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Health Equity Challenges for Forced Migrants in the COVID-19 Pandemic

Morisod Kevin

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Faculté de biologie
et de médecine

Département Vulnérabilités et médecine sociale, Unisanté

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Thèse de doctorat en médecine et ès sciences (MD-PhD)

présentée à la

Faculté de biologie et de médecine
de l'Université de Lausanne

par

Kevin MORISOD

Médecin diplômé de la Confédération Helvétique

Jury

Prof. Pedro Marques-Vidal, Président et répondant MD-PhD

Prof. Patrick Bodemann, Directeur de thèse

Prof. Marti, Co-directeur de thèse

Prof. Nicolas Senn, Expert

Prof. Yves Jackson, Expert

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**Health Equity Challenges for Forced Migrants in the
COVID-19 Pandemic**

Lausanne, le 3 mai 2024

pour Le Doyen
de la Faculté de Biologie et de Médecine

Prof. Pedro Marques-Vidal

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Summary

Context. Achieving equity in health and healthcare remains a challenge for healthcare systems worldwide and marked inequities in access and quality of care persist. The COVID-19 pandemic has highlighted pre-existing health inequities, particularly among forced migrant populations. Those populations often find themselves on the margins of society, facing barriers to healthcare access, limited resources, and a lack of representation in health policy. Moreover, the scientific literature has shown the importance of social and structural determinants on health equity since the start of the pandemic, with major inequities in terms of mortality, infection rates and access to care and vaccination across regions and populations. However, there is little or no data on the impact of the COVID-19 pandemic on forced migrant populations and the role of social and structural determinants of health (SDH) on these inequities. This thesis seeks to provide a better understanding of the health equity challenges faced by forced migrants during the COVID-19 pandemic in the Canton of Vaud, Switzerland. It encompasses five key objectives. Initially, it seeks to elucidate the concept of health equity and evaluate its practical application within emergency care, a specific setting particularly relevant to the population of interest. (Study 1) Secondly, it aims to identify the risk factors associated with a higher COVID-19 prevalence. (Study 2) Thirdly, it delves into the attitudes and awareness of asylum seekers regarding COVID-19 prevention guidelines. (Study 3) The fourth objective involves assessing and comprehending the pandemic-related experiences and concerns of asylum seekers. (Study 4) Lastly, the thesis aims to identify key success factors and limitations to the implementation of COVID-19 vaccination program for undocumented migrants. (Study 5)

Findings. Study 1 highlights the use of administrative data-derived indicators in combination with SDH can improve the measurement of health equity in emergency care settings across health care systems worldwide. Study 2 emphasizes on the differences in COVID-19 infection rate based on the place of living and the health literacy, advocating for specific public health strategies, to protect better those populations. Study 3 shows that poor knowledge on COVID-19 health recommendations was associated with linguistic barriers and living in a community center. Moreover, forced migrants whose asylum applications have been denied were more likely to believe COVID-19 rumors. Study 4 reveals that asylum seekers residing in community centers reported a higher incidence of sleep disorders linked to the COVID-19 pandemic compared to those living in private accommodations. Likewise, individuals with lower educational backgrounds expressed a heightened fear for their lives in relation to the pandemic. Lastly, Study 5 demonstrates that specific public health policies, like vaccination programs for undocumented migrants, were vital to ensure equitable healthcare provision, particularly during a pandemic.

Conclusion. In conclusion, our thesis highlights the importance of considering health equity as an integral component of all comprehensive public health policies. It advocates for public health interventions tailored to the unique needs of forced migrants and their living conditions during crises like the COVID-19 pandemic. These measures may involve avoiding high-density facilities by facilitating the relocation of migrants from community centers to private accommodations, ensuring that quarantine and isolation measures are feasible across various living environments, adapting the communication of health recommendations to be linguistically and culturally appropriate, implementing targeted COVID-19 vaccination programs for undocumented migrants, and proactively addressing mental health through preventive actions.

Résumé

Contexte. L'équité en santé reste un défi pour les systèmes de santé du monde entier et des iniquités marquées persistent en matière d'accès et de qualité des soins, mises en évidence lors de la pandémie de COVID-19, en particulier parmi les populations migrantes forcées. Ces populations se retrouvent souvent en marge de la société, confrontées à des obstacles à l'accès aux soins, à des ressources limitées et à un manque de représentation dans les politiques de santé. De plus, la littérature scientifique a montré l'importance des déterminants sociaux et structurels (DSS) sur l'équité en santé depuis le début de la pandémie, avec des iniquités majeures en termes de mortalité, de taux d'infection et d'accès aux soins et à la vaccination entre les régions et les populations. Cependant, il existe peu ou pas de données sur l'impact de la pandémie de COVID-19 sur les populations migrantes forcées et sur le rôle des DSS sur ces iniquités. Cette thèse vise à mieux comprendre les défis en matière d'équité en santé auxquels les migrants forcés ont été confrontés pendant la pandémie de COVID-19 dans le canton de Vaud, en Suisse. Elle comprend cinq objectifs principaux. Premièrement, elle cherche à élucider le concept d'équité en santé et à évaluer son application pratique dans les soins d'urgence. (Étude 1) Deuxièmement, elle vise à identifier les facteurs de risque associés à une prévalence plus élevée de COVID-19. (Étude 2) Troisièmement, elle étudie les attitudes et la sensibilisation des demandeurs d'asile à l'égard des mesures de prévention de COVID-19. (Étude 3) Le quatrième objectif consiste à évaluer et à comprendre le vécu et les préoccupations des demandeurs d'asile durant la pandémie. (Étude 4) Enfin, la thèse vise à identifier les facteurs clés de succès et les limites de la mise en œuvre d'un programme de vaccination COVID-19 pour les migrants sans-papiers. (Étude 5)

Résultats. L'étude 1 souligne que l'utilisation d'indicateurs dérivés de données administratives en combinaison avec les DSS peut améliorer la mesure de l'équité en santé dans les contextes de soins d'urgence. L'étude 2 met l'accent sur les différences de taux d'infection à COVID-19 en fonction du lieu de vie et de la littératie en santé. L'étude 3 montre que la méconnaissance des recommandations sanitaires relatives à COVID-19 est associée à des barrières linguistiques et au fait de vivre dans un foyer communautaire. De plus, les requérants d'asile déboutés sont plus susceptibles de croire aux rumeurs en lien avec la pandémie de COVID-19. L'étude 4 révèle que les demandeurs d'asile résidant dans des foyers communautaires ont une incidence plus élevée de troubles du sommeil liés à la pandémie de COVID-19 que ceux vivant dans des logements privés. De même, les personnes ayant un faible niveau d'éducation ont exprimé une plus grande crainte pour leur vie en lien avec la pandémie. Enfin, l'étude 5 démontre que des politiques de santé publique spécifiques, comme les programmes de vaccination pour les migrants sans-papiers, sont essentielles pour assurer une prestation de soins de santé équitable, en particulier lors d'une pandémie.

Conclusion. En conclusion, notre thèse souligne l'importance de considérer l'équité en santé comme une composante à part entière de toutes les politiques de santé publique. Elle préconise des interventions de santé publique adaptées aux besoins spécifiques des migrants forcés et à leurs conditions de vie lors de crises telles que la pandémie de COVID-19. Ces mesures peuvent consister à éviter les logements à forte densité de population, en facilitant le transfert des migrants des foyers communautaires vers des logements privés, à s'assurer que les mesures de quarantaine et d'isolement sont réalisables dans les divers environnements de vie, à adapter la communication des recommandations sanitaires pour qu'elle soit linguistiquement et culturellement appropriée, à mettre en œuvre des programmes de vaccination ciblés contre le COVID-19 pour les migrants sans papiers, et à aborder de manière proactive la santé mentale par le biais d'actions préventives.

Introduction

Motivation

This thesis is part of an initiative launched in 2019 by the World Health Organization (WHO) with the support of the Swiss Confederation's Department for International Cooperation (SDC) entitled "*Action on the social determinants for advancing health equity in the time of COVID-19*". The aim of this initiative is to follow up the 2008 WHO Commission on the Social Determinants of Health (WHO Commission on Social Determinants of Health, 2008) by identifying models and practices for acting on the social and structural determinants of health (SDH) to advance health equity in the context of the COVID-19 pandemic. (Solar et al., 2023)

The COVID-19 pandemic has not only challenged healthcare systems worldwide but also highlighted the existing health inequities, particularly among forced migrant populations. Those populations often find themselves on the margins of society, facing barriers to healthcare access, limited resources, a lack of representation in health policy and face health inequities in the host country ahead of the COVID-19 pandemic. (Abubakar et al., 2018)

The scientific literature has highlighted the importance of SDH on health equity since the start of the pandemic, with major inequities in terms of mortality, infection rates and access to care and vaccination across regions and populations. (World Health Organization, 2021)

However, there is little or no data on the impact of the COVID-19 pandemic on forced migrant populations and the role of SDH on these inequities worldwide, including Switzerland. The aim of this thesis is to fill these gaps in the specific context of the Canton of Vaud in Switzerland, a region accounting for around 10% of the forced migrant population in this country.

This thesis includes five articles (See Articles) whose main objectives and results will be summarized in the chapter “Specific Aims of the Thesis” and “Summary of the Findings” respectively. The thesis begins with an introductory chapter divided into four sections.

The first introductory section explores the concept of health equity, a fundamental principle in public health, and its link to the SDH. Next, it aims to synthesize the role of the SDH on health equity during the COVID-19 pandemic, based on a WHO review we took part in entitled *COVID-19 and the social determinants of health and health equity: evidence brief*. (World Health Organization, 2021) The introduction focuses then on migrant populations, in particular forced migrants, and the specific health equity issues faced by these populations. These three initial sections of the introductory chapter allow identifying the main hypotheses and research gaps on the potential impact of the COVID-19 pandemic on health inequities of migrant populations. The last introductory section looks at the specific setting of this doctoral work, the canton of Vaud in Switzerland.

The concept of health equity

General comments on "Equity"

The essence of equity, central to this doctoral research, warrants a comprehensive understanding due to its inherent complexity. In this thesis, a specific definition of equity is adopted. However, it is imperative to acknowledge that equity is a multifaceted concept prevalent across various research domains, including philosophy, law, social sciences, and clinical sciences. Its interpretation may fluctuate based on the theoretical framework applied, yet fundamental principles persist across these disciplines.

In philosophy, the concept of equity traces back to Aristotle's Greek writings, notably in "Nicomachean Ethics" Book V, dedicated to justice. (Ross & Brown, 2009) Here, equity is portrayed as an adjunct to justice, offering a nuanced approach to judgement by taking context into account. While justice demands uniform treatment for all, thus necessitating equality, Aristotle contended that mere egalitarianism was insufficient. He advocated for a concept akin to equity, one that introduces flexibility and discernment into decisions. Aristotle posited, "just and equitable are the same thing, and although both are virtuous, superiority belongs to that which is equitable." (Chroust, 1942) This notion is exemplified by the scenario of a mentally unstable individual pledging a weapon to a creditor; returning the weapon upon settlement of the debt, though seemingly just, may not be equitable due to the potential dire outcomes. Thus, equity closely aligns with justice or social justice, incorporating a moral dimension to adapt to specific contexts. (Ross & Brown, 2009)

It is based on this concept of equity that the World Health Organization (WHO) defines health equity as "The absence of systematic or potentially remediable differences in health status, access to healthcare and health-enhancing environments, and treatment in one or more aspects of health across populations or population groups defined socially, economically,

demographically or geographically within and across countries.”(World Health Organization, 2024) By extension, to be interested in health equity is to be interested in sub-set of health inequalities, where differences in health are associated with social disadvantages that are modifiable and considered unfair.(Braveman, 2022; M. Marmot, 2017)

Health equity and the social and structural determinants of health

In the health field, the distinction between equity and equality often blurs. The equitable provision in healthcare, for instance, was perceived as ensuring uniform care or universal, equal access to health services and healthcare. While this egalitarian approach stands out in stark contrast to highly unequal healthcare systems, it falls short of realizing equal health outcomes among individuals, mostly by neglecting the impact on health of SDH between individuals or populations beyond the healthcare system.(Braveman, 2006; Culyer & Wagstaff, 1993)

To illustrate this concept, we have developed images inspired by existing graphics and adapted them to health issues. (Figure 1) It shows the differences between equality and equity and proposes three operational dimensions of health equity. In these figures, the variations in ground level represent the different SDH (such as level of education, income, material living conditions, etc.), while the fence represents the different obstacles to accessing care (language barrier, cultural barrier, structural racism, etc.). Finally, variations in gender and ethnic origin are represented by the different characters.(Bodenmann et al., 2023a)

- Equality (Figure 1a) is not synonymous with equity and is insufficient to tackle health inequities

- Clinical equity (Figure 1b): the clinician is required to do more for the patient on the right than for the other two; he or she adapts to the specific needs of each patient, considering

differences in the SDH of the patients. This extra effort is represented by the accumulation of boxes below each character, considering their SDH.

