to enter their institutions and conduct my research. They were very open and declared their willingness to cooperate. At both institutions there is a public rhetoric of gender equality due to their institutional relationship with particular international agencies which have fostered institutional gender awareness. Hence gender research as such is no longer seen as something strange. This also contributed to gaining access to the researched institutions. In turn I promised to share my research findings with the universities, making available to them copies of the final thesis. Andrew Shenton and Susan Hayter (2004) think that this is one of the ways to show the researcher's reciprocity in order to gain access to institutions and participants.

During the meeting with the academic authorities I emphasized the need to negotiate directly with my potential informants instead of securing their participation in compliance with an order from above. This was intended to safeguard the informants' right to decide whether or not to participate in my research.

Whenever I went to the universities for the interviews I went to the gatekeepers' office, greeting them. I also talked with people, including students, in the corridor. I was aware that being there and being seen every day could contribute to reducing my outsider position. In fact, junior teachers and researchers addressed me by using my own name instead of my academic degree, as is usual within Mozambican universities. The relationship I established with my interviewees went beyond the university spaces. Not infrequently did I meet them outside the university. They would come to me and try to find out how my research was going, shared with me the research find-

ings they had already obtained in their own work, etc. Even though it was a necessary relationship for the context of my research, this created social relationships beyond academic spaces. Below I describe the main characteristics of my participants.

Informants' demographic data

In total, I interviewed thirty-nine participants, twenty-four women and fifteen men. This means that women constituted the majority of my informants. A brief profile of each of my participants is presented in Appendix I. At the time of the interview, the women were aged between 29 and 60, while the men were aged 30 to 54. At UniLurio, regardless of gender, the average age was 30 years while at UEM it was 35. Concerning marital status, more than half of participants (25) were married at the time of interviews (20 women and five men), 13 of the participants were single (three women and ten men) and the rest divorced (one woman). All married participants regardless of gender had at least one child.

In respect of their professional experience (teaching and research) the women and men were quite different. Considering all the women I interviewed, on average they had 12 years of service in their career, while the men had 10 years. The pattern for the participants at UniLurio was similar: here the female participants were more experienced professionally than the men. On average the women had six years while the men had just four years of service. Overall, UEM academic staff (researchers and lecturers) were much more experienced than UniLurio's. They had on average 13 years of work experiences while UniLurio's academic staff (lecturers¹¹) had 7 years. The majority of my participants in both universities had a Master's degree, but the number of doctorates among the UEM participants was notably higher (six females and two males had PhDs) than at UniLurio (two females and one male with PhD¹²). A small number (three) had only a licentiate degree (two women and one men).

The participants belonged to diverse ethnic groups. The majority of interviewees from UniLurio belonged to the Macua and Lomué (from the north of the province of Zambezia) ethnic groups while at UEM despite the greater ethnic diversity among the interviewees, the Changana and Ronga ethnic groups were over-represented among my participants. Although my research

¹¹ At UniLurio academic staff are researchers and teachers simultaneously while at UEM there are separate research and teaching careers. This is a very important point that should be unpacked (but in a different project than my thesis), as different career pathways have different impacts on women (and academics in general).

¹² These included a woman and man with PhD degree who were not part of faculty body at FNC and as such not included in Table 2.2 but they occupied a managerial position within the University.

was undertaken in different geographical and sociocultural contexts with different religious beliefs (in the north predominantly Muslim and in the south predominantly Christian), my participants were more or less homogeneous in both institutions with a great predominance of Catholics and Protestants, and very few Muslims. This means that at UniLurio most staff were not from the region but had migrated there.

Although my research was particularly concerned with women’s reported experiences in biological research careers, some male participants were included because as women’s colleagues their awareness, views and understandings about the challenges and obstacles faced by women was also relevant. Some of these males occupied positions of power both as academic managers and as professors, and their practices also influenced women’s academic life. Women and men, in academia, act in inter-relation with each other, and mutually influence each other’s situation. Further, the participation of male interviewees was also part of my feminist academic activism, inviting them to reflect (more critically) on women’s career status, obstacles and struggles in science disciplines, especially in biological research. For example, at the end of one interview, a certain academic manager said that the interview had led him to reflect on and learn a lot about issues that he had not previously taken into account in his daily practices managing the research at the university. Involving men thus had both an information-producing and an educative function.

The participants were heterogeneous regarding their functional roles, academic and experience levels. I had four types of participants: managers from both universities, lecturers, researchers, and students at postgraduate level. I focused on three main levels of functional roles: *central*: pro-vice chancellor (for academic affairs), scientific director, *intermediate*: faculty directorates (deans of faculty, faculty scientific council members), directors of research centres, heads of department of Biological Sciences; *local*: course directors, researchers and postgraduate students as showed below (see Table 2.3).

Although I had planned to interview 49 participants altogether, during my fieldwork I was only able to interview 39 people due to the unavailability or unwillingness of others to contribute. My interviewees were distributed as follows:

Table 2.3. Distribution of interviewees by sex and category.

Category of participants		Female	Male	Total
Academic managers		3	6	9
Academic staff (researchers and lecturers)	UniLurio	18 r+t*	6	24
	UEM	9r*		
		9t*		

Students in postgraduate programs	3	3	6
Total	24	15	39

*r = researcher; t = teacher.

Source: The author.

I had fewer interviewees than planned for the following reasons: 1) in one institution there were few academic staff with a PhD and I was only able to interview three such people, 2) another institution had limited postgraduate programs in biological sciences, and several of these programs were not running at the time of my interviews and 3) due to this lack of postgraduate programs (Master's and doctoral) within these two institutions, most of their postgraduate students (lecturers/researchers) were abroad and therefore hard to reach. The majority of people get postgraduate degrees in biological sciences abroad. In that respect they were like myself. Below I start by situating myself as an individual and researcher; then I reflect on the experiences I had in the settings as an insider-outsider.

My position as an embodied researcher in the field

Conducting an institutional ethnography through face-to-face interviews put me into direct contact with my informants. Marlene Laine (2000) maintains that ethnographic fieldwork includes the development of various kinds of relationships with people in the field which from the standpoint of researcher positioning can be described through insider and outsider notions or a mix of both. In spite of Abdi Kusow (2003: 597) arguing that the 'relationship between researcher and participant cannot be determined a priori such that a researcher can be categorically designated either an insider or an outsider' I understand that it is important to reflect on my positioning in this research. The researcher's identity affects the research access and outcomes as well as the participants (Boogard, 2019), and consequently the production of new knowledge. For Dieng 'every researcher whether they practice reflexivity or not, self-awareness or not, is talking from various locations and standpoints that do matter' (2019:30). I therefore begin by situating myself below.

Situating myself

I am a black Mozambican man, feminist, non-partisan, middle-aged, middle class, and at the time of my study married with two children, working in a public university in Maputo, capital of Mozambique where I live with my family. Since 2007 I have been employed at the Department of Biology of

the Faculty of Natural Sciences and Mathematics at Pedagogical University of Maputo (UPM) where I teach Biology.

Early during my undergraduate studies in biology, I became interested in gender and sexuality issues but I had no opportunity to learn social and cultural dimensions of human sexuality due to the strong emphasis on biomedical issues. Later during my Master's degree, I established contact with Brazilian researchers in the area, I became aware of and overcame much of my lack of knowledge of socio-cultural issues of human sexuality and sex education. This also allowed me to learn a little more about the possibilities of integrating these aspects into biology courses at the former Pedagogical University in Maputo. But in the context of our struggle against AIDS at the university, we explored its biomedical aspects rather the social and cultural issues related to individual practices. This pattern was also followed by the broader country in its strategy against AIDS, and as a result the AIDS epidemic in Mozambique progressed throughout the country. I think this was one of many reasons that motivated me to study the socio-cultural dimensions of gender and sexuality.

After my degree in biology I worked for two years in a non-profit NGO (non-governmental organization) in Maputo as program officer on a project for the empowerment of economically disadvantaged women. This allowed me to live close to the many challenges that Mozambican women face, especially in rural areas. When my contract expired, I was admitted to the department of biology at the public university in Maputo as a trainee laboratory assistant. I moved to the district of Montepuez in the south of Cabo Delgado province where I worked for five years in the department of biology of a local public university. During my stay in Montepuez I saw that my female colleagues were less engaged in research due to reasons I never understood and this undoubtedly also encouraged me to conduct this research.

Marlene Laine (2000) underlines that 'feminist scholars seek to transform traditional impersonal relationships into relations of equality and reciprocity, and some aspire to the development of close friends' (110), avoiding any kind of potentially exploitative relation with research participants or use of intrusive methods. The kind of relationships I established with my participants were influenced by the positionalities I assumed in different situations. According to Deborah Atobrah (2019:78) positionality 'creates in the ethnographer, an awareness and sensitivity to the potential effects of their biases, and to position herself in ways that such effects are mitigated or minimised'. My positionality, and both mine and the participants' identities were paramount to the success of this research. Thus as a man who interviewed a group predominantly composed of academic women, I had to reflect on the impact this characteristic and other factors might have on my data. To this end I problematize my insider-outsider identity below.

Insider, outsider or both?

Andrew Holmes (2020) argues that positionality in qualitative research encompasses

The individual's world view or 'where the researcher is coming from' [which] concerns ontological assumptions (an individual's beliefs about the nature of social reality and what is knowable about the world), epistemological assumptions (an individual's beliefs about the nature of knowledge) and assumptions about human nature and agency [that is] individual's assumptions about the way we interact with our environment and relate to it (1).

In this subsection I therefore seek to answer three main questions. Firstly, which factors influenced my positionalities in the field, secondly, what were my positionalities in different places and toward people I interviewed, and finally, how did my positionalities in these different settings influence the interactions that I had with women and men at different level and roles within university? Feminist critiques of science have shown that science, knowledge and researchers are not neutral (Code, 1993; Harding, 1993; Haraway, 2004). On the contrary they are embodied practices and subjects (Henry 2003: 229). Hence from a feminist point of view the assumption of researcher neutrality is critiqued due to the fact that the relationship between researched and researcher is seen as an embodied interaction of subjects. Reflecting on the researcher's positionality Snoya Dwyer and Jennifer Buckle assert that,

The issue of researcher membership in the group or area being studied is relevant to all approaches of qualitative methodology as the researcher plays such a direct and intimate role in both data collection and analysis. Whether the researcher is an insider, sharing the characteristic, role, or experience under study with the participants, or an outsider to the commonality shared by participants, the personhood of the researcher, including her or his membership status in relation to those participating in the research, is an essential and ever-present aspect of the investigation (2009:55).

Researchers as embodied subjects tend to position themselves as *insiders/outside*rs or experience both, influenced by the concrete field context (Laine, 2000; Henry, 2003; Ellingson, 2006; Eppley, 2006; Ergun & Erdemir, 2010). For instance, Liudmila Kirpitchenko and Lejla Voloder (2014) state that there cannot be rigidly defined boundaries between insider and outsider; the insider/outsider researcher's positionality is not fixed. Instead, it has been seen as continuum and hence as fluid, depending on the context. Karen Eppley (2006:1) therefore proposes a reconceptualization of the insider/outsider researcher positionalities in ethnographic research 'not as a fixed and binary positioning, but an unsettled, tenuous positionality situated within a continuum', expanding that discussion beyond the binary.

According to Xiaolin Xu (2016), 'it's possible for the researcher to be an insider as long as they share the same knowledge, values and attitudes of the studied community, no matter whether they have been socialized inside or outside the community ' (Xu, 2016:1). As a Mozambican returning to areas where I had worked and/or lived for many years, I was an insider who did not face certain difficulties which an outsider might have. I had prior knowledge of how things in general worked in the social contexts of my research, how people interacted with each other and how to engage with them. However, as an outsider in the researched institutions, the 'situated' knowledge and experiences I had proved to be partial. Hence I faced very particular challenges in accessing institutions and people, in interviewing, in how I positioned myself in the researched settings, in the kind of relationships I established with my interviewees (both female and male) and accessing documents as I shall explain.

Below (Table 2.4) I summarize traits that made me both an insider and an outsider.

Table 2.4. Researcher characteristics as insider-outsider.

Some characteristics that made me an insider.	Some characteristics that made me an outsider.
Mozambican citizen	Different ethnicities in diverse regions
Black	
Shared language/s (Portuguese)	
Doctoral student	Many interviewees in different educational (no PhD) and institutional positions.
Knowledge of HE system	Limited knowledge of specific institutions
Academic background in biology	Specific institutional academic environments unknown
Christian as the majority of interviewees	Studying abroad on scholarship
Male	Predominantly female interviewees
Middle-aged like most participants	Some interviewees older (studying up); some younger (studying down)

Junior researcher and lecturer in a public university	Some of interviewees were senior lecturers and in more powerful positions.
Married and having children like most participants	

Source: The author.

On the surface Table 2.4 suggests that my interviewees and I had more in common than not which means that our differences were not more significant than our commonalities. In fact, due to our similarities overall, I had no great difficulties overcoming the challenges that our differences posed to me as a researcher. Alison Griffith (1998) refers to the epistemological privilege of an insider due to the familiarity with the field sites and/or commonalities with the researched group. Despite being a researcher going home for fieldwork I did not go there with the assumption that my insider position would give me an advantage. On the contrary, I faced certain difficulties to gain access to one of the universities due to my outsider condition. The outsider position I inhabited in different moments and settings during the fieldwork raised some challenges and dilemmas (Saeed & Griffin, 2019) regarding accessing the institutions, documents, participants, and establishing rapport.

At one university I considered myself as an insider since I had worked in the same sociocultural context and geographical area in which the university is located for several years and on some occasions I had had the opportunity to work with the dean of faculty. But I had never been on the university campus before. This means that many of the internal factors such as the infrastructure, the work environment, teachers and researchers, etc. were unknown to me and made me at certain points an outsider. Overall, my field sites were neither utterly unfamiliar nor fully familiar to me. Therefore, even when conducting fieldwork in my home country, I considered myself in certain ways an outsider because I was confronted with knowledge, people, places, 'cultures' and facts of which I had limited knowledge and experience, despite having been a doctoral student at one university.

As a male carrying out research based on a feminist approach, and interviewing women, I understood that this enterprise was going to be to some extent challenging due to the kind of social interactions between women and men in my country, where power and control are important dimensions of the gender regimes. From a feminist viewpoint there is a sense that when men interview women and vice-versa the interview 'becomes laden with gendered performances and power struggles' (Gailey & Prohaska, 2011:366). As I prepared to conduct interviews with women as the main subjects of my research the first 'epistemological obstacle' was my gender identity, even though I consider myself a feminist man.

From a feminist viewpoint there can be a sense that women are better equipped to study women (Dahl, 2016). It requires gender awareness and methodological skills to avoid employing any potentially exploitative practices (Devault, 1990). Being a male, I was expecting that women might not feel comfortable sharing their lived experiences with me. But what occurred was quite the opposite. The female interviewees seemed very open in sharing their experiences and emotions with me. They looked at me as someone who was sympathetic and empathetic to them. Råheim et al. (2016:5) remind us that 'the participant's perception of the interviewer can influence their interaction'. Hence the willingness of those women to share their experiences, feelings and emotions with me was largely influenced by the perception and assessment they had of me and the empathy I demonstrated. As one said,

When the interviewer is friendly or sympathetic it helps us to be more comfortable, to talk more about us because it is not easy to talk about our lives (Latifa, fieldnote, 2019-10-30)

I found that the women I interviewed were comfortable enough to share not only their experiences within academia but also sensitive experiences regarding part of their struggles in their private lives, as Celeste did, due to the good rapport and trustworthy relations we had mutually built up.

Because when I separated I left the house, now I live alone with the children, in the city, rented house, so it is complicated (Celeste).

Overall people tend to hide their emotions and this type of information regarding their private lives from people who are not part of their closest personal relationships.

The women I interviewed also articulated emotional experiences when reporting their academic lives.

Few people here are really willing to give you an opportunity to show your potential, your skills, what you are really able to do and grow. But my mentor has been like a father to me for all the support he has given me [during the interview she gets emotional and cries]. Besides him my colleague and friend Jennifer who is like a sister helps me to survive here (Vera, lecturer, fieldnote, 2019-10-11).

I tried to assume the role of an active and collaborative listener by demonstrating empathy regarding the interviewees' stories which was 'very helpful in hearing and understanding the stories of people both similar to and different from [myself]' (Gair, 2012:140). Devault (1990) argues that 'women are less listened to than men and less likely to be credited for the things they say in groups; they are interrupted more often than men' (95). This meant that as feminist male I had to position myself to listen carefully to the women talk.

At the beginning of the interviews I therefore made it clear that I was not there to assess whether their answer was right or wrong. On the contrary, I wanted to hear and learn from their experiences. This stance was crucial to gaining acceptance from my female interviewees.

When I was planning the interviews with males, I decided not to disclose my feminist position to them in order to avoid any resistance to participation in my interviews. I knew that there was a certain resistance from males regarding gender issues. However, during the fieldwork I was confronted with male participants asking me why, being a man, I was interested in women's issues. This seemed to me a legitimate question but it was not possible to answer this question without disclosing my feminist position. I therefore explained to those male interviewees that I disagreed with the idea that gender was a matter only for women (because I already knew about this tendency to conceive of gender as a women's issues). I advocated that gender issues were of concern to both women and men. Furthermore, I also made clear that a research university, as indeed both institutions are currently proposing themselves to become in their actual strategic plans, would only be possible with the full and equal participation of women and men. So, being a man with a background in biology reinforced my interest in the subject. This answer in many cases seemed good enough.

However, later I realized that more than providing quick answers to satisfy my interviewees it demanded a more critical-reflexive activity on my part. It required a better understanding of the sense, meaning, contexts (both academic and social) in which those questions were raised as well as their epistemological and ideological reach. I ended up realizing that those questions were loaded with conceptions and representations of gender not only as a social category but also as a field of epistemological debate. As a social category even within subjects in academia the notion of gender is often misunderstood and misused. There is a sense that gender is a synonym for woman or talk about women's issues (Casimiro & Andrade, 2007).

Despite being considered a cross-cutting issue within Mozambican academia, gender issues still have little or no resonance in the sciences. This made me at certain point a kind of stranger among my peers (those with the same background in biology). Indeed, most academic production (including academic consultancy) on gender issues has been carried out by women as part of their feminist activism. So having a male instead of women doing this work is quite uncommon. In the past I was a victim of bullying from my male colleagues in the institution I work in due my involvement and academic activism around feminist issues. In their anti-gender attitudes they used to ask me if I was a man - being man in their sense implied rejecting all assumptions of gender equality. Therefore, a man's involvement in gender/women studies could be wrongly interpreted as abandoning part of one's masculine identity. All this constitutes evidence of male resistance to the ideals of gender equality within academia. In my view, this questioning of

my own interests in gender issues also reflects a masculinist subculture or 'hidden culture' of resistances and tensions regarding institutional gender policies (Tvendten, 2011).

During the fieldwork I realized that some of my interviewees knew me by name but had not met me face-to-face. When I introduced myself some of the participants said that they had heard somewhere that I had worked at a local university for five years. This contributed to reducing my outsider identity. The similarity between the interviewees and me in both universities in terms of age contributed to the establishment of a more level communication between us. Where I was younger than my interviewees, given our hierarchical culture, being younger conferred a culturally condoned sense of superiority to older interviewees towards me. My interview with a male older than me at one of the universities was delayed by about two days. At the appointed time he said that had something else to do. Not infrequently after waiting for hours I was informed at the last minute that it would not be possible to interview a certain man on that day and time. He said,

I really only came because of you, but let's quickly get it over with and let me teach (Baptista).

This stance, although showing consideration for me by accepting to be interviewed, also reflected the less privileged position that I had at that moment as an outsider, younger than him and a PhD student. Overall I was neither a complete insider nor a total outsider; I was in an ambivalent situation, a dual and shifting position as insider-outsider depending on the settings, situations and the kind of participants.

Data collection and analysis

In my thesis I combined document analysis and semi-structured interviews as the primary sources of qualitative data. Aside from the document analysis and individual interviews, some observational details were also captured in my field diary. I kept these personal fieldnotes for further analysis after each interview, and they were useful during the data analysis. Debendra Adhikari (2018) explains that 'fieldnote writing is a crucial means to documenting' (98) and preserving empirical data during fieldwork. The combination of these techniques has advantages, for instance to improve methodological validity. Glenn Bowen (2009) argues that the combination of document analysis with other qualitative research methods such as interviews, participant or non-participant observation, etc., provides a confluence of evidence that creates credibility. Furthermore, Bowen stresses that 'by examining information collected through different methods, the researcher can corroborate findings across data sets and thus reduce the impact of potential biases

that can exist in a single study' (2009: 28). In the following subsection I describe the two main techniques I used for the data collection and discuss them in the order in which I analyse the data in this thesis.

Document analysis

In my analytical process, I looked at the documents from a chronological perspective, and I organized their interpretation by trying to see how macro-level documents were taken up in meso-level ones (i.e. how national policies fed into institutional ones). In particular, I looked at how gender emerged in these documents. Consequently, I present my empirical findings following this chronological perspective of the documents and their coverage of gender from the national to institutional levels. Dorothy Smith (2005) argues that document analysis is instrumental for IE since the ruling relations within institutions are textually organized and mediated through discourses presented in institutional documents. Idalberto Chiavenato (2009) argues that formal organizational culture involves operational aspects such as the organizational structure, titles, job descriptions, objectives, strategies, practices, policies, personnel guidelines, methods, work procedures, productivity and financial measures. All these organize and coordinate people's everyday working relationships. The informal organizational culture involves items oriented to social and psychological aspects, such as patterns of influence and power, people's perceptions and attitudes, group feelings and norms, values and expectations, patterns of group interactions and affective relationships. Therefore, an analysis of the interplay between these formal and informal issues in the university work environment helps to understand their influences on women's careers as well as to portray the position of women in everyday academic life. I gathered such informal dimensions from my interviews.

I collected documents partly from the university websites and those printed locally made available by the relevant authorities. I analysed a set of official written documents dealing, broadly, with national and institutional policies, in particular national gender policies, strategic plans for higher education, university strategic plans, university gender strategies, research policies and annual reports. In these documents I explored what they tell us about gender and research as relevant to biological sciences. I also examine the approach of Mozambican policymakers to gender mainstreaming in higher education, mainly in relation to research, and evaluate the political framing of some crucial aspects of gender equality. Thus I analyse policy documents, starting from the national policy documents and then the local as illustrated in Table 2.5 below:

Table 2.5. Type of documents analysed in the two universities.

Governance level	Coverage	Issued by	Type of documents
<i>Central</i>	National	Government	National gender policy; Strategic plan for higher education.
<i>Local</i>	University	Rectorship (planning direction; scientific directorate)	Strategic plans of the universities; gender strategies of the universities; research policy. Annual reports
	Organic units	Faculty of Science Department of Biological Sciences	Faculty and departmental annual reports of activities.

Source: the author.

This structuring allows me to map the relationships between these documents, and their (dis)continuities and contradictions. I chose these documents because they reflect what is or was officially planned, the ongoing actions, the achievements and perspectives within the institution involving a gender viewpoint. Stephan Wolff (2004) claims that official documents represent institutionalized traces that can be used to reach conclusions about the activities, intentions and ideas of the organizations they represent. From this viewpoint all official documents constitute evidence about the formal organizational culture that legitimate its practices. In the absence of a finished or approved version of an official document, I use working/ongoing documents (such as a draft of a given institutional strategy or plan). These particular documents 'can provide rich veins of insight into how policy actors are thinking through the issues under study...' (Dalglish et al., 2020:1427). Document analysis allowed me to gain an insight into how gender issues fit into the processes of university life and their impacts on the institutionalized relationships between women and men in their research careers. In the institutional documents I examined the following aspects:

Table 2.6. Aspects covered in the analysis of institutional documents

Document selected	Data analyzed
University Strategic Plan (from 2014 onwards), policy documents, planning documents	Indicator used by the university to monitor progress on gender mainstreaming. Identify strategic approaches to gender in the university.
Gender Strategy	Integration of gender dimension into research and innovation, objectives, expected impacts and results, institutional mechanisms for promoting

	gender parity in research and STEM-related careers. Discourses on women in STEM research (objectives, goals, strategic actions).
Annual Research Report (from 2015)	List of funded projects, led by fe/male researchers. Women involved in research network or academic mobility. List of junior female researchers trained in Master's and PhD programs. Actions for promoting gender equality.
Research Policy, funding proposals	Gender perspective in the research aims, goals, indicators, expected impact from a gender perspective. Strategic actions/activities and programs, women's access to research funds, grants and fellowships, networking. Women's training.
Annual Plan and Reports of the Department of Biological Sciences (since 2014)	Mainstreaming of gender in the departmental annual plan of activities. Results, achievements, training activities of young women researchers, recruitment and selection of new researchers, advancement in career, financing of research projects led by women. Implemented action toward gender equality.

Source: The author.

I chose these documents because they reflect what is or was officially planned, the ongoing actions, the achievements and perspectives within the institution involving a gender viewpoint. Stephan Wolff (2004) claims that official documents represent institutionalized traces that can be used to reach conclusions about the activities, intentions and ideas of the organizations they represent.

Only some of the documents I gathered were available online on the universities' homepages (see Table 2.7).

Table 2.7. The process of gathering the documents.

Document	Finding document				Reasons
	Easy	Some- what hard	Harder to find	Impos- sible to find	
National gender policy	x				Accessible online

Strategic plan for higher education	x				Accessible online
Strategic plans of the universities		x			The most recent were not available online.
Gender strategy of the university		x			Not available online. Difficult to find hard copy.
Research policy		x			Partly available online.
Faculty annual report		x			Difficult to obtain as hard copy, document was not available on the homepage.
Departmental annual plan of activities				X	Unavailable online and hard copy was not provided.
Departmental annual reports			x		Not all versions I planned to analyse were available in one of the universities.

Source: the author.

The availability of documents on the university website is a measure of the institution's transparency and ensures that all potential users and stakeholders are able to access them easily. Accessibility of documents constitutes a best practice in institutional communication strategies. Conversely, inaccessible documents mean that they were not widely disseminated and hence may not only not be well and widely known, but also have little influence. From this viewpoint all official documents constitute evidence about the formal organizational culture that legitimate its practices. In the absence of a finished or approved version of an official document, I use working/ongoing documents (such as a draft of a given institutional strategy or plan). These

particular documents 'can provide rich veins of insight into how policy actors are thinking through the issues under study...' (Dalglish et al., 2020:1427). Document analysis allowed me to gain an insight into how gender issues fit into the processes of university life and their impacts on the institutionalized relationships between women and men in their research careers.

As with other qualitative research methods, document analysis has both advantages and limitations. Glenn Bowen (2009) argues that it is an efficient and cheap method of data collection since documents are in the public domain (on the internet or other) and they can easily be accessed without permission. This assumes, of course, that such documents have been put online but it needs to be recognized that this is not inevitably the case, and, indeed, was not always the case in the two universities where I conducted my research. Unlike interviews documents are not influenced by the presence of the researcher but of course the researcher interprets them and that is where the researcher becomes present. Bowen also identifies some limitations regarding document analysis. These are related to insufficient details to answer a research question given that documents are produced for some purpose other than research. Documentation is sometimes not retrievable, or retrievability is difficult, sometimes the access may be deliberately blocked and there is the possibility for biased selectivity that is the available documents reflect the emphasis of a particular organisational unit (Bowen, 2009: 32).

As already indicated, contrary to the literature above which mostly assumes relatively easy access to published documents (Bowen 2009), I experienced difficulties in obtaining detailed annual reports, activity plans and other documents relevant to my research. Although the managers in the universities I studied had declared their willingness to cooperate I experienced some difficulties in accessing the relevant documents in one of the universities. There were managers who believed that these documents were not for public consultation even if this was, at least theoretically, not the case.

At the time of my fieldwork the official websites of the universities did not have some of the documents (e.g., updated strategic plans, annual academic reports, research policy, gender strategies, etc.), hence I had to negotiate access to these sources (see table 2.8). I got some through informal gatekeepers. These gatekeepers were a childhood friend that I was surprised to find working in one of the researched universities as administrative staff, and my former lecturer. As I had a written letter authorizing my fieldwork, I requested (orally) the documents from the friend and former teacher. The relationship I already had with them made this easier and in any event, these were not secret or confidential documents.

Table 2.8. Documents accessed online on the university websites and via gatekeepers.

University A	University B
<ul style="list-style-type: none"> • Research policy • Annual reports of the University • Strategic plan 2008-2014 (extended) • Strategic plan 2018-2028 • The regulation of the scientific publication incentive fund 	Documents I sought to analyse were not available online.
Documents accessed via informal gatekeepers	
<ul style="list-style-type: none"> • Gender strategy • Annual report of the Department of Biological Sciences (2015, 2016, 2017) 	<ul style="list-style-type: none"> • Gender strategy proposal • Annual reports • Strategic plan 2010-2014 • Strategic plan 2016-2020

Source: The author.

At university A it was possible to find a considerable number of institutional documents online. However, the annual reports of the researched units (Faculty of Sciences/Department of Biology) were not there and I therefore had to obtain these in other ways as explained above. In those cases in which the university homepage had little by way of documentation I had to negotiate with informal gatekeepers using my 'insider' networks (Shenton & Hayter, 2004) to gain access to other documents. My access to the documents via informal gatekeepers was legitimate, not least because I had official research authorization from the universities.

There is a sense that sometimes gatekeepers can hide key information when they feel that their personal and/or institutional interests are in some way threatened (Lane, 2000). In Shenuka Singh and Douglas Wassenaar's (2016) words, 'all institutions and organizations have an autonomous right to permit or deny access to their information, space, personnel and clients and/or service users for research purposes, unless such information is already published in the public domain' (2016: 42). However, not all lack of documentation is about purposeful withholding. In some institutions websites are simply not very developed due to a lack of resources and know-how. Nonetheless, according to Mozambican national law, all information of public

utility must be stored in such a way as to facilitate access to potential interested parties, unless they are considered confidential or a state secret (Anon., 2014/5). In Mozambique, there is a legal framework that guarantees access to information, established in the constitution (Anon., 2018a).

As a counterpart to the document analysis I also conducted semi-structured interviews. Next I outline the theoretical assumptions underpinning my interviews, and details regarding the interviewing process (e.g. where, with whom and how they were conducted).

The interviews: a theoretical foundation

As a feminist man doing IE I sought to explore women's obstacles and challenges in biological research at the university through the lens of their experiences. As most of these experiences remained undervalued or hidden in the context of higher education institutions in Mozambique and to bring up these experiences to the surface I used a feminist perspective of interviewing as an embodied and purposeful conversation between the subjects to collect/gather information (Burns, 2003; Kvale, 2006; Hesse-Biber, 2007; Ellingson, 2012). As a 'conversation with a purpose' I did not see interviewing as a neutral process where informants are taken as mere 'objects' rather than subjects with their own subjectivities, experiences and particularities (Burns, 2003). As noted by Marjorie Devault and Glenda Gross (2012) this assumption 'neglects the dynamics of power involved in any empirical research: the hierarchical, often charged relations between researcher and informants, the politics of interpretation and representation' (206) that can shape the interview process, influencing the patterns of responses provided by the informants and hence affecting the research. Sharlene Hesse-Biber (2007) claims that 'interviewing is a particularly valuable research method feminist researchers can use to gain insight into the world of their respondents' (114). Such a feminist stance invited me to challenge the simplistic view of doing interviews as just asking questions.

Conducting interviews from this feminist assumption demanded on my side as researcher and male a constant 'epistemological vigilance' in my relationships with my participants (especially with women and those in hierarchically superior positions) during the interviewing. I shall discuss this further below.

The interviewing process

As part of my ethnographic work I conducted semi-structured one-to-one interviews which I audio-taped. Through this process I identified some dis/continuities between the documents I analysed and what my participants said. Interviewing proved to be a dynamic, dialogical and mutual learning process. All the interviews were held in Portuguese (official language) over

a four-week period at each institution. The individual interviews lasted between sixty and ninety minutes. As the subjects' participation was voluntary, all participants were encouraged to choose the most convenient place and time for their interviews. The interviews were recorded with the permission of the participants to preserve the integrity of the data (Firmin, 2008) after they read the information sheet and signed the consent form (see appendix A and B). The recordings form an accurate account of the interview which can be replayed for analytic purposes.

As an interactional and embodied process there was also the potential for interviewer biases which might misdirect the informant (Payne & Payne 2004; Yin, 2011) but to minimize this I used an interview protocol with guiding questions (see Appendixes C, D and E). Based on the main categories/characteristics of my informants and the kind of information I was seeking to explore with each group at different levels and functional roles within the university, I produced three interview guides for different constituencies of interviewees. I combined my interview guides with follow-up questions (e.g., in what way..., what do you mean with..., why do you think..., etc), to go beyond the participants' initial response and get some details, clarification, and further information. As much as possible, I tried not to hinder the flow of the interview, and only interrupted when I realized that a new space had opened up in our conversation.

Before starting the interviews each participant was invited to read and sign the consent form (Appendix B). Only after this was the interview initiated. Loretto Quinney et al. (2016) argue that this is a fundamental ethical requirement prior to any data collection. Thus I followed the Swedish ethic review authority guideline to protect people in my research. The interviewees were also informed of their right to withdraw from the interview without any penalty. The interviews were held in different settings (in offices, in the car, in the laboratories, under trees, in a restaurant and on the beach) and mostly during normal working hours (only three were conducted during the weekend). The diversity of places in which the interviews were undertaken is explained by the need to obtain a quiet space that allowed the conversation to be recorded without interference, a private and secure space to preserve confidentiality and promote the interviewee's trust (Quinney et al., 2016).

Conducting some interviews at the interviewees' work place (teacher's room) and during working hours sometimes proved to be counterproductive. There were times when I had to interrupt the interviews because the interviewee was called away to urgently attend a meeting or respond to a manager's concern. Due to this and before starting to record the interview, I proposed to my interviewees that we both turn off our mobile phones to avoid those interruptions. It was also for similar reasons that some interviews were held in more diverse places. But despite feeling generally prepared I had not expected to conduct any interview on the beach, for example. However, one

participant told me that a natural environment (beach) brought inner peace of mind, serenity and calmness so that she could freely share her personal experiences with me. Interviews that took place away from university offices seemed more fluid since the interviewees felt more relaxed and without work-related pressures. In the interviews with my participants, I was not concerned to follow the order in which the questions appeared in my interview guide instead I covered all of them depending on the dynamic of my conversation with the interviewees. This turned my interviews into a more dialogical social inquiry (Smith, 2002) stimulating and embodied process rather than a mechanic process of just asking questions.

Overall in the interview process, I adopted a 'bottom-up' interview strategy by starting to interview people in non-managerial or functional roles. Thus women and men in managerial positions were left to the end. I began by interviewing intensively the majority of women who did not occupy managerial positions and in the end some of their male colleagues. My dialogue with these women gave me a standpoint from which I explored during my interviews with people in functional roles as well as in my scrutiny work with institutional documents. This differential process of doing interviews allowed me to learn about the intersection between gender, career position and gender awareness mainly about women's obstacles and challenges in doing research that created differences between women and men in their career advancement.

Before interviewing academic managers I also utilized part of the information I had read in the strategic plans of their universities as the starting point for my conversation with them. For example, I asked academic managers about the institutional concerns and objectives regarding gender issues and how these were reflected in the university key documents. I asked this to get a 'flavour' of how those elite interviewees activated gender-related information contained in these documents in their daily practices of academic managements.

Although I was aware of the problem of power asymmetries with my interviews it was not always possible to minimize or overcome power differences (Lancaster, 2017), for example with elite interviewees (e.g. top managers, rectors and pro-vice chancellors). In these cases, age (seniority), academic degrees (PhD) and functional role shaped the process, so I had to act in accordance with the strong hierarchical institutional culture, showing respect and politeness. In fact, interviewing people in powerful positions (managers) in their offices, in their territory of power within the institution, was challenging. This challenge of interviewing senior professionals, the so-called 'elite interviewees', has been reported in different studies (Quinney et al., 2016; Boucher, 2017; Empson, 2018; Liu, 2018). Certain power imbalances between myself and my elite interviewees were also reflected in the places where the interviews took place. The top managers' office did not offer a neutral environment to me. The office interiors reflected the high-

level position of their occupants. They were loaded with symbols of power that were not only symbolic but also material (a flag of the republic on the left and one of the universities on the right, in the wall behind there were a picture of the president of the Republic). There usually was a huge table with chairs around and my potential interviewees at an executive desk. These were extremely formal settings, with enough elements to make the interview quite normative. This could almost make me a spectator of the managers while they spoke due their powerful positions (Mikecz, 2012; Liu, 2018).

In Mozambican academic culture there is a tendency to 'power distance' from subordinates (UEM, 2019a). Managers, senior lecturers and/or professors make clear distinctions between themselves and subordinates. As a doctoral student I experienced something different in the Swedish academy, concretely at the Centre of Gender Research of Uppsala University, where all people, both junior and senior, as colleagues call each other by their first names rather than by their position or degrees for example. This is not seen as impolite. It was really difficult at the beginning of my PhD to adapt myself to this new academic culture. In Mozambican academic culture calling people in powerful positions by their first name can be seen as disrespectful. For me interviewing people in the Mozambican academic milieu meant that I had to conform to that academic culture as a junior researcher and doctoral student.

Max Kelly (2019:137) claims that 'our own experiences, skills, subjectivities experiences, cultural norms and values travel with us, and we bring some of these subjectivities to qualitative fieldwork'. Hence I addressed my elite interviewees (both female and males) in terms of the prevailing 'academic etiquette' in their functional role (eg. Dra/Dr..., professora/professor, Director, Her Magnificency, Rector Magnifico, etc). Without being obsequious as Laura Empson (2018) underlines, it was necessary to be formal and respectful in my approach. Despite our power differences I approached those elite interviewees with an awareness that they were also my fellow professionals. This mentality was fruitful, helping me to overcome or at least diminish psychological obstacles (like anxiety and nervousness) that I initially felt before entering their office.

When I spoke with interviewees in non-powerful positions or managerial roles, regardless of gender, with the same academic degree and position in their career as myself, I asked for permission to call them by their own names instead of academic titles as is usual. On all occasions I obtained their approval for this. This was part of an effort to reduce obstacles in our conversation.

Perhaps due to my outsider identity in those university settings some managers felt a bit suspicious or wary of me even though I introduced myself as a doctoral student. I realized that there was a potential fear for some of the elite interviewees (managers) that I might be a disguised journalist (this is not an unusual occurrence in Mozambique). In other words

they may have felt scrutinized. That fear is quite common and understandable in many public Mozambican institutions due to the leakage of institutionally sensitive documents to newspapers through undercover journalism, for example. One senior manager for instance said to me, 'I hope that what I am going to say here will not be published later in a newspaper'. In order to deal with this issue I had to assure them that I was not a journalist but just a doctoral student showing them my student card issued by Uppsala University.

In general, the elite interviewees were very collaborative after I had introduced myself and explained the objectives of the interview. My first effort was to gain their trust and create rapport. Sometimes this happened over an initial cup of coffee. During our coffee I used social conversation as a strategy to adapt to that environment (Mikecz, 2012). Those moments of social conversation were quite important to reduce the excessive formalism of the interview (Empson, 2018). I usually started these elite interviews by asking a general question about the interviewee's roles within the universities even though I already knew about these.

From a feminist viewpoint there is a sense that oppressed social groups have a better understanding of the world (Harding, 1993; Alcoff, 1995; Brooks, 2007) and surrounding environments than their oppressors. However, Max Travers (2001:135) asserts that 'members of the subordinate group are often unable to perceive that they are oppressed'. The implication of Travers' assumption is that there is a lack of awareness among women about the forces and social structures that oppress them in a given patriarchal socio-cultural or organizational context. In my interviews I did not find that to be true at all. For instance a young female participant said,

...being a woman has some bearing due to this social issue yet not in terms of knowledge and ability that a woman has, no. It is really due to the social issue that we end up having less liberty compared to men (Lara).

As can be noted from the quote above, women were well aware of the different structures and forces that subordinate them. Contrary to Travers, and in line with my experiences, Acker claims that 'workers in lower-level, non-management positions may be very conscious of inequalities' (2006:452). In line with Acker's statements, I found that women in non-managerial or junior position revealed a critical awareness of their own career obstacles and challenges and more so than the people in elite (powerful) positions who actually revealed a certain lack of awareness as I discuss further on.

Marjorie DeVault and Liza McCoy (2006) suggest that interviews with managers and administrators should usefully be conducted in the later phases of institutional ethnography so that the 'researcher can use information gained from frontline workers to direct the interview' (30). The interviews

covered different issues depending on the role of informants within the university (see Table 2.9).

Table 2.9. Main topics covered by the interviews according to the role of the interviewees.

Interviewees	Main topics covered
Academic managers.	Gender and inequalities in the workplace. Gender dimensions in official documents. Institutional mechanisms and incentives to encourage and promote women in research. The participation of women in biological research (obstacles and challenges).
Lecturers (senior and team leaders).	Women's engagement in biological research. Training of female researchers. Challenges and barriers for female researchers. Structure and functioning of the research groups.
Junior lecturers, researchers and students.	Motivation, researcher career paths. Experiences, views, representations and practices in career management. Obstacles and challenges. Career progression and satisfaction. Expectations and career aspirations.

Source: The author.

All these topics were part of two main analytical dimensions in my work:

- I. The institutional dimension (gender and organization culture): as an important complement to the document analysis, this domain focused on individuals in power positions within the university (academic managers). The issues covered were gender in research policies, strategic plans, the annual plan of the faculty of science and the department of biological sciences, gender in annual graduate plans, institutional mechanisms to facilitate women's participation in research in sciences, academic mobility programs, recruitment strategies, selection and training of junior researchers, career development mechanisms for researchers.
- II. The individual dimension: The assessment of individual dimensions focused on informants in non-managerial roles. Here the topics were personal experience, personal values, career management and expectations, motivation, experiences, career and work environment satisfaction, career constraints and obstacles, career progression.

Participant observation

In my research observation was a complementary research method I conducted to a very limited extent. This had to do with the fact that at the time (end of October) in which the formal authorization for the data collections was issued the two universities were at the end of the second semester and in a short break for exams. Consequently, it was a relatively 'dead period'. Secondly, at the local level, there were limited funds to support my expenses for the planned time of my fieldwork, consequently, it was reduced. It meant that there were prior conditions (restrictions) that did not enable me to perform my observations in more systematic and extensive ways. Timothy Diamond (2006) reminds us that 'as with place, time is immanent in participant observation' (60) hence not infrequently doing observation raises questions of time commitment.

