COVID-19 among migrants, refugees, and internally displaced persons: systematic review, meta-analysis and qualitative synthesis of the global empirical literature

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eClinicalMedicine
2024;74: 102698
Published Online 10 July 2024
https://doi.org/10.1016/j.eclinm.2024.102698

Summary

Background Evidence amounted early that migrants, who are often side-lined in pandemic response or preparedness plans, are disproportionately affected by the COVID-19 pandemic and its consequences. However, synthesised evidence that quantifies the magnitude of inequalities in infection risk, disease outcomes, consequences of pandemic measures or that explains the underlying mechanisms is lacking.

Methods We conducted a systematic review searching 25 databases and grey literature (12/2019 to 09/2023) and considered empirical articles covering migrants, refugees, asylum-seekers, and internally displaced persons reporting COVID-19 cases, hospitalisation, ICU admission, mortality, COVID-19 vaccination rates or health consequences of pandemic measures. Random-effects meta-analysis of observational studies and qualitative analysis were performed for evidence synthesis. A protocol was registered with PROSPERO (CRD42021296952).

Findings Out of 17,088 records, we included 370 reports in the review. For the quantitative studies (n = 65; mainly from high income countries), meta-analysis with over 53 million participants studied showed that, compared to non-migrants, migrants have an elevated risk of infection (RR = 1.84; 95%-CI: 1.44–2.35) but similar risk for hospitalisation (RR = 1.10; 0.91–1.33), while the probability of ICU admission was higher (RR = 1.23; 0.99–1.52). Among those hospitalised, migrants had a lower risk of mortality (RR = 0.56; 0.42–0.76), while their population-based mortality tended to be higher (RR = 1.46; 0.95–2.26). The qualitative synthesis (n = 75) highlighted the complex interplay of social and COVID-19-related factors at different levels. This involved increased exposure, risk, and impact of pandemic measures that compromised the health of migrants.

Interpretation Even in the advanced stages of the pandemic, migrants faced higher infection risks and disproportionately suffered from the consequences of COVID-19 disease, including deaths. Population-level interventions in future health emergencies must better consider socio-economic, structural and community-level exposures to mitigate risks among migrants. Enhancing health information systems is crucial, as the lack of migration variables makes it difficult to close coverage gaps, leaving migrants largely 'invisible' in official data.

Funding None.

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Keywords: COVID-19; Refugees; Asylum seekers; IDP; Migration; Health inequality; Meta-analysis; Quantitative synthesis

Research in context

Evidence before this study

Existing reviews on inequalities in COVID-19-related health risks during the early phase of the pandemic found that migrants were disproportionally affected, but the *magnitude* of inequalities between migrants and non-migrants in multiple key outcomes has not been quantified. Reviews covering studies until October 2021 focused on individual health effects, e.g., mental health, risk of infection, or severity of COVID-19 disease among migrants, and were limited in their geographic scope (e.g., focus on single countries, or high-income countries), the outcomes considered, or covered only single or specific migrant groups.

Added value of this study

We mapped the *global* empirical literature and synthesised the available *qualitative* and *quantitative* literature (published in English, German, and Spanish) on multiple COVID-19-related outcomes among diverse categories of migrants, as well as the impacts of the COVID-19 pandemic on migrant populations by September 2023, covering over 53 million participants. Our results showed higher infection risk among migrants compared to non-migrants, and hinted at different patterns by geographical or contextual exposures. Contrary to previous (narrative) systematic reviews, we found no evidence for increased hospitalisation risk in migrants (living in high-income countries) compared to non-migrants among COVID-19-cases, but higher risk for ICU admission and death as far as population-level estimates are considered. Findings from the qualitative synthesis uncover not only the ways in which interrelated social risks and inequalities engender severe and unique impacts on migrants; they also pinpoint potential sources of resilience at individual, community and societal level.

Implications of all the available evidence

Migrants were at higher risk of SARS-CoV-2 infection throughout the pandemic compared to non-migrants, and seemed to have more severe courses of disease requiring ICU admission. Hospital-based mortality was lower, while population-based mortality tended to be higher in migrants than non-migrants, indicating that the venue for reducing such inequalities is through population-level rather than clinical interventions. To better prepare for future health emergencies and avoid future pandemic measures from unfolding (unintended) negative consequences for migrants, it is urgently required to improve health information systems, ensure the inclusion of migrant populations in national pandemic response plans, and align these with social and health equity policies.

Introduction

Global health emergencies like the COVID-19 pandemic occur unpredictably, and effective responses require well elaborated and actionable preparedness strategies in line with the International Health Regulations.[1] National pandemic preparedness and response plans are part of such strategies and are supported by the WHO, e.g., through a strategic plan published on February 4, 2020, with subsequent ongoing elaboration.[2,3] However, migrants have been side-lined in such plans, prompting a call for urgent global action to consider migrants in pandemic responses from the Lancet Migration early in the pandemic (April 10, 2020).[4]

Evidence from the early phase of the pandemic (i.e., year 2020) suggests that migrants were disproportionally affected by the COVID-19 pandemic at all levels. Reviews of the early literature found an increased risk of SARS-CoV-2 infection in migrant populations and elevated all-cause mortality compared to non-migrants.[5,6] However, most reviews restricted their focus to high-income countries (HIC); little is known about low- and middle-income countries (LIC/MIC). Migrants living in crowded housing conditions, but also undocumented migrants and migrant healthcare workers, were found to be at higher infection risk.[5,6] A study examining outbreaks in German accommodation centres for asylum seekers and refugees found a significantly higher attack rate if indiscriminate mass-quarantine was applied to all camp inhabitants compared with targeted contact tracing.[7] Several studies identified risk factors such as precarious working conditions, crowded housing, language barriers, or legal barriers to healthcare among migrants as well as negative effects of pandemic control measures on mental health.[5,6,8–10]

Despite these early efforts to compile evidence on differential risks and exposures between migrant and non-migrant populations, there is a lack of synthesised evidence quantifying the *magnitude* of inequalities in infection risk, consequences of disease, or vaccination rates. Furthermore, there is still a dearth of consolidated knowledge on the impact of pandemic response strategies on migrant health beyond studies published at the onset of the pandemic.

We conducted a systematic review covering the literature from 12/2019 to 09/2023 to map the global landscape of the empirical literature and synthesise the evidence in this field. We investigated the risk of SARS-CoV-2 infections and the consequences of disease (measured by hospitalisation, intensive care unit (ICU) admission, and mortality rates) among migrants, including asylum seekers, refugees, and internally displaced persons (IDP) compared to non-migrants; vaccination coverage among migrants and non-migrants; and the impact of lockdown and pandemic control measures on migrant health.

Methods

Search strategy and selection criteria

We conducted a systematic literature review in line with the Preferred Reporting for Systematic Reviews and Meta-Analyses (PRISMA) guideline. Studies were eligible for inclusion if (first generation) migrants, IDP, refugees, or asylum seekers were studied (following definitions of the International Organisation for Migration (IOM)[11] and the United Nations High Commissioner (UNHCR)[12]); health effects of COVID-19 (cases, hospitalisation, ICU admission, mortality, vaccination) or corresponding policy measures among refugees and migrants were assessed; and if written in English, German, or Spanish. We performed the search in the Cochrane Library and the WHO Covid-19 Research Database (representing a comprehensive source of 24 bibliographic databases), thereby updating and complementing the search of a previously published review now covering all studies from 12/2019 to 09/2023.[6] All study designs were considered except case series, theoretical research papers, and policy analyses without empirical data. We included peer-reviewed articles and official reports from the IOM and European Public Health Association websites, as well as studies from previous reviews known to the authors. For systematic reviews, only the primary studies were considered. The inclusion and exclusion criteria are listed in Supplementary Table S1. The review protocol was registered with PROSPERO (CRD42021296952).

Search terms were developed, refined, and validated among the review team, and databases searched by experienced reviewers (SR, MH) of the Rapid Response Review Unit (RRRUN) (as of 09/2023) (Supplementary Tables S2 and S3).[13] Website searches were performed by three reviewers (JL, SA, JO) (as of 11/2021). Identified records were uploaded to a management tool for systematic reviews (Covidence), where two reviewers each screened titles and abstracts independently. The same applied to full-texts. Discrepancies were resolved by a third reviewer (KB) and decisions were consented in constant discussion among the review team.

The volume of included articles required adjustments to the protocol regarding data extraction and quality assessment. Data extraction was done individually and cross-checked by MH. The following items were extracted: Generic bibliographic information (author, title, year published, journal); study objectives, hypothesis, and research questions; study characteristics (research method, sample size, geography); population and context characteristics; findings (e.g., main outcomes in quantitative studies, major themes/minor themes in qualitative studies) and conclusions as reported. For the quantitative synthesis, we added the crude numbers of COVID-19 cases (identified using different methods e.g., PCR-test, seroprevalence, self-reported), hospitalised cases, ICU admissions, and deaths among migrants and non-migrants (i.e., resident population of the countries underlying the studies).

The Joanna Briggs Institute's (JBI) critical appraisal tools were used for the quality assessment, which was performed by pairs of two reviewers independently.[14] Articles were rated using the respective checklist based on their study design. A quality score (range 0–100%, from lowest to highest quality) was constructed based on the answers of applied checklists (questions indicated as "not applicable" were not counted into the overall quality score in order to avoid artificial downrating of studies). For each study, the scores obtained from two independent ratings were averaged, and studies were grouped based on their scores and classified as high (100-75% of possible score), moderate (74-50%) and low (<50%) quality studies (Supplementary Table S4). Rating discrepancies in case of considerably different scores were resolved by discussion among the team. The quality of modelling studies was assessed using an adapted instrument derived from existing tools as used in previous reviews.[6,15–18]

Evidence synthesis

We *descriptively* synthesised and mapped all included studies (Panel 1) and performed *analytical* synthesis of selected qualitative and quantitative studies. For the quantitative synthesis, we included only moderate- or high-quality articles that reported on COVID-19 cases, hospitalisations, ICU admissions, and mortality among migrant *and* non-migrant populations, in order to draw reliable conclusions from the literature. We checked all quantitative reports for their eligibility. Low quality articles, those reporting outcomes among migrants *without* comparison groups or stratified results for migrants or without denominators were excluded from the quantitative synthesis. Studies reporting on vaccination coverage could only be synthesised narratively, as less than five studies provided data that qualified for meta-analysis.

We performed meta-analyses for the binary outcomes (COVID-19 cases, hospitalisation, ICU admission, and mortality) using the effect sizes relative risk (RR) and risk difference (RD), which allow estimation and interpretation of pooled proportional and absolute risk, respectively, associated with migratory status compared to non-migrants. Given that the denominators for mortality differed (i.e., deaths based on hospitalised cases or population-based mortality), we performed separate analyses. As we assume that studies are likely to have functional differences and that the true effect size θ varies

Panel 1: Overview of identified global empirical literature on COVID-19-related health outcomes and effects of pandemic control measures (e.g., lockdown) among migrants (12/2019–09/2023), N = 370 studies.

Study designs

Out of 370 included studies, 256 (69.2%) had a quantitative design, e.g., (repeated) cross-sectional, (retrospective, prospective) cohort, or case–control design, 18 (4.9%) were modelling studies. 76 studies (20.5%) were qualitative research, and 20 (5.4%) studies had a mixed method design.

Geographic scope

Most studies (72.9%) were conducted in high-income countries (n = 270), 51 studies (13.7%) took place in (upper) middle-income countries, 45 (12.1%) in lower middle-income countries, and only ten studies (2.7%) were conducted in low-income countries. Some studies did not report a specific country context (e.g., modelling studies) or comprised multiple countries.

Migrant groups

The migrant groups studied varied widely. Study populations consisted mainly of *a)* international migrants (n = 208; 56.2% of studies) as defined by (a combination of) various indicators such as region of origin, country of birth, nationality, language-proficiency, or migrants/immigrants without further specification; *b)* international migrants with a specific legal status that was reported, including international students (n = 10; 2.7%), refugees (n = 56; 15.1%), asylum seekers (n = 23; 6.2%), labour migrants (n = 58; 15.7%), undocumented migrants (n = 17; 4.6%), Immigration and Customs Enforcement (ICE) detainees (n = 6; 1.6%); *c)* IDP (n = 10; 2.7%); *d)* internal migrants (mainly in India and China) (n = 14; 3.8%); *e)* returnees (n = 8; 2.2%); and *f)* ecological (net) migration flows (n = 25; 6.8%).

Health outcomes

54 (14.6%) studies investigated infection risk, 29 (7.8%) transmission risk, 127 (34.3%) health outcomes of disease (i.e., COVID-19 cases, hospitalisation, ICU admission, mortality, or pneumonia), 22 (5.9%) health services access, 68 (18.4%) mental health (e.g., depression, anxiety, trauma or stress), 110 (29.7%) looked at the effects of pandemic control measures (e.g., lockdown, mask wearing, etc.), and only 30 (8.1%) studies addressed vaccination.

Note: Numbers do not add up to 100% in the sections geographic scope, migrant groups and health outcomes as some studies covered multiple categories.

Supplementary Tables S6a and 6b, p.39ff. for study characteristics of all included studies.

between studies, we fitted random-effects models using inverse variance weighting.[19] We carefully assessed the heterogeneity between studies, used sensitivity analyses to check for robustness of models, and performed explorative subgroup analyses.

The measure of between-study heterogeneity τ^2 estimates the variations in the true effect size θ. It was calculated using the restricted maximum likelihood (REML) method and the Q-Profile method to compute corresponding 95% confidence intervals (95%-CI).[19,20] The measure I^2 was not suitable for assessing heterogeneity, as it tends toward 100% when studies have large sample sizes, which is the case for many of the included studies. The measure τ^2, however, is insensitive to the precision of the included studies. Based on τ^2, we calculated a prediction interval (PI) that allows to quantify the range into which a future study might fall based on the evidence considered. The PI provides a meaningful interpretation of τ^2.[18] To calculate the 95%-CI for both the pooled estimate $\hat{\theta}$ and PI, we used the modified Hartung-Knapp (HK) method with ad hoc variance correction given that $SE_{HK} < SE_{SL}$ (i.e., standard error of HK model compared to classical DerSimonian-Laird model).[20] In addition, we performed subgroup analyses for study regions and indicators of migratory status where appropriate, to identify possible explanations for heterogeneity. We used sensitivity analysis to carefully check the robustness of the models for each outcome and effect size and, as a result, excluded studies from the meta-analysis. Therefore, we calculated influence diagnostics to detect extremely influential studies that have a high impact on $\hat{\theta}$ and τ^2. We excluded studies based on extreme or implausible values of standardised residuals, Cook's distance, hat value, and leave-one-out cross-validation (LOO-CV) to measure direct impact on τ^2 and $\hat{\theta}$.[21] We performed further sensitivity analyses to assess the impact on our estimates of duplicate data sources underlying the different primary studies. Supplement Chapter 6 provides more information on the sensitivity analysis. The results of the meta-analyses are presented in forest plots as well as in drapery plots (Supplementary Figs. S3, S7, S11, S15, and S19).[22] Analysis and visualisations were performed using R 4.2.0 statistical programming language. Meta-analyses and sensitivity analyses were performed using the *meta* and *dmetar* packages.[21,23]

For the qualitative synthesis, we included all studies that conducted qualitative research (i.e., purely qualitative studies or mixed-method studies reporting qualitative results) and rated moderate- to high-quality. A coding scheme was developed following the model of Diderichsen et al.;[21] and the extracted data was coded using ATLAS.ti 8 software. The development of the coding scheme involved both inductive and deductive coding strategies. During the first round, codes were developed inductively from the data. They were then compared and integrated with the existing model, which describes COVID-19-related inequalities for migrants in three categories: *exposure, risk*, and *impact*. Through iterative meetings (first within the qualitative analysis-team (NG, MB, SA, JL), then the entire review-team), we elaborated the original model as follows: 1) through inductive coding, we added further codes to the categories; 2) the original model was linear (from exposure to risk to impact), while our data showed many interrelations and feedback loops within and among the categories; 3) within each category, we distinguished between factors on the micro-, meso- and macro-level; 4) we added the category "*sources of resilience*", which interacts with the other three categories.

Role of the funding source

There was no funding source for this study.

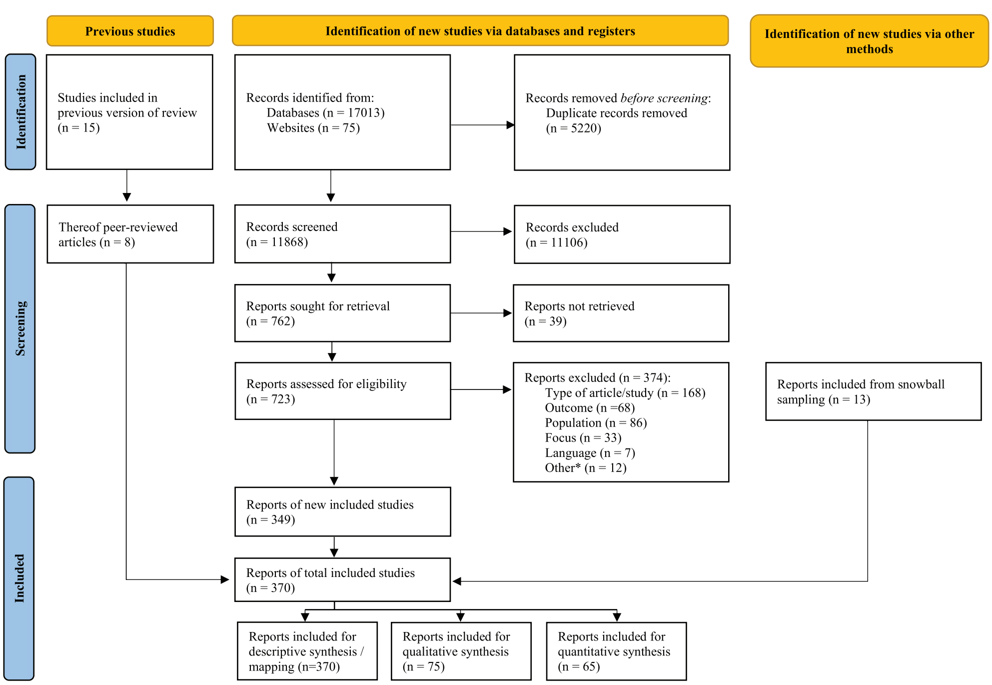
Results

The search yielded 17,013 records from databases and 75 from websites. After the removal of 5220 duplicates, 11,868 records were screened based on their title and abstract; 762 reports were sought for retrieval, and 723 assessed for their eligibility whereof 374 did not meet the criteria (Supplementary Table S5). Another 21 reports were included based on previous reviews (n = 8) or snowball sampling (i.e., primary studies from reviews) (n = 13) (Fig. 1). A total of 370 reports were included (Panel 1). Of these, 75 qualified for qualitative synthesis (Table 1) and 65 for meta-analysis (Table 2).

Based on the sensitivity analysis, some studies were not eligible for the quantitative synthesis and therefore excluded from the meta-analysis (Supplement Chapter 6.1). Among the 34 studies reporting on COVID-19 cases,[23–56] 25 were eligible for quantitative synthesis.[23,25–28,30,31,33,35–40,42–45,47,49–51,54–56]

Sample sizes comprised over 53 million participants studied (migrant and non-migrant groups) for COVID-19 cases, 903,797 for hospitalisation, 138,442 for ICU admission, and 738,247 for mortality.

The *risk of infection* among migrants was 1.84 (95%-CI: 1.44–2.35) times the risk of non-migrants, with a RD of 0.05 (95%-CI: 0.03–0.07) (Fig. 2a). Drapery plots confirm that RR and RD also apply with 99%-CI (Supplementary Fig. S3). Inequalities in infection risk between migrants and non-migrants living in North America (RR = 2.72; 95%-CI: 1.62–4.56) or Northern Europe (RR = 2.00; 95%-CI: 1.42–2.83) seemed to be larger than inequalities observed in Southern Europe (RR = 1.53; 95%-CI: 1.10–2.13), whereby the actual RD compared to non-migrants was 0.10 (95%-CI: 0.05–0.15) in North America and 0.05 and 0.02 (95%-CI: 0.02–0.08; −0.01–0.05) in Northern and Southern European countries, respectively (Fig. 2b).



*: Other reasons for exclusion include unspecific pandemic measures (e.g. "the pandemic"), knowledge-attitude- and practice (KAP) studies, and retracted studies (n=1)

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

Fig. 1: **PRISMA flow-chart.**

Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
Ag Ahmed et al., 2021	Mali	UMIC	November–December 2020	IDPs	Differential exposure—housing, Differential exposure—conditions in camp-like settings, Differential impact on children—compromised education, Source of resilience—mutual support, Source of resilience—being home/with family, Differential exposure—social norms, Differential exposure—no work security/safety net, Differential impact—economic stressors, Source of resilience—state assistance (in/accessible)	Qualitative research	The main challenges identified concerning the implementation and adoption of physical distancing measures include the proximity in which IDPs live, their beliefs and values, the lack of toilets and safe water on sites, IDPs habits and economic situation, humanitarian actors' lack of financial resources and authority, and social pressure from religious leaders.	The study demonstrates the difficulty for IDPs to follow most of the physical distancing measures and informs about the risk of disease spreading among IDPs with its potential consequences. It also shows the inability of mitigation measures to control the outbreak and suggests actions to be considered.	high
Arora et al., 2022	Norway	HIC	Not reported	International migrants	Differential impact—"living the pandemic twice", Differential impact—economic stressors, Differential impact—impact on "migration project", Differential impact—social roles, family dynamics, Source of resilience—trust, Differential risk—lack of health information, Differential impact—discrimination, Source of resilience—communication with peers and family, social media, Source of resilience—religion	Qualitative research	Our analysis showed that participants perceived the circumstances induced by the pandemic to be difficult and voiced the challenges experienced. Their experiences encompassed social, economic, and the public sphere, where immigrants felt themselves to be in more vulnerable positions than before the pandemic. Our analysis identified four main themes: 1) Feeling stagnated, 2) Perceptions towards government and health authorities, 3) Boundaries of us vs them, and 4) Coping.	We conclude our paper by stating that government and health authorities should consider both short-term and long-term consequence of the pandemic to mitigate impact on communities at risk.	high
Udaya Bahadur et al., 2021	Nepal	LMIC	April 2020–May 2020	Internal and International migrants	Differential impact—discrimination; Differential impact—economic stressors; Differential impact—increased barriers to healthcare; Differential impact—mental health effects of combined stressors	Mixed-Methods: Cross-Sectional Study; Qualitative Research	Mild depression (9.1%; 40/441) and anxiety (16.1%; 71/441) was common among respondents followed by moderate depression and anxiety (…) and severe depression and anxiety (…). Anxiety and depression were independent of their socio-demographic characteristics. Perceived fear of contracting COVID-19, severity and death were prominent among the respondents. Respondents experienced stigma and discrimination in addition to being at the risk of disease and possible loss of employment and financial responsibilities. In addition, poor (quality and access to) health services, and poor living condition at the quarantine centres adversely affected respondents' mental health.	Depression and anxiety were high among quarantined population and warrants more research. Institutional quarantine centres of Karnali province of Nepal were in poor conditions which adversely impacted mental health of the respondents. Poor resource allocation for health, hygiene and living conditions can be counter-productive to the population quarantined.	high

(Table 1 continues on next page)

Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
(Continued from previous page)									
Babuc 2021	Turkey	UMIC	July 2020	Refugees	Differential impact—economic stressors; Differential impact—social roles, family dynamics; Differential impact—economic/survival strategies; Source of resilience—mutual support; Differential impact on children—compromised education	Qualitative research	According to the findings of the study, the suspension or slowdown of economic activities due to the pandemic has caused not only an uncertainty about the future, but also a change in familial positions and roles. Also the accepted norms of social relations have been inevitably suspended resulting in increased ambiguity. Strengthening the network of solidarity within relatives and building stronger relationships within the family are common relational strategies of the participants to mitigate the social and economic impacts of the COVID-19 outbreak (…).	Considering the fact that the lockdown measures can be tightened again at any time with respect to the increase in the spread of the disease, social and economic policies should be expanded to include the Syrian migrants. Also, educational policies during the COVID-19 pandemic should include specific measures such as technological support and guidance to mitigate the risks and disadvantages that Syrian children experience in terms of distance learning.	medium
Bauza et al., 2021	India	LMIC	May 2020–July 2020	Returnees	Differential impact—economic stressors; Differential impact—impact on migration trajectories; Differential impact—discrimination	Mixed-Methods: Cross-Sectional Study; Qualitative Research	Although the research revealed high compliance with preventative measures, the pandemic and associated lockdowns also led to many challenges and hardships faced in daily life particularly around job loss, economic security, food security, and emotional wellbeing.	The results underscore the vulnerability of marginalized populations to the pandemic and the need for measures that increase resilience to large-scale shocks. (…) In particular, there is a need for greater government response to limit harm to livelihood and mental, social, and nutritional health during any lockdown periods required to reduce disease spread.	high
Biddle et al., 2021	Germany	HIC	May 2020–July 2020	Asylum Seekers and Refugees	Differential exposure—conditions in camp-like settings; Differential impact on camp residents/domestic workers—severe measures/restrictions; Source of resilience—improved intersectoral collaboration/digitalization	Qualitative research	We found substantial heterogeneity of measures taken to prevent infection, inform refugees, maintain social and health services, test for SARS-CoV-2 and quarantine positive cases. Effective inter-sectoral cooperation proved to be particularly important for coordination and implementation of measures. Need for support was expressed with regard to the improvement of infrastructure, opportunities to work with language interpreters and stronger involvement of local health experts.	Amidst multiple actors and the complexity of structures and processes, the admission authorities have been taking on essential responsibilities related to infection control on an ad hoc basis, without being sufficiently positioned to do so. In order to further contain the pandemic, a strengthening of centralised, setting-specific recommendations and information as well as their translation through the pro-active involvement of the public health authorities at the local level are essential.	medium