- Institutional equity (Figure 1c), where the healthcare structure adapts to the specific needs, abilities and skills of patients. This institutional effort is represented by the removal of the fence.

- Structural equity (Figure 1d), where society is prepared to make adaptations to mitigate differences in the SDH.(Bodenmann et al., 2023a)

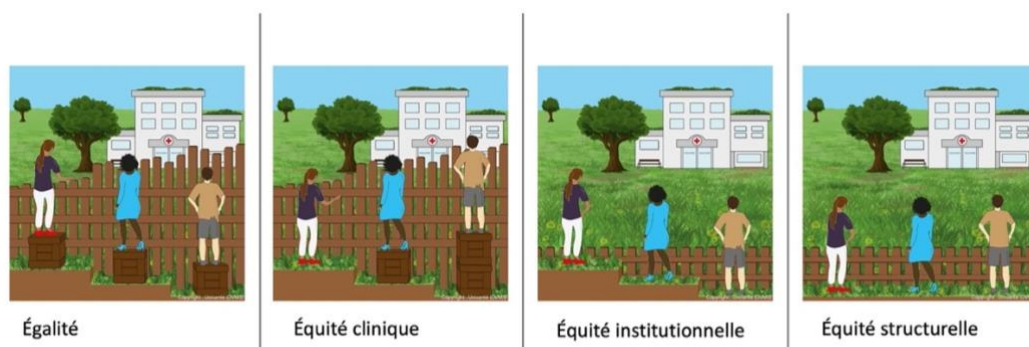


Figure 1 Graphical representation of the concept of health and its clinical, institutional and structural dimensions. The ground levels represent the social gradient and the barrier corresponds to all the barriers to access to care and health. (Copyright: Department of Vulnerability and Social Medicine (DVMS) at Unisanté and Chair of Medicine for Vulnerable Populations at the FBM of the UNIL). From left to right, images a to d.(Bodenmann et al., 2023b)

In his book *The health gap*, Prof. Michael Marmot promotes an approach that he describes as proportionate universalism, ensuring access to health and healthcare for all, but adapting to the specific context and social gradient present in any society.(M. G. Marmot, 2016) His starting point is the observation that health inequalities exist not only between the most disadvantaged and the most advantaged, but also between all social categories. For example, the life expectancy of the 10% most educated or wealthiest of a given community is almost systematically higher than that of the next 10%, and so on.(M. G. Marmot, 2016) To limit these

inequalities, the author recommends a public health vision that incorporates the various factors that explain them, in particular the SDH, i.e. the conditions in which people are born, grow, work, live, and age and people’s access to power, money and resources.(WHO Commission on Social Determinants of Health, 2008) The SDH were first described by Dahlgren and Whitehead in 1991 and have been an essential conceptual framework for a holistic approach to health equity.(Dahlgren & Whitehead, 1991) (Figure 2) They, include the socio-economic status, material living conditions, housing, level of education, as well as the political, cultural and environmental conditions.

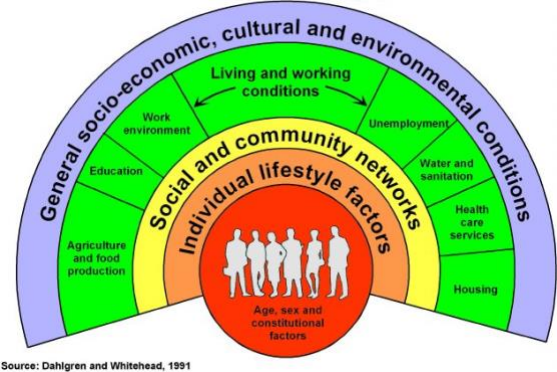


Figure 2 Social and structural determinants of health (Dahlgren & Whitehead, 1991)

The concept of health equity is appearing with increasing frequency in peer-reviewed literature since the beginning of the century. The use of this term has increased 15-fold over the last 10 years, particularly with the advent of the COVID-19 pandemic, reflecting the importance of this issue in health policy and public health research.(Bodenmann et al., 2023a) (Figure 3)

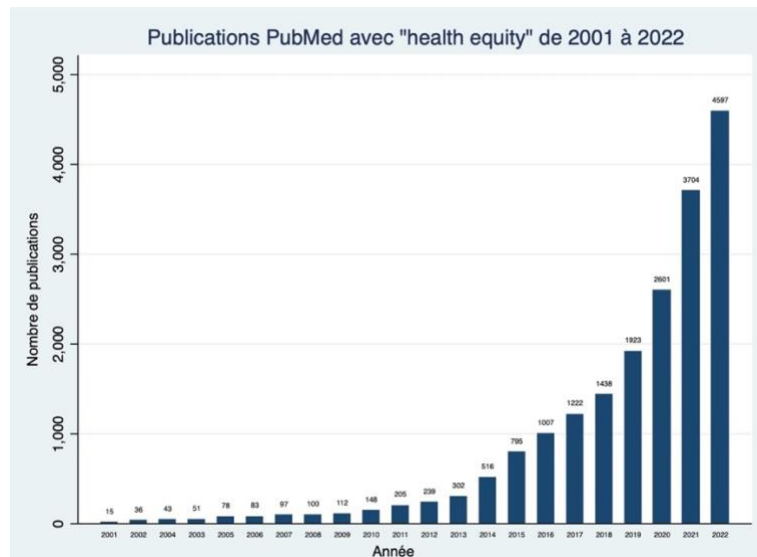


Figure 3 Publications in Pubmed with the concept "health equity" in the title, abstract or text (2000-2022).(Bodenmann et al., 2023b)

Derived from the previous concepts, the notion of social vulnerabilities represents the sum of SDH of an individual or a population at a given time, in a given context, exposing them to an increased risk of health inequities.(Morisod et al., 2020)

An individual or community with unfavorable social and structural determinants of health equity (e.g. an asylum seeker with low educational background, language and cultural barriers, precarious legal status, bad living conditions and limited access to the health system) will be at risk of health inequities and in this sense will be considered vulnerable. Vulnerability is not an immutable notion. On the other hand, it will evolve over time according to the evolution of the social determinants of the individual or community in question.(Morisod et al., 2020)

The thesis context: the COVID-19 pandemic

Research on COVID-19 has shown that older individuals globally face a heightened risk of severe illness and mortality. Additionally, pre-existing medical conditions such as hypertension, diabetes mellitus type 2, respiratory diseases, and obesity significantly amplify the severity and mortality risk of COVID-19, with men being more susceptible than women.(Booth et al., 2021; Zhou et al., 2020) These situations of vulnerability extends to those with disabilities and those undergoing cancer treatment, for instance.(World Health Organization, 2021)

Moreover, the prevalence of these comorbidities often correlates with SDH making noncommunicable diseases more common among lower socio-economic groups.(Azarpazhooh et al., 2020) The pandemic has starkly highlighted global inequities in infection rates, hospitalizations, and deaths across and within countries.(M. Marmot et al., 2020) While susceptibility to COVID-19 stems from existing SDH, evidence is mounting that disadvantaged groups' ability to follow public health guidelines (like mask-wearing, physical distancing, and adherence to lockdown measures) and to recover from the pandemic's consequences (and indirect impacts of public measures) is also determined by these social factors.(Alberti et al., 2020; Benjamin, 2020)

As a result, marginalized groups have shouldered the heaviest burden of the crisis, leading to increased poverty, deprivation, and discrimination, along with enduring social and economic consequences that threaten health equity.(M. Marmot et al., 2020)

Evidence consistently indicates that economically disadvantaged individuals face significantly higher rates of COVID-19 infection and mortality. Income disparity itself further exacerbates these outcomes.(World Health Organization, 2021) An extensive review found a direct association between income inequality and poverty with an increased rate of hospitalizations (including intensive care) and deaths.(Wachtler et al., 2020) Similarly, Public Health England

showed that mortality linked to Covid-19 is twice as high in disadvantaged areas of London compared with the most advantaged areas.(Office for National Statistics, 2020) A study published in the Lancet Infectious Diseases also highlighted a higher prevalence of SARS-CoV-2 infection according to the degree of social precarity or ethnicity.(de Lusignan et al., 2020) In the United States, the black community, particularly the disadvantaged, is paying the heaviest price for the epidemic.(Chowkwanyun & Reed, 2020; Millett et al., 2020) And these inequities in the face of COVID-19 disease go beyond the usual health inequities between these population categories. Admittedly, the prevalence of certain clinical diagnoses is higher in disadvantaged neighborhoods or within specific communities, but these diagnoses alone do not seem to explain the significant difference in mortality. Other important hypotheses emerged: occupations more at risk of contact with the virus among black people in the United States, greater promiscuity in some neighborhoods making it more difficult to apply social distancing measures, and poorer access to the healthcare system.(Dorn et al., 2020; Johnson et al., 2020) Moreover, sanitary measures such as hand hygiene were severely compromised for many people who do not have access to running water,(M. Marmot, 2020) as were social distancing measures for people living in community centers or prisons.(Okano & Blower, 2020; Razum et al., 2020)

This trend of heightened vulnerability among less affluent populations to SARS-CoV-2 infection and subsequent mortality had been documented across a large variety of countries and settings. For instance, in New York City, the areas most affected by deprivation saw a higher concentration of ethnic minorities with pre-existing health conditions.(Arasteh, 2021) Moreover, an analysis in Brazil correlating income inequality levels, as measured by the Gini coefficient, with COVID-19 outcomes revealed that neighborhoods with greater income disparities experienced higher incidences of infection and death.(Demenech et al., 2020) In

Switzerland, a study showed poorer access to screening tests, and a higher risk of hospitalization, and higher mortality rate among people living in socio-economically disadvantaged areas compared with those living in more advantaged regions.(Riou et al., 2021)

In summary, according to WHO, evidence indicated that populations with superior living conditions, education, social capital, and access to healthcare, i.e. better SDH, have been more resilient against the pandemic. In the other hand, some populations, such as forced migrants, who are exposed to several unfavorable SDH, are particularly at risk of health inequities during the COVID-19 pandemic. Therefore, a heightened focus on the SDH of this population is needed to an equitable approach in recovery efforts and future pandemic preparedness.(Alberti et al., 2020)

The thesis population: forced migrants

Definitions

The International Organization for Migration reports that approximately one-seventh of the global population now resides in a place different from their birthplace.(United Nations Publications, 2018) A migrant is defined as an individual who has relocated across an international border or within their own country, moving away from their usual place of residence.