However, even being aware of such limitations, at the time of the interviews I was able to make some ethnographic notes, in my field diary, about feelings, emotions and non-verbalized expressions I observed. I also made some field notes in my diary on how some gatekeepers reacted when I asked to get access to some institutional documents.

Where interviews were conducted in laboratories I had an opportunity to observe the features of these laboratories. I also observed how people talked and interacted with each other, including myself in the corridor and cabinets, their gestures. So to some extent, I was engaged in observational work that provided rich and fruitful contextual information. According to Julia Phillippi and Jana Lauderdale, (2018) field notes as part of observation 'aid in constructing thick, rich descriptions of the study context, encounter, interview, focus group, and document's valuable contextual data' (381).

All the information that came out from observations was crucial after the interviews (during the interview analysis), refreshing my memories on how we (my interviewees and I) interacted. For example, I utilized these ethnographic notes from the field diary to remind myself about the aspects that shaped my interaction (interviews) with different people, the hierarchical and power asymmetries when interviewing academic managers, their office layout and content. I paid attention, for example, to how our bodies were situated in the settings of the interviews, and to the symbols of power (e.g., national flag) and hierarchies, and my vulnerable position as a PhD student located in the huge and impressive rooms of senior staff. I could distinctly remember additional details of each of the interviews by rereading my ethnographic notes.

Interviews data analysis

I used thematic analysis (TA) as the method to analyse my interviews data. Thematic analysis can be defined as 'a method for identifying, analysing and

reporting patterns (themes) within data' (Braun & Clarke, 2006:79). My analytic procedures in TA I performed (Table 2.10) was based on the six steps suggested by Virginia Braun & Victoria Clarke (2006):

Table 2.10. Steps followed during the thematic analysis.

Steps	Description
Step1. Familiarizing myself with the data sets.	Listening to all recorded interviews, reading and re-reading the interviews transcripts, capturing some initial ideas and making some notes.
Step 2. Generating initial codes.	In this stage the data were organized in a meaningful and systematic way through a grid analysis. I did this by hand initially, working through hard copies of the transcripts with pens and highlighters. I copied extracts of data from individual transcripts and collated the codes (see table 2.11). I initially planned to use qualitative data analysis software (NVivo) but as I had no access to it in Maputo so I coded by hand.
Step 3. Searching for themes.	I examined the different codes and some of them clearly fit together into a theme.
Step 4. Reviewing themes.	During this phase I reviewed, modified and developed the preliminary themes that I identified in Step 3. I checked if the themes made sense in order to guarantee their coherence (internal homogeneity) and distinction from each other (external heterogeneity). For this I used the 'cut and paste' function in MS word. I gathered all the data that were relevant to each theme.
Step 5. Defining and naming themes.	Here I continued to refine the themes in order to determine what aspect of the data each theme captured. I went back to the collated data extracts for each theme and organized them into a coherent and internally consistency. I checked if each theme had specific identity. I also added some narratives that could easily be used in step 6.
Step 6. Producing the reports.	At this point I started to write the analysis chapter on women's obstacles and challenges in their research career) and the analysis chapter on women's career paths.

Source: The author, adapted from Braun & Clarke (2006).

Thus, to begin my analysis I read all the transcribed interviews in their entirety with the intention of becoming familiar with them, capturing general

information about their structural elements and locating where there was content that I was looking for, for further, more detailed analysis. In a second stage, I explored their contents in order to identify those contents that directly or indirectly related to my research topic. Finally I performed a thematic analysis as described in the data analysis (see Table 2.10). In the analysis of the themes their relevance for my research questions was considered. Coding helped me to critically analyse my interviewees' accounts. All my codes were semantic and provided a short description of the data. Table 2.11 illustrates a sample of the codes.

Table 2.11. Coding samples.

Quote	Transcripts	Coding
1	For us women, mothers, wives and researchers, it has not been easy to reconcile all these roles/tasks.	Work-family reconciliation
2	I have seen that for my colleagues who are married, have children, they have more social burdens and it has not been easy for them to manage that.	Family burdens
3	I can't go abroad and leave my husband, leave my children here, they are still small.	Going abroad
4	lack of highly qualified teachers who can mentor junior ones	Mentorship
5	Here is a lack of female role models who can show and inspire them that it is possible, that they are capable.	Female role models
6	There's really no incentive, whether or not I do research my salary remain the same.	Incentives
7	Today is characterized by the lack of resources at the institutional level allocated to the researchers.	Resources
8	Seemingly men win more research projects than women.	Access to research funding
9	Our scientific production is still very low when compared to men because we have so many tasks, it is the social issue, the family issue and then work.	Academic performance
10	For men, it is easier to progress in their careers because it's easier for them to stay working for a long time until late at night, including in the laboratory.	Career progression
11	The salary, subsidies and progression of those who teach are much higher and faster than those who dedicate themselves to research.	Career attractiveness
12	It is not always easy to reconcile teaching, research and administrative tasks, many of us teach three or more subjects and in large classes.	Workload

13	We have no practice of planning research funding in which additional resources are allocated to women.	Gender in planning
14	We need structured laboratories, with the necessary equipment and after that those consumables are available.	Equipment
15	So you choose either you work to gain your salary or you want to ensure that you changed something in the community.	Choices

Source: The author.

From the list of my codes I then extracted the following core themes: i) Family issues, ii) going abroad, iii) finance/access to research funds, iv) incentives system for female researchers, v) work obligations, vi) work conditions, vii) careers support for women, viii) career progression and ix) women's decisions. Later, all these themes were reviewed, refined, reduced and modified during the analysis process into new/final themes: i) sociocultural issues (eg. conventions on family, marriage, women's role and men's position in society); ii) immaterial work conditions (e.g. conditions for studying abroad, mentoring and role models, financial issues in research and publication, work-life balance, expectations of and investments in female career progression and promotion, individual research practices, attractiveness of research career), ii) material work conditions for doing research (e.g. infrastructural conditions of laboratories, equipment, reagents), and iv) individual reactions/attitudes in the face of macro- and meso-level obstacles (e.g. resigned/accommodated, confident, dissatisfied, non-conformist attitudes, will of making changes, proactive, confident, expectations). In the context of my research thematic analysis proved to be an effective method to identify patterns in the responses of my interviewees and thereby also explore what was different among them.

Finally, in my analytical procedures, I decided to use direct quotes of what my interviewees said. Smith reminds us that in the interviews 'the ways in which people [...] speak incorporate the socially organized relation in which their experiences arises' (2002:31) either within the university or in broader society. Thus, what women reported about their experiences in biological research was connected to what other people were 'doing [or not] elsewhere and elsewhere' (Smith, 2002, id.). In other words, their experiences can be mapped in connection to local and extra-local processes and practices. I now turn to discuss the main ethical issues in my research.

Ethical concerns

In my research I followed ethical guidelines in Sweden and Mozambique. In Mozambique the need for ethical approval through a specific ethics committee (of bioethics) exists only for research involving experiments with living organisms and human beings. As suggested by the Swedish ethics review authority <https://etikprovningsmyndigheten.se/for-forskare/vad-sager-lagen/>) and Swedish research council in “good research practice guideline” (<https://www.vr.se/english/analysis/reports/our-reports/2017-08-31-good-research-practice.html>) before conducting my fieldwork I had to obtain permission/approval from the local competent authorities. To do so I submitted a formal letter with full details of my research and how it would be conducted etc. to the competent university entities to obtain their authorization/approval. I shared with these authorities a printed copy of the consent form that I later gave to each of the participants in which I showed my commitment to data protections, and detailed the rights of my informants including the efforts I would undertake to protect the image of the involved institutions. To this I also attached a formal letter issued by my main supervisor who has oversight over my thesis, proving that I was a PhD student registered at the Centre for Gender Research of Uppsala University under their supervision and that my research was funded by SIDA. I also provided to the local university authorities with my full personal contact details both in Mozambique and in Sweden as well as the contacts (email and phone number) of my supervisors. I also had to submit a document (*guia de marcha*) issued by the institution that locally established myself as a scholarship international student in the SIDA-funded subprogram 2.1.2. Gender mainstreaming. I have no exact knowledge of the internal process of decision-making about this but I was issued with the relevant document three weeks later.

One of my ethical concerns in the first stage of the research before the fieldwork was designing the information letter and consent form (this involved information about the overall plan for the research, the purpose of my research, the methods for data collection that will be used, the consequences and risks that research would entail, the principal investigator and supervisors, that participation in research was voluntary, and the research subject's right to suspend his / her participation at any time without penalties). After permission issued by the competent University entities I had negotiate individually and face-to-face with my potential interviewees to obtain their consent to participate voluntary in my research. Thus I provided for each of them before the interviews a consent form, I also clarified all concerns and questions they had. Only after making sure that my participants read and properly understood the consent form and signed it I proceed with the interviews. I made sure to acknowledge and emphasize the participants' rights to withdraw with no potential risk. Here, I as a researcher had the responsibility

to explain as fully as possible, and in terms meaningful to the participants, what the research was about, why it was being undertaken and how it would be presented. I stressed that the consent form was for the research participant's protection. Through this I sought to reassure the interviewees.

Since I accessed certain participants via informal gatekeepers, they sometimes asked me if I had already interviewed person X or Y. To protect my interviewees' identities I simply responded no, when in fact most of the times I had already interviewed those people. Some informants also asked other interviewees if they had already been interviewed by me. Even though in these cases I had no control over the participants' responses I always asked each of my interviewees not to disclose their participation and/or share information given during the interviews with anyone else to protect themselves against potential harm.

A strive to protect participants' from being identifiable anonymity was important due to their ongoing professional relationships within the work place. Since many participants knew each other, the use of pseudonyms was not enough. To protect their identity further I chose to withhold some information such interviewees' background, names of courses and institutions to which they were affiliated, the discipline they taught, their scientific specialities. I also changed the names of places that could be seen as identifying information. In the final version of my analysis chapters, the organizational affiliation of my interviewees are not disclosed and where professional background is not directly relevant, it is not reported. But gender, academic degree, marital status, age and roles (broadly described) as key analytics categories were kept. Nevertheless, when there were very few people with a given academic degree I chose not to disclose it.

Ethical issues were not limited to protecting informants from being identifiable. Interviewing mostly women and given the potential influences of our gender differences according to the traditional gender regimes in Mozambique during the interviews, I tried as much as possible to assume the role of a collaborative listener, as already discussed. This worked quite well. Nonetheless, the women I interviewed often asked me if they had answered questions well or not. As Bella did:

So it's this is the way I am... the way I think. I don't know if [laughter]...I gave the correct answer. At least that is what I know, right! (Female lecturer).

On these occasions I emphasized that I was not interested in getting right or wrong answers but only in listening to what they had to share. I tried to make them feel that they were truly the experts of their own experiences. This contributed to overcoming at least some of our differences. Overall I did not face very many ethical dilemmas in my research due to the flexibility with which I negotiated my insider-outsider position with my interviewees as well as with the gatekeepers in each of the institutions.

In the next chapter I begin presenting my data analysis, focusing on the documents I gathered in the two universities.

3. Gender in national and institutional policies and strategies for higher education in Mozambique

This chapter is concerned with the results of my analysis of a set of formal written policy documents issued by the government and universities dealing broadly or in a more specific way with gender issues. I explored these documents' interconnectedness from a gender viewpoint and their impacts on women's research careers in biological sciences. Below I present the main findings of this process, starting with the national documents and then moving to the institutional ones.

The national gender policy of Mozambique

From 2000 onward Mozambique began to make an effort to formally integrate gender equality within public policies as 'cross-cutting issues', as a result of the government's commitments following the Declaration and Platform for Action of the IV World Conference on Women in Beijing (1995), the SADC Declaration on Gender and Development (1997) and gender strategy of African Union (2009). Since 2000 gender issues have become an integral part of most Mozambican development plans and national strategies (Tvedten et al., 2008; AU, 2009). For analytical purposes I divide the implementation of the national gender policies and related strategy (PGEI) into two periods, the first one from 2006-2016 which I call the 'first wave' of the gender policy or PGEI 1, and the 'second wave' of the gender policy' (PGEI 2) that runs from 2018-2028.

The first 'wave' of PGEI 1

The first national gender policy and its related strategy of implementation were approved by the government through Resolution n. 19/2007, of 15 May, of the Council of Ministers. They aimed to establish gender mainstreaming in all development plans and public policies (Loforte, 2004). The policy in question is here understood as 'the set of programs, actions and activities carried out by the State and public or private strategic partners,

aiming to ensure a certain citizenship right' (CNAQ, 2015:2). The main goal of the PGEI 1 was to establish national guidelines to enable decision-making and design strategic actions needed to raise the status of women and gender equality in the country as shown in the Table 3.1.

Table 3.1. The first national gender policy (PGEI 1).

Purpose of the document	Target audience	Authorship	Agenda of the doc. creator
Provide, in an integrated way, the main guidelines to be taken into account in the designing of sectoral strategic plans of the various public and private institutions with respect to gender equality, human rights and strengthening of women's participation in the country's development.	Governmental and non-governmental institutions, researchers, politicians, mass media, international partners, civil society, religious and political leaders and parliamentarians.	Council of ministers (the government of Mozambique).	Contribute to reducing gender inequalities and promote gradual change in the mentality of both men and women regarding gender-based discrimination.

Source: the author.

The main priority groups of the PGEI 1 were,

Women and men living in an absolute poverty situation, with emphasis on female heads of family, elderly women and men with disabilities and unemployed, women and men affected by HIV/AIDS, women working in the informal sector, rural women and workers, young and older adults. (Anon., 2006c:16)

As can be noted from the quote above, this list does not address specific occupational groups such as female academics for example despite their particularities and needs, similar to other women in socially and institutionally disadvantaged positions, who were also not explicitly included in that list of priority groups. In fact, it should be noted that until mid-2015, that is, nine years after the approval of the first gender policy, there were no policies and tools specifically designed to address gender issues in the tertiary education sector in the country.

Gender issues in the PGEI 1 were addressed in relation to five main strategic pillars, namely the political, economic, legal, socio-cultural, and defense and security levels, each with their respective strategic actions. Analysing the relevance of the content (objectives and strategic actions) integrated into each of the pillars, I found that only the political, legal and sociocul-

tural domains partially covered my research topic. Consequently I do not discuss the economic level, or the defense and security domains. Two relevant themes for my study emerged, the first one concerned 'legal aspects' involving questions around laws and political frames to promote gender equality in public and private institutions. The second one was about 'supporting initiatives' regarding practical and complementary actions to support the political and legal frames as examined below.

Legal aspects

From the viewpoint of the legal aspects, PGEI 1 advocated a need 'to review discriminatory legislation against women, create laws and administrative mechanisms to prevent and eliminate all forms of discrimination against women' (Anon., 2006c:12). This shows a recognition of the fragility of the national framework then in force in the country in supporting women's lives and careers in different sectors of activities. It had to do with fact that most of the legislation in the country at that time dated from the colonial period (Arthur et al., 2011). Therefore there was a need to 'harmonize and adjust the body of legislation to present socio-economic, political and cultural realities' (Bergh-Collier, 2007: 54). Consequently the legal reform undertaken for the establishment of a national framework for gender equality promotion suggested a commitment to the cause of women's struggles that I consider an important achievement since the country's independence. Gender equality has been defended as a constitutional principle in Mozambique since 1975 but there was a lack of anti-discriminatory laws and policies from a gender point of view (Bergh-Collier, 2007). Despite criticisms and gaps in the process of implementation, the approval of gender-responsive legislation and policies has provided a substrate for the fight against gender inequalities to take place in a more structured and institutionalized way that goes beyond the political rhetoric as happened in the early stages after independence.

The PGEI 1 document also recommended that 'all sectors of activity [should] adopt programs and action plans in which gender perspectives were integrated' (Anon., 2006c:12). This was an explicit effort to institutionalize gender mainstreaming as a strategy, an important part of the national agenda for sustainable development. Since then Mozambican policymakers have engaged in designing and implementing a series of instruments in order to improve the condition and status of women.

However, the policy document stated that 'women's emancipation and gender equality [were] not only achieved through their inclusion in the [national] laws but demanded a more complex process of removing economic, *social and cultural barriers* that often require a thoughtful practice of positive discrimination in favour of women' (Anon., 2006c:2 *emphasis added*). This meant recognition of the complexity of gender inequality across the country as well as awareness about possible clashes across the country due

to its cultural diversity, cultural values and norms. A recognition that positive discrimination is required in favour of women was important as a strategy to boost their participation in the public life of the country, as was the fact that the text points to intangible barriers such as social and cultural ones which are notoriously hard to shift. Nonetheless positive actions might require supporting initiatives.

Supporting initiatives

According to the PGEI 1 policy document the first action to support the different key actors was to 'develop capacity building and training actions for the stakeholders with a view to providing them with the institutional technical capacity to successfully coordinate and implement activities linked to gender policy and implementation strategy' (Anon., 2006c:15). Parallel to this there was the creation or institutionalization of gender units (GU), entities within each institution that were meant to guarantee the integration and mainstreaming of gender as well as the operationalization of the objectives and strategic actions of the PGEI 1 (Anon., 2006c). Nevertheless, as Ana Loforte (2004) suggests, a considerable part of the implementation of gender mainstreaming in the public sector failed due to the lack of technical skills and competencies on gender issues of the people within GUs.

Another important strategic intervention to complement the legal frame was the 'inclusion of themes about women's human rights, equality and gender equity in the education curricula to raise the awareness of children on such matters' (Anon. 2006c:13). This concern to address gender issues within the national education system was strongly concentrated on primary education. This had to do with the national imperative to fight the high rates of absenteeism and school dropouts among girls in primary education which, in the context of Mozambique, is strongly linked to sociocultural issues such as initiation rites and early/child marriages rather than to economic factors (poverty). The policy recognized the need to 'promote girls' access to education, scientific and technological training' [and at the same time] to raise society's awareness of the need to reduce the burden of housework on women and girls [and thereby] dedicate themselves to their training' (Anon., 2006c:13). As part of the so-called 'cultural heritage' and socialization, school-age girls suffer from more household tasks as part of what has been considered a 'normal' process of building their gender identities as women (Osório & Silva, 2008). This has been one of the greatest cultural barriers affecting girls'/women's educational advancement.

The policy document recommended that '*families* should create conditions for the involvement and sharing of family responsibility between women and men in family planning, pregnancy, raising and bringing up children' (Anon., 2006c:13 *emphasis added*). This suggests two things: firstly, the

policy recognized that the domestic and family sphere impacts in particular ways on girls' education (Roby et al., 2009; Assaad et al., 2010). Secondly, there was no equitable distribution of domestic tasks between the sexes (Putnick & Bornstein, 2016). This compromises females' academic performance and/or educational attainment (Emmanuel, 2015) and consequently creates patterns of educational gender differences. However, this policy document said nothing about institutional involvement in creating supportive tools for the greater equitable sharing of family responsibilities between women and men. This had to do with the fact that the text looks at this issue as solely a family concern or initiative. Wright and Rocco remind us that 'symbolically, texts function to organize and dictate social and cultural space for particular individuals and groups because they rely on shared beliefs and ways of expressing those beliefs' (2007:3). Thus it is crucial to challenge this view of the work-family balance as a domestic concern for women. This is a transformative shift needed in the country's public policies especially for higher education careers since translocal ruling relations within families organize the social niche occupied by women through their social ascribed roles.

Some scholars have argued that household chores together with marriage are the biggest deterrents against girls' schooling and women's career outcomes. This may also explain the policymakers' concerns with domestic work overload of girls and women (Putnick & Bornstein, 2016) even though they do not suggest concrete actions through which this issue should be addressed at institutional level. Thus there is a need for awareness-raising actions to change the mindset within communities and local institutions regarding these cultural practices. It also means working to change the roles and tasks that men assume within households. Families and institutions are key actors at the local level contributing to the transformation of socio-cultural norms and harmful practices against women (UN Mozambique, 2020).

The PGEI 1 advocated 'the need to promote the access and training of women [increase in the number of them] in courses or areas traditionally attended only by men' (Anon. 2006:13). Here the document does not make explicit reference to STEM-related courses and also does not provide any clues as to how such an action might be implemented. With respect to research, I found that throughout the document, the only explicit concern with gender issues in research was contained in subparagraph g) of point 1.4, concerning sociocultural issues. Here, according to the PGEI 1, there was a need for the country to create a national database on gender issues by promoting more gender research in order to 'improve knowledge about the impacts of gender relations in all sectors of activity' (Anon 2006c:14). Nevertheless, as I evidenced in my literature review, 16 years after the implementation of PGEI 1, there is still a scarcity of research in Mozambique on the experience and participation of women in scientific research in STEM in higher education. Furthermore, women's presence among researchers still

remains extremely low. There seem to be no obvious strategic interventions the country has undertaken in order to boost female participation in STEM careers, specifically among faculty and researchers within HEIs.

The policy established awareness-raising actions to change the mindset within communities against certain cultural practices that impede the advancement of girls and women. However, the policy referred neither explicitly nor implicitly to maternal and paternal leaves or 'family-friendly' policies that support women's and men's work (Nyberg, 2012). I shall discuss this issue in relation to the support the women academics I interviewed reported receiving from their male partners in their careers. As will be shown, there is a gap between the discourse in these political documents and what women continue to experience in this domain eighteen years after the first national gender policy.

Finally, the policy document included a list of macro indicators and gender equality targets (e.g., an increase in the percentage of enrollment, retention and achievements of girls in educational institutions to 50% by 2015; an increase in the percentage of women in power and decision-making bodies to 40% by 2015). These are all quantitatively measurable outcomes that is they are more concerned with numbers than with the quality of the implementation processes. In a situation of acute deficit such a focus on numbers is important. However, the indicators made no explicit or implicit reference to the tertiary education sector and the participation of women in male dominated fields as already mentioned. In other words, although this action was foreseen in the text, it was left out in the indicators for monitoring and evaluation purposes. This makes it much less likely that such measures are implemented.

In sum, the PGEI 1 intended to cover gender equality in all facets of life and Mozambican society with the main goal of establishing and implementing an initial political and legal framework that would work as a kind of launching pad and support for all programs, projects and action plans for the promotion of gender equality. The implementation of the PGEI 1 revealed some important advances but also a series of gaps, constraints and challenges that led the government towards the implementation of its second gender policy that I discuss next.

The second 'wave' of PGEI 2

This second national gender policy was approved in 2018 by the Council of Ministers through resolution n. 36/2018 of 12 October (Anon., 2018c). As with the previous one, the operationalization of the PGEI 2 was also shared by different strategic actors (see Table 3.2).

Table 3.2. Overview of the scope of the national gender policy (PGEI 2).

Purpose of the document	Target audience	Issued by	Aim
Provide guidance in an integrated way of the main lines of action for the promotion of gender equality and respect for human rights across the country.	All the public and private institutions, civil society, non-governmental organizations, research institutions, international organizations, political parties, religious groups and mass media.	Council of ministers (the government of Mozambique).	Establish and implement a political and supporting frame that contributes to promoting gender equality in the formal sector. Promote attitudes and practices conducive to gender equality and equity in all spheres.

Source: the author.

In the PGEI 2 gender issues are addressed around 9 strategic domains (four more than in PGEI 1) or areas of intervention: i) legislation, ii) governance, iii) education and training, iv) reproductive rights, sexual and reproductive health; v) productive resources and employment, vi) gender-based violence, vii) conflict mediation and peace-building; viii) media and information technologies and ix) environment and climate change (Anon., 2018: 2587).

Differently from the previous national gender policy, sociocultural issues are no longer a strategic pillar of PGEI 2. In other words, those social, cultural ideologies, relations and processes that produce experiences of marginalization and subordination of women across multiple sites of Mozambican society (Wright & Rocco, 2007) for example within the family, academia and elsewhere, disappeared in the text as one of its mainstays. As the socio-cultural relations and ideologies are also present in the universities shaping their ruling relations and fuelling the inequality regime, this disappearance is to be regretted. It suggests a rising conservatism within gender policy making.

Only the political, legal, education and training domains, as well as productive resources and employment, addressed issues of gender and research. Thus governance, gender-based violence, environment and climate change and the rest of the strategic domains are not discussed here. My analysis of the statements within each domain resulted in two broader analytical categories: legal approaches and supporting initiatives towards gender equality. The first consisted of statements addressing legal and political aspects to

support gender mainstreaming in government and multilateral organizations activities, while the second involved initiatives especially designed for supporting women in the educational field (as an incentive to help women in STEM) and employment.

Legal approaches

In the political and legal domains, the first concern was still to ensure the institutionalization of gender issues through their mainstreaming into national policies, systems and institutional processes. In this regard, the policy document advocates a need to

ensure that [all] plans, policies, programmes, strategies and budgets [of public and private institutions] promote gender equity... each sector is responsible for the integration of gender dimension into its strategic plans and economic and social plan, including gender objectives, actions, indicators and targets... (Anon., 2018c: 2589).

Notably, the main concern of the PGEI 2 here is to encourage all the sectors of activities and institutions to mainstream gender within their planning and management instruments. This paves the way for all higher education institutions to mainstream gender into their institutional mechanisms. According to the global gender gap index 2021 Mozambique has moved forward in tackling gender gap especially in the political arena and currently occupy the position 32 of the 156 countries included in the ranking thanks to its efforts in implementing legal reforms and gender-responsive tools (World Economic Forum, 2021). This is encouraging data for the country as it shows that gender gaps can be overcome through a commitment of the political and academic leaderships in designing and implementing properly a set of legal reforms and gender policies instruments in their settings. Despite this overall progress of the country in reducing gender gap the greater challenge still is the country's performance in educational attainment especially in tertiary education where the imbalances have still not been bridged (World Economic Forum, 2021).

Bearing this to mind the policymakers in the PGEI 2 document advocate that one should 'apply legislation and public policies [already designed] to eliminate social and cultural practices harmful to the exercise of women's human rights...' (Anon, 2018c: 2587) especially in accessing education, in the possibility to continue their schooling till completion of a university degree and later pursuing a career. This seems to be a key issue for the country's efforts to bridge the gender gap in educational achievement.

Currently, one of the greatest challenges Mozambique faces in promoting gender equality is the effective application of the existing policies. From this point of view there is a need for the country to invest more in strengthening

institutional mechanisms in the educational sector to ensure the proper implementation of these tools. This applies in particular to the need to ensure the implementation of anti-discriminatory laws and policies (Krizsán & Zentai, 2006; Long & Kavazanjian, 2012). Nathalie Holvoet and Liesbeth Inberg (2014) argue that one of the common criticism that has been made on the implementation of these national gender policies is that institutions at local levels have completely ignored them in their planning activities. This undermines the country's capacity to achieve its goals. In 2008 Tvedten and colleagues reminded us that 'neither national governments nor donors have managed to make the transition from policy statements and legal frameworks to significant progress towards gender equality and women empowerment' (Tvedten et al., 2008:1). This remains the case in 2022. It suggests that much more remains to be done regarding the implementation processes of all these policies.

Feridoun Sarraf (2003) draws attention to the challenges and obstacles that make the implementation by the national government slow. They include gender-biased cultures within institutions, and lack of gender analysis expertise in most government organizations. Although the strategy of gender mainstreaming is not that new in the global context, in Mozambique most institutions and sectors are still unfamiliar with it as it is not part of their traditional planning concerns and practices. Some scholars have argued that for developing countries such as Mozambique weakness in planning and monitoring techniques and inactive gender focal points or gender units are other crucial aspects that slow down the national process of implementing gender-responsive policies (Sarraf, 2003; Lele et al., 2011). Therefore there is a need to provide gender-sensitivity training especially for senior managers and technicians at different levels of planning, human resources, administration and finance, and institutional research management in academia to build their gender awareness and consequently integrate gender perspectives into their institutional instruments.

To ensure the application of the legal framework and gender equality policy in the country, the PGEI 2 emphasizes the need to 'define *means of sanctioning non-compliance* with the legislation on gender equality' (Anon., 2018c:2587 *emphasis added*). Here there is a change in tone, from an appealing to a more prescriptive one. This hardening of the government's political discourse, in which the policymakers emphasize that it will be necessary to use appropriate sanctions, suggests an awareness of the existing resistance in the operationalization and implementation of the policy. Although policymakers advocate the need to implement punitive measures, they do not specify in the document the type of measures to be adopted. Besides due to the fear of sanctions singular and collective (institutional) persons can act strategically to integrate gender issues into their formal policies, programs and plans but without any guarantee that they will be de facto engaged in fostering gender equality at different levels of the institution.

Finally, as with the previous gender policy, the PGEI 2 also has a particular line about women within the family. The policy document recommends the need for 'strengthening legislation so that the family institution is respected and the rights of women and men are ensured' (Anon., 2018c:8). Differently from the PGEI 1 this quote shows a clear change in discourse with respect to more equal and shared family responsibilities, as for instance in domestic tasks advocating the need for male involvement in household chores alongside their wives. From a more progressive discourse that suggested a need for sharing household chores, childcare, etc., a new, I would say, normative and conservative discourse about the family as institution is articulated, clearly aligned with the prevalent gender order in the country. This is evident in the fact that no further mention is made about men sharing household tasks. This change may suggest an acceptance of the socio-cultural fact that women's social burdens within the family and its associated household chores have not changed, and as such women continue to live and work in a disadvantageous position that somehow, however, cannot be changed or helped.

In this regard Conceição Osório & Teresa Silva (2008) state that 'despite the advances that have been made towards the adhesion of men and women to a norm of equality, more visible in urban areas [than rural], this has not been translated into [changes of] practices within families' (119). Despite the prevailing public discourses in modern and urbanized Mozambican contexts about egalitarian relations in domestic tasks, Mozambicans' practices within families contradict what is said publicly, showing a continuing strong adherence to the traditional ascribed social roles for women and men. Thus, at the family level, women are still heavily burdened by domestic tasks and roles since all their socialization and family experience remain based on these. Consequently the silence of the text around male co-responsibility in household chores conveys a more conformist view and attitude with regard to this male hegemonic position. Further, the assertion about 'respect towards the institution of the family' sounds like an assertion of the status quo where the family is 'protected' as an institution but protected against what is something that is unclear in the text. It is unclear how this squares with the notion that the family ensures the human rights of women. Indeed, women have been eliminated in this rendition which instead references an abstract notion of 'women's rights'. One might therefore overall argue that PGEI 2 is regressive in gender terms.

Although the document further defends the importance of 'encouraging a change in attitudes towards promoting shared responsibilities within the home' (Anon, 2018c: 2589) it does not suggest actions regarding how this will be achieved. Clearly, this discourse of a need for ensuring shared responsibilities between women and men in domestic work contradicts the previous one in which the policymakers advocated the need to protect family and women's rights within it. Since Mozambican society largely espouses

traditional gender roles, ‘protecting the family’ as this policy document suggests implies not only its structure but also its functioning based on these rigid roles, social conceptions and local cultural norms (Osório & Silva, 2008). This certainly enables society to maintain and perpetuate inequalities and hierarchies between women and men. Indeed it helps to explain the overall disadvantaged position women occupy in the university too, particularly in STEM careers, despite the existing discourses of gender equality in the public sphere.

Even considering the legal provisions established in family law regarding equal rights and duties between women and men within the family, the text of PGEI 2 clearly omits the need to adopt family-friendly policies as a tool to support women’s careers. It means that the PGEI 2 does not take into consideration the potential risk of the clashes between women’s academic tasks and family duties. This is an important aspect that, although culturally sensitive in the context of Mozambique, needs to be broadly debated and addressed. Indeed, the legal provisions contained in the earlier family law passed in 2004 provide grounds for equality and measures against discrimination within the family (Arthur et al., 2011). Spouses here are assumed to support each other reciprocally in all aspects of family life including household chores (Bergh-Collier, 2007). However, what is usually seen is that men, traditionally considered the breadwinners, contribute to the household expenses while women, seen as caregivers, are mainly responsible for carrying out all domestic chores, childcare, etc. even if they have paid employment outside the home as well. On this Maria Arthur and colleagues stress that,

Despite attempts to establish ‘an ideal’ marital model through norms governing a civil union, the rules governing traditional marriage enable them to be neither effective nor respected. In theory, gender equality and respect for women’s rights are guaranteed by law [...]. In practice, and given that most unions are either informal (de facto unions) or customary (traditional marriage), most women continue to be denied the rights guaranteed by the Constitution... (Arthur et al., 2011:16).

This contributes to the reproduction of existing inequalities. I discuss this issue in more detail in the next chapter.

Supporting initiatives

The document foresees a series of complementary support actions in various social domains but I focused only on those related to women’s education and training in STEM. The policy document does not suggest which actions should be undertaken in order to provide support for women’s careers in academia. The first concern expressed in the policy document has to do with

a need to 'ensure the access, retention and successful completion of women and men at all levels of education closing the gender gap' (Anon., 2018c:2587). Although girls and women are the majority in the Mozambican population, they are the least educated due to the effects of sociocultural and economic issues that end up generating patterns of gender inequalities in access to and completion of different levels of training (González, 2015).

Inge Tvedten et al. (2008) claim that education is still one of the 'most important areas for intervention on the issue of gender equality and empowerment of women' (2) and as such it has been this sector, mainly primary education, that has attracted more investments from the government and its cooperation partners. Due to this fact the completion rate for primary education has risen to above 50% for both sexes. Nevertheless, this rate drops sharply for women in higher education where statistics show that the completion rate is 40% for women (INE-Moçambique, 2019). This explains why the policymakers have been concerned about women's training in HE with a particular focus among the student population at the undergraduate levels and less on women among academic/research staff.

In spite of that, the policy document recommends that all stakeholders make efforts to engage women and girls in STEM to 'increase the number of girls choosing science, technology, engineering and mathematics' (Anon, 2018c:2588). Thus it would be interesting to examine the ongoing strategic interventions in HEIs to boost the participation of women in STEM courses both among the student population and the faculty body in the Faculty of Science. This is important for changing the existing gender imbalances in STEM that Mozambique, like many other countries, has struggled to overcome.

Since 2006 the national gender policy document has explicitly mentioned the status of girls and women in STEM. The inclusion of this topic in the policy document may, on the one hand, contribute to awareness about it in society at large, and academic institutions in particular. On the other hand, it might contribute to mobilizing actions and resources for attracting young women to science, and providing support to women already in science careers, and thereby overcoming female underrepresentation both in teaching and in research in STEM. The integration of the gender perspective in HEI and institutional plans of universities need to reflect this national concern regarding the underrepresentation of women in science. As I have already argued, although gender issues have a cross-cutting status in education, they have not been part of the traditional concerns of scholars in the field of science. This may also explain the dearth of intervention programs and projects based in secondary schools specifically oriented to attract a greater number of women candidates to courses related to STEM in Mozambican universities. Furthermore, these interventions across the country should be based on the empirical evidence provided by local research on this matter that however is still sparse.

Moreover, it is necessary to produce structural solutions for the precarious conditions in which science teaching and learning occurs in secondary schools, a fact that can also contribute to the low motivation to pursue science disciplines. Several studies have shown that the majority of high school graduates have no opportunity to develop practical knowledge of science disciplines, for example, to work in a laboratory for basic experiments, handle basic instruments such as microscopes, test tubes, etc., which is often only possible in universities (Anjo, 2018). Although the policy document is somewhat ambitious from the point of view of provision of these resources, a structural deficit is still in evidence, for example, in access to high-tech resources, equipment, microscopes, computers and high-speed internet in higher education institutions. The covid-19 pandemic has further exposed this structural weakness (Zunguze & Tsambe, 2020).

Finally, from what I have said so far, it is evident that despite some differences and discontinuities between the two policies documents their main goal in the education field since 2006 has been to ensure equitable access to formal education and training for girls and boys. It is quite encouraging to find reflected within the text a clear concern for girls and women in STEM. The framework in these gender policies provides a ground for all academic and research institutions as key actors in policy implementation to engage in reversing gender disparities in education, particularly in STEM. The main political measure recommended to achieve this is mainstreaming gender in the institutional policies, strategies, programs, projects and sectoral action plans with a focus on teaching, research, university governance, and outreach.

In order to understand the interconnectedness of sectoral instruments with the discourses addressed in the national policy documents, I will next examine how gender issues, particularly about women in science, are addressed in the national strategic plan for higher education.

Gender in the strategic plan of higher education (2012-2020)

Mozambique's main goals, visions, objectives, strategic indicators and priority actions for the tertiary sector are set out in the higher education strategic plan 2012-2020 (PEES 2012-2020). This nationwide document that guides all policies, strategies and actions reflects the Mozambican government's vision for higher education over an eight-year period (MINED, 2012).

The PEES was written in a context marked by the strong expansion of higher education institutions across the country. It was a nationwide document developed centrally by the Mozambican government together with different stakeholders: representatives of public and private HEIs, the coun-

cil of rectors, and the Ministry of Education (MINED). Given the macro-social, economic and educational context of higher education in Mozambique, the PEES elected as its main goal 'the promotion of *equitable participation and access* to higher education' (MINED, 2012:9 *emphasis added*). In the plan there were 10 strategic areas of intervention, namely: quality, expansion and access, management and democracy, financing and infrastructure, governance, regulation and supervision, teaching, research, cross-cutting-issues, internationalization and regional integration (MINED, 2012). The document mentions gender and equality only as something that needs to be taken into account (see MINED, 2012: 74) Gender is there as an issue to be dealt with in the future instead of an instruction to be followed and achieved. In the text discourses on gender and equity are exclusively addressed in relation to access to higher education. As such gender issues are not mainstreamed in the rest of the strategic areas of intervention in the document - this conveys a view that gender does not matter in research and other domains of academic life in higher education. In other words, it means that although gender issues are considered a cross-cutting issue in all strategic axes of the HEIs, there is a greater concern with ensuring equality in access and less on gender imbalances in STEM and research careers among faculty.

The policy document stresses that 'the socio-economic factors, ethnic and regional origin, gender and others should not be impeding factors for accessing higher education' (MINED, 2012: 20). The low levels of research in higher education may be why priority has been given to gender equality in access instead of in research. This is particularly relevant if we take into account that despite the rapid expansion of HEIs across the country the Mozambican higher education system still is an elite system in which less than 6% of the population are enrolled (Miguel et al., 2022).

The fact that gender issues are not addressed in teaching and research constitutes strong evidence of the disconnection between the PEES 2012-2020 and the national gender policy (PEGI 2) which advocated the need for mainstreaming gender in these two pillars of academia. Perhaps due to the specificities of the PEES, gender issues were superficially addressed, leading policy-makers to establish a separate instrument to deal with this matter in detail, which I will examine next.

Gender Equity Strategy for Higher Education (2018-2023)

In 1995 the Government of Mozambique approved the so-called post-Beijing action platform that focused on the mainstreaming of gender in public policies (Casimiro & Andrade, 2009). More than two decades later, the country

has its gender equity strategy for higher education (GESH). This is a national guideline document for strategic actions that will be undertaken to address gender inequalities in higher education. In discussing the GESH 2018-2023 I focus my analysis on those aspects that directly or indirectly connect with gender *in research* with a particular focus on STEM.

Structurally the GESH is divided into two main parts: the first can be considered the *general framework* of the strategy in which a brief description of gender imbalances in higher education is presented as well as the vision, mission, objectives, principles and goals of the strategy (MCTESTP, 2018). At this point the main concepts such as gender, gender equality, gender parity, gender mainstreaming are explained, and the strategic domains of action with their respective indicators and expected results are also presented. The second part of the document is the action plan with details of the budget and stakeholders to ensure the achieving of the goals (MCTESTP, 2018).

The purpose of the GESH is to 'ensure the promotion of equity, equal rights and opportunities for people of both sexes in access to a quality higher education and pursuit of academic career and academic management successfully and discrimination-free higher education' (MCTESTP, 2018:9). From this quote it is clear that the country elected the need to ensure access to HE (a constant in policy documents) and the pursuit of an academic career as the priority for tertiary education. The topics covered in the GESH centre on three main areas of strategic action, namely the political, legislation and the curriculum. The election of this triad as structuring axes of the GESH is perfectly aligned with the national gender policy that also integrates these aspects. However, GESH, due to its specificity and mission, addresses these issues in a more focused way in relation to tertiary education. Regarding the political domain, the first strategic objective defined in the document has to do with the 'promotion of equal opportunities for the entry, maintenance and *advancement of men and women in higher education and academic careers*' (MCTESTP, 2018:15 *emphasis added*). As can be noted, differently from the previous documents I analysed, this is the first time that concerns with gender equality in career advancement in HE appears in the texts. I found this very encouraging since it encourages HEIs to pay more attention on inequalities between women's and men's career progression in academia and as such to implement interventions to combat these inequalities. Here, the strategy aim is to achieve 'an increase in the number of women progressing in [academic] careers, in management and leadership positions in HEIs ' (MCTESTP, 2018:16). These leadership positions in academic careers involve mainly teaching and research.

The text clearly indicates the strategic actions through which the above-mentioned goal is to be achieved. These include:

Action 1.3.1: promote the representation of *competent women in decision-making_processes* in higher education and HEIs. Action 1.3.2: create condi-

tions for the equitable presence and access of *competent women in management and leadership* positions both in the areas of academic management and university governance. Action 1.3.4: ensure that men and women responsible for decision-making processes and in academic management and leadership positions in academia *are sensitive to global gender issues and those specific to the HE* subsector. Action 1.3.6: create mechanisms for valuing, retaining and encouraging *capable women* in the academic career, governance and leadership of HEIs (MCTESTP, 2018:16-17).

As can be noted from the quote above, the discourse makes a clear appeal to the ideology of 'meritocracy'. Words such as 'competent', 'competence', 'capable' are consistently used followed by the word WOMEN as some of the requirements that seemingly solely women MUST show to be nominated for positions of power within the university. This discourse should not be seen as a coincidence; quite the contrary, as it is used consistently and unconsciously this may suggest that this implicit gender bias is deeply rooted in the policymakers' mental schemes and as such part of broader 'ideological and social processes that produce experiences of subordination' (Devault & McCoy (2001:754) work for women. In addition the discourse seems to be somewhat contradictory. On the one hand, it preaches a supposedly gender-neutral ideology (of meritocracy) in progression and appointments in academia. On the other, it demands that women and men in positions of power show awareness of and sensitivity to inequalities between women and men in academic careers. I will return to this after in Chapter 4, examining how such discourses around competence and meritocracy affect women's careers in academia.

In the policy framework, the strategy aims to 'create mechanisms for valuing, retaining and encouraging more *capable* [and highly skilled] *women* in the academic career, governance and leadership of HEI' (MCTESTP, 2018:18). Valuing, retaining and encouraging women still remains a challenge and the policy document does not suggest how HEIs should operationalize such a discourse. So, the supportive actions for women's careers in HEIs remain vague. Strategic interventions such as the implementation of family-friendly policies, an improvement of women's salaries, and an integrated system of research incentives for faculty/researchers possibly aligned with their research outcomes/academic productivity, as well as research scholarships for women to increase their academic qualifications and access to research funds, would be desirable.