(Table 1 continues on next page)

Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
(Continued from previous page)									
Bojorquez et al., 2021	Mexico	UMIC	April 2020–May 2020	International migrants	Differential impact—re-traumatization/mental health effect of lockdown; Differential impact—increasing barriers to healthcare	Qualitative research	In addition to fear of contagion and economic insecurity, migrants experienced emotional distress associated with hardening migration policies, and the difficulties of having to find shelter in place in non-private spaces. Some CSOs continued or adapted previous psychosocial support activities, helping migrants navigate these issues, but other activities stopped amidst physical distancing measures and because of limited resources. Migrants themselves implemented some group activities. There was a surge of civil society initiatives of online support, but some shelters leaked the techno-logical and other resources to benefit from them.	To conclude, our results suggest that, as other authors anticipated, the COVID-19 pandemic and lockdown measures have important mental health consequences for migrants. (...) As recommended by international organizations, instead of being limited to clinical interventions, this response should prioritize the psychosocial aspects that are the root of mental health problems in these types of populations, covering basic needs such as decent work, appropriate places to live, and access to education and health services.	high
Burton-Jeangros et al., 2020	Switzerland	HIC	April 20, 2020–May 10, 2020	Undocumented migrants	Differential exposure—no work security/safety net, Differential impact—economic stressors (loss of job/income, food/housing insecurity, debt), Differential impact—legal insecurity, Source of resilience—state assistance (in/accessible), Differential impact—increased barriers to social and legal services, Source of resilience—mutual support, Differential risk—lack of health insurance/healthcare access, Source of resilience—legal status	Mixed-methods: Cohort study; qualitative research	Migrants faced cumulative and rapidly progressive difficulties in essential life domains. As a consequence, they showed high prevalence of exposure to COVID-19, poor mental health along with frequent avoidance of health care. Moreover, the loss of working hours and the related income overlapped with frequent food and housing insecurity … Despite these unmet needs, half of the participants had not sought external assistance for reasons that differ by legal status. Both groups felt that seeking assistance might represent a threat for the renewal or a future application for a residency permit.	The cumulated difficulties faced by migrants in this period of crisis and their limited search for assistance highlight the need to implement trust-building strategies to bridge the access gap to sources of support along with policies protecting them against the rapid loss of income, the risk of losing their residency permit and the exposure to multi-fold insecurities.	medium
Cano Collado et al., 2021	Mexico	UMIC	December 2020	International migrants	Differential impact—impact on “migration project”, Differential impact—economic stressors, Differential impact—mental health effects of combined stressors	Qualitative research	Some factors impact the mental health of migrants in the place of origin and during transit (forced migration, persecution, and the lack of possibilities to achieve a decent standard of living …). Moreover, positive, and negative manifestations were reported in the dimensions of mental health, because of the migratory process and COVID-19.	Migration has become an option for survival and well-being given the limited opportunities that exist in the regions of origin. Efforts must be made to develop migration and health policies that benefit this group. Unfortunately, some limitations of data collection emerged due to Covid 19. Finally, it is suggested to replicate the study among other areas of the southern border of Mexico with a high flow of migrants.	medium

(Table 1 continues on next page)

Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
(Continued from previous page)									
Ceccon & Moscardino 2022	Italy	HIC	June–August 2020	Asylum seekers	Differential impact—"living the pandemic twice", Source of resilience—state assistance (in/accessible), Differential impact—impact on "migration project", Source of resilience—health information, self-efficacy, Source of resilience—framing, Differential impact—mental health impact of combined stressors	Mixed-methods: survey with closed and open ended questions	[M]ost participants were correctly informed about the nature, origin, and spread of COVID-19, expressed moderate or high satisfaction concerning the clarity of communication about safety measures, and followed them most of the time. Worries about family in the home country, loneliness, fear for own and loved ones' health, and concerns about delays in the asylum application were the most frequently mentioned stressful events. Psychological and physical distress significantly increased, and positive future orientation significantly decreased during the lockdown. However, participants also emphasized the usefulness of instrumental support from social workers and exhibited a resilient attitude characterized by the acceptance of uncertainty, sense of connectedness, and positive outlook.	Even though we found preliminary evidence for detrimental effects on mental health in line with prior research, our results also revealed important sources of resilience, including social support, sense of purpose, and focus on future goals, which are key assets that may protect potentially vulnerable individuals from adverse outcomes.	high
Chakraborty et al., 2022	India	LMIC	May 2020–June 2021	Migrant workers	Differential impact—economic stressors, Differential impact—impact on migration trajectories (e.g., return migration), Differential exposure—housing, Differential exposure—no work security/safety net, Source of resilience—state assistance (in/accessible)	Mixed methods: Qualitative research; Cross-Sectional study	The pandemic and successive rounds of lockdown in destination and home states have unsettled the lives and magnifed several pre-existing problems faced by the migrant communities. Not only their income has fallen, getting job and movement between destination state and West Bengal has become uncertain. With the exception of rag pickers in Bengaluru, majority of the migrant workers returned to their villages.	The social protection measures in place were focused more towards the rural population, leaving a much larger gap in covering the urban poor and migrant labour. This crisis, therefore, should be taken into consideration and more migration-inclusive social protection policy encompassing public employment programmes, food, health and cash transfer is needed.	medium

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Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
(Continued from previous page)									
Chattoraj 2022	Singapore	HIC	April 2020–December 2021	Migrant workers	Differential impact on camp residents/domestic workers—severe measures/restrictions, Differential impact—mental health effect of combined stressors, Differential impact—"living the pandemic twice", Source of resilience—state assistance (in/accessible), Source of resilience—communication with peers and family, social media	Qualitative research	The data demonstrate the shared hardships of commonality they accepted during COVID-19. Apart from their families, they face a life of uncertainty and anguish in the dorms, stating that commonality is felt and embodied individually while collectively negotiated and enacted. Despite the fact that their lives are filled with uncertainty and worry, they are happy and comfortable in Singapore because of how the government has taken care of them during times of crisis.	This study showed that Bangladeshi MWs in Singapore shared a wide range of common experiences, collective constellations and aspirations regarding migration to Singapore, living and working in the city-state. They have experienced inequities from the locals with regard to medical assistance and living in dire conditions in the dormitories. Also, the MWs remained completely isolated from the rest of the residents ... Since March 2022, as more than 90% of the workers are already vaccinated, they can enjoy spending time with their friends and relatives outside the dorms (MOM 2022). Therefore, the creation of a sense of commonality and collective constellation was evident from the narratives of the respondents ... The way Singapore treated them during the COVID-19 made them even more reliant upon the city-state. As long as Singapore functions effectively and efficiently, MWs will continue to respect its good governance.	medium

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(Continued from previous page)									
Cleaveland et al., 2023	USA	HIC	June 2021–September 2022	Undocumented (Latinx) migrants	Differential exposure—no work security/safety net, Differential impact—economic stressors (loss of job/income, food/housing insecurity, debt), Differential impact—economic/survival strategies, Source of resilience—state assistance (in/accessible), Differential impact—increased barriers to healthcare, Differential risk—lack of health insurance/healthcare access, Source of resilience—mutual support	Qualitative research	[T]he pandemic created financial precarity through prolonged periods of unemployment and food insecurity. Workers described worry over unpaid bills, and potentially catastrophic episodes in which they treated severe COVID-19 with home remedies. Long spells of unemployment, food insecurity, inability to pay bills and lack of access to healthcare emerged because of socio-political contexts including the nature of low-wage labour and lack of a safety net.	ULI workers suffered disadvantages in multiple domains during the pandemic, including unemployment, food insecurity, lost work hours, and an inability to afford healthcare, even when seriously ill with COVID-19. These disadvantages arose despite living in a relatively affluent county. The U.S. failed this population by sustaining immigration policies that ensure social exclusion and lack of access to even basic resources such as health care and food, while at the same time, relying on ULI to perform valued work in the secondary economy. The inequities described here include a reticence to seek badly needed health care and food insecurity. These issues could be remedied through a reconsideration of policies governing immigration and wealth distribution.	high
Da Mosto et al., 2021	Italy	HIC	April 2020–September 2020	Asylum Seekers and Refugees	Differential impact on camp residents/domestic workers—severe measures/restrictions; Differential exposure—conditions in camp-like settings; Differential exposure—high-risk jobs; Differential impact—discrimination; Differential impact—legal insecurity; Differential impact—increased barriers to healthcare; Differential impact—economic survival/strategies	Qualitative research	Even though various measures were implemented in reception centres (i.e., mass quarantine, supply of personal protective equipment, risk communication campaigns and specific governance tools) they often had a discriminatory approach towards migrants and only considered the biomedical aspects of COVID-19, excluding its social roots and repercussions. This factor, together with the lack of an effective governance system at both the local and the national level, was the most relevant issue associated with the management of the syndemic in reception facilities and affected all the social determinants that shape the health profile of RAS.	The study revealed the importance of social factors in the management of the syndemic in reception centres. It also highlighted how the underlying causes of the impact of COVID-19 are tightly correlated to the political and social approaches of local and national institutions to migration. In order to guarantee the well-being of society as a whole and successfully control the epidemic, it is necessary to consider migration as a human reality rather than an emergency, and demolish all the policies and bureaucratic systems that act as structural violence on RAS. (...) This way it will be possible to develop more inclusive approaches to public health and guarantee the conditions for RAS' empowerment.	medium

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(Continued from previous page)									
de Diego-Cordero et al., 2021	Spain	HIC	April 2019–September 2020	Migrant workers	Differential impact on camp residents/domestic workers—severe measures/restrictions; Source of resilience—work security, decent labour; Differential impact on women—increased care workload; Differential impact—mental health effects of combined stressors; Differential impact—"living the pandemic twice"; Source of resilience—communication with peers and family, social media	Qualitative research	The results show the moral debt accrued by the caregivers with the family who employ them, while worsening the physical and psychological health of many of the care-givers, due to both work overload and fear of the global pandemic.	The emotional debt and the relationship as 'quasi-family members' have contributed to increasing the work overload, since as well as the usual care, they have been responsible for all the domestic work, resulting in a non-stop working day during the lockdown, without any personal free time and being separated from the social group of their friends who live in Spain. On the contrary, the security they have felt in the family home is also significant (...).	high
De Jesus et al., 2022	France	HIC	March–May 2020	Asylum Seekers, undocumented migrants, international migrants	Differential impact—economic stressors, Differential impact—increased barriers to social and legal services, Differential impact—mental health effects of combined stressors, Differential impact—"living the pandemic twice", Differential impact—legal insecurity, Differential impact—impact on "migration project"	Qualitative research	The findings reveal that migrants experienced increased food and financial insecurity as well as disruptions of formal social networks and routines. These vulnerabilities led to more social isolation and loneliness, as well as more worry for themselves and for their relatives who were left behind in their countries of origin. During the lockdown, feelings of social exclusion, marginalization, and fear of deportation among migrants escalated.	The findings of this paper highlight the importance of implementing a cohesive pandemic response approach that views health as a fundamental inclusive right for all human beings and all policies as health policies to promote well-being for all.	high
DeCarlo Santiago et al., 2021	USA	HIC	June 2020–July 2020	International migrants (including international students)	Differential impact on children—compromised education; Differential impact—increased barriers to healthcare; Differential impact—economic stressors; Source of resilience—state assistance (in/accessible); Source of resilience—mutual support	Qualitative research	Among students, 71.4% were identified as male, and the majority of caregivers were mothers (85.7%). Newcomer families reported significant challenges due to COVID-19, including difficult social–emotional adjustment, financial challenges, and significant academic difficulties. Themes also emerged related to sources of support and coping	(...) the present study highlights the numerous difficulties that newcomer families are experiencing during COVID-19. Although increased distress is common (...), newcomer families may experience difficulties that are compounded by the resettlement experience or barriers based on status.	medium
Del Real et al., 2023	Argentina/Chile	UMIC/HIC	2018–June 2020	International migrants	Differential impact—economic stressors, Differential exposure—no work security/safety net, Source of resilience—state assistance (in/accessible), Differential impact—social roles, family dynamics, Differential impact—mental health effects of combined stressors	Qualitative research	We found that the governmental COVID-19 containment measures in both countries generated four stressors: employment loss, income loss, devaluation of employment status, and inability to send needed remittances. Moreover, sending remittances helped some migrants cope with concerns about loved ones in Venezuela. However, sending remittances became a social stressor when immigrants struggled to simultaneously sustain their livelihoods and send financial support to relatives experiencing hardships in Venezuela. For some immigrants, these adversities generated other stressors (e.g., housing instability) and symptoms of anxiety and depression.	Broadly, for immigrants, the stressors of global crises transcend international borders and generate high stress, which strains their psychological well-being.	high

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Duggal et al., 2021	India	LMIC	April 2020–June 2020	Internal migrants	Source of resilience—being home/with family; Differential impact—economic stressors; Differential impact—social roles, family dynamics; Differential impact on children—compromised education; Source of resilience—religion	Qualitative research	Participants reported that they were afraid of dying alone in the city without their families around so they decided to go back home. At the same time the stress of being back home without any way of financially supporting themselves and their families generated great amounts of uncertainty and helplessness in the participants. They experienced feelings of guilt and frustration at not being able to find a job and worried constantly about the future. Participants reported experiencing worries about the future, helplessness and a fear that the world and 'normal life' was about to change indefinitely. Their sense of personal agency and certainty was taken away almost overnight which generated distress in them.	The research used an intersectional frame to understand how different social identities of migrant status, gender and class coalesce together to generate unique forms of marginalization. It calls for future policy and practice work to acknowledge and integrate the lived experiences of those who remain on the edges, invisible yet critical backbones of a well-functioning and harmonious society. Finally, it emphasises that the pandemic is just a mirror being held up to all of us- and the 'reflections' and 'lessons' need to be carried forward, remembered, documented and transformed into action that is meaningful to the lives of people.	high
Enriquez et al., 2021	USA	HIC	March 2020–June 2020	Undocumented migrants	Source of resilience—state assistance (in/accessible); Differential exposure—high-risk jobs; Source of resilience—legal status; Differential impact—legal insecurity; Differential risk—lack of health insurance/healthcare access; Differential impact on children—compromised education; Differential impact—re-traumatization/mental health effect of lockdown	Mixed-Methods: Cross-Sectional Study; Qualitative research	Qualitative findings showed that immigration status exacerbated the negative economic impact of the pandemic, leading to severe individual and family financial strains that had cascading negative effects on undocumented students' academics and health. Quantitative findings focused on students' own pre-pandemic economic insecurity to show that it was associated with worse academic, financial, and health impacts during the initial months of the pandemic.	Qualitative findings highlighted how campus resources such as study space and technology were no longer available, harming students' academics. Thus, our findings suggest that the benefits of campus-wide resources, (...), depend on a continuous rather than cumulative provision of services. The quantitative results also demonstrated that being a student in the UC system, versus the CSU, was positively associated with increased negative academic, financial, and health impacts. Differences may emerge because UC campuses host a much larger number of on-campus residential students and offer more support services, thus inflicting a greater burden on UC undocumented students who were forced to relocate to their permanent homes and cut off from campus support.	high

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Articles

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Filippi & Giliberti 2021	Italy	HIC	February 2020–May 2020	Asylum Seekers and Refugees	Differential risk—lack of trust; Differential impact—economic stressors; Differential impact—impact on migration project; Differential exposure—conditions in camp-like settings	Qualitative research	By analysing the transformation of Italian reception policies in the last years, the article shows the relationship between these changes and the condition of refugees and asylum seekers in these centers during the COVID-19 pandemic. Overcrowded housing, the absence of institutional guidance on managing the situation, and the interruption of many migrants' migratory projects are the main findings that emerged.	Our analysis encourages us to reflect upon two points. The first reflection is that the pandemic, as a new "total social event," adds another layer of complexity to the Italian reception system, which was already under duress due to the Salvini Decree that introduced changes that did not benefit refugees and asylum seekers. The second reflection is that the pandemic has amplified and brought to the fore those pre-existing dynamics of marginalization and exclusion, which often feature in the stories of migrants who enter the Italian reception system.	medium
Gele et al., 2022	Norway	HIC	April 2020–May 2020	International migrants	Source of resilience—framing; Source of resilience—health information, self-efficacy; Differential exposure—housing; Differential exposure—high-risk jobs; Differential risk—low accessibility/affordability of protective equipment; Differential risk—health literacy; Differential risk—language barriers; Differential risk—sociocultural norms; Differential risk—lack of health insurance/healthcare access; Differential exposure—transnational life/mobility	Qualitative research	We found that participants' attitudes toward the pandemic in general, and more specifically their adherence to preventive measures, have increased over time. However, the number of barriers that hinder immigrants from adhering to preventive measures were identified and classified more broadly into three main subthemes: (1) socio-economic barriers; (2) socio-cultural barriers, and (3) other barriers. Socio-economic barriers include overcrowded households, working in first-line jobs, education and language. Socio-cultural barriers include collectivist culture, religious fatalism and risk perception toward the pandemic.	To reduce the health inequality that arises from overcrowded housing, there is a need for a long-term strategy to help improve the housing situation of low-income immigrant families that live in overcrowded households. In addition, increasing health literacy and more generally, the integration of immigrants, may also reduce the effect of socio-cultural factors on an immigrant's uptake of preventive measures.	medium
Geuijen et al., 2021	The Netherlands	HIC	May 2020–June 2020	International migrants	Differential impact—increased barriers to social and legal services; Differential impact on women—increased care workload	Qualitative research	Two main themes related to the pandemic emerged: (1) Work of support workers during the COVID-19 pandemic and (2) Impact of the COVID-19 pandemic upon migrant families who have children with ID [intellectual disability].	The present study demonstrates that support workers particularly struggled to stay in touch with migrant families who have children with ID during the COVID-19 pandemic. Therefore, support workers should tailor their support to the needs of migrant families.	medium

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(Continued from previous page)									
Gogoi et al., 2023	United Kingdom	HIC	May–July 2021	International migrants	Differential impact—economic stressors, Source of resilience—state assistance (in/accessible), Differential impact—increased barriers to social and legal services, Differential impact—increased barriers to healthcare, Differential impact—mental health effects of combined stressors, Differential exposure—high-risk jobs, Differential impact—social roles, family dynamics, Differential impact—discrimination, Differential impact—"living the pandemic twice", Source of resilience—religion, Source of resilience—being home/with family, Source of resilience—work security, decent working conditions	Qualitative research	Five key themes and 14 subthemes were identified and presented using the QoL framework. The five key themes describe how COVID-19 affected the following aspects of QoL: (1) financial and economic, (2) physical health, (3) social, (4) mental health and (5) personal fulfilment and affective well-being. The narratives illustrated inequities in the impact of COVID-19 for individuals with intersecting social, economic, and health disparities.	Our findings demonstrate the multidimensional and differential impact of the pandemic on different population groups, with most of the negative economic impacts being borne by people in low-paid and insecure jobs. Similarly, adverse social, physical and mental health impacts particularly affected people already experiencing displacement, violence, physical and mental illnesses or even those living alone. These findings indicate that COVID-19 impacts have been influenced by intersecting health and socioeconomic inequalities, which pre-existed. These inequities should be taken into consideration while designing pandemic recovery and rebuilding packages.	high
Goth et al., 2022	Norway	HIC	Spring 2021	International migrants	Differential risk—lack of health information, Differential risk—health literacy, Differential exposure—social norms	Mixed-Methods: Cross-Sectional Study; Qualitative research	Our interview data from Norway showed that information from the authorities was insufficient and not adapted to the needs of the minority population, especially in the early phases of the pandemic. Furthermore, information was not available in the common minority languages of the country. Another finding indicates that health literacy, particularly regarding COVID-19, seemed to be low in the Pakistani minority, and COVID-19 was not considered as a threat in Norway before death rates began rising in Pakistan.	Based on our results we can highlight that language barriers could be a factor in the spread of the infection. In addition, interviews with informants from the Pakistani population in Norway indicate that preventive measurements (masks, disinfecting detergent) took unreasonably long time to reach the minority population. Only when information about the devastating effects of COVID-19 (delta mutation) in Pakistan reached the Pakistani minority in Norway, the desired changes in behaviour were observed. Until then required attendance at celebrations and family events in or outside Norway and avoidance of mask wearing remained and participated to spread the infection.	high

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Articles

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Guruge et al., 2021	Canada	HIC	First six months of the pandemic (summer and fall 2020) (not further specified)	International migrants	Differential impact on women—increased care workload; Differential impact—social roles, family dynamics; Differential impact—impact on migration project	Qualitative research	Results revealed that parenting experiences during the pandemic entailed dealing with changing relationships, coping with added burdens and pressures, living in persistent fear and anxiety, and rethinking lifestyles and habits. Amid these changes and challenges, some parents managed to create opportunities for their children to improve their diet, take a break from their rushed lives, get in touch with their cultural and linguistic backgrounds, and spend more quality time with their family.	While immigrant parents exhibit remarkable resilience in dealing with the pandemic-related meso and macro-levels restrictions, funding and programs are urgently needed to support them in addressing the impact of these at the micro level.	high
Hari et al., 2021	Canada	HIC	April 2020–June 2020	International students	Source of resilience—framing; Differential impact—impact on migration project; Source of resilience—communication with family and peers, social media	Qualitative research	We found that international students experienced the pandemic transnationally and faced increased challenges, which heightened their reliance on support from transnational families, and generated anxieties about their future career and mobilities.	We know from this study that IS are drawing on their transnational resources, it is, therefore, imperative that we rethink locally based supports. (…) There is a need to provide more effective locally emplaced, pragmatic, emotional and social support.	high
Im & George 2022	USA	HIC	April 2020–October 2020	Refugees	Differential impact—economic stressors; Differential impact—increased barriers to healthcare; Differential impact—re-traumatization/mental health effect of lockdown; Differential impact—increased barriers to social and legal services	Mixed-Methods: Cross-Sectional Study; Qualitative Research	For refugees, the impact of the COVID-19 pandemic manifests through multiple factors such as health, social, and economic hardships, which were likely exacerbated by barriers to access to virtual service platforms and resources and communication breakdown with service providers.	A thematic analysis revealed how pre-existing are conflated with emergent barriers during the pandemic and how such cumulative adversities experienced by the refugee community have widened the gaps in social services and healthcare as well as social support within the refugee community. This study proposes several implications for future research and policy in social work with refugee populations during the post-COVID time.	high
Kang et al., 2022	South Korea	HIC	June–November 2020	Migrant workers	Differential impact—economic stressors, Differential impact—increased barriers to healthcare, Differential risk—lack of health information, Differential impact—increased barriers to social and legal services, Differential impact—social roles, family dynamics, Differential impact—mental health effects of combined stressors	Qualitative research	Migrant workers had difficulty accessing and using health care services due, in large part, to linguistic barriers and a lack of an adequate support system. Four main themes were identified: difficulty understanding and using medical services, obtaining necessary health and safety information, the impact of COVID-19, and protecting oneself from becoming infected with COVID-19. Most workers depended on information from social networking services (SNS) and co-workers.	Migrant workers' difficulty with health care access was exacerbated during the COVID-19 pandemic. The findings suggest the necessity of enhancing migrant workers' health literacy, along with the use of SNS as a viable pathway for sharing health information and resources.	medium

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Kaur-Gill et al., 2021	Singapore	HIC	Not reported	Migrant workers	Source of resilience—work security, decent working conditions; Differential impact on camp residents/domestic workers—severe measures/restrictions; Differential impact—mental health effects of combined stressors; Differential impact on women—increased care workload; Source of resilience—communication with peers and family, social media	Qualitative research	The findings in our article reveal the interplays of mental health meanings situated within a structural context of employment and a cultural environment that manifests unequal power relationships and indebtedness. During the Circuit Breaker, domestic workers in already poor employment conditions found themselves at greater precarity and limited agency. (...) Precarious migrant journeys include vicious debt cycles, unethical agents, and corrupt employment practices, detailing the scripts of mental health stressors.	While functional employment structures enabled and empowered well-being, dysfunctional structures disrupted mental health meanings, creating layers of constant contention for domestic workers to broker, limiting opportunities for mental health and well-being. Narratives gathered indicate systemic mental health precarities tied to workplace dysfunctions.	high
Khai & Asaduzzaman 2022	Thailand	UMIC	September 2021–January 2022	Undocumented migrants (workers)	Differential exposure—no work security/safety net, Differential impact—economic stressors, Differential impact—social roles, family dynamics, Differential impact—impact on "migration project", Differential impact—mental health effects of combined stressors, Differential impact—increased barriers to healthcare, Differential impact—legal insecurity, Source of resilience—communication with peers and family, social media, Source of resilience—religion	Mixed-Methods: Cross-sectional study; Qualitative research	The major mental health issues reported by the study participants were depression, generalized anxiety disorder, frustration, stress, and panic disorders, while loss of employment, worries about the pandemic, social stigma, lack of access to healthcare, lockdown, and fear of detention were the predominant contributing factors. In response, we identified two key coping mechanisms: coping at a personal level (...) and coping at a social level (...).	These findings point to the importance of policy and intervention programs aimed at upholding mental health at such humanitarian conditions. Sustainable institutional mental health care support and social integration for the migrant workers, irrespective of their legal status, should be ensured.	medium
Knights et al., 2021	United Kingdom	HIC	June 2020–November 2020	Asylum Seekers and Refugees	Differential impact—increased barriers to healthcare; Differential exposure—high-risk jobs; Differential impact—economic stressors; Differential impact—mental health effects of combined stressors; Differential risk—lack of health information; Differential risk—lack of trust; Source of resilience—improved intersectoral collaboration/digitalization	Qualitative research	It was found that digitalisation had exacerbated existing inequalities regarding access for some migrant groups through a lack of access to, or knowledge of, technology; concerns about language barriers, difficulties building trust, and the risk of missing safeguarding cues in virtual consultations were also expressed. The physical closure of some surgeries was reported to have led to challenges in migrants registering with, and accessing, primary care. Communication barriers, feeling left behind in receiving support and health interventions in comparison to the general population, and a lack of access to information were issues widely raised by migrants. Additionally, they reported views of COVID-19 and COVID-19 vaccinations that ranged from acceptance to misinformation, often originating from social media or word of mouth. Some migrants experienced increased risk factors to their health and severe illness from COVID-19, partially resulting from their economic and social situations.	Pandemic-related changes to primary care delivery may become permanent; some migrant groups are at risk of digital exclusion and may need targeted additional support to access services. Solutions are needed to address vaccine hesitancy in marginalised groups to ensure equitable COVID-19 vaccine uptake.	high