According to United Nations High Commissioner for Refugees (UNHCR), forced migrants are defined by “people worldwide forcibly displaced as a result of persecution, conflict, violence, human rights violations and events seriously disturbing public order.”(UNHCR, 2023)

At the end of 2022, 108.4 million people worldwide were forced migrants, divided into three main categories: refugees, asylum seekers and internally displaced people.(UNHCR, 2023)

- Refugees: people forced to flee their own country and seek safety in another country. In general, forced migrants are considered refugees after receiving legally-defined protection by their country of residence or international organizations.
- Asylum seekers: forced migrants whose request for sanctuary has yet to be processed.
- Internally displaced people (IDP): forced migrants who haven't cross an international border. Around 58% of all forced migrants are IDPs.(UNHCR, 2023)

Among these forced migrants, one category is particularly at risk of health inequities: undocumented migrants, defined as migrants who do not fulfil the requirements established by the country of destination to enter, stay or exercise an economic activity.(UNFPA, 2004)

There is very little data on this overlooked population, which often lives in precarious

conditions with limited access to healthcare and other social services in the host country.(Winters et al., 2018)

Health equity issues

Although human migration has a lengthy history, its role as a crucial determinant of health has often been overlooked. Research highlighted that the health outcomes among migrants are varied and subject to change, influenced by a multitude of factors. These include the health condition of the individual before moving, socio-economic and environmental circumstances, prevalent diseases and risk behaviors in the destination, cultural norms and practices, and the availability of preventive or therapeutic health services during the migration journey.(Abubakar et al., 2018) While the health profiles of migrants are diverse, evidence consistently indicates that forced migration exerts a particularly severe impact on health outcomes.(Abubakar et al., 2018) For example, asylum seekers and refugees have higher prevalence rates of depression, anxiety, and posttraumatic stress disorder compared with the host population.(Close et al., 2016)

Using the conceptual framework of the SDH and health equity described above, we can identify specific issues concerning the health of forced migrant populations in the host country. Below we present the main risks of health inequities identified in migrant health literature in relation to the SDH of forced migrant populations.

- Political determinants of health

Depending on the status of the forced migrants and the host country in which they live, they could have very different access to healthcare.(Ottersen et al., 2014) In Switzerland, for example, asylum seekers and refugees benefit from universal health insurance cover. This is

not systematically the case for undocumented migrants or asylum seekers in other countries.(Winters et al., 2018) The various laws governing the rights of forced migrants have an impact on their SDH, as they affect their ability to work, receive training or access quality healthcare. Similarly, their living and housing conditions depend on the host country's policies.(Ottersen et al., 2014) However, forced migrants have virtually no influence on these laws, as they are often excluded from any political decision-making process.(Willen et al., 2017) Moreover, the political discourse in host countries often marginalizes migrants, challenging their rights to healthcare and exacerbating exclusion. Understanding these dynamics is crucial for addressing health inequities in migrant populations.(Willen et al., 2017)

- Discriminations and cultural determinants of health

Migrants often encounter discrimination and social exclusion based on ethnicity, race, nationality, or status, sometimes driving them to leave their home countries. This discrimination continues in transit and host countries, fueled by stereotypes and racism.(Paradies, 2006) Cultural identity can unfortunately be used as a basis for this discrimination, which not only divides communities but also perpetuates fears and misconceptions about public health and resource distribution.(Napier et al., 2014)

The discrimination faced by migrants is complex, intersecting with issues of gender and disability, and is characterized by both racism and anti-migrant sentiments.(Abubakar et al., 2018; Napier et al., 2014) It has tangible effects on mental health and access to healthcare among migrants, and broader societal impacts, such as economic losses due to racial discrimination.(Elias & Paradies, 2016; Momartin et al., 2006)

- Language barriers and health literacy

Language barriers and low health literacy remain major sources of health inequities, limiting access to information and quality of care and explaining higher prevalence and incidence of chronic disease such as diabetes among forced migrants.(Andersen et al., 2016) The absence or non-reimbursement of community interpreters during medical consultations and the limited translation of public health information contribute to the exclusion of forced migrants from the healthcare system, especially for those with low health literacy.(Fernández-Gutiérrez et al., 2018; Tsai & Lee, 2016)

In conclusion, addressing the health equity issues of forced migrant populations means considering their SDH, in particular their living conditions, their language barriers, their discriminations, their legal status and their access to healthcare.

The Setting: Canton of Vaud, Switzerland

The canton of Vaud in Switzerland is the third largest in terms of population, with 830'791 inhabitants at the end of 2022 (9.42% of the country population), and the largest of the country's French-speaking minority.(Etat de Vaud, 2024)

In this canton, a pioneering nurse-led initiative known as the Network for Migrant Health (RESAMI) has been launched to offer specialized health care services to asylum seekers and migrants receiving emergency assistance. This comprehensive network includes a range of public and private health care providers, such as the Migrant Care Unit (USMi), primary health care doctors, pharmacies, various specialists and the Migrant Reception Establishment (EVAM).(Bodenmann et al., 2007) EVAM, backed by the canton of Vaud and in accordance with the Federal Asylum Act, is tasked with the registration, accommodation, and provision of emergency services to asylum seekers and others facing precarious legal statuses. The Migrant Care Unit, staffed by nurses, general practitioners, and administrative staff with specialization in primary care for asylum seekers, operates in synergy with interpreters to enhance communication and care provision.(Tzogiou et al., 2022) While EVAM focuses on the social and housing needs of the asylum seekers, the USMi is dedicated to their health care, ensuring coordination and delivery of services with the support of the broader RESAMI network, including when the expertise of general practitioners, pediatricians, or other medical specialists is necessary. Upon their arrival in Vaud, asylum seekers and individuals eligible for emergency aid are encouraged to undergo health assessments at the USMi, which includes vaccinations. The USMi plays a crucial role in navigating language and cultural barriers, promoting efficient use of health care services, and acting as a liaison to direct patients to appropriate care within the RESAMI network or to emergency services as needed.

Furthermore, the USMi offers ongoing consultations and educates on disease prevention and health maintenance. Within the RESAMI framework, individuals have the flexibility to continue their treatment through the USMi or transition to the standard health care system based on their needs.(Spycher et al., 2021)

According to cantonal administrative data, 744 asylum seekers were living in one of the ten community centers of the Canton of Vaud during the first year of the COVID-19 pandemic, for a total of 5'608 people in the asylum process and 6'619 people with refugee status. (Etat de Vaud, 2024) Throughout the COVID-19 pandemic, community centers enforced mandatory face mask policies and recommended preventive measures such as hand hygiene, social distancing, and minimizing contact. Additionally, individuals who tested positive for SARS-CoV-2 were required to undergo quarantine and isolation to curb the spread of the virus. In the Canton of Vaud, starting from April 2021, COVID-19 vaccination was made accessible and complimentary for individuals aged 18 and above, encompassing asylum seekers and refugees. Nonetheless, undocumented migrants lacking health insurance were not included in the official vaccination campaigns.

Health equity and forced migration in the COVID-19 pandemic

Before the COVID-19 pandemic, as previously described, asylum seekers, refugees and undocumented migrants were already facing health inequities,(Abubakar et al., 2018) and poorer access to care.(Brandenberger et al., 2019)

Since the onset of the COVID-19 pandemic, experts and scientists have been raising concerns about the heightened risks faced by forced migrant populations. They have emphasized the importance of taking social context and living conditions into account in efforts to manage and prevent the spread of COVID-19.(Bhopal, 2020; Kluge et al., 2020; Orcutt et al., 2020) Factors like high population density, belonging to a minority ethnic group, and experiencing social deprivation have been recognized as risk factors for contracting SARS-CoV-2 infection. (de Lusignan et al., 2020; de Souza et al., 2020; Rentsch et al., 2020) The International Organization for Migration, in a report released in December 2020, underscored a range of potential vulnerability factors that forced migrant populations encountered during the pandemic.(Guadagno, 2020) They included: social promiscuity and poor living conditions that facilitate the spread of the virus,(Clark et al., 2020) reduced access to healthcare services,(Page et al., 2020) including mental health support,(Aragona et al., 2020) apprehension about legal consequences,(Clark et al., 2020) limited understanding of public health guidelines due to language and cultural differences,(Clark et al., 2020) and pre-existing health conditions.(Greenaway et al., 2020)

In the following subsections, we will explore the significant health inequities that forced migrants encountered during the COVID-19 pandemic, highlighting gaps in existing research.

Higher risk of contamination

Singapore's experience in the spring of 2020 underscored the critical need to pay attention to particular demographic groups. Despite the public health authorities' success in curbing the virus's spread through an efficient testing and isolation regime, numerous outbreaks emerged within the cramped and unsanitary living conditions of migrant worker residences. This situation highlighted the vulnerabilities of specific populations during health crises.(Yi et al., 2021) Furthermore, a surveillance study in the United States conducted across 14 homeless shelters indicated that factors such as population density and the nature of sleeping accommodations (e.g., dormitory-style rooms without partitions versus single or shared rooms) were identified as risk factors for SARS-CoV-2 infection.(Rogers et al., 2021) These studies underscore the significance of housing and living conditions as risk factors for disease transmission. Numerous epidemic outbreaks have been documented in immigrant detention centers, particularly in the United States..(Erfani et al., 2020; Openshaw & Travassos, 2020) A systematic review focusing on the clinical outcomes and risk factors for COVID-19 among migrant populations revealed that migrants face a higher risk of infection. It called for improved attention to particular groups of migrants, especially those residing in reception centers, to address their heightened vulnerability.(Hayward et al., 2021) A retrospective study utilizing national surveillance data from Greece underscored that refugees and asylum seekers in reception facilities faced a 2.5 to 3 times higher risk of COVID-19 infection than the general population.(Kondilis et al., 2021)

However, there is a lack of evidence on the risk factors associated with a higher rate of infection among forced migrants living in community centers.

Lower access to public health information/ lower implementation of public recommendations

Among the various factors contributing to the heightened burden of the pandemic on forced migrants, limited access to COVID-19 public health guidelines emerged as a significant issue.

The restricted understanding of public health guidelines, stemming from language and cultural barriers, was identified as a vulnerability among asylum seekers and refugees. (Aragona et al., 2020; Clark et al., 2020; Guadagno, 2020)

Current research indicates that factors such as linguistic and cultural barriers, limited health literacy, living conditions, and legal status may lead to a distrust of authorities and exacerbate the impact of the COVID-19 pandemic on asylum seekers, refugees, and undocumented migrants. (Burton-Jeangros et al., 2020; Crouzet et al., 2022; da Silva Rebelo et al., 2018)

Asylum seekers who had limited knowledge or did not fully comprehend public health guidelines, often due to poor communication, language differences, or cultural obstacles, likely faced increased concerns related to the COVID-19 pandemic, including fears of infection or death, leading to a significant decline in their mental health. (Nungsari et al., 2022; Sharif-Esfahani et al., 2022) Prior research has highlighted disparities in communication during pandemics, particularly impacting linguistic minorities and socially marginalized groups. This unequal access to information could foster mistrust, leading to heightened stress, anxiety, and apprehension during a pandemic. (Chu et al., 2020)

Nonetheless, there remains insufficient data concerning the access to information and comprehension of health recommendations among forced migrants during the COVID-19 pandemic.

Worse COVID-19 experience with worries, sleep troubles and fear of dying

Forced migrant populations consist of diverse communities, each with unique vulnerabilities. Specifically, during the pandemic, certain groups, such as undocumented migrants and individuals residing in community centers, were especially at risk due to adverse SDH.(Crouzet et al., 2022; Douglas et al., 2020; Garcini et al., 2020; Meyer et al., 2020; Page et al., 2020)

Community centers indeed often feature conditions such as high population density, shared living spaces, and a lack of privacy. These factors likely exacerbated the negative impact of the pandemic on the residents, intensifying their worries.(Garrido et al., 2022)

Likewise, asylum seekers who possess minimal awareness or understanding of public health guidelines, often due to insufficient communication, language differences, or cultural obstacles, may have faced increased anxiety concerning the COVID-19 pandemic (including fears of infection or death) and significant mental health challenges.(Sharif-Esfahani et al., 2022) Past studies have highlighted disparities in communication during pandemics, which disproportionately affect linguistic minorities and those who are socially marginalized. This disparity in information access has led to mistrust, contributing to heightened stress, anxiety, and fear during the pandemic.(Chu et al., 2020; Nungsari et al., 2022)

Nevertheless, there is little or no data on the experiences and worries of forced migrant populations living in community centers during the COVID-19 pandemic.