Legislation

The main concern here is to ensure reproductive rights and a work-life balance for both students and academic staff. According to the document there is a need to 'ensure gender equity in higher education through an appropriate

legal framework taking into account sexual and reproductive rights' (MCTESTP, 2018:20). This quote implies that there is a lack of a more comprehensive and inclusive framework that is 'appropriate' to the practical needs of academic women during reproductive events (pregnancy, childbirth, breastfeeding and child-rearing). In fact, the existing national instruments such as the labour law and the general regulation of the public servants and state employees only safeguard the rights and interests of employees in academic/professional careers (Anon, 2017, 2018a). This means that unlike a female lecturer or researcher at the university, a student who becomes pregnant during the course will be more likely to quit or postpone their training program. In many cases, these students do not have the possibility of studying from home or a reasonable amount of time to make up missed curricular activities after childbirth, due to the extremely inflexible study regime. Despite the fact that there is a possibility for students after pregnancy-related absences to return (UEM, 2020), structural barriers can prevent them from continuing and force them to postpone or quit their studies. As such, one of the strategic actions foreseen in the policy document is to 'ensure that motherhood, paternity including their leave and family responsibilities are not grounds for discrimination' (MCTESTP, 2018:20). This can be achieved through the implementation of flexible absence and attendance policies keeping female students connected to university after the birth of a child or during childcare.

The right to parental benefit during parental leave is statutory according to the Mozambican social insurance system that women need to apply to during pregnancy. Although statistics on social security are available for the last 30 years, there is no indication of the number of women who have benefited from maternity allowance across the country (INSS, 2020). According to the maternity benefit act, Mozambican women workers are entitled to a maximum of 3 months' (90 days) maternity leave while male employees are entitled to 7 days (Anon., 2018). This is clearly a source for discrimination and inequalities between women and men in baby care. Such a difference shows two critical issues: firstly, that paternity leave is symbolic and does not allow equal participation of the couple in the care of the baby; secondly, that women more than men are required to adjust their careers for family life. This perpetuates the academic tenure-track gender gap. A study by Maureen Baker (2010) in Canada found that parental leave is less used by men. This is the case in many countries. To be more gender equitable, the current system of parental leave in Mozambique needs to be revised or rethought to allow for shared parental leave that would be useful for women in academic careers.

Academia

This point covered gender-related issues in teaching (curriculum) and research that are addressed very briefly. Further, I found that two of six strategic actions defined in this domain refereed directly to research and four to teaching, evidencing a greater weight concerning gender issues in teaching than in research. According to the GESH the main objective both for teaching and research is to 'promote the degenderizing of careers and disciplines in academia' (MCTESTP, 2018:23), in other words it means fighting against the growing association of certain careers and disciplines with a specific gender. For example in Mozambique women enrolled in the Social Sciences, Biological Sciences, Medicine, Health Sciences and Education outnumber their male counterparts and consequently these disciplines are tendentially perceived as more suitable for women while male figures are usually linked with STEM. Makarova and colleagues remind us that '[these] gender-science stereotypes of [...] science can potentially influence young women's and men's aspirations to enroll in a STEM major at university' (Makarova et al., 2019:1). Against this backdrop, the policy document is concerned with strategic actions that can contribute to counter this trend.

One of the actions foreseen in the policy document to achieve this end is to 'expose high school students to successful female [models] in STEM as well as male models in Social Sciences and Humanities' (24). As noted the target group here are students from secondary education, this is also a good starting point of the school-based intervention that aims to promote science as a career among young women and candidates to university. A similar concern should exist with regard to young female researchers and assistants who are already pursuing academic careers at the university enabling them to have greater work contact/or working with other senior and/or doctorate women as female role-models in science careers through mentoring or networking programs. There are studies suggesting a positive effect of young women exposure to female role models in STEM careers (Drury et al., 201; Herrmann et al., 2016; Breda et al., 2020; González-Pérez et al., 2020). This is even more relevant and critical for the Mozambican academic context in which women remain a minority group among students, faculty and researchers in STEM-related careers (UEM, 2021b). Yet in order to reduce gender gaps in research, the document highlights the need to 'increase opportunities for research scholarships for women in the higher education in order to achieve a gender balance' (MCTESTP, 2018:16).

The achievement of this remains a great challenge for most HEIs. For example, more recent statistics from UEM show a strong persistence of gender imbalances in the awarding of scholarships where more than 60% of scholarships were awarded to male students and less than 34% to female students regardless of course and level of training. This trend is also noted among faculty being trained (UEM, 2021b; Kruse et al., 2017). In other words, it

appears that achieving gender equality in this field is still a mirage. Scholarships for teachers and researchers training in science also need to be accompanied by the implementation of family-friendly policies. Interestingly, this gender strategy for higher education intended to 'create funding lines to include family and child care for researchers in at least 10% of HEIs' (p. 32). However, it appears difficult to make an assessment of the effectiveness of this action since there is a lack of evidence regarding the real number of female researchers and faculty covered by this kind of initiative.

There are no concerns about gender imbalances among faculty with PhD degrees. This suggests that women are most likely not yet benefitting from this type of scholarship. The institutional assessment in one of the Mozambican universities carried out by Stein-Eric Kruse and colleagues (2017) supports this assertion. They reported that 'women faced difficulties in being able to go abroad for studies, often meeting resistance both from their own families who see this as a violation of their domestic responsibilities and from colleagues who do not like to see that women rise above them' (Kruse et al., 2017:60). From this viewpoint, the implementation of women-friendly scholarships together with 'sandwich' training programs may encourage more women to apply for doctoral training programs abroad as these kinds of flexible scholarships allow women to reconcile their academic needs (training and research) with their family roles although such measures do not alter the underlying gender inequalities. There is a need to expand the list of gender objectives, actions and indicators which are not yet properly addressed in the strategy.

Finally it is important to note that the text elaborates a list of gender indicators for each result and/or action but they fail because they are mostly quantitative. The main concern of policymakers appears to be simply changing (increasing) the number of women at all levels without, necessarily, challenging or dismantling the foundations that generate inequalities between women's and men's careers in higher education. I acknowledge that this emphasis on numbers can make sense in the social and higher education contexts of Mozambique that are still characterized by strong gender imbalances at all levels. Further, actions to counteract this are still being designed and/or at the beginning of their implementation. Numbers are important in measuring gender imbalances but they are not adequate enough to capture the dynamics of gendered processes and practices that create gender inequalities in academic careers, especially in STEM. For this reason scholars have argued that gendered practices and processes within institutions do not necessarily disappear by increasing numbers of women in a given setting (Günter et al., 2021) since inequality regime elements very often operate in a subtle manner (Acker, 2006 2009). So, attention should also be given to the quality of social and institutional processes, practices and relations that are harmful to women in their academic careers. Thus gender indicators foreseen

in the text need to go beyond numbers. Next, I examine Mozambique's gender strategy for research.

The gender strategy of the national research fund (2016)

Mozambique's strategic vision to promote gender equality in research and innovation is addressed through the gender strategy of the national research fund (GE-FNI). The National Research Fund¹³ (FNI) is a Mozambican government statutory agency, directly linked to the Ministry of Higher Education, Science and Technology. The FNI constitutes the main research funding agency that supports knowledge production at the national level through competitive research funds. In GE-FNI 2016 gender is a cross-cutting issue and is mainstreamed in each of its six main areas of intervention.

According to the FNI their gender strategy aims to 'foster [gender] equality in the research field, in order to remove sex-based discrimination and encourage a more balanced [participation] and diverse environment within the scientific research community' (FNI, 2016:3). This suggests a recognition by the central government through the Ministry of Higher Education, Science and Technology that in the Mozambican academic environment women continue to face strong barriers to realizing their potential. This is probably also exacerbated by the fact that until 2015/16 the majority of Mozambican HEIs had no policies or gender strategies in place to overcome gender inequalities or initiatives to increase women's representation in academia. Such governmental recognition constitutes a crucial starting point for the design of an institutional/university framework to 'stimulate gender equality of opportunities [at universities] and diminish regimes of inequality' (Teelken & Deem, 2013: 520) as well as supporting women in academia (Winchester & Browning, 2015).

To tackle those challenges the strategy highlighted key areas such as girls'/women's training; discrimination and gender stereotypes in the research field; work-life balance; gender pay gaps and imbalances in accessing research funding; women's self-confidence; and research networking for women researchers (FNI, 2016). The document also advocates the need to close the gaps in the participation of women in scientific knowledge production and innovation to achieve gender balance in science (STEM). This goal is pursued through the promotion of girls' and women's education, in order to raise their academic qualifications and through affirmative action to improve their access to (higher) education through scholarships; combating gender stereotypes in research and the factors that induce poor representation

¹³ The FNI manages national public (governmental) and international funds by strategic partners who support the building up of the scientific and technological research capacity of Mozambique.

of women in research (FNI, 2016). For example, one of the main objectives of the GE-FNI (2016) is to

Implement actions for the identification of different forms of discrimination and inequalities between men and women in the field of research to the point of fostering the emergence of a gender awareness in institutional culture and a movement that values the contribution and role of women in the research (FNI, 2016:12).

Implicit here is that institutional gender awareness does not yet exist or remains weak in most Mozambican academic/research institutions. Although GE-FNI 2016 addresses gender issues in six strategic domains I would highlight something that emerges in this strategy which has to do with concerns regarding the work-life balance, motherhood and other family obligations for female researchers. With respect to the work-life balance the document states that ' [there is a need to] promote a collective awareness that domestic work and child rearing are no longer strictly female functions, but a [more] balanced and neutral sharing of family responsibilities between men and women' (FNI, 2016:15). However, the text does not make clear which concrete actions (from the policy viewpoint) should be taken to achieve this outcome. Still with regard to the work-life balance, the strategy is intended to 'eliminate the notion that the family is an obstacle to women's professional progress and [...] to promote a temporary reduction in research activity and project management during the maternity period' (FNI, 2016:15). The most important issue from the political point of view is not the reduction of time that women spend on research, teaching or management, but the adoption of more flexible work models. It is also noticeable that all the efforts are concentrated on changing women's situation, with hardly any mention of changing men's.

So far, I have engaged with national policy documents but there is also a need to explore how these instruments are interconnected with those at the meso or institutional level. I shall therefore now analyse the universities' strategic plan, gender strategy and annual reports of the department of biological sciences.

Gender discourses in the institutional documents of UEM and UniLurio

In this section I start by exploring the strategic plans of the universities as guidance documents in which the institutions express their values, views, commitments, needs, priorities, goals and strategic areas of intervention for a given period of time. The strategic plans are also the documents which guide all other action plans.

Gender issues in the UEM Strategic Plan (2018 – 2028)

The UEM strategic plan (PEUM 2008-2012) developed in 2017 covers a period of 10 years in which UEM intended to become a research-based university. In this institutional project, gender inequalities are considered part of the university's concerns. They are incorporated into the strategic plans as transversal themes covering different domains of university life, mainly teaching, research, outreach and administrative areas (UEM, 2017a). This plan was implemented in a social, economic and political context severely affected by political instabilities, economic crises, and above all a worsening of socio-economic inequalities in the country. Seven strategic axes underpinned the PEUM: i) teaching and learning, ii) research, iii) services and innovation, iv) university governance and cooperation; v) university management, finance and human resources; vi) infrastructures and vii) transversal issues (UEM, 2017a).

Notably the concerns with gender were not reflected in the set of strategic actions, indicators and goals defined for the research domain. For example, one of the strategic objectives in the research axis is to 'expand the availability of qualified teachers and researchers for the materialization of the UEM research agenda through investment in the recruitment, training and retention of research-related staff' (UEM, 2017a:34). There are two important aspects or implications that should inform this institutional stance: firstly, the university needs to make huge investments in women's training; secondly, the need to improve the recruitment and hiring processes for women faculty and researchers in STEM field as they remain underrepresented. Notably, available statistics at the university (UEM, 2021b) show a persistent and continued gender gap both among faculty (27% are women) and research staff (48% are female and 52% male), that is there has been a male dominance in all academic degrees and careers. Such a distribution might reflect the fact that teaching is more valued and better paid than research as such males tend to be well represented in this privileged careers and/position than women. Furthermore, the distribution of women and men within research staff should be interpreted carefully as it may induce a sense that gender parity has been attained which is not certainly the case for the reason I explain: When analysing from the top to the down level the human resources involved in research it is possible to note that they are distributed in three main categories: researchers, technicians and assistants, administrative and support staff. Even being underrepresented in all of these categories women are greatly represented in the lower positions that is, in the categories of technicians and assistants (48%) and administrative/support staff (45%). But if considering the distribution of research staff according to gender and category one can note that the percentage of women among researchers is 35% (MCTESTP, 2020). It meant that according to this distribution women are involved in research mainly as part of 'support staff' providing researchers, mostly males,

with necessary conditions and stuff for doing research. This is clearly a strong reminder of the sex segregation in the domestic world, as in the Mozambican wider society in which women are lagged behind in the kitchen preparing the meal and other stuff for men and their guests at the dinner table, and indeed women even in academia are not yet taking their place at the 'dinner table' of research in Science.

Interestingly, the UEM annual report points out that the number of lecturers with a doctorate has increased since 2014 as well as a slight increase in the percentage of women holding a PhD (UEM, 2021b). Yet that increase is quite insignificant when compared to the men in the faculty of Science. From the Master's degree onwards, the effects on women's careers of factors related to the 'leaky-pipeline' become more severe, preventing them from advancing and gaining a PhD (Brechelmacher et al., 2015). Both teaching and high-level researcher roles (principal investigator and coordinating researcher) at the universities are still hypermasculinized. This shows the need for greater institutional investments in women's training, especially at the doctoral level as a positive measure that enables them to reach the professorial positions. It means that all measures put in place to overcome inequalities between women's and men's careers in academia might fail if they do not help firstly women gain their PhDs.

With respect to the strategic axis of cross-cutting issues, UEM intends to 'develop an organizational plan to integrate and address gender issues and promote gender equity within the university community and the wider society through teaching, research and extension actions' (UEM, 2017a:16). This means that UEM should be committed to designing a more comprehensive instrument to address gender issues. This would make it possible to overcome the brevity and superficiality with which transversal issues are dealt with within the strategic plan. It would also contribute to greater detailing of strategic actions, objectives, indicators and institutional goals in the field of gender, thus enhancing monitoring, and medium- and long term evaluation.

The implementation of these strategic actions is supposed to contribute to the creation of an academic environment more welcoming to women and democratic from the point of view of gender relations (UEM, 2017a). All these 'necessary utopias' as reflected in the document, together with judicial and political initiatives, demand huge institutional changes in the norms, (in)formal rules and practices 'embedded in [institutional] gendered practices' (Clavero & Galligan, 2020:655). Georgina Waylen (2012) reminds us that 'changing institutions is, therefore, a fundamental part of lessening gender inequality' (12). Next, I explore this institutional instrument for promoting gender equality within the university.

Gender issues in the research policy of UEM (2007)

The Eduardo Mondlane University research policy (PIUEM), approved in July 2007 by the university council, is an institutional document that defines the principles and assumptions that govern all research management processes at the university. The UEM research policy sought to ensure compliance with the National Strategy, best norms and accepted practices/procedures within the institution to achieve its goals. The main purpose of the PIUEM is to guarantee 'the efficient use of human, financial and material resources and the balanced development of research and scientific and technological production' (UEM, 2007:2). My analysis of the PIUEM is concerned with how gender issues are integrated within this policy document and what stimulatory initiatives are foreseen to promote gender equality in research.

Overall the policy advocates a decentralized management process of research at the university, where each faculty and department is responsible for planning, implementing, monitoring and assessment all the programs, projects and actions in the research domain (UEM, 2007). Based on this assumption of the 'academic/scientific independence' of the units, it is their responsibility to mainstream gender in research programs and projects.

The PIUEM covers seven areas: excellence in research, post-graduation, research management, outreach and consultancies, publication and dissemination of research results, ethics in research, intellectual property and authorship (UEM, 2007). The document further defines eight key points for its implementation such as i) priority areas of research, ii) procedures to prepare and submit research projects, iii) monitoring and assessment, iv) research funding, v) sharing of research resources, vi) data bank, vii) lecturers and researchers' training/capacity building and viii) ethics in research (UEM, 2007). Here I focus on research management including research funding resources, fund raising and the financial management of funds and allocation of funds, the sharing of research resources and lecturers' and researchers' training/capacity building (UEM, 2007). Notably, all these aspects of the research policy document do not contain any references to women's empowerment or gender equality in research. This means that as part of the institutional frameworks and initiatives to support institutional change for gender equality in research, the research policy document does little. This finding is in line with the conclusion from the SIDA assessment which found that most plans and strategic documents and policy statements at UEM 'pay lip service to gender issues [...] in practice, very little progress has been made [at the micro-institutional level]' (Alberts, et al., 2003:8). This silence/lack of gender sensitivity within the UEM research policy weakens the institutional capacity to identify and define measures to overcome gender barriers that women face in their careers. This is even more critical if one considers that by 2028 UEM intends to become a research-based institution (Kruse et al.,

2017; UEM, 2017a). Despite this lack of gender concerns within the research policy, it is important to stress that among other important initiatives to strengthen research capacity building the document underlines the need for ensuring the development of human capital through internal and external training/capacity-building programs. The policy document recognises that 'training at the postgraduate level is a fundamental factor for the increase in quality in research activity' (UEM, 2007:5). That is, the document considers increasing the levels of academic qualifications of women and men among the teaching/research staff one of the key factors for the success of the research policy. Thanks to international cooperation UEM has made significant investments and improvements among their academic staff that have contributed to reducing the number of lecturers and researchers with only a licentiate degree. Nonetheless, the number of women with both a Masters and a PhD in STEM-related courses remains too low. One of the challenges here is why, despite these institutional efforts to increase the levels of academic qualifications, women remain less qualified academically and consequently progress slower in their careers than their male counterparts. This may suggest something more structural beyond academia that I will also discuss further in the next chapter.

The document also highlights the need to 'motivate training of junior lecturers/assistants by senior lecturers and researchers' (UEM, 2007a:18), that is to implement mentoring programs. Mentoring is an important issue within universities for the academic career of young women lecturers and researchers, and has been directly associated with their career advancement and persistence in science (Dawson et al., 2015). From the point of view of gender in the field of science, it appears that the gender identity of the mentor is significant in the process. Scholars have argued that a dearth of female role models together with stereotypical role models (both male and female) in STEM mentoring programs can prevent women from entering STEM fields and consequently contributing to their underrepresentation in science-related careers (Cheryan et al., 2011; Atkinson, 2020; González-Pérez et al., 2020). Thus, the implementation of a mentoring program as foreseen in the research policy document should take into account these gender differences.

Another important mechanism to stimulate research is linked to research grants. The PIUEM document asserts that 'UEM facilitates and encourages scientific excellence by providing research opportunities and incentives for scientific research [that] can be provided through recognition of the research result to evaluate one's performances and/or through the allocation of research funds' (UEM, 2007:5). This understanding emphasizes a gender neutrality both in the allocation of the research grants and an incentive fund for scientific publications (UEM, 2016a) based on the criterion of academic performance. Although the last instrument has been implemented in the university since 20 April 2016, that is nine years after the approval of the re-

search policy, it is considered part of the University's research policy (see UEM, 2016a). The main objective of this fund is to

stimulate greater [scientific] production, productivity, publication and dissemination of academic outcomes [...] benefiting more productive faculty and researchers with financial incentives to increase their innovative publication rates in the specialty ...with a structured and systematic peer review system as foreseen in the PIUEM (UEM, 2016a:4).

Although this incentive fund for scientific publication and that of the research grants are supposedly gender-neutral, that is based on 'objective' criteria, several studies carried out abroad have found gender differences in awarded research grants in which women are less likely to be granted (Burns et al., 2019; Safdar et al., 2021). One of the reasons for such differences in awarding research grants has to do with a systemic gender bias within academic committees of evaluation. This seems to vary across research domain, discipline and countries. For instance a study by Paul Yip et al. (2020) in Hong- Kong did not find empirical evidence of gender bias against women for research grants applications in social sciences. This appears to suggest that such bias is associated with male dominated disciplines or careers. There is a clear need to address gender inequalities in research and to strengthen the institutional capacity to identify and dismantle barriers that fuel gender inequalities in awarding research grants. Such an institutional awareness of gender imbalances in research was not reflected within the research policy document. In sum, it is imperative to produce a more gender-responsive research policy in academia in order to counteract inequalities between women and men in the research domain.

The Gender Strategy of UEM (2020-2030)

The gender strategy of UEM (EGUEM) was approved by the university council in December 2019 that is two months after I had finished my field-work at that university. This strategy therefore came too late to have an impact on my interviewees. But what they said is an important baseline that can be taken into account in the mid- and long-term assessment of the effects of the EGUEM and to compare what happened before and after the strategy was implemented.

The main purpose of the strategy is 'to ensure that men and women have equal rights and duties in access to higher education and academic careers and their permanence in them...' (UEM, 2019b:7). The EGUEM details four major challenges, namely: gender stereotypes and prejudices; unequal division of responsibilities and labour; reconciling academic, professional and family lives; and bullying/sexual abuse (UEM, 2019b). One of the principles that guides the EGEUM is that of gender mainstreaming as such. For the

research domain the first challenge is to fight against gender stereotypes, prejudices and discrimination. There were 12 strategic actions (EA) foreseen to achieve this end goal. In my analysis of these actions four were redundant (EA3, EA4, Ea6, Ea10) and consequently left aside. These actions had students and not faculty as the main target group. Therefore, I considered the following strategic actions:

EA1. Reinforcement of budget allocations and human resources of departments and institutions working/researching on gender equality in UEM. **EA2. Establishment** of incentive measures for research and knowledge production in the field of gender in the different organic units of the UEM. **EA5.** Design a regulation for the constitution of research teams in the UEM containing corrective measures for the disparities between the number of women and men in the research projects. **EA.7.** Creation of permanent care infrastructures, such as crèches or kindergartens for sons and daughters of teachers, students and administrative staff. **EA11.** Conducting a cross-cutting and comprehensive investigation into the subject of sexual harassment, moral abuse in the UEM, in partnership with civil society organizations and potential donors. **EA12.** Establishment of support and protection mechanisms for whistleblowers and victims (UEM, 2017:22).

In my analysis four key topics emerged: research funding and incentives, the composition of research teams, the work-life balance and sexual harassment, as outlined in Table 3.3.

Table 3.3. Key-topics emerged from the strategic actions foreseen in the research domain in EGUEM

Emerging topics	Strategic actions	Objectives	Challenges
Funding and re- search incentives.	EA1+ EA2	Valuing human resources with a view to producing innovative knowledge in the field of gender equality.	Gender prejudices and stereotypes
Gender imbalances within research teams	EA5	Ensure the correction of gender disparity in the research projects.	The unequal division of work and responsibilities
Work-life balance	EA7	Promote management and infrastructure-building measures to	Ensure balance between academic (professional) and family

		support reconciliation between academic/ professional and family lives.	lives
Sexual harassment	EA11+EA12	Investigate causes and effects of harassment (moral/labor and sexual) in order to provide the university community with relevant knowledge on this matter.	Moral and sexual abuses and/or harassments in the workplace.

Source: adapted from UEM (2019). Note: in the original document EA8 and EA9 are missing i.e. they did not write about these.

Research funding and incentives: with regard to this subject, the document focuses only on the need for greater funding for gender research proposals within the university. The statement does not cover, for example, the dynamics of gender in accessing research funds and grants in STEM disciplines where women are underrepresented. For many reasons, this lack of research funding and incentives seems to be something more structural for most of teaching-based universities in Sub-Saharan Africa. The continued lack of financial resources has deep socio-economic and political roots in these countries, to do with their economic and political instability and poverty that led the countries to remain strongly dependent on international aid. Furthermore, public higher education institutions in Mozambique are not able to compete for international research funds and hence to boost university revenue through research. That is also the case for UEM (Kruse et al., 2017). However, the challenge still is how to ensure that even in these contexts of lack of research resources both women and men benefit equally. Several studies have suggested that gender inequality in grants awarded still persist (Elming & Abrahamsson, 2010; Bedi et al., 2012; Burns et al., 2019; Safdar et al., 2021). In an institutional assessment of the National Research Fund in Maputo, Sten-Åke Elming and Kenneth Abrahamsson (2010) found that the actual number of FNI grants awarded to female applicants were very few. They also found that the number of FNI research proposals by female applicants as research coordinators were very few. However, the study did not make clear why women applied less for research funding than men. I will get back to this issue in the next chapter.

A study by Romy Lee and Naomi Ellemers (2015) in the Netherlands also found that women were less likely to obtain research funding, due to a gender bias within the committee evaluations. The results showed that male applicants had significantly higher application success rates than women not because of the higher quality of their proposals but as a result of a pervasive gender bias in the evaluations. These studies provide empirical evidence of gender inequalities in accessing research funding and/or awarded research grants. More needs to be done in Mozambique to combat this.

Work-life balance (WLB): Scholars have examined how policy development and implementation within institutions can contribute to creating a more supportive (family-friendly) work environment necessary for a better work-life balance (Saltmarsh & Randell-Moon, 2015; Adebayo, 2016; Franco et al., 2021). In Mozambique the sociocultural context together with a lack of a supportive institutional environment for women has contributed to exacerbating conflicts between professional responsibilities and non-work responsibilities related to family.

Women and men are equal before the law but the prevailing ideologies and practices strongly rooted in cultural values, habits and beliefs constitute a kind of societal dispositif of the legitimation/naturalization of inequalities in the roles of women and men. Due to this fact academic women are severely affected by conflicts and tensions between their family roles and professional careers. Interestingly, the UEM gender strategy acknowledged that one of the factors related to the absence of an environment and conditions for the inclusion of women in the various domains of university life has to do with 'the reproduction of [certain] forms of patriarchal ideologies within the academic environment inculcated in the primary socialization process of men and women' (UEM, 2019b:12). This suggests that the patterns of patriarchal culture ruling within Mozambican universities as gendered organisations, constitutes one of the institutional obstacles to women's advancement in their careers. In other words, the university itself is reflecting and translating in a more distinctive way societal structures and gender hierarchies that end up blocking women's careers and perpetuating gender imbalances.

A study by Toyin Adisa et al. (2019) in Nigeria found that the patriarchal culture in the workplace had a negative impact on women's work-life balance in most sub-Saharan African countries like Nigeria. This is also true for Mozambique and has to do with women's excessive subordination in the culture. Toyin Adisa et al. (2021) conclude that in many sub-Saharan African countries such as Nigeria the idea of the work-life balance as inspired by the western context is still a myth, due to a less supportive masculinist culture. In the sociocultural, familial contexts in Mozambique, the refusal of male involvement in domestic activities functions as a kind of guarantee of hegemonic masculinity or male power. Nonetheless, for societies in transition, as is the case in Mozambique, it is important that their formal social organization is positioned in such a way that it promotes the necessary social

changes. Therefore, there is a need to invest in designing and strengthening workplace policies regarding WLB to boost the participation of women in research. Although the UEM gender strategy advocates the need to create a physical infrastructure to support women in achieving WLB, these initiatives should be part of a broader framework of women-/family-friendly institutional policies.

Sexual violence and harassment: Sexual harassment in the university was one of the topics that emerged in the document. The fact that sexual harassment is mentioned means that the institution recognizes that there is an issue. One of the measures to combat this problem within the university is the 'creation a regulation for the application, monitoring and sanctioning of transgressions in the scope of harassment/moral/occupational and sexual harassment' [together with the] establishment of support and protection mechanisms of whistleblowers and victims' (UEM, 2019b:28). Although sexual harassment in the workplace is a structural problem and almost naturalized in Mozambique (Arthur, 2003; Pathfinder et al., 2009), there is a lack of empirical studies about women's experiences with sexual harassment in higher education institutions and how it impacts on their career paths. The existing exploratory studies were carried out within primary and secondary schools but there is evidence that this is a global pandemic, including in higher education (Bondestam & Lundqvist, 2020). Nonetheless, within Mozambican universities there is a rule of a culture of silence, including from the victims of sexual harassment in the workplace. It remains under-reported due to the fear of retaliation. A study by Stephen Aguilar and Clare Baek (2020) in the USA found that female students in life and physical sciences chose not to report sexual harassment because of a lack of institutional response. Nothing was done against the perpetrator.

This silence makes the institutions complicit and allows sexual harassment in the workplace to continue. Bearing this in mind, the university proposes to 'carry-out, in cooperation with civil society partners and potential donors, a cross-cutting and comprehensive investigation on the subject of bullying/moral/labor and sexual abuse at the university' (UEM, 2019b:29). Despite being illegal, sexual harassment in the workplace is a pervasive phenomenon that women are confronted with throughout their career. This structural problem constitutes an affront to the dignity of women and a violation of their human rights. Despite the existing legislation it has not been eliminated. For many reasons sexual harassment in the workplace remains under-reported. This suggests the need to strengthen the institutional mechanisms for reporting and dealing with sexual harassment. Joni Hersch (2015) argues that the absence of institutional mechanisms for the prevention of sexual harassment functions as a kind of demonstration of a tolerance of sexual harassment within the organization.

I now turn to the local institutional documents that is, at the faculty and departmental levels that are equally important for this study since they pro-

vide strong evidence of what is being done at the lower level, and how directives from higher-order documents filter down (or not) to lower-institutional levels.

Gender issues in the annual reports of the Faculty of Science (UEM)

Since the end of 2017 and early 2018 with the approval of the university strategic plan (2018-2028), gender appeared as a cross-cutting issue covering teaching, research, outreach and university governance at all university units. Conversely, I found that at the faculty of sciences (FSc) gender has been historically lagged behind in the last decade as noted in the faculty annual reports in the last 10 years (see UEM, 2012, 13, 14c, 15, 16b, 17c, 18a and 19d). In fact, even after the approval of gender mainstreaming at the university, the FSc reports repeatedly have shown that gender is absent in their key documents, i.e. there were no planned/reported activities, goals, statements or even intentions that had to do with gender (UEM, 2019d). This invisibility of gender in the text conveys a view that gender imbalances in science, related careers obstacles for women, the dearth of women among doctorate faculty in Science are still not been considered as concerns of FSc. For example in the annual reports of 2019, the transversal themes presented in the text were culture, sport, health and environment but even so without any reported activities.

Next, I examine gender concerns at the departmental level with the main focus on the Department of Biological Sciences.

Gender issues in the annual reports of the Department of Biological Sciences (UEM)

The department's annual reports are important institutional documents that report academic and administrative outcomes based on the annual/master plans. The departmental level plays a key role in the implementation of institutional policies and/or strategies, programs. Different instruments designed at the macro- and meso-institutional levels are operationalized at departmental level, with direct impacts on the professional careers of academic women.

I analyzed the annual reports for the years 2016, 2017 and 2018, and found that in all of them the gender dimension was either absent or not mainstreamed in the three main pillars of academic work (teaching, research, services). There was nothing that had to do with gender in the reported activities and research projects (UEM, 2016c, 17b, 18b). With the exception of statistical data about teacher training, most of the information was not disaggregated by sex. This lack of statistical data disaggregated by sex in the

departmental annual reports does not enable one to capture the dynamics of gender inequalities operating at the lower institutional level. Furthermore, it can compromise the monitoring and assessment processes.

In general, it is evident that UEM has formal instruments to combat gender inequalities in different spheres of university life but not for specific disciplines such as the STEM sciences. However, the documents demonstrate some discontinuities from the macro to the meso level especially with regard to the research domain. Despite the existence of a gender strategy that focuses on gender issues in research, it is still silent on gender imbalances in the field of STEM and no strategic actions were foreseen to overcome them, either among students or faculty. In sum there is still a need to implement actions to boost women's career advancement in science.

In the next section, I will be discuss documents gathered at UniLurio in order to understand how these address gender issues.

Gender in the strategic plan of UniLurio (2016-2020)

The strategic plan of UniLurio 2016-2020 (PEUL), written between September and December 2015, was a guiding document for the main lines of action in the areas of teaching, research, services, university governance and transversal issues (UniLurio, 2015). This PEUL was published at a particular moment of the history of the university, marked by a change in its leadership and national debates about the reform of higher education in Mozambique. In the PEUL, gender issues are part of transversal issues. According to UniLurio (2015:48), 'the integration of this pillar into the strategic plan is justified by the need to ensure gender equality' as one of the main goals of the university. In the 2016-2020 PEUL, gender equality issues arise for the first time only at the end of the document. According to PEUL 2016-2020, UniLurio aims to 'create a policy for promoting gender equity and social inclusion at university level' (UniLurio, 2015: 48). This institutional effort reveals some commitment of their leadership to promote gender equality. But during my interviews with key informants they told me that the university was still in the process of designing its gender strategy. In other words, it was not in place at the time.

Similarly the document advocated as a strategic priority '[the need] to mainstream gender in the planning and implementation of activities in all sectors; creation of gender units within the university responsible for coordinating the planning, implementation, monitoring and evaluation of gender-specific actions and promoting a range of actions at different levels to increase gender equity and equality' (UniLurio, 2015: 49). This suggests that the political will to integrate gender issues is there. The details regarding the operationalization of gender equity objectives, goals, targets, actions and indicators, for example in teaching and research, are detailed in the general matrix of the proposal of the UniLurio gender strategy (2019-2024) that I

was given during the process of collecting material for my document analysis. For the success all these initiatives the university needs to invest in their own institutional capacity on gender mainstreaming by providing systematic training programs for academic managers. There is also a need to systematically follow-up and evaluate any initiatives and their effects. At the point when I undertook the research it was not yet possible to establish the impacts of all this.

I shall now analyze the UniLurio gender strategy. It is important to stress that this is a working document (proposal) insofar as it had not yet been approved by the university council at the time of writing (winter 2022). Thus, it is very likely that part of the document I analyzed may differ in some way from the final version approved by the competent authorities as a result of additions or exclusions. I examined the document in order to understand what the university is intending to achieve with regard to gender equality.

The gender strategy of UniLurio (2019 – 2024)

This policy document was drafted in April 2019 but for its implementation required the approval of the university council. UniLurio's gender equity strategy aims to 'promote gender equality and equity in the northern provinces of the country through interventions that improve access to and the quality of higher education and education for all members of society with particular emphasis on girls and people with special needs' (UniLurio, 2019:8). Although the document is intended as a gender equity strategy, thus encompassing women and men, the emphasis on girls in higher education is notable. This has to do with the social and cultural context of the northern region of Mozambique where young women continue to have fewer possibilities to continue their studies and enter a university as their schooling is less prioritized than in the case in the south.

In the field of research, the strategy aims to 'promote the integration of gender issues in the research within the university and outreach activities with surrounding communities' (UniLurio, 2019:18). The strategy also intends to 'ensure gender equity in the academic and professional mobility programs between different organic unities' (UniLurio, 2019:19). Academic mobility together with the creation of research networks for women and the institutionalization of mentoring programs contribute to the strengthening of women's participation in research careers, especially for those in early careers (Gopaul & Pifer, 2016; Sautier, 2021). Although the document proposes the implementation of internal mobility programs for lecturers between different domains of the university, such initiatives should be done in a more comprehensive way that allow junior lecturers/researchers to be in contact with senior researchers from other national HEIs and international institutions to strengthen their self-confidence and skills in research.

Gender issues in the annual reports of the Faculty of Natural Sciences (UniLurio)

In all the annual reports of the Faculty of Natural Sciences for the years 2016, 2017 and 2018 I found a lack of statements, reported activities and projects involving gender issues. They did not contain references to gender. This suggests a pervasive silence at that time about gender inequalities in teaching, research and services. Although gender is widely disseminated in the upper-institutional documents at the lower levels the available data reported showed that there was no concern to incorporate the gender dimension within the reported projects and activities.

In sum, there is an institutional effort in designing instruments that incorporate gender. Both the strategic plan and the gender strategy address these. However, the documents at the faculty and departmental levels did not provide any evidence that there were such activities, projects or programs.

Conclusions and recommendations

My document analysis showed that there is continuity between governmental and macro-institutional documents in terms of their purposes, strategic objectives, goals, and actions foreseen to overcome gender inequalities. The strategic plans I examined included gender as 'cross-cutting themes/issues'. In spite of this not all the different contents within the documents necessarily reflected this principle of gender mainstreaming which seems to be more rhetorical than substantive. That is the UEM research policy document does not refer to gender in research as a whole and did not foresee any strategy to deal with such inequalities. My findings demonstrate that the challenge appears not to be in designing policy documents but in their implementation/operationalization at the lower levels.

Despite efforts to integrate gender into Mozambican public policies, only recently have the tertiary education sector institutions started to design concrete instruments (policies/strategies) to deal with gender inequalities. Both UEM and UniLurio have formal policies to combat gender inequalities among students in general and academic staff but they do not pay attention to specific disciplines such as the sciences in which gender imbalances are high. Overall, documents both from UEM and UniLurio have paid considerable attention to integrating gender issues within their macro-institutional policies such as the strategic plan and the gender strategy. Gender remains less/or not mainstreamed in research as reflected both in the research policy and annual reports of the faculty of science/department of biological sciences. As such there is a need to provide support to the scientific directorates and key academic managers on how to mainstream gender in research and research careers as well as in defining indicators for gender issues in re-

search. This may contribute to strengthening the gender dimension in the research programs and projects within these units. In addition there is a need to extend the strategic actions, processes, and outcome indicators foreseen in the gender strategies of the universities covering issues such as mentoring, increasing female models in STEM, planning and budgeting from a gender perspective at the level of faculties and departments, national and international academic mobility network, and family-friendly scholarships.

The documents from the faculties of natural sciences and at the departmental level (of biological sciences) at both universities did not make any reference to gender in research and services. There were no effective actions to promote gender equality within the department of biological sciences. This lack of strategic actions contributes to the perpetuation of inequalities. Therefore, there is a need to provide training programs for academic managers such as deans of faculty and heads of departments (of biological sciences, planning and studies) on how to mainstream gender in their annual plan of activities or strategic plan for the faculty.

In both universities some of the key documents were hard to find both online and as hard copies. This may suggest some weakness in the internal dissemination/communication of these institutional policy documents to the potential beneficiaries or stakeholders. These documents need to be widely disseminated among the potential beneficiaries.

In this chapter, I presented the main findings of gender-related texts (a set of policy documents) in higher education covering national and institutional levels and how these can be interconnected with those processes and practices that at macro and meso-levels (locally and extra-locally) shape women's experiences in academia more broadly and specifically in research careers. I shall now move on to explore my interviewees' standpoints on the obstacles and challenges women face in their biological research careers.

4. Women's obstacles and challenges in biological research careers

In this chapter I use my interview data to examine women's reported barriers and challenges in biological research at the two universities. I do this at three analytical levels – macro, meso, and micro - to understand how each of these levels affects these female researchers in their research practices and/or careers. In the first section in which I analyze the macro-level factors I start by exploring how women are viewed through society's eyes, i.e., the sociocultural gender orders and regimes produced in Mozambican society and their impact on the women's academic research careers. The second section is about the meso-level barriers. There I examine factors that have undermined and/challenged women's careers at university level. Finally, in the last section I explore at micro level how the obstacles and challenges from the macro and meso levels trigger different responses among the women. I also map out how the women's reported experiences were interconnected with the documents I explored in Chapter 3.

Macro-level obstacles to women's research careers

In this section I explore social factors that act as determinants of women's status and participation in biological research at the university. At the macro level I consider issues such as ascribed/expected social roles, social conventions regarding marriage, cultural values/ethnicity, religion, patriarchal ideology, and socialization and its influence on the gender differences. At the macro level Mozambican society in a broad sense, and more specifically the sociocultural context in which my interviewees were located, reflected certain gender orders, cultural beliefs about gender, social expectations and stereotypical ideas and representations of femininities and masculinities that shaped women's and men's careers differently.

Sociocultural obstacles and challenges for female researchers

According to my interviewees, the major social factors constraining women's research careers had to do with their culturally legitimized family burdens. It meant that women were struggling to balance their work at the uni-

versity and family responsibilities as housewives and mothers - this is how women are traditionally seen. My interviewees emphasized that the way society is structured places significant social burdens on women, which considerably increase conflicts between work and life. The majority (18 out of 24) of my female interviewees were not happy with their overall work-life balance due to this. Marriage and motherhood are seen by wider society as part of women's self-realization (Osorio & Silva, 2008) but they also constitute powerful barriers to women's advancement in academic careers due to the limited decision-making power they have regarding their careers. This results from the strong patriarchal culture that determines 'women's participation in the labor market and the way in which decisions are made or managed in the family' (Muamine, 2013:38). Empirical studies (e.g., Christiana, 2013; Wang & Cho, 2013; Gallardo, 2021) have shown that women's family responsibilities have a prominent influence on their job time and performance. In some cases women got divorced because of work-life conflicts. As a married woman under the age of 30 and a young researcher explained,

I believe that one of the things that influenced my first divorce was because of the time I dedicated to research. He said, 'you don't have time for me and no time for the household stuff, because you spend a lot of time in college and sometimes travel and stay in the countryside a lot' (Juliana).

This shows how much men expect marriage and family to take center stage in the lives of Mozambican women. It means that young women such as Juliana, located in very conservative settings, are more likely to suffer from strong work-family tensions (Muamine, 2013; Garenne, 2014). Both women in the north, as well as those in the south, experienced these work-life conflicts.

Research in biology almost always requires women to stay for long hours working in the laboratory or going away for fieldwork. Male partners may consider this a potential threat to their marriages and to family stability (Ndege, 2007; Anon., 2019). From the perspective of Mozambican traditional society women are considered the mainstay of the family that guarantees society's ability to reproduce itself through procreation. Under the influence of customary law and gender-based social values, women are constructed as mainly responsible for childcare and education (Ndege, 2007). Even if they live in urban places, women who do not fulfil this social prescription, regardless of whether or not they have a brilliant professional career, end up suffering social criticism or being socially viewed as not being 'truly women'. The reason behind of this is the prevailing cultural view of womanhood in many sub-Saharan African countries where marriage and maternity are events through which women achieve social recognition while men do so through their roles/work in the public sphere (Makama, 2013; Atake & Ali, 2019). This view functions as a culturally-sanctioned *dispositif* for guaran-

teeing social norms and gender conformity. Ana, a childless, unmarried woman and academic manager in one of the universities, explained,

...there is still a lot of belief that women cannot be alone, be independent in the true sense of the word. And when I say independent I mean that here, there is still a lot of ideas that to be someone as a woman and as a person, I must have a [male] partner and no matter how bad things are with him I will continue because society looks at me poorly if I'm divorced, looks poorly at me if I don't have children.