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Kuhlmann et al., 2020	Austria, Germany, Italy, Poland, Romania	HIC	January 2020–May 2020	Migrant workers	Differential exposure—supply of migrant workforce for essential sectors; Differential exposure—high-risk jobs; Differential risk—lack of health insurance/healthcare access	Qualitative research	Results suggest that undersupply of carers coupled with cash benefits and a culture of family responsibility may result in high inflows of migrant carers, who are channelled in low-level positions or the informal care sector. COVID-19 made the fragile labour market arrangements of migrant carers visible, which may create new health risks for both the individual carer and the population.	The results highlight the weaknesses of existing health labour market arrangements in the LTC sector, which stretch far beyond poor workforce management. As the COVID-19 pandemic revealed, these conditions may directly impact population health and the health and wellbeing of the migrant carers, thus becoming fundamentally a public health policy issue. (…) Including LTC migrant carers more systematically in health work-force governance and research, therefore, must become an issue of public health and European policy.	high
Kumar et al., 2021	India	LMIC	March 2020–May 2020	Internal migrants	Differential impact—discrimination; Differential impact—economic stressors; Differential impact—legal insecurity	Qualitative research	As our participants reported, they dealt with multiple hardships, including loss of jobs and income, police brutality, Othering, and differential treatment, difficulties accessing health services, food, cash transfer and other social programmes during the first COVID-19 pandemic nationwide lockdown. (…) Consequently, many of them became anxious, and were uncertain about their future. With no money and savings, many participants struggled to live and survive during the lockdown.	The findings indicate the need for policy responses to focus on addressing conditions of work, terms of employment and access to necessities for Indian MW, including ensuring conditions for a prompt job-ready recovery and mental health care after the COVID-19 pandemic.	medium
Kunpeuk et al., 2022	Thailand	UMIC	Not reported	Migrant workers	Differential risk—lack of health insurance/healthcare access, Differential exposure—no work security/safety net, Differential exposure—conditions in camp-like settings, Differential exposure—housing, Differential exposure—transnational life/mobility	Qualitative research	Results show that there were seven key themes emerging from the analysis, including: (i) sustainability of the HICS; (ii) people dropping out from the Social Security Scheme (SSS); (iii) quality of health screening in the Memorandum of Understanding (MOU) migrants; (iv) health screening problems and state quarantine management in response to COVID-19; (v) managing the migration quota and dependency on migrant workers; (vi) influx of migrants in the backdrop of COVID-19; and (vii) poor living conditions of migrants and the impact of COVID-19. The majority of interviewees agreed that undocumented migrants is a critical concern that impedes access to migrants' health and social welfare. This situation was especially pronounced during the second wave of COVID-19 in Thailand, which took hold in migrant communities.	In the short term, the poor living conditions of migrants urgently need to be addressed in order to contain and mitigate this crisis. In the long term, there needs to be an improved health system design that includes migrants, regardless of their immigration status. This requires intersectoral policy coherence, including the hastening of nationality verification to sustainably mitigate undocumented migrants.	high

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Lee C. et al., 2023	USA	HIC	July 13–October 3, 2020	ICE detainees	Differential exposure—conditions in camp-like settings, Differential impact—increased barriers to healthcare, Differential risk—retaliation from employer/camp manager/detention officer	Qualitative research	Major themes discussed by participants included difficulties protecting themselves against COVID-19 due to denial of basic and essential supplies, lack of implementation of known risk mitigation measures, failure to provide timely healthcare access, misuse of solitary confinement, and punishment in response to self-advocacy.	Overall, these findings are draw attention to the human rights abuses inside detention centers during the COVID-19 pandemic, and have important implications to the health of individuals in congregate carceral settings, including prisons and jails, both during and beyond the pandemic.	high
Lee W–C. et al., 2022	Taiwan	HIC	September–November 2021	Migrant workers	Differential impact—economic stressors, Differential impact—discrimination, Differential impact—impact on migration trajectories, Differential exposure—conditions in camp-like settings, Differential impact—mental health effects of combined stressors	Qualitative research	During the pandemic, workers experienced overload, economic hardship, suspended home visits, isolation, discrimination, and fear of cluster infection in the crowded dormitory.	The identified coping strategies could inform policy development to assist with positive adaptation and promote the well-being of the migrant worker population.	medium
Li et al., 2021	China	UMIC	January 2020–July 2020	Internal migrants	Differential impact—economic stressors; Source of resilience—mutual support	Mixed-Methods: Cross-Sectional Study; Qualitative Research	The research revealed three distinct long-term vulnerabilities faced by migrant worker families experiencing difficulties: physical/ material, motivational/attitudinal and social/ organisational. At the same time, during our project helping migrant workers fight COVID-19, we recognised these families' capacities.	Specific recommendations are made for a long-term mechanism on disaster management and social assistance. The authors call for the inclusion of family, child, and urban-rural integration perspectives, government-NGO cooperation and interaction among communities, NGOs and social workers to ensure improved and sustainable policies and services to reduce migrant worker families' vulnerabilities.	medium
Loganathan et al., 2021	Malaysia	UMIC	June 2020–March 2021	International migrants	Differential impact—economic/ survival strategies, Differential impact—discrimination, Differential impact on children—compromised education, Differential impact—economic stressors, Differential impact—legal insecurity	Qualitative research	Our findings suggest that lockdowns disproportionately impacted non-citizen households as employment, food and housing insecurity were compounded by xenophobia, exacerbating pre-existing inequities. School closures disrupted school meals and deprived children of social interaction needed for mental wellbeing. Many non-citizen children were unable to participate in online learning due to the scarcity of digital devices, and poor internet connectivity, parental support, and home learning environments.	The lack of government oversight over learning centres meant that measures taken were not uniform. The COVID-19 pandemic presents an opportunity for the design of more inclusive national educational policies, by recognising and supporting informal learning centres, to ensure that no child is left behind.	medium

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Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
(Continued from previous page)									
Lui et al., 2021	Hong Kong, China	HIC	May 2020–August 2020	Migrant workers	Differential impact—"living the pandemic twice"; Differential impact on camp residents/domestic workers—severe measures/restrictions; Differential impact—mental health effects of combined stressors; Differential impact—legal insecurity; Source of resilience—state assistance (in/accessible)	Qualitative research	FDWs [foreign domestic workers] reported a dual-country experience of the pandemic, where they expressed concerns about local transmission risks as well as worries about their family members in their home country. Changes to their current work situation included how their employers treated them, as well as their employment status. FDWs also cited blind spots in the Hong Kong policy response that also affected their experience of the pandemic, including a lack of support from the Hong Kong government.	The current study demonstrates that the COVID-19 pandemic has exacerbated the existing power dynamics that constrain FDWs in Hong Kong. Not only is there a greater need to provide for family members back in FDWs' home countries, but there are also increased pressures from employers and a lack of support from the Hong Kong government. Through this study's findings of the current situation and challenges faced by FDWs in Hong Kong during the COVID-19 pandemic, it is clear that policy-level interventions are needed to mitigate the particularly negative effects on FDWs. More supportive policies should be adopted that not only consider the specific needs of FDWs but listens to them.	high
Lusambili et al., 2020	Kenya	LMIC	October 2020	Refugees	Differential impact—increasing barriers to healthcare; Differential impact—discrimination	Qualitative research	Our findings suggest that within the first eight months of COVID-19, preferences for home deliveries by refugee women increased and health care workers reported having observed reduced utilisation of services and delayed care. Fear, economic challenges and lack of migrant-inclusive health system policies were key factors influencing home deliveries and delayed and low uptake of facility-based care.	The findings highlight the need to mitigate and lower barriers that prevent refugee women from seeking care at health facilities. One approach includes the development of refugee-inclusive public health policies, particularly during a pandemic, and the need to tailor health care services for refugees at facilities and in the communities.	medium
Ly et al., 2022	Mali	LIC	November–December 2020	IDPs	Differential exposure—conditions in camp-like settings, Differential risk—health literacy, Differential risk—lack of health insurance/healthcare access, Differential risk—health information, Source of resilience—mutual support	Qualitative research	The main challenges reported on IDP sites included difficulties in contacting positive cases, a lack of facilities for quarantine and isolation, a lack of physical space for building new facilities, and a lack of financial resources to support IDPs during isolation and quarantine. The difficulties reported included: changes in social behaviour and practices, fear of stigma, a poor level of literacy, and language barriers. To address those difficulties, the local initiatives developed by IDPs included strengthening the awareness of IDPs on COVID-19, early warning of sites' leaders about positive and suspected cases, and setting up a toll-free number to facilitate access to appropriate information on COVID-19.	The findings of this study could be used as evidence to guide policy, adjust current strategies and take into account … IDPs, a group with increased vulnerability, in COVID-19 response, more precisely during the implementation of isolation and quarantine measures. By doing so, they will help improve the response to COVID-19, IDPs health, and population health.	high

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Martin-Anatias et al., 2021	New Zealand	HIC	May 2020–June 2020	International migrants	Differential impact on women—increased care workload; Differential impact—social roles, family dynamics	Mixed-Methods: Cross-Sectional Study; Qualitative Research	Both our survey and our interviews indicated that many women, particularly mothers, experienced increased demands on their time and emotional energy in comparison to men, particularly in fields related to childcare and domestic labour, and that they also experienced a decline in wellbeing linked to heightened levels of exhaustion and stress. (…) Their [Indonesian migrant mothers] stresses were instead linked to feelings of anxiety, frustrations and inadequacy with home-schooling their children in English.	(…) our research indicates that both second-language speaking status and a prevailing gender ideology of 'state Ibuism' (as opposed to neoliberal feminism) were critical factors differentiating Indonesian migrant mothers' experiences from those of many other mothers in NZ.	medium
Martuscelli 2020	Brazil	UMIC	March 2020–April 2020	Refugees	Differential impact—impact on migration project, Differential impact—legal insecurity, Source of resilience—state assistance (in/accessible), Differential impact—increased barriers to healthcare, Differential impact—discrimination	Qualitative research	The results show that refugees tend to be more affected by the government responses to the pandemic, especially the closure of the Federal Police, the closure of the borders, and the uncertainty and difficulties to access the emergency benefit (Auxílio Emergencial do Governo Federal).	The Brazilian federal responses to COVID-19 harm refugees. Borders closing brings uncertainty about their family reunification right. The suspension of the Federal Police and the CONARE activities allows uncertainties on their asylum and naturalization processes. Bureaucratic barriers prevent their access to the emergency benefit created to support vulnerable people.	medium
Martuscelli 2021	Brazil	UMIC	March 2020–April 2020	International migrants	Differential impact—economic stressors; Differential impact—legal insecurity; Differential impact—"living the pandemic twice"; Differential impact—impact on migration project	Qualitative research	The results indicate that refugees face three challenges connected to this pandemic: (a) same challenges as Brazilians due to their labor vulnerability social identity, (b) challenges aggravated by the pandemic due to their identity of nonnationals including access to information and services, and (c) new challenges due to their social identity of forced displaced nonnationals including closing of migration services and borders and the feeling of "living the pandemic twice."	This research contributes to the literature of intersectionality and asylum by understanding how refugees in the Global South are affected by pandemics and responses to them, considering their own lived experiences and multiple social identities.	high
Matsuoka et al., 2022	Japan	HIC	September–November 2021	International migrants	Differential risk—lack of health information, Source of resilience—mutual support, Source of resilience—state assistance (in/accessible)	Qualitative research	Language was a major barrier to accessing health-related information and health and welfare services, and it was identified at multiple levels of the ecological model, namely, the individual, organizational, and community levels. The language and cognitive barriers observed at the individual level, such as a limited awareness of social, health, and welfare services, were attributable to community-level factors.	The findings from this study demonstrate how migrants represent a vulnerable group in the host country, even more so in a time of crisis. Providing relevant information concisely, in plain language, and using illustrations could be helpful for them. Moreover, supportive people and organizations around migrants could be mobilized to help them better access health and welfare services.	medium

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Mookerjee et al., 2021	India	LMIC	3 months into the lockdown (presumably: May 2020–July 2020)	Internal migrants	Differential impact—economic stressors; Source of resilience—state assistance (in/accessible); Source of resilience—being home/with family; Differential impact—mental health effects of combined stressors; Differential impact—discrimination	Qualitative research	Financial worries were found to be endemic, with rising debt a major source of stress, and educational qualifications becoming an obstacle to earning. Returning migrants were suspected of bringing the virus from the city, and so stigmatized in their home towns and villages. However, the pandemic lockdown also showed some un-expected healthful consequences. It provided these marginalized, and always busy workers the time and space to stop working for a while, to stay home, eat home food, and take walks in the comparatively green and clean spaces of their home environments.	This study shows the need for a kind of social security or insurance to get workers though low-or-no-income periods, but further research focused on the economic structural constraints experienced by migrant workers is necessary to shape such policy. (...) The pandemic lockdown as an enabler of health is one of three inversions that emerged in this culture-centrerd study (...) In this, the pandemic lockdown may be seen to have enabled a measure of agency and health in the lives of these workers, an oasis albeit temporary, and ultimately subject to the demands of the globalized cities of India.	high
Nasol & Francisco-Menchavez 2021	USA	HIC	2017–2020	Migrant workers	Differential exposure—high-risk jobs; Differential impact on women—increased care workload; Source of resilience—state assistance (in/accessible); Differential risk—lack of health insurance/healthcare access	Qualitative research	Based on quantitative and qualitative data with Filipino workers before and during the COVID-19 crisis, we find that RCFEs [residential care facilities for the elderly] have failed to comply with labor standards long before the pandemic where the lack of state regulation denied health and safety protections for home care workers. The racial inequities under COVID-19 via the neoliberal approach to the crisis puts home care workers at more risk. (...) Last, while the experiences of Filipino home care workers during the pandemic expose the elder care industry's exploitation, we find that they are also creating strategies to take care of one another.	Our study demonstrates how legal protections and public assistance, or the lack thereof, is a major social determinant of care workers' health. The experiences of Filipino home care workers during the COVID-19 pandemic broadly expose the elder care industry's exploitation of racialized migrant workers and the government's neglect in protecting them, endangering key essential workers during a historical public health crisis. (...) Although these informal networks ["communities of care"] are not a sustainable replacement for state-sponsored health care and health resources, we uplift the innovative strategies of Filipino care workers to demonstrate their ingenuity and commitment to caring for themselves and one another.	medium

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Ozer et al., 2022	Burkina Faso	LIC	May 2020	IDPs	Differential impact—economic stressors (loss of job/income, food/ housing insecurity, debt), Differential impact—increased barriers to healthcare, Source of resilience—state assistance (in/ accessible), Differential impact—impact on “migration project”	Mixed-Methods	Although no respondent reported having been directly affected by the virus, 84.9% of the IDPs surveyed had no income-generating activities during the lockdown and the remaining 15.1% who continued to work reported that their activities had been greatly scaled-down. For a large majority of them, their living conditions, already described as difficult under ‘normal’ circumstances (insufficient food, insignificant financial assistance, or difficult access to health care), further deteriorated. In addition, IDPs were unable to leave the camps or regions where they were located to search for better living conditions or to return home. Lastly, 96.2% of respondents believed that the COVID-19 pandemic would have a negative impact on their future.	These IDPs, like many in the sub-region and around the world, therefore require urgent assistance from the authorities and humanitarian NGOs, as the slightest new stress is likely to considerably worsen their already vulnerable state.	medium
Qi & Ma 2021	Australia	HIC	February 2020–November 2020	International students	Source of resilience—state assistance (in/accessible); Differential impact—discrimination; Differential impact—impact on migration trajectories (e.g., return migration)	Qualitative research	Our thematic analysis highlights participants’ experiences and views of Australia’s crisis responses in the four areas of financing, third-country transit, visas and immigration, and pandemic management.	Australia’s federal-level international student policies during the global crisis of COVID-19 extended a parochial, neoliberal approach exclusively in line with national interest.	high
Quandt et al., 2022	USA	HIC	June–July 2021	Migrant workers	Differential exposure—no work security/safety net, Differential impact—economic stressors, Differential exposure—supply of migrant workforce for essential sectors, Source of resilience—mutual support, Source of resilience—religion, Differential exposure—high-risk jobs, Differential exposure—transportation, Differential risk—lack of health insurance/healthcare access, Source of resilience—health information, self-efficacy	Qualitative research	Findings suggest that agricultural workers faced significant impacts and risks at work (work stoppages, stress about bringing COVID-19 home to family) and at home (contracting COVID-19, loss of friends and family, and mental health challenges). Agricultural workers and their employers often implemented COVID-19 precautions such as social distancing measures, personal protective equipment, hand washing and hand sanitizers, and isolation. Many agricultural workers did access testing resources on either side of the US-Mexico border and worked with US-based Spanish-speaking community-based organizations to register for vaccine appointments.	To better support agricultural workers and their employers in the future, we recommend the following: 1. Prioritize agricultural workplace conditions to increase agricultural worker physical and mental health, 2. Extend public health services into agricultural work sites of transit and the workplace, and 3. Lastly, trusted Spanish-speaking community-based organizations can play a critical role in public health outreach.	high

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Ramana et al., 2023	India	LMIC	November–December 2020	Migrant workers; internal migrants	Differential impact—economic stressors, Differential impact—social roles, family dynamics, Source of resilience—mutual support, Source of resilience—state assistance (in/accessible); Differential impact—discrimination, Differential impact—mental health effects of combined stressors, Differential impact—increased barriers to healthcare	Qualitative research	The primary financial challenges mentioned by the migrant workers in the interviews were unemployment, monetary issues, and a difficult sustenance. The social concerns were described as anxious migrant exodus, discrimination, mistreatment, lack of social assistance, inability to fulfil their family's expectations, lack of safe transportation arrangements by the authorities during the exodus, inadequacies in the public distribution system, law and order, and apathy of their employers. The psychological repercussions were described using terms like "fear," "worry," "loneliness," "boredom," "helplessness," and "trapped." Monetary compensation, job opportunities at the native place, and a well-managed migrant exodus were reportedly their key expectations from the government. Healthcare issues mentioned during the lockdown included a lack of facilities to treat common ailments, substandard care, and repeated COVID-19 testing prior to departure.	The study highlights the need to have rehabilitation mechanisms such as targeted cash transfers, ration kits, and safe transportation services for migrant workers through inter-sectoral coordination for mitigating hardship.	medium
Rast et al., 2023	Germany	HIC	July–August 2020	Asylum seekers	Differential impact on camp residents/domestic workers—severe measures/restrictions, Differential impact—re-traumatization/mental health effect of lockdown, Source of resilience—health information, self-efficacy, Source of resilience—trust, Differential risk—lack of trust, Source of resilience—framing, Source of resilience—communication with peers and family, social media	Qualitative research	Quarantine was experienced as burdensome by participants. Shortcomings in social support, everyday necessities, information, hygiene, and daily activities exacerbated the strains of quarantine. Interviewees held different opinions about the usefulness and appropriateness of the various containment and mitigation measures. These opinions differed by individual risk perception and the measures' comprehensibility and compatibility with personal needs. Power asymmetries related to the asylum system furthermore impacted on preventive behaviour.	Quarantine can amplify mental health burdens and power asymmetries and can therefore constitute a considerable stressor for asylum seekers. Provision of diversity-sensitive information, daily necessities, and accessible psychosocial support is required to counteract adverse psychosocial impacts of pandemic measures and safeguard wellbeing in this population.	high

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Reynolds et al., 2021	Mexico	UMIC	August 2020	Asylum Seekers	Differential impact on camp residents/domestic workers—severe measures/restrictions; Differential risk—lack of trust; Differential impact—increased barriers to healthcare; Differential impact—re-traumatization/mental health effect of lockdown; Differential impact—economic stressors; Differential risk—health literacy	Qualitative research	The pandemic caused significant mental health burdens but no perceived adverse physical effects, with the U.S. border closure and health care access barriers as more pressing concerns. Participants reported access to information about COVID-19 but had varied levels of know-ledge and adherence to disease reduction strategies due to camp conditions. Most participants believed that they had special protection from COVID-19, including strong immune systems or from God. The nongovernmental organizations providing health care and sanitation faced multiple challenges to implement new policies to manage COVID-19. The institution of required temperature checks and quarantine of COVID-19 positive patients led to distrust, decreased seeking of health care services among asylum seekers, and possible underreporting of COVID-19 cases.	Our findings among asylum seekers in a Matamoros camp highlight the challenges to implementing disease reduction policies in low-resource congregate camps. Policies to address disease outbreaks focusing on the social determinants of health, health care access barriers, and community engagement may be more acceptable to asylum seekers, suggesting the need for effective strategies to provide prevention information that complements such measures.	medium
Rubio González et al., 2023	Spain	HIC	January–June 2022	Migrant workers	Differential exposure—no work security/safety net, Differential risk—retaliation from employer/camp manager/detention officer, Differential impact on women—increased care workload, Differential exposure—conditions in camp-like settings, Differential impact—increased barriers to social and legal services, Source of resilience—legal status, Source of resilience—mutual support	Qualitative research	Two main themes emerged: Non-compliance with the collective labor agreement, and non-compliance with workplace health and safety standards.	The results suggest that the adverse living and working conditions of the migrant farmworkers increased their risk of COVID-19 infection, due to the lack of compliance with the health measures decreed. The vulnerability experienced by migrant farmworkers increased work conflicts and prompted their mobilization to fight for their rights.	high
Sabar et al., 2021	Israel	HIC	March 2020–May 2020	International migrants	Differential impact on camp residents/domestic workers—severe measures/restrictions; Differential impact—mental health effects of combined stressors; Differential impact—economic stressors; Source of resilience—mutual support	Mixed-Methods: Qualitative research; Cross-Sectional Study	During the lockdown, the challenges embedded in caregiving in Israel were amplified and new challenges emerged, such as the inability to leave the employer's premises, which some likened to being imprisoned. The major hardships voiced in all interviews were loneliness, fear of contracting the virus, worries about the safety of their families back home, and anger at restrictions imposed without consulting them by the assisted living facilities or their employers. At the same time, they expressed sincere gratitude for being employed, paid and safe.	Philanthropy for Filipinos in need in Israel and back home was found to be an effective coping mechanism. While lockdown conditions increased the fragility of the marginalized migrant workers, their ability to donate funds empowered them at both individual and communal levels. Developing a donor identity reinforced their sense of belonging to the Filipino community in Israel and back home.	medium

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Sanna 2021	Romania/Italy	UMIC/HIC	March 2020	Returnees	Differential exposure—high-risk jobs; Differential impact—discrimination; Differential risk—lack of health insurance/healthcare access; Differential impact—impact on "migration project"	Qualitative research	Among the reasons to return during the pandemic that my informants mentioned there were: the sudden loss of a job due to temporary or permanent closing of businesses during the lockdown in Italy and elsewhere; the closing of universities, in the case of Romanian students studying abroad; and the impossibility of affording healthcare in a foreign country due to not having a regular work contract. In other cases, of course, it was the fear of being sick in a foreign country that mattered most.	In this paper, I have shown how the image of returning migrants during the first month of the COVID-19 pandemic in Romania was constructed by the media in March 2020: by very quickly associating the migrants with the virus, by juxtaposing the noble acts of Romanians left in Italy with the criminal acts of those who came back, and by reinforcing such juxtaposition by giving voice to Romanians who stayed in Italy.	medium
Sanò & Della Puppa 2021	Italy	HIC	February 2020–May 2020	International migrants	Differential impact—economic stressors; Differential impact—legal insecurity; Differential impact—impact on migration trajectories; Source of resilience—state assistance (in/accessible); Differential exposure—supply of migrant workforce for essential sectors	Qualitative research	By analysing two very different contexts from the economic and social point of view, we highlight the similarities between these territories, the mobility and immobility they generate and through which they are crossed, before and during the COVID-19 pandemic.	The ethnographic cases we described show the need to rethink the conceptual categories with which we usually analyse mobility, illuminating the links it has with national policies, with territorial administrative provisions, with the economic and social fabric of an area, with individual and not necessarily 'rational' choices of individuals.	medium
Shah & Alkazi 2022	Kuwait	HIC	April–June 2020	Undocumented migrants (labor migrants irregularized by the conditions of their visa)	Differential impact—impact on "migration project", Source of resilience—mutual support, Differential impact—legal insecurity, Differential impact—economic stressors	Qualitative research	Twelve of our interviewees were planning to leave in response to the amnesty declared on 1 April, while 14 were planning to stay or were uncertain. Network support continued to provide an essential element in enabling their survival. Intermediaries such as kafeels (sponsors) were often unavailable or unwilling to provide assistance.	The health and welfare of irregular migrants require special policy attention since they now face an enhanced risk of being apprehended and deported.	medium
Singer et al., 2022	USA	HIC	November 2020–December 2020	ICE Detainees; asylum seekers	Differential exposure—conditions in camp-like settings, Differential risk—retaliation from employer/camp manager/detention officer, Differential risk—lack of health insurance/healthcare access	Qualitative research	Detained asylum seekers reported inadequate medical care, obstacles to receiving care, an inability to social distance, poor hygiene, restricted movement, and a lack of infection control—all which increased their risk of contracting and spreading COVID-19 and exacerbated health inequalities brought to the forefront by the pandemic.	Advocating for improved disease prevention and screening, prompt access to health care and treatment, cohorting of infectious cases, and community alternatives to detention to decrease the detained immigrant population sizes are crucial to halt communicability of the virus and its subsequent morbidity and mortality in this vulnerable population.	high