Lack of access to COVID-19 vaccination

Undocumented migrants faced significant health inequities, largely due to their living and social circumstances, which heightened their vulnerability to COVID-19 exposure.(Baggio et al., 2021; Bahar Özvarış et al., 2020; Bhopal, 2020; Matlin et al., 2022) Moreover, they had limited healthcare access, especially if they were uninsured. This was particularly relevant

regarding access to COVID-19 vaccination.(Bartovic et al., 2021; Crawshaw et al., 2021; Teerawattananon et al., 2021) A recent review underscored the myriad obstacles that undocumented migrants encounter in accessing COVID-19 vaccinations, encompassing both systemic restrictions and practical challenges from both the supply and demand perspectives.(Matlin et al., 2021)

For instance, the authors identified significant practical barriers on the supply side, such as the absence of interpreters at vaccination centers and the failure to tailor vaccination campaigns to the living and working conditions of undocumented migrants.(Matlin et al., 2021) Additionally, critical demand-side barriers to COVID-19 vaccination among undocumented migrants include their mistrust of the government, fear of personal data being shared with immigration authorities, low perception of the COVID-19 threat, and the proliferation of misinformation regarding vaccination.(Matlin et al., 2021)

Although recommendations have been published to encourage the vaccination of undocumented migrant populations, to our knowledge there was no detailed description of a specific vaccination program, how to implement it and what are the key success factors and limitations.

Specific Aims of the Thesis

Through five different studies, this thesis sought to provide a better understanding of the health equity challenges faced by forced migrants during the COVID-19 pandemic in the Canton of Vaud, Switzerland and filled the gaps identified in the previous section. First, it aims to describe the concept of health equity and to identify how it could be measured in specific healthcare setting.(Study 1) Then, this thesis seeks to enhance understanding of the previously mentioned risk factors influencing COVID-19 contamination rate among forced migrant populations.(Study 2) It also seeks to comprehend how forced migrants access information about COVID-19 (Study 3) and to assess the factors that influence the mental and emotional aspects of their pandemic experience.(Study 4) Finally, it examines the access to COVID-19 vaccinations of undocumented migrants in the Canton of Vaud, Switzerland.(Study 5) The objective is to use these insights to guide the creation of more inclusive pandemic response policies in the future.

We carried out these studies using different methods, including a systematic review of the literature (Study 1), a sero-epidemiological analysis (Study 2), a cross-sectional survey (Study 3), a mixed-method study (Study 4) and a descriptive case report (Study 5). The objectives and main results of these studies are listed below.

Study 1: Measuring Health Equity in Emergency Care Using Routinely Collected Data: A Systematic Review

This study was a systematic review of administrative data-derived health care equity indicators and their association with SDH in emergency care settings. The study's aims were to:

- Describe how health equity is measured by combining administrative data-derived indicators and SDH.
- Identify a set of valuable and replicable indicators that can be used in the analysis of health equity in emergency care settings or with specific populations, such as forced migrants.(Morisod et al., 2021)

Study 2: Prevalence of SARS-CoV-2 infection and associated risk factors among asylum seekers living in asylum centres: A cross-sectional serologic study in Canton of Vaud, Switzerland

This study was a seroepidemiologic analysis of SARS-CoV-2 infection conducted in two asylum centers of the canton of Vaud, Switzerland. The study's aims were to:

- Explore the pandemic's spread into asylum centers during the first wave of the pandemic in Switzerland.
- Identify the risk factors associated with a positive anti-SARS-CoV-2 seroprevalence test after the first partial lockdown period (16 March to 27 April 2020) amongst asylum seekers and refugees living in centers.(Morisod, Grazioli, et al., 2023)

Study 3: Asylum Seekers' Responses to Government COVID-19 Recommendations: A Cross-sectional Survey in a Swiss Canton

This study was a self-administered cross-sectional survey about asylum seekers' knowledge, attitudes, and perceived adherence to recommendations about COVID-19. The study's aims were to:

- Explore asylum seekers' attitudes and knowledge concerning COVID-19 recommendations.

- Describe associations between these variables and participants' socio-demographic characteristics.(Morisod, Durand, et al., 2023)

Study 4: Facing the COVID-19 Pandemic: A Mixed-Method Analysis of Asylum

Seekers' Experiences and Worries in the Canton of Vaud, Switzerland

This study was a sequential explanatory mixed method design, starting with a quantitative survey followed by qualitative semi-directed interviews with asylum seekers living in community centers. The study's aims were to:

- Measure and understand asylum seekers' pandemic experiences and worries.
- Explore and enhance our comprehension of the experiences of asylum seekers during the COVID-19 pandemic, taking into account their living situations, immigration status, level of education, language proficiency and health literacy.(Morisod, Martin, et al., 2023)

Study 5: COVID-19 Vaccination Program for Undocumented Migrants: Notes from the Field of a Regional Center of General Medicine and Public Health, Canton of Vaud, Switzerland

This study was a case study using administrative data analysis and semi-structured interviews with key stakeholders. The study's aim was to:

- Describe a vaccination program for undocumented and uninsured migrants conducted at a regional center of general medicine and public health
- Identify key success factors and limitations to the implementation of vaccination program for undocumented migrants(Morisod, Nikles, et al., 2023)

Summary of the Findings

Study 1: Measuring Health Equity in Emergency Care Using Routinely Collected Data: A Systematic Review

In this review of 29 studies, 14 indicators of equity were discovered and categorized into four groups that mirror the journey of patients through emergency care. The two most commonly utilized indicators of equity were the total number of visits to the emergency department (ED) and ambulatory care sensitive condition-related ED visits. These studies examined equity through the lens of seven SDH, relevant for forced migrant populations: social deprivation, income, education level, social class, insurance status, health literacy, and both financial and non-financial obstacles. Although there were some inconsistent findings, all the SDH identified were linked to inequities in the accessibility and utilization of emergency services. Adopting a multifaceted approach to indicators could offer a more detailed and nuanced understanding of healthcare equity than relying on a single indicator alone. (Morisod et al., 2021)

Study 2: Prevalence of SARS-CoV-2 infection and associated risk factors among asylum seekers living in asylum centres: A cross-sectional serologic study in Canton of Vaud, Switzerland

The study involved 124 individuals from two asylum centers, with 82 participants from Center 1 and 42 from Center 2, resulting in an average participation rate of 36.7%. Seroprevalence rates were found to be 13% [95% CI 0.03, 0.14] in Center 1 and 50% [95% CI 0.34, 0.65] in Center 2. Among those who tested positive for SARS-CoV-2, 40.63% did not show any symptoms (asymptomatic), and none experienced severe Covid-19 symptoms requiring hospital care. The study also reported high adherence to public health measures among participants, notably in hygiene practices (96.3% compliance) and maintaining social distance

(88.7% compliance). However, only a small fraction (11.3%) consistently wore masks in public spaces. After considering individual differences, the analysis showed a decreased infection risk among participants with higher health literacy (adjusted odds ratio [aOR] 0.16, $p = 0.007$ [95% CI 0.04, 0.60]) and smokers (aOR 0.20, $p = 0.013$ [95% CI 0.06, 0.69]). Although no severe Covid-19 cases were reported in this cohort, the results highlight the importance of devising specific public health strategies, particularly for individuals with lower health literacy, to mitigate outbreak risks in asylum centers and enhance the well-being of this vulnerable group. (Morisod, Grazioli, et al., 2023)

Study 3: Asylum Seekers' Responses to Government COVID-19 Recommendations: A Cross-sectional Survey in a Swiss Canton

This research sought to investigate the awareness and perceptions regarding COVID-19 recommendations among asylum seekers in the canton of Vaud, Switzerland, through a cross-sectional survey. The study focused on how well these individuals understood health guidelines, their experiences during the pandemic, and their susceptibility to misinformation, correlating these aspects with their sociodemographic profiles. A total of 242 individuals participated in the survey, predominantly male (63%, $n = 150$), with a median age of 30 years (Interquartile Range, IQR: 23–40). The findings revealed that low levels of knowledge about health guidelines were significantly linked to language difficulties (adjusted odds ratio [aOR] 0.36, 95% CI 0.14–0.94, $p = 0.028$) and residence in community centers (aOR 0.43, 95% CI 0.22–0.85, $p = 0.014$). Furthermore, those whose asylum applications had been rejected were more inclined to believe in COVID-19 related rumors (aOR 2.81, 95% CI 1.24–6.36, $p = 0.013$). The outcomes highlight the critical need for customizing health recommendations and strategies

to effectively communicate with asylum seekers, especially those encountering language barriers or residing in communal living facilities.(Morisod, Durand, et al., 2023)

Study 4: Facing the COVID-19 Pandemic: A Mixed-Method Analysis of Asylum Seekers' Experiences and Worries in the Canton of Vaud, Switzerland

A group of 203 participants filled out a questionnaire addressing their concerns, sleep disturbances, and fears of dying. Additionally, semi-structured interviews were conducted with 15 asylum seekers residing in a community center, exploring the influence of social and living conditions on their pandemic experiences and worries. Findings indicated that asylum seekers housed in community centers reported a higher incidence of sleep disorders attributed to the pandemic compared to those in private housing (adjusted odds ratio [aOR] 2.01, $p = 0.045$). Moreover, individuals with lower educational levels expressed increased fears concerning their well-being (aOR 2.31, $p = 0.015$). The qualitative data revealed that shared living environments significantly contributed to asylum seekers' worries, and that implemented safety measures were felt to exacerbate feelings of social isolation. The study underscores the significant effects of the COVID-19 pandemic on ASs, emphasizing the need for public health initiatives to be sensitive to their specific circumstances and living arrangements.(Morisod, Martin, et al., 2023)

Study 5: COVID-19 Vaccination Program for Undocumented Migrants: Notes from the Field of a Regional Center of General Medicine and Public Health, Canton of Vaud, Switzerland

The article outlines the deployment of a vaccination program for undocumented migrants at Unisanté, a regional academic center for general medicine and public health. Key features of the program included coordinated efforts among health authorities, the regional center, and

community partners; a walk-in service that was free of charge and did not require health insurance; the employment of skilled nursing and administrative staff experienced in working with vulnerable populations; the provision of information materials in multiple languages and the availability of interpreters; assurances of confidentiality; and an extensive community outreach campaign. A total of 2,351 undocumented migrants from 97 different nationalities received at least one dose of the mRNA COVID-19 vaccine (Spikevax), with 2,242 completing the vaccination series. While evaluating the overall success of this canton-wide program was challenging, due to limited data on this population, it contributed to vaccinating a large number of undocumented adult migrants in the Canton of Vaud, overcoming obstacles such as the pandemic's challenges, healthcare staff's increased workload, and limited resources through strong collaborative efforts. The implementation of such targeted public health measures is crucial for ensuring equitable care during pandemics. (Morisod, Nikles, et al., 2023)

Discussion

General synthesis

While the COVID-19 pandemic had highlighted and reinforced health inequities between different population categories worldwide,(World Health Organization, 2021) this thesis confirmed the social vulnerability of forced migrant populations and the need to identify health equity indicators adapted to specific contexts and populations. The emphasis on customizing public health guidelines and interventions, while considering SDH such as living conditions and language barriers, is crucial for managing the COVID-19 pandemic among forced migrant populations. The pandemic's impact on asylum seekers and refugees was, indeed, significantly influenced by their ability to understand and apply health recommendations to limit the pandemic spread, access relevant information, and navigate the effects of health restrictions on their daily lives. The challenge of accessing information and the susceptibility to rumors were linked to factors like language barriers, living conditions, and legal status. Employing community interpreters more systematically or involving migrant communities in the distribution of public health messages could address these issues and reduce the spread of misinformation. Additionally, identifying and utilizing specific social networks prevalent among forced migrants could enhance the targeted delivery of public health communications. Additionally, targeted public health initiatives, such as granting priority access to vaccinations and implementing specialized COVID-19 vaccination programs, are essential to minimize the potential for epidemic outbreaks in asylum centers and enhance the safety of this population.