This quote indicates an assumption that women achieve their value, social recognition, and their self-fulfilment only when they have a man at their side. This expectation persists even when women have higher levels of education or occupy a top rank position within academia as indeed happened with Ana, a highly educated woman. Rizwana Yousaf and Rudi Schmiede (2017) stress that 'these cultural stereotypes are communicated to men and women from early childhood and become embedded in their behaviours. It is this socialization that moulds the ideas and minds of children, hinting at whom they should be and what roles they should take on, as they evolve into adulthood' (3). Despite the political and legal discourses of gender equality in Mozambique (Anon., 2018c), the process of women's socialization continues to inculcate in them traditional views regarding the role of women. A senior female lecturer with a PhD degree and married said: 'the household is the woman....We can talk about gender, we can talk about equality, we can talk about everything, but in practice, family is managed by women' (Judite).

The internalization of this social ideal by women as well as men from an early age is decisive to maintain the gender order and structures of patriarchy. Florence Ebila (2015) reminds us that 'woman's identity is constituted by the socio-cultural perceptions that define her and how these perceptions eventually force her to conform to socially sanctioned and acceptable norms of her society' (145). As a senior woman Judith who was also from a Muslim family in southern Mozambique strongly adhered to the patriarchal ideology and sex segregation of the family's member. Liazzat Bonate (2006) argues that religious belonging, together with local traditions, plays a crucial role in structuring women's everyday life within the family and beyond. Unsurprisingly even among academic women whom one might expect to be more emancipated it was possible to find very traditional views of womanhood and conformity to their domestic roles. This deep-rooted traditional view among senior women seems difficult to change even under the influence of current discourses of gender equality. Judite's view above reflects a very striking structural issue in patriarchal culture, not only in Mozambique but elsewhere in most sub-Saharan African countries: older women frequently manifest a strong adherence to traditional views of women's roles in the family. Thus they act as a guardian of a cultural heritage that includes patri-

archal values and practices which are then passed on to younger women (Annan-Yao, 2005). Elisabeth Annan-Yao reminds us that,

Women in these types of societies accept these attitudes thereby perpetuating gender discrimination. As the main educators of children of both sexes in the traditional African families, women socialize boys and girls to accept conditions of exploitation of females by males through the values they transmit. Boys then grow up with a superiority complex while girls are made to accept and internalize an inferior position in society. Although this form of socialization results in gender inequalities, it is considered by the family to be perfectly normal (2005:2).

Mozambican society is structured around a very restrictive androcentric logic, including in the matrilineal context in the north of Mozambique (Costa, 2005; Osório, 2006; Osório & Silva, 2008). However, my female interviewees complained about the effects of these familial burdens on their careers:

I was taught, as many persons of my generation were taught, that marry very early [...] the way our society is structured. Marry very early will not allow our progression because women end up assuming more household tasks rather than developing in terms of studying and developing a career. Having children very early... although children belong to both parents, they initially belong to the mother in terms of care, so ah sometimes it is not so easy to reconcile being a mother and study and making career progress (Judite).

I know some colleagues who preferred not to continue their training abroad. Some already have a Master's degree and are postponing their doctorate. Some are here, they prefer to do it in Mozambique and not abroad. Because they have children at school age but others' may not be at school age, but they prefer to be here in Mozambique. (Valentina)

Both Judite and Valentina's claims show that women's career development was not a priority within some families due to cultural factors. From this viewpoint, early marriage is one of the practices that puts women at a disadvantage in terms of career progression since most of them also become mothers very early. Florence Ebila (2015) explains that 'a proper woman puts the family interest first before even her own personal interest' (146). This means that women rather than men are expected to sacrifice themselves, even their careers, for the stability of marriage and family. This is particularly the case in the north of Mozambique where it is very deeply rooted in the matrilineal local culture (Osório, 2006; Osório & Silva, 2008). Isabel Casimiro (1998) claims that 'by privileging women's roles as mothers and wives at an early age' (163) women are socialized to be, think and act in conformity with these values. Etelvina a married woman and female lecturer claimed,

we were maybe created to be 'multi-task' because, since we were children, we already knew that unfortunately our society, I don't know if it continues

like this, but I think it continues, 'there is the women's work'...you knew that in addition to going to school, in addition to studying, in addition to doing the homework you had to do other activities at home. I think we grew up like that, and many times the activities that were aimed at women, were much more than those that were directed at men. So, we ended up growing like this, you know that the responsibility of.... you were educated knowing that the responsibility to educate the children is YOURS, in terms of picking up, and taking, taking to the hospital (when you are...) so you know that is your responsibility. (Etelvina)

The construction of womanhood closely related to domesticity is a major societal challenge for modern women and their careers since the social pressure for gender conformity is so strong. Thus even being educated and urbanized women within families still continue educating their children basing on the ideals of sex segregation of domestic tasks. Pam Baatsen et al. (2018) in a study in the province of Nampula, northern Mozambique, found that this kind of cultural pressure contributes to early marriages and maternity, which prevents many girls from continuing to participate in higher education and from developing an academic career. They also found a high school drop-out rate due to pregnancy.

However, in the south of Mozambique where Judite, Valentina and Etelvina were from, girls from the Tsonga ethnic group marry later than the Makhua in the north (Arnaldo, 2004). Thus women's early marriages within some families in the Tsonga ethnic group might be influenced by the family's socioeconomic status and women's economic disadvantages. Women from families with poor financial resources tend to get married earlier in order to help their relatives' household income. Women in the north with a matrilineal lineage system are still the objects of traditional gender role divisions, bolstering 'the man's traditional role as breadwinner' (Heikkinen, 2015:48). From this viewpoint, the societal challenges women face in their academic careers in both matrilineal and patrilineal contexts remain similar since, in the end, most of the responsibility for domestic duties remains in women's hands (Osório, 2006).

In a study of career, marriage and motherhood within a women's college in the USA, Michele Hoffnung (2004) also found that socioeconomic status and intentions concerning family were related to career and motherhood status. This research showed that those women who were mothers had significantly fewer advanced degrees and lower career status than non-mothers. Even though conducted in a very different context from Mozambique, this shows that the social factors that produce and generalize the poor condition of women in academic careers produce similar results in women's lives across different settings. Women's struggle to reconcile their career needs and family is not something particular to African and/or Mozambican wom-

en but for them this can be exacerbated due to contextual local factors. Bella, a married woman and senior lecturer, clearly illustrates this. She explained:

It [early marriage and motherhood] was more negative for me, I couldn't reconcile my career with my personal life and then I had a lot of challenges that somehow interfered with my journey to study abroad, etc. They almost blocked me psychologically. So, I know that at this moment I can make this assessment a little calmer ... they interfered much more in my progression. The difficulty was related to marriage, the need for having children which is not an easy aspect and then having to be here, and having to be abroad, so it almost created decisions like that! So at some point it was necessary to take a position - abdicating, right, and trying to do what was possible here, closer to the family.

Bella did not take opportunities she had to study abroad and gain postgraduate qualifications. Her testimony shows how her work-life conflict impacted on her decision-making. George Ndege (2007: 78) argues that 'Mozambican society places an exceptionally high value both on heterosexual marriage and on having children'. This is because the family name is perpetuated, and the spiritual link to ancestors guaranteed, through procreation. As Ndege states: 'without children family dies off' (79). In Mozambique, even in quite diverse contexts, the patriarchal system is largely ensured by the systems of marriage and men's economic power as breadwinners. Therefore marriage, children and family are part of the symbolic production of male dominance. Unmarried women are still seen as incomplete or witches (see also Casimiro 1998: 161; Osorio & Silva 2008).

One of the common consequences of the Mozambican emphasis on marriage and family is dissatisfaction with one's life or professional career, which in turn affects women's performance, both in academia and in family life. For some women in my study (10 out of 24) the social pressure was so great that they ended up quitting their training. More than in their workplace, it was within families that social pressure was exerted on women. In the urban centres, even though these have 'a degree of modernisation in social relationships' (Tvedten, 2011:4), women researchers experience a dilemma. On the one hand, imposed by conservative and traditional society, they are expected to demonstrate gender conformity, staying at home as mothers and wives. On the other hand, these 'modern women' are challenged by a society in transition to emancipate themselves, be more independent and actively engaged with their studies, incomes and professional development. A junior researcher and married woman explained:

Well, when I completed my Master's degree in 2015 I had thought of doing a doctorate. In fact, the Italian Cooperation [donor program] had proposed it to me – I've been working on some projects with them. I travelled, did a course and returned. The Italians said, 'you have to advance...' but that's where marriage came. I started postponing it. I maintained contact and even started

the research project and so forth but I then stopped researching, stopped contacting them because I was no longer seeing myself...I could no longer allow myself to travel for a PhD. But now, [laughter] two years have gone by...and I no longer want to know about a PhD, honestly speaking. No! I began to think 'why would I need a doctorate? O.K. I will leave and so much will stop' and unfortunately, the social component tells us 'no, you're a woman. You cannot be absent for a long time; when you come back your husband will...' now, I am not that given to that. Because my husband also travels a lot. (Lara)

This somewhat conflicting awareness between wanting and 'duty', between the desire to continue their training and the duty to build a family, reflects the structural dilemma experienced by many women.

Signe Arnfred (2015) explains that in many families in urban contexts, the social dependence of women on their husbands is increased by economic dependence. Some women fully supported this situation. Joana, a female married researcher who self-identified as religious, said:

It is very clear to me that there is no reason to want to compare a woman and a man ... for me in my mind it is clear that my role as a mother, as a wife is much heavier than that of many parents. It is easier for a man to be absent from home for long months and there is no damage; in the case of the woman who is a mother and wife, I feel that it weighs a lot more for women, there is a lot of charging at home... I had several opportunities to leave and I refused, not because my family imposed this on me, but it was what I believe in.

One of the social institutions that supports women's domestic roles is religion, as the interviewee's reference to her belief makes clear. Joana views family roles as strongly sex segregated, and assumes that her role cannot be fulfilled by her husband. She thus cements herself into her family obligations, in line with patriarchal prescriptions. Reinforcing the idea of the patriarchal model of domination, the vast majority (20 out of 24) of the female interviewees who were married saw themselves as family-centred when they emphasized that household activities were not up to the husband but to themselves as women and wives. Due to the prevailing patriarchal culture, in southern Mozambique men are not expected to take part in domestic tasks such as cooking, cleaning, taking care of children, etc., traditionally considered a 'non-male domain' and as such inappropriate for them. However, in the matrilineal north, where men on marriage move into the house of their mother-in-law, they participate in domestic tasks. They help with cleaning the house, or work for a certain period of time on the mother-in-law's land under her supervision (Arnfred, 2015). This, however, does not lead to the greater emancipation of women.

Men's position in society and their support for their wives' careers

My interviewees, particularly those married or in a cohabiting relationship, emphasized the role of their spouse in their career. Married women regardless of age or career position considered that understanding and support from their male partners was fundamental for their career advancement. This is consistent with results from Heikkinen's (2015) study of the role of the spouse in female and male managers' careers in Finland. Heikkinen found that 'spousal support from the male spouses was [variously] constructed as flourishing, irrelevant, deficient or inconsistent' (53). However, unlike Heikkinen, I did not have interviewees who considered their male partner's support as irrelevant, as highlighted by Custodia, married, with children, and a researcher:

Thanks to God I've got a wonderful family that's always there as long as I prove that the thing I'm intending to do is just that, they support me...from my parents to my husband – they've always been there for me, supporting my doing of things. I got married and nothing changed. My spouse joined the group [my relatives] and stood by me. Well, pertaining to the house I have no complaints. My husband supports me; he's always there – in times whereby I've to be awake until late or wake up very early in order to finish something, he's always been there; sometimes he himself takes the computer and helps typing when I need.

Custodia was unusual in this. In general men were reported as providing limited support to women as researchers and academics. Indeed, according to my interviewees, their male partners would not sacrifice part of their time/careers to support their wives' careers. Due to the socio-cultural gender order in Mozambique, men may experience feelings of fear that their male dominance is potentially threatened when women have a higher academic degree than they or progress faster than they. Indeed research findings by Julia Dahl et al. (2015) suggest that superior performances by women threaten masculinity. Dahl and colleagues stress that 'men's ideological dominance may subordinate women and maintain existing gender-based power differences through a variety of mechanisms' (251). One of these mechanisms is being selfish and less supportive in relation to their wives' careers.

Heikkinen (2015) suggests that if a male partner seeks to participate 'in family life to a greater extent than simply breadwinning, it is necessary for him to construct the spousal gender roles as negotiable and fluid' (55). If a man adopts such a role in Mozambique many people, including women in urban areas, believe that he has been bewitched by his wife to make him a kind of 'puppet' who does everything she wants. The process and cultural ideal of becoming 'truly African men' implies non-gender-equitable forms

of manhood (Groes-Green, 2012) in which men keep themselves distanced from domestic tasks as a kind of proof of their virility and male status. Consequently, men in the patriarchal contexts of southern and part of northern Mozambique are less likely to adopt what Groes-Green (2012) has called 'women-friendly or non-dominant ways of being a man in Africa' (92). As Florinda, married and a young researcher, said:

It is not easy but we keep on negotiating and he sometimes understands. But there are times he says 'no, you are also distant.' He calls out for us but we keep on negotiating – which is not easy. For instance, here, we sometimes travel to attend seminars, conferences and more. He helps me with that. He ends up staying with the kids – spending more time at home. So, if everything is fine at home, here [at work] also it will be fine. If not, there will be some problems but we don't stop doing what needs to be done at work.

As the quote above shows, support from the male partner, either by adopting a more flexible role, or by providing the wife with direct support can be essential for women in the conciliation of work and family. Florinda's statement also draws attention to something interesting, the fact that many women like her, even in the absence of direct support from their male partner in their careers, continue to do their research.

Some female interviewees who said they had support from their husbands also said that their partner later complained about the time that the women devoted to their research rather than to their family. Some stated that their partners even threatened to break up the marriage, others that their marriages had ended because their partners complained that they no longer devoted all their extensive time to the family. Paula, a young woman under 30, in a cohabiting relation, a mother and a lecturer, put this problem down to men's flawed understanding of equity:

Because there are men who don't understand how to deal with this issue of equity. Deal with this matter that, 'Look, I have to help out with this task because' [deep breath]... There are men who don't understand this. Yesterday my partner asked me a question: 'But what are your advantages of moving from here to make the presentation at the health conference in another province?' I said, 'Well, let's see; this has got no money but for me it's relevant because there's sharing knowledge, it is important for my academic and scientific growth, thus I am going.' [deep breath] I sometimes try to make him understand how important the tasks I am performing, the research and its relevance... [deep breath] (Paula).

The emotion expressed through deep breathing that marked pauses between Paula's statements shows how her partner's limited understanding of her work demands made her emotionally uncomfortable, generating stress and some disappointment due to incomprehension, poor empathy and support from the partner. Many men, instead of using their power and social privi-

leges to help their women advance, instead undermine their careers. This lack of male support emerges as a gendered barrier for women. It is a strategy of male domination to maintain women subjugated and economically dependent on men (Bourdieu, 2002). Pierre Bourdieu reminds us that masculine domination encompasses a set of behaviours that include control over reproductive and productive means such as women's work, body and sources of income (Bourdieu, 2002). This is a structural issue that goes beyond the family to the workplace where inequality regimes are also prevalent (Acker, 2006) as I shall discuss in relation to the institutional barriers to women's careers.

As Paula and many others pointed out, their male partners did not understand the fact that they, as researchers, had to go away on field work or spending many hours in the laboratory. This fact is not always well regarded by men who see nothing wrong with doing so themselves. Sometimes, when I was interviewing women in the laboratory, the interviews were interrupted by them having to justify themselves to their partners for not being at home at that time, what they were doing, etc. This mechanism of control can result in women devoting less time to laboratory and/or field research than required to make a productive career.

Men's careers also influenced women's research careers. Negotiations around gender roles could be easier when men worked in similar jobs to women. Such a situation was portrayed by a married young female lecturer and researcher. She stated:

The issue of family, marriage does influence women's career ... but not so much when we are affiliated with people who do the same things we do. For a woman who is married to someone who does research, is a teacher, has an academic career, this is not relevant because he also needs time to develop his career. This is most impactful when we join partners who don't do what we do (Juliana).

Mara, married with children and a researcher, was one of the few female researchers who had no problems with her husband's support:

There is time that I need to go to the sea and stay there for 20 days [for research], that means I am away for twenty days and my husband and daughter will stay alone at home. I am lucky because my daughter has no trouble with her father, they have an incredible relationship. I feel like she does not miss me when I am away, but it's not an easy task to manage. In Mozambique it is difficult. For example, my husband is an understanding man to that, but Mozambican society is not prepared to have a woman who travels every single month for fieldwork. Not everyone accepts that, beginning with my mother and my brothers, none of them is in favour of my lifestyle. We had an agreement before getting married. I told him that I would not get married before my dreams had come true. My husband promised to bear with me and is still fulfilling his promise.

As noted above women in matrilineal society may have some advantages to negotiate with their male partners (Arnaldo, 2004) but this rarely happens in southern Mozambique. Yet, even in the matrilineal context (where, however, men still make the decisions) women understand that Mozambican society and men are largely not prepared to see women leave their domestic milieu to do research for any length of time. When this occurs, the husband's family, particularly the mother, sometimes offers greater resistance to the idea of the woman going abroad than the husband. One married woman with a PhD explained:

When I went to study abroad, some people, my relatives sometimes pressed and asked me if that was what I wanted, if it was not better to go home and leave the training for later. Regarding my partner, he was understanding, but his aunts, cousins, etc., they used to ask me if I didn't want to go home. I have some colleagues who preferred not to continue their training, gave up, others preferred to postpone their training because of the family or lack of support from their partners (Valentina).

Mozambican culture is characterized by extended families where not only the husband but also other family members may exert pressure on women. The family plays a major role in the decision to study abroad or not for women. This is not so for the men. They leave their affairs to their wives or to their elder brothers instead. This is not just an issue in Mozambique. Lindsay's (2014) findings in the USA showed that 16% women in that country lacked support from their family but only 8% of men. This suggests that family support is gender-asymmetrically distributed, even in the USA.

Daniele Vignoli et. al. (2018) found that in some situations women's employment provoked marital disruption. There is a sense that women's roles as researchers are in some way secondary to their familial responsibilities. Women themselves often act in accordance with this and strategically withdraw from research, even if only for a time, to fulfill their family roles. As one senior female researcher said:

I want to continue doing research only. I can teach a few classes, continue doing research, and what I want to do is also go back to what I had stopped doing which is cooking, doing the washing up, really being a housewife, I want to do it again... (Lucilia)

This contrasts sharply with the views of a young male researcher who said:

I am a man, I have this facility to be more practical. Even because being in a country, in a province where the patriarchal issue is very strong, where the man is the boss, it is the patriarch, he decides and manages the home. So I have this facility, this flexibility to manage my career, but for women researchers this is not always easy (Pedro).

Pedro's statement shows that there are some men who recognize the gender differences that govern their and women's lives. In spite of this, he had no sense that he might have the same social obligations as a woman researcher. The fact that he was a man was enough for him and acted as an unquestioned justification for his privilege. From Pedro's point of view such privilege is socially ratified as part of his manhood.

The ideal of the submissive home-making woman according to the model of traditional society contrasts sharply with the notion of more equal women in modernity. Among my interviewees older women unsurprisingly adhered more strongly to the more traditional model. Younger women saw themselves as more autonomous, despite not necessarily disconnecting from the traditional family structure. For many of my interviewees, then, work-life imbalances were first and foremost a sociocultural issue.

However, institutions are part of this process. Mike Noon and Paul Blyton (2007: 356), for instance, define work-life balance as 'the ability of individuals to pursue successfully their work and non-work lives, without undue pressures from one undermining the satisfactory experience of the other'. Alan Felstead et al. (2002: 56) state that work-life balance can be defined as 'the relationship between the institutional and cultural times and spaces of work and non-work in societies where income is predominantly generated and distributed through labour markets'. From this last viewpoint work-life balance is the relationship/conciliation between time and formal workspaces and non-work environments. Thus, work-life balance is also an issue of academic institutions as it results from an interplay between society and institutions as I will discuss in the section on institutional obstacles.

The effect of marital status on work-life balance

Married women were at a disadvantage compared to single and divorced females. Once at home most married women have to leave everything related to their research work behind to dedicate themselves to their family and domestic tasks. A married woman explained,

There is that person's will to become a good professional [teacher, researchers and academic manager] but so, many times, for example, when I was writing my research proposal I was in charge of the course, I had to take care of my husband and our daughter of three years (Etelvina).

While married women ended up having a huge difficulty for work-life balance, this was not the case for single women. Perhaps that is why young women in their awareness of the effects of early marriage on their careers increasingly prefer strategically to postpone marriage and motherhood. Single and divorced researchers seem to have much more flexibility in managing their research careers. Clearly, they are challenging the social ideals of

'being women' and as such, they run the risk of being considered 'atypical' or 'abnormal' since they distance themselves from the prescribed Mozambican gender norms. A single junior researcher said:

In my case it is very easy to reconcile family life and research because I am single and have no children. Then I decided to pay more attention to my professional life. I have more freedom to make my own individual program. If I want to stay all day in the laboratory until 10.00 pm I can stay. I have no family commitments. If I want to come to work at the weekend I can come, nothing prevents me (Jurema).

Ana Costa (2005) suggests that the social worth of a woman does not increase if she is independent and materially well off, if she has no husband and children. This author claims that 'a woman without children, single and with an economic situation that allows her to own a home and enjoy some independence is not necessarily considered more "valued" socially although she is certainly more independent and has more power and autonomy over her life' (212). Everybody, including women, is encouraged to perceive spinsterhood as potentially negative and undesirable. As Costa (2005) maintains, a woman without a family (husband and children living together in their home) 'is socially marginalized - it can turn autonomy into suffering and freedom into a nightmare' (212).

This happens not only with young women in the lower echelons but also with those who occupy top positions within the university. As Alberta, a senior professor, found:

after my appointment to this position [as top rank manager] some colleagues came to my office to ask what was done to my family and when I was going to present them... so this question of family, being a mother, wife, etc., much more than being a researcher seems to define a large part of Mozambican women's true status.

As this quote shows, in Mozambican society there is permanent social pressure on women to conform to traditional gender roles. Alberta was 'required' to provide proof that she had complied with the social prescription of being a woman (having a family). Alberta is a woman who studied abroad in western countries for a large part of her life. This allowed her to develop a highly critical sense of life in Mozambique and to develop another view where marriage, husband and children were not necessarily the highest point of her self-fulfilment as a woman.

In sum, my interviewees' accounts showed that women complained about the strong conflicts between their family burdens and academic tasks/duties created by the social structure. Nonetheless, several women had benefitted from spousal support in their careers. For academic women work-life conflicts translate into difficulties to reconcile their work as researchers or lec-

turers at the university with their family life as mothers and wives both in patrilineal (Maputo) and matrilineal society (Nampula and Cabo Delgado provinces). My findings also suggest that work-life conflicts are greater for married and divorced women with younger children, regardless of the stage of their careers, than for single and divorced women without children. This is also the case if compared to men, both married and divorced with children. These issues are not simply internal (familial) constraints that can be solved individually within the family. Universities as the workplace and employers of these women have a role in this process and should provide support for women's careers.

I shall now move on to discuss *institutional* factors that, according to my interviewees, constitute obstacles for women engaged in biological research.

Institutional (meso-level) obstacles influencing women's research career

Empirical studies have argued that institutional factors have an important influence on research careers (Njuguna & Itegi, 2013; Musiige & Maassen, 2015; Wangenge-Ouma et al., 2015; Cloete et al., 2017). The *meso* or institutional level here involves those material and immaterial conditions that affect research (Sarwar & Imran, 2019). In addition to a human component which Akilagpa Sawyerr (2004) calls the active component, there are also social and immaterial components involved. These immaterial factors include institutional arrangements for supporting science, research incentive systems, research grants, research budgets and benefits, institutional research management, cultures and policies for research and innovation (both formal and informal) that reflect an institutional commitment to fostering the research capacity (Musiige & Maassen, 2015). Here are also included the practices of mentorship, researcher training, female role models that inspire women to pursue a career in science, the quality of the work environment, and interpersonal relationships (Musiige & Maassen, 2015).

The *physical or instrumental* factors include different material conditions under which the research is performed within universities (Cloete et al., 2018) such as research or physical infrastructures such as buildings, laboratories and equipment which are fundamental determinants of research output. In sum, all these institutional conditions that include both material and immaterial factors contribute to facilitating or inhibiting the internal capacity of women to be engaged in research and are fundamental for 'African universities to become research-intensive universities' (Cloete et al., 2017a:135). In next subsection I begin by discussing the immaterial factors first and then the instrumental/material factors constraining women in biological research.

Immaterial factors

There were five main issues that my interviewees raised regarding the immaterial factors they faced. These were a lack of i) research funding¹⁴, ii) the absence of institutional mechanisms to attract and stimulate female researchers, iii) the difficulty of going abroad for training, iv) limited of mentoring and role models, and v) slower career progression and promotion.

Financial constraints: lack of research funding

Gordon Musiige and Peter Maassen (2015) argue that 'most academic staff members of African universities have not been very research active, which has impacted the gross research output levels' (111). This has to do with a range of factors. According to my interviewees one of the main institutional factors influencing women's research productivity is related to the lack of research funding. For universities in sub-Saharan Africa Castells maintains that this challenge is 'both for structural reasons and for institutional causes' (2017: 46). The author stresses that 'structural reasons have to do with the cumulative character of the process of uneven scientific development' (id.). I would argue that these are linked to the economic and political histories of most sub-Saharan African countries, since most face socio-economic issues such as poverty, underdevelopment, governance problems, and political instability. This view is not a 'failed-state' narrative for African countries as claimed by Cloete et al. (2018); it is simply a portrait of the reality experienced by many of these countries including Mozambique. Njuguna & Itegi (2013) agree partly with this, but these authors also draw attention to the bad side-effects of corruption among government officials 'with little or no regard for research [who] have fraudulently channelled billions into personal accounts in developed countries, thereby enriching themselves at the expense of research programs' (357). The lack of institutional capacity to finance academic research in most African countries like Mozambique results from a combination of macroeconomic and political factors (AU-NEPAD, 2010), including corruption, that undermine the availability of resources for research.

In spite of my empirical data not pointing directly to corruption as such, this issue does anyway affect academic research institutions. Njuguna and Itegi (2013) stress that 'incongruent political patterns also affect research' (358) and indeed this has been one limiting factor for most public universities funded by public resources. For instance since 2015, the Mozambican economy has faced a strong depression, motivated by political and economic

¹⁴ This has to do with the poor government annual budget disbursed to public universities, as well as the inability of HEIs to capture competitive international funds for their research. Much of what public universities use for funding their research comes from international donations (see Alberts, et al., 2003; Kruse et al., 2017; UEM, 2021) and a very small amount from the national research fund (FNI).

corruption scandals which have led to a considerable number of international donors reducing their direct support to the state budget. This in turn has partly contributed to the lack of governmental financial resources and undermined the government's ability to directly fund higher education and research in universities (Ndikumana, 2006).

There is a positive correlation between the economic development of countries and their research output (Kumar et al., 2015). For instance Ahmad Samimi and Hoda Roshan (2011) found a positive relation between scientific output and gross domestic product in developed countries as well as in most developing countries. These authors also draw attention to the fact that for developing countries this positive relationship between gross domestic product and investment in research was not as strong as for developed countries. Sawyerr (2004) stresses that 'in industrialized countries, advanced learning and research are receiving increased attention and investment in recognition of their acknowledged contribution to economic development' (214). However, research, both basic and applied, in the public universities under study, has received low investment.

This situation is also influenced by the policies of the World Bank in the low-income countries of sub-Saharan Africa that have 'persisted in shaping higher education policy and its financing' (Teferra, 2013:21). The view that is imposed on African governments is that primary and secondary schooling are more important for poverty reduction than tertiary education (Teferra, 2013). Therefore these governments are encouraged to invest more in basic education than in higher education (Sawyerr, 2004; Experton & Fevre, 2010). Historically, public universities have also not received direct public funds to finance their research activity through the block grant that the government allocates to them annually. All this has made it more difficult for the universities to build and strengthen their institutional research capacity. The women I interviewed, regardless of age and career position, all talked about poor access to internal and external research funds.

Since 2018 certain Mozambican universities have, for the first time, had research activities in their budgetary plan. Cloete et al. (2017) state that 'the reluctance of governments in Africa to support differentiated research universities is a major stumbling block towards developing a research university' (137). Due to their low governmental budget Mozambican public universities are largely dependent on international aid programs or initiatives to develop their research capacity (MCTESTP, 2006; Cloete et al., 2017). Batista, an assistant researcher with only a licentiate, explained:

Every researcher must dedicate themselves to the competitive funds like FNI [the National Fund for Research], WWF [World Wide Fund for nature], the World Bank, and these organizations which provide funds and the other small academic projects from the university which give us funds to do research. (Batista)

This is consistent with the picture outlined by Cloete et al. (2017) who show the extreme dependence of most African universities on international aid funds. However, the World Bank, one of the most influential counterparts in the higher education system in Mozambique, draws attention to the low capacity of many African higher education institutions to directly and innovatively capture more financial resources since 'the government centrally controls key parameters affecting the mode of operation and sustainable financing of public tertiary education institutions, such as the level of their budgetary resources, salary conditions' (World Bank, 2010:163). While the Mozambican government also finances research projects in public universities to a limited extent via the National Fund for Research (FNI), universities sometimes finance research from their own internal funds. But, more than 50% of the research carried out by Mozambican public universities is financed from abroad (AU-NEPAD, 2010:40). One of the senior female researchers I interviewed corroborated this. She explained:

We do not have institutional incentives for research internally, but internationally we do. But I think that the fact that we have a vice-chancellor who took gender issues a little bit higher has changed a lot. We have a fund from an African Bank [AfB] that imposes many clauses on gender issues and that is also helping... they give a lot of scholarships to the university and require that a percentage be directed at women. The AfB project and the question of having a vice-chancellor was decisive in finding that issues and gender are beginning to be institutionalized and gaining a little more importance (Cristina).

This shows how much some international agencies can influence institutional research agendas through their research funding criteria but also that they require institutional top-down support. And they help in the development of institutional gender awareness. However, for some researchers the excessive bureaucratic requirements of certain funding agencies, including the national one, proved a significant hindrance. Jurema, a single woman and a researcher, explained:

Obstacles in doing research have more to do with the bureaucratic process at the end of the day. For example, our acquisition of reagents or research material, it's a headache. Eh! Disbursement of funds, we work a lot with the National Research Fund and that is a disaster. Just to disburse the funds after the review of the reports comes, I think they, because of this problem, are working on it, but here really what prevents research eh! are these things. Therefore, access to funds and the possibility to spend the funds because you also have a lot of rules imposed by the state, and as we are also a public institution we have to comply, eh! They only create problems and then as we have a, let's say, a flexible system of rules (Jurema).

National research funding agencies require that projects submitted for their funding are coordinated by individuals with a PhD degree. This is a reasonable requirement since one would expect researchers to have research training before they start researching. It is also a requirement commonly followed in developed countries. But in the Mozambican context one might argue that this requirement discriminates against women since the majority of female lecturers and researchers in Biological Sciences do not have a doctorate and as such are excluded from leading research projects. This means that they are continuously dependent on their male colleagues to be invited into projects, and for whom they assume more peripheral roles as research assistants.

The lack of research funding has been exacerbated by Mozambique's financial crisis leading to significant cuts in university budgets. Without this necessary capital, Mozambican public universities are not able to compete successfully with other research universities (Musiige & Maassen, 2015). Although universities themselves have the capacity to generate their own financial resources, this is not sufficient to cover their needs. This makes the university dependent on funding from the general budget of the Mozambican government (UEM, 2019c) and donations from its cooperation partners. Investments channeled to research in STEM as I found in my document analysis remain critically low. As one senior manager said:

Today is characterized by the lack of resources at the institutional level allocated to researchers. From this point of view, research is a product of almost personal management, researchers and teachers themselves identify priorities, apply for research opportunities, earn projects and they implement them themselves...internally there is no planning for financing gender-sensitive research, in which additional resources are allocated to women. This does not exist. (Julio)

This indicates that the research function in universities is a highly individualized exercise. It means that universities have both very active and inactive academics in terms of research. The difficulty that universities face in providing financial resources for research is transferred to the researcher, thus becoming an individual problem. This puts women without PhDs and limited English language capacities at a competitive disadvantage compared to men. One further effect of this was identified by Mara, a female researcher:

The lack of experience and language are the key factors that interfere with our publications and reduce the possibility for networking or to access the international initiatives for research beyond Portuguese countries.

On the one hand, women still face limitations in access to the funds that exist in the country, on the other, universities do not have specific internal financing policies for projects developed by women. This contributes to women's

demotivation. Equal opportunity of access to research funds has not been established; these funds continue to benefit mostly men.

Some women use men with PhDs strategically, even from different arenas of expertise, in their research projects to assure approval and the financing of their research proposals.

To access research funds from FNI we must have a head/leader with a PhD degree and by the way, the majority are men and that is what we use to win projects. (Rosa).

Without measures to help women gain PhDs, women cannot take on leading positions in research projects.

This reproduces the gender hierarchy in research within departments of biological sciences. There are also groups and lines of research strongly dominated by men such as marine ecology/biology which have received significant funding for their projects. Despite women being the majority in the department, research there always has a male face. As Batista, a male researcher, said:

Although there are many women, men have always been leaders in this department and being leaders, they will not only lead in relation to science itself but also in the allocation of resources. Therefore, women have less access to research resources than men, men appear to win more research projects than women (Batista).

The practice of academic consultancy has been the main way to overcome the lack of internal financial resources for research. As one top research manager put it:

... we already know that from the budgets of the government we will hardly have funds for research, so we are investing in providing research consulting services, especially for international agencies and NGO. (Julieta).

Research consultancy also means that the results cannot be published without the outside stakeholders' legal permission but academics need to publish to progress their careers. Early-career female researchers involved in research at one university in this study benefited financially from donor projects, but the lack of incentives to engage in scholarly research and produce academic outputs are amongst the factors responsible for their low research productivity in terms of publications. Musiige & Maassen (2015) draw attention to the fact that 'academics become more reporters to donors than producers of research-based academic publications, since very few donor projects require scholarly output' (115). This was certainly an issue for the faculty of science at one of the universities where I undertook my research.

Lack of university incentives for research

There were contradictions among my interviewees regarding their university's incentives for women researchers and the policies relating to the promotion among academics, even among those belonging to the same university. For instance, an interviewee from one university reported that there was a biannual practice of (monetary) recognition of researchers who published the most in a given year. However, for gaining this recognition the researchers themselves needed to apply for the award. Apart from this practice, any 'incentives' were mainly oral encouragement by superiors. A female researcher explained:

Now there is also the so-called The Best Lecturer and The Researcher Award which is the award that is also given at the time of the Scientific Conference which happens every two years called Scientific Gala. But the mechanisms are not so clear, **they** are not very transparent, so it also goes through a process of self-application. (Lucilia)

The quote above seems to suggest that there is an institutionalized system of incentives for research and publications but not specifically for women as my document analysis also demonstrated. Gerald Wangenge-Ouma et al. (2015) claim that 'there are no direct incentives for knowledge production and research dissemination through publications in the Mozambican higher education system, at either the national or institutional levels' (134). This situation remains in 2022. As one senior male academic manager said to me:

There is no institutionalized strategy to attract, engage, and encourage women for research. And at the department level, we don't have a mechanism for recognizing women's engagement in research. (Julio).

Aside from the absence of institutional mechanisms to attract and/or keep women engaged in research, there is a general lack of incentives for knowledge production. This is corroborated by other scholars (Wangenge-Ouma et al. 2015; Cloete et al., 2018). Cloete et al. (2018) maintain that 'the university's leaders seemed to have failed to establish an incentives regime' (109). This has to do with the 'prioritization of teaching over research at the university' (id.) and hence these universities remain strongly teaching based. A female top rank manager explained:

It is true that access to research is limited because there are financial constraints, etc. etc. but on the other hand, I think sometimes we also let ourselves stay in our comfort zone. Above all, this is mainly about the public sector because in the public sector there is no incentive for research. Even at this level there is no incentive for research. I think there is really no incentive, my salary is the same whether I do or don't do research. And then, this, we don't see much eh! What we are gaining. (Ana).

This manager's assertion is supported by an institutional context in which despite having a research policy the two universities until the middle of 2020 did not have a gender strategy sensitive to disparities in the field of research and publications. My document analysis showed that at one of the universities there was a system to foster scientific publications, where lecturers and researchers who publish the most are granted a certain amount of money through the scientific publication incentive fund which was also referred by some of the interviewees. Nevertheless, Wangenge-Ouma et al. (2015) argue that at the institutional level there is poor implementation of such research incentives. This reflects a gap between policy and practice. Further, most of my interviewees at one of the universities showed little knowledge in such a publication incentive fund:

Well, from the institution...There're no incentives. Our incentive is to travel, getting subsistence allowances or knowing new places. That's the only incentive. We get incentives from the university as a whole – incentives due to publications and as a Centre, no. There is no such incentive... There is an incentive which unfortunately we got to know about it last year I guess... There is an incentive for the number of publications; publications at national journals...there is an incentive for it. (Beatriz)

There is an 'event' that recognises the people who contributed the most to the development of research at the university...it's said that even when you do research, there is an amount that is added to your salary. I think annually there is an award for the best researcher, to the best administrative staff. In fact, this is an acknowledgement but I think it had to be much more than that. It had to be much more than that, oh there also appeared, that was one or two years ago, the recognition of those who publish, yes I think it was offered an 'x' amount of stimulus to those who publish. (Latifa)

Both Beatriz' and Latifa's statements demonstrate that there were many uncertainties surrounding the existence and functioning of the publication incentive fund. Further, both interviewees were researchers at the same institution in which the fund was already established. This raises questions about the internal communication mechanisms used to disseminate this information among the faculty. It corroborates the experience I had during the fieldwork, while I was trying to find key university documents which were not available. This also indicated communication problems.

In contrast, interviewees from the other university were more homogeneous in their responses. They did not mention any institutional instrument/mechanism to encourage scientific publications among the faculty. One said:

Look, I think that the stimuli for research here must come before the recognition of those who already do this. There are people who have done it [publish] and people who don't do it, and there is no recognition or stimuli for

those who do. It all starts there in recognition, right! So, there are people who publish 5, 6 'papers' per year but it seems that it is the same as the one who does not publish... The one who does and the one who does not do share the same benefit. (Carla)

This stance is not particular to Carla; rather, it is largely supported both by the results of the document analysis and what the academic managers I interviewed said. There is a pervasive lack of institutional mechanisms to strengthen the faculty's research capacity. It points to the need to design and implement instruments to boost scientific production and publication rates among faculty, since lecturers are evaluated by their research outcomes. Wangenge-Ouma and colleagues suggest that 'the remuneration policy for higher education personnel constitutes a particular strategy advocated by the Mozambican government to encourage individuals to pursue academic careers and enhance research productivity' (2015:134). One interviewee said:

All university lecturers, professors and researchers received an added bonus to their monthly salary [research grant]. It is a government incentive (Bella).

As Bella states, in fact, all teaching and research staff in public universities in Mozambique receive a bonus [for research] in their monthly incomes. However, this has been insufficient to stimulate high research productivity.

Unsurprisingly there were both junior and senior lecturers who claimed that from the point of view of financial income a research career compared to teaching does not pay. It suggests that the government strategy to incentivise research has not produced the expected results. Cloete et al. (2018) stress that 'in combination with other material conditions, the incentives for research, which are weak and crowded out by incentives for other activities such as teaching, have failed to encourage a research culture at these institutions' (109). Thus, different initiatives and strategies in public universities are needed in order to make research more attractive for junior academics (Habib & Morrow, 2007).

To overcome the general lack of incentives for research one of the universities in this study invested in academic consultancy as a source of income for financing its research projects and thereby strengthening the research culture. But this does not result in an increased number of research publications, either for the individual researcher or for the university (or the country). Reflecting on this issue within university contexts in Sub-Saharan Africa, Musiige and Maassen (2015) stress that 'most academics [find] themselves engaging in research in order to supplement their relatively low salaries with the income from donor projects' (124). This explains why many young academic researchers immerse themselves in teaching and research-as-consultancy during the early years of their tenure.

Some scholars have drawn attention to the side effects of academic consultancy. Felicita Njuguna and Florence Itigi (2013) for instance claim that 'this monetary preoccupation has led to acrimonious struggle among researchers for often irrelevant donor promoted projects or consultancies' (354). The financing lines proposed by external stakeholders do not always align with the interests of researchers or institutional research agendas.

In one of the universities, there was no institutionalized system/policy of research grants and incentives for publishing, or any initiatives to attract and retain more female researchers. My interviewees' statements and documents supported this finding. Hence most women there mainly engaged in teaching. Whereas in the other university, although the document showed that there was an institutionalized system for the research grants, and an incentive system (monetary compensation) for scientific publication my interviewees diverged significantly on their answer as to whether or not there were mechanisms for encouraging women to engage in research. The differences in interviewee responses stemmed from a lack of knowledge about what institutional mechanisms might be available. Those that appeared to be there were still recent and only a small number of people had benefited from them. This also suggests, as already discussed, that communication about such incentives in the university is poor. It would be useful to understand how the documents that institutionalize and regulate these practices are disseminated among the university community so that a greater number of researchers have access to that information. Clearly work remains to be done to disseminate information about incentives more effectively.

The difficulty of going abroad for Master's and PhD training

Since there are very few postgraduate courses or local staff with postgraduate qualifications in Mozambique, it is essential for researchers to be able to go abroad to study. With the expansion of higher education in Mozambique in 1989, the demand for more qualified teachers and researchers increased. To this day, much Master's and PhD training takes place outside the country (Brito et al., 2008). In 2022 the majority of postgraduates still go abroad, not least because such studies are often funded by international scholarships.

However, going abroad for postgraduate training is a real challenge for many female researchers for both institutional and social reasons as already explained. Indeed, this is one of the major obstacles in the process of training new female researchers to increase their academic skills, research competences and degrees so as to be able to reach senior academic positions. Even being recognized by their male colleagues and managers as committed to research and publishing does not mean that women are at the front of the line for a PhD. Laura, a young married female researcher with children explained:

If an opportunity was given to me today for a PhD in fact, years ago I used to say 'I've got to go to Brazil or Italy for a PhD' but from the moment that I got married and had children – I now think about doing a distance-learning PhD, a research PhD, one not requiring that I travel so far. I think, therefore, that being a woman has some bearing..., not in terms of knowledge and ability that a woman has, no. It is really due to the social issue that we end up having less liberty compared to men. (Laura).