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Singh et al., 2020	India	LMIC	Not reported	Migrant workers	Source of resilience—state assistance (in/accessible); Differential impact—impact on migration trajectories, Differential impact—impact on migration project	Qualitative research	One important theme among migrants was their eagerness to return to their native homes. Participants were also concerned about pending agriculture-related work, their families back home, and job insecurity. Most of the migrants supported the government-mandated lockdown and agreed that they would follow all instructions.	Physiologic requirements, safety, and security were the predominant needs of the migrant workers while staying in the shelter home during lockdown. The participants feared contracting COVID-19 and were uncertain about when and how they would return to their native homes.	medium
Srivastava et al., 2021	India	LMIC	Not reported	Internal migrants	Differential impact—economic stressors; Source of resilience—mutual support; Differential impact—discrimination; Differential impact—impact on "migration project"; Source of resilience—communication with family and peers, social media; Source of resilience—framing	Qualitative research	The analyses revealed that multiple stressors include financial crisis, unavailability of food, inability to continue education, inability to pay house rent, lack of support from neighbors and family, and other psychological stressors that affected them. However, they also tried multiple strategies to deal with the problems, including a cognitive appraisal of the problem and making oneself psychologically competent to deal with the situation.	The present work strengthens the earlier studies on uncovering the stresses of migrant workers along with suggesting available options to deal with them and emphasizes the role of family and proper emotional support in the management of pandemic-related stress among internal migrant workers.	medium
Stevenson et al., 2023	Columbia	UMIC	June 2020–June 2021	International migrants; refugees	Differential exposure—transnational life/mobility, Differential risk—lack of health insurance/healthcare access, Differential impact—economic stressors, Differential impact—discrimination, Source of resilience—communication with peers and family, social media	Qualitative research	Venezuelan migrants and refugees reported high levels of housing instability, job instability, increased barriers to accessing healthcare, and complications in engaging in the HIV care continuum, among other impacts of the COVID-19 pandemic. Stakeholders reported complications in provision of care and obtaining medicines, difficulty maintaining contact with patients, increased discrimination and xenophobia targeting Venezuelan migrants and refugees, increased housing instability among Venezuelan migrants and refugees, and other impacts as a result of the COVID-19 pandemic.	This study demonstrates the unique impacts of the COVID-19 pandemic among Venezuelans residing in Colombia by both compounding extant vulnerabilities and introducing new challenges, such as high rates of eviction. Colombia has enacted increasingly inclusive migration policies for Venezuelan refugees and migrants within the country; findings from this study underscore the necessity for such policies both in and outside of the Colombian context.	high
Tang & Li 2021	China	UMIC	April 2002–July 2020	Rural migrants	Differential impact—economic stressors; Source of resilience—mutual support; Differential impact—social roles, family dynamics	Qualitative research	The study finds that rural migrants suffered from serious social impacts due to COVID-19, especially during the associated lock-down period. Despite some similar impacts, influences of COVID-19 varied among rural migrants at different life-cycle stages, due to variations in human capital, family burdens, role in a household, and ability to find part-time work. Receiving little support from governments and employers, rural migrants tended to adopt household strategies to deal with difficulties related to COVID-19.	Findings also suggest that both central and local governments need to provide practical aid to this group and to improve the social security system for rural migrants.	medium

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Thomas et al., 2021	India	LMIC	March 2020–April 2020	Migrants workers, Refugees	Source of resilience—state assistance (in/accessible); Differential impact—impact on migration trajectories, Differential impact—economic stressors	Qualitative research	The outcomes of this study shed light on (1) the most urgent needs that need to be addressed per population group, (2) the variety of state-level responses as well as best practices observed to deal with mitigation issues and (3) opportunities for quick relief as well as more long-term solutions.	The COVID-19 pandemic has not only reduced people's means of maintaining a livelihood but has simultaneously revealed some of India's long-standing problems with infrastructure and resource distribution in a range of sectors, including nutrition and health, education, etc. There is an urgent need to construct effective pathways to trace and respond to those people who are desolate, and to learn from—and support—good practices at the grassroot level.	medium
Tosh et al., 2021	USA	HIC	August 2020–November 2020	ICE detainees	Differential exposure—conditions in camp-like settings; Differential exposure—transportation; Differential impact on camp residents/domestic workers—severe measures/restrictions; Differential risk—retaliation from employer/camp manager/detention officer; Differential impact—increased barriers to social and legal services	Qualitative research	Our findings suggest that migrant detention and deportation present distinct challenges that undermine attempts to contain the spread of COVID-19. We provide testimonies from migrant detainees who speak to these challenges in unsettling personal terms. Our interviews highlight the insufficient actions by Immigration and Customs Enforcement (ICE) to contain the spread of the pandemic and a troubling lack of due process in immigration court proceedings.	Based on these findings, we argue that reducing the number of migrants detained in the United States is needed not only in the context of the COVID-19 pandemic but also as a preventative measure for future health crises. Reductions can be achieved, in part, by reforming federal immigration laws on "mandatory detention."	medium
Uansri et al., 2023	Thailand	UMIC	July–October 2021	Migrant workers	Differential risk–lack of health insurance/healthcare access, Differential impact—economic stressors, Differential risk—health information, Differential risk—lack of health insurance/healthcare access	Qualitative research	[B]arriers included, but were not limited to, the precarious status of migrants, the lack of health insurance, the loss of job during the pandemic which later caused them financial difficulty, and the health service reorientation in response to the pandemic that did not match the way of life of some migrants. The aforementioned problems were also coupled with negative attitudes towards migrants in society.	Our study highlights healthcare access barriers to migrant workers in Thailand during the COVID-19 pandemic.	medium

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Ullah & Harrigan 2022	Australia	HIC	September 2020–October 2021	Migrant workers; international students	Differential exposure—no work security/safety net, Source of resilience—state assistance (in/accessible), Differential impact—economic survival/strategies, Differential impact—mental health effects of combined stressors, Source of resilience—work security, decent working conditions	Qualitative research	We compare our findings to two models of social security: the self-insurance model and state-insurance model. In first lockdown, without social security, participants struggled to comply with public health orders because of the need to work for income, lack of housing suitable for isolation, and lack of medical leave. Participants tended to avoid testing, and to work while potentially contagious. Participants reported high levels of anxiety, depression and emotional distress caused by job loss and exclusion from an implicit social contract with the rest of Australian society. In contrast, during the second lockdown, where temporary migrants were provided social security payments, participants reported avoiding risky work, undertook Covid-19 testing many times, and self-isolated successfully. There was little evidence of emotional distress. Participants felt like a valued part of Australian society.	These results suggest a self-insurance model of social security does not protect the physical and psychological health of vulnerable populations and can exacerbate the spread of communicable diseases. In contrast, state-insurance and social welfare payments to marginalised communities, particularly unemployment benefits and medical leave, are crucial public health policy levers for both protecting vulnerable populations and tackling outbreaks of communicable diseases such as Covid-19.	high
van den Muijsenbergh et al., 2022	The Netherlands	HIC	November 2020	Undocumented migrants	Differential exposure—no work security/safety net, Differential exposure—high-risk jobs, Source of resilience—health information, self-efficacy, Differential risk—lack of health information, Differential risk—lack of health insurance/healthcare access, Differential impact—economic stressors, Differential impact—increased barriers to healthcare, Source of resilience—mutual support	Qualitative research	The UDMs [undocumented migrants] perceived the COVID-19 as a threat. Their precarious position affected their perceived vulnerability, which motivated them to seek information on and comply with preventive measures and testing. However, structural barriers decreased their self-efficacy and opportunity to comply. The COVID-19 measures impacted the lives of UDMs on essential domains, resulting in job, food, and housing insecurity, and increased barriers in access to healthcare.	An intersectoral approach addressing health communication, access to healthcare, and social support, as well as legal rights for safe employment, is needed to alleviate the impact of the measures on UDMs.	high
Vosko & Spring 2022	Canada	HIC	2020–2021 (not specified)	Migrant workers	Differential exposure—supply of migrant workforce for essential sectors; Source of resilience—state assistance (in/accessible); Differential exposure—conditions in camp-like settings; Differential risk—retaliation from employer/camp manager/detention officer	Mixed-Methods: Primarily Qualitative Research	Although estimates vary by source, over 1000 migrant farmworkers in Ontario tested positive for COVID-19 between April and July 2020. Thus, while Ontario documented 36,594 cases by July 2020 (i.e., 250 per 100,000) (…), the rate of infection among migrant farmworkers, 20,015 of whom entered Ontario during the spring and summer growing season, was approximately 4996 cases per 100,000 people. (…) The magnitude of illness among migrant farmworkers in Southern Ontario, and Canada more broadly, reflects the emphasis, deeply ingrained in programs emblematic of migration management such as the SAWP, on keeping labour costs low in the interest of protecting the national food supply.	Taking Southern Ontario as its focus, this article reveals how the federal government response to COVID-19 in agriculture perpetuated the effects of longstanding laws and policies requiring migrant farmworkers, circumscribed in their ability to politically mobilize on account of their institutionalized deportability, to shoulder disproportionate amounts of economic, social, and health risks. Centreing the transnational character of migrant farmworkers' renewal, it identifies meaningful interventions to limit the structural disempowerment of migrant farmworkers and the externalization of their social reproduction.	medium

(Table 1 continues on next page)

Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
(Continued from previous page)									
Vosko et al., 2022	Canada	HIC	October 2021–February 2022	Migrant workers	Differential exposure—conditions in camp-like settings, Differential exposure—transportation, Differential risk—retaliation from employer/camp manager/detention officer, Differential exposure—no work security/safety net, Differential impact—economic stressors, Differential impact—mental health effects of combined stressors	Qualitative research	More specifically, the pandemic increased employment strains in four ways: by bringing forth a new risk of COVID-19 transmission in workplaces and in employer-provided dwellings; magnifying the mental and physical health risks associated with employer-provided housing; amplifying the risks of employer reprisal and repatriation; and reducing earnings and/or introducing new threats of lost income.	We concluded that the deleterious outcomes of the pandemic for this group were rooted in the deplorable pre-pandemic conditions they endured. Consequently, the band-aid solutions adopted by federal and provincial governments to address these conditions before and during the pandemic were limited in their efficacy because they failed to account for the transnational employment strains among precarious status workers labouring on temporary employer-tied work permits. Such findings underscore the need for transformative policies to better support health equity among migrant farmworkers in Canada.	high
Williams et al., 2023	USA	HIC	June–July 2020	International migrants (Latina immigrant mothers, 1/3 of them undocumented)	Source of resilience—health information, self-efficacy, Differential exposure—no work security/safety net, Differential exposure—high-risk jobs, Differential risk—lack of health insurance/healthcare access, Differential risk—lack of trust, Differential impact—economic stressors, Differential impact on children—compromised education, Source of resilience—mutual support, Source of resilience—state assistance (in/accessible)	Qualitative research	Mothers enacted behaviours (e.g., sanitation practices, wore masks, stayed home) to lessen negative impacts of the pandemic on family health and well-being. Factors beyond their control (e.g., public policies, work policies and practices) placed families at greater risk for poor health and well-being.	Findings build upon and extend prior research that reexposed unjust employment conditions, inadequate health-care systems, and an anti-immigrant context during the pandemic that perpetuated health disparities among Latino immigrants and other minoritized populations.	high

(Table 1 continues on next page)

Author & year of publication	Country of study	Socio-economic development of country[a]	Period of study	Migrant population	Health outcomes	Study design	Main results (as reported)	Conclusions (as reported)	Quality[b]
(Continued from previous page)									
Yee et al., 2021	Singapore	HIC	June 2020–July 2020	Migrant workers	Differential impact—economic stressors, Differential impact—social roles, family dynamics; Differential exposure—conditions in camp-like settings; Source of resilience—communication with peers and family, social media; Source of resilience—religion	Qualitative research	Three theme categories were derived from 27 interviews: migrant worker concerns during COVID-19, coping during COVID-19 and priorities after COVID-19. Major stressors in the crisis included the inability to continue providing for their families when work is disrupted, their susceptibility to infection in crowded dormitories, the shock of receiving the COVID-19 diagnosis while asymptomatic, as well as the isolating conditions of the quarantine environment. The workers coped by keeping in contact with their families, accessing healthcare, keeping updated with the news and continuing to practise their faith and religion.	We identified coping strategies employed by the workers in quarantine, many of which were made possible through the considered design of care and service delivery in mass quarantine facilities in Singapore. These can be adopted in the set-up of other mass quarantine facilities around the world to support the health and mental well-being of those quarantined. Our findings highlight the importance of targeted policy intervention for migrant workers, in areas such as housing and working environments, equitable access to healthcare, and social protection during and after this crisis.	medium
Yoosefi Lebni et al., 2022	Iran	LMIC	April 2021–July 2021	Refugees	Differential impact—social roles, family dynamics, Differential risk—lack of health information, Differential impact—economic stressors, Differential exposure—housing, Differential impact—increased barriers to healthcare	Qualitative research	The main categories include little knowledge and information (…), family challenges (…), socio-economic challenges (…), health issues (…) and problems after the death of a COVID-19 patient (…).	Afghan refugee women in Iran are very vulnerable facing COVID-19 due to their fragile conditions. Social and health institutions and organizations need to provide more support to these women so that they can protect their health and that of their families against COVID-19 and the damage caused by it.	high
Zambrano-Barragan et al., 2021	Peru, Colombia	UMIC	July 2020–September 2020	International migrants	Differential impact—increased barriers to healthcare; Differential impact—discrimination; Differential impact—economic stressors; Differential impact—mental health effects of combined stressors; Source of resilience—state assistance (in/accessible)	Qualitative research	We found that forced migrants from Venezuela in both Colombia and Peru face common obstacles along their access trajectories to healthcare, which we summarize as legal, financial, and relating to discrimination and information asymmetry. By limiting effective access to care during the pandemic, these obstacles have also affected migrants' ability to cover the costs of basic needs, particularly food and housing. Our study also found a prevalent reliance on alternative forms of care, such as telemedicine, easy-to-access pharmacies, and extra-legal care networks.	We conclude that COVID-19 has exacerbated pre-existing conditions of informality and health inequities affecting Venezuelan migrants in Colombia and Peru. (…) These findings also provide guidance for specific policy recommendations. Given legal and financial obstacles, it is important to facilitate access to public health services irrespective of migratory status.	medium

[a]Socioeconomic Development of Country based on the World Bank country classification by income; HIC: High income countries; UMIC: Upper-middle income countries; LMIC: Lower-middle income countries; LIC: Low income countries. [b]Based on quality appraisal tools of the Joanna Briggs Institute for respective study designs and appraised by two independent raters. Categories based on cut-offs of appraisal scores (high: 100-75% of possible score, medium 74-50%, and low <50%).

Table 1: **Characteristics of studies included in the qualitative synthesis.**

Author & year of publication	Country of study	Socio-economic development of Country[a]	Period of study	Migrant population	Study design	COVID-19 outcome identified by	Source of data (as reported)	Health outcomes	n (migrants)	n (non-migrants)	N (migrants)	N (non-migrants)	Quality[b]
AbuRuz et al., 2022	United Arab Emirate	HIC	March–May 2020	International migrants	Cross-Sectional Study	PCR test; 30-days in hospital mortality rate	Electronic medical records from a large government tertiary care centre in Al-Ain city	Mortality	56	34	2521	774	high
Al Awaidy et al., 2021	Oman	HIC	February 4, 2020–July 23, 2020	International migrants	Cross-Sectional Study	PCR test	National Department of Communicable Diseases	Hospitalisation ICU admissions Mortality	2351 426 153	6609 763 206	28,523 2351 2351	40,859 6609 6609	high
Altare et al., 2022a	Jordan	LMIC	April 1, 2020–March 31, 2021	Refugees	Cohort Study	Laboratory-confirmed not further specified	UNHCR data on i) COVID-19 line list and ii) routine health data iii) Jordanian cases = Johns Hopkins COVID Research Centre	COVID-19 cases	2616	609,453	115,743	10,203,140	high
Altare et al., 2022b	Uganda	LIC	March 23, 2020–March 31, 2021	Refugees	Cohort Study	Laboratory-confirmed not further specified	UNHCR data on i) COVID-19 line list and ii) routine health data	COVID-19 cases Hospitalisation ICU admission Mortality	271 95 2 4	41,077 197 1 3	1,318,351 271 95 95	45,741,008 728 197 197	high
Alqahtani et al., 2020	Saudi Arabia	HIC	March 1, 2020–May 20, 2020	International migrants	Cross-Sectional Study	PCR test	Medical records from Prince Mohammed bin Abdul Aziz Hospital in Riyadh	ICU admission	32	15	368	90	high
Aradhya et al., 2021	Sweden	HIC	March 12, 2020–February 23, 2021	International migrants	Cohort study	ICD codes	Swedish National Board of Health and Welfare	Mortality *(population based)*	641	3330	492,399	2,984,648	high
Bell et al., 2023	Sweden	HIC	March 2020–March 2022	International migrants	Cohort study	PCR test	VAL (Vård Analys Lager, the Stockholm Regional Healthcare Data Warehouse); Swedish National Tax Agency (death dates); national population registers (Statistics Sweden); SmiNet	Hospitalisation Mortality	5270 490	5225 658	555,410 5270	1,226,715 5225	high
Bonde et al., 2023	Denmark	HIC	2020–2021 not further specified	International migrants	Cohort Study	PCR test	Public registers not further specified	COVID-19 cases Hospitalisation	54,270 1363	204,706 3049	329,440 54,270	2,122,102 204,706	high
Canevelli et al., 2020	Italy	HIC	February 21, 2020–April 29, 2020	International migrants	Cross-Sectional Study	PCR test	National Institute of Health (Istituto Superiore di Sanità, ISS) (via ISTAT)	Mortality *(population based)*	68	2619	16,402	616,729	medium
Casanova et al., 2021	USA	HIC	May 5, 2020–September 15, 2020	Undocumented migrants	Cohort study	Test not further specified	COVID Prison Project (CPP); The New York Times, with denominator data from the American Community Survey	COVID-19 cases	2942	351,717	16,166	9,979,856	medium
Chilunga et al., 2022	The Netherlands	HIC	March 1, 2020–March 14, 2021	International migrants	Cohort Study	ICD codes	Basic population register from Statistics Netherlands; cause of death registry	Mortality	4584	23,365	4,238,000	13,183,000	high

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Author & year of publication	Country of study	Socio-economic development of Country[a]	Period of study	Migrant population	Study design	COVID-19 outcome identified by	Source of data (as reported)	Health outcomes	n (migrants)	n (non-migrants)	N (migrants)	N (non-migrants)	Quality[b]
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Coyer et al., 2021	The Netherlands	HIC	February 29, 2020–May 31, 2020	International migrants	Cross-Sectional Study	PCR test	Amsterdam-Amstelland COVID-19 notification database	Hospitalisation *(population based)*	319	204	486,534	386,521	high
D'Ambrosi et al., 2021	Italy	HIC	March 1, 2020–April 30, 2020	International migrants	Cross-Sectional Study	Nasopharyngeal swab test not further specified	Medical data on pregnant women from Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico, Milan, Italy (Province of Milan Lombary)	COVID-19 cases	56	22	902	629	high
Darwish et al., 2022	Canada	HIC	March 1, 2020–August 31, 2020	International migrants	Cohort Study	Laboratory-confirmed not further specified	Electronic medical records (four major tertiary care hospitals in Montéal)	ICU admission Mortality	33 5	9 1	581 581	471 471	high
Diaz-Menendez et al., 2021	Spain	HIC	February 25, 2020–April 19, 2020	International migrants	Cross-sectional Study	"confirmed cases" not further specified	La Paz University Hospital (Madrid)	ICU admission Mortality	25 34	50 426	486 486	1740 1740	medium
Dimopouplou et al., 2023	Greece	HIC	March 1, 2021–June 30, 2021	International migrants	Cross-sectional Study	Seroprevalence	Survey data (conducted in seven university departments of pediatrics across the country)	COVID-19 cases	17	91	120	638	high
Drefahl et al., 2020	Sweden	HIC	March 13, 2020–May 7, 2020	International migrants	Cohort study	ICD codes	Swedish National Board of Health and Welfare	Mortality	720	2406	2582	14,599	medium
Dressler et al., 2021	Germany	HIC	April 27, 2020–December 6, 2020	Asylum Seekers and Refugees	Cross-Sectional Study; Cohort study	PCR test	Federal state health authority (Baden-Wuerttemberg)	hospitalisation	13	1498	603	21,635	high
Engjom et al., 2021	Finland, Denmark, Norway, Sweden, and Iceland	HIC	March 1, 2020–June 30, 2020	International migrants	Cross-Sectional Study	PCR test	Nordic Obstetric Surveillance Study (NOSS)	Hospitalisation *(population based)*	36	20	54,350	229,518	high
Erfani et al., 2021	USA	HIC	April 1, 2020–August 31, 2020	ICE detainees	Cohort study	PCR test	ICE Website; ICE Statistics Fiscal-Year 2020; US Census Bureau	COVID-19 cases	1443	442[c]	21,591	100,000[c]	medium
Fabiani et al., 2021	Italy	HIC	February 20, 2020–July 19, 2020	International migrants	Cross-Sectional Study	PCR test	Italian national case-base COVID-19 surveillance system (Italian National Institute of Health)	Hospitalisation ICU admission Mortality	4884 549 327	75,432 9066 20,823	15,507 4884 4883	195,225 75,432 75,252	high
Giacomelli et al., 2022	Italy	HIC	February 21–November 31, 2020	International migrants	Cohort Study	PCR test	Patients' clinical charts of two major hospitals in Milan	Mortality	33	245	258	921	high
Giorgi Rossi et al., 2020	Italy	HIC	February 27, 2020–April 2, 2020	International migrants	Cohort study	PCR test	SARS-CoV-2 database of the Reggio Emilia Province	Hospitalisation Mortality	64 6	997 211	202 64	2259 997	high

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Author & year of publication	Country of study	Socio-economic development of Country[a]	Period of study	Migrant population	Study design	COVID-19 outcome identified by	Source of data (as reported)	Health outcomes	n (migrants)	n (non-migrants)	N (migrants)	N (non-migrants)	Quality[b]
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Golshani & Akhlaghi 2022	Iran	LMIC	March 1–May 31, 2020	Immigrants; Refugees and Asylum seekers	Cross-Sectional Study	PCR test	Medical records of 67 hospitals in Isfahan Province	ICU admission Mortality	19 31	311 614	168 168	4960 4960	medium
Guijarro et al., 2021	Spain	HIC	February 1, 2020–April 25, 2020	International migrants	Cohort study	PCR test	Hospital Universitario Fundación Alcorcón; official municipal population registry of the City Council of Alcorcón (Madrid)	COVID-19 cases	179	856	20,301	131,599	high
Hamadah et al., 2020	Kuwait	HIC	February 24, 2020–April 20, 2020	International migrants	Cross-Sectional Study	PCR test	COVID-19 registry of all patients in Kuwait from Jaber Al-Ahmad Al-Sabah Hospital	ICU admission Mortality	40 30	11 10	829 829	294 294	high
Hamm et al., 2022	USA	HIC	March 1–December 31, 2020	Refugees	Cohort Study	PCR test	Records of Emergency Department visits at the University of Kentucky hospital system	COVID-19 cases	65	50	393	1631	high
Harkness et al., 2021	USA	HIC	February 18, 2020–August 26, 2020	International migrants	Cross-Sectional Study	Self-reported	Online Survey of Latinx sexual minority men in South Florida	COVID-19 cases Other: Effect of lockdown measures	17	1	49	44	medium
Holmberg et al., 2022	Finland	HIC	February 27, 2020–August 3, 2020	International migrants	Cohort study	Test not further specified	Electronic patient records of the Helsinki University Hospital district; Finnish Intensive Care Consortium (FICC) database; HUCH electronic patient data management systems	COVID-19 cases Hospitalisation ICU admission Mortality	845 135 38 6	3160 488 109 20	8228 845 135 135	110,072 3160 488 488	high
Immordino et al., 2022	Italy	HIC	February 2020–April 2021	International migrants	Cross-Sectional Study	unclear	Integrated national surveillance system by Italian National Institute of Health	Hospitalisation ICU admission Mortality *(case based)*	508 5 32	9987 113 4820	6819 508 6819	155,441 9987 155,441	high
Indseth et al., 2021	Norway	HIC	March 1, 2020–October 18, 2020	International migrants	Cross-Sectional Study	Test not further specified	Norwegian Surveillance System for Communicable Diseases (MSIS); Norwegian Patient register	COVID-19 cases Hospitalisation Mortality	4931 535 31	11,301 964 222	869,442 4931 535	450,801 11,301 964	high
Ingraham et al., 2021	USA	HIC	March 4, 2020–August 19, 2020	International migrants	Cohort study	PCR test	Electronic health records of 12 Minnesotan hospitals and 60 primary care clinics	Hospitalisation	301	565	1086	4491	high
Islamoska et al., 2022	Denmark	HIC	February–June 2020	International migrants	Cross-Sectional Study	ICD-10 COVID-19 diagnosis	Register based hospital data from The National Patient Register	Hospitalisation	316	1893	61,006	431,646	high