Our conclusions are comparable to those of a recent scoping review on the health and well-being of forced migrant populations during the COVID-19 pandemic.(El Arab et al., 2023) In

particular, the authors highlighted the difficulties associated with access to information, inequities in access to healthcare and vaccination, and the living conditions of people living in community structures (detention facilities or overcrowded camp).(El Arab et al., 2023)

The importance of indicators to measure health equity

Measuring health equity is crucial for evaluating a healthcare system's performance, and Study 1 contributes to identifying relevant indicators for such assessments. The findings advocate for a comprehensive approach, using a combination of indicators to achieve a more complete analysis of healthcare equity, and suggest that the identified indicators could potentially be used to measure equity in broader healthcare system analyses.

In addition, the conceptual model established from Study 1 enabled us to write two health policy articles. The first is a critical analysis of the introduction of an emergency room tax on health equity, published in the *Revue Médicale Suisse*. (Morisod et al., 2022) The second is an analysis of the health equity issues of refugees from Ukraine in the canton of Vaud, following the Russian invasion of Ukraine in February 2022. (Morisod & Bodenmann, 2022)

Health equity issues of forced migrants during COVID-19 pandemic

Seroprevalence and associated risk factors

To the best of our knowledge, Study 2 was one of the first efforts to examine the risk factors for a positive anti-SARS-CoV-2 serological test among asylum seekers and refugees residing in centers. The study highlighted that the living conditions and close social interactions in community settings necessitate special focus to prevent viral spread. It emphasized that these groups should be given priority for testing and vaccination services. Moreover, the study found that asylum seekers and refugees with lower health literacy faced a higher risk of SARS-CoV-2 infection compared to those with higher health literacy levels, corroborating findings from a previous cross-sectional study that investigated the link between health literacy and SARS-CoV-2 infection among outpatient department participants.(Nguyen et al., 2020) Therefore, enhancing the health literacy of asylum seekers and refugees, along with tailoring public health messages and recommendations to their specific needs, could significantly bolster the effectiveness of public health responses.(Cangussú et al., 2020; McCaffery et al., 2020; Ruedin et al., 2022; Wernly et al., 2020)

Access to information, trust and worries

In Study 3, nearly half of the participants displayed limited understanding of COVID-19 precautions, even though they reported high levels of compliance and satisfaction with the guidelines provided. SDH like housing conditions (comparing those in community centers versus private apartments), legal status, and language obstacles (specifically, low proficiency in French) were linked to reduced awareness and increased susceptibility to misinformation. These elements must be taken into account in health policy decisions concerning the COVID-19 pandemic to address and reduce health disparities.(Shadmi et al., 2020) Our results indicate

that communication tailored to linguistic and cultural needs is crucial for enhancing the knowledge and compliance of asylum seekers and refugees. Employing participatory methods that involve community engagement and co-production could be beneficial in actively fostering trust and reinforcing public health initiatives, including COVID-19 vaccination campaigns.(Bartovic et al., 2021; Crawshaw et al., 2021; Thomas et al., 2021)

Study 4 emphasized that the lived experiences and concerns of asylum seekers throughout the COVID-19 pandemic were shaped by SDH, including factors like gender, living circumstances, and educational background. Our results corroborate prior research that underscores both the clinical and social ramifications of the COVID-19 pandemic on migrant communities.(Burton-Jeangros et al., 2020; Nungsari et al., 2022) A notable outcome of our study indicates that asylum seekers residing in centers experienced a significantly higher incidence of sleep disorders attributed to the COVID-19 pandemic compared to those living in individual apartments. These findings point to the considerable impact that living conditions have on the experience of the pandemic. These findings align with the outcomes of a comprehensive online international survey conducted among asylum seekers and refugees, in which participants residing in asylum centers reported greater deterioration in sleep quality compared to those living in individual apartments.(Spiritus-Beerden et al., 2021)

COVID-19 Vaccination program

The vaccination program described in Study 5 resulted in over 2,000 fully vaccinated undocumented migrants from 97 different countries, despite their lack of health insurance. This success can be attributed to effective coordination between health authorities, the regional medical center, and community organizations, as well as sustained efforts to build and maintain trust within these populations. The program utilized a combination of top-down and

bottom-up approaches, with public health authorities providing resources and coordinating communication campaigns, while community partners targeted and engaged with the populations directly.

Logistical challenges, a short implementation timeline, and the strain of the COVID-19 crisis posed significant obstacles to the vaccination program. However, multidisciplinary collaboration involving stakeholders from various institutions proved essential in overcoming these barriers. Flexibility in vaccine distribution and ensuring quality care were paramount considerations throughout the program implementation process.

General limitations

The studies comprised in this thesis are not without limitations. Specific limitations for each study are discussed within each article. We discuss below general limitations.

First, the conceptual framework of the SDH is very broad and it appears difficult to propose an exhaustive analysis of all the SDH of health equity in forced migrant populations. In this thesis, we therefore focused on the SDH that seemed most relevant in the context of the COVID-19 pandemic, based on the existing literature.(Solar et al., 2023) Thus, this thesis work has facilitated a better understanding of the role of key SDH such as living in a community center or legal status on health inequities during the COVID-19 pandemic.

Second, migration categories such as voluntary or forced, along with labels like refugees, asylum seekers, and undocumented migrants, provide a structure for understanding migration trends. However, these classifications can also oversimplify the complex reasons behind migration and potentially stigmatize individuals, as they often don't fully capture the diverse circumstances of each migrant's journey.(Abubakar et al., 2018) While intended for administrative use, such as for offering protection or conducting research, these terms may not accurately reflect the challenges and aspirations driving people to migrate, frequently influenced by both adverse conditions and the search for better prospects, such as employment and living conditions.

Additionally, the journey of migration is seldom a linear or direct path. Instead, it is typically winding, characterized by multiple stopovers and often involves moving back and forth between locations.(Abubakar et al., 2018) Nevertheless, carrying out research with these groups presents considerable methodological and logistical hurdles, which accounts for the relatively small number of studies published on this topic to date.

Third, the cross-sectional design of study 2, 3 and 4 did not permit the evaluation of changes over time, thus preventing the establishment of any temporal relationships. The cross-sectional findings provided a basis for further research on equitable pandemic responses, including community-based participatory research.

Fourth, a limitation of this thesis concerns the external validation of the results and their generalization. The specific context of the Canton of Vaud in Switzerland and the heterogeneity of the forced migrant populations limit the extrapolation of the results. Conducting studies with these populations remains a significant methodological and logistic challenge, explaining the low proportion of studies published to date. International collaboration will be necessary in the future to ensure the external validity of the results. However, most of the results obtained in this thesis were comparable with other international studies, confirming the impact of the COVID-19 pandemic on health inequities in migrant populations. This is particularly evident in the level of knowledge regarding health recommendations,(Hamadneh et al., 2021; Harris et al., 2021; Kananian et al., 2021) the support for rumors linked to the pandemic,(Tan et al., 2021) and the mental health burden of the COVID-19 pandemic.(Garrido et al., 2022; Liddell et al., 2021; Sharif-Esfahani et al., 2022)

Perspectives

Despite these limitations, and as discussed above, we believe that the studies comprised in this thesis provide interesting contributions to the health equity literature among migrant populations. Findings also pointed to the needs for further research examining health inequities in these populations. We present some suggestions below.

Research is needed to test health equity indicators identified in Study 1

Following the systematic review of Study 1 and based on its conclusions, we recently published an analysis of the impact of socio-economic level on potentially avoidable hospitalizations between regions in Switzerland.(Spycher et al., 2024) The next steps will be to test the findings of Study 1 in specific settings, such as a hospital ward or a healthcare institution. The impact of SDH on healthcare service utilization, particularly emergency services, remains unclear, with inconsistent findings in the current scientific literature For example, in a recent study, McCormick et al. demonstrate that emergency admissions are primarily due to a higher prevalence of illness in disadvantaged areas,(McCormick et al., 2018) while Pollack et al. did not find a consistently significant connection between neighborhood poverty and ED use.(Pollack et al., 2019) Further studies of this nature are necessary to enhance our understanding of the intricate relationship between SDH, healthcare utilization, and health equity.

Research is needed to test and measure the impact of implementing specific public health measures for forced migrant populations.

This thesis highlighted the health inequities faced by forced migrant populations during the COVID-19 pandemic. (Study 2, 3 and 4) It demonstrated the importance of taking account of

SDH such as living and housing conditions, language barriers and legal status in the experience of the pandemic. Given the unique vulnerabilities and diverse characteristics of forced migrant populations, along with the potential for significantly improved outcomes through tailored interventions, (Study 5) there is a clear imperative for research in this area.(Abubakar et al., 2018) Studies are needed to fill the gaps in our understanding of how best to implement public health measures in these contexts. This research should aim to assess the health status and needs of forced migrant populations and evaluate the effectiveness of targeted health interventions.

Foster collaboration between researchers, policymakers, and community organizations to ensure that findings are translated into actionable policies and programs.

Vaccination campaigns, mental health services, and chronic disease management programs must be crafted with an awareness of the barriers to access and utilization that are unique to migrant settings. Research plays a pivotal role in identifying these barriers, testing the effectiveness of tailored interventions, and refining strategies to ensure they are both impactful and feasible within the context of forced displacement.

To this end, we are currently working on a longitudinal analysis of the mental health of Syrian refugee families, following the implementation of a specific family consultation.(El Ghaziri et al., 2019, 2021) At the same time, we are developing a digital platform called NaviSanté, the aim of which is to improve access to information and navigation in the social and healthcare system for migrant populations.(HUB UNIL, 2023)

Conclusion

In conclusion, our thesis highlights the importance of considering health equity as an integral component of all comprehensive public health policies. It calls for public health strategies that are tailored to the unique needs of forced migrants and their living conditions from the beginning of crises like the COVID-19 pandemic. Recommended actions include minimizing the use of high-density facilities by facilitating the move from community centers to private accommodations, guaranteeing that quarantine and isolation measures can be effectively applied in various living environments, customizing the delivery of health guidelines, creating dedicated COVID-19 vaccination initiatives for undocumented migrants, and proactively addressing mental health through preventive measures. Policymakers are urged to tackle the negative social and structural determinants affecting the health of forced migrants by implementing equitable asylum policies, ensuring decent living conditions, and providing comprehensive access to healthcare services.

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Articles

STUDY 1

Measuring Health Equity in Emergency Care Using Routinely Collected Data: A Systematic Review

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PhD candidate contribution:

Kevin Morisod helped conceive the study and its design, conducted the background literature review, participated in the data collection and data analysis, and drafted the manuscript.

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REVIEW ARTICLE

Open Access

Measuring Health Equity in Emergency Care Using Routinely Collected Data: A Systematic Review

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Abstract

Introduction: Achieving equity in health care remains a challenge for health care systems worldwide and marked inequities in access and quality of care persist. Identifying health care equity indicators is an important first step in integrating the concept of equity into assessments of health care system performance, particularly in emergency care.

Methods: We conducted a systematic review of administrative data-derived health care equity indicators and their association with socioeconomic determinants of health (SEDH) in emergency care settings. Following PRISMA-Equity reporting guidelines, Ovid MEDLINE, EMBASE, PubMed, and Web of Science were searched for relevant studies. The outcomes of interest were indicators of health care equity and the associated SEDH they examine.

Results: Among 29 studies identified, 14 equity indicators were identified and grouped into four categories that reflect the patient emergency care pathway. Total emergency department (ED) visits and ambulatory care-sensitive condition-related ED visits were the two most frequently used equity indicators. The studies analyzed equity based on seven SEDH: social deprivation, income, education level, social class, insurance coverage, health literacy, and financial and nonfinancial barriers. Despite some conflicting results, all identified SEDH are associated with inequalities in access to and use of emergency care.