As noted in the quotation above the social and the institutional are imbricated here in the decision to go abroad because on the one hand the institution demands research competence to advance in one's academic career but there are societal constraints (e.g. marriage, children, family) that restrict these opportunities for women. Amina Mama (2011) stresses that 'at the institutional level, Africa's universities remain steeped in patriarchal institutional cultures'(4) and this was also the case of Mozambique in which the ongoing processes and practices both in the wider society (in the north matrilineal and south patrilineal) and the universities are fueled by patriarchal values. As a result, most married women or those with children – if at all – as an attempt to fulfil the social prescription for gender-conforming opt for more flexible and less disruptive training models that allow them to study without neglecting their family responsibilities. It means that women's difficulty in going abroad for training, at the institutional level was determined by a lack of family-friendly policies and flexible scholarships for women and pervasive patriarchal culture that provide a ground for the inequality regimes. The gender strategy for HE advocates the need to increase scholarships for women as a countermeasure to overcome gender disparities in training. However, the institutional documents showed that women remain less likely to be awarded these scholarships, especially for training overseas in STEM careers. Thus, the majority of women were stuck in assistantship positions without a PhD degree. For these women, sandwich training programs that require less absence of women from their families, seem to be more effective as one female researcher and doctoral student said:

I got that scholarship and then I did the Master's degree. I did it in 2013 and only started my doctoral degree in 2018! All this time I postponed my PhD training. I was - I used to ask myself, 'Which doctoral degree am I going to do?' I applied for scholarships, but because they had their conditions and I didn't want, I am a mother, like I signed there and I'm married, so I didn't want anything which said 'stay four years abroad'. So I tried a doctoral degree which didn't affect my family structure. (Rosa)

At the time of the interview, she let me know, there were no women on the PhD training program she was involved with. This is a critical issue since the need to increase the qualification of the academic staff through training programs at the postgraduate level both internally and overseas has been recognized and addressed in the institutional documents as a key issue for boost-

ing the research capacity of the universities as well as the quality of research carried out. Aside from adopting a 'sandwich' training program, there were no references either in the documents or in the interviews about other mechanisms to encourage and support women's training abroad.

In the highly gendered and hierarchical academic context of Mozambican HEI, organizational cultures and practices influenced by gendered societal norms ended up maintaining the disadvantaged position of women in academic careers. In other words, the way in which Mozambican public universities are structured and functioning have enabled men to consolidate their elite position even in the domains (Department of Biological Sciences) in which they are clearly a minority. These patterns of academic inequalities between women and men have nothing to do with academic skills or competencies as usually claimed in that academic milieu but are a mirror of traditional Mozambican society that, following Acker (2006), that maintains and reproduces within universities inequality regimes.

Limited mentoring and role models

Mentorship emerged as one of the other institutional issues that my interviewees encountered. They discussed three issues regarding mentorship: first, mentoring practices in the university; second, the development of mentoring relationships; and finally, the nature of the mentoring relationship. The interviews showed that there was a lack of systematic mentoring as institutionalized practice. When it happened, it occurred informally. According to FNI (2016) mentoring involves personal and personalized contact, and works as a guide. It is useful for women at the beginning of their careers since it puts them in contact with more experienced professionals or colleagues of the same or different levels, who can help these women in the planning and development of their research careers. The majority of young female researchers and lecturers had benefited from some mentoring. As one of them said:

This is not news here, nobody moves for nothing, I never had directly - a direct mentor. I used to say, 'I'm one of the people who got into this department and was alone.' So, there's nobody to stimulate me and say, 'look, do this, you're doing eh this research, you're going to do your doctoral degree', nobody tells you what about here, what about there. (Rosa)

In both universities mentorship did not always work properly and there was a limited number of female mentors in biological research as role models for early-career researchers. The women who benefited from mentoring in their early research/teaching career were satisfied with this and showed greater self-confidence and career satisfaction. However, even in a department historically constituted mostly of women, most researchers/lecturers acting as mentors were men because they had higher academic qualifications than the

women. At the time of the interviews there were very few senior female researchers involved in mentorship. This is problematic and recognized by the managers in the university. As Cristina said: 'There are not many women who serve as role models in biological research in Mozambique'.

Okeke et al. (2017:6) have shown that this relative paucity of mentors and female role models at higher levels reduces the motivation for aspiring female scientists. Although mentors of female researchers do not have to be female, female mentors can serve an important function. These authors also suggest that 'female role modeling is not only directed at young women, it demonstrates to societies, institutions, and individuals that broadening participation of the under-represented gender improves the quality, extent, and reach of science' (id.).

Although some studies suggest that there is no association between the gender of the mentor and the mentee regarding their career satisfaction (DeCastro et al., 2014), the pattern of responses provided by my interviewees (senior researchers/lecturers and supervisors) indicates some gender differences in the way they assessed their mentoring relationships with male and female mentees. Those women who had had female mentors (eight out of 24) were more satisfied with their career and more self-confident.

When I joined there was no person who could inspire me, who could motivate me in this field. In general, for the health area, yes, there are many colleagues, but not in my speciality. But, because the University, or our department invites or make regular requests to the Faculty of Medicine, I went there to attend classes and there I worked with a female senior professor in my field, who is not the person who should, here in the department, she is not here in the department, she is in the Faculty of Medicine. So she is the person I usually work with if there is a project, if I have any proposal, if I have any doubts regarding to our discipline... So, if I had not, excuse my expression, 'meddled' in the Faculty of Medicine, I would be a little lost today or maybe even unmotivated. (Celeste).

Similarly Etelvina who was also mentored by a woman, said:

I have my supervisors that are also married. In my career my supervisors were women and hmm! I got the inspiration from them. I know some other successful women that are married and they easily manage different things. Here at the university I have Dr. Shaniya and my head of the section, Dr. Yara. These people stimulate me a lot. I learn a lot from them, they stimulate me to continue studying and do the research work. They make up a motivating team but I cannot find such easiness with all colleagues.

The young female researchers who had the opportunity to work with female mentors felt more encouraged to persist in their research career and follow their mentors' footsteps.

Several studies have demonstrated the positive effects of female role models on young women's intention to pursue a STEM career, increasing their expectations of success, interest, academic performance, enjoyment and sense of belonging to STEM field (Drury et al., 2011; Dasgupta & Stout, 2014; Herrmann et al., 2016; González-Pérez et al., 2020). Nilanjana Dasgupta and Jane Stout (2014) assert that,

Access to role models and mentors influences successful professional development. Young adults identify with successful female role models whose presence allows them to think: 'If she can be successful, so can I' and 'I want to be like her.' Typically, however, female college students encounter few same-sex role models who are faculty in STEM departments (24).

My findings align with these results. At both universities many women entered their teaching/research career as licentiates (Bachelors), i.e. directly after their first degree and without having a doctoral degree. Most of them did not benefit from mentoring and immediately went into the classroom to teach, supervise undergraduate dissertations, and participate in research projects. Theoretically as university teachers they are expected to teach and conduct research but some of my interviewees and young women did not benefit from prior training or guidance by a senior teacher as a mentor on how to handle all this, and especially to be engaged with research. This was corroborated by a male top rank academic manager who explained:

A good number of such women or such men hold their Bachelor's degree. Which means they still lack more, still more capabilities related to the goals of research. That's not to say that they didn't do well in their Bachelor's degree. That's not what I'm trying to say. What I'm trying to say is that it still lacks this deep preparation for these women and men to be engaged in the field of research (Marcos).

The interviewees who did benefit from some mentoring referred to these mentors as a kind of 'mother' and 'father' in their academic lives. This was particularly noticeable at one of the universities.

Cecilia and Paulo [mentors], they had a good influence on my willingness to pursue a research career. At that time Cecilia [a PhD senior researcher] was the only one who published. She would be the one teaching how to publish, but it was not something I could do automatically. Paulo is a kind of biologist who does not wear a tie. I had these two people who worked a lot in the area of ecology... many people said that we had something that perhaps cannot be found in other faculties of [this] university. We had Paulo who was our first director of the faculty. He left his spirit in the people that you are not working for a person, you are working for [name] university and that means you are working for the whole country. The decision you make today will determine the way Mozambique will be tomorrow, so you choose, either you work to gain your salary by the end of the month or you want to ensure that you

changed something in the community..., he made us competitive. He taught us a lot about our difficulties. (Mara).

The mentoring relationship described above goes far beyond being a mere source of acquiring knowledge or practices. It is also about personal and professional values, psychosocial support, commitment to organizational values and research because it is through this that many young women learn to walk alone and be more confident. A female lecturer said:

I think that we have some directors who we have to thank. Those are people who motivate us the most to publish articles and to research because somehow we think that we can make some progress in the career, producing. Look, that is why I don't forget this because it was very remarkable. (Paula)

Regardless of the gender and academic degree of their mentors, what made all the difference in the career of these young female researchers was what their mentors did, I mean the nature of the relationship the latter established with their female mentee. Rochelle DeCastro et al. (2014) also note that 'communicating with the mentor, mentor behaviours, collegiality of the mentoring relationship were significantly associated with career satisfaction' (301). I found that a more authoritative mentoring style could become a source of frustration and demotivation for the careers of young researchers. A junior researcher explained,

Our seniors, sometimes are good and sometimes no ...unfortunately. Uffh! I will always repeat myself – due to this subordination thing. They said, 'I am the head and as such, we should go in this way, and do this and that.' Even though it's incorrect...' but because I want it to be that way,' we all have to go this way. And if you suddenly happen to say 'no, I think it is best to go this way' you're punished, for instance. And you're left to your own corner and your research endeavour stands still and that's it. You send through an email, never get a reply, while your male colleague beside you has gotten his response. But it's the same person both of us have contacted. Things like these... It's just that men are tougher to go there and talk; talk from man-to-man and sort it out while women end up...I don't know...refraining and sometimes giving up some activities. (Beatriz)

Some (3 out of 6) senior female lecturers mentioned that young people, both men and women they work with, tend to be more individualistic, less subordinate and in a way they felt these young people know it all. Even if they have innovative ideas, the lack of this subordination to the hierarchy within Mozambican social groups in interpersonal relationships leads many senior teachers to choose not to work with this type of young person. Moreover, some male mentors used hierarchical differences to be oppressive towards young female researchers and supervisees.

Women who did not have any mentorship were less likely to participate in funded research projects and consultancies. In addition to that they were less satisfied/motivated, felt more isolated, less involved in research projects/groups and as such had fewer scientific publications.

Poor structuring and functioning of research groups

Research groups at the institutional level are important modes of academic working and forms of cooperation among researchers across the universities (Vabø et al., 2016). Despite the well known importance of research groups, the research process in the researched institutions was still characterized by a certain individualism rather than an institutionalized structuring through research groups. Yet among the established research groups at the time of the interviews, almost none of them were led by women. A female researcher explained:

For me my biggest challenge will be to really establish a 'strong team', a very strong team with colleagues or people who believe that we can be a reference laboratory at the level of the country, but it takes a lot of work for that (Latifa).

As noted in this quote, the absence of an internal research network and peer support through functional and institutionalized research groups is an issue for female researchers, especially those in early careers.

One of the universities had almost no structured and articulated research groups coordinated by a senior researcher. As a male senior researcher and top-ranking manager explained:

Until now we still struggle to, we're not yet, we still, we didn't create research groups. Because their creation is very important and this is the university's concern. We believe we can create research groups in the future which can involve these women to boost their research work. This is one of the difficulties to be found. Difficulties connected to the lack of creation of research groups, study groups (Marcos).

At both universities there were cases of a weak structure and functioning of research groups to help with the integration and training of young female researchers. One female researcher working full-time for 10 years stated: 'I think the department doesn't have research groups for the ones who come to fit in.' But even if the institution had research groups, as one informant claimed, most were unconsolidated and worked in a very limited way. In both universities the most consolidated research groups with greater robustness and scientific productivity were in the area of marine ecologies. One academic manager said:

It is true that we have grown a lot in the ecology component. This department has historically been in ecology. So, that is why these groups are much more mature. But eh! The health group is taking very, very large steps, has few lecturers for now, but is also growing rapidly. When these groups are consolidated, I have no doubt that they will work there. (Julio).

Areas such as health were still in development.

So, in the more developed areas such as Marine Biology, then, these areas I think have more opportunities, more support, because there are also older people that is more experienced people in this area. In other areas, for example related to health, the department is not so strong. I don't know why, but now that we have Dr. Victor who came back from [other university]. But we don't have a lot of people trained in the health area, so maybe that's why people are not, are not involved or do not feel very involved in this area of research. (Sergia)

Even if a woman was a senior lecturer she was excluded from positions of power in these more developed areas, which were assumed by men.

I think research in this department has male representation. The management and research have male representation. I've been a student here and I've always seen, they're the prime researchers... I don't see any women being cherished, being put as the lead... (Rosa).

This gender hierarchy within the research groups reflects the reproduction of traditional patterns of patriarchal social structures. Castel (2017) argues that the university as ideological apparatus reproduces dominant ideologies. This is particularly true if we take into account that although women constitute a majority in the biology department of both universities they have never been appointed to the position of head of department, that is, they remain in a subordinate position. Thus as Castel (2017) claims, 'the university tends to express and even amplify the ideological struggles present in all societies based on gender stereotypes' (36). This was also evident in the universities under study where vertical and horizontal gender segregation in research teams prevailed.

Unattractive research careers

Among my young female interviewees, research careers were seen as unattractive when they existed as separate tracks. Two factors contribute to this: the low social prestige of the research career in the institution and low monetary compensation. Due to the strong division of teaching and research careers in the universities 'the patterns of remuneration of academic staff differ increasingly' (Szromek & Wolniak, 2020: 8) according to career, academic degree, fields of science and position in the career. However, the traditional and dominant model of the researcher in one of the universities was that they

are considered part of the technical staff (i.e., a form of support staff), hence hierarchically inferior to the teaching staff who are prioritized. A young female researcher explained:

Speaking of subsidies, we are only talking about the base salary, again, it's not the institution's fault and it is the system's fault, right! That is a lecturer is treated as a specialist, but a researcher is not, but at the end of the day, he/she is, right! (Joana)

Teaching careers seem much more attractive in this context and the majority of young women opt for these. Historical reasons explain the low institutional status conferred on research careers. In one of the universities, research careers were initially created in order to allow progression for professional technicians assisting the faculty in the research process. Another issue is related to low income and incentives since most women in research careers are young and in the process of trying to create stable and livable incomes. Sawyerr (2004) stresses that 'in most African countries, conditions for research have been severely compromised as manifest by the generally poor remuneration' (211). This situation is not only institutional but at the same time it is also structural for many African universities. They can suffer brain drain since 'their academic environment remains not attractive enough for talented national scholars, who [as a consequence] relocate to overseas universities [...] which offer more attractive academic environments' (Cloete, et al., 2017a:140). Thus, research careers need to be reframed and understood differently now from what was historically the case that is research is no longer just a form of support for university teachers.

In the next section I analyze the material work conditions in the universities and their influence on women's scientific outputs, starting with the managers' views of the obstacles female academics face.

Managers' views of obstacles women face in biological research

When asked about institutional obstacles for women engaged in biological research, the one female and all the five male managers interviewed denied the existence of such obstacles in their department/university. They thought that women do not face any barriers in research because in their institutions women were treated as equal to their male counterparts. As two male top managers said:

Well, I do not see, here at the institution level, in fact our institution even favours a lot, the gender issue. So, at the institution level I don't see, I mean, I think this battle is an individual battle for each one depending on their effort, and the institution facilitates. (Josue)

There are no obstacles, I do not think there is an obstacle that can inhibit their [women's] progress. (Antonio)

On the one hand these managers show a weak awareness of the institutional obstacles women face. But on the other, the denial of the existence of institutional obstacles in the departments and areas under their responsibility can be interpreted as an attempt to show that everything is fine, that they are doing a good job in the gender domain. This lack of institutional awareness among top managers, leaders and department heads contributes to reproducing gender inequalities in the organization (Acker, 2006). Therefore, the first step towards any institutional change in this area is for top managers, both female and male, to be helped to be more aware of gender inequalities in the academic and research fields in their organizations, that is to make the 'invisible' visible.

Further, managers argue that the university supports everyone including women. They considered differences between women's and men's careers as something exclusively individual. Even acknowledging that family burdens compromise significantly women's academic performance managers still blamed women themselves for the existing differences. The narratives of academic managers suggest a worrisome problem of lack of university support for women. This replicates my findings in the document analysis that showed, institutionally, a lack of concern with inequalities between women's and men's academic careers at the faculty and departmental levels. A top-rank female academic manager said,

These issues of inequality between men and women in doing research, I think they have the same capacity and institutional openness to do. But then, there are a series of constraints that *they impose on themselves or are imposed by the family* (Ana; emphasis added).

This is a classic neoliberal position, typical for contemporary universities, making the individual responsible for what are structural issues. Further, this supposed institutional openness has not translated into women's and/family-friendly policies and/or an institutional frame for career support of women. All of the senior male managers and lecturers had little gender awareness regarding the institutional barriers that women face and which they, as managers, could do something about.

It has been claimed that oppressed groups have a better understanding of the world than their oppressors, despite Max Travers' (2001:135) assertion that 'members of the subordinate group are often unable to perceive that they are oppressed'. In contrast, Acker claims that 'workers in lower-level, non-management positions may be very conscious of inequalities' (2006: 452), given that in the hierarchical context of the academic culture, power and authority differences are fundamental to the organizational processes in which inequalities are produced. My interviews with lecturers (without any functional administrative roles), students and researchers support Acker's view: they revealed a very high level of critical awareness about the difficul-

ties that women face in their research careers. This awareness was largely influenced by the position the individual occupied. Thus both women and men in senior positions with functional roles as academic managers revealed less critical awareness of institutional obstacles for women in their research career than those at lower levels. As one female academic manager said:

I don't see any difficulties, there is no discrimination, and a good thing we did is that in addition to being divided into divisions, we are also, we have research lines and people have the opportunity to study (Julieta).

There are several explanations as to why these more senior people failed to identify any obstacles to women's careers. One may be that they deliberately refused to see these problems because they did not want to compromise their own positions. Another might be that having achieved great progress in their own careers they found it difficult to see that this might not be the same experience for everyone. A third one is that most of them genuinely thought there were no issues. Whatever the reason, it is concerning that these managers who have the power to improve women's position in the university and support their research careers, were unaware of these difficulties.

Young female researchers, whether married or not, showed greater levels of awareness about these obstacles compared to married senior women. The latter had already reached higher levels in their careers and might have been more resigned. This difference can also be explained by the fact that women in the early to mid-career are still in a phase of intense struggle to ascend to the next higher levels.

Like male senior lecturers, some female married senior lecturers (3 out of 6) and some single female early-career researchers (4 out of 18) thought that there were no institutional obstacles for women in the field of research if they are able to demonstrate their science competence. Bella, an older married woman and lecturer/researcher in her department, stated:

I don't see any obstacle in our department, I don't feel that. Because in my perspective I think we have, we always had very open-minded colleagues and they always encouraged that. If there was an obstacle, maybe an obstacle, someone in particular, but I didn't notice it. (Bella)

Bella and other senior lecturers' view assumes that there are no institutionalized gender inequalities in research. Even if they had to 'put up a fight', some women did not link that to structural institutional inequalities but to a personal failure to display their competences adequately. As one said:

Internally the institution gives equal opportunity both to women and men. So, there is no obstacle. So, there is no obstacle in terms of giving advantage to one group or giving disadvantage to another group. Men and women, as long as they have capability, as long as they are willing to tread the path of re-

search, they get opportunities. And us women, we had to put up a fight and say, 'look, I am here too. I want to participate too eh...in this project, I deserve too, I can show that I can do it too.' Women should show their capabilities. It's a thing of meritocracy. (Judite)

It should be noted that in the quote above, a certain lack of awareness is evident about the subtle institutional mechanisms that reproduce and perpetuate inequalities between women and men in academia. As part of inequality regimes the visibility of inequalities depends a lot on the subject's position within the institution (Acker, 2006). My interviewees saw any obstacles as related to the subjects that is to the identity and social roles of women, instead of to institutional barriers within the universities. The managers' statements tended to blame the women themselves by invoking the notion of meritocracy. This means that these senior female lecturers had internalized stereotypical ideas of meritocracy as criteria to blame researchers in the lower echelons who found it difficult to advance in their research careers.

Low expectation of and investment in married female researchers

Higher education institutions are a social field permeated by tensions between managers and workers, women and men. They are non-neutral environments where men defend their gendered privilege (Acker, 1998). Juliana, a lecturer, explained: 'my director used to say: 'Research was not made for the married [women]'. This view sought implicitly to induce conformity to social norms in women, to accept the idea that for women career and research are not compatible with marriage. Juliana's director's speech indicates the weak expectations that he, as a man and manager, had regarding the performance of women in the field of research. As noted by Acker (2006), informal interactions and practices between different subjects in workplaces also (re)produce gender inequalities in the daily life of organizations.

Representations and expectations regarding married women that circulate in broader society and are discursively reproduced within academia by individuals with decision-making powers often act as criteria for exclusion and/or the reproduction of inequalities within organizations (Acker 2006). Hence, in academia married women with younger children, for example, are given less attention and opportunities by project managers than single or divorced women. The five male managers I interviewed had limited expectations regarding the performance of married women in research and publications. Julio, for instance, claimed:

If you look, for example, two lecturers, a male and a female, you will see that the male lecturer's progress is quicker than the one of the female lecturer because she then has the social component and if she has children, and that thing of children holds her back a little bit, frustrates her a little.

This prejudice leads men in management positions to invest more in single or divorced women. One woman said:

According to what I and my colleagues in the same situation think, they don't want to invest in people like us who won't be able to follow at the same pace as them. If they come to me and say 'you'll stay abroad for two years', I'm not available because of my family matters. (Rosa)

Women's careers could thus be stalled.

The material factors

An important aspect regarding research reported by my interviewees concerns the infrastructural conditions of the laboratories, equipment and reagents. This is a structural issue for higher education in Mozambique as a whole, since it affects many public and private institutions that have science courses. Due to financial constraints universities have no capacity to invest in their material infrastructures. Njuguna and Itegi (2013) claim that 'governments in Africa spend very little money building supportive environments for research perhaps because of other competing entities including food, health care, education and other basic social services' (354). Despite the experimental demands of biological research, the material conditions for its execution are still weak, as explained by Julio, a senior professor with a PhD and academic manager in one of the universities.

The vast majority of researchers, professors in the department, are very oriented towards laboratory-based research. If we had enough equipped laboratories, with the consumables available right there ...we would make it [research] happen. We need structured laboratories, with the necessary equipment and after that those consumables are available. It means that we have a long way to go.

This has been one of the institutional challenges for many Mozambican and African universities. Cloete et al. (2018) highlight that a research university is also characterized by possessing the necessary research infrastructure such as laboratories, to ensure appropriate work conditions, etc. The lack of well-equipped laboratories is one of the institutional factors limiting the development of biological research. Since women are the most engaged in laboratory research, they are the most affected. The lack of equipment for research is related to the scarcity of financial resources for its acquisition abroad, since much of this material is very expensive. As Jurema, a researcher, said:

For example in the area of molecular biology in particular, people don't understand that we, the cost doesn't, like ah! Your stuff is very expensive, you

produce few results no, but it is an expensive area. The equipment is expensive, the reagents are expensive. So, this is also a barrier.

As Jurema suggests, the lack of institutional capacity to acquire high-tech equipment contributes to the low research performance of the academic staff. Njuguna and Itegi (2013) argue that for many developing countries research facilities are too costly. The latter's inbuilt obsolescence is also an issue. This has crippled many laboratories, as importing spare parts is also difficult and expensive. Cloete et al. (2018) assert that 'the institution's leaders lack the funds to build the academic and infrastructural foundations required to help it to become a research-intensive university' (110). This statement was corroborated by Beatriz, a female researcher, who explained:

Well, materially – unfortunately, most of the time or almost always we depend on funding. The state's budget isn't enough to maintain research. Personally, for what I am doing – most of the material or reagents I have were an extra investment and also from some MA professors who ended up leaving them here, basically. (Beatriz).

The biggest difficulty as reported by Beatriz as a researcher had to do with the lack of equipment and reagents; most of those available were brought by visitor lecturers from abroad. The question is how researchers respond to these issues posed at structural and institutional levels, and I next examine this at the micro-level.

Individual/micro-level factors

At this point I will address micro-level obstacles or individual factors. These are not actually about individual choices or preferences, but about how women reacted to the prevailing structural and institutional factors in the settings in which they were located, and which meanings they attributed to those factors in their research careers. Aspects of having family and children, or not, have already been addressed and will not be picked up again in the following.

Different categories of women at different stages of their career varied significantly in how they reacted towards structural and institutional constraints (Feuvre, 2015). The literature highlights a number of individual and motivational factors that influence researchers' participation in research activities. Some studies have focused on how demographic specificities affect the willingness of people to participate in research. In research conducted in Australia, Emma Finch et al. (2013) found that individual engagement in research was influenced by research interest, research skills and confidence, experience and academic qualifications.

Similarly Musiige and Maassen (2015) stress that a 'passion for or interest in the discipline, ambitions, self-esteem, age, career rank, academic qualifications, and a desire to collaborate with others, are related to academics' level of intrinsic motivation' (113). In the context of my research, it was clear that these personal attributes are not simply a function of individual choice or aptitude but are largely inflected by macro- and meso-level factors. These individual attributes (e.g., academic degree, age, position and stage in the career, functional roles) had significant effects on my interviewees but acquired meaning through macro- and meso-level inflections. For example, regardless of their position in their career older women adhere more strongly to traditional ideals regarding the social roles of women and men. Younger, single, divorced or married women showed more critical and nonconformist attitudes, aiming for changes at the institutional level. This shows that societal and institutional levels impact differently on individuals.

Despite the prevailing traditional view of women in Mozambique, many young female and urbanized researchers tend to break with the social ideals that place them in the roles of mother and wife. Younger women among my interviewees (13 out of 24) were more proactive, more self-confident to the point of believing that they could still do something different. The sense that the result of their research was in some way advantageous for the scientific community reinforced and strengthened their self-esteem and self-confidence. Sergia, a young female lecturer, stressed:

I was able to apply for funding and performed well in the work I did which deserved a presentation in several conferences as I was able to develop an experimental diagnostic test of a disease. It was good, so good! And because of that, doors were opened for my involvement in other work relating to the same perspective.

For the majority (20 out of 24) of women interviewed, their self-determination to do research was also the result of their perception of the quality of the work environment from the point of view of interpersonal relationships established with colleagues at the same level and with more senior ones. Vera, an assistant lecturer, explained:

My boss, he's the main teacher of this subject. He is a *wonderful human being*. He knows how to *be human*, how to be a professional. It is very difficult for me to see this in many people here. I see, especially when we, as *assistants*, most of the theoretical classes, the main lecturers teach, right! His positive *attitude towards students, towards us as colleagues*, with me as an *assistant*. I do things *happily* because he gives me the possibility to say no, I have the right to say no (Vera, *emphasis added*).

Despite weak institutional incentives, the women proved to be quite motivated and engaged in their work by the team spirit within the group among their

colleagues from the same academic level, age group and career position. When looking at how Vera described her experiences of interpersonal relationships with senior male staff to whom she was an assistant, she used five key-words (mostly adjectives denoting positive qualities) that gave substantial meaning to what she said, human, human being, attitudes, colleagues assistants and happiness. It may suggest that for her, before the academic qualities of her hierarchical superiors with whom she worked, their personal ability to establish more democratic, empathic and humanized socio-professional relationships with their assistants and junior people was a more significant issue, with positive effects on women's satisfaction and self-confidence. By humanized relationship, I meant a more welcoming and women-friendly environment that enables people to connect positively 'with their inner selves and others socially, emotionally and cognitively in the context of learning and teaching [and research] in HE' (Nerantzi et al., 2021:1).

Vera associated more positive attitudes such as happiness, satisfaction, and greater motivation with such a perceived model of democratic and humanized academic relationships. A study by Belle Ragins and colleagues (2000) found that satisfaction in mentees' relationships with mentors was positively correlated with their job/career attitudes. In other words, junior people who were satisfied with the quality of the relationship they had in the work environment with older and highly-ranking people increased their career commitment, self-confidence, '[positive] perceptions of the opportunities for promotion, organization-based self-esteem and procedural justice perception' (Ragins et al., 2000:1183). This may well explain the sense of happiness and satisfaction Vera had experienced. Further Vera's statements is nothing more than a critique of her surrounding academic work environment, which is generally highly hierarchical. In a similar vein Chrissi Nerantzi et al. (2021) suggest the need for 'building and sustaining effective relationships in HE' (1) i.e. more democratic and humanized models of relationships that can provide a welcoming and women-friendly environment.

However, there were interviewees (four out of 24) where it was possible to see a feeling of disappointment and frustration motivated by the specificity of the socio-professional relationships established between junior researchers and seniors/supervisors. In the Mozambican academy in general such relationships are strongly bureaucratic and hierarchical, based on differentials of academic degrees, career position and seniority more generally. This led Julieta to conclude:

I sometimes even joke and say that we should perform some cleaning and take away seniorship - every senior - and put in new people who don't know us literally. Maybe in that way we would proceed because there is everything to make the institution shine in the true sense. (Julieta)

Julieta's statement hints at intergenerational conflict or at least dissatisfaction in the professional relationship between junior and senior researchers, mostly their former teachers. Thus the fact that most of the women interviewed still had not earned a PhD compared to their male counterparts predisposes them to feel more conflicted about their seniors. James Hearn and Melissa Anderson (2002) analyzed workplace conflicts in academic departments in universities in the USA. Their findings suggest that 'among the demographic factors of potential influence [on the conflicts] are the department faculty's size, gender composition, and seniority composition' (507). Even considering the fact that historically the biology department is made up of women, seniority involves predominantly males. As larger proportions of women are engaged in formerly all-male activities (academic research careers) conflict is more likely. Among my interviewees it was also possible to note that in one of the universities the conflict between juniors and senior research staff was very low. In part this was because the research staff were all approximately in the same range age, at the same academic degree level (mostly Masters), and many had been colleagues since their undergraduate years. The low asymmetry in faculty age, rank, length of service/experience within junior research staff in the faculty of natural sciences greatly reduced the possibility of intergenerational conflicts. But homogeneity also reduces diversity and hence creative input.

Conclusions and recommendations

In this chapter, I have aimed to examine the obstacles that undermine women's research careers in biological sciences within public universities in Mozambique based on the responses collected from women working in the departments of biological sciences at two universities in the south and north of the country. I explored these obstacles at macro (social), meso (institutional) and micro (individual) levels. It can, without doubt, be concluded that the Mozambican social academic milieu is not a women-friendly environment for women to pursue a research career. Women's reported experiences throughout their careers in the universities are a mirror of what the documents I examined indicated, and these themselves mirror the broader society in which Mozambican HEIs have emerged. For example, in general, as reflected in the more recent documents the family appears as an entity that cannot be questioned. Consequently, the ascribed social roles for women and men within the so-called modern and urban families remain less flexible. This along with a lack of institutional supportive initiatives for women's careers affects how women actually work in the universities.

The data that emerged from the interviews showed that women's research careers in biological sciences are affected by a set of entangled factors acting at societal, institutional and individual levels. My results show that once

inside the academy, these women continue to face obstacles and challenges since most of the strategic interventions foreseen to overcome such gender barriers are sparsely, or not, implemented. Women remain significantly present in the lower levels of academic careers in biological sciences, but they are systemically underrepresented in professorial positions. This means that although working in an initially female-dominated disciplinary field, the overrepresentation of women in biology at lower levels does not eliminate the gender inequalities and/or gendered processes that place them in a disadvantaged position compared to their male counterparts. The discourses of supposedly female domination in biology hide a wide range of barriers and challenges they still struggle with.

Despite a public rhetoric of gender equality, Mozambican society is still structured and guided by traditional gender beliefs and a culture based on male power. This socio-cultural characteristic pervades the universities by (re)creating existing patterns of gender inequality. My study shows that Mozambican women in biological research careers within public HEIs are more likely than men to postpone or avoid their Master's or PhD training abroad due to their family responsibilities both in the matrilineal north and in the patrilineal south of the country. These findings are partly in agreement with previous research by Heidi Johann Prozesky and Mouton (2019) who reported that African women experience difficulties travelling to conferences and networking because of the assumption that they are primary domestic caregivers at home.

With regard to spousal support my findings suggest that there are few women who can easily get the necessary support from their male partners in their academic careers and/or training programs. This lack of support is a strategic part of the male power game for maintaining their hegemony within the family and within marriage. This may well explain why the women I interviewed, most of whom were married and had at least one dependent child, remain less qualified (with no PhD) and hence under-represented in the highest positions within biological careers. This is a societal and structural impediment for women. Although Mozambican universities demand a more qualified teaching and research staff to transform themselves into research universities, these overlapping of societal and institutional factors prevent many women from progressing and achieving seniority. This is particularly exacerbated for those married women in early research careers who already have children.

My research also suggests that younger women are less likely than their older counterparts to strongly adhere to traditional beliefs about gender roles. Nonetheless they experience substantial work-life conflicts, even if, as was the case with some of these interviewees, they do not give up on investing in their academic careers despite being married, whereas older women regardless of their academic degrees were more gender conforming and thus less

prone to this conflict. We may be seeing something of a generational shift here.

For these young female researchers the absence of family-friendly institutional policies to support them exacerbated work-life conflicts. There is empirical evidence that the university environment is not supportive of female researchers in maintaining both career and family commitments despite the rhetoric of gender equality within both universities. At this level my findings have some implications for overcoming these work-life tensions that women are confronted with. Universities should seek to adopt policies that enable young women to undertake postgraduate degrees. This is part of the institutional immaterial factors that influence women's success in their biological research careers.

As my research showed, very few women had gained PhD degrees in biological sciences in the last decade which is contrary to the general world tendency. This indicates the need for policies that can boost female researchers to achieve PhDs since a 'true' research career in biological science and in other academic science disciplines often begins with doctoral research instead of licentiate degrees as now happens at the two universities covered in my study. However, at this point, married women in early research careers end up falling behind compared to single or divorced women, and compared to their male counterparts who regardless of marital status can easily decide to go abroad for training.

Reducing the social disadvantages of married women and women with children requires some institutional changes. Academic managers and policymakers should promote more flexible training program models aimed at these women, that allow them not to be absent for a period of time from their families. This would increase the number of female researchers with PhD degrees. It would in turn improve the institutional gender indicators in research.

In parallel to this lack of supportive policies for women, it was evident that the two universities do not have institutional mechanisms to attract, stimulate and promote junior female researchers engaged in biological research careers through a system of academic incentives. Perhaps due to their public nature these universities are extremely dependent on government bureaucracy and do not find within their administrative and financial autonomy margins for more innovative/progressive initiatives. This helps to maintain the strong gender disparities that are currently observed among faculty and researchers in the field of science.

Women reported that they experienced difficulties in accessing national funds for research due to the eligibility criteria which require the applicant/principal investigator to have a PhD degree, something that many women working in the researched universities do not possess. This put them at a disadvantage compared to men. Paradoxically some of these women obtained research funds from international agencies, even with just a Master's

degree. I would therefore argue that internally (at national level) male senior lecturers/researchers have relatively easy access to the national funds for research disbursed by governmental agencies, and women have to align themselves with such men strategically to get access to that funding. This removes some autonomy from women in the design, coordination and implementation of their own research projects. It challenges the higher education institutions and national research funding agencies to come up with more efficient strategies in the provision of funds for research projects, especially ones led by young female researchers. There was little institutional awareness regarding women's difficulties in accessing research funding, and indeed the research policy of the universities was not gender-sensitive. It is supposedly gender-neutral aiming to promote competitiveness and meritocracy among researchers even though this is a bit of a fantasy. My findings from document analysis show that there is a silence around gender in the research policy. Therefore, if the universities are concerned with gender inequalities as they claim in some of their key documents, this should be translated into making gender issues visible across all structures and domains of its functioning including research. I suggest universities revise their research policy, mainstreaming gender, and taking into account the real and different needs of women and men in their research careers. It is important to dismantle or at least challenge this dominant view of the supposed gender neutrality (blindness?) of university research policies since it contributes to maintaining, reproducing and perpetuating gender inequalities in the research field.

With regard to features of the workplace, my results demonstrate that there are some obstacles that women may well share with their male colleagues, mostly in terms of the material conditions that help to enhance academic productivity (availability of research funds, laboratory equipment and supplies, field work support services, and infrastructure). However, it was clear that female researchers are particularly likely to be severely affected by poor laboratory conditions since most of these women were involved in experimental biological research whereas men occupied managerial positions or were involved in biological fieldwork. The obstacles connected to fieldwork for women (e.g. societal/family issues) create obstacles that results in women (to a higher degree than men) avoiding research areas that demand fieldwork and therefore (to a higher degree than men) choose experimental oriented research areas (since it doesn't demand being away from the family) then poorly equipped laboratories end up affecting their careers negatively. Men choose areas not involving and demanding experiments, and most of them are in positions controlling the resources, then the consequence is that the few resources available are distributed to male-dominated areas of research that is to a less extent to laboratory equipment. Perhaps for this reason the research on marine ecology has been seen/considered a kind of postcard of the departments of biological sciences at the two universities. Due to this,

female biologists are more strongly affected than men by the poor conditions of the laboratories which compromising their research outputs and scientific outcomes. These, however, are equally important for their career promotion. Despite this lack of good material conditions for experimental research, my participants considered the lack of research funds to be the most critical factor for ensuring academic research and productivity. Thus at institutional levels gender-sensitive policies and strategies are needed to promote research among women in science.

My research shows that at the individual level some highly qualified/senior researchers and lecturers chose not to devote most of their time to ordinary biological research. This stems from the perception that biological research careers are still very precarious in terms of the status and remuneration system, undervalued and underpaid compared to teaching staff. This has led these senior people to be more engaged in extra teaching and consultancy activities rather than in research, since the former give them additional economic benefits. For junior female researchers the primary reason for their persistence in biological research careers was not any financial benefit but their own 'love for the subject', and in one institution the positive effect of a supportive environment provided by their peers and mentors of both genders.

Most of these young women enthusiastically reported their experiences and career expectations and these were positively associated with their satisfaction regarding previous experiences/relationships they had had with mentors regardless of gender. They also believed that despite all the struggles in their academic environment they had a chance to progress professionally. This feeling was not uncommon among individuals at the beginning of their careers since for several of these interviewees it was their first work experience in academia. Additionally, I found some evidences indicating that young female researchers who had an opportunity to work with female mentors reported higher career aspirations to become successful in their academic research careers. These results should encourage universities to design, institutionalize and implement formal mentoring programs for the younger and/or newly-hired lecturers/researchers in the universities giving attention to the structure, quality and frequency of the interaction/relationships between mentors and mentees. In addition to this, my findings suggest the need for institutional investments in increasing the number of women reaching PhD and seniority. There is a need for additional academic investments in the new generation of female researchers in order to realize their potential and induce institutional changes in the field of their disciplinary research. Conversely, women who reported an autocratic leadership from male managers or less supportive mentor-mentee relationships revealed that this contributed to their dissatisfaction and blocked their professional creativity.

Finally young female researchers rather than older women reported a critical awareness of the problems they face both within academia and in society

at large. This is encouraging in terms of their attitudes toward societal representations and cultural expectations of women.

In the next chapter, I explore women's career paths in biology and how this shaped their career aspirations and expectations.

5. Women's actual careers in biological sciences: a tale of unequal opportunities

In the previous chapter, I examined how perceived barriers at the macro, meso and micro levels shape women's research careers. The focus of this chapter is on women's career pathways in biological sciences. I was concerned about what enabled their careers and the kind of challenges that emerged during their careers trajectories. I interviewed women from different generations of researchers and university lecturers in two locations, and as such with experiences initiated in different contexts. Their career accounts provide us with a better understanding of the variety of ways in which they chose to engage in biological science careers. Thus, here I seek to answer three main questions: how did these women decide to engage in biology careers, what was the role of the HEIs in these women's career choices, and what were the expectations and aspirations regarding their careers of the two generations of researchers co-existing within the departments of biological sciences? The chapter consists of three sections: i) women's career decisions making where I examine the main factors that enabled their choices; ii) women's career development where I explore the perception of female and male, senior and junior interviewees with regard to women's progression, and iii) supporting women's research careers in academia where I analyse how the universities deals with women's careers barriers.

Women's decision making to pursue a career in biological sciences

Before moving on to my findings I will briefly discuss theoretical perspectives on career choices. Career choices and decision making can be better understood through a psychosocial model blending individual preferences and social and cultural factors (Hodkinson & Sparkes, 1997). Phil Hodkinson and Andrew Sparkes (1997) as well as Suzan Philips and Nicholas Pazi-enza (2013) remind us that choosing a career or occupation is a fluid and active process that can change over time as the individual grows and throughout her/his interaction with the perceived surrounding social environment.

Azer Efendiev and Pavel Sorokin (2013) talk about careers as socially structured pathways. Likewise Katerina Günter et al. (2021) view the decision to study biology in terms of an individual interest that from an active and interactional process of 'developing an awareness of contexts [and] interrelations' (844). Several studies have pointed to different factors as influencing the career decisions, ranging from personal career interest, family, friends/peers, salary expectations, teachers, social media and past experiences (Adya & Kaiser, 2005; Ferrinho et al., 2010; Mutekwe & Modiba, 2012; Saleem et al., 2014; Vilhjálmsdóttir & Arnkelsson, 2013; Ngussa & Charles, 2019; Abe & Chikoko, 2020; Patsis, 2020).

Career decision making is a complex process that involves different factors at micro, meso and macro level. Musatafa Özbilgin et al. (2005) claim that,

At the micro level of the self, there are factors such as individual agency, dispositions and different forms of capital, as key influences on individual choice. The meso level involves the habitus or the processes that mediate and negotiate career choices in the light of individual desires, capital and contextual circumstances. At the macro level, the study examines structural conditions that inhibit or enhance career choice (Özbilgin et al., 2005:2004).