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Author & year of publication	Country of study	Socio-economic development of Country[a]	Period of study	Migrant population	Study design	COVID-19 outcome identified by	Source of data (as reported)	Health outcomes	n (migrants)	n (non-migrants)	N (migrants)	N (non-migrants)	Quality[b]
Jaqueti Aroca et al., 2020	Spain	HIC	(data until) April, 2020	International migrants	Cross-Sectional Study	PCR test	Hospital Universitario de Fuenlabrada (Madrid)	COVID-19 cases	136	782	259	1522	medium
Johnson-Agbakwu et al., 2021	USA	HIC	May 6, 2020–July 22, 2020	Refugees	Cross-Sectional Study	PCR test	Valleywise Health Medical Centre (Maricopa County, Arizona)	COVID-19 cases	8	25	45	305	medium
Kalani et al., 2021	Iran	LMIC	January 2020–December 2020	Refugees	Case-Control Study	PCR test	Medical records from 2 tertiary hospitals of Jahrom University of Medical Sciences	ICU admission Mortality	15 10	31 18	132 132	266 266	high
Kjollesdal & Magnusson 2021	Norway	HIC	April 1, 2020–December 2, 2020	International migrants	Cross-Sectional Study	Notified cases not further specified	Emergency preparedness register from: MSIS; Norwegian patient register; the Norwegian population register; Employer and Employee register	COVID-19 cases	26,547	490,872	90,585	2,639,042	high
Kjollesdal et al., 2021	Norway	HIC	March 1, 2020–November 15, 2020	International migrants	Cross-Sectional Study; Ecological study	Test not further specified	Emergency preparedness register (MSIS; Norwegian patient register)	COVID-19 cases hospitalisation	9434 747	16,416 1138	715,238 9434	3,656,036 16,419	high
Kondilis et al., 2021	Greece	HIC	February 26, 2020–November 15, 2020	Asylum Seekers and Refugees	Cross-Sectional Study	Laboratory-confirmed not further specified	COVID-19 epidemiological surveillance reports by the Hellenic Public Health organization (NPHO); Ministerial Decrees issued by the Greek Ministry of Migration and Asylum	COVID-19 cases	1106	77,553	56,221	10,816,286	high
Labberton et al., 2021	Norway	HIC	June 15, 2020–March 31 2021	International migrants	Cross-Sectional Study	PCR test	BeredtC19 Register (= emergency preparedness register)	COVID-19 cases Hospitalisation	28,642 1347	53,890 1741	912,043 28,642	4,582,626 53,890	high
Lombardi et al., 2021	Italy	HIC	April 7, 2020–June 12, 2020	International migrants	Cross-Sectional Study	Seropositivity	Medical data on healthcare workers from Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico, Milan, Italy (Province of Milan Lombardy)	COVID-19 cases	282	27	3869	186	high
Lusk & Chandra 2021	USA	HIC	March 1, 2020–March 31, 2021	Migrant workers	Ecological study	"confirmed cases" not further specified	John Hopkins University; U.S. Census Bureau; Census of Agriculture	Mortality *(case based)*	459	12,947	27,223	702,070	medium

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Author & year of publication	Country of study	Socio-economic development of Country[a]	Period of study	Migrant population	Study design	COVID-19 outcome identified by	Source of data (as reported)	Health outcomes	n (migrants)	n (non-migrants)	N (migrants)	N (non-migrants)	Quality[b]
(Continued from previous page)													
Maifredi et al., 2022	Italy	HIC	February 15, 2020	International migrants	Cohort Study	PCR test	Data from Brescia Local Health Agency database (BLHADB)	COVID-19 cases Hospitalisation ICU admission Mortality Vaccination	12,133 1214 135 58	99,186 14,374 1459 4239	134,492 12,133 1214 1214	869,718 99,186 14,374 14,374	medium
Mallet et al., 2021	France	HIC	May 2020	International migrants	Cross-Sectional Study	PCR test	Data collection in meat processing plants in France	COVID-19 cases	73	67	335	836	high
Martin et al., 2022	United Kingdom	HIC	December 2020–March 2021	International migrants	Cross-Sectional Study	PCR test; self-reported; Seropositivity	Survey data of the prospective nationwide cohort study	COVID-19 cases	718	1775	2129	6126	high
Martin-Sanchez et al., 2021	Spain	HIC	March 1, 2020–April 15, 2020	International migrants	Cohort study	"confirmed" or "highly suspicous" not further specified	Administrative databases from 18 spanish centres; National Statistics Institute of Spanish Statistical Office	ICU admission Mortality	83 69	696 1609	1498 1498	8649 8649	high
McGrath et al., 2022	Ireland	HIC	March 2020–June 2021	International migrants	Case-Control Study	PCR test	All contact tracing records within the hospital site (Dublin, Ireland)	COVID-19 cases	127	158	718	1093	high
Mema et al., 2021	Canada	HIC	March 28, 2020–May 10, 2020	Migrant workers	Cohort study	PCR test	Panorama, Interior Health's public health information system	COVID-19 cases	23	0	31	6	medium
Methi et al., 2021	Norway	HIC	August 1, 2020–May 1, 2021	International migrants	Cohort study	PCR test	BeredtC19	COVID-19 cases Hospitalisation Mortality	12,827 1250 54[d]	14,903 996 117	193,654 12,827 1250	528,101 14,903 996	high
Nair et al., 2021	United Arab Emirates	HIC	March 1, 2020–June 30, 2020	International migrants	Cross-Sectional Study	PCR test	Medical data from two public hospitals in Al Ain	Mortality	65	30	2354	716	high
Ngiam et al., 2020	Singapore	HIC	February 2020–April 2020	Migrant workers	Cross-Sectional Study	PCR test	Hospital in Singapore [not further specified]	ICU admission Mortality	1 0	13 2	425 425	100 100	high
Nordberg et al., 2022	Sweden	HIC	March 1, 2020–June 15, 2021	International migrants	Case-Control Study	Laboratory-confirmed not further specified	Data from the Swedish Intensive Care Register (SIR)	ICU admission Mortality	1927 574	2989 990	11,980 1927	37,224 2989	high
Norman et al., 2020	Spain	HIC	March 2020–May 2020	International migrants	Cross-Sectional Study	PCR test	Electronic medical records of a (1000-bed) tertiary referral centre, Madrid	ICU admission Mortality	71 40	187 443	389 389	1956 1956	high
Norredam et al., 2023	Denmark	HIC	February 1, 2020–July 1, 2021	International migrants	Cohort Study	ICD-10 diagnosis	The National Patient Register & Civil Registration Registry	Mortality	104	868	1296	4992	high
Otto et al., 2021	USA	HIC	March 1, 2020–February 28, 2021	International migrants	Ecological study	PCR test	Data of the Children's Hospital of Philadelphia Care Network	COVID-19 cases	113	1171	596	9542	medium

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Author & year of publication	Country of study	Socio-economic development of Country[a]	Period of study	Migrant population	Study design	COVID-19 outcome identified by	Source of data (as reported)	Health outcomes	n (migrants)	n (non-migrants)	N (migrants)	N (non-migrants)	Quality[b]
(Continued from previous page)													
Pagani et al., 2021	Italy	HIC	December 23, 2020–February 19, 2021	International migrants	Cross-Sectional Study	Rapid antigen test	Cross-sectional prevalence study in the San Siro social-housing neighbourhood of Milan	COVID-19 cases	13	14	472	1572	high
Passos-Castilho et al., 2022	Canada	HIC	March 1–August 31, 2020	International migrants	Cross-Sectional Study	PCR test	Medical records at four tertiary care hospitals in Montreal (Quebec); laboratory data and semi-structured phone survey	ICU admission Mortality	205 83	133 83	622 622	471 471	high
Richard et al., 2023	Canada	HIC	June 2021–April 2022	International migrants	Cohort Study	Self-reported	Survey data (Ku-gaa-gii pimitizi-win study, Toronto)	COVID-19 cases	64	60	169	246	high
Rostila et al., 2021	Sweden	HIC	January 31, 2020–May 4, 2020	International migrants	Cohort study	ICD codes	Swedish register data "Aging Well"; cause-of-death register maintained by the National Board of Health and Welfare	Mortality Other: Effect of lockdown measures	438	1016	1336	4329	high
Sempere-Gonzalez et al., 2021	Spain	HIC	March 1, 2020–April 30, 2020	International migrants	Cohort Study	PCR test	Medical records of Vall d'Hebron University Hospital, Barcelona	Hospitalisation ICU admission Mortality	19 40 0	83 110 22	142 142 19	558 558 83	high
Sisti et al., 2023	Italy	HIC	January 4, 2021–January 31, 2022	Asylum seekers	Cohort Study	positive molecular test result for SARS-CoV-2 [or] positivity by rapid antigen tests	Italian National Institute for Health, Migration, and Poverty (INMP) electronic platform in collaboration with the managers of the isolation and quarantine facilities	COVID-19 cases	2861	7,265,656	70,512	40,902,006	medium
Udell et al., 2022	Canada	HIC	January 1–December 31, 2020	International migrants	Cohort Study	PCR test	linkage of multiple databases (e.g., hospital discharge abstracts, physician claims, chronic disease registries, health survey, laboratory, and drug dispensing data) and the Immigration, Refugees and Citizenship Canada (IRCC) Permanent Resident database	COVID-19 cases	7836	12,688	102,023	476,240	medium
Vosko & Spring 2021	Canada	HIC	2020–2021 (not specified)	Migrant workers	Mixed-Methods: Primarily Qualitative Research	unclear	Not explicitly stated	COVID-19 cases Other: Effect of lockdown measures	994[e]	36,594	20,015	14,637,600[e]	medium

(Table 2 continues on next page)

Author & year of publication	Country of study	Socio-economic development of Country[a]	Period of study	Migrant population	Study design	COVID-19 outcome identified by	Source of data (as reported)	Health outcomes	n (migrants)	n (non-migrants)	N (migrants)	N (non-migrants)	Quality[b]
(Continued from previous page)													
Warszawski et al., 2022	France	HIC	May 2020–November 2020	International migrants	Cohort Study	Seroprevalence	FIDELI national database	COVID-19 cases *(November)*	291	3172	3337	54,296	high
Wiedmeyer et al., 2023	Canada	HIC	January 1, 2020–July, 31 2021	International migrants (including international students), Migrant workers	Cross-Sectional Study	Test not further specified	Medical Service Plan (MSP) registry file; SARS-CoV-2 testing; physician payments via Population Data British Columbia	COVID-19 cases Other: health services access	50,407	93,405	1,126,304	4,146,593	high
Zlot et al., 2021	USA	HIC	February 29, 2020–November 29, 2020	International migrants	Cohort study	Laboratory-confirmed not further specified	Oregon Pandemic Emergency Response Application (Opera); HIV cases in Oregon Public Health Epidemiologists' User System (Orpheus); CDC's Enhanced HIV/AIDS Reporting System (eHARS)	COVID-19 cases	40	91	249	2083	high

[a]Socioeconomic Development of Country based on the World Bank country classification by income; HIC: High income countries; UMIC: Upper-middle income countries; LMIC: Lower-middle income countries; LIC: Low income countries. [b]Based on quality appraisal tools of the Joanna Briggs Institute for respective study designs and appraised by two independent raters. Categories based on cut-offs of appraisal scores (high: 100-75% of possible score, medium 74-50%, and low <50%). [c]Monthly case rate (August 2020); no information on adjustment. [d]This is not the absulte number as we had to impute cases when the article reported ≥5. [e]Calculated based on the infection rate and numbers given in the paper.

***Table 2:* Characteristics of studies included in meta-analysis.**

The main migrant category studied was international migrants defined by various indicators of migratory status (Panel 1). We grouped studies based on the underlying indicators of migratory status and provide an explorative subgroup analysis in the supplement (Supplementary Fig. S21). Among these groups, infection risk in migrants whose migratory status was defined by country of birth or region of origin was almost twice the risk of non-migrants (with narrow PIs), and inequalities appeared to be more pronounced among foreign workers and when migration status was defined via language (Supplementary Fig. S21). Inequalities in infection risk compared to non-migrants were varying widely (wide PI) in migrants living in any kind of shared accommodation (refugee camp, dormitory, detention facility) indicating high between study variations (e.g., through the socioeconomic development (HIC vs. lower MIC) of the countries of study or setting (reception centre and detention facility vs. large refugee camps)).[23,26,39]

Twenty studies reported on *hospitalisation* of migrant and non-migrant SARS-CoV-2 infected individuals,[24,25,33,34,38,40,42,47,57–68] whereof 12 studies were eligible for quantitative synthesis.[24,25,33,34,38,40,42,47,62,63,67,68] Overall, the risk of hospitalisation appeared to be comparable among both population groups (RR = 1.10; 95%-CI: 0.91–1.33) (Fig. 3). The analysis showed no significant effect, which is also confirmed by the drapery plots (Supplementary Fig. S7). However, studies from Southern Europe tended to report a lower risk in migrants compared to non-migrants,[42,62,63,67,68] whereas studies conducted in Northern Europe reported slightly elevated risk among migrants (Fig. 3).[25,33,34,38,40,47]

The meta-analysis of the outcome *ICU admission* included 12 out of 19 studies and showed 1.23 (95%-CI: 0.99–1.52) times the risk in migrants compared to non-migrants (Fig. 4).[33,42,57,62,63,69,70,71,72,73,74,75] The risk difference among the groups was 0.02 (95%-CI: –0.00-0.04) (Fig. 4). Drapery plots confirmed significant effects (Supplementary Fig. S11).

As for *mortality*, 22 out of 30 studies were eligible for meta-analysis (Supplementary Chapter 6.4.).[33,34,47,48,58,63,67,69,70,72–74,76–85] Studies with mortality as outcome used different denominators: hospitalised cases vs. population-based mortality within the respective time-period and geographic region. This resulted in different trends and patterns of inequality. If studies reported mortality due to or associated with COVID-19 using all deaths in the population as denominator (population-based mortality), the risk for fatal outcomes tended to be higher (RR = 1.46 (95%-CI: 0.95–2.26)) in migrants compared to non-migrants with an absolute risk difference of 0.08 (95%-CI: –0.01–0.16) (Fig. 5). However, only four studies using population-based mortality fed into the synthesis (Supplementary Fig. S15). With hospitalised cases as denominator for

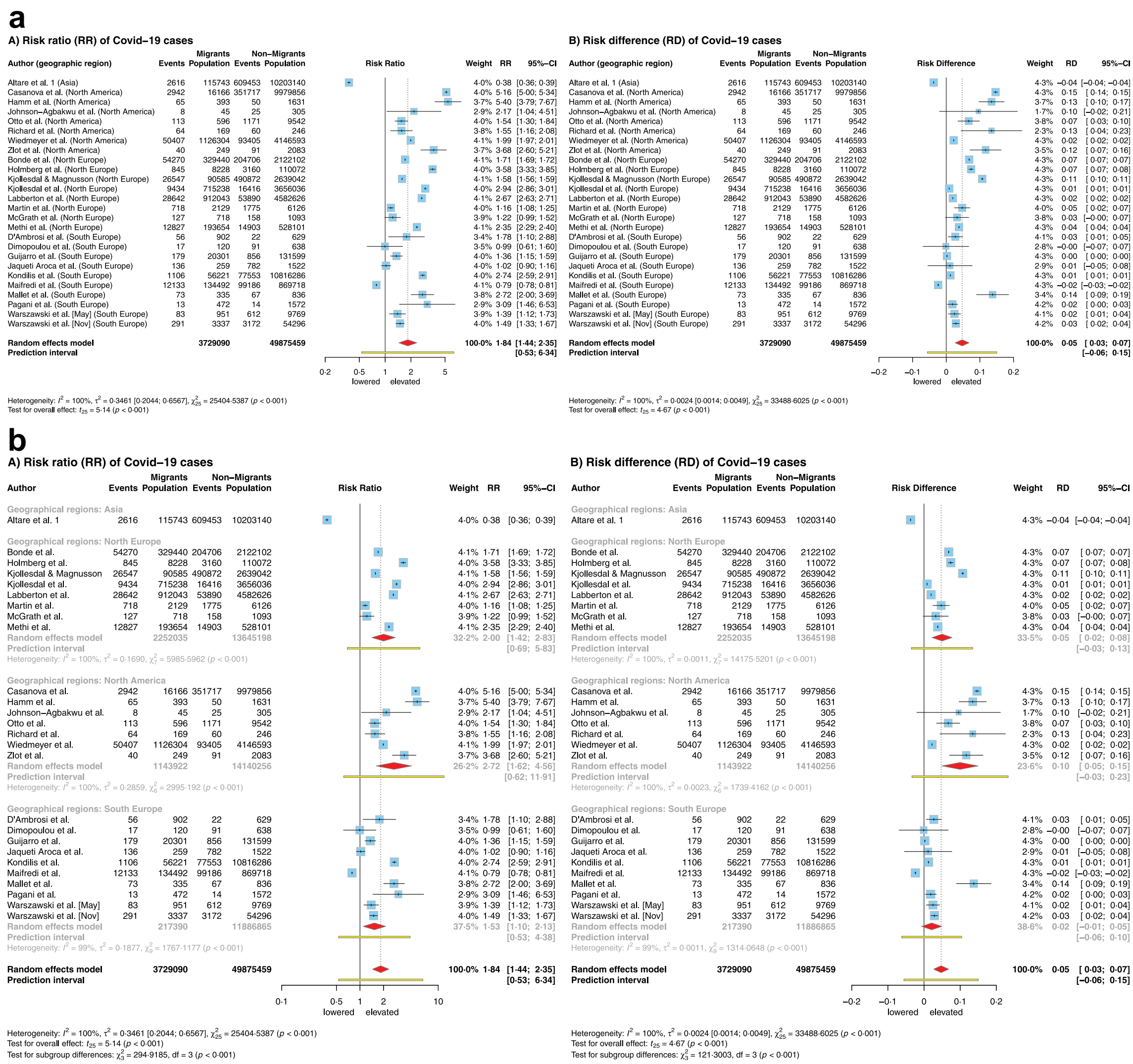


Fig. 2: **a: Forest plot of relative risk (A) and risk difference (B) of COVID-19 cases between migrants and non-migrants. b: Forest plot of relative risk (A) and risk difference (B) of COVID-19 cases between migrants and non-migrants by geographical region of study.** Legend: Events: COVID-19 cases; Population: denominators; CI: Confidence Interval; I2 and Tau2: Measures of heterogeneity. Warszawski et al. reported cases for May [May] and November [Nov] 2020 from independent surveys and thus appears twice.[54]

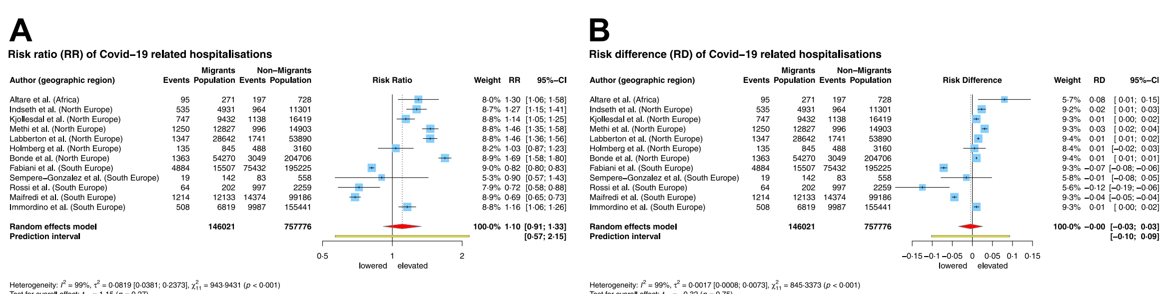


Fig. 3: **Forest plot of relative risk (A) and risk difference (B) of hospitalised cases between migrants and non-migrants.** Legend: Events: hospitalised cases; Population: denominators (COVID-19 cases); CI: Confidence Interval; I2 and Tau2: Measures of heterogeneity. Studies reporting on other denominators were excluded from the analysis.[58,59,61,65]

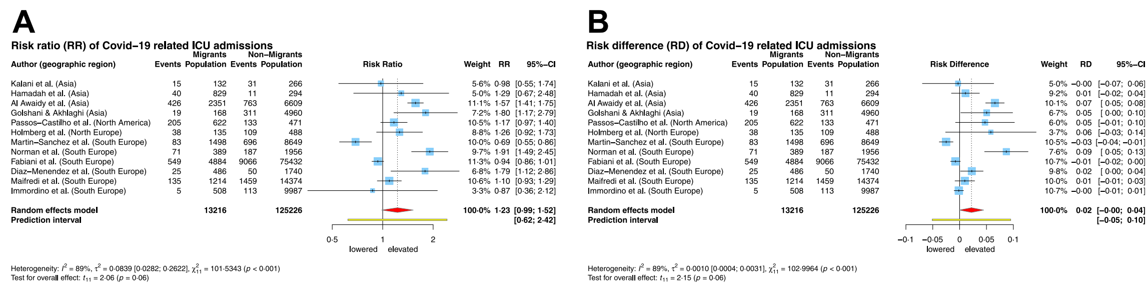


Fig. 4: **Forest plot of relative risk (A) and risk difference (B) of ICU admissions between migrants and non-migrants.** Legend: Events: ICU admissions; Population: denominators (hospitalised cases); CI: Confidence Interval; I2 and Tau2: Measures of heterogeneity. Studies reporting on other denominators were excluded from the analysis.[68,76]

incident COVID-19 associated deaths (hospital mortality), the mortality risk in migrants appeared to be almost half that of non-migrants (RR = 0.56; 95%-CI: 0.42–0.76) with a risk difference of –0.06 (95%-CI: –0.09–(–0.03)) (Fig. 5) based on a sample size of 51,171 participants analysed. Drapery plots confirmed a 99%-CI in the results for RR and RD (Supplementary Fig. S19).

Overall, 16 studies were potentially based on non-unique data sources. Sensitivity analyses showed estimates to be robust against potential duplicates, with the exception of ICU admission and hospital-based mortality estimates (Supplement Chapter 6.1.2; 6.2.2; 6.3.2; 6.4.2; 6.4.4).

The *qualitative synthesis* was based on 75 high-to moderate-quality articles and provided insights into the syndemic nature of the COVID-19 pandemic by showing the complex interactions between social and COVID-19-related factors that have resulted in relative disadvantages for migrants.[53,88–161] Fig. 6 illustrates exposures, risks, and impact of COVID-19 measures as well as sources of resilience for migrant populations, each at micro-, meso-, and macro-levels (i.e., at the level of the individual, the family/community, and state/society, the latter including policies and institutions such as the healthcare system and the labour market). “Exposure” refers to aspects in the living and working environment of a person that determine the extent to which that person comes into contact with SARS-CoV-2; whereas “risk” designates factors shaping that person’s interaction with these exposures. Factors in the different categories and on the different levels interacted and compromised the physical and psychosocial health of migrants in severe and sometimes unique ways.

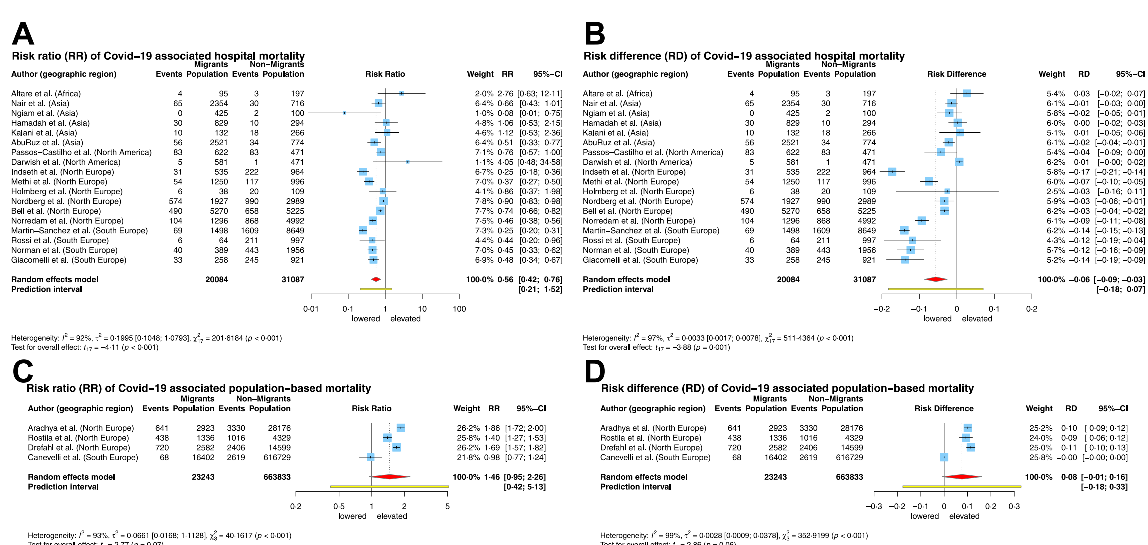
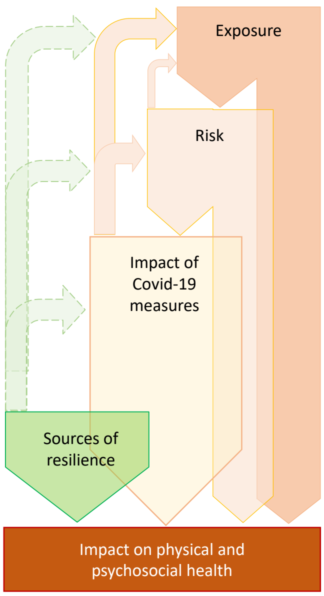


Fig. 5: **Forest plot of relative risk and risk difference of mortality between migrants and non-migrants for hospitalised cases A) and B) and population-based mortality C) and D).** Legend: Events: COVID-19-related deaths; Population: denominators (hospitalised cases A) and B); population-based mortality C) and D)); CI: Confidence Interval; I2 and Tau2: Measures of heterogeneity. Studies reporting on other denominators were excluded from the analysis.[63,86,87]

Risks and impact related to Covid-19 and pandemic measures for migrants: summary of qualitative research findings



Exposures, risks and impact on the...		
... micro/individual level	**... meso/family, community level**	**... macro/society, state, health system**
	- Crowded housing, incl. higher transmission risk, limited options for isolation - Conditions in camp-like settings, incl. inadequate occupancy, sanitation, prevention) - Social norms; e.g. pressure to participate in events, risk perception, religious fatalism	- No work security and/or governmental support - Essential and high-risk jobs, incl. need to use unsafe transportation - "Import" of migrant labor for specific sectors amidst lockdown
- Non-affordability of preventive means - Low health literacy - Language barriers	- Camps/Labor migrants/Detention centres: penalization of demand for preventive or response measures	- No/Late/Insufficient provision of health information and neglect of linguistic diversity - No/Limited health coverage - Distrust in health system and authorities, frustration over discrepancies between health information and reality
- Economic impact, e.g. loss of job/income, debt, food/housing insecurity, hazardous alternative livelihood strategies - Uncertainty (legal, personal, professional, migration prospects) Particular effects on - women: increased care workload - children: impact on education, child labor	- Inability to fulfil social roles; e.g. send remittances, breadwinner - Impact on social and family dynamics - Impact on transnational lives, "living the pandemic twice"	- Impact on migration project; e.g. suspension of migration-related services/asylum procedures, return migration - Increased stigmatization, discrimination - Compromised provision of/access to social and health services - Differential measures in certain settings; e.g. severe mobility restrictions in camps/among in house care-workers; collective response measures, obligatory testing
- Framing (e.g. "We've been through worse.") - Communication with family and peers via social media - Recreational/Spiritual activities - Safety (e.g., having a safe place to live, being at home) - Financial resources	- Mutual (material, psychosocial) support among kin, peers and/or local communities - Decent work conditions, incl. participation	- State or NGO assistance (e.g. food/ financial aid, shelter – in theory; in practice often no access) - Access to health information - Trust in authorities - Adaptation of services (e.g. online) - Legal status (allows to assert rights) - Effective intersectoral exchange and collaboration

Fig. 6: **Risks and impacts related to Covid-19 and pandemic measures for migrants: a summary of qualitative research findings**.