Conclusion: The use of administrative data-derived indicators in combination with identified SEDH could improve the measurement of health care equity in emergency care settings across health care systems worldwide. Using a combination of indicators is likely to lead to a more comprehensive, well-rounded measurement of health care equity than using any one indicator in isolation. Although studies analyzed focused on emergency

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care settings, it seems possible to extrapolate these indicators to measure equity in other areas of the health care system. Further studies elucidating root causes of health inequities in and outside the health care system are needed.

Keywords: health equity; emergency care; determinants of health

Introduction

Equity is defined by the World Health Organization as “the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other means of stratification.”¹ Applied to health care, equity means guaranteeing the “distribution of care in such a way as to get as close as feasible to an equal distribution of health.”²

These definitions imply two essential components of equity: horizontal equity (same care for the same health need) and vertical equity (different care for different needs).³ To be able to analyze equity within the health care system, most researchers assume that vertical equity is on average satisfied and focus their analysis on horizontal equity, that is, inequalities in the use of the health care system for the same health needs.⁴

However, achieving equity in health care remains a challenge for health care systems worldwide.^{5–7} Several recent studies raise the importance of addressing the concept of equity when making decisions about health care policies and practices.^{8–10} However, the performance assessment of health care systems has traditionally been limited to quality and efficiency indicators and health care decision makers remain poorly informed about equity,⁸ particularly in some specific settings, such as emergency care.¹⁰ Measuring and monitoring equity is therefore an emerging area of interest in assessing emergency care performance.^{10–13}

Emergency care is a unique health care setting as it is situated at the interface of outpatient (ambulatory) care and inpatient (hospital based) care. Identifying indicators of health care equity in this setting makes it possible to assess both access to outpatient care, while also highlighting differences in quality of care within hospital-based care.^{14,15}

To ensure accessibility of quality data on relevant variables for measuring health care equity, several approaches and data could be used, from primary qualitative or quantitative data to the use of routinely collected administrative data. For this study, we have decided to focus on studies based upon routinely collected administrative data as it has two fundamental

advantages in the analysis of health care equity: the achievement of near complete coverage of the target population and the possibility of disaggregation in sub-populations. Moreover, using administrative data minimizes cost and burden of response.¹⁶

Finally, we have focused our analysis on studies measuring equity through socioeconomic determinants of health (SEDH), that is, the level of education, financial resources, and social and material living conditions.^{17,18}

The aim of this systematic review is to identify how health care equity is measured through the combination of administrative data-derived emergency care equity indicators and SEDH with the goal of creating a set of valuable and replicable indicators that can be used in the identification and analysis of health care equity in emergency care settings.

Methods

The protocol of this systematic review was published in PROSPERO at the outset of the study (Supplementary File S1). The reporting of this systematic review was based on the PRISMA-equity guidelines¹⁹ (Supplementary File S2).

Inclusion/exclusion criteria

We included studies reporting on health care equity indicators, which were analyzed as such, focusing on studies that used administrative data and were conducted in emergency care settings. This included several study designs, such as retrospective cohort studies, cross-sectional studies, and ecological (small-area level) studies. As this systematic review’s objective is to focus on health care equity in the context of emergency care and not to identify inequalities in emergency care provision between countries, a focus was placed on studies conducted in high-income countries.

It is indeed tricky, in countries where health care resources are often lacking or insufficient, to determine whether variations in the use of care among specific populations are linked to inequities in access to care or whether they are the result of an overall lack of resources in the health care system. We included studies



on adults (age 18 and over). If a study included both children and adults, we limited data extraction to data pertaining only to adults. We included studies regardless of whether a disease-specific focus was taken (e.g., cancer, chronic diseases, or mental health). Searches were limited to English, German, French, and Italian (due to the authors' language skills), published between January 2010 and January 2019.

We chose to focus on studies published after 2010 because of the significant evolution of health care equity-related literature that followed the WHO Report "Closing the gap in a generation: Health equity through action on the social determinants of health."²⁰

We limited our analysis to studies looking at inequities and their associated SEDH as defined above, excluding studies looking at determinants of health such as race/ethnicity, gender, or place of residence, to ensure consistency and comparability between studies and countries.^{4,18}

We excluded studies that did not focus on equity, as well as opinion articles, editorials, conference abstracts, and study protocols.

Search strategy

The search strategy was conducted with a medical librarian's assistance using four databases: Ovid MEDLINE, EMBASE, PubMed, and Web of Science. We used keywords in the field of equity, socioeconomic factors, and emergency care. We combined the Medical Subject Headings terms "Health Services Accessibility," "Health Equity," or "Health care Disparities" with a combination of terms defining administrative data and with text words "emergency department" or "emergencies." Initial searches were conducted in November 2018 to assess the scope of the literature. The last search was conducted in January 2019. The full search strategy can be found in Supplementary File S3.

Following the initial search, we screened reference lists of all included studies and performed Google and Google Scholar searches using key search terms to identify any further relevant studies that were not initially captured or had not yet been published.

Study selection

Two reviewers (K.M. and X.L.) conducted screening of articles independently and in duplicate. This was done in two stages. First by screening all titles and abstracts and second, by reviewing the full text of all relevant articles to determine their eligibility in the final analysis. Two other reviewers (J.M. and P.B.) provided arbitra-

tion in the event of a disagreement at both stages of screening. Reasons for exclusion of articles at the full-text screening stage were documented.

Data extraction

Two authors (K.M. and X.L.) extracted data independently and in duplicate from included studies using Rayyan^{®*} and any discrepancy was resolved by consulting the two other reviewers (J.M. and P.B.). Data on the key characteristics of the studies were extracted in a predefined data extraction form, into an Excel[®] spreadsheet.[†]

Quality and bias assessment

Risk of bias was assessed using the validated checklist published by the United States National Heart, Lung and Blood Institute (NIH) for observational cohort and cross-sectional studies.²¹ This tool is composed of 14 questions. It has been recently recommended in a review for the assessment of both observational cohort and cross-sectional studies.²²

Results

The initial search yielded 354 articles, of which 29 were included in the final analysis (Fig. 1). Of these, 17 (59%) were conducted in the United States, 5 (17%) in the United Kingdom, 3 (10%) in Canada, 2 (7%) in Australia, 1 (3%) in Sweden, and 1 (3%) in Switzerland. Twenty-eight (97%) were written in English and one (3%) in French.

Risk of bias assessment

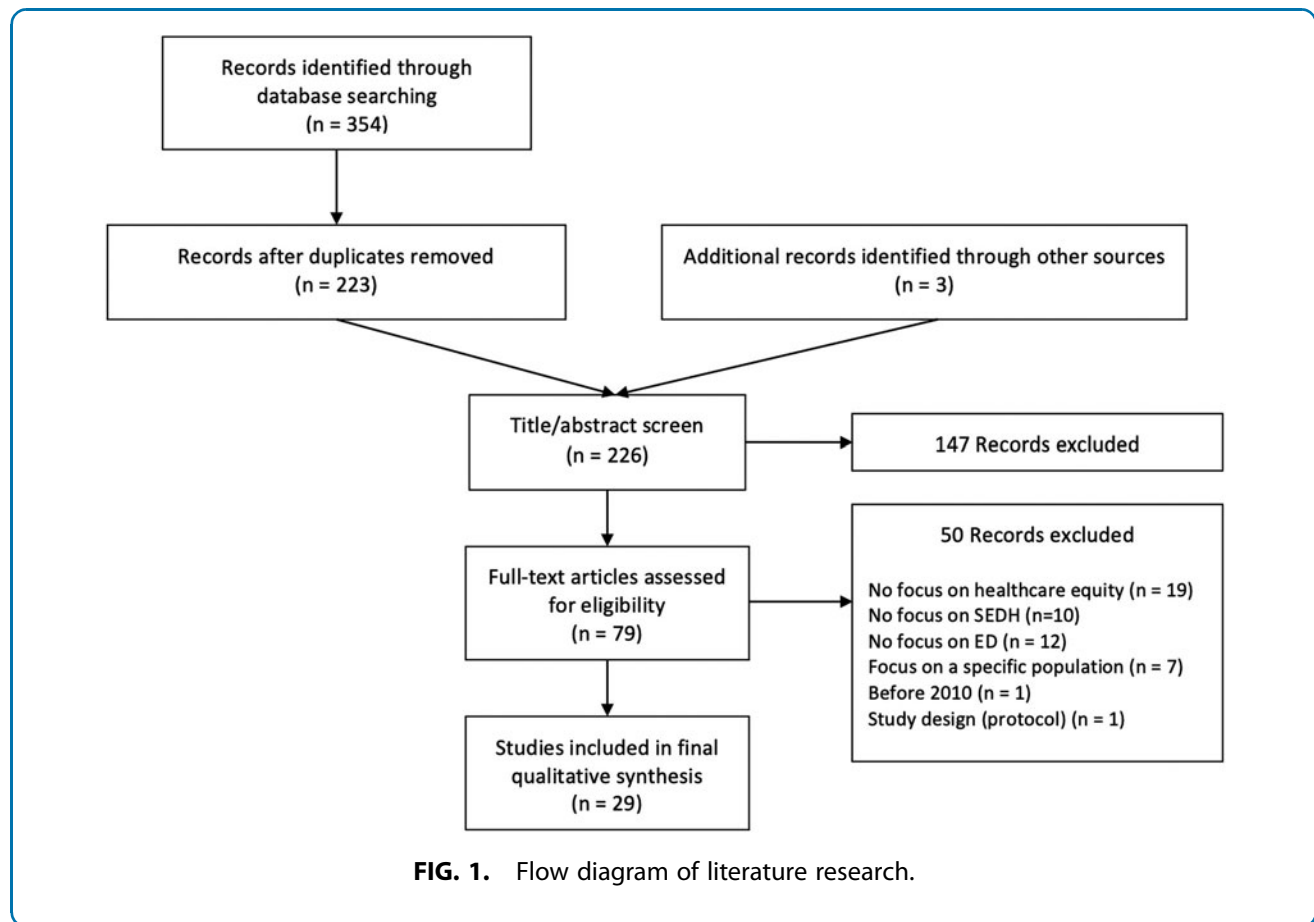
The NIH quality and risk of bias assessment tool used made it possible to evaluate the internal validity of selected studies in this review. Of the 29 studies, 28 are considered fair, and 1 study is considered poor, mainly due to the lack of statistical analysis of confounding factors. The detailed assessment is available in Supplementary Materials (Supplementary Table S1).

Moreover, the bias assessment revealed two significant risks of bias across studies. First, there is a risk for confounding related to the use of retrospectively collected administrative data used across all included studies as adjustment can only be performed with available collected variables. For example, the almost systematic absence of precise clinical diagnoses in administrative

*Free online systematic review management system.

†Including information about the design of the study, population, type of data, indicators of health care equity, SDEH addressed, main findings, and key conclusions.





data undermines the ability to estimate the health outcomes of selected populations accurately.

Second, comparisons between studies are biased because, for the same variable, data are not collected in a standardized manner. This information bias is particularly relevant for the assessment of social deprivation, often analyzed using indices that include many variables that differ between studies.

The significant heterogeneity associated with a large number of outcomes and exposures prevented the authors from performing a meta-analysis.

Equity indicators

The analysis of the 29 articles highlighted 14 different indicators used to assess health care equity. We categorized them into four groups according to the part of the patient care pathway they analyzed:

- A. Equity indicators of poor access to outpatient care (indicators “before emergency care”) (Group 1)
- B. Equity indicators of quality of emergency care (indicators “during emergency care”) (Group 2)

- C. Equity indicators of clinical outcomes (indicators “following emergency care”) (Group 3)
- D. Global Equity indicators (Group 4)

Equity indicators of poor access to outpatient care (Group 1).

1. ED visits/emergency admissions[‡] rate
 With 26% ($n=7$) of articles using this indicator, it was the most commonly reported indicator identified in this systematic review.^{23–29} It was used to highlight disparities of access to outpatient care.