All these approaches converge in the idea that personal interests are influenced by the contextual factors of the settings in which women are located. Thus, in my study career choice is seen as a psychosocial process resulting from internal (psychological) and external (sociocultural factors) processes (Hodkinson & Sparkes, 1997; Philips & Pazienza, 2013; Efendiev & Sorokin, 2013). Based upon the statements made by the female researchers I interviewed, I shall now explore some of the factors which they cited as the main influences on their decision to pursue a career in biological sciences.

Senior women from the March 8 generation and their career decision making

The most prominent (structural) factor that led young women at that time (1977) to pursue careers in biological sciences, mainly as teachers, was the macro-political (socialist) context of Mozambique after independence. The political decisions regarding Mozambican youth for the March 8 generation had lifelong consequences. Unsurprisingly senior female lecturers I interviewed (6 out of 24) reported that they had no control over their career decision — they did not choose to become biologists. Their entrance into biological sciences was not an individually planned decision; it was state-planned, something not uncommon in the communist and absolutist regime in which they lived. One senior female lecturer explained:

I am from the time after independence. We did not decide what we wanted to be. Someone decided for me and I had other dreams at that time naturally. I did not want to be a biologist, I wanted to be a doctor [study medicine] and my father wanted me to be a lawyer. But then independence happened and several things changed in our lives at that time the Ministry of Education decided about the future of the students. So, when we concluded secondary education we went to check some lists that had our names and the decision that had been taken in relation to what we had to do. I had been enrolled to be a Biology and Chemistry teacher in secondary education. I am from the group of 1979, the third group of the so-called 'March 8th'. So I did not have the chance to choose what I wanted to be. Well, I took the course on Biology and Chemistry Teaching, I taught at secondary school before working at the university and when I finished the teacher training course I went to teach. I did not return to secondary education to teach because I was chosen as monitor^[15] at the time. Therefore, it was the policy of that time training national lecturers and I was chosen to be a monitor of Biology and since then I stayed at the university (Judite).

Judite's story was common among a certain generation of women. Political decisions were the most prominent reason for their entrance into biological sciences, as science teachers at secondary schools, since not science itself but teaching/education in general 'were widely framed as a national priority within government policy and rhetoric' due to the high illiteracy level soon after the independence (Archer et al., 2015:926).

Judite's preference had been a career in medicine and that was suddenly changed by the political decision that led Judite and many other women of her time to become teachers at the secondary school. It is not clear which criteria they (political decision-makers at that time) used to place the majority of women in education but I suspect that it was inspired by the sociocultural associations of teaching with traditional socially ascribed roles in the domestic arena as caregivers and the notion that women are mainly responsible for children's education within Mozambican families. Such a view or female work model grounded in domesticity inspired consciously and/or unconsciously the public educational policies, leading to 'a feminisation of the teaching workforces' (Kelleher, 2011) in the country especially in primary school and the lower levels of secondary education. Even though the country at Judite's time had a strong political rhetoric of women's emancipation, their tasks and overall occupation in the public sector was a kind of extension of their domestic sphere. Despite the fact that Judite's personal

¹⁵ A monitor is a position occupied by a student in regular academic situations and at the end of a course who, through a selection process, provides assistance to a teacher. The student monitor, also called university tutor, performs a variety of non-teaching duties. Among other responsibilities, the monitor has the task of assisting the teacher in the preparation, application and correction of tests; under supervision of the teacher the monitor guides students in the development of practical activities and experiences helping students to understand the subject, and answers questions. The monitor also participates in work groups during the class and monitors students' work during the learning process (See UEM, 2014d).

interest and expectation clashed with these socio-political interests at that time, after several years of complying with that compulsory political prescription Judite managed to establish herself as a university teacher with a PhD degree. This was a milestone in her career as a science teacher that to date still very few women are able to achieve.

It is important to remember that until the 1990s, as part of the socialist education policies, 'access to the university did not require entrance examinations and university attendance was free' (Langa, 2014:7). Everyone who completed high school was guaranteed access to higher education. In spite of this, the number of women enrolled in science-related courses was low. In general, however, independence proved to be a milestone in the life and history of Mozambican women who, for the first time by 1985-1990 when the course of Biology reopened¹⁶, were admitted as teachers to the university. However, overall very few women from the March 8 generation managed to establish themselves within science careers in the university and to achieve senior faculty positions. At one of the universities there were women who reached seniority without obtaining a doctoral degree, a fact which was also noted in my interviews. But this is rare. Nonetheless, these few senior women in the science field became the role models for the new generations of faculty.

Although these women were made to pursue a career they did not choose, some reported that they had always had a passion for the discipline. Bella, a senior female lecturer, explained:

I had a path, right! Whereby I started teaching early when the colonizers left the country. I started teaching, I always liked biology, plants in particular, and then I started working, right! I studied later. Because of my passion for plants I decided to study biological sciences, I was already teaching biology classes in secondary education.

For other interviewees biology was not their preference. Being a teacher at the time was a profession that conferred a certain social prestige and economic advantages in terms of access to consumer goods in so-called consumer cooperatives or *cooperativas de consumo*. This generation of senior women was mostly trained as biology and chemistry teachers for secondary education. Any academic career in biological sciences at university level was a consequence of individual opportunities they later found to increase their academic qualifications. Lucilia, a PhD and senior lecturer, explained:

¹⁶ In the last years of Portuguese colonial rule the former University of Lourenço Marques offered among others academic programs medicine and biology. However, by 1978 the Frelimo government closed some of these science-related courses including biology, chemistry and physics which were considered of lesser priority in the development of the country (see Beverwijk, 2005; Langa, 2014).

it was not my first option but I was from that time of March 8th, something like that, so after the tenth grade, at that time it was ninth grade, after the ninth grade I had to teach, that was at a secondary school. The career is something that sometimes we make decisions that later we say: should I continue or stop? I continued teaching out of obligation, and one of the subjects I chose was biology, right! Having worked for exactly three years, I came to study at the Faculty of Education where I did Biology and Chemistry to teach the seventh and ninth grades. After the course I went to teach classes. There was an opportunity to continue studying to get a Bachelor degree and since I was already in the Biology area, right! I went to get a degree in Biology in Germany. [And] I really started to like it.

Lucilia went through a process from following state prescription to seizing an opportunity to study abroad and gain a degree. This experience was rather different from that of the new generation as I discuss below. Most of my interviewees were younger people from the new generation. I will explore the different motivations that led them to opt for a career in biological sciences.

Career decision-making in biological science among the new generation

In contemporary Mozambique secondary education lasts five years and in the middle of it (grade 10) students are confronted with a critical decision: 'What shall I do in grade 11? Which group of disciplines should I choose in preparation to enter a university course?' The disciplines they take in the 11th grade determine which courses they can take at university. So, after two years of studying a particular group of disciplines and completion of high school (grade 12) students can apply to public or private higher education courses according to their preferences.

Since the late 1990s, students have enrolled in public universities after taking the entrance exams or *exames de admissão* (Beverwijk, 2005; Silva, 2012). When they apply to university they are asked to declare their intended course options, just two, in order of priority (first and second option). Two decades ago candidates for the entrance exams in biology and chemistry at university basically had two main possibilities: medical courses (human or veterinary) and biological sciences (marine biology, applied biology, biology and health, etc.). Only students who obtained the highest grades in the entrance exam were admitted to university. Özbilgin et al. (2005) remind us that 'for career choice to take place, there should be alternative career routes available and there should be an individual preference between these career options' (2001). This is partly the case regarding the *exames de admissão*. Young women choosing their subjects in 2022 do so under very different conditions from those of the previous generation. Thus for my data analysis

in the next subsections, I will consider only the 18 young women I interviewed.

'I would have liked to do medicine': Medicine as a dream career

Unlike women of the March 8 generation who in 2022 constitute a minority within the departments of biological sciences and among my interviewees, the younger generation of female researchers reported greater diversity in their career preferences. Despite that it is worth noting that most of the young female researchers and/or lecturers (11 out of 18) I interviewed were applicants who had put down medicine as their first option but had failed to make the grade in the entrance exam.

When I did grade ten, I was already thinking of doing medicine. It's what I wanted to do, but it was because we were a big group of girls who wanted to do medicine and then I applied to medicine at UEM but I didn't get admitted. I didn't have other chances of submitting to another university [private HEI] because my parents couldn't afford it. Then in the following year, I changed my choice to biology. I succeeded with biology as my first option and then it came to me the late idea, because of biology. I could have done medicine and I'm already more prepared, but okay I stayed here. I got in and I liked it so much because we, the best students, could have changed [to medicine] in the first semester since I always had good marks. But I didn't want to change. I and a few more colleagues never changed and I like being here. Nowadays I'm happy with my choice (Joana).

I wanted to do medicine as my first option but I did not succeed. Then I went for the second option, which was biological sciences and during the whole first semester, I thought about switching course and go into medicine but I ended up staying here (Paula).

As the quotes above show, medicine was the main preference for these young women. Similar results were reported by UEM (2009) where medicine was the first option for female applicants to the exam entrance. According to my interviewees, career interest (a passion for health sciences) and employability were the reasons for choosing medicine instead of biology. Singh Swapnika et al. (2011) in India found that among their participants 'subject preference [came] from one's individual interest and job opportunity' (98). Thus the career decision is also taken based on individual perceptions of the labour market (Munying, 2012; Pascual, 2014). It is much easier to get a job in medicine in Mozambique than in many other areas requiring higher education since graduate opportunities in the Mozambican labour market are scarce. Further, pupils from primary education onwards 'have deficient contact with science and technology, making it difficult for them later to follow science and technology courses in higher education' (Anon., 2006:33). This is due to a number of structural weaknesses that still characterize secondary education in Mozambique. These include poorly equipped

science laboratories and in most cases not functional to prepare students to pursue science or engineering in higher education, poorly prepared science teachers, and the biased image of science disciplines as something extremely difficult and complicated which ends up creating a feeling of anxiety in students (Anon, 2006).

In Mozambique, medicine has the status of an 'elite course' and is in high demand since the country still faces a great shortage of highly qualified medical staff. Paulo Ferrinho et al. (2010) found that medical students at UEM in Maputo referred to medicine as a profession providing stable job opportunities and job security. They also found that parents'/relatives' background was important as students tended to reproduce the former's career path in the health sector.

Sam Jones et al. (2018) in Mozambique found significant differences in the average salary expected by final year undergraduates in their first month of work. They showed that medical students had the highest average salary expectations followed by engineering students. Both the expected salary and those actually paid in the public sector to medics are indeed much higher than for trainee assistant researchers in biological sciences. One interviewee expressed her feeling of sadness regarding the social status of biological careers in the labour market in Mozambique, where there are fewer job opportunities and low wages offered, even within the university. She explained:

Unfortunately, it [biology career] does not give me a good income, but I like it, so, it pays off sometimes. But it does not give the monetary return, taking into account the financial situation of many families, maybe I would even advise against pursuing biology. Because the job market for biologists is horrible. I know several biologists who are sitting, with absolutely nothing to do in NGOs [Non-governmental Organizations] and companies that offer vacancies that are usually temporary, we can say so. I know someone who has managed for two years, was working in a well-paid project but after a while, the project ended and the person today is looking for something to do because he has nothing. So I would not advise other women to pursue biology, maybe something like finance, accounting, whatever. Because I think it is a good area and there are a lot of opportunities in the market for it. That's what I think, it's the reading that I do. But biology as such is very complicated. I like to be here at the university because as any state institution, it [permanent employment at the university] gives me security. I know that nobody is going to suddenly appear, say I'm fired, I don't have a job anymore, so I like the security factor (Celeste).

Careers in biological sciences are still somewhat unattractive for many young people because of the salary paid in the public sector (the average basic salary for a medic at the beginning of their career in 2022 was 39.532 Mt/ USD 620 per month, whereas for an assistant researcher it was 22.236Mt/USD 336). This can vary according to geographical location, and

career stage which determines other extra benefits (MEF, 2019) as well as other factors that I will refer to below.

Mozambique does not yet have nationwide studies on the employability of graduates that allow in-depth analyses of their employment situation. The available data from some existing case studies offer limited insights. For example, according to the World Bank, despite the fact that young people constitute the majority of the population in sub-Saharan African countries and an active labour force, most of these young people 'have weaker links to the world of work than the general population' (Filmer et al., 2014:1) both in rural and urban areas. Jones et al. (2018) conducted a survey of university-to-work transitions of Mozambican graduates where they analysed the employability of young women following their undergraduate courses in the main public and private HEIs. The results showed that the few who graduated in medicine were immediately absorbed into the public sector/state as the main employer in Mozambique, while at the same time continuing to work in the private sector (Jones et al., 2018). It meant that medicine graduates were the most likely to be immediately hired and/or enter permanent employment while biological graduates had to struggle hard to find a job, especially in the public sector. The certainty of employability seem to be a key factor in the process of career choices in Mozambique. Mendola et al. (2018) conducted a study examining the influence of expectations regarding employment and earnings among university students in Mozambique. Unsurprisingly, the results showed that 'students tend to avoid occupations with disparities in high earnings and low probability of finding a job' (Mendola et al., 2018:1), especially in the formal public sector characterized by limited employment opportunities, few vacancies, and difficulties in accessing them.

Becoming a biologist as an alternative career path

The specificities of higher education policies in a given country (macro level) and their institutional operationalization (meso level) often play a significant role in applicants' career decisions. Although university documents have a discourse about the applicant choosing courses according to their preferences (UEM, 2021a) it is clear that the system is set up to direct the way in which students at high school make their 'limited' decisions regarding the university courses they apply to. Universities do not provide a great opportunity for the students to explore their interests or to try out different courses from those centrally defined through the study plan for high school students until they find a good fit. For example, the law (ministerial diploma no. 68/96 of 7 August, 1996) which regulates the conditions for entrance into higher education institutions, establishes three main subject groups according to certain nuclear disciplines, namely groups A, B and C which form the basis for access to specific courses in higher education institutions (Anon., 1996).

Group A involves disciplines related to arts and humanities, group B involves the subject areas of medicine, veterinary, biological sciences, chemistry. This means that secondary school students who have attended classes in this group will only be able to apply to university courses by taking admission exams in biology and chemistry with the options, of course, of medicine, veterinary, biology, and chemistry/biology (Anon., 1996). Group C involves engineering, technologies, physics and design disciplines. It is into this pre-defined system that students must fit at the end of secondary school and from this point begin to design their possible future careers. Thus specificities such as the fact that decisions at secondary school level regarding subjects (e.g. arts and humanities, or sciences) set directions for the subsequent decisions one is able to make. Limited university places in a given discipline, entrance exams requiring specific grades to be eligible to apply for these places, anticipated job opportunities, and having connections (or not) all set the parameters within which students can 'choose', or rather, within which they decide which subjects to take.

Since the majority of the young women interviewees reported that they had not chosen biology as their first option but a medical course, it was these non-admitted applicants to medicine who instead ended up in biological sciences.

Honestly speaking, I would have liked to do medicine, which is my passion and preference but I got accepted into biology and health, which was my second option. I decided to carry on studying this subject. I did my degree course. I participated in some research projects, and I decided to pursue this area of investigation. When I finished my degree course I had the opportunity to do my Master's degree and then the PhD (Etelvina).

Etelvina's statement suggests that pursuing biology might be considered an 'alternative career' to medicine. She ended up discovering herself as a biologist after being there. In this, my findings are consistent with previous studies (Özbilgin et al., 2005; Shen et al., 2014; Patsis, 2020; Günter et al., 2021).

In general, employment opportunities are more constrained for women than for men (Filmer et al., 2014). For most of these young women their academic career in biological sciences was the first employment opportunity. As one woman said:

I entered here [the university] only with a Bachelor level and without any work experience. I graduated in 2010 and early 2011 I entered this institution. It was my first job. Soon, the MSc was established and there was a need for learning and knowing a bit more about what I was going to be doing and working with biotechnology. There was also an opportunity of a fully paid MSc [laughter], everything paid for me, at home and closer to my family – thus, I put all of that together and I ended up doing the MSc in Biotechnology (Beatriz).

Once in an academic career these young women had more opportunities (scholarships) for training than biologists working outside the university sector. The desire to get a degree is really high due to its link to earnings and social promotion. Patsis (2020) reminds us that 'individuals shape their desires, expectations and choices significantly through the social context provided by their socioeconomic position' (75). As my findings too suggest, women's research careers in biological science is not a matter of individual agency but is collectively (socially and institutionally) constructed, that is within the gendered relations of family, university and wider society (Liani et al., 2021).

Those who had embraced a biological sciences career, expressed a feeling of satisfaction or self-realization regarding that career. However, due to the macroeconomic conditions of the country, employment opportunities for university graduates in general remain low (Kilimani, 2017), and this is a dilemma for young people in Mozambique as elsewhere in sub-Saharan Africa, especially girls and women (British Council, 2014; Filmer et al., 2014). Analysing youth unemployment in sub-Saharan Africa the World Bank argues that 'the unemployment rate is highest among university graduates [and most of the families are not able to] fully support a recent graduate while he or she seeks a job' (Filmer et al., 2014:3). This reflects a contradictory trend also evident in other countries. An international comparison shows that in the USA and among OECD countries, for example, degrees in health sciences and biological sciences or STEM in general are at the top of degrees supporting employability (OECD, 2017), whereas in the Mozambican labour market biological sciences are not in the top 40 university courses with the highest employment levels (see <http://mz-lifestyle.blogspot.com/2019/03/top-40-cursos-universitarios-com-maior.html>). This is critical for a developing country such as Mozambique; it shows that a large part of the skilled workforce in science cannot easily find jobs and as such cannot contribute with their knowledge to the economic and social development of the country. This may also explain why biological science does not figure as a priority for the young women I interviewed.

Overall, although an increasing number of university places have been offered in Mozambican universities over the years, the number of candidates for biological sciences courses has been four times lower than that of medicine (Mário et al., 2003; UEM, 2009). The evidence also suggests that university graduates from natural sciences (including biology) tend to prefer the private sector where they can earn more than in the public sector, although their careers in the private sector are somewhat more vulnerable (Jones et al., 2018). Further, both for the older and the new generation of women their research careers in the public universities began soon after completion of their Bachelor degree (Licenciatura). This trend was reflected in my empirical data. Paula, a young doctoral student and trainee assistant, explained:

When I finished my degree [*licenciatura*] and before starting my academic career here at the university I worked at an NGO whose project was funded by the USA which was also one of my dreams when I did biology which was to work with humanitarian organizations. Then the university opened vacancies and I applied, I was interviewed and then admitted. So I had to make a choice between the NGO and the University. As I wanted to continue my Master's degree, do my PhD since I was not satisfied with just my degree, I made the decision to stop working at this NGO and come here. Here I have had many more opportunities, I like to study and I had the opportunity to study without any restrictions so I think I made the right decision. In terms of benefits, I confess that in the NGO I had greater monetary benefits, in terms of salaries I was better in the NGO, I had health insurance. Here, in addition to training, I have the possibility to participate in consultancies, I have more job stability, which pays off in a way.

Interestingly, although many of my interviewees had not initially chosen this, they were satisfied with their academic careers in biological sciences. This may have been because they had graduated in a discipline closely related to what they had dreamt of doing and due to the job opportunities they had had soon after finishing their courses. It seems to me that despite the low wages earned in academic careers, for these young people the need to guarantee a permanent or stable job was fundamental. Along with this, they had the possibility to increase their academic qualifications while at the same time developing private academic consultancies as an additional source of income. It has to be remembered that all my interviewees actually had jobs, so in a certain sense they had made it.

The 'serendipitous' experience of becoming a biologist

Among my female participants, there were some for whom a career in biology was just unexpected happenstance. One young female lecturer reported that she wanted to study neither medicine nor biological sciences. It was really something she 'stumbled' upon, a kind of serendipitous experience, since her entrance or 'her self-discovering' in biological sciences was accidental. As Samantha Copeland (2019) explains serendipitous experience 'is profoundly contingent upon contextual factors, beyond the insight of the serendipitous individual' (2386). Thus it is an individual and lucky experience or discovery. This was what happened to Vera, a young female lecturer, who stated:

When I applied for college, I also applied for electronic engineering, I did not apply for agro-processing. Unfortunately, I was not admitted and I was re-routed to agro-processing. So, I thought I would change the course after arriving there [laughter], I would do electronics, something like that. However, when I got there I discovered that it is also engineering, but linked to food processing. Because in the first year, we had the curricular subjects that we had always had, but in the second year as the curriculum changed, it was only

biology, microbiology, biochemistry, biology, it is a load of biology. That's it! So I studied, I studied until I ended up taking a passion for the discipline. I fell in love with biochemistry. I would have done my electronics. However, as I didn't do it, I don't know how it is. I'm fine here, I'm happy. I had to see the opportunities, I wasn't approved in the course I wanted. There was a second chance, I wasn't going to stay at home. I was seventeen when I completed. So I wanted to do something. I wanted to study for a degree.

This idea of switching courses later in the first year was not uncommon among undergraduates and some colleges offer this possibility. In this process some students ended up discovering themselves and joining what they really enjoyed. Stacie Irwin et al. (2018) stress that having a university degree does not necessarily assure employment as such, although it can be 'a prerequisite for accessing more decent jobs' (8). Most young people who are unable to succeed in the course of their dreams end up entering alternatives pathways. The ideal is to secure a place on an undergraduate course, instead of losing a year, and wasting time at home without any relevant occupation. However, jobs for young biologists have been declining, especially in the public sector. Deon Filmer et al. (2014) highlight how this situation is a potential risk for urban youth in sub-Saharan Africa due to lower job-creation, even for university graduates. This situation is also emphasized by the British Council who state that 'for the next decade ... the risks associated with growing numbers of urban youth without meaningful occupation are high' (British Council, 2014:1). The need to obtain 'the possible university degree' seems to make all the difference to Mozambican youth, particularly due to the fact that less than 5% of the population are in higher education or have a university degree. Nonetheless, better-educated people 'too struggle to find pathways to adulthood, especially to stable, remunerative employment that allows them to [contribute to] support a family' (Filmer et al., 2014:2).

Other reported factors influencing women's career decision making in biological sciences

Many of my interviewees emphasized that their decision to do biology resulted from a blend of different influences. One of these was teachers.

The teachers' role

The influence of teachers on building the science identities of their students in and outside the classroom and as well as toward their career aspirations is well documented in the literature (Brickhouse, et al., 2000; Habashi, et al., 2009; Faitar & Faitar, 2013; Ferro, 2019). Teachers have been described as one of the main influences on students, encouraging their interest in science disciplines and STEM careers. My empirical data also reinforce this, demonstrating how important the support of the teachers was for young women's

career ambition in science, especially science teachers in middle and upper secondary education. For some of these young women (8 out of 18) the teachers' attitudes toward science regardless of their gender played an important role in the women's aspirations regarding science careers. Florinda, a female lecturer, explained:

my biology teacher, when I was in the eleventh [grade], he selected me and a colleague of mine, we were the best in biology class. So he was [a] biologist. I didn't even know he was from here in the department. But he took us and several other students from other public schools as well. So we went to visit the research ship, it was called Dolos and they were on a scientific cruise here in Mozambique. So it was the first time I was able to interact with biologist scientists. That's why - because he knew we wanted to do medicine, me and this friend - he said, 'Look, think about biology' when you're choosing your course. So I didn't come here blind.

In Mozambique teachers, regardless of gender, are considered social role models and a source of inspiration for the new generations. They can also play a key role in deconstructing misinformation, stereotyped representations and beliefs about girls/women in science since they spend most of their time in contact with the students at school, thus influencing their psychosocial development and future career ambitions. However, some studies have provided contradictory results on the influence of teachers on students' career choices. For instance, Monica Adya and Kate Kaiser (2005) in the USA found that teachers and counsellors provided little or no career direction for girls in information technologies. Conversely a study carried out in Zimbabwe by Edmore Mutekwe and Maropend Modiba (2012) showed that 'teachers' attitudes and influence contributed to girls' career aspirations and choices' (279). The authors concluded that teacher attitudes and beliefs regarding what was considered socially appropriate (roles and occupation) impact on 'girls' aspirations and career prospects' (Mutekwe & Modiba, 2012: 290). Baraka Ngussa and Rehema Charles (2019) studied the perceived role of teachers and parents in students' career choice preparedness in Tanzania. Günter et al. (2021) in Sweden also consistently showed this teachers' influence on students' interest/motivation and choices of studying biology at university. The results showed that teachers had a positive influence contributing significantly to informed decisions regarding their future careers. My findings are consistent with these two previous studies conducted in African countries and the one by Günter and colleagues in Sweden. A junior lecturer/researcher reinforced this:

Who motivated me to pursue biology, I'm not going to lie to you, I did my high school at Manyanga [a secondary school in Maputo], I had a teacher I remember him, he motivated me so much, he was my biology teacher. But at that time I wanted to do medicine, but forest engineering was the second op-

tion. Unfortunately I did not get admitted. That's when I realized, my father said, why don't you do marine biology? So I did marine biology (Celeste).

Women's perception of the stimulating way in which their teachers dealt with biology during the classes contributed to their willingness to undertake biological academic careers. Karen Murcia et al. (2020) maintain that students 'recognised and appreciated classroom teachers who spoke enthusiastically about STEM careers and integrated such information into their teaching subjects' (604). My findings are consistent with this. Rosa, a female teacher, explained:

I had the opportunity to be invited by one of my teachers to join a group of students who were going to do data collection for their thesis in the Maputo Reserve. There I had the opportunity to experience what it is to be a biologist in practice, right! Finally, I made the decision there that was what I wanted for myself.

The claims of my interviewees reinforce the argument according to which learning science at school through the pedagogical practices of their teachers is also a process of appropriation and building of science identities (Brickhouse, et al., 2000:443). Throughout learning science, girls do not just learn about concepts, instruments and processes but also internalize views, values in relationship with their teacher and peers and situate themselves as individuals (women) within this world of science. It suggests that having contact with professionals during secondary education reinforces personal interests to pursue biological sciences at school level. Later positive experiences with teachers on undergraduate courses are crucial in women's decision to stay in biology.

Mass media (television) influences

Women are also given messages about their educational and career opportunities from popular media such as television and other cultural influences such as books. I noted that a few of my female interviewees (3 out of 18) were strongly influenced by TV programs during their adolescence. Custodia stressed:

To be honest, since I was a child I always wanted to be a doctor in research. I never wanted to be a biologist, I was fortunate as a child to see some films, some novels that inspired me a lot. At the time I remember seeing a soap opera called 'Surrogacy', *barriga de aluguer*. So that inspired me a lot, my mentality was always to become a doctor but focused on research, and I applied to university at that time when I did grade 12 and instead of going to medical school, I started a biology course. But even in the biology course I always assumed that it is an area to be able to work in research. So, I discovered myself in biology, in the course...that after all, what I wanted was not exactly to do medicine. So, I have always had that taste, and another thing

that was also remarkable for me as a child was a novel, in which there was an alchemist who made, turned bones into, bones into gold. So, I have always liked this research thing, it was remarkable for me and I ended up coming here. I am happy to be here as researcher in molecular biology.

In the late 1990s and early 2000s in Mozambique there were science documentaries and programs on public television (produced by Transtell, Davidson Institute of Science Education, etc.). To my knowledge there is no local study on the impact of these television programs and documentaries as a source of information for girls regarding science topics or career ambitions in STEM. Television has been considered an important cultural and technological artefact involved in the construction, representation and transmission of stereotyped information relating to professions. Jocelyn Steinke (2017) suggests that 'media images of STEM professionals may be important sources of information about STEM and may be particularly salient and relevant for girls during adolescence as they actively consider future personal and professional identities' (1). This potentially positive influence was reported in other previous studies conducted outside the Mozambican context (Morgan, 2017; Steinke, 2017).

It is very encouraging to find this influence reflected in some of the narratives of the young women I interviewed. They provide important clues as to the possibility of utilizing television programs and documentaries to counter stereotypical ideas and to influence girls' future career choices in science. It is worth stressing that television programs in science, technologies and innovation strongly associated with images of women as researchers or scientists can fulfil the objective of deconstructing gender stereotypes regarding STEM-related professions. Hence this is an issue to be taken into account in Mozambique's national science and technology policy (Anon., 2003) if the intention is to increase girls' interest in science. These programs have the advantage of reaching simultaneously a greater number of girls, potentially encouraging them in the medium and long term to pursue a career in science. As Vera, a trainee researcher, claimed:

When I was younger I used to watch these science programs in which there were female scientists and nowadays my son says, 'mom is a scientist'. So yes, actually I had this thought of working in these fields. But when I did twelfth grade, I applied for biology, but I was part of a big group of girls who wanted to do medicine.

The quote above shows that information that women from an early age receive from their surroundings influence their decision making regarding their future careers. As Noshina Saleem et al. (2014) claim, 'Television is one of the important sources of occupational information for youth because it regularly portrays work-related activities of fictional characters' (28). Carlota, a female lecturer aged 40-49 years, explained:

The main motivation: at that time, when I was still a student in high school, there was a television program, the ABC of biology, presented by some of the university teachers, both female and male, now colleagues of mine, where they talked about biology. This captivated me. Thus I applied for biology as my first option instead of medicine. I like biology, I always liked it as a student and I was always a good student in biology.

In countries such as Mozambique where female role models in science are scarce, girls at upper level of primary or lower secondary education benefit from contact with women engaged in science or at least hear their career stories.

Nonetheless it remains a challenge to rethink STEM education in Mozambique and make it gender-responsive (UNICEF, 2020). Science documentaries in local languages aired by communitarian televisions may be one feasible alternative. Usually, mass media are criticized for their role in reproducing gender stereotypes on STEM related careers, particularly for girls. Here, in contrast, I found a positive influence of tv science programs on girls' career choices.

Family and parents' background

One young female interviewee chose biological sciences as a result of her family background. There were also two interviewees who indicated that their relatives had influenced their decision to study medicine. Mara explained:

Most of my teachers thought I would do mathematics teaching in my degree course, but my father thought that medicine pays a lot in Mozambique compared to mathematics. It was okay for me at that time, though. I was good at biology too, I did not face problems in it. I was not the one doing the enrolment, but my brother was; when he got there he chose biological sciences as second option. I did the entrance exam without knowing my second option. I only knew that I had to pass medicine, but the chemistry exam was hard and I ended up failing. I had to do biological sciences as my second option. I did not know what biological sciences was before. I came here without knowing where I was going.

As can be noted from the quote above, attitudes and representations of relatives towards a career in science, as well as their expectations regarding a women's future career, employability possibilities and expected salary, come into play in the decision-making process about the perceived best possible career for a girl. The family, together with the school, are key in shaping girls' science career motivations (Eccles et al., 1990; Wang & Degol, 2013).

Irwin et al. (2018) claim that overall 'there is often friction in the interplay between young people's aspirations about work and older people's expectations about the work younger people should do, and what work is available. Individual and collective aspirations, attitudes and norms can act as strong

informal barriers' (2). Therefore, relatives can act both as a deterrent and as a motivator for girls to pursue science careers. Some studies carried out in Mozambique (Sparreboom & Staneva, 2015; Jones et al., 2018) have suggested a significant and positive effect of parents' schooling on the possibility of access to higher education and their children's career expectations. My results also corroborate this influence exercised by the family on girls' career choices. Jurema, a young female researcher, reported this familial influence:

My parents are agronomists, I mean, my mother is a forest engineer and my father is an agronomist. So, I have always been in contact with [laughter] biology, let's say so. The other thing is that I have always liked biology, I like to know, I have always been curious to know how things worked and the most complicated machine, more complex, right! Not only complicated, more complex is a living being, right! So, that was the reason, instead of going into engineering. So, it's a kind of family DNA.

This relationship between a child's career ambition and family background has been explored through Bourdieusian approaches to forms of capital as part of his theory of social reproduction. According to Pierre Bourdieu (1986) there are four main types of capital: economic, social, cultural and symbolic. These capitals interact with *habitus*, 'a person's internalized matrix of dispositions, which guides behaviour within fields (social contexts), [producing] relations of privilege or subordination within society' (Archer et al., 2015:923). Thus Archer and colleagues also maintain that 'families with higher levels of science-related resources (capital), have also been found to actively promote, develop, and sustain their children's science interest and aspirations, through the foregrounding of science within everyday family life' (Archer et al., 2015:924). This was actually the case with Jurema who was from an upper middle-class background. Jurema's family capital influenced her decision regarding her future in a science-related career. Jurema's notion of 'a kind of family DNA' was part of her science-related cultural capital, socially transmitted by her parents, something Archer et al. (2015) call familial science capital.

Curiosity and lack of information

Surprisingly there were a couple of interviewees (2 out of 18) who had no idea what they wanted to study. Their decision to pursue biological sciences was taken under conditions of a lack of information and awareness regarding their courses, or influenced by curiosity for something new. One interviewee was unsure what she would actually enjoy, so she selected marine biology as it sounded interesting at the time. Carla, explained:

I applied for marine biology as my first option. Since I was a child I wanted to do medicine, then when I saw marine biology, for me it was a new course and it was a curiosity course. Then I decided that I was going to

do marine biology, not because I knew about marine biology. For me it was a curiosity. I always liked plants and animals, but I was always curious about it.

This participant was motivated by the appearance of a new course on the traditional list provided by the university. Carla ended up developing a passion for the course. This suggests that universities need to provide a wide range of information to potential candidates as a way of helping students make informed course decisions and encourage them into less well known areas. Until 2020 the two universities under study here did not provide detailed information about their courses on their internet platforms or elsewhere. They only published a list of the courses in the local newspapers which was of limited help in the decision of the applicants.

In sum, women's careers and aspirations have been strongly shaped by the different historical and political processes which Mozambique has undergone since independence. Older generations of female researchers had their individual aspirations and possibilities for career choices limited by political fiat, despite the strong political rhetoric regarding women's emancipation. Senior women from the generation of March 8 still constitute the few existing female role models in STEM for the new generation of younger women. However, it is important to note that some of these women and senior lecturers were not able to continue their studies and obtain a doctoral degree due to social impediments (see Chapter 4). Conversely, the majority of junior female researchers had their training more readily facilitated in the new socio-economic and educational contexts that opened up greater possibilities and opportunities for their career choices. Despite this, the new generation who constitute the majority of the faculty and researchers in Mozambique, do not have a doctoral degree as the country continues to have extremely limited capacity for internal training of its own academic staff in science. This needs to change. Furthermore, universities need to give course and career advice and guidance to support their applicants/candidates in making appropriate decisions before the application for the entrance exams.

Regardless of the social, geographical region and political context, the female researchers I interviewed from different generations had in common the fact that biological sciences were not their initial career preference. Thus we need to reflect on the status and value of science careers in Mozambique. The vast majority of my interviewees, regardless of the generation they belonged to, stated that they were satisfied with the professional career they had. Both seniors and junior women at the two universities in different socio-economic, political contexts and geographical locations got into an academic career (teaching and research) in biological sciences with a Bachelor degree. In Mozambique, this is the minimum requirement for entering an academic career in the position of trainee assistant. The younger women were looking for an alternative career path close to medicine, their main

preference, but the decision to do biological sciences was sometimes favourably influenced by external factors such as teachers, family/parents and mass media. No less important is the fact that one interviewee became a biologist due to happenstance. Altogether, though, all the women I interviewed had of course been able to get a job and therefore represented those who had been successful in a context where jobs for graduates are relatively scarce.

Younger women are required to be active subjects in teaching, doing research, journal publications, all of which is useful for their career progression. They are also expected to take part in administrative management (bureaucratic activities). This means that many of these junior people are overloaded with academic tasks, even in their early career. This compromises their academic performance in the research field, especially those working in a university without a clear distinction of teaching and research careers.

There was little or no attempt by HEIs to encourage secondary school girls into science. The scarcity of such institutional interventions which might counteract the masculinization of science disciplines explains why my interviewees did not refer, for example, to any projects, programs or initiatives carried out by the universities that they benefited from as high school students. This contradicts the intentions expressed in the macro-institutional documents discussed in Chapter 3 such as the strategic plans and gender strategies. However, as an insider I know that very occasionally one of the universities opens its doors to promote courses to secondary school students through the so-called 'Open Day' which is an opportunity for students to get to know the institution, and to learn about the courses and services it offers. This, however, is not properly documented and it did not come up in the documents I analysed. Even though I interviewed young women who worked in and outside of Maputo they seemed uninfluenced by the so-called 'Open-Day' activities in their career choices/decision making. In sum, there is a need to establish more articulated, consistent and systematic interventions to promote science-related courses among school communities with a focus on women and science in order to overcome certain gender stereotypes.

Women's career development in biological sciences

In Mozambique, an academic career can start right after one's undergraduate degree instead of during or after one's doctoral/post-doctoral studies as happens in many other countries (Brechelmacher et al., 2015). The common thing in Mozambique is for people with first degrees (Bachelor) to be employed as trainee assistants in teaching or research careers (UniLurio, 2011; UEM, 2014a; UEM, 2014b). The new junior faculty/researcher member acquires a permanent position automatically after an initial two years of this supervised academic internship, or probationary period. As

already discussed, hiring people with just a '*Licenciatura*' or Bachelor's degree results from the lack of PhDs in the country. Teaching staff are involved in teaching, research and administrative tasks while academics in research careers are solely engaged in research and not infrequently support teaching staff. However, not all the public universities offer both careers despite the existence of a legal framework that creates the researcher statutes (Anon., 2006).

Teaching and research staff are public-sector civil servants (Anon., 2017) and as such they are evaluated through a performance-based approach (Caixote et al., 2020). Their regular evaluation through the annual performance appraisal form covers three main areas of academic work: teaching, research and so-called extension or outreach tasks (the administrative dimension is only included for those in managerial roles). According to Carlos Caixote et al. (2020), appraisals aim to 'assess individual performance and merit of civil servants in exercising their duties and responsibilities' (52).

In the public administration, progression is considered as 'the [horizontal] change of rank within the same career or professional category and ... is dependent on the experience of the employee in the rank, the merit of the employee' (Anon., 2017: Art. 37) and other requirements under the terms of the teaching career regulation. Progression is exempt from competition and is automatically carried out at the end of three years of effective service within a given level if the teacher has performed satisfactorily in her/his annual evaluation (Anon., 2006a; UniLurio, 2011, Anon., 2012b; UEM, 2014b). Promotion is the vertical change from one rank to the next one (e.g., trainee assistant to assistant) and 'is made via public selective processes or competition for employees [teachers and researchers] who in the category fulfill the prerequisites required [in the career regulations]' (Anon., 2017: Art. 36). Promotion is managed locally, that is each institution is responsible for the assessment of applications from their own staff. There are number of requirements for progression and promotion (see Appendixes G and H). In addition to academic achievements, career advancement depends on the availability of relevant funds. It means that even if the lecturer or researcher fulfils all or most of the requirements foreseen in the regulation if there is no funding, academic staff remain in the same rank (Anon., 2017), creating delays in career advancement. My data have to be understood within this context. I shall now turn to exploring the perceptions and experiences of the academic women I interviewed toward their career advancement.

Perceptions of career progression by successful senior female academics in biological sciences

Overall my interviewees reported different views of career advancement where women exhibited more heterogeneous perceptions and were some-

what divided in their views. Some agreed that there were no gender differences in career progression while others invoked both biased meritocracy ideologies and social reasons to explain their perceived career differences compared to their male counterparts. Males had more homogenous views, arguing that there were no differences beyond those generated by individual merit as I shall discuss later. In this they reflected Acker's (2006) point that those who occupy privileged positions frequently deny that others suffer inequality of opportunity.

Some of my female interviewees did not perceive themselves to be formally and explicitly discriminated against in their career on the basis of their gender identity. Eight out of 24 women interviewed, mainly senior and with a doctorate, agreed that their career progression was similar to men's. However, if that was the case, how could they explain the scarcity of women in professorship positions while women outnumber men in lower career positions (assistants) within the biological sciences? Interestingly, their responses pointed only to notions of meritocracy according to which the universities provide equal opportunities, resources and other work conditions for everyone (Powell, 2016). As such, their belief was that all academic staff regardless of gender had equal opportunities and conditions to advance in their ranks. A female assistant professor claimed:

I think there is equal opportunities for career advancement. I guess so as I said, our department is mainly made up of women, right! So I never felt discriminated as a woman, I never heard it here. Many of the people in training programs are women. (Carlota)

Being a female here has not affected my progression. It might be because our colleagues are not that bad! I think not, it has not influenced negatively. They [male colleagues] don't have that spirit that this is a woman that she can't. Yeah! It [career progression] is a matter of competition, who succeeds first. (Lucilia)

These interviewees strongly believed that the practices of meritocracy in academia were gender-neutral and that the institution was committed to assuring equality in the workplace and in career advancement. From a theoretical point of view this discursive position did not map onto the career realities of most women since the annual institutional HEI reports explicitly show profound and systematic differences between women and men in their career progression (UEM, 2015). It is true that the Constitution of the Republic of Mozambique advocates that 'men and women shall be equal [...] in all spheres of political, economic, social and cultural life' (Anon., 2012a: art. 36). Due to this fact, the few women who are successful in their career in academia (e.g., women with a doctoral degree or occupying a power position) have been repeatedly utilized as proof that gender equality has been attained or at least assured within the institutions. But the discursive posi-

tions expressed above induce in people a false sense of the absence of gender-based differences and problems within public universities, as pointed out by an assistant professor:

In terms of gender, I think there are no differences in career progression since men and women do the same jobs, tasks, I don't know. There are not many differences in their career progression. I think the difference is more in individual engagement. Yah! It has more to do with individual commitment than gender itself. There are women that I notice, they're on a fast track compared to men and so on (Valentina).

This may suggest that Valentina was unaware of how women's career advancement is affected in particular ways by their gender identity. I would argue that a certain lack of gender awareness results from an internalization of the ideology of meritocracy with its supposedly gender-neutral system. Not only Valentina but the rest of the female professors had similar perceptions. This may be a function of the position they occupy: having successfully achieved doctoral degrees and seniority, these women may not want to consider that gender plays a role in academics' advancement because it would challenge the basis on which they think they have achieved their positions. In many contexts women decry the importance of gender because they want to believe that meritocratic values reign and that they gained their positions not because they were female but because they have the relevant qualifications (Bagilhole & Goode, 2001; Nielsen, 2015; Seron et al., 2018). And they do. But for every woman that succeeds there are plenty of women who get stuck professionally because men get preferential treatment. This is what the HEI statistics clearly reveal. Further, the ideology of meritocracy generates a sense that gender as social category does not matter for career progression, only academic competence or performance. The perception that career progression for both women and men is equal contradicts what has been reported by numerous studies. There is ample research indicating that very few women manage to climb the academic ladder of promotion and/or that it has been more arduous for females than for males (Doyle, 2006; Thanacoody et al., 2006; Kapareliotis & Miliopoulou, 2019; Shober, 2019; Liani et al., 2021).