Our synthesis shows that migrants faced exposures at meso- and macro-level; among these exposures, crowded housing conditions, working in essential and/or high-risk jobs and precarious conditions, and lack of governmental support emerged as particularly critical.[88,94,97,99,101,104,107,108,110,116,117,121,125,135,137,141,149,154–160] Some studies further pointed to the role of social norms in creating exposures, describing for instance that some communities may tend to put pressure on their members to participate in gatherings and events. Risks existed at all three levels. At the individual level, the included studies identified unaffordability of personal protective equipment, low health literacy, and language barriers.[101,108,111,118,128,140] These risk factors can be cross-referenced to the macro- and meso-level. Studies reported late, insufficient, or no provision of health information in ways that accommodate linguistic diversity, formal barriers to health services, and distrust in institutions, including public health services.[89,106,108,111,115,118,119,121,128,132,134,137,143,146,149,153,155,159] Several studies described discrepancies between the official health information provided and the actual living conditions of some migrant populations as a source of frustration and alienation, which, in turn, could lead to an overall rejection of pandemic measures; for example, when camp-like settings (camps, accommodation centres for asylum-seekers, shared housing for labour migrants, detention centres) made it impossible for the residents to maintain social distancing or adequate hygiene practices. Further risks at the meso-level include retaliation from employers, camp managers and detention officers, which deterred migrants from demanding preventive and response measures such as the provision of protective equipment, testing, or quarantining.[53,122,141,146,152,156]

Among the impacts of the COVID-19 pandemic and pandemic measures, two interrelated factors figured prominently across the literature: On the individual level, lockdown measures entailed severe economic consequences (such as job loss) which, in turn, sometimes necessitated hazardous alternative livelihood strategies such as survival prostitution or child labour. On the macro-level, pandemic measures impacted on migration prospects and migration trajectories (e.g., related to disruption of relevant services such as visa and work permit renewal or the processing of asylum applications, or return migration). Combined, these factors generated major legal and social insecurity for migrants and, as a corollary, fears of failing one's "migration project".[89,91,92,95,102,105–107,113,117,124,130,133,142,147] The above factors are intertwined with meso-level factors: the inability to fulfil social roles (such as acting as the family's breadwinner, sending remittances) influenced family dynamics, including gender and intergenerational roles[91,104,105,107,112,115,116,129,130,150,158,159]; and the transnational character of their lives added to migrants' distress as they feared for the wellbeing of their beloved ones back home while experiencing crisis in their host country ("living the pandemic twice").[96,98,126,130] Further impacts on the macro-level include increased discrimination and aggravated barriers to health and social services.[89,90,93,100,110,120,123,125,127,131,136,138,143,148,149,160,161] In some settings, they involved the effects of differential pandemic measures. For instance, migrants in camp-like settings as well as in-house domestic workers were often subjected to severe mobility restrictions. On top, in many camp-like settings, collective response measures such as mass quarantine or obligatory testing were imposed on the residents.[92,98,100,101,116,126,139,140,142,152] Our analysis highlights the severe, to some extent unique, and in part unintended consequences of pandemic control measures for migrants.[92–94,100–102,107,109,112,114–116,129,130,134,140,141,152] More than the pandemic itself, these unintended consequences of pandemic measures have contributed significantly to the severe psychosocial impact on migrants.[93,106,114,139,140]

Our analysis pinpoints sources of individual, community and systemic resilience that can counteract some of the above described exposures, risks, and impact of pandemic measures. Among the main individual-level sources of resilience are optimistic framings of the crisis (e.g., "We've been through worse.") and the exchange with family and peers via social media.[89,96,101,108,113,116,117,139,148,149,158] Mutual material and psychosocial support as well as decent work conditions that allow for a sense of control and participation are important community-level sources of resilience.[91,94,99,103,110,116,124,128,132,141,142,145,148,150,154,155,157] Macro-level sources of resilience include access to governmental assistance, the tailored provision of health information, trust in the authorities, and legal status, which is key to being able to assert one's rights.[53,89,94,96,98,99,106,108,131,132,134–136,139,141,144,147,151,155,157,160] Our analysis shows that many of these meso- and macro-level sources of resilience have been inaccessible for migrants during the COVID-19 pandemic, especially during the pandemic's first phase.[53,106]

In later phases of the pandemic, in some contexts, policy responses to the Covid-19 pandemic were adjusted, for instance, in terms of migrants' inclusion in the provision of governmental assistance and tailored health information, leading to improved social and health outcomes.[98,154] Eventually, our analysis highlights the multifaceted interrelations among the various factors in the different categories and on the different levels, with some key factors triggering cascading effects and feedback loops (Panel 2).

Evidence for vaccination coverage among migrant populations was mixed. We identified 30 studies that investigated vaccination coverage. Nine studies focused on migrant populations only.[162–170] Eighteen articles investigated migrants compared to the non-migrant populations and one examined migrants in different settings.[42,171–186] Two-thirds of the studies using comparison groups showed that the migrant populations had lower vaccination rates than non-migrants (ranging from 5 to 34 percentage-points difference in population based settings; in specific settings (e.g., informal settlements) the difference was up to 43 percentage-points).[42,171,173–181,185] The majority of studies was conducted in HIC (n = 21) and upper MIC (n = 6). Only two studies reported data from lower MIC. Five studies (conducted in Switzerland, USA, Canada and China) found higher or similar vaccination rates in migrants compared to non-migrant groups. However, the difference amounted to a maximum of eight percentage points and there were considerable differences with regard to the migrants' countries of origin.[172,182–184,187] Differences across country contexts may also stem from access and accessibility to health information, as suggested by the European Centre for Disease Prevention and Control technical report.[186] Alongside the empirical studies, two modelling studies with medium and low quality recommended to include migrants in the national vaccination strategy to prevent COVID-19 incidence and ensure cost-effectiveness.[188,189] Overall, studies were very heterogenous regarding the study population, sample size, setting, reporting of vaccination coverage, and countries of studies.

Discussion

Our meta-analysis quantified inequalities in risk of SARS-CoV-2 infection, hospitalisation, ICU admission, and mortality between migrants and non-migrants in HIC. We found that the infection risk was nearly twice the risk among migrants compared to non-migrants, at five percentage-points higher on average. Inequalities tended to be more pronounced in Northern Europe and North America, and lower in Southern Europe. These differences could be related to differences in access to health systems (e.g., based on legal status), in testing policies and management of COVID-19 cases, or in environmental risks (e.g., occupation and accommodation). Especially precarious living conditions such as overcrowding or lack of sanitation and/or pandemic control measures applied in the settings (e.g., mass quarantine) may lead to higher infection risk.

We found no evidence for inequalities in risk of hospitalisation, which stands in contrast to inequalities observed between ethnic minorities (e.g., Hispanic, Black, Asian) and majority populations (e.g., White), indicating that different mechanisms are at play in the pathway between health and ethnicity versus migration.[190] The different hospitalisation risks could also stem from different functioning of health systems in different countries of studies. Moreover, lower hospitalisation rates are not *per se* a "positive" outcome, as they may also indicate under-treatment in the sense that migrants may have received less referrals to hospitals despite being at (same or higher) need for tertiary care compared to non-migrants. Formal evaluations of differences in need for tertiary care (e.g., symptom severity) between migrants and non-migrants were not performed in the identified studies (beyond adjustments for age and sex). The assumption of under-treatment or late referral appears plausible, as our meta-analysis

Panel 2: Vignettes to illustrate cascading effects and feedback loops for different migrant groups deriving from pandemic control measures.

Vignette a) "Migrants with precarious legal status"

The pandemic-related closure of offices and services obstructed the renewal of residence and work permits for migrants with precarious legal status. Informal labour markets were severely impacted by pandemic measures, leading to widespread loss of jobs and livelihoods, with no social safety nets in place. The resulting legal and economic insecurities amplified existing power differentials, put migrants at risk of exploitation, and generated major psychosocial distress due to the uncertain future prospects in the host country. Pressures to send money to families and communities back home exacerbated such distress. The coping strategies of migrants and their families sometimes involved extremely hazardous employment, including child labour and survival prostitution. This, in turn, increased the exposure to and risk of a SARS-CoV-2 infection, but also other health issues such as injuries, sexually transmittable diseases, violence, unwanted pregnancies, and ill mental health. Adverse social consequences include descent into extreme poverty, food insecurity, impacts on children's education, stigma, and tensions within families over changing gender and intergenerational roles. Access to social and health services, including tailored services such as walk-in clinics for uninsured patients, were also compromised due to the pandemic. The only available source of material and psychosocial support were often informal networks based on kinship, diaspora and religious communities.
(Synthesis based on Babuc 2021, Da Mosto et al. 2021, Knights et al. 2021, Filippi & Giliberti 2021, Im & George 2021, Martuscelli 2021, Sabar et al. 2021, Sanò & Della Puppa 2021, Sohel et al. 2021, Thomas et al. 2021, Yee et al. 2021, Zambrano-Barragan et al. 2021)

Vignette b): "Migrant domestic care workers"

Domestic care workers faced particularly strict pandemic measures and related changes in their working conditions: With their work permit and visa often bound to a specific employer/client, many had to accept severe mobility restrictions, namely cohabitation with their client in combination with strict curfews, and increased workloads (e.g., more cleaning and washing), alongside obligatory quarantine and testing measures, in order to keep their job. Cohabitation with the client meant a loss of personal freedom and privacy, longer working hours, constant availability, less rest and breaks, and more stress. Non-compliance with health and safety protection such as a lack of protective equipment or of paid sick leave was frequently noted. This increased health risks for domestic workers, including burnout and other mental health problems. Domestic workers were very concerned about being terminated due to a SARS-CoV-2 infection or for other health reasons. In some studies they described their work situation during the pandemic as a "prison" or as being trapped in a climate of constant control, abuse and fear, with no options to leave an employer without also losing their work permit and visa.

In studies that described their situation in positive terms (e.g., as having a safe job and income and a safe place to stay), such framings depended on the quality of the relationship with the employer/client and decent employment practices (e.g., ensuring the worker's day off and participation in familial decision-making). Being able to communicate with the family back home during the pandemic, e.g., via social media, was described as another source of resilience—and at the same time as potential stressor. Many migrant domestic care workers continued being responsible for their families in the home country. This double responsibility of care translated into a "dual-country experience of the pandemic"; that is worries for the well-being of the family back home, increased pressure to send remittances, alongside the (often sole) responsibility for the care and health of the client in the host country.
(Synthesis based on de Diego-Cordero et al. 2022, Lui et al. 2021, Kaur-Gill et al. 2021, Kuhlmann et al. 2020, Nasol & Francisco-Menchavez 2021, Sabar et al. 2021, Sanna 2021)

indicates that once infected and hospitalised, migrants experienced more severe courses of disease: the risk of being admitted to ICU was 23% higher in relative, and two percentage points higher in absolute terms among migrants compared to non-migrants (albeit with broad PIs). While the share of migrants in deaths among hospitalised cases was lower (likely due to age differences), their share among deaths at population-level measured by population-based mortality was 46% higher in relative and eight percentage points higher in absolute terms, compared to non-migrant populations in the respective studies. Higher population-based mortality in migrant populations might be due to adversities related to social determinants such as income, work environment, housing, education, or health services access (e.g., under-treatment) and even legal aspects concerning migratory status. Overall, the meta-analysis of this review is mainly based on data from HIC and thus may not apply to (lower) MIC/LIC.

Intersections among COVID-19-related exposures, risks, and impacts of pandemic measures in migrant populations compromised their physical and mental health in severe and sometimes unique ways, which was found not only in high- and upper-middle-income but also in (lower) middle- and low-income countries. Cascading effects and feedback loops became evident, highlighting the syndemic nature of the COVID-19 pandemic.[191,192] We also found (potential) sources of resilience, indicating entry points for measures to better protect migrants during health emergencies. Notably, our analysis highlights examples where greater inclusion of migrants in pandemic measures and social support mechanisms during later phases of the pandemic (e.g., provision of tailored information and of governmental assistance) has led to better social and health outcomes. Overall, the qualitative results highlight intersecting socio-economic, work-related and legal precarity as key determinants of health inequalities faced by migrants.[108,119,134] This is further underscored by studies, which describe some states' special policies to recruit migrant workers amid lockdowns for agricultural and care work, often in precarious labour contexts.[53,101,119,141,144] Asylum seekers and other undocumented migrants were also absorbed in "essential" sectors to meet labour shortages.[193] These examples illustrate the reliance of globalised economies on migrants as an essential, yet precarious workforce. The COVID-19 pandemic has highlighted that the same extractivist economic approach shifts the social costs of labour, including health risks, to the migrant workers and their communities.[194] The qualitative results thus underscore the importance of a political economy-perspective to understand the structures that generate and sustain social and health inequities for migrants. Sub-regional and regional governance structures that promote trade and mobility for economic cooperation need to ensure migrant and worker health as a key requisite of development and sustainability. There is a critical need for governments, international organisations, civil society and migrant communities to engage with industry actors (e.g., employers, industry associations, unions) in sectors and industries where migrant workers are overrepresented. The underutilisation of the domain of work, including occupational safety and health programs, in addressing the health of migrants is truly a missed opportunity for global health.[195]

We found a high degree of heterogeneity among studies regarding the design, migrant populations, quality of data (including the different classifications of COVID-19 cases), and countries of studies. Poor reporting in primary studies raised considerable challenges in meta-analysis. This was most pronounced for mortality due to the use of different denominators: population, COVID-19 cases, COVID-19-related hospitalised cases or all-cause deaths in the total population. The latter two ways of reporting mortality have been identified by Karanikolos and McKee as a factor which substantially limits the comparability of COVID-19-related mortality between countries.[196] Another way to address mortality related to the COVID-19 pandemic was to examine differences in all-cause mortality before and during or after the pandemic (excess all-cause mortality). However, we did not include such studies in our meta-analysis due to the lack of comparability with the other studies. Our review underlines the need for harmonised reporting in future health emergencies to ensure comparability of mortality estimates across countries and studies. The trend to lower mortality rates in hospitalised cases is dependent on testing strategies, and adjustment for age and comorbidities, which was not always performed in primary studies yielding estimates prone to confounding. In contrast, excess rates of age- and sex-standardised mortality due to COVID-19 among the population are more likely to reflect the true mortality risks. As a consequence of the *unadjusted estimates* reported in our review the population-based mortality in migrant populations might be underestimated as migrants tend to be younger than the general population in the country of destination. In view of this, our results indicate that migrants tended to be at considerably higher risk of death associated with COVID-19 than non-migrants during the pandemic (until 09/2023). Nevertheless, estimates from our meta-analysis should be used with caution given the mostly unadjusted data reported in most primary reports.

The strength of this review is the synthesis of all (high- to moderate-quality) evidence retrievable from indexed and considered grey-literature sources, comprising both qualitative *and* quantitative studies on health-related impacts of the COVID-19 pandemic on migrants globally. The analysis of the interconnectedness of exposure, risk, and impact of pandemic measures at micro-, meso-, and macro-levels benefitted from qualitative research, which captures social phenomena in their complexity and within their particular context, thereby allowing us to contextualise findings. Despite an overwhelmingly broad landscape of literature, however, our knowledge of some groups and migration phases still remains scarce and sketchy, for example, related to labour migrants, undocumented migrants, migrants with disabilities, elderly migrants, returnees, migrants in transit, or in pre-migration phases. Countries of studies were mainly destination countries so that evidence is skewed toward COVID-19-related migrant health in the *post-migration* phase. Further efforts are required to better reflect health-related aspects of the complex migration trajectory by considering pre- and peri-migration aspects. Additionally, quantitative findings clearly focus on HIC, so that evidence on COVID-19 outcomes of disease in migrants in low- and middle-income countries remains scarce despite our global search.

The meta-analysis provides valuable evidence of the magnitude of COVID-19-related inequalities, despite being limited by the striking heterogeneity of underlying primary studies and the reliance on crude (i.e., unadjusted) estimates. Cautious interpretation is required due to poor quality of reporting in primary quantitative studies. As mentioned above, we could not adjust the RR for age and sex because the data were either not reported or even unavailable to the authors of primary studies upon request. This risk of confounding negatively impacts on our results, and highlights the urgent need to improve the reporting quality and primary data in studies and routine data presenting migration-stratified outcomes (in health emergencies and beyond). Another source of potential bias stems from the fact that we could not deduplicate individuals, whose data may have been included in different reports but who essentially were drawn from the same dataset or cohort. This related to 16 studies (Norway: n = 5, Sweden: n = 3, Italy: n = 3, Spain: n = 3, Canada: n = 2) and mostly referred to estimates derived from population-based registries. However, following a sensitivity analysis (Supplement Chapter 6), we can assume that the effects on the estimates of overlapping data sources were marginal; as effects with and without respective potential duplicate data sources did not differ significantly (with the exception of estimates for ICU admission and hospital-based mortality). The grey literature search was comprehensive, but not exhaustive as further potentially relevant websites (UNHCR, WHO, Regional Public Health Associations) were not searched due to time and resource constraints. Overall, the broad search enabled to include studies from different research fields, but this posed a challenge to the applicability of the quality appraisal tools. For 15 studies, only a few questions of the JBI checklists were applicable. We included English, German and Spanish articles, so that articles in other languages, e.g., French, Chinese or Arabic, could not be considered and thus studies from respective countries may not have been included. However, we can assume that relevant papers would have been indexed in searched databases and would have been identified by our non-restricted search. We can also assume that most of the information published on COVID-19 is published in English.[197] Given only four articles were excluded based on language, a risk of selection bias induced through language restrictions may be negligible.

Our review sheds a glaring light on the lack of evidence on important measures of pandemic response, such as vaccination coverage among migrants, until September 2023. We found only 8% of studies investigating vaccination coverage among migrant populations. The results were mixed, with two thirds of the studies with comparison groups reporting lower vaccination coverage among migrant groups. There was a huge heterogeneity in reporting of coverage rates, as well as in study population, setting, sample size and countries of studies. While there are some studies on vaccination rates, the focus of the research appears to remain on *vaccination hesitancy*, *knowledge* and *attitudes* toward COVID-19 vaccination, or different *ethnic* groups, rather than on *coverage rates* in migrants as defined previously, and the underlying barriers to effective vaccination (beyond individualised approaches of vaccine hesitancy). The scarcity and poor quality of reporting of studies points to the weakness of Health Information Systems (HIS) to provide reliable data on key aspects of migrant health such as vaccination coverage. The lack of harmonisation across different indicators of migratory status and outcome measures puts validity and comparability of findings severely at risk. Our findings hence call for urgent implementation of existing recommendations and technical guidance to enhance the integration and availability of indicators of migratory status in HIS.[198–200] This requires prompt action in the post-COVID-19 recovery phase to bridge the divides between health and migration governance by means of effective collaboration structures at all levels of government (local, national, international).[201] Monitoring migrant health should be considered an essential component of pandemic preparedness, and future national plans must secure an adequate inclusion of migrant groups which promote social and health equity. This includes anticipation and prevention of unequal effects or unintended (negative) consequences of the pandemic on migrant health that are exacerbated by language barriers, stigma, and discrimination, and by financial, administrative, and legal barriers to health systems.

Contributors

MH: Conceptualization, Review methodology, Investigation, Data curation, Formal analysis—statistical analysis, Writing—Original Draft, Visualization, Project administration.

NG: Investigation, Formal analysis—qualitative analysis, Data curation, Visualization, Writing –Review & Editing.

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SF: Investigation, Writing—Review & Editing.

AM: Investigation, Writing—Review & Editing.

KW: Conceived the study, Conceptualization, Review methodology, Writing—Review & Editing.

KB: Conceived the study, Conceptualization, Review methodology, Investigation, Formal analysis, Validation, Writing—Review & Editing, Supervision.

All authors had full access to all data in the study and had final responsibility for the decision to submit for publication.

Data sharing statement

A full list of studies identified in the search as well as the full data extracted from included studies are available for academic research projects by request to the corresponding author: Kayvan.bozorgmehr@uni-bielefeld.de.

Declaration of interests

AM, KB, MH, SF received an individual honorarium from IOM, for which they do not declare any conflicts of interest. AM, KB, MH report to have consulted for Robert Koch-Institute. KB reports institutional grants from the Federal Ministry of Health Germany, the German Federal Ministry of Education and Research, the Federal Agency for Health Education Germany, DFG—German Science foundation, Global Health Academy of the German Alliance for Global Health Research (GLOHRA) and an issued grant/licence for Refugee Care Manager© (RefCare). KB is also elected member of the Steering Committee of GLOHRA. SR reports having consulted for German Association of Psychosocial Centres for Refugees and Victims of Torture (BAfF). All other authors declare no competing interests.

Acknowledgements

No funding received. We thank Masha Ertel for her vigorous support in title and abstract screening.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.eclinm.2024.102698.

References

1 World Health Organization. *International health Regulations (2005)*. 3rd ed. Geneva, Switzerland: WHO; 2016.
2 World Health Organization. *2019 novel coronavirus (2019-nCoV): strategic preparedness and response plan*. 2020.
3 World Health Organization. *COVID-19 strategic preparedness and response plan (SPRP 2021)*. WHO; 2021.
4 Orcutt M, Patel P, Burns R, et al. Global call to action for inclusion of migrants and refugees in the COVID-19 response. *Lancet*. 2020;395:1482–1483. https://doi.org/10.1016/S0140-6736(20)30971-5.