2. Ambulatory care sensitive conditions (ACSCs)[§]
 ED visits/ACSC emergency admission rate

Also called Preventable ED visits/Preventable emergency admissions, this indicator, used in seven articles, is used as often as the previous indicator “ED visits/emergency admission rate.”^{10,24,26,30–33}

[‡]For the purpose of this article, the term “emergency admissions” is referring to a hospital admission following ED-based care or to a hospital admission for an emergency condition.

[§]ACSCs are conditions for which it is believed that timely and appropriate outpatient care could prevent disease complications, or worsening of disease conditions, thereby preventing ED visits and hospital admissions.



3. Frequent ED visits

One study used this indicator considering frequent ED visits when 4 or more ED visits occurred by an individual per year.³⁴

4. ED-associated initial diagnosis rate

This indicator compared the rate of initial diagnosis of cancer in the ED between different SEDH.³⁵

Equity indicators of quality of emergency care (Group 2).

5. Emergency-specific procedure rate

This indicator comprised a combination of different procedures performed during emergency care, highlighting disparities in the quality or access to care for specific emergency conditions such as a brain scan for the diagnosis of acute stroke,³⁶ reperfusion therapy in acute stroke,³⁷ and cardiac catheterization after myocardial infarction or cardiac arrest.^{38,39}

6. Delay to diagnosis or treatment rate

Two studies focused on disparities in time to access to a diagnostic,³⁶ or therapeutic procedure.⁴⁰

7. Missed diagnoses in ED rate

This indicator, used in one study, highlighted disparities of missed diagnoses of acute myocardial infarction according to insurance status or median household income.⁴¹

Equity indicators of outcome after emergency care (Group 3).

8. Major adverse event rate

This indicator was used in two studies that analyzed emergency general surgery.^{42,43} It represented the rate of specific complications following an emergency general surgery.^{**}

9. In-hospital mortality and (10) failure to rescue rate

In-hospital mortality was used to reflect the quality of care during emergency care or surgery as reported in three articles identified in our review.^{39,42,43} One distinguishes in-hospital mortality from failure to rescue.⁴²

11. Neurological recovery rate

This specific indicator was used in one study analyzing the neurological recovery over time of patients who presented to the ED with a cardiac arrest.³⁹

12. Length of stay/Bed days (after emergency admission)

Although these are traditional indicators of hospital care quality, they are used in one study that analyzed inequities following emergency admission according to social deprivation.⁴⁴

Global equity indicators.

13. 30-/90-/365-day mortality rate

One study analyzed 30-/90-/365-day mortality following emergency admission for hip fracture, reflecting quality of ED- and hospital-based care, as well as access to and quality of ambulatory follow-up care post-discharge.⁴⁵

14. ED readmission rate/Emergency rehospitalization rate

This indicator was used in three articles. Two of them analyzed ED readmissions within 30 days post-discharge.^{46,47} One used this indicator to analyze the rate of hospital admissions through the ED in the year following a diagnosis of cancer.⁴⁸

The different emergency care equity indicators are summarized in Table 1.

Socioeconomic determinants of health

The articles included in this review analyzed health care equity based on seven SEDH:

Insurance status, social deprivation, income, education level, social class, health literacy, and financial and nonfinancial barriers (see Table 2 for details).

Insurance status. Insurance coverage was used in 16 articles. Some of them compared outcomes between uninsured and insured individuals,^{24,30} between publicly and privately insured individuals,^{33,38–40,46,49} or between uninsured, publicly, and privately insured individuals.^{23,25,35,41–43,47,48}

Social deprivation (indices of area deprivation). This SEDH was composed of different indices, including the “Index of Multiple Deprivation,”^{††,10,44,45} “Carstairs Index,”^{‡‡,31,36} “Index of Marginalization area,”^{§§,27} “INSPQ deprivation Index,”^{***,28,34} “area-based socioeconomic status quintile index,”^{†††,48} and “CT/10.”^{‡‡‡,26}

^{††}A composite score originates from the following domain indices: income, employment, health, education, access to services, community safety, and physical environment.

^{‡‡}An index of deprivation used in spatial epidemiology, based on four variables (male unemployment, lack of car ownership, overcrowding, and low social class).

^{§§}A validated census- and geography-based index that measures marginalization at the level of the census dissemination area (DA), including economic, ethnoracial, age-based, and social marginalization.

^{***}Institut national de la santé publique du Québec (INSPQ) deprivation index: an index based on six socioeconomic indicators calculated at the DA level. This index has two components, material and social. The material component is based on the proportion of people without a high school diploma, the employment-to-population ratio, and the average income. The social component is based on the proportion of people living alone, the proportion of separated, divorced, or widowed people, and the proportion of lone-parent families

^{†††}Area-based SES quintile: an index of seven components based on American Community Survey (Education index, percent persons above 200% poverty line, percent persons with a blue collar job, percent persons employed, median rental, median value of owner-occupied housing unit, and median household income).

^{‡‡‡}CT/10: a coefficient that refers to the effect of a 10% increase in the percentage of the population in the Census tract (CT), who have household incomes below 200% of the federal poverty threshold. (The poverty coefficient indicates the effect of a 10% increase in the fraction of the population living in poverty).

^{**}Including cerebrovascular accident, pneumonia, pulmonary embolus, acute respiratory distress syndrome, renal failure, urinary tract infection, myocardial infarction, sepsis, septic shock, and cardiac arrest.



Table 1. Emergency Care Equity Indicators

| Group 1 | Group 2 | Group 3 |
|---|--|---|
| Access to high-quality outpatient care (i.e., before ED care) | Quality of emergency care (i.e., during ED care) | Outcome following emergency care (i.e., after ED care) |
| ED visits/emergency admission rate | Specific procedure rate (including management of STEMI, ischemic stroke, and out-of-hospital cardiac arrest) | MAE rate (specifically following emergency surgery) |
| Preventable ED visits/preventable emergency admission rate (ACSCs) ^a | ED missed diagnosis rate | In-hospital mortality rate/failure to rescue rate (after emergency admission) |
| ED-associated initial diagnosis rate (of cancer, in "emergency presenters") | Delay to diagnosis or treatment rate (for emergency conditions) | Recovery rate (after out-of-hospital cardiac arrest) |
| Frequent ED visit rate (four or more a year) | | LOS/bad days (after emergency admission) |
| ED readmission rate/emergency rehospitalization rate (within 30 days of discharge or during the year after diagnosis of cancer) | | |
| 30-/90-/365-day mortality rate (specifically following emergency hip fracture admission) | | |

^aACSCs: conditions for which timely and appropriate outpatient care can prevent disease complications, more severe disease, or need for hospitalization.

ACSCs, ambulatory care sensitive conditions; ED, emergency department; LOS, length of stay; MAEs, major adverse events; STEMI, ST segment elevation myocardial infarction.

Income. To measure income differences, four studies used median income household (divided into quartiles or thirds),^{41,43,46,47} and one used presence versus absence of a reportable income.⁵⁰

Education level. Depending on the studies, the education level was divided into three or four categories ranging from never attended school to graduate degree.^{37,49}

Social class. This SEDH is defined hierarchically into six classes.^{§§§} It was used in one study.³¹

Health literacy. In one study, health literacy was the SEDH used in the health equity-focused analysis, based on scores obtained through the Rapid Estimate of Adult Literacy in Medicine test.^{****,32}

Financial and nonfinancial barriers. In one article, these two types of barriers were used based on subjects' responses to 14 questions relating to financial concerns^{††††} and nonfinancial barriers.^{††††29}

§§§Professional, managerial, skilled nonmanual, skilled manual, semiskilled manual, and nonskilled manual.

****A reading recognition test comprised 66 health-related words arranged in ascending order of difficulty.

††††A set of seven self-reported financial concerns items: "insurance won't cover care," "the respondent will have to pay more than expected," "he/she will have to pay more than he/she can afford," "medications will cost too much," "not being sure about being dropped from the public healthcare program," "not knowing what the health plan covers," "and not knowing where to go with questions about coverage."

††††Seven self-reported nonfinancial barriers, including transportation difficulties, problems making appointments, not knowing where go for care, work/family responsibilities, office/clinics not being open at suitable times, obtaining childcare, and not being able to utilize one's preferred provider.

Addressing health care equity through the association of emergency care indicators and SEDH

Across the studies, all identified SEDH were found to be associated with statistically significant differences in emergency care indicators. Descriptive examples of associations between equity indicators and some of the two main SEDH identified in this review are presented below (see Table 2 for details).

Health insurance. In a large retrospective study, including over 2.2 million patients, Lines et al. demonstrated that patients with public insurance are 2.5 times more likely to have preventable ED visits (Group 1) than private patients (rate ratio 2.53, 95% confidence interval [CI] 2.49–2.56).³³ Similarly, in another large retrospective cohort of 1.3 million patients, Metcalfe et al. highlighted a statistically significant association between in-hospital mortality (Group 3) and insurance status among patients presenting to hospital with acute surgical conditions, requiring emergency surgery, whereby uninsured patients were at significantly higher risk of death than privately insured patients (odds ratio 1.28, 95% CI 1.16–1.41).⁴²

However, some studies do not show significant differences in access or quality of care based on insurance coverage.^{38,41} Furthermore, among the studies comparing patients with and without insurance coverage, two have shown an increase in the use of ED (Group 1) after the introduction of public insurance coverage for previously uninsured patients. For example,



Table 2. Description of the Selected Articles

| Authors (year of publication) Country | Study design | Aim | Population | Emergency care indicators | Socioeconomic determinants of health | Statistics | Key conclusion |
|---|-----------------------------------|--|--|--|---|---|--|
| Insurance status Berlin et al. (2016) Switzerland | Nation-wide cross-sectional study | To determine if patient characteristics affected the rate of revascularization in acute STEMI patients | Patients with acute STEMI (n = 9696) | Specific procedures Revascularization rate | Insurance status (ref: public) a. Half Private b. Private | Relative proportion: a. 1.05 (95% CI 0.98–1.13) b. 1.06 (95% CI 0.96–1.17) | No association was found between insurance status and revascularization rate. |
| Bradshaw et al. (2015) Australia | Population-based cohort study | To determine whether quality indicator-based outcomes of PPM implantation were comparable for publicly and privately insured patients | Adults implanted with a PPM between 1995 and 2009. (n = 9748) | Specific procedures 1. Emergency implant of PPM (%) Delay to treatment 2. Time to PPM implementation for emergency cases 3. LOS for emergency cases (≥ 2 days) | Insurance status (public vs. private) | 1. 60% vs. 33%, (p < 0.001), nonadjusted 2. Adjusted odds ratio 0.89 (95% CI 0.78–1.03) (p = 0.17) 3. Adjusted odds ratio 0.91 (95% CI 0.79–1.04) (p = 0.17) | Publicly insured patients are more likely to have emergency implant of a PPM. There were no differences identified in outcomes between publicly and privately insured patients. |
| Casey and Mumma (2018) United States | Retrospective cohort study | To evaluate the association of patient insurance status with hospital treatments and outcomes following out-of-hospital cardiac arrest | Adult patients with a "present on admission" diagnosis of cardiac arrest (patient admitted from the ED to an acute care hospital) (n = 38,163) | 1. Good neurologic recovery 2. In-hospital mortality (survival to hospital discharge) Specific procedures 3. Cardiac catheterization 4. DNR within 24 h 5. Treatment at 24/7 PCI ^a center (STEMI center) | Insurance status (ref: private insurance) a. Medicare insurance b. Government insurance | Odds ratios with 95% CI 1.a. 0.85 (0.79–0.91) 1.b. 0.94 (0.88–1.01) 2.a. 0.78 (0.73–0.83) 2.b. 0.65 (0.61–0.69) 3.a. 1.25 (1.15–1.36) 3.b. 1.24 (1.13–1.36) 4.a. 0.44 (0.40–0.48) 4.b. 0.56 (0.51–0.61) 5.a. 0.87 (0.82–0.94) 5.b. 0.91 (0.85–0.98) | Insurance status is independently associated with the likelihood of good neurological recovery, survival to hospital discharge, treatment at a 24/7 PCI center, receiving a DNR order within 24 h of admission and undergoing cardiac catheterization in patients experiencing out-of-hospital cardiac arrest. |
| Davis et al. (2010) United States | Retrospective cohort study | To examine the frequency of return visits for treating dental health problems in hospital emergency rooms for patients without access to private dental services | Individuals without access to private dental services (n = 7846) | ED visits (dental-related) | Insurance status (private, commercial), public, Medicare or self-pay) | — | Patients without insurance are much more likely to resort to the ED for dental problems than those with private coverage |