As my document analysis showed, there is a silence in terms of measures to counteract gender differences in academic careers. In fact, all national and institutional documents assume and convey this belief that the progression and promotion of women and men in academic careers are equal. This belief, together with the prevailing gender culture in Mozambican HEIs institutions, equally internalized by senior women at the highest levels of academic careers, leads to a false sense that equal opportunities exist in higher education. Thus, regardless of gender, it is not uncommon to find these dominant discourses reproduced among senior professors in privileged (power) positions

within public universities. This has to do with the historical politicization of public HEIs since the socialist era. Due to this politicization of education people in privileged position have strategically opted for being politically correct (Langa, 2010). Although senior women and those with doctoral degrees maintain that they do not think there are differences between women's and men's career progression, they implicitly agreed that women are in a disadvantaged position or at least progress more slowly than males since the women 'fail' in the competition for posts. One senior lecturer voiced her experience regarding the difficulty she had to be promoted.

I had problems regarding my progression. Yes, because I think that many times what they overvalue is the academic degree, right! So in this context whoever has it feels more competent and it is not always true, right! But it is more in this perspective. And I always tried not to get into conflicts regarding that. In my case, I had some constraints in my career progression because I was unable to manage family issues that affected me at that time. But I see here, my younger colleagues who had a really fast progression and even faster than some that started earlier, you see. People who already have a PhD degree today, right! Before, things were more difficult, now I think they aren't. (Bella).

One senior PhD holder had the view that gender differences in speed of advancement had to do with individual merits. If career advancement is just a matter of academic competition or personal skills that can ensure their achievements in academia to such extent that 'who succeeds first is promoted' as my interviewees argued, the implication would be that women do not get promoted due to their lack of merits, performances or personal skills. This is the latent view reflected in the narratives of women in professorial positions.

Perceptions of junior women on their careers advancement

In contrast to the interviewees discussed above, a large number of women participants (16 out of 24) reported that they perceived differences between the sexes in the speed of their career-progression. There was wide agreement among these women, regardless of their age and position that men progressed faster and more easily. These women recognized that they faced significant obstacles in career advancement in the university. One of the main reasons for this had to do with academic qualifications that is lack of time for completing a doctoral degree due to family burdens. A young woman explained:

I see differences between males and females in the speed of their career progression. [Men] are very objective. They run after and they get there. [Laughs]. Yeah! I will give an example of one who was even my student and who is finishing his doctorate, currently he is my colleague. Now he is de-

fending his PhD. I have been here for eleven years! Eleven years! Right! So a lot of people have moved up. I have students who have finished [their] PhDs and I'm not ashamed of it. Their rapid progression is simply due to dedication and availability. They did not have to think about children, leave the baby despite being married, the wife always stays there with the children. (Paula, assistant)

This woman attributed her failure to progress to the fact that she had not completed her PhD whilst men more junior than herself – indeed former students of hers – had. She saw this as related to men's ability to leave domestic and childcare chores to their wives, a luxury she did not have. From her point of view men were perceived as in privileged position according to the social prescription. Although Lorryn Williams (2017) asserts that 'in the societal beliefs women are seen [...] to be less capable of meeting the demands of higher academic positions, less qualified or able than men, and to have a preference for junior positions' (2), it seems that the lower positions that women tend to occupy in academic careers are not a matter of individual choice or preference. Rather, they are the result of factors acting at the social (family) and institutional levels that end up affecting women in particular ways. So when women in Mozambique invest less in their professional advancement due to strong commitment to the family they act as expected in their socially ascribed roles in conformity with the prevailing gender regime. And that is why women can experience a certain stagnation in their career. At the macro level in Mozambique, women and men are socialized differently, with hegemonic masculinities dominating the culture. Consequently, men tend to be widely represented as more competent when performing academic tasks while women are considered in terms of their ascribed social roles as caregiver, i.e. mother and housewife, even in the academic milieu.

At institutional level my results suggest certain gender patterns in attaining eligibility for professorships although the policy documents suggest through the principle of equality that women and men have equal opportunities (see PGEI, PGEI II and GESH 2018-2023). For instance, it is important to note that GESH 2018-2028 highlights its commitment to increasing the number of women progressing in their academic careers. Although the documents showed an increase in the number of professors with a PhD degree in the last decade (UEM, 2021b) especially in humanities, arts and social sciences, nonetheless the number of women who completed their PhD in STEM is still almost insignificant. This means that women cannot advance or be appointed to the highest levels of managerial positions within universities since one of the main criteria for this is to have a PhD. Even in the departments of biological sciences in which women outnumbered men their career progression to the 'higher levels [were] not in proportion to their representation within the profession [of biologist]' (Barrett & Barrett, 2011:141). It

meant that even being the majority in those academic settings women hardly advanced in their careers due to social and institutional reasons (e.g teaching workload, limited mentoring, lack of family-friendly policies, engagement in bureaucratic tasks, gender bias in assessment of women's academic performance) making their career more vulnerable and as such ' [facilitating] inequalities of career progression' (151).

The policy documents I analysed claimed that they intend to eliminate the belief or conception that family is an obstacle to women's advancement in academic careers (see FNI, 2016). The point here is that family burdens still have a heavy influence on the possibility of women obtaining a PhD degree and hence advancing their academic careers as my interviews showed. In addition to that, it is important to stress that it is not just a matter of eliminating a particular belief but an issue that requires a wide range of actions to mitigate this real constraint. Equally this difficulty in obtaining a PhD and hence progress in their career comes from an intersection of macro- and meso-level factors, exacerbated by women's workloads (in the university and within the family), and the absence of a supportive network to counteract these negative effects on women's careers. As Angelika Brechelmacher et al. (2015) argue, obtaining a PhD is crucial for later promotion.

Decades ago, professorships (promotion to assistant professors) in Mozambique were also granted to senior faculty (assistants) without a PhD degree through the administrative resolution n.02/92 of 15 June (Conselho Nacional da Função Pública, 1992: cod.2259). Nowadays none can be a professor without a doctoral degree. This means that women have remained for decades in lower positions. The UEM annual report showed that more than 90% of the female teaching staff at the Faculty of Science were in assistantship positions (UEM, 2019e). Statistical data from 2019 indicate that the number of women assistants completing their Masters has increased sharply, whereas the number of women who earned their PhD and were promoted to professorship was five times less than that of males (UEM, 2019d,e). Hence the perception of the majority of women I interviewed that there were gender differences in career advancement are consistent with this reality portrayed in the institutional reports.

These facts are empirical evidence that women are progressing more slowly than their male colleagues as consistently demonstrated by previous studies (Valian, 1998; Fox, 2001; Ash et al., 2004; Thanacoody et al., 2006; Din et al., 2018; Liani et al., 2021; O'Connell & McKinnon, 2021;). In 2019, there was no woman in the position of full professor at the Faculty of Science (UEM, 2019d). The existing full professors (9) were all men, none of whom were in the Department of Biological Sciences in which women are greatly present. Also in the category of associate professors, three out of 19 were women, and in the category of assistant professors, there were eight women and 37 men (UEM, 2019e:104). These data are very critical since they show women's underrepresentation at all levels.

The vast majority of the interviewees regardless of gender excluded any institutional dimension from their narratives, since the universities supposedly offer equal opportunities and working conditions for everyone, although my document analysis suggests that at the institutional level there is a lack of supportive networks, systems/programs for women's academic careers especially in STEM field which are considered important factors for a successful career (Gregory, 2001). As career advancement is seen as a matter of individual agency the assumption here is that for everyone 'selection [and promotion] decisions are based solely on individual qualifications and the ability demonstrated, and that gender does not matter in the assessment of male and female applicants, [and that] talent will prove itself and excellence will surface automatically' (van den Brink, 2015:192). Consequently, to advance in their careers women need to show or at least prove their academic competence, as supposedly their male colleagues do. One senior woman and assistant professor stated:

I think if they [women] show equal competences [as men] they should both be promoted. I think we have to evaluate according to the requirements, isn't it? ... I'm going to say one thing: progression for men happens faster than progression for women because they manage to get the qualifiers within a much shorter term in relation to women. Let us say that it is easy for a man to stay at work until late at night if there is any laboratory work, any writing job etc. Men can use more hours of the day working compared to women. Because women always have the social part. So I would never exceptionally stay at university up to 9 pm right! Because normally I have a household agenda to fulfill, I am a woman, I have a home to manage. I have shopping to do, I have to get home earlier to look after the children to be at the house when the maid leaves, to get dinner ready and prepare a whole environment and all these roles still belong to women. I feel that perhaps if I were a man I would have the privilege of having advantage in terms of working hours, in terms of absence from my home, but as I am a woman and many women feel the same way (Judite).

Judite's assertions show what she had learnt from the social and institutional environments in which she was socialized and located. As can be noted from the quote above, certain women are aware of the constraints they face in advancing through the ranks as well as the reasons for their slower progression compared to men. There was a perception that men were more successful in their academic careers due to their commitment, engagement and abilities in fulfilling the requirements for promotion in a shorter time than women. More broadly, female interviewees revealed stereotypical notions of meritocracy as they implicitly associated the notion of merits with hegemonic masculinity and/or stereotyped personal traits of masculinity. Some of these attributes included dedication, commitment, good performance, focused, dedicated engagement, merit, availability, individualism, self-investment, competences, less compromise with family or domestic issues. This tenden-

cy of women to exhibit stereotypical ideas of meritocracy and successful career in a more masculinist way was learnt from their environment (Dasgupta, 2013). Messerschmidt argues that these perceived traits of successful careers are a result of a historical process of 'academic appropriation of hegemonic masculinities' (2012:56) that also feed gendered STEM stereotypes against women within academia. In fact, these traits characterize the so-called meritocratic system that women need to fit into in order to be successful in their academic careers.

Williams (2017) asserts that 'these beliefs are considered to be real, objective features of women academics, with the consequence that women shy away from, are not considered for, or are excluded from, higher academic positions' (23). Unconscious gender bias along with meritocracy ideologies in academia work as descriptive elements of 'what women and men are like' in their academic identities and as a prescription of 'what [successful] women and men should be like' in their academic careers in science (Corbett & Hill, 2015:37). Consequently, if women fail in their efforts to fit into this system, they are blamed. These beliefs were widely shared among all the interviewees regardless of gender. This suggests something more structural beyond the individual.

The internalization of these values led some women to make negative self-assessments of their careers and research performances (Correll, 2001; Corbett & Hill, 2015; Dunlap & Barth, 2019). The implicit gender stereotypes exhibited unconsciously by male teachers and academic managers can be critical for women since the majority of people in powerful positions to influence women's careers are males. This can be a critical factor in the annual performance evaluation of women. One junior lecturer said,

We were five, the majority progressed but I was lagged behind because the person [who had the power to decide] sat down and thought, she does not have the right and should not progress to the assistant position. Most of these people who changed positions did not have a Master's degree as myself. They said that the condition to progress was not the academic level as such but the publications one had. They looked at me and said, no we don't think she deserves to be promoted. I suffered here but I'm here to work for my son's future and I don't care. (Vera).

Career progression in the supposedly meritocratic system is also influenced by the decisions of superiors. Several studies have shown that implicit gender bias regarding women's performance undermines their career advancement (Powell, 2016; Gvozdanović & Maes, 2018). I did not examine in depth the criteria, processes and procedures of the annual evaluation of the academic staff in the two universities where I conducted my research. However, a study by Caixote et al. (2020) found several issues regarding the implementation of performance management systems in public universities in Mozambique such as a 'lack of clear academic job descriptions, poor verifi-

cation of performance measures, limited transparency, limited consultation of academic staff members' (57). This may suggest a risk for biased evaluations of academic performances in the supposedly meritocracy system ruling Mozambican public universities.

Several female interviewees, regardless of the generation they belonged to, felt that they were less likely to fulfil all the prerequisites for promotion in good time due to their social burdens (see Chapter 4). This phenomenon is described as a self-fulfilling prophecy 'when women academics do not see women as academically able due to their acceptance of gender-role stereotypes and abilities' (Williams, 2017:22) but there were few women, especially the senior ones with a PhD degree who perceived themselves as fulfilling all the prerequisites in time to compete equally with male counterparts for positions in the careers. A female assistant professor said:

I assume I'm here in this place/position on my merit and not just because I'm a woman. Exactly! In the competition [for a promotion] I would apply on an equal footing with men. I think they have the same capacity and there is institutional openness to do so. I acknowledge that there are gender inequalities in the workplace, in academia and I think there is a lot to be done but we still have a long way to go. But then, there are a series of constraints that they [women] impose on themselves or have imposed by the family. There are women who if they have a boyfriend decide to take their professional career forward [but] regardless of whether or not they have a partner [they], but there are very few. (Ana)

Surprisingly, part of Ana's statements blamed young women for creating obstacles for themselves to progress in their careers. As senior women and doctoral lecturers, my interviewees Judite and Ana both invoked meritocratic ideologies and principles as the fairest way to determine who has the competencies and merits to achieve a position. Consequently, according to their stances women were not progressing due to their lack of merits and commitments in their careers since the possibility for advancement was supposedly equality for all. Valian (1998) argues that successful people tend to interpret their career achievements in meritocratic terms. From this viewpoint, successful women have invested in the system as it is and have a lot to gain from the discourse of meritocracy. In academia this conception has worked as a kind of naturalization of men's tendency to occupy privileged and/or power position in academia. This naturalization of meritocratic ideals based on male models of work leads women and the system as a whole to put 'the responsibility for the low number of female professors on women themselves' (Powell, 2016:31). Unsurprisingly women blame themselves for their slow progress in their academic career in science because this is how they are socialized.

Now as soon as I started my career I was already told that look, you get in here and you have to do your Master's and doctoral degree, you have to proceed in the academic career, you have to publish, you.....Since then I started to look around me to see where I fit in and I saw two kinds of people: the ones who put the career first and the family comes next, and the ones who put their family first and the career comes next. So I belong to the group where the family comes first. For me, my career - my family comes first and my career comes next (Rosa).

Career advancement here is seen as an individual endeavour that results from hard work and dedication. This is relevant in the understanding of women's chances of professional achievements (Williams, 2017).

Workload: a subtle 'roadblock' to career progression

In spite of a strong rhetoric of meritocracy junior women both in the early and mid-career stages mentioned that they did not have enough time to do research due to their teaching and bureaucratic (administrative) workloads. A similar result was found in study by Awando et al. (2014) carried out among academic staff in an HEI in the USA. Their participants too complained about their workloads regarding service tasks and teaching overload. Women rather than men were engaged in service responsibilities (administrative tasks) and teaching. The study concluded that these factors constituted a subtle obstacle in career advancement for women. Sarah Riordan (2011) argues that it is challenging for junior people in early-career stages to balance all their new academic career duties since there are numerous tasks that end up creating clashes in their professional realities. This seems to be more an institutional problem rather than a solely individual dilemma.

Junior interviewees complained about lack of time.

Yah! It hasn't been so easy because, first, we actually have the teaching part, right! So sometimes we have many subjects to teach. The workload, so it's not always easy to manage. Teaching takes a long time and our research project has a limited time. Sometimes there is that constraint. (Florinda).

Sometimes we have so many tasks, we don't even have time to work on the research career. For example, I teach and I am also part of the administrative section. But because of the tasks having to teach, having to take care of the administrative services inside the university it takes my time that I should devote to the field research. (Juliana)

Yongzhan Li et al. (2020) stress that teaching workloads consume not only time but also energy and emotion to such an extent that these junior people end up feeling fatigued. This affects their efficacy in relation to research tasks. From what these junior women reported a high teaching-research conflict at both universities magnified by the absence of a research career trajectory in one of them made doing research difficult. Junior interviewees in

early and mid-careers did not have time allocated for research. This finding is consistent with Brechelmacher and colleagues' study (2015) who found that regardless of gender, assistants at European universities reported that high teaching loads impeded the completion of their research projects (Brechelmacher et al., 2015). In addition to that, my work suggests that in Mozambique women rather than men tend to be affected by teaching overload.

The documents I analysed did not pay due attention to gender disparities in academic career progression and how these are shaped at individual levels by the institutional factors. My female interviewees' statements consistently showed how macro and meso level factors contributed greatly to constraining their career advancement in very particular ways. Without taking into account all these factors, documents and people within academia will continue to blame women as responsible for their own reduced status and the lower position they occupy in their careers. Thus it is important to stress that in Mozambican sociocultural and academic contexts women are doubly disadvantaged in relation to progressing in their career; on the one hand, because of the gender order ruling the country as discussed in Chapter 4, and secondly due to poor institutional support for their careers. The strategies foreseen so far in the documents (see FNI, 2016; MCTESTP, 2018) to increase the number of women progressing in academic careers (being promoted to professorial positions) have not been effectively implemented. This is evidenced by the low number of women in the science field that have been promoted to associate or full professor. One senior academic woman stated:

we must do research...we have to do research but I don't have much time for research because the directorship of the course takes a lot of my time. So maybe when I leave this, because as soon as I finished my PhD, I was immediately nominated for administrative roles. So I forgot a little bit about the research area, I do but very little. I think that maybe if I had not been here in the directorship of the course, maybe I would have been able to apply myself more to doing projects but in fact, I did not. (Cristina)

Although Mozambican HEIs remain teaching-based, academic managers pay huge attention to research performance in progression and promotion terms, while assistant lecturers are pushed into teaching duties leaving their research behind. This is a contradiction which causes issues in the annual appraisal of teaching staff. It can be more critical for those universities in which there are no distinctions between teaching and research careers if staff's professional achievements are measured through research performance. A similar problem has been reported by Moraru et al. (2015) in a cross-international study among European countries.

Finally, in order to explore gender differences in the perception of women's performances and career advancement I asked male teachers and academic managers to make an assessment of women's careers. The latter, after

all, are the ones who make decisions about women's careers. In the next subsection I examine their perception of women's career progression.

Male views of women's career advancement

The male interviewees demonstrated perceptions that were tendentially more homogeneous than my female interviewees'. They did this by, on the one hand, strongly adhering to the ideology of meritocracy and on the other hand, by denying any difference in women's career progression than that resulting from individual engagement as underlined by the two academic males quoted below.

I think this battle [for promotion] is an individual battle to each one depending on their effort, and the institution facilitates, obviously, the institution needs teachers with doctoral degrees, in ways that have facilitated in the acquisition of permits to study. It involves commitment and devotion. (Josue)

There's no progression difference between men and women in the career at least here because the opportunities are likely the same. Whatever someone has to do, they must invest, focus and dedicate themselves. The good thing is that the doors are open here in the department. So the candidate is the one who has to show dedication and face it. It's not the opportunity knocking at one's door. So, in the end, there's no problem at all. (Batista)

The interviewees constructed their perception of career advancement as an individual struggle in which only the fittest evolve to the highest ranks. In the view of these interviewees, the position that women occupy as well as their failure of career progression resulted from low individual commitment and engagement. This is a somewhat reductionist view in which women emerge as the culprits. It loses sight of the effects of social and institutional factors that particularly undermine the progression of women but not men.

The socially and institutionally advantageous positions men enjoy did not encourage them to have the same critical awareness of gender inequalities in career advancement as women had. One might argue that the majority of women I interviewed as a socially disadvantaged group within universities was in a better epistemic position, based on their lived experiences (Brooks, 2007), to recognize existing inequalities in the settings in which they were situated. Thus, men who pointed out social factors as generators of different patterns of gender in academic progression, were a kind of outlier within the group. Yet, it was encouraging to note that there were males who were aware of the social factors constraining women from climbing the academic promotion ladder. Some men also commented on the impact of family responsibilities on women's career progression opportunities, for example:

I don't see any difference in speed of progress between me and my female colleagues. The progression I would say is fair and uniform. If men make progress, women will also make progress, but that also depends on personal commitment, it depends on involvement. But I think the social life somehow exerts pressure and makes some of them [women] fail to achieve the goals they set. They have said that this social component has a great impact or influence on their career. (Sergio)

This male interviewee agreed, at least to some extent, on the existence of differences in career progression between women and men motivated by factors beyond the women's control that is deeply rooted in societal issues, norms, values and beliefs. In spite of this, it is important to note that overall males' interviewees excluded the meso-level factors, both material and immaterial, from their statements and how these contributed to gender differences in the careers progressions. Even so, Sergio advocated that career progression in academia was a gender-neutral process that depended on the individual abilities in self-fulfilling the requirements for promotion. One male explained,

I would not say that there are differences [between women and men] in terms of progression in their careers and I will not say that it has been the same. What happens is to comply with what is regulated by the university. So, regardless of being a woman or a man, if the individual complies with the requirements, which is to have three years of service or three years in a specific category, good remarks in the evaluations during the last three years and/or gaining a new academic degree. So if people meet all these requirements, regardless of whether they are male or female will get approval and hence changing their position in the career. (Joseph)

This dominant view of supposedly gender-neutral career progression that denied differences in women's and men's progression is widely contradicted by my findings of document analysis that demonstrate a highly gendered process from the assistantship to the professorial position as well as the accounts of junior women. Joseph as the rest of the male interviewees regardless of their position in the career linked women's career progression to merit based on scientific outputs and research performance.

Men due to their social, cultural and institutional hegemonic position were unaware of or at least devalued the role of the interaction between the societal (motherhood and marriage) and institutional factors (along with its inequality regimes) in creating gender differences in the career progression (McIntosh, 2012) mainly in the speed with which women and men obtained their PhDs, a core requirement to be promoted for the professorial positions. Men's narrative on the supposedly gender-neutral career progression and appeals for meritocracy was indeed a kind of discourse that served to legitimate their privileged position in the careers. The lack of a broader supportive framework on women's careers at the universities that would help women to

overcome most of the macro-level barriers was never referred as institutional constraints; and this was actually one of the most prominent causes that led women to be stuck in the lower positions in the careers and hence making them progress slower than men. At this point, my findings are aligned with those from Ayflen Bakioglu and Nilüfer Ülker (2018). A study by Bakioglu and Ülker (2018) with Turkish academic women suggest that gender differences in the career progression within academia resulted from a combination of social and institutional factors. Women were more likely to suffer from career breaks in their trajectory in academia due to social factors but the majority of them did not receive a sufficient amount of support from their workplace throughout career progression due to a male-dominant atmosphere that made them progress slower than men (Bakioglu & Ülker, 2018). A similar situation along with a lack of partner's support in their careers as showed in chapter 4 was also experienced by my female interviewees.

The negative effects resulting from the social and institutional factors over women's career progression were 'hidden' from the males' eyes as well as of the majority of academic managers. But its results have worked as a powerful barrier that still prevents young women to climb the academic ladder and achieving the highest level of their academic careers (Bain & Cummings, 2000). The supposedly gender-neutral views on careers advancement prevented most of these males to be aware of or at least reflecting critically on how universities recreated barriers for women's progression. One male interviewee viewed women advancing in the ranks as resulting from nepotism. Some men continue to doubt women's academic competence, and their expectations regarding women's careers remain remarkably lower as underlined by a junior lecturer.

The truth is that the institution gives more value to women. The problem is that at my university, where I work, women were more privileged before, only afterwards, within the scope of the elections, there was automatic progression. Yes, there was automatic progression, changing careers, I also changed careers [from trainee assistant to assistant, the career is still the same] but women had more advantage because it is so, just because they are women. The problem is when a man wants to make progress, then we have to open the statutes, as it is, follow all the procedures precisely. When you become a trainee assistant you must have at least three scientific publications in recognized journals and you also need to have a very good performance in the evaluation in the last two years and be friends with the director. For me it is subjective, because the objective is when there is budgetary appropriateness. Those women or men who have a friendship with the director or who is in power easily progress regardless of academic performance. No person will always have a very good performance evaluation. That is not easy, my brother.... there is no such thing. Very good academic performance is when you have a direct relationship with your superior. The indicators that are there, are manipulated. (Alfredo)

According to Alfredo, personal relations are key to getting promotion. This male interviewee expressed in a more explicit way what others did implicitly. Juvêncio Nota (2011) argues that these views regarding women's progression are not uncommon within Mozambican public institutions. Generally, when a woman ascends to a privileged or powerful position there is a sense that such professional achievement results from a favour (sexual or friendship) with a powerful male (Nota, 2011). This points to corrupt practices which need further investigation and eradication, but also to gendered prejudices regarding women's competence.

University support for women's careers

I have so far been discussing women's career development in academia. Support from the workplace is of particular importance to mitigate the problems inhibiting the advancement of women in research (Moodly & Ton, 2017; Bakioglu & Ülker, 2018). My concern here is with formal or institutionalized assistance towards women's careers (Reese et al., 2021). It implies changes in those institutional practices and norms that limit women's participation in biological research as well as providing assistance for career advancement. Universities across the world have designed and delivered their own programs to encourage and support academic women's career progression (Parker et al., 2018; Sawarkar et al., 2019). Below I explore institutional approaches on this matter.

Dealing with women's career barriers

At this point, I focus on the extent to which universities provide a supportive environment for women. Discussing this issue with female and male academic managers, I asked about gender issues in their institutional concerns. Regardless of the institution, all of my manager interviewees (10) said that gender and equity were integrated into the strategic plans of the university as cross-cutting themes (UEM, 2017; UniLurio, 2016). According to these academic managers this was a clear signal of the university's commitment to promoting gender equity within the academic environment. An academic manager explained her university's concerns on gender issues:

Well eh! There are gender concerns at the institutional level and as you know also at the national level, right! It is a concern to have more and more gender equality and especially in this region we face situations very, eh! How can I say, challenging. I think the issue of religion and asymmetries between the South and the North. We have here higher levels of girls' school dropout and then there is, of course, there is also influence of the rite of initiation, there are many problems of early marriages and pregnancies. (Carla)

Carla emphasized attention to the realities of the local community instead of to academic staff. It may also show that she views those problems as having roots reaching further back, and/or that she is deflecting from the institutions' failures to support women adequately. Moreover, this may suggest a lack of awareness of the women's struggles within the university as I also showed in the previous chapter. This awareness is essential for addressing women's needs in STEM careers (Mavriplis et al., 2010) and hence providing the necessary institutional assistance.

Surprisingly institutional practices/experiences at one of the universities as reported by my interviewees indicated a major concern with graduated students from high school pursuing science-related courses at the university. A woman and academic manager explained how her university handled gender issues.

If there is a gender strategy or program I don't know yet, I can't lie. I don't know exactly, but we do everything for women to have more access to the university. To put more women at university! I think we will have it through the project funded by an international bank. There is a gender component, gender equality that is trying to remedy this situation. We were also trying to work with those young women in [upper levels of] secondary schools but the faculty did not create conditions for this. Sometimes we created mechanisms to prepare them to pass the entrance exam but only women in this case, right! and those who were admitted in the entrance exam we awarded them with a scholarship for studying in our university. (Julieta)

If on the one hand Julieta demonstrated some lack of knowledge of how her institution was addressing gender issues in more formal ways, on the other it was not clear whether or not the initiatives or practices she mentioned were part of a formal action plan or a systematic process institutionalized to assist women in academia. As the top managers of the two universities examined here let me know at the time of the interviews, they had no gender strategies or policy that would support Julieta's statements. Nonetheless, in one of the universities, there was an institutional framework for developing and implementing effective gender strategies.

Julieta believed that her institution was doing its best to get more women into the university although the institutional mechanisms through which they stimulated such new entrance remained unclear, since girls and boys from high school were admitted only through entrance exams. There was no documentary evidence that the universities implement a gender quota system in the courses. Furthermore the discourse according to which 'everything was done for girls/women...' is what I have already considered as a form of political correctness. A very self-protective attitude, an attempt to protect their own image as managers showing that they were doing their best for girls/women. Nonetheless there were two institutional interventions, firstly providing additional training courses for female applicants for the entrance

exams in order to encourage them to enroll in STEM-courses, and secondly providing scholarships mainly for girls admitted to the universities regardless of the courses. This was also corroborated by Julieta's colleagues at different levels of university management.

No interventions for young women (lecturers and researchers) engaged in biological research were mentioned. Although these managers claimed that gender issues were part of their institutions' concerns, academic women, even those in managerial roles, remained feeling less supported. Women complained about this lack of institutional assistance. A senior woman and academic manager said:

I think that there should be more and more incentives and support. Here at the department level women should be more encouraged. I may not have had that many problems during my postgraduate training because I was also one of the people who finished in record time. My coordinator ... he always supported me, he always supported, whenever I needed something he was there. He never left me even with those difficulties.... I may have been lucky! Now for example, for my colleagues I don't see any support, I have evidence from two teachers who are studying and who are not being supported. They should have support, they are not being supported, neither morally nor monetarily. (Lucilia)

Even with scholarships linked to the university, everybody who is currently doing their doctoral training is almost all of the same age and the first ones to go for studies overseas were males. Currently, here, there are no women doing their PhD. (Cristina)

These quotations indicate a lack of support for women's career development. This is consistent both with my document analysis findings and those from Bakioğlu and Ülker (2018) in Turkey who found a lack of support for women from the workplace throughout their career. The fact that the majority of my interviews had weak support from both their male partners and the universities made their careers a permanent source of tension and conflict, and a highly insecure individual venture. A study by Shuruq Alsharif (2018) in Saudi Arabia showed that a lack of implementation of an effective strategy for women within organizations along with cultural issues was the main contributor to blocking their career development. Similar trends showed up in the narratives of the academic managers I interviewed. My findings suggest that at the time of the interviews little attention was devoted to academic women to strengthen their participation in science and biological research. At the level of departments of biological sciences at the two universities there was no evidence of systematic activities, projects and programs for this. This was an issue that came up in my document analysis and was corroborated by the statements of an academic manager who explained:

The plans are elaborated at the section level and the sections are mostly constituted by female researchers and lecturers. I have no doubt that what this department does is of interest to our female colleagues. They are the ones who propose what they want to have done, how they want the framework, what kinds of things the department should address most. But I confess that despite having mostly female staff, I don't think when they address it they wonder if the thing is for women or men. They address it in the fullness of the things that must be done as they should be done. And I have realized that who is addressing it [or planning the activities] are women so the female interests are properly framed. (Julio)

The assumption of decentralized planning at the department level led Julius wrongly to consider that everything in the department's annual plan met the needs of the women as they were the majority. Clearly, Julio's stance was biased because as the main manager of the academic unit and being somewhat aware of the needs of women in their careers one would expect a more proactive attitude as part of the departmental agenda. The lack of related leadership meant that women in a majority-women department could be blamed for any issues regarding the operationalization of gender issues.

Lucilia's account on the previous page - she was also a section head in the same unit as Julio, where he was the coordinator - completely contradicted what he said. Hence it was more likely that academic women within their departments were not benefitting from institutional support for their needs as both Lucilia and Cristina reported. There were perceptions of a generally less supportive departmental climate for women. This less supportive, male-dominated atmosphere in academia has been described in several studies (Settles et al., 2006; Moodly & Ton, 2017). Ritwick Sawarkar et al. (2019) argue that the departmental local environment plays a key role in the academic performance of early and mid-career female faculty such as the majority of my interviewees. Thus 'institutional support and guidance can relieve challenges for early-career female faculty' (Sawarkar et al., 2019:1). But as Moodly and Ton remind us, there 'is a [structural] problem for women academics as HEIs are organised in ways that privilege masculinities' (2017:141).

Interestingly Lucilia's experience draws attention to the importance of gender-responsive practices from academic managers. Still, it is necessary to go far beyond this personal will of managers to support academic women as indeed advocated in the macro-institutional documents. To this end, it is important that managers at different levels within the university are trained on the subject not only to develop gender awareness but above all on how to mainstream gender in the plans of their directorates, faculties, research centres and in the annual plans of activities at the departments level. That is, build up gender mainstreaming at the public universities. This is only step one though; it is equally important to ensure that any such policies are put into practice and implemented rather than existing just on paper.

In fact, despite the fact that the academic managers mentioned that gender issues were part of their institutional concerns, most of them also assumed that there was still much to be done for academic women. A top academic manager said,

Regarding gender inequalities in academia I think there is still a lot of work to be done. That is being done, but we still have a long way to go. So there is already a gender strategy in progress and we have the strategic plan, there are some transversal issues such as gender. There are also some actions, we have now started a program with an international donor institution [AB] where we have a very strong component of facilitating scholarships for our women [students]. So in our scholarships we give particular attention to girls either at university level or at the level of the AB itself... we also have a program of preparation for pre-university students, who are finishing secondary education in the science field to enter our university. At the research level, for female researchers in science the university has no allocated additional institutional resources to this group, given all the structural difficulties. We certainly favour women but on the other hand, we also don't want to bring about, create inequalities. Right! I think that such an affirmative action issue is not in our policy because it end up creating what I call, equality and inequality. (Ana)

As noted in the quote above the main concern seemed to be to increase the number of newly admitted female students in science-related courses. Unsurprisingly, Ana a top manager at one of the universities rejected the idea of affirmative actions for the academic empowerment of women because in her view this would end up creating other forms of inequality as side effects. This resistance to designing and implementing affirmative actions may explain the strange institutional silences regarding gender issues that I witnessed at the level of departments in one of the universities. Such an attitude from senior female academic managers, as I previously mentioned, was not uncommon, due to their strong internalization of meritocratic ideals or anti-feminist attitudes. It is important to note in this context that affirmative action on behalf of women in the field of research within universities is a strategic vision advocated by the Mozambican government at the central level through the gender strategy of the national fund for research agency (FNI, 2016). Nonetheless, scholars seem to be somewhat divided regarding affirmative action policies in HE. Such actions are in decline in a number of countries such as the USA and the European Union due to positive action being viewed as discriminatory (Palmer, 2010: 762). There are also those opposing this kind of policy or intervention, advocating that it is 'demeaning to women in academia' (Kimura, 1997:238) and as such affirmative action should be banned, while others think affirmative action efforts in academia are essential (Hinrichs, 2012). Due to the sociocultural context and particularities of HE in Mozambique, I would argue that all HEIs should be encouraged at least to design and implement affirmative actions or to mainstream

gender in their institutional framework and management tools. This is because the implementation of affirmative actions is a more effective way to make changes within institutions, as in most Mozambican public institutions, in which we have a very low number of women in privileged or power positions (Silander et al., 2022).

If, on the one hand, the managers I interviewed intended to demonstrate institutional commitment to gender issues by being politically correct, on the other hand, it was evident that they had difficulties in planning methodologies to integrate gender issues in their management tools.

At the university level as I said we don't have a regulatory instrument or guidelines about how to integrate gender issues in our [annual] research plans. In spite of not having such regulation we have Teaching Career Regulations, a strategic plan that can guide us considering the gender issue. So there in the strategic plan, also the gender component is there. But unfortunately we don't have up to now an actual regulatory instrument with which we can guide ourselves in our research, but we do have (Marcos).

Actually at the department level we have not yet done a specific activity related to gender. Even in our annual activity plans we didn't. But I know that the faculty has a group, and women usually have small meetings to discuss this, I think even this year there was a seminar here, and then there was another seminar in a university on gender issues. At the university from what I remember, I think there is a document about that [gender issues]. I think the university has now started, and has made some progress. Before, there was not much concern in terms of gender. At the level of the university, the rectorate has worked with units to find out what they have to do with women and gender issues (Antonio).

These two statements suggest that managers still face challenges in the planning and implementing of activities on gender issues. Nota (2011) argues that usually gender issues in the strategic plans of many public institutions in Mozambique are included in the section on cross-cutting issues but are dealt with in very superficial, imprecise and brief ways. This hinders subsequent monitoring and the evaluation of the implementation of gender issues at the institutional level. This has been one of the major institutional weaknesses in the implementation of gender mainstreaming in Mozambican public institutions. In addition to this, at the two universities there was an engagement to provide internally postgraduate training programs for faculty to increase their academic qualifications, especially through Master's degrees. This led to more women with *Licenciatura* degree earning a Master's degree. A woman acknowledged this fact and asserted that,

We need to invest in our training because we have a certain level, this is a faculty, it is a university and everyone should hold a PhD degree. We are training our faculty and most of us are holding their Master's degrees. So this is what we are already doing. But if we had funds from the state budget or

not I think we would invest more in the scholarships for PhD training. Then together we would start looking for ways to do research, to compete for external research funding, etc. (Rosa)

Even in the context of a lack of institutional initiatives to support women's careers in science they mentioned that there had been some programs/projects within the universities funded by some of the university's cooperation international partners to provide scholarship for female students. As they told me the two universities had benefited from important external support programs for their capacity building on gender issues, their gender mainstreaming plan, and teacher training funded by international agencies such as SIDA/SAREC at UEM or the African Development Bank at UniLurio. Interestingly one of the academic managers believed that having women in the top ranks of the university management as vice-chancellors was helping them to make some progress in the domain of gender issues.

At an institutional level we have a big fund from an international bank which has also imposed many gender conditions; helping is also the...the African Development Fund that gives money in a very institutional fashion – within the institution. I think the policies from our cooperation partners are beginning to get a bit into the thing because they provide institutional money for scholarships – and they demand that a percentage be for women who are doing something regarding training. There should be a percentage for women since it's something that's not managed within the university, the thing of us having to be more feminine has been coming through a bit. And the fact that we have a female vice-rector – I think it was decisive in order for us to start thinking that gender issues become more institutionalized (Cristina).

It seems to me that the institutional gender awareness at both universities is being favourably influenced by the gender sensitivity that the top leadership in university management have, together with the strategic cooperation partnerships with international donor institutions. As I mentioned, there were strong indications that external support at the two universities would contribute significantly, in the medium and long term, to the strengthening of their institutional capacity building on gender issues as well as to the academic-scientific empowerment of women in science careers (Alberts et al., 2003; Boeren et al., 2006). Nevertheless, it is necessary for the universities to work more at creating an institutional environment that promotes and supports women's advancement in academic careers.

Conclusions and recommendations

In sum what emerged from the interviews in this chapter and the documents analysis findings was that it is still a challenge for the Mozambican HEIs to make more girls and women interested in or feel attracted to careers in sci-

ence. Although the HEIs are concerned with the need to ensure access to higher education as recommended by the strategic plan, the preferences of women for careers in the science field are not sufficiently encouraged by the public HEIs.

There were consistent differences between the career paths of senior women from the March 8 generation and younger ones and how they became engaged with a career in biology. The older generation of female teachers and/researchers was more likely to describe their career pathways in terms of the prevailing political circumstances of the country. The new generation career decision making happened in a context of a variety of career options provided by the changes in the political, educational and economic orientation of the country, from a communist culture to a more individualistic or neoliberal market-oriented setting adopted from the 1990s onward. This resulted in different research career experiences. For the women in both generations I interviewed, careers in biological sciences were not what they aimed to do but an alternative career path.

Furthermore, regardless of the generation that they belonged to, the women perceived their career advancement as being slower than that of men despite the fact that national and institutional policy documents claimed their concern to fostering equal opportunities for advancement in academic careers. This has to do with a range of overlapping factors at the social level (strong commitment to family management) and the institutional one (higher teaching-research conflicts resulting from overloads in teaching and/or administrative tasks). For women it was difficult to obtain a doctoral degree, they had less time to do research, and there were stereotypical gendered perceptions of merits and implicit biased (self-)assessments of women's performance in research.

In their perception of women's career advancement, my interviewees showed similarities and dissimilarities. A shared view regardless of age and position in the career, of both females and males, was an assumption of ideologies of meritocracy governing the institutions. The main difference was that women rather than men (most of whom were in positions of power within the university) were more aware of the societal and institutional factors blocking their progression in academic careers. This lack of awareness that men revealed was in line with what the annual reports at the meso (institutional) levels demonstrated. It contributes to maintaining and perpetuating the patterns of gender imbalances in career advancement.

The meritocracy rhetoric worked to women's disadvantage as it was utilized by the interviewees to blame women for their lack of career progression. A gendered pattern of career promotion pathways emerged. Women thought that men rather than they themselves tended to fulfil the requirements for promotion more rapidly. This was, of course, true since women were unable to take up PhD scholarships abroad and were less able to devote significant time to their work compared to men.

At the institutional level, universities need to reduce the high teaching-research conflict that women are frequently under in order to provide early- and mid-career academic staff with time for doing research. There is a need to develop strategies to support career development, especially of those women in the lower and middle ranks.

Senior women and women with doctoral degrees, male teachers and managers widely shared subtle stereotypes regarding women's performance that can magnify the obstacles that women academics face in their career progression. This is also harmful in the annual evaluation of teaching and research staff. Nonetheless, further research involving senior lecturers (supervisors) and academic managers (deans of faculties of science, head of departments and directorates of the courses and centres of research) is needed to strengthen this finding, that is to investigate to what extent annual performance appraisals of women and men are affected by their superiors' (unconscious) gender bias.

The results also suggested a poor institutional framework and erratic activities to provide guidance and support for junior academic women. Consequently there is a need to encourage universities to develop gender-responsive *practices* that take into account the particular needs of women within academic environment.

There was a poor attitude of academic managers in providing institutional support for academic women to overcome their career obstacles. Although managers broadly agreed that gender issues were part of their institution's concerns and reflected in their strategic plans, my results still suggest that there is considerable difficulty in the operationalization of gender issues in the management of research in universities. Without this workplace commitment and support the weak status of women in the domain of academic research and career progression simply continues.

Finally, the absence of an institutional action plan designed for supporting and strengthening female participation in the research field and career advancement contributed significantly to the risk of perpetuating tensions and conflicts between women's academic careers and their social and the institutional environments. However, at the time of the interviews the two universities were in the process of building their gender strategies and at one of the universities it was already approved by the university council. This may suggest an institutional commitment to developing strategic actions to surpass the scenario portrayed by most of my interviewees. Even so, there is a need to design and implement training programs for academic managers at different levels on how to mainstream gender issues within academic units (faculties, departments and sections) and in their research management practices in order to provide institutional support for women.

In the next chapter in which I draw my conclusions, I discuss how my empirical results have contributed to answering my research questions and also provide some policy suggestions and institutional actions that need to be

undertaken in order to overcome the obstacles and challenges I identified. Finally, I end with recommendations for future research

6. Conclusions

Final remarks

My purpose in this study was to analyse the obstacles that have undermined women's advancement in biological research careers. Through this, I intend to contribute to the development of structural policies and active measures to counteract the effects of these gender-related career obstacles prevailing in Mozambican higher education. Higher education in Mozambique is recent and is in a complex transformative process. Its policy framework has gradually developed, adapting to the country's changing political, economic social, cultural, and technological context. This process has resulted not only in the establishment of new public and private HEIs across the country but also in new concerns and themes, one of which is gender inequality.

My thesis had three main research questions that I addressed in the different analysis chapters. The first question was about how gender issues have been part of higher education institutions' concerns in general and regarding biological research (careers) specifically. The second question concerned the main obstacles and challenges women face in those careers. The third question was about how women's research career trajectories have been shaped by these obstacles and challenges. Each of these research questions was mainly responded to in Chapters three, four and five, respectively.