5 Hayward SE, Deal A, Cheng C, et al. Clinical outcomes and risk factors for COVID-19 among migrant populations in high-income countries: a systematic review. *J Migr Health*. 2021;3:100041. https://doi.org/10.1016/j.jmh.2021.100041.
6 Hintermeier M, Gencer H, Kajikhina K, et al. SARS-CoV-2 among migrants and forcibly displaced populations: a rapid systematic review. *J Migr Health*. 2021;4:100056. https://doi.org/10.1016/j.jmh.2021.100056.
7 Jahn R, Hintermeier M, Bozorgmehr K. SARS-CoV-2 attack rate in reception and accommodation centres for asylum seekers during the first wave: systematic review of outbreak media reports in Germany. *J Migr Health*. 2022;5:100084. https://doi.org/10.1016/j.jmh.2022.100084.
8 Jaljaa A, Caminada S, Tosti ME, et al. Risk of SARS-CoV-2 infection in migrants and ethnic minorities compared with the general population in the European WHO region during the first year of the pandemic: a systematic review. *BMC Publ Health*. 2022;22:143. https://doi.org/10.1186/s12889-021-12466-1.
9 Mengesha Z, Alloun E, Weber D, Smith M, Harris P. "Lived the pandemic twice": a scoping review of the unequal impact of the COVID-19 pandemic on asylum seekers and undocumented migrants. *Int J Environ Res Public Health*. 2022;19:6624. https://doi.org/10.3390/ijerph19116624.
10 World Health Organization. *Refugees and migrants in times of COVID-19: mapping trends of public health and migration policies and practices*. 2021. Geneva.
11 International Organization for Migration. Glossary on mirgation. International migration law N°34. https://publications.iom.int/system/files/pdf/iml_34_glossary.pdf. Accessed May 2, 2023.
12 Nations High Commissioner for Refugees. *Handbook on procedures and criteria for determining refugee status under the 1951 convention and the 1967 protocol relating to the status of refugees*. 2019.
13 Rapid Review Response Unit (RRRUN). *Bielefeld: Department of Population Medicine and Health Services Research, Bielefeld University*; 2024. https://review-unit.de/. Accessed April 2, 2024.
14 JBI. Critical appraisal tools. https://jbi.global/critical-appraisal-tools. Accessed May 2, 2023.
15 Bennett C, Manuel DG. Reporting guidelines for modelling studies. *BMC Med Res Methodol*. 2012;12:168. https://doi.org/10.1186/1471-2288-12-168.
16 Dahabreh IJ, Trikalinos TA, Balk EM, Wong JB. Guidance for the conduct and reporting of modeling and simulation studies in the context of health technology assessment. In: *AHRQ methods for effective health care : methods guide for effectiveness and comparative effectiveness reviews*. Rockville (MD). 2008.
17 Egger M, Johnson L, Althaus C, et al. Developing WHO guidelines: time to formally include evidence from mathematical modelling studies. *F1000Res*. 2017;6:1584. https://doi.org/10.12688/f1000research.12367.2.
18 Saltelli A, Bammer G, Bruno I, et al. Five ways to ensure that models serve society: a manifesto. *Nature*. 2020;582:482–484. https://doi.org/10.1038/d41586-020-01812-9.
19 Borenstein M, Hedges LV, Higgins JP, Rothstein HR. *Introduction to meta-analysis*. Chichester, UK: John Wiley & Sons Ltd; 2009.
20 Röver C, Knapp G, Friede T. Hartung-Knapp-Sidik-Jonkman approach and its modification for random-effects meta-analysis with few studies. *BMC Med Res Methodol*. 2015;15:99. https://doi.org/10.1186/s12874-015-0091-1.
21 Diderichsen F, Evans T, Whitehead M. The social basis of disparities in health. In: *Challenging inequaities in health: from ethics to action*. 1. 2001:12–23.
22 Rücker G, Schwarzer G. Beyond the forest plot: the drapery plot. *Res Synth Methods*. 2021;12:13–19. https://doi.org/10.1002/jrsm.1410.
23 Altare C, Kostandova N, Okeeffe J, et al. COVID-19 epidemiology and changes in health service utilization in Azraq and Zaatari refugee camps in Jordan: a retrospective cohort study. *PLoS Med*. 2022;19:e1003993. https://doi.org/10.1371/journal.pmed.1003993.
24 Altare C, Kostandova N, Okeeffe J, et al. COVID-19 epidemiology and changes in health service utilization in Uganda's refugee settlements during the first year of the pandemic. *BMC Publ Health*. 2022;22:1927. https://doi.org/10.1186/s12889-022-14305-3.
25 Bonde JPE, Begtrup LM, Jensen JH, et al. Occupational risk of COVID-19 in foreign-born employees in Denmark. *Occup Med*. 2024;74(1):63–70. https://doi.org/10.1093/occmed/kqad044.
26 Casanova FO, Hamblett A, Brinkley-Rubinstein L, Nowotny KM. Epidemiology of coronavirus disease 2019 in US immigration and Customs enforcement detention facilities. *JAMA Netw Open*. 2021;4:e2034409. https://doi.org/10.1001/jamanetworkopen.2020.34409.
27 D'Ambrosi F, Iurlaro E, Tassis B, et al. Sociodemographic characteristics of pregnant women tested positive for COVID-19 admitted to a referral center in Northern Italy during lockdown period. *J Obstet Gynaecol Res*. 2021;47:1751–1756. https://doi.org/10.1111/jog.14729.
28 Dimopoulou D, Kyritsi M, Dadouli K, et al. Seroprevalence of anti-SARS-CoV-2 antibodies among children and their parents in Greece. *Eur J Pediatr*. 2022;182(1):439–449. https://doi.org/10.1007/s00431-022-04681-8.
29 Erfani P, Uppal N, Lee CH, Mishori R, Peeler KR. COVID-19 testing and cases in immigration detention centers, april-August 2020. *JAMA*. 2021;325:182–184. https://doi.org/10.1001/jama.2020.21473.
30 Guijarro C, Pérez-Fernández E, González-Piñeiro B, et al. Differential risk for COVID-19 in the first wave of the disease among Spaniards and migrants from different areas of the world living in Spain. *Rev Clin Esp*. 2021;221:264–273. https://doi.org/10.1016/j.rceng.2020.10.005.
31 Hamm J, Duncan MS, Robertson NM, Keck JW, Crabtree K. COVID-19 in patients with a primary refugee-associated language in a Kentucky emergency department during 2020. *J Immigr Minority Health*. 2023;25(3):728–732. https://doi.org/10.1007/s10903-022-01435-4.
32 Harkness A, Weinstein ER, Mayo D, Rodriguez-Diaz C, Safren SA. Latinx sexual minority men's behavioral, psychosocial, and medical experiences during COVID-19: differences across immigration statuses. *Ann LGBTQ Public Popul Health*. 2021;2:104–115. https://doi.org/10.1891/lgbtq-2020-0054.
33 Holmberg V, Salmi H, Kattainen S, et al. Association between first language and SARS-CoV-2 infection rates, hospitalization, intensive care admissions and death in Finland: a population-based observational cohort study. *Clin Microbiol Infect*. 2022;28:107–113. https://doi.org/10.1016/j.cmi.2021.08.022.
34 Indseth T, Grøsland M, Arnesen T, et al. COVID-19 among immigrants in Norway, notified infections, related hospitalizations and associated mortality: a register-based study. *Scand J Public Health*. 2021;49:48–56. https://doi.org/10.1177/1403494820984026.
35 Jaqueti Aroca J, Molina Esteban LM, García-Arata I, García-Martínez J. COVID-19 en pacientes españoles e inmigrantes en un área sanitaria de Madrid. *Rev Española Quimioter*. 2020;33:289–291. https://doi.org/10.37201/req/041.2020.
36 Johnson-Agbakwu CE, Eakin CM, Bailey CV, et al. Severe acute respiratory syndrome coronavirus 2: a canary in the coal mine for public safety net hospitals. *AJOG Glob Rep*. 2021;1:100009. https://doi.org/10.1016/j.xagr.2021.100009.
37 Kjøllesdal M, Magnusson K. Occupational risk of COVID-19 by country of birth. A register-based study. *J Public Health (Oxf)*. 2023;45(1):6–12. https://doi.org/10.1093/pubmed/fdab362.
38 Kjøllesdal M, Skyrud K, Gele A, et al. The correlation between socioeconomic factors and COVID-19 among immigrants in Norway: a register-based study. *Scand J Public Health*. 2022;50(1):52–60. https://doi.org/10.1177/14034948211015860.
39 Kondilis E, Papamichail D, McCann S, et al. The impact of the COVID-19 pandemic on refugees and asylum seekers in Greece: a retrospective analysis of national surveillance data from 2020. *Eclinicalmedicine*. 2021;37:100958. https://doi.org/10.1016/j.eclinm.2021.100958.
40 Labberton AS, Godøy A, Elgersma IH, et al. SARS-CoV-2 infections and hospitalisations among immigrants in Norway-significance of occupation, household crowding, education, household income and medical risk: a nationwide register study. *Scand J Public Health*. 2022;50:772–781. https://doi.org/10.1177/14034948221075029.
41 Lombardi A, Mangioni D, Consonni D, et al. Seroprevalence of anti-SARS-CoV-2 IgG among healthcare workers of a large university hospital in Milan, Lombardy, Italy: a cross-sectional study. *BMJ Open*. 2021;11:e047216. https://doi.org/10.1136/bmjopen-2020-047216.
42 Maifredi G, Izzo I, Gasparotti C, et al. SARS-CoV-2 infection and vaccination coverage among fragile populations in a local health area of northern Italy. *Life*. 2022;12:1009. https://doi.org/10.3390/life12071009.
43 Mallet Y, Pivette M, Revest M, et al. Identification of workers at increased risk of infection during a COVID-19 outbreak in a meat processing plant, France, may 2020. *Food Environ Virol*. 2021;13:535–543. https://doi.org/10.1007/s12560-021-09500-1.

44 Martin CA, Pan D, Melbourne C, et al. Risk factors associated with SARS-CoV-2 infection in a multiethnic cohort of United Kingdom healthcare workers (UK-REACH): a cross-sectional analysis. *PLoS Med*. 2022;19:e1004015. https://doi.org/10.1371/journal.pmed.1004015.
45 McGrath J, McAloon CG, More SJ, et al. Risk factors for SARS-CoV-2 infection in healthcare workers following an identified nosocomial COVID-19 exposure during waves 1-3 of the pandemic in Ireland. *Epidemiol Infect*. 2022;150:e186. https://doi.org/10.1017/S0950268822001595.
46 Mema S, Frosst G, Hanson K, et al. COVID-19 outbreak among temporary foreign workers in British Columbia, March to May 2020. *Can Commun Dis Rep*. 2021;47:5–10. https://doi.org/10.14745/ccdr.v47i01a02.
47 Methi F, Hart RK, Godøy AA, Jørgensen SB, Kacelnik O, Telle KE. Transmission of SARS-CoV-2 into and within immigrant households: nationwide registry study from Norway. *J Epidemiol Community Health*. 2022;76(5):435–439. https://doi.org/10.1136/jech-2021-217856.
48 Ngiam JN, Chew N, Tham SM, et al. Demographic shift in COVID-19 patients in Singapore from an aged, at-risk population to young migrant workers with reduced risk of severe disease. *Int J Infect Dis*. 2021;103:329–335. https://doi.org/10.1016/j.ijid.2020.11.157.
49 Otto WR, Grundmeier RW, Montoya-Williams D, et al. Association between preferred language and risk of severe acute respiratory syndrome coronavirus 2 infection in children in the United States. *Am J Trop Med Hyg*. 2021;105(5):1261. https://doi.org/10.4269/ajtmh.21-0779.
50 Pagani G, Conti F, Giacomelli A, et al. Differences in the prevalence of SARS-CoV-2 infection and access to care between Italians and non-Italians in a social-housing neighbourhood of milan, Italy. *Int J Environ Res Publ Health*. 2021;18:10621. https://doi.org/10.3390/ijerph182010621.
51 Richard L, Nisenbaum R, Brown M, et al. Incidence of SARS-CoV-2 infection among people experiencing homelessness in Toronto, Canada. *JAMA Netw Open*. 2023;6:e232774. https://doi.org/10.1001/jamanetworkopen.2023.2774.
52 Sisti LG, Di Napoli A, Petrelli A, et al. Newly arrived migrants did not represent an additional COVID-19 burden for Italy: data from the Italian information flow. *Global Health*. 2023;19:32. https://doi.org/10.1186/s12992-023-00926-9.
53 Vosko LF, Spring C. COVID-19 outbreaks in Canada and the crisis of migrant farmworkers' social reproduction: transnational labour and the need for greater accountability among receiving states. *Int. Migration & Integration*. 2022;23:1765–1791. https://doi.org/10.1007/s12134-021-00905-2.
54 Warszawski J, Meyer L, Franck J-E, et al. Trends in social exposure to SARS-Cov-2 in France. Evidence from the national socio-epidemiological cohort-EPICOV. *PLoS One*. 2022;17:e0267725. https://doi.org/10.1371/journal.pone.0267725.
55 Wiedmeyer M-L, Goldenberg S, Peterson S, et al. SARS-CoV-2 testing and COVID-19-related primary care use among people with citizenship, permanent residency, and temporary immigration status: an analysis of population-based administrative data in British Columbia. *Can J Public Health*. 2023;114:389–403. https://doi.org/10.17269/s41997-023-00761-w.
56 Zlot AI, Capizzi J, Bush L, Menza TW. Impact of COVID-19 among immigrant and communities of color living with HIV in Oregon, 2020: two pandemics rooted in racism. *J Immigr Minor Health*. 2021;23:1348–1353. https://doi.org/10.1007/s10903-021-01281-w.
57 Al Awaidy ST, Khamis F, Al Rashidi B, Al Wahaibi AH, Albahri A, Mahomed O. Epidemiological characteristics of 69,382 COVID-19 patients in Oman. *J Epidemiol Glob Health*. 2021;11:326–337. https://doi.org/10.1007/s44197-021-00001-9.
58 Bell M, Hergens M-P, Fors S, Tynelius P, Leon AP de, Lager A. Individual and neighborhood risk factors of hospital admission and death during the COVID-19 pandemic: a population-based cohort study. *BMC Med*. 2023;21:1. https://doi.org/10.1186/s12916-022-02715-4.
59 Coyer L, Wynberg E, Buster M, et al. Hospitalisation rates differed by city district and ethnicity during the first wave of COVID-19 in Amsterdam, The Netherlands. *BMC Publ Health*. 2021;21:1721. https://doi.org/10.1186/s12889-021-11782-w.
60 Dressler A, Finci I, Wagner-Wiening C, Eichner M, Brockmann SO. Epidemiological analysis of 3,219 COVID-19 outbreaks in the state of Baden-Wuerttemberg, Germany. *Epidemiol Infect*. 2021;149:e101. https://doi.org/10.1017/S0950268821000911.
61 Engjom H, Aabakke Anna JM, Klungsøyr K, et al. COVID-19 in pregnancy-characteristics and outcomes of pregnant women admitted to hospital because of SARS-CoV-2 infection in the Nordic countries. *Acta Obstet Gynecol Scand*. 2021;100:1611–1619. https://doi.org/10.1111/aogs.14160.
62 Fabiani M, Mateo-Urdiales A, Andrianou X, et al. Epidemiological characteristics of COVID-19 cases in non-Italian nationals notified to the Italian surveillance system. *Eur J Public Health*. 2021;31:37–44. https://doi.org/10.1093/eurpub/ckaa249.
63 Immordino P, Genovese D, Morales F, Casuccio A, Amodio E. Epidemiological characteristics of COVID-19 cases in non-Italian nationals in sicily: identifying vulnerable groups in the context of the COVID-19 pandemic in sicily, Italy. *Int J Environ Res Publ Health*. 2022;19:5767. https://doi.org/10.3390/ijerph19095767.
64 Ingraham NE, Purcell LN, Karam BS, et al. Racial and ethnic disparities in hospital admissions from COVID-19: determining the impact of neighborhood deprivation and primary language. *J Gen Intern Med*. 2021;36:3462–3470. https://doi.org/10.1007/s11606-021-06790-w.
65 Islamoska S, Holm Petersen J, Benfield T, Norredam M. Socioeconomic and demographic risk factors in COVID-19 hospitalization among migrants and ethnic minorities. *Eur J Public Health*. 2022:302–310. https://doi.org/10.1093/eurpub/ckab186.
66 Martínez-Alfonso J, Mesas AE, Jimenez-Olivas N, Cabrera-Majada A, Martínez-Vizcaíno V, Díaz-Olalla JM. Economic migrants and clinical course of SARS-CoV-2 infection: a follow-up study. *Int J Public Health*. 2022;67:1605481. https://doi.org/10.3389/ijph.2022.1605481.
67 Rossi P, Marino M, Formisano D, Venturelli F, Vicentini M, Grilli R. Characteristics and outcomes of a cohort of COVID-19 patients in the province of reggio emilia, Italy. *PLoS One*. 2020;15:e0238281. https://doi.org/10.1371/journal.pone.0238281.
68 Sempere-González A, Salvador F, Monforte A, et al. COVID-19 clinical profile in Latin American migrants living in Spain: does the geographical origin matter? *J Clin Med*. 2021;10:5213. https://doi.org/10.3390/jcm10225213.
69 Kalani N, Hatami N, Haghbeen M, Yaqoob U, Raeyat Doost E. Covid-19 health care for afghan refugees as a minor ethnicity in Iran;clinical differences and racial equality in health. *Acta Med Iran*. 2021;59:466–471.
70 Hamadah H, Alahmad B, Behbehani M, et al. COVID-19 clinical outcomes and nationality: results from a Nationwide registry in Kuwait. *BMC Publ Health*. 2020;20:1384. https://doi.org/10.1186/s12889-020-09490-y.
71 Golshani K, Akhlaghi H. Effects of the COVID-19 pandemic on healthcare delivery to an immigrant population in the Islamic Republic of Iran. *East Mediterr Health J*. 2022;28:719–724. https://doi.org/10.26719/emhj.22.075.
72 Passos-Castilho AM, Labbé A-C, Barkati S, et al. Outcomes of hospitalized COVID-19 patients in Canada: impact of ethnicity, migration status and country of birth. *J Travel Med*. 2022;29:taac041. https://doi.org/10.1093/jtm/taac041.
73 Martín-Sánchez FJ, Valls Carbó A, Miró Ò, et al. Socio-Demographic health determinants are associated with poor prognosis in Spanish patients hospitalized with COVID-19. *J Gen Intern Med*. 2021;36:3737–3742. https://doi.org/10.1007/s11606-020-06584-6.
74 Norman FF, Crespillo-Andújar C, Pérez-Molina JA, et al. COVID-19 and geographical area of origin. *Clin Microbiol Infect*. 2021;27:632.e1–632.e5. https://doi.org/10.1016/j.cmi.2020.11.011.
75 Díaz-Menéndez M, Trigo E, Borobia AM, et al. Presenting characteristics and outcomes of migrants in a cohort of hospitalized patients with COVID-19: does the origin matter? *Travel Med Infect Dis*. 2021;42:102027. https://doi.org/10.1016/j.tmaid.2021.102027.
76 Nordberg P, Jonsson M, Hollenberg J, et al. Immigrant background and socioeconomic status are associated with severe COVID-19 requiring intensive care. *Sci Rep*. 2022;12:12133. https://doi.org/10.1038/s41598-022-15884-2.
77 Nair SC, Gasmelseed HI, Khan AA, et al. Assessment of mortality from COVID-19 in a multicultural multi-ethnic patient population. *BMC Infect Dis*. 2021;21:1115. https://doi.org/10.1186/s12879-021-06762-9.
78 AbuRuz S, Al-Azayzih A, ZainAlAbdin S, Beiram R, Al Hajjar M. Clinical characteristics and risk factors for mortality among COVID-19 hospitalized patients in UAE: does ethnic origin have an impact. *PLoS One*. 2022;17:e0264547. https://doi.org/10.1371/journal.pone.0264547.
79 Darwish I, Harrison LB, Passos-Castilho AM, et al. In-hospital outcomes of SARS-CoV-2-infected health care workers in the

COVID-19 pandemic first wave, Quebec, Canada. *PLoS One*. 2022;17:e0272953. https://doi.org/10.1371/journal.pone.0272953.
80 Norredam M, Islamoska S, Petersen JH, Benfield T. COVID-19 mortality and use of intensive care among ethnic minorities - a national register-based Danish population study. *Eur J Epidemiol*. 2023;38(8):891–899. https://doi.org/10.1007/s10654-023-00991-9.
81 Giacomelli A, Ridolfo AL, Bonazzetti C, et al. Mortality among Italians and immigrants with COVID-19 hospitalised in Milan, Italy: data from the Luigi Sacco Hospital registry. *BMC Infect Dis*. 2022;22:63. https://doi.org/10.1186/s12879-022-07051-9.
82 Aradhya S, Brandén M, Drefahl S, et al. Intermarriage and COVID-19 mortality among immigrants. A population-based cohort study from Sweden. *BMJ Open*. 2021;11:e048952. https://doi.org/10.1136/bmjopen-2021-048952.
83 Rostila M, Cederström A, Wallace M, Brandén M, Malmberg B, Andersson G. Disparities in coronavirus disease 2019 mortality by country of birth in Stockholm, Sweden: a total-population-based cohort study. *Am J Epidemiol*. 2021;190:1510–1518. https://doi.org/10.1093/aje/kwab057.
84 Drefahl S, Wallace M, Mussino E, et al. A population-based cohort study of socio-demographic risk factors for COVID-19 deaths in Sweden. *Nat Commun*. 2020;11:5097. https://doi.org/10.1038/s41467-020-18926-3.
85 Canevelli M, Palmieri L, Raparelli V, et al. COVID-19 mortality among migrants living in Italy. *Ann Ist Super Sanita*. 2020;56:373–377. https://doi.org/10.4415/ANN_20_03_16.
86 Lusk JL, Chandra R. Farmer and farm worker illnesses and deaths from COVID-19 and impacts on agricultural output. *PLoS One*. 2021;16:e0250621. https://doi.org/10.1371/journal.pone.0250621.
87 Chilunga FP, Stoeldraijer L, Agyemang C, Stronks K, Harmsen C, Kunst AE. Inequalities in COVID-19 deaths by migration background during the first wave, interwave period and second wave of the COVID-19 pandemic: a closed cohort study of 17 million inhabitants of The Netherlands. *J Epidemiol Community Health (1979)*. 2022. https://doi.org/10.1136/jech-2022-219521.
88 Ag Ahmed MA, Ly BA, Diarra NH, et al. Challenges to the implementation and adoption of physical distancing measures against COVID-19 by internally displaced people in Mali: a qualitative study. *Confl Health*. 2021;15:88. https://doi.org/10.1186/s13031-021-00425-x.
89 Arora S, Bø B, Tjoflåt I, Eslen-Ziya H. Immigrants in Norway: resilience, challenges and vulnerabilities in times of COVID-19. *J Migr Health*. 2022;5:100089. https://doi.org/10.1016/j.jmh.2022.100089.
90 Udaya Bahadur BC, Pokharel S, Munikar S, et al. Anxiety and depression among people living in quarantine centers during COVID-19 pandemic: a mixed method study from western Nepal. *PLoS One*. 2021;16:e0254126. https://doi.org/10.1371/journal.pone.0254126.
91 Babuç ZT. A relational sociological analysis on the impact of COVID-19 pandemic lockdown on Syrian migrants' lives in Turkey: the case of mersin province. *J Int Migr Integr*. 2021;23:1645–1666. https://doi.org/10.1007/s12134-021-00907-0.
92 Biddle L, Jahn R, Perplies C, et al. COVID-19 in collective accommodation centres for refugees: assessment of pandemic control measures and priorities from the perspective of authorities. *Bundesgesundheitsblatt Gesundheitsforsch Gesundheitsschutz*. 2021;64:342–352. https://doi.org/10.1007/s00103-021-03284-2.
93 Bojorquez I, Odgers-Ortiz O, Olivas-Hernandez OL. Psychosocial and mental health during the COVID-19 lockdown: a rapid qualitative study in migrant shelters at the Mexico-United States border. *Salud Ment*. 2021;44:167–175. https://doi.org/10.17711/sm.0185-3325.2021.022.
94 Burton-Jeangros C, Duvoisin A, Lachat S, Consoli L, Fakhoury J, Jackson Y. The impact of the covid-19 pandemic and the lockdown on the health and living conditions of undocumented migrants and migrants undergoing legal status regularization. *Front Public Health*. 2020;8:596887.
95 Cano Collado LA, HernÁNdez M, Priego Álvarez HR. Mental health of immigrants in a shelter in tabasco, Mexico during the COVID-19 epidemic. *Salud Uninorte*. 2021;37:583–609. https://doi.org/10.14482/sun.37.3.616.89.
96 Ceccon C, Moscardino U. Impact of COVID-19 and lockdown on mental health and future orientation among young adult asylum seekers in Italy: a mixed-methods study. *Transcult Psychiatry*. 2022;59:782–796. https://doi.org/10.1177/13634615221098306.
97 Chakraborty M, Mukherjee S, Dasgupta P. Bengali migrant workers in south India: a mixed-method inquiry into their earnings, livings and struggle during Covid pandemic. *Indian J Labour Econ*. 2022;65:425–443. https://doi.org/10.1007/s41027-022-00374-w.
98 Chattoraj D. "We are all migrant workers": commonality of Bangladeshi migrants' experiences in Singapore amidst covid-19. *Int J Asia Pac Stud*. 2022;18:9–36. https://doi.org/10.21315/ijaps2022.18.2.2.
99 Cleaveland C, Lee M, Gewa C. "I thought I was going to die there:" Socio-political contexts and the plight of undocumented Latinx in the COVID-19 pandemic. *SSM Qual Res Health*. 2023;3:100242. https://doi.org/10.1016/j.ssmqr.2023.100242.
100 Da Mosto D, Bodini C, Mammana L, Gherardi G, Quargnolo M, Fantini MP. Health equity during COVID-19: a qualitative study on the consequences of the syndemic on refugees' and asylum seekers' health in reception centres in Bologna (Italy). *J Migr Health*. 2021;4:100057. https://doi.org/10.1016/j.jmh.2021.100057.
101 de Diego-Cordero R, Tarriño-Concejero L, Lato-Molina MÁ, García-Carpintero Muñoz MÁ. COVID-19 and female immigrant caregivers in Spain: cohabiting during lockdown. *Eur J Wom Stud*. 2022;29:123–139. https://doi.org/10.1177/13505068211017577.
102 de Jesus M, Moumni Z, Sougui ZH, Biswas N, Kubicz R, Pourtau L. "Living in confinement, stopped in time": migrant social vulnerability, coping and health during the COVID-19 pandemic lockdown in France. *Int J Environ Res Publ Health*. 2022;19:10084. https://doi.org/10.3390/ijerph191610084.
103 DeCarlo Santiago C, Bustos Y, Jolie SA, et al. The impact of COVID-19 on immigrant and refugee families: qualitative perspectives from newcomer students and parents. *Sch Psychol*. 2021;36:348–357. https://doi.org/10.1037/spq0000448.
104 Del Real D, Crowhurst-Pons F, Olave L. The work, economic, and remittance stress and distress of the COVID-19 pandemic containment policies: the case of Venezuelan migrants in Argentina and Chile. *Int J Environ Res Publ Health*. 2023;20:3569. https://doi.org/10.3390/ijerph20043569.
105 Duggal C, Ray S, Konantambigi R, Kothari A. The nowhere people: lived experiences of migrant workers during Covid-19 in India. *Curr Psychol*. 2021:1–10. https://doi.org/10.1007/s12144-021-02220-6.
106 Enriquez LE, Rosales WE, Chavarria K, Hernandez MM, Valadez M. COVID on campus: assessing the impact of the pandemic on undocumented college students. *Aera Open*. 2021;7:19. https://doi.org/10.1177/23328584211033576.
107 Filippi D, Giliberti L. Italian reception policies and pandemic: from exclusion to abandonment. *Dve Domov*. 2021;54:131–142. https://doi.org/10.3986/dd.2021.2.10.
108 Gele A, Sheikh NS, Kour P, Qureshi SA. Uptake of covid-19 preventive measures among 10 immigrant ethnic groups in Norway. *Front Public Health*. 2022;10:809726. https://doi.org/10.3389/fpubh.2022.809726.
109 Geuijen PM, Vromans Laura Embregts Petri JC M. A qualitative investigation of support workers' experiences of the impact of the COVID-19 pandemic on Dutch migrant families who have children with intellectual disabilities. *J Intellect Dev Disabil*. 2021:1–6. https://doi.org/10.3109/13668250.2021.1947210.
110 Gogoi M, Chaloner J, Qureshi I, et al. One virus, many lives: a qualitative study of lived experiences and quality of life of adults from diverse backgrounds living in the UK during the COVID-19 pandemic. *BMJ Open*. 2023;13:e067569. https://doi.org/10.1136/bmjopen-2022-067569.
111 Goth US, Lyshol H, Braaum LE, Sørensen A, Skjerve H. COVID-19 among the Pakistani immigrant population in Northern Europe–Incidence and possible causes for infection. *J Migr Health*. 2022;6:100138. https://doi.org/10.1016/j.jmh.2022.100138.
112 Guruge S, Lamaj P, Lee C, et al. COVID-19 restrictions: experiences of immigrant parents in Toronto. *AIMS Public Health*. 2021;8:172–185. https://doi.org/10.3934/publichealth.2021013.
113 Hari A, Nardon L, Zhang H. A transnational lens into international student experiences of the COVID-19 pandemic. https://doi.org/10.1111/glob.12332; 2021.
114 Im H, George N. Impacts of COVID-19 on refugee service provision and community support: a rapid assessment during the pandemic. *Soc Work Public Health*. 2022;37(1):84–103. https://doi.org/10.1080/19371918.2021.1974639.
115 Kang SJ, Hyung J, Han H-R. Health literacy and health care experiences of migrant workers during the COVID-19 pandemic: a qualitative study. *BMC Publ Health*. 2022;22:2053. https://doi.org/10.1186/s12889-022-14487-w.
116 Kaur-Gill S, Qin-Liang Y, Hassan S. Negotiating mental health during the COVID-19 pandemic: performing migrant domestic