With regard to the first question my document analysis showed that gender and equality issues were articulated in public policy documents at national level such as the national gender policy and its strategy of implementation (PGEI), and in the gender equality strategy for higher education (GESH). I found that in the policy documents at the national level (from PGEI 1 to PGEI 2), there were changes of formulation over the years regarding the socio-cultural aspects that constitute major constraints in the work towards gender equality. In the first version (PGEI 1) these aspects were explicitly addressed and pointed to as a hindrance to women's careers, but in later versions they were left out and reformulated. This may reflect an increasingly conservative attitude among policymakers. No longer insisting directly that men contribute more to household chores but instead suggesting in rather vague and general terms that the family needs to be protected certainly points in that direction. It does nothing, however, to improve the persistent and powerful gender inequalities that undermine the development of the country as a whole.

As my findings showed, socio-cultural aspects at the macro level constitute one of the major factors undermining women's advancement in academia, fueling the inequality regimes and ruling relations within universities. If on the one hand at the macro-level, family and marriage cannot be questioned as a social and cultural compulsory prescription for women; on the other hand at the meso (institutional) level universities do not provide a supportive framework for women to help them overcome the barriers resulting from the macro level to deal with the work-life imbalances women face. Consequently women's careers remain socially, culturally and institutionally vulnerable.

In the strategic plan of higher education 2012-2020, I found an invisibility of gender in the field of research. This plan does not contain any explicit gender-related strategic objectives and actions, particularly in the field of research. Indeed, until 2017 Mozambique had no specific instrument (such as a gender equality strategy) to combat gender inequalities in higher education. Therefore, concerns regarding gender equality in the official policy documents of higher education are actually very recent. This, as previously discussed, may be explained by the policymakers' overriding concern regarding initial access to higher education. This is still a major challenge and priority for the Mozambican government since less than 3% of the Mozambican population has a higher degree. From the policymakers' viewpoint gender inequality in research was a non-problem at national level, even though by 2016 the national research fund already had its own gender strategy.

Overall, the national documents paid some attention to gender equality issues, but insufficiently so. At the meso level university documents tended to co-articulate with the national gender policy (PGEI). Consequently concerns with gender and equality were also reflected in overarching university policy documents such as the strategic plans and the gender strategies. However, there was a gender invisibility in the research policies of the universities, which conveyed the sense that gender does not matter in relation to research careers. This lack of concern with inequalities between women's and men's careers was underpinned by a dominant ideology of meritocracy that also shaped academic managers' discourses. This ideology of supposedly gender-neutrality in career advancement contributed to obscuring women's socio-cultural disadvantaged position in research careers, but was mobilized to blame women for their poor career progression.

My document analysis showed that at faculty and department level, there were no references to gender from 2016 to 2021. In other words, strategic directives set at the broader, top level did not filter down to the lower levels of academe, the coalface, where the work actually needs to happen. And there appear to be no mechanisms in place to ensure those directives' implementation. Although gender issues in the national (government) and uni-

versity policy documents are considered as cross-cutting issues, this approach failed because they did not address the main pillars of university work (teaching, research, university governance and outreach). This ends up diluting the principle of gender mainstreaming as widely advocated in the policy documents. Therefore, the Ministry of Higher Education, the HEIs, and partners are called upon to critically rethink the practicality of the 'Mozambican model' that is supposedly based on the principle of gender mainstreaming to address gender issues.

There was little indication how gender mainstreaming was to be operationalized. This created discontinuities within university, that is from the 'top documents' (covering all domains of the university) to the local ones (at the faculty and departmental domains) in terms of how the gender strategic objectives, actions and indicators foreseen in the strategic plan and gender strategy might be operationalized at faculties and departments to achieve the university's ambition toward gender equality. Gender in the key institutional documents appears as something for the future, and as such gender-related information in the institutional documents had relatively little or no input in the daily management practices and actual concerns of the academic managers.

The lack of reported actions toward gender equality within the Faculty of (natural) Science and departments of biological sciences shows that at the local level little or nothing had been done to overcome the obstacles women reported. This is strongly linked to the patriarchal culture of departmental and other institutional leaders, who are mostly men. Even though there is a program of development of institutional practices and of research sensitivity to gender, one of the universities operated with fossilized practices where men continued to dominate almost all positions of power within it. This was somewhat different in the other university. These differences show that inequality regimes are not immutable. They operated differently in the two universities due to these institutions' histories and settings. For example, at one of the universities, there was a great asymmetrical gender distribution regarding age, academic degrees and career stage. Most of the women there were former students of senior males who became their colleagues. Most of these men had PhDs and were in professorial positions. Having few women with PhDs reduced these women's capacity to influence decision-making and changes within the department. Thus women were less privileged and doubly disadvantaged. This was because wider society's gender relations were reproduced at the departmental level where, even though women outnumbered men, no woman had been appointed as head of department, for example. Decision-making power continued to be concentrated in senior males' hands. Without PhDs women remain confined to lower career positions (mostly as assistants and trainee assistants). Consequently, the career structures for women are unequal, amounting to vertical segregation.

This is reinforced by social custom and practice which dictates that people in the university, students and faculty, address each other using their academic degrees and/or position in the university before their names. So the professors (Professor Doctor) are mostly males while the 'dr'¹⁷ are women. This reinforces hierarchies and inequalities between women and men; ongoing university customs and practices serve to produce, exacerbate, maintain, and legitimize these inequalities.

In one department most of the teaching staff had studied together at undergraduate level; they were in the same age range, had the same academic degrees and occupied similar career positions. All of them, with few exceptions, were junior. This homogeneity provided a sense of more equal work relations, although there were slightly fewer women than men in the department. The tasks at the departmental level were generally shared, but, again, the head of department was a male figure. Even though women and men were at the same career stage, had similar levels of academic degree, and ages, women were nonetheless less likely to occupy a managerial position. People there addressed each other by their names instead of by their academic degrees. Despite the above-mentioned differences, the two universities at the departmental level were historically headed by males which demonstrates that vertical gender segregation persists possibly more sustainedly than horizontal segregation.

Although the academic managers I interviewed sometimes produced a politically correct discourse on gender, they did not materialize gender equality efforts in their management practices. Instead they either deliberately or inadvertently excluded gender issues from their work plans and agendas. There are two possible explanations for this: the first has to do with a lack of relevant specific/practical competence regarding how to integrate and operationalize gender issues at the local level. The second is that the silencing of gender issues is a kind of passive or hidden resistance to gender equality in academia (Sağlamcı et al., 2015) due to its clash with the sociocultural values and beliefs of 'the bosses' of the university and their strong ideologies of preferentialism, disguised as meritocracy. Both explanations have implications for the universities. The first is that, for example, it is not enough to integrate gender issues into strategic plans or to design an institutional strategy for gender equality. This does not guarantee the achievement of university goals around gender equality. Thus, universities need to enable the main actors at the lower institutional levels to develop competences in operationalizing gender equality within their units. They also need to be held accountable for that implementation and given both incentives and penalties to ensure its operationalization.

¹⁷ This is used in Mozambican universities to refer to faculty or researchers without a PhD degree.

Further and long-term capacity-building actions on planning and budgeting from a gender perspective can help them in this regard, but even so, it is necessary to acknowledge that it will take time for the academic managers to overcome their difficulties and trigger the necessary changes at local levels due to the fact that these issues are as new as they are complex in the Mozambican academic realities and daily practices. The establishment of an integrated system of training and support for academic managers (faculty deans, deputy deans, heads of department, responsible persons of the planning and finance sectors) would help them to develop a collective gender awareness that would enable them to make changes in their units. Such a system should, above all, allow for mutual help between peers and sharing of experiences, so that their overcoming of difficulties in practical work with gender issues within their department is collective. I think this is one possible way that universities can move towards equality. This is a necessary change that opposes the current erratic ways of working with gender issues within the faculties and/or academic departments.

For those HEIs that still show inconsistencies or erratic implementation of gender actions, the National Council for Quality Assessment of Higher Education should reinforce inspection actions in this domain, always involving an expert in matters related to gender to draw attention to the need to implement strategic interventions around gender issues consistently. There is a need to audit and know explicitly what each institution is doing and what changes or results are being generated in the mid- and long term.

In chapter four I explored the obstacles women in biological research careers face at macro, meso and micro levels. At the macro level, regardless of career position, social constraints closely related to the prevailing gender order were dominant, where women's social standing and roles continue to be linked to their household chores and family burdens as wives, mothers and caregivers. Despite the fact that contemporary Mozambican society is usually described as being in transition, the dominant view that still underpins the sense of 'being a woman' both in urban and rural areas continues to be strongly associated with the ability of women to skillfully perform domestic tasks within the family, to get married and give birth.

My female interviewees lived a dilemma seeking to respond to the modern discourse of gender equality that invites them to conquer new spaces in the country's public life, and at the same time acting in accordance with the social prescription and expectations of traditional society of them as mothers and wives. My interviews suggested that in their mental schemes what actually defined still quite a few of them as 'real women' were not necessarily the results and advances achieved in these formal public spaces, but the values dominating the domestic sphere. Unsurprisingly I found a strong internalization of these values among those academic women who were already married and/or with dependent children.

These societal obstacles were greatly exacerbated within the two universities I studied whose contexts are still characterized by a lack policies and actions to support women's careers. The document analysis and interviews showed a lack of policies to support women in overcoming the clashes they reported between their family responsibilities and academic careers. Whilst there was little support for women's training at doctoral level, some institutional documents such as the research policy at one of the universities assumed that this was a priority. Gradually it has become more possible for women to gain Master's degrees, but the challenge remains for them to obtain doctorates, key qualifications to advance in research and academic careers. Here additional investments are needed.

Overall older women were more conformist in their attitudes, while younger ones were more proactive in trying to further their careers. Among the urban younger generation of women some were beginning to question the prevailing social prescriptions of womanhood. These young women strategically postponed marriage and motherhood to better invest in their careers. They were very enthusiastic and engaged in laboratory and field research activities in both universities. Thus, unsurprisingly, at the time of this study the few women doing PhDs in biological sciences were the youngest ones. This means that there may be a medium and long-term, rather than immediate, shift in the profile of researchers in Mozambican universities since completing a PhD takes a minimum of four years. Further investments in and support should be given to this generation of younger female researchers who are able to negotiate their careers in a more independent way to gain PhDs. The older and married women acted in a more resigned manner in order to avoid or reduce family tensions, opting to strategically sacrifice their careers in favour of supposed family stability, something not common among males who had to make little or no adjustments in the pursuit of their careers. Here my results contradicted those by Antonio and Hunguana (2014) who pointed to a greater tendency of men to 'academic sedentarization' when they started to assume family responsibilities. In my research this trend was more prominent among women, as they were less present in doctoral programs, for example, due to their family responsibilities/social roles, as reported.

In chapter five I examined how the women's research trajectories had been shaped by the obstacles and challenges they reported. In Mozambique, research careers are still very unattractive due to the lack of adequate material conditions, low salaries, etc., especially for highly qualified young women. In spite of this and the obstacles they confronted, most of my interviewees who dedicated themselves to biological research reported that they have done so out of a passion for the discipline and for the possibilities/facilities they would have to gain postgraduate training scholarships, especially for PhDs.

Given the local employment conditions which largely do not favour the graduate market, the majority of my interviewees, both seniors and juniors, had not intended to undertake a career in biology. This result is interesting as it seems to contradict the dominant sense that women's preference in science disciplines has been biology. For my interviewees, the career in this discipline was a possible, alternative career pathway in which they ended up being 'successful' though they had aimed at medicine as they saw this as having better employment prospects. This seems to make sense in a social context in which the majority of the population does not have a higher degree and employment opportunities for highly educated youth are scarce.

My findings showed that career-related obstacles still prevail for women even when they largely outnumber men as noted in the two departments of biological sciences. Many of my female interviewees remained stuck in their careers at Master's level and as university assistants, one of the lower echelons in the academy, as they struggled to obtain a doctorate to advance. This problematic, associated with the fact that getting a PhD mostly still requires going abroad for several years to study, was not recognized as a gender issue at institutional level. Instead, two themes dominated the related explanations, namely meritocracy and family. The meritocratic discourse was closely linked to what was referred to as women's commitment and individual engagement/investments in their careers. Women were considered to lack ambition and, related to the second theme, expected to do what is socially required, i.e., put marriage and family first.

These two issues thus have a dialectical relationship since both the weight of the women's family burdens along with their teaching workload greatly reduced the time available to women to dedicate themselves to career development, and this has shaped people's perceptions that women do not make huge investments in their careers, which ends up compromising their academic performance and merits. Male academic managers and senior women considered women's careers as a matter of individual agency linked to merit. However, my interviews with junior women do not support this argument. Instead, I suggest that such difficulties were more due to the intersection of societal and institutional factors instead of individual factors as they suggested. Clearly, it was not a matter of women's lack of merit. But male academic managers and senior women were not able to identify the significant institutional factors that block women's careers. This is not surprising if one takes into account the internal reality of Mozambican institutions in which gatekeepers, the people who occupy positions of leadership and power within Mozambican institutions, are very self-protective. Recognizing institutional obstacles to the careers of women could be seen as a form of public recognition on their part that things need to change and there is inevitable resistance to making such change happen.

My findings indicated unconscious gender bias and a strong adherence to the ideology of meritocracy, particularly among senior staff and those in positions of power. This created a kind of blindness to women's obstacles and struggles that Joan Acker (2006) also diagnosed when discussing inequality regimes. She writes: 'the degree of awareness of inequalities, varies in different organizations [and] lack of awareness may be intentional or unintentional. Managers may intentionally hide some forms of inequality' (452). Indeed, unconscious gender bias prevents senior staff at different levels from becoming aware of how the intersection of the prevailing gender order in the country and a poor institutional framework of policies/actions to support women's careers has placed women at a double disadvantage in academia. This makes it difficult for universities to meet the practical needs of women in research careers, and undermines the implementation of institutional and formal interventions to counteract or overcome the obstacles reported by the women. Even though gender is addressed in their key policy documents, the actual gender practices within universities, mainly by their key actors such as heads of department and deans of faculty, suggest that they are not working to dismantle inequalities between women's and men's careers. This is part of how inequality regimes operate, creating a kind of gender blindness in order to maintain and reproduce wider social disadvantages of women in academia. Acker reminds us that 'people in dominant groups generally see inequality as existing somewhere else, not where they are [...]. Gender and gender inequality tend to disappear in organizations or are seen as something that is beside the point of the organization' (452). This attitude towards gender equality was evident in my research, to the extent that in one of the universities the head of the biology department believed that there were no gender-related career obstacles as women were the majority and therefore gender inequalities should not be discussed.

Mozambican higher education in general and public universities in particular need a paradigm shift in their approaches to gender inequalities in academia. This means that in parallel with the implementation of gender mainstreaming, as advocated in the national gender policy and the higher education gender and equity strategy, HEIs have to design and implement a framework of family-friendly policies that respond to women's training and research needs, and to a reduction of tensions between family and academic life. More than men, women need more flexible doctoral and Master's training programmes, e.g., the sandwich model and/or distance learning, which seem more feasible for those women who have family responsibilities. Mozambican men need to be challenged to change their mindset, that is to become more gender-equal, taking on responsibility for the care of children, housework etc, to the same extent as women. This along with flexible schedules would allow women to make investments in their academic careers. Added to this, there is a need to integrate gender-related content in

schools from the early stages of primary school and through high school to change gender perceptions from a young age. Another possibility would be to think about awarding scholarships exclusively to women in male-dominated sectors or even where they are in the majority at the lower levels as in the departments of biological sciences.

This kind of affirmative action is needed in strongly hierarchical societies and academic contexts such as Mozambique that are marked by extensive gender inequalities and asymmetries. Here there is a need for positive discrimination in the attribution of PhD scholarships preferentially to women to enable their academic career advancement. This is one of the feasible strategies for Mozambican universities in the short and medium term to overcome the inequalities in academic qualifications that I have identified in this thesis.

My results suggest that little or no attention has been given to the effects of the intersection of societal and institutional factors (obstacles) on women's careers. Despite the fact that departments of biological sciences have a strong female presence, there are very few women with doctorates in the position of assistant, associate and full professors. This demonstrates that women have progressed much more slowly than men in their careers. The universities I studied not only reproduced the gender inequalities instituted by wider society but also recreated them in a very particular way through their formal and informal gender cultures, practices and processes. The invisibility of concerns about gender and equity at the lower institutional levels (faculties, departments) at both universities showed that locally little has been done to change that situation, even considering the fact that the annual reports of one university suggested an overall increase in the number of women with PhDs, especially in arts and humanities.

Based on the findings of this thesis I suggest that Mozambican universities, as part of a framework of broader institutional changes, need to build an institutional gender awareness that helps them to systematically interrogate themselves not only about what has been done but above all what is not happening and still needs to be done toward gender equality, especially regarding women's academic careers. This constitutes a tangible need for higher education as a broader system but for HEIs in particular in the mid and long term.

At present people within academia continue to blame women for their lack of career advancement. Challenging the prevailing gender order is a necessary 'utopia' for Mozambican HEIs which can and should be fuelled by the various social movements existing inside and outside the universities, academic feminism and feminist activism, that already have a history in some public universities such as UEM. This could play a key role in this process by influencing the relevant policies and practices. This is a national imperative as stressed in the national gender policy documents.

Future directions for research and initiatives to promote gender equality

In this last section I begin to look forward and reflect on the potential research topics that can be developed based on my empirical findings, methodology and contributions to the field of gender studies in higher education, with Mozambique as a point of departure. I am aware of the multitude of potential themes and/or research topics that can emerge as follow up issues from my thesis but I have limited myself to just a few. For example, there is a need for research with an intersectional approach to understanding how political-party membership, race and ethnicity shape women's possibilities to progress in their academic careers, to be awarded research and training scholarship, and to occupy positions of power within public universities. I myself did not ask my participants to disclose their political party affiliation in order to understand how this shapes their career experiences in the university. Thus an empirical investigation dealing with the intersection between gender, political affiliation, age, ethnicity and academic degrees would be instrumental in our understanding of the subtle practices that create and reproduce inequalities in Mozambican academia.

Moving to methodological suggestions, systematic participant observation might be useful to capture the daily practices of academic managers in their planning and management practices and to understand how they mobilize the gender-related information contained in the over-arching institutional documents to conceive their annual plans.

In my research it became evident that women remain in the lower positions of biological research careers and struggle to access research funding. As some of my interviewees' accounts suggested certain people never fail when applying for research funding at the local (governmental) research funding agencies, indicating a kind of nepotism. Thus, research on gender bias in research funding allocation is necessary here. Coincidentally, the number of male applicants who have had their projects financed is five times greater than that of women. Even recognizing the fact that there are very few women with PhDs in science, it would be important to explore how gender bias and gendered practices for example among the committee members responsible for the assessment of the research proposals influence their assessment of the research proposals led by women as well as their chance of approval.

At the national level I suggest that we need to create an interdisciplinary field of research on gender in higher education with a focus on STEM that could support the country with structural policies to combat or overcome gender inequalities in this educational subsystem. This would be instrumental since gender and women's issues are not traditional concerns of Mozambican scholars within science disciplines but could become so through this measure. There is also a need for an updated and reliable statistical database

on gender inequalities in HE that Mozambique currently does not have, together with qualitative information. This would be crucial for designing public policies more in line with the socio-cultural and educational realities of the country. To do so I suggest research on gender in HE should be undertaken both with qualitative and quantitative approaches to support a national gender barometer in higher education in Mozambique, as a tool for the sectoral measurement of gender inequalities.

At institutional levels given the fact that most HEIs struggle with operationalizing gender issues at the faculty and departmental level, there is a need to establish a gender focal point model or gender units within each HEI. They should have a focal point on gender issues, a trained person with skills and competencies in gender issues, who can support their work with gender at different levels of their structures. As addressed in Chapter 3 this is not just to design institutional instruments that include gender issues. HEIs need to build capacity for implementing such instruments. Currently, Mozambique has a lack of internal experts and facilities for providing this support to its HE. Instead, such work is carried out with the help of international donors such as SIDA. This needs to be taken on internally in the country. Therefore there is also a need for a kind of panel of experts on gender issues to advise on government and HE policies on gender issues.

Most of my interviewees were former students at the universities they worked. Mozambican universities have worked in a very endogenous way through a traditional practice of selecting and hiring their 'best students' for their faculty body. The majority of these newly hired teachers have been men, especially in the faculties of science. One important issue that needs further research would be about gender bias in hiring processes and practices. This is needed to combat gender inequality in HEI.

Men still dominate the majority of positions of power in faculties of science, departments of biological sciences and in research as a whole. Considering the dearth of female role models even at departmental level, I suggest a study in STEM departments and/faculties about women's perceived quality of work environment, gender work relations (supervisors and supervisees, assistants and professors) and academic leadership styles, and how they affect the academic performances of women, their career satisfaction and prospects for advancement in academia.

Mozambican universities need a gender equality diagnostic of all HEIs, as a prior step to mainstreaming gender, in order to identify and eliminate those institutional processes and practices that maintain gender inequalities and are harmful to women's careers in academia. I am aware that this will not necessarily eradicate all inequality regimes but it may at least diminish the prevailing gender inequalities. Further, universities in their annual reports, need clearly to dedicate a specific heading to gender-related information to show what has been done/achieved or not regarding gender equality. Systematic

gender analyses are required, including proper accounting for associated actions and activities.

Patriarchal values and practices remain dominant both in the matrilineal north and the patriarchal south. Thus, with a sociocultural approach, it would be important to investigate the micro-cultures of gender (taking into account age, sex, academic degrees and ethnicity) among academic managers in the universities and how they shape the processes of the implementation of gender equality strategies across different academic disciplines and/or departments within the university.

Lastly but perhaps most importantly, there is a clear need to develop and adopt measures that enable women to begin to climb the academic career ladder, that is to enable them to get PhDs in the first place. Unless this is done, women will continue to occupy the lowest ranks of academe, and their talents will be wasted. This is a crucial part of the structural solutions/strategic interventions necessary to enable women's advancement in academe.

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Appendices

Appendix A. Participant information sheet

Hi!

My name is Juvêncio Nota and I am a PhD student at the Centre for Gender Research at Uppsala University-Sweden. As a part of my thesis I am conducting interviews on women's participation in biological research in the public universities of Mozambique. I am interested to explore your lived experience and practices in academia seeking to identify challenges and barriers both personal and institutional that affect the participation of women in biological research in your University. Therefore you are invited to take part in an interview because as a biologist, researcher, students, lecturer, director of faculty, head of department or person in a similar role is directly close to the research and management processes you have interesting things to say on this topic. All the information that you provide during the interview will be kept strictly confidential and anonymized, that is you will not be identified in any reports or publications. If you decide to take part please sign a consent form indicating your agreement to participate voluntarily in the research. You have the right to withdraw from the interviews at any time if you wish without giving a reason.

The entity principally responsible for the research and the data control is Uppsala University.

Please feel free to contact me or my supervisors, Professor Gabriele Griffin or Anita Hussenius, for more information.

Best wishes,

Juvêncio Nota

Contact information:

PhD student and interviewer: Juvêncio Nota. Cell: +258 820136590

Email: Juvencio_manuel.nota@gender.uu.se

Main person responsible for the project and supervisor: Gabriele Griffin. Professor at Centre for Gender Research, Uppsala University: gabriele.griffin@gender.uu.se

Anita Hussenius. Docent at Centre for Gender Research, Uppsala University: anita.hussenius@gender.uu.se

Appendix B. Consent form

CONSENT FORM

Title of Project: ***Women's Participation in Biological Research in Mozambican Public Universities***

Name of Researcher: Juvêncio Manuel Nota

Please initial all boxes

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my legal rights being affected.
3. I give permission for the researcher to record and store my interview for later reuse and publish data anonymized from this.
4. I agree to take part voluntarily in the above study.

☐☐☐☐

Signature

Place and date

Appendix C. Interview guide questions for academic managers

1. What is your current position within the University, how long have you been in that position?
2. Are gender issues part of your institutional commitment? Why?
3. Has your institution worked on gender issues? Are there any gender policy strategy, etc.?
4. How do you assess gender inequalities in the workplace, in your institution?
5. Has the University encouraged the participation of women in research programs/projects?
6. What are the institutional mechanisms for attracting, promoting and encouraging women's participation in science/ research?
7. What do you think about women's engagement, commitment toward research and scientific production in the faculty of science/Department of Biological sciences?
8. How does the recruitment and selection of researchers take into account the gender imbalances in science?
9. How does the university's research policy integrate gender issues?
10. What do you think of training members of the University committees in gender awareness?
11. Does your University provide any additional resources to women to help them develop their research career?

Appendix D. Interview guide questions for lecturers, senior researchers and team leaders

1. What is your current position within the University, how long have you been in that position?
2. What do you think about women's engagement, commitment toward research and scientific production in your department? Do you think they face any specific challenges/barrier?
3. How is the process of integration and training of junior female researchers into your group/department?
4. How female researchers have been attracted and encouraged to be engaged in the research?
5. What is the gender composition of your research group?
6. How do you feel about working with junior female researcher?
7. There is any female researcher who received research fellowships, mobility grants, distinctions or awards for the quality of their scientific work in your faculty/department?
8. How do you assess the process of academic mobility of female researchers in the department?
9. Which challenges and barriers do you think female researchers face in the faculty of science/Department of Biological Sciences?
10. If you were to give advice to a more junior female researchers who wanted to advance their career what would you say to them?
11. Do you know any story about sexual harassment in your workplace? If yes, could share them?

Appendix E. Interview guide for students and junior researchers

Motivation, researcher career paths

1. How did you decide to become a biologist or follow research career?
2. How do you feel about the work environment in your department/ research team? Does it stimulate your motivation and creativity? How?
3. Has gender affected your career progression in a positive or negative way? How?
4. What factors or people are most supportive in your overall career progression?
5. Have personal or domestic issues influenced your career decision? How?

Experiences, views, representations and practices in career management

6. What do you think about women's engagement, commitment toward research and scientific production in your department? Do you think they face any specific challenges/barrier?
7. How do you feel about working with senior male/female researchers and supervisors? How do they contribute or not to your self-confidence creativity and innovation in the research?
8. How does your career progression compare to people of the opposite gender? If there is a difference why do you think that might be?
9. What challenges you face to manage your researcher career with household work (family life)? How do you reconcile both?
10. Are there any institutional incentives you have received to be involved in research? Can you specify?
11. Do you feel that your research work within the University is valued and recognized? If yes, how? If not what might be the reason?
12. Are there any stories about sexual harassment in the workplace? If yes, could you share them?

Career satisfaction

13. When you look back over your career what do you see as the critical points?
14. Have you ever thought about quitting your research career? Why?
15. What would you advise for other women attempting to follow the same career as yours?

16. If you could turn back at the begging, would you pursue same career here? Why?
17. What you think about the University sensitivity/commitment on women/gender issues?

Expectation and career aspirations

18. What is your professional aspiration for in the future?
19. What factors do you think will affect your future success in this University?
20. What are you planning to do once completed your Master/PhD?
21. Would you like to follow a different career in the future? Why?

Appendix F. Socio-demographic data sheet for respondents

1. *University*: ☐ UEM ☐ UniLurio
2. *Gender* ☐ male ☐ female ☐ others
3. *Age*: ☐ ≤ 30 years ☐ 30-39 years ☐ 40-49 years ☐ ≥ 50 years
4. *Career/functional roles*: ☐ researcher ☐ lecturer ☐ academic managers
5. *Academic degree*: ☐ Licentiate ☐ Master ☐ PhD
6. *Career experience (years)*: _____.
7. *Working mode*: ☐ full time ☐ part-time
8. *Ethnicity*: _____.
9. *Religion*: ☐ Catholic ☐ Islamic ☐ Protestant ☐ Others
10. *Marital status*: ☐ Single ☐ Married ☐ Divorced ☐ Widowed
11. *Children*: ☐ yes ☐ no
12. *Category of biological research involved*: ☐ Basic¹⁸ ☐ Translational¹⁹ ☐ Applied²⁰

¹⁸ Investigation to gain knowledge and understanding of a particular subject, phenomenon or process without regard to practical application. Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view (Frascati Manual, 2015)

¹⁹ Or Experimental: is the scientific work required to develop a clinical or commercial application from a basic science discovery. Experimental development is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes (Frascati Manual, 2015).

²⁰ Is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective. It is carried out to create therapies or commercial/consumer products. (See Frascati Manual, 2015).

Appendix G. Categories and prerequisites for promotion and progression for a teaching career.

Academic ranks (teaching career)	Requirements for:	
	Promotion	Progression
Full Professor (PhD required)	<ul style="list-style-type: none"> a) Based on public exams about the competence of the individual by a committee of professors involving internal and external examiners. b) The candidate needs to be approved in a public defense exam with a minimum rating of good. c) At least five articles published in books or journals with peer review. d) Fully registered in the position of associate professor. e) To be approved in a public exam or curriculum evaluation according to the professional qualifiers of the teaching career with a minimum rating of good. f) Vacancy availability. 	Automatic, every three years of effective work at each level (1, 2, 3, 4) on the basis of individual research competence and teaching skills, on the basis of individual research competence and teaching skills irrespective of vacant positions. Good marks in the annual evaluation of academic performance in the last three years in the category and budgetary availability.
Associate Professor (PhD required)	<ul style="list-style-type: none"> a) Apply in public competition. b) At least 4 scientific articles published in books or journals with peer review. c) Fully registered in 	Automatic at the end of every three years of effective work at each level (1, 2, 3, 4) along with accumulative conditions: good marks in the evaluation of academic performance

	<p>the position of assistant professor.</p> <p>d) Approval of curriculum vitae of the applicant.</p>	<p>in the last three years in the category and budgetary availability.</p>
<p>Assistant Professor (PhD required)</p>	<p>a) Apply for position in open competition with other applicants (assistants).</p> <p>b) At least 3 years of professional experience in the category.</p> <p>c) At least 3 scientific articles published in books or journals with peer review in the assistantship position.</p> <p>d) Appraisal performance with a minimum of good in the last 2 years signed by the supervisor and/or head of the department.</p> <p>e) Fully registered in the position of assistant after completion of a PhD degree (for assistants without PhD).</p> <p>f) Approval in a public competition.</p> <p>g) Approval of the curriculum vitae evaluation with a minimum rating of good.</p>	<p>Automatic and the end of every three years of effective work at each level (1, 2, 3, 4) along with accumulative conditions: good marks in the evaluation of academic performance in the last three years in the category and budgetary availability.</p>
<p>Assistant (without PhD)</p>	<p>a) 2 years of effective work in the category of trainee assistant.</p> <p>b) Approval in the internal competition for trainee</p>	<p>Automatic at the end of every three years of effective work at each level (1, 2, 3, 4) together with the following conditions: good</p>

	<p>assistants with a good mark.</p> <p>c) Submission of the individual academic report signed by the supervisor of the internship or head of department.</p> <p>d) Vacancy availability.</p>	<p>marks in the annual evaluation of academic performance in the last three years in the category and budgetary availability.</p>
Trainee/ junior Assistant	<p>a) To become a trainee assistant one must hold a Licenciatura with a minimum grade of 14/20.</p> <p>b) Apply for position in public competition.</p> <p>c) 1 year of professional experience (academic experience is not mandatory).</p>	

Source: adapted from UniLurio (2011) and UEM (2014).

Appendix H. Categories and prerequisites for promotion and progression for research career.

Academic ranks (Research career)	Specific prerequisites for...	
	Promotion	Progression
Research coordinator (required a PhD)	<ul style="list-style-type: none"> a) Vacancy availability b) Apply for the position through public competition c) Need to be approved in a public exam/defense d) At least 10 articles published in book or journals with peer review e) Be employed in the position of principal investigator 	Automatic at the end of every three years of effective work at each level (1, 2, 3, 4) together with the following conditions: good marks in the annual evaluation of academic performance in the last three years in the category and budgetary availability.
Principal Investigator (required a PhD)	<ul style="list-style-type: none"> a) At least 8 articles published in books or journals with peer review in the position b) Fully registered in the position of adjunct principal investigator 	Automatic at the end of every three years of effective work at each level (1, 2, 3, 4) together with the following conditions: good marks in the annual evaluation of academic performance in the last three years in the category and budgetary availability.
Adjunct principal investigator (required a PhD)	<ul style="list-style-type: none"> a) At least 6 articles in books or journal with peer review published in the position of research assistant 	Automatic at the end of every three years of effective work at each level (1, 2, 3, 4) together with the following conditions: good marks in the annual evaluation

		of academic performance in the last three years in the category and budgetary availability.
Research assistant (without PhD)	<ul style="list-style-type: none"> a) At least 2 years of effective in the position of trainee Assistant, b) At least 2 articles published in books or journals with peer review, c) Submission of a detailed academic report indicating all the activities performed in the position of trainee assistant signed by the main supervisor of the internship or head of department. 	Automatic at the end of every three years of effective work at each level (1, 2, 3, 4) together with the following conditions: good marks in the annual evaluation of academic performance in the last three years in the category and budgetary availability.
Trainee researcher	<ul style="list-style-type: none"> a) To become a trainee Assistant one must hold a Licenciatura with a minimum grade of 14/20. b) Apply for the position via public competition, c) 1 year of professional experience (academic experience is not mandatory). 	

Source: adapted from Anon. (2006) and UEM (2014a)

Appendix I. Mini-biography of my participants²¹

Ana, over 50 years old and assistant professor with more than 30 years in her academic career. At the time of the interview she occupied one of the top rank managerial positions in one of the university. She is childless and not married.

Beatriz, at the time of the interview she had been a full-time assistant researcher for 10 years. She is aged between 30-39 years, holds a Master's degree and was involved in applied research. Beatriz is from the south (Bitonga ethnic group) and declared herself as not belonging to any of the three main religious groups in Mozambique (Protestant, Catholic and Islamic). She was married and a mother.

Bella, over 50 years old, was a full-time female teacher in one of the department of biological sciences. Bella was a married woman and had children. Bella has worked as teacher for more than 23 years and has a licentiate degree. She identify herself as a Catholic woman and belonging to the Changana ethnic group.

Carla, 30 years old, a female lecturer. She had a Master's degree and occupied an academic managerial position and member of the scientific committee. Carla has worked in the University for 6 years and was involved in biological applied research. She was a catholic, married and belonged to the Makua ethnic group. At the time of the interviews she had two children.

Carlota, aged 40-49, was an assistant professor, a PhD and occupied a position as academic manager within the department of biological sciences in one of the universities. Carlota identified herself as Catholic, married and mother. She belongs to the Ronga ethnic group from southern Mozambique.

Celeste, aged around 30, comes from the southern Mozambique and belongs to the Bitonga ethnic group. She was a separated woman, Catholic and a mother. Celeste has worked in the department of biological sciences as researcher for 5 years. She had a licentiate degree and had been involved in basic biological research.

²¹ For all respondents, the place and discipline in which they work was intentionally omitted to preserve their identity.

Cristina, a woman aged 40-49, was an assistant professor and researcher. Has a PhD degree and is an academic manager. Cristina has been involved in applied biological research. She has 13 years in academe and is one of the most experienced teachers within her department. She is single, with no children and Catholic.

Custódia, is a junior female researcher aged 30-39, has a Master's degree and at the time of the interview she was doctoral student. Custodia has been researcher for 8 years. She is mother, married, catholic and was involved in applied research.

Etelvina, a woman of about 30, is a young trainee assistant for three years. Holds a Master's degree and has been involved in applied research. She is a doctoral student, single and childless. Etelvina belongs to the Changana ethnic group and is a Protestant.

Florinda, a woman aged 30-39 and a full-time assistant researcher for 9 years. She has a licentiate degree and at the date of the interview was a student in a Master's program. Has been developing applied research. Florinda is married, already a mother and belongs to the Changana ethnic group and is also a Catholic person.

Joana, is a female researcher aged 30-39, has a Master's degree and 10 years of work experience in her career and has been involved in applied research. Joana, is a married woman, mother, protestant and is from southern Mozambique, belongs to Bitonga ethnic group.

Judite, over 50 years old, is a senior assistant professor and occupies a management position within the University where she has worked full-time for 35 years. Judite has been involved in applied research and held her PhD abroad. Belonging to the Bitonga ethnolinguistic group (from Inhambane-South of Mozambique), she is a married woman, mother and Muslim.

Juliana, under the age of 30, is a lecturer and researcher for 3 years. She holds a Master's degree and has conducted applied biological research. Juliana is a Shangana woman, Protestant, single and a mother.

Julieta, under 30 years old, is a young female teacher, researcher and academic manager. Has a Master's degree and has worked full-time at the university for 7 years. She is involved in basic biological research. Julieta is a single woman, has no children, belongs to the Lomué ethnic group (from central Mozambique) and is Catholic.

Jurema, a young woman aged 30-39 with a Master's degree, a researcher for 7 years. Jurema is also a doctoral student and has been carrying out basic and applied research. She describes herself as belonging to the *Chuabo* (an ethnic group from central Mozambique), has no religion, is single and has no children.

Laura, aged 30-39, is a full-time assistant researcher and has a Master's degree. She has worked for 10 years at the university and throughout her career has been involved in applied biological. She is a married woman, mother and Catholic.

Latifa, aged 40-49, works as a lecturer in the department and occupies a managerial role within the department. At the time of the interview she had a Master's degree and 12 years of work experience. Has been involved in basic biological research. She is married, mother, catholic and belonging to the Shangana ethnic group.

Lucilia, is over 50 years old works as a senior lecturer and assistant professor for 26 years. At the time of the interviews, she was taking over a position of academic manager. Lucilia has been involved in applied research. She is divorced, had children belongs to the Shangana ethnic and is a Catholic person.

Mara, 30 years old, is a young female lecturer and researcher for 6 years. She has a Master's degree and has been involved in applied research. She also has a functional role as an academic manager. From the province of Zambezia (central Mozambique) she is married and a mother, belongs to the Marendje ethnolinguistic group and a Catholic person.

Paula, is aged 30-39, she has worked as lecturer for 11 years. She has a Master's degree and has been developing applied biological research. At the time of the interview she was a student in a PhD program. Paula belongs to the *Shope* ethnic group (Southern Mozambique), she is a Protestant, married and a mother.

Rosa, aged 30-39, is an assistant lecturer with a Master's degree and 10 years of career experience working full-time. She has developed applied biological research. At the time of the interview, Rosa was also a doctoral student. Belonging to the Shangana ethnic group, she is Catholic, married and a mother.

Sergia, is a middle-aged (30-39), lecturer and academic with a Master's degree working full-time for 8 years. She has been involved in applied research. From the Makhua ethnic group, Sergia is a Protestant, mother and married woman.

Valentina, aged 30-39 is a PhD lecturer working at the university for 14 years where has been involved in applied biological research. She is married, a mother and Catholic. At the time of the interview, she was in an advanced stage of pregnancy.

Vera, is a young university teacher under the age of 30. She has a licentiate degree and early in her career of just two years. At the time of the interview Vera was a trainee assistant and student in Master's program, involved in basic research. She belongs to the Ronga ethnic group (from southern Mozambique), is a Catholic, married and a mother.

Alfredo, a male aged 30-39 years old, is an assistant in the department where he has worked for 4 years. He has a Master's degree and has been involved in basic biological research. Alfredo belongs to the Shangana ethnic group (from southern Mozambique) Alfredo is a Catholic and married man with seven children.

António, aged 30-39, is an assistant lecturer where he has worked full time for 5 years and also occupies a managerial position. Antonio has a Master's degree and is involved in applied biological research. He comes from a province in the Central Mozambique and belongs to the Ndau ethnic group. Antonio identified himself as Catholic, married and childless.

Baptista, is a male aged 40-49 works full-time in the department as an assistant researcher with a Master's degree for 25-years of work experience. He has been involved with applied biological research. Baptista belongs to the Shangana ethnic group, is a Catholic, married and a father.

Caetano, aged 30-39 years, is a Master's student, researcher for 5 years. He belongs to the Makhua ethnic group, is a single man with no children and catholic.

Filomeno, is a male lecturer aged 30-39 years with a Master's degree who has worked for 8 years in the university. He belongs to the Makhua ethnic group and is Catholic. Filomeno was a married man and had children. He has been involved in basic and applied research.

Francisco, aged 30-39 years works as lecturer for 8 years and has Master's degree. Francisco is single, with no children and is involved in basic research. He belongs to the Makonde ethnic group and is Catholic.

Jose, aged 30-39, is a young male lecturer and researcher and has been involved in basic research. Jose has been a lecturer for 4 years and has a licentiate degree. He comes from the Makonde ethnic group, is a Catholic, single and childless.

Joseph, aged 30-39, he is a researcher in one of the universities where has been developed biological applied research for the last 8 years and full time. He has a Master's degree and at the time of the interview was at the end of a doctoral program. Joseph belongs to the Ronga ethnic group, is Catholic, married and a father.

Josue, a male over 50 years old, is PhD and a senior lecturer as well as an academic manager. He belongs to the Shangana ethnic group, is married, a father and a Catholic.

Julio, aged over 50, is a senior and PhD lecturer. At the time of the interview was an academic manager. He has worked full-time for 23 years in the department and carrying out applied research. Julio is a single man, not affiliated with a religion and is a father.

Marcos, aged 40-49 is an assistant professor and academic manager. At the time of the interview, he occupied a top rank position in research management and academic manager. He is a Muslim belonging to the Makua ethnicity which is very matrilineal. He is married and a father.

Mateus, aged 30-39 years is a male trainee researcher with work experience of 6 years in the careers. He has a Licentiate's degree and at the time of the interviews was Master's. Mateus is single, belongs to the Shangana ethnic group and with no children.

Pedro, aged between 30-39 years, is an assistant and academic manager. He has a Master's degree and has been worked at the university for 5 years where she conducts applied biological research. Belonging to the Makua ethnic group, Pedro is a married man with children and Catholic.

Sergio, aged 30-39, works as assistant researcher for 3 years. He works full-time. He is, has a Master's degree and has been involved in applied biological research. Sergio is not a Mozambican citizen, he is married and Protestant.

Zacarias, aged 40-49 is an assistant with Master degree, researcher for 9 years. He belongs to Ronga ethnic group, is a married man and has children.

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1. Nicole Ovesen, *Intimate Partner Violence and Help-Seeking in Lesbian and Queer Relationships: Challenging Recognition*. 2021.
2. Juvêncio Manuel Nota, *Women and Biological Research Careers in Higher Education in Mozambique: A Case Study of Two Public Universities*. 2022.