work in contentious conditions. (Special Issue: the COVID-19 pandemic: precarious migrants and outbreak inequality). *Am Behav Sci*. 2021;65:1406–1425. https://doi.org/10.1177/00027642211000394.
117 Khai TS, Asaduzzaman M. 'I doubt myself and Am losing everything I have since COVID came'-A case study of mental health and coping strategies among undocumented Myanmar migrant workers in Thailand. *Int J Environ Res Publ Health*. 2022;19. https://doi.org/10.3390/ijerph192215022.
118 Knights F, Carter J, Deal A, et al. Impact of COVID-19 on migrants' access to primary care and implications for vaccine roll-out: a national qualitative study. *Br J Gen Pract*. 2021;71:e583–e595. https://doi.org/10.3399/BJGP.2021.0028.
119 Kuhlmann E, Falkenbach M, Klasa K, Pavolini E, Ungureanu M-I. Migrant carers in Europe in times of COVID-19: a call to action for European health workforce governance and a public health approach. *Eur J Public Health*. 2020;30:iv22–iv27. https://doi.org/10.1093/eurpub/ckaa126.
120 Kumar N, Udah H, Francis A, Singh S, Wilson A. Indian migrant workers' experience during the COVID-19 pandemic nationwide lockdown. *J Asian Afr Stud*. 2022;57(5):911–931. https://doi.org/10.1177/00219096211046278.
121 Kunpeuk W, Julchoo S, Phaiyarom M, et al. Access to healthcare and social protection among migrant workers in Thailand before and during COVID-19 era: a qualitative study. *Int J Environ Res Publ Health*. 2022;19. https://doi.org/10.3390/ijerph19053083.
122 Lee CH, Uppal N, Erfani P, et al. Individuals' experiences in U.S. immigration detention during the early period of the COVID-19 pandemic: major challenges and public health implications. *Health Justice*. 2023;11:8. https://doi.org/10.1186/s40352-023-00211-2.
123 Lee W-C, Chanaka NS, Tsaur C-C, Ho J-J. Acculturation, work-related stressors, and respective coping strategies among male Indonesian migrant workers in the manufacturing industry in taiwan: a post-COVID investigation. *Int J Environ Res Publ Health*. 2022;19. https://doi.org/10.3390/ijerph191912600.
124 Li Tao, Li Zhen, Pan Yu, Wang Xiaojie. Frangibility and potentiality: migrant worker families in China during COVID-19. *China J Soc Work*. 2021:1–33. https://doi.org/10.1080/17525098.2021.1888765.
125 Loganathan T, Chan ZX, Hassan F, et al. Education for non-citizen children in Malaysia during the COVID-19 pandemic: a qualitative study. *PLoS One*. 2021;16:e0259546. https://doi.org/10.1371/journal.pone.0259546.
126 Lui ID, Vandan N, Davies SE, et al. "We also deserve help during the pandemic": the effect of the COVID-19 pandemic on foreign domestic workers in Hong Kong. *J Migr Health*. 2021;3:100037. https://doi.org/10.1016/j.jmh.2021.100037.
127 Lusambili AM, Martini M, Abdirahman F, et al. "We have a lot of home deliveries" A qualitative study on the impact of COVID-19 on access to and utilization of reproductive, maternal, newborn and child health care among refugee women in urban Eastleigh, Kenya. *J Migr Health*. 2020;1:100025. https://doi.org/10.1016/j.jmh.2020.100025.
128 Ly BA, Ahmed Mohamed Ali Ag, Traore FB, et al. Challenges and difficulties in implementing and adopting isolation and quarantine measures among internally displaced people during the COVID-19 pandemic in Mali (161/250). *J Migr Health*. 2022;5:100104. https://doi.org/10.1016/j.jmh.2022.100104.
129 Martin-Anatias N, Long NJ, Davies SG, et al. Lockdown ibuism: experiences of Indonesian migrant mothers during the COVID-19 pandemic in aotearoa New Zealand. *Intersections*. 2021;2021:1–13.
130 Martuscelli PN. How are forcibly displaced people affected by the COVID-19 pandemic outbreak? Evidence from Brazil. (Special Issue: the COVID-19 pandemic: precarious migrants and outbreak inequality. *Am Behav Sci*. 2021;65:1342–1364. https://doi.org/10.1177/00027642211000402.
131 Martuscelli PN. How are refugees affected by Brazilian responses to COVID-19? *Rev Adm Pública*. 2020;54:1446–1457.
132 Matsuoka S, Kharel M, Koto-Shimada K, et al. Access to health-related information, health services, and welfare services among south and southeast asian immigrants in Japan: a qualitative study. *Int J Environ Res Publ Health*. 2022;19(19):12234. https://doi.org/10.3390/ijerph191912234.
133 Mookerjee D, Chakravarty S, Roy S, Tagat A, Mukherjee SA. Culture-centered approach to experiences of the coronavirus pandemic lockdown among internal migrants in India. *Am Behav Sci*. 2021;65:1426–1444. https://doi.org/10.1177/00027642211000392.
134 Nasol K, Francisco-Menchavez V. Filipino home care workers: invisible frontline workers in the COVID-19 crisis in the United States. (Special Issue: the COVID-19 pandemic: precarious migrants and outbreak inequality. *Am Behav Sci*. 2021;65:1365–1383. https://doi.org/10.1177/00027642211000410.
135 Ozer P, Dembele A, Yameogo SS, Hut E, Longueville F de. The impact of COVID-19 on the living and survival conditions of internally displaced persons in Burkina Faso. *World Dev Perspect*. 2022;25:100393. https://doi.org/10.1016/j.wdp.2022.100393.
136 Qi J, Ma C. Australia's crisis responses during COVID-19: the case of international students. *J Int Stud*. 2021;11:94–111. https://doi.org/10.32674/JIS.V11IS2.3578.
137 Quandt A, Keeney AJ, Flores L, Flores D, Villaseñor M. "We left the crop there lying in the field": agricultural worker experiences with the COVID-19 pandemic in a rural US-Mexico border region. *J Rural Stud*. 2022;95:533–543. https://doi.org/10.1016/j.jrurstud.2022.09.039.
138 Ramana AB, Singh S, Rupani MP, Mukherjee R, Mohapatra A. Plight of migrant construction-site workers during the COVID-19 lockdown in 2020: a qualitative exploration in Bhavnagar, Western India. *Work*. 2023;76(1):33–45. https://doi.org/10.3233/WOR-220127.
139 Rast E, Perplies C, Biddle L, Bozorgmehr K. Between care and coercion: asylum seekers' experiences with COVID-19 containment and mitigation measures in German reception centres. *Int J Public Health*. 2023;68:1605230. https://doi.org/10.3389/ijph.2023.1605230.
140 Reynolds CW, Ramanathan V, Lorenzana E, et al. Challenges and effects of the COVID-19 pandemic on asylum seeker health at the U.S.-Mexico border. *Health Equity*. 2021;5:169–180. https://doi.org/10.1089/heq.2020.0110.
141 Rubio González M, Jiménez-Lasserrotte MDM, Ugarte-Gurrutxaga MI, et al. Experiences of the migrant farmworkers during the syndemic due to COVID-19 in Spain. *Soc Sci*. 2023;12:273. https://doi.org/10.3390/socsci12050273.
142 Sabar G, Babis D, Sabar Ben-Yehoshua N. From fragility to empowerment through philanthropy: the Filipino labor migrant community in Israel during COVID-19. *J Immigr Refug Stud*. 2021. https://doi.org/10.1080/15562948.2021.1898074.
143 Sanna J. The othering of returning migrants in Romania during the first wave of the COVID-19 pandemic: event analysis. *Contemporary Southeastern Europe*. 2021;8:19–29. https://doi.org/10.25364/02.8:2021.1.2.
144 Sanò G, Della Puppa F. The multiple facets of (im)mobility. A multisited ethnography on territorialisation experiences and mobility trajectories of asylum seekers and refugees outside the Italian reception system. *J Mod Ital Stud*. 2021:1–17. https://doi.org/10.1080/1354571x.2021.1943209.
145 Shah NM, Alkazi L. COVID-19 and threats to irregular migrants in Kuwait and the Gulf. *Int Migrat*. 2022;61(2):138–153. https://doi.org/10.1111/imig.12992.
146 Singer EK, Molyneux K, Kaur K, Kona N, Malave GS, Baranowski KA. The impact of immigration detention on the health of asylum seekers during the COVID-19 pandemic. *SSM Qual Res Health*. 2022;2:100072. https://doi.org/10.1016/j.ssmqr.2022.100072.
147 Singh GP, Arun P, Chavan BS. Migrant workers' needs and perceptions while lodged in a shelter home in India during the COVID-19 pandemic. *Prim Care Companion CNS Disord*. 2020;22:20m02753. https://doi.org/10.4088/PCC.20m02753.
148 Srivastava A, Arya YK, Joshi S, et al. Major stressors and coping strategies of internal migrant workers during the COVID-19 pandemic: a qualitative exploration. *Front Psychol*. 2021;12:648334. https://doi.org/10.3389/fpsyg.2021.648334.
149 Stevenson M, Guillén JR, Bevilacqua KG, et al. Qualitative assessment of the impacts of the COVID-19 pandemic on migration, access to healthcare, and social wellbeing among Venezuelan migrants and refugees in Colombia. *J Migr Health*. 2023;7:100187. https://doi.org/10.1016/j.jmh.2023.100187.
150 Tang S, Li X. Responding to the pandemic as a family unit: social impacts of COVID-19 on rural migrants in China and their coping strategies. *Hum Soc Sci Commun*. 2021;8:8. https://doi.org/10.1057/s41599-020-00686-6.
151 Thomas J, de Wit EE, Radhakrishnan RK, Kulkarni N, Bunders-Aelen JG. Mitigating the COVID-19 pandemic in India: an in-depth exploration of challenges and opportunities for three vulnerable population groups. *Equal Divers Inclusion*. 2022;41(1):49–63. https://doi.org/10.1108/EDI-09-2020-0264.

152 Tosh SR, Berg UD, León KS. Migrant detention and COVID-19: pandemic responses in four New Jersey detention centers. *J Migr Hum Sec*. 2021;9(1):44–62. https://doi.org/10.1177/23315024211003855.
153 Uansri S, Kunpeuk W, Julchoo S, Sinam P, Phaiyarom M, Suphanchaimat R. Perceived barriers of accessing healthcare among migrant workers in Thailand during the coronavirus disease 2019 (COVID-19) pandemic: a qualitative study. *Int J Environ Res Publ Health*. 2023;20. https://doi.org/10.3390/ijerph20105781.
154 Ullah F, Harrigan NM. A natural experiment in social security as public health measure: experiences of international students as temporary migrant workers during two Covid-19 lockdowns. *Soc Sci Med*. 2022;313:115196. https://doi.org/10.1016/j.socscimed.2022.115196.
155 van den Muijsenbergh M, Torensma M, Skowronek N, Lange T de, Stronks K. Undocumented domestic workers and coronavirus disease 2019: a qualitative study on the impact of preventive measures. *Front Commun*. 2022;7:736148. https://doi.org/10.3389/fcomm.2022.736148.
156 Vosko LF, Basok T, Spring C, Candiz G, George G. Understanding migrant farmworkers' health and well-being during the global COVID-19 pandemic in Canada: toward a transnational conceptualization of employment strain. *Int J Environ Res Publ Health*. 2022;19:8574. https://doi.org/10.3390/ijerph19148574.
157 Williams E, Greder K, Kim D, Bao J, Dan Karami NOH. Navigating health and well-being during the COVID-19 pandemic: experiences of Latina immigrant mothers in rural Midwestern communities. *Fam Relat*. 2023;72(4):1549–1568. https://doi.org/10.1111/fare.12884.
158 Yee K, Peh HP, Tan YP, et al. Stressors and coping strategies of migrant workers diagnosed with COVID-19 in Singapore: a qualitative study. *BMJ Open*. 2021;11:e045949. https://doi.org/10.1136/bmjopen-2020-045949.
159 Yoosefi Lebni J, Enayat H, Irandoost SF, Dehghan AA. Exploring the challenges of Afghan refugee women facing COVID-19: a qualitative study in Iran. *Front Public Health*. 2022;10:838965. https://doi.org/10.3389/fpubh.2022.838965.
160 Zambrano-Barragán P, Ramírez Hernández S, Freier LF, et al. The impact of COVID-19 on Venezuelan migrants' access to health: a qualitative study in Colombian and Peruvian cities. *J Migr Health*. 2021;3:100029. https://doi.org/10.1016/j.jmh.2020.100029.
161 Bauza V, Sclar GD, Bisoyi A, Owens A, Ghugey A, Clasen T. Experience of the COVID-19 pandemic in rural odisha, India: knowledge, preventative actions, and impacts on daily life. *Int J Environ Res Public Health*. 2021;18:2863. https://doi.org/10.3390/ijerph18062863.
162 Abi Zeid B, El Khoury T, Ghattas H, et al. Predictors and barriers to vaccination among older Syrian refugees in Lebanon: a cross-sectional analysis of a multi-wave longitudinal study. *Lancet Healthy Longev*. 2023;4:e219–e227. https://doi.org/10.1016/S2666-7568(23)00038-7.
163 Al-kassab-Córdova A, Silva-Perez C, Mendez-Guerra C, Herrera-Añazco P, Benites-Zapata V. Factors associated with not receiving the primary series and booster dose of the COVID-19 vaccine among Venezuelan migrants in Peru: a population-based cross-sectional study. *Trav Med Infect Dis*. 2023;53:102563.
164 Bastola K, Nohynek H, Lilja E, et al. Incidence of SARS-CoV-2 infection and factors associated with complete COVID-19 vaccine uptake among migrant origin persons in Finland. *Int J Public Health*. 2023;68:1605547. https://doi.org/10.3389/ijph.2023.1605547.
165 Bug M, Blume M, Kajikhina K, et al. COVID-19 vaccination status among people with selected citizenships: results of the study GEDA Fokus. *J Health Monit*. 2023;8:34–51. https://doi.org/10.25646/11142.
166 Elmore CE, Blackstone SR, Carpenter EL, et al. Advancing COVID-19 vaccination equity among the refugee community: an innovative multi-sector collaborative outreach program. *J Health Care Poor Underserved*. 2022;33:25–43. https://doi.org/10.1353/hpu.2022.0157.
167 Hong L, Jin Z, Xu K, et al. COVID-19 vaccine uptake and vaccine hesitancy in rural-to-urban migrant workers at the first round of COVID-19 vaccination in China. *BMC Publ Health*. 2023;23:139. https://doi.org/10.1186/s12889-023-15068-1.
168 Martínez-Donate AP, Correa-Salazar C, Bakely L, et al. COVID-19 testing, infection, and vaccination among deported Mexican migrants: results from a survey on the Mexico-U.S. border. *Front Public Health*. 2022;10:928385. https://doi.org/10.3389/fpubh.2022.928385.
169 Rosado JI, Costero JM, Wang Y. COVID-19 vaccine uptake and hesitancy in a latino agricultural community. *Health Educ Behav*. 2023;50(6):815–821. https://doi.org/10.1177/10901981231167893.
170 Sezerol MA, Altas ZM. Vaccine uptake and COVID-19 frequency in pregnant Syrian immigrant women. *Vaccines*. 2023;11:257. https://doi.org/10.3390/vaccines11020257.
171 Dolby T, Finning K, Baker A, et al. Monitoring sociodemographic inequality in COVID-19 vaccination uptake in England: a national linked data study. *J Epidemiol Community Health*. 2022;76:646–652. https://doi.org/10.1136/jech-2021-218415.
172 Ohlsen EC, Yankey D, Pezzi C, et al. Coronavirus disease 2019 (COVID-19) vaccination coverage, intentions, attitudes, and barriers by race/ethnicity, language of interview, and nativity-national immunization survey adult COVID module, 22 April 2021-29 January 2022. *Clin Infect Dis*. 2022;75:S182–S192. https://doi.org/10.1093/cid/ciac508.
173 Al-Hatamleh MAI, Hatmal MM, Mustafa SHF, et al. Experiences and perceptions of COVID-19 infection and vaccination among Palestinian refugees in Jerash camp and Jordanian citizens: a comparative cross-sectional study by face-to-face interviews. *Infect Dis Poverty*. 2022;11:123. https://doi.org/10.1186/s40249-022-01047-y.
174 Bartig S, Müters S, Hoebel J, Schmid-Küpke NK, Allen J, Hövener C. Social differences in COVID-19 vaccination status - results of the GEDA 2021 study. *J Health Monit*. 2023;8:2–22. https://doi.org/10.25646/11268.
175 Bentivegna E, Di Meo S, Carriero A, Capriotti N, Barbieri A, Martelletti P. Access to COVID-19 vaccination during the pandemic in the informal settlements of rome. *Int J Environ Res Public Health*. 2022;19:719. https://doi.org/10.3390/ijerph19020719.
176 Gram MA, Moustsen-Helms IR, Valentiner-Branth P, Emborg H-D. Sociodemographic differences in Covid-19 vaccine uptake in Denmark: a nationwide register-based cohort study. *BMC Publ Health*. 2023;23:391. https://doi.org/10.1186/s12889-023-15301-x.
177 Hussaini L, Labberton AS, Winje BA, et al. COVID-19 vaccination rates among adolescents (12-17 years) by immigrant background and sociodemographic factors: a nationwide registry study in Norway. *Vaccine*. 2023;41:3673–3680. https://doi.org/10.1016/j.vaccine.2023.04.079.
178 Nomah DK, Llibre JM, Díaz Y, et al. SARS-CoV-2 vaccination coverage and factors associated with low uptake in a cohort of people living with HIV. *Microorganisms*. 2022;10:1666. https://doi.org/10.3390/microorganisms10081666.
179 Powis M, Sutradhar R, Patrikar A, et al. Factors associated with timely COVID-19 vaccination in a population-based cohort of patients with cancer. *J Natl Cancer Inst*. 2023;115(2):146–154. https://doi.org/10.1093/jnci/djac204.
180 Kraft KB, Elgersma I, Lyngstad TM, Elstrøm P, Telle K. COVID-19 vaccination rates among healthcare workers by immigrant background: a nation-wide registry study from Norway. *Scand J Public Health*. 2022. https://doi.org/10.1177/14034948221100685.
181 Kraft KB, Godøy AA, Vinjerui KH, Kour P, Kjøllesdal MKR, Indseth T. *COVID-19 vaccination coverage by immigrant background*. Tidsskrift for Den norske legeforening; 2022.
182 Heiniger S, Schliek M, Moser A, Wyl V von, Höglinger M. Differences in COVID-19 vaccination uptake in the first 12 months of vaccine availability in Switzerland - a prospective cohort study. *Swiss Med Wkly*. 2022;152:w30162. https://doi.org/10.4414/smw.2022.w30162.
183 Quadri NS, Knowlton G, Vazquez Benitez G, et al. Evaluation of preferred language and timing of COVID-19 vaccine uptake and disease outcomes. *JAMA Netw Open*. 2023;6:e237877. https://doi.org/10.1001/jamanetworkopen.2023.7877.
184 MacDonald SE, Paudel YR, Du C. COVID-19 vaccine coverage among immigrants and refugees in Alberta: a population-based cross-sectional study. *J Glob Health*. 2022;12:5053. https://doi.org/10.7189/jogh.12.05053.
185 Nilsen TS, Gulseth HL, Daae A, Indseth T. Koronavaksinering i utlandet blant utenlandsfødte. *Tidsskr Nor Laegeforen*. 2022;142. https://doi.org/10.4045/tidsskr.22.0052.
186 European Centre for Disease Prevention and Control. *Reducing COVID-19 transmission and strengthening vaccine uptake among migrant populations in the EU/EEA; 3 June 2021*. Stockholm: ECDC; 2021.
187 Song S, Zang S, Gong L, et al. Willingness and uptake of the COVID-19 testing and vaccination in urban China during the low-risk period: a cross-sectional study. *BMC Publ Health*. 2022;22:556. https://doi.org/10.1186/s12889-022-12969-5.

188 Kassa SM, Njagarah JBH, Terefe YA. Modelling Covid-19 mitigation and control strategies in the presence of migration and vaccination: the case of South Africa. *Afr Mat*. 2021;32(7):1295–1322. https://doi.org/10.1007/s13370-021-00900-x.
189 Suphanchaimat R, Tuangratananon T, Rajatanavin N, Phaiyarom M, Jaruwanno W, Uansri S. Prioritization of the target population for coronavirus disease 2019 (COVID-19) vaccination program in Thailand. *Int J Environ Res Publ Health*. 2021;18:10803. https://doi.org/10.3390/ijerph182010803.
190 Irizar P, Pan D, Kapadia D, et al. Ethnic inequalities in COVID-19 infection, hospitalisation, intensive care admission, and death: a global systematic review and meta-analysis of over 200 million study participants. *Eclinicalmedicine*. 2023;57:101877. https://doi.org/10.1016/j.eclinm.2023.101877.
191 Horton R. Offline: COVID-19 is not a pandemic. *Lancet*. 2020;396:874.
192 Willen SS, Knipper M, Abadía-Barrero CE, Davidovitch N. Syndemic vulnerability and the right to health. *Lancet*. 2017;389(10072):964–977.
193 Anderson B, Poeschel F, Ruhs M. Rethinking labour migration: Covid-19, essential work, and systemic resilience. *Comp Migr Stud*. 2021;9:45. https://doi.org/10.1186/s40878-021-00252-2.
194 The Guardian. *Migrant fruit pickers charged thousands in illegal fees to work on UK farms, Investigation shows*. 2022.
195 Flynn MA, Wickramage K. Leveraging the domain of work to improve migrant health. *Int J Environ Res Public Health*. 2017;14:1248. https://doi.org/10.3390/ijerph14101248.
196 Karanikolos M, McKee M. How comparable is COVID-19 mortality across countries? *Eurohealth*. 2020;26(2):45–50.
197 Sepúlveda-Vildósola AC, MejÍa-Aranguré JM, Barrera-Cruz C, Fuentes-Morales NA, Rodriguez-Zeron C. Scientific publications during the COVID-19 pandemic. *Arch Med Res*. 2020;51:349–354. https://doi.org/10.1016/j.arcmed.2020.05.019.
198 Bozorgmehr K, Biddle L, Rohleder S, Puthoopparambil SJ, Jahn R. What is the evidence on availability and integration of refugee and migrant health data in health information systems in the WHO European Region? Health Evidence Network synthesis report 66, Themed issues on migration and health. *X. Health Evidence Network*. 2019.
199 World Health Organization. *Collection and integration of data on refugee and migrant health in the WHO European Region: technical guidance*. 2020, *92890553*.
200 Bozorgmehr K, McKee M, Azzopardi-Muscat N, et al. Integration of migrant and refugee data in health information systems in Europe: advancing evidence, policy and practice. *Lancet Reg Health Eur*. 2023;34:100744.
201 Wickramage K, Annunziata G. Advancing health in migration governance, and migration in health governance. *Lancet*. 2018;392:2528–2530.