(continued)



Table 2. (Continued)

| Authors (year of publication) Country | Study design | Aim | Population | Emergency care indicators | Socioeconomic determinants of health | Statistics | Key conclusion |
|--|---------------------------------------|---|---|---|---|---|---|
| DeLeite et al. (2010) United States | Case-crossover study | To examine if expanding Medicaid to low-income childless adults impacts ED use | Low-income childless adults (n = 9619) | 1. Total ED visits 2. ACSCs ED visits 3. Specific ED visits (for mental health/drug/alcohol) 4. Unclassified ED visits | Insurance status (comparison before and after introduction of public insurance) | Predicted increase after introduction of insurance (%): 1. 46%, p < 0.01 2. 38.7%, p < 0.01 3. 343.9%, p < 0.01 4. 89.8%, p < 0.01 | Public insurance coverage expansions to childless adults have the potential to improve health and reduce costs by increasing access to outpatient care, ED visits, and reducing hospitalizations. |
| Kerr et al. (2014) United States | Retrospective cohort study | To determine factors associated with ED utilization for HIV-infected patients | HIV-infected South Carolina residents (n = 4947) | Total ED visits | Insurance status (ref: private) a. Self-pay b. Medicare c. Medicaid d. Indigent/charity e. HMO | IRR (95% CI) a. 0.65 (0.61–0.70) b. 0.88 (0.82–0.95) c. 1.26 (1.18–1.36) d. 1.65 (1.47–1.86) e. 1.08 (0.95–1.23) | Insurance type is associated with ED utilization. There is a need to evaluate HIV primary care systems to increase access and develop interventions to reduce preventable ED visits. |
| Lines et al. (2019) United States | Retrospective cohort study | To compare PCS conditions ED use for public vs. private insurees | People younger than 65 years in the Massachusetts all-payer claims data (n = 2,269,455) | Preventable ED visits | Insurance status (ref: private) Any public insurance | Rate ratio (95% CI) 2.53 (2.49–2.56) | Public insurance is associated with more PCS ED use. Statewide labor shortages and low reimbursement rates from public insurance may provide inadequate access to care that may otherwise help reduce PCS ED use. |
| Livingood et al. (2016) United States | Retrospective, population-based study | To clarify some of the factors associated with the use of ED for initial cancer diagnoses | Patients with a primary or any secondary diagnosis of cancer (n = 989) | ED-associated initial diagnoses (of cancer) | Insurance status (ref: private) a. Medicaid b. Medicare c. Uninsured | Relative risk (95% CI) a. 3.10 (1.87–5.39) b. 4.35 (2.63–7.54) c. 2.67 (1.60–4.65) | There is a significant relationship between health insurance and ED-associated initial cancer diagnosis. |
| Mazurenko et al. (2010) United States | Retrospective pre-/post-cohort study | To examine the impact of Nevada's Medicaid expansion on changes in rates of hospital ED admissions for ACSCs | Patient hospitalized a. Pre-expansion of Medicaid (n = 107,940) b. Post-expansion of Medicaid (n = 106,016) | ACSC emergency hospital admission | Insurance status (Medicaid or uninsured) | Odds ratio (95% CI) a. 0.50 (0.16–0.83) b. 0.62 (0.29–0.94) | Uninsured patients are more likely to be admitted through the ED for ACSCs, regardless of Medicaid expansion. |
| Metcalfe et al. (2018) United States | Retrospective cohort study | To identify socioeconomic disparities in EGS and whether they are more likely to be associated with MAEs or an FTR appropriately to such events | Patients presenting EGS with acute surgical conditions (n = 1,345,199) | 1. MAEs ^b 2. In-hospital mortality 3. FTR ^c | Insurance status (ref: private) a. Public b. Uninsured | Odds ratio (95% CI) 1.a. 1.18 (1.16–1.20) 1.b. 1.16 (1.13–1.19) 2.a. 0.96 (0.92–1.01) 2.b. 1.28 (1.16–1.41) 3.a. 1.01 (0.95–1.07) 3.b. 1.20 (1.06–1.36) | Lack of insurance is an independent risk factor for in-hospital mortality, due to both excess MAEs and FTR. |

(continued)



Table 2. (Continued)

| Authors (year of publication) Country | Study design | Aim | Population | Emergency care indicators | Socioeconomic determinants of health | Statistics | Key conclusion |
|---|--|---|---|--|---|--|--|
| Social deprivation Cookson et al. (2018) United Kingdom | Whole-population study at the small-area level | To present a new and improved analytical approach to integrating health equity into mainstream health care quality assurance | CCG-LSOA ^d (CCGs, <i>n</i> = 209) (LSOAs, <i>n</i> = 32,844) | Potentially avoidable emergency admissions | Social deprivation IMD (between the most and least deprived neighborhoods) | Absolute gradient index (95% CI) 927/100,000 (912–942) (the mean rate of potentially avoidable emergency admissions: 792/100,000 people) | Administrative data on inequality in health care quality within similar populations served by different health care organizations can provide useful information for health care quality assurance. In 1980–1981 and 1990–1991, both individual social class and area deprivation were associated with emergency C-sections. In 1999–2000, there was no significant association. |
| Fairley et al. (2011) Scotland (United Kingdom) | Longitudinal retrospective analysis between 1980 and 2000 | To examine whether individual social class, area deprivation, or both are related to emergency Caesarean sections in Scotland and investigate changes over time | Women with live singleton birth A. 1980–1981 (<i>n</i> = 133,555) B. 1990–1991 (<i>n</i> = 128,933) C. 1999–2000 (<i>n</i> = 102,285) | Emergency admission (for Caesarean section) | a. Social class (divided in six classes) Social deprivation b. Index of area deprivation (Carstairs score) ^e | Odds ratio (95% CI) A.a. 1.14 (1.04–1.25) A.b. 1.18 (1.05–1.32) B.a. 1.13 (1.04–1.23) B.b. 1.13 (1.02–1.26) C.a. 1.02 (0.93–1.12) C.b. 1.02 (0.93–1.13) | More-deprived patients have less chance of being scanned in a timely manner. |
| Lazzarino et al. (2011) United Kingdom | Retrospective cohort study | To identify any stroke patient groups being excluded from appropriate use of brain imaging based on levels of social deprivation | Patients with a principal emergency admission diagnosis of stroke (<i>n</i> = 209,174) | Specific procedure 1. Brain scan, at any time 2. Brain scan on the same day of admission | Social deprivation Index of area deprivation (Carstairs score, in five quartiles) ^f (ref: least deprived) a. Second b. Third c. Fourth d. Most deprived | Odds ratio (95% CI) 1.a. 0.98 (0.92–1.05) 1.b. 0.99 (0.93–1.06) 1.c. 0.99 (0.93–1.06) 1.d. 0.97 (0.91–1.04) 2.a. 0.95 (0.90–1.00) 2.b. 0.93 (0.88–0.98) 2.c. 0.91 (0.86–0.96) 2.d. 0.94 (0.89–0.99) | The rate of emergency bed days rose with increasing deprivation, while no significant inequalities were observed for LOS. |
| Levin and et Crighton (2017) United Kingdom | Ecological small-area study (during the course of RCOP ^g program) | To examine mean LOS and rates of emergency bed days during the RCOP in Glasgow City | Data zones of household residents of Glasgow City 65 years of age and older | 1. Bed days (after emergency admission) 2. LOS (after emergency admission) | Social deprivation Index of area deprivation SIMD ^h (ref: SIMD 1, most deprived) a. SIMD 2 b. SIMD 3 c. SIMD 4 d. SIMD 5 (least deprived) | Relative risks (95% CI) 1.a. 0.89 (0.87–0.91) 1.b. 0.79 (0.76–0.81) 1.c. 0.67 (0.65–0.69) 1.d. 0.60 (0.58–0.62) 2.a. 1.03 (1.01–1.04) 2.b. 1.01 (0.99–1.02) 2.c. 0.99 (0.97–1.004) 2.d. 0.96 (0.94–0.98) | People in lower-income neighborhoods remain more likely to go to the ED, have more ED visits, and have more PCS ED visits than people in higher-income neighborhoods. |
| Lines et al. (2017) United States | Retrospective cohort study | To explore associations between ED use and neighborhood poverty | Patients with commercial insurance (<i>n</i> = 64,623) | 1. Total ED visits 2. Preventable ED visits | Social deprivation (percent living in poverty in CT/10 ⁱ) | z-score (<i>p</i> -value) 1. 5.84 (<0.01) 2. 6.2 (<0.01) | |

(continued)



Table 2. (Continued)

| Authors (year of publication) Country | Study design | Aim | Population | Emergency care indicators | Socioeconomic determinants of health | Statistics | Key conclusion |
|--|-------------------------------|--|---|---|--|---|---|
| Shulman et al. (2018) Canada | Population-based cohort Study | To determine if the combination of socioeconomic status and mental health visits in adolescence is associated with diabetes-related ED visits in early adulthood | Patient with a diagnosis of diabetes before their 15th birthday (n = 8491) | ED visits (diabetes-related) | Social deprivation Index of Marginalization area (based on the ON-MARG), divided in five quintiles (ref: least deprived) | Rate ratio (95% CI) 3.15 (1.79–5.54) | Socioeconomic status combined with mental health visits is associated with an increase in risk of diabetes-related ED visits in early adulthood for people with childhood-onset diabetes. |
| Thorne et al. (2016) United Kingdom | Record linkage study | To identify whether social deprivation has any effect on mortality risk after emergency admission with hip fracture | Patients emergency admitted with hip fracture in England (n = 455,862) and Wales (n = 29,733) | 1. 30-day mortality (following hip fracture) 2. 90-day mortality (following hip fracture) 3. 365-day mortality (following hip fracture) | a. Social deprivation (2007 IMD, cf footnote 1) for England, divided in five quintiles (ref: least deprived) Most deprived b. Social deprivation (2008 Welsh Index of Multiple Deprivation) ^k for Wales, divided in five quintiles (ref: least deprived) Most deprived | Odds ratio (95% CI) 1.a. 1.187 (1.147–1.228) 1.b. 1.136 (0.991–1.302) 2.a. 1.185 (1.154–1.217) 2.b. 1.135 (1.022–1.261) 3.a. 1.154 (1.128–1.181) 3.b. 1.203 (1.100–1.317) | There is a positive association between social deprivation and increased mortality at 30 days post-admission for hip fracture in both England and Wales. This association is still evident at 90 and 365 days |
| Vanasse et al. (2012) Canada | Retrospective cohort study | To compare ED use in patients with mood disorder based on the dwelling sector level of material and social deprivation | Patients 18 years of age or older hospitalized with a diagnosis of mood disorder (n = 177,850) | Total ED visits (during the year following the diagnosis of mood disorder) | Social deprivation Combination of material and social deprivation quintiles based on the INSPQ deprivation index ^l (ref: least deprived) Most deprived a. Women b. Men | Relative risk a. 3.82 b. 3.25 | There is a gradient between the level of disadvantage in the neighborhood of residence and the rate of ED visits. |
| Vanasse et al. (2014) Canada | Retrospective cohort study | To measure and compare ED use in relation to the level of material and social deprivation of the area of residence | Patients 30 years of age or older with diagnosis of hypertension without diagnosis of CVD (n = 276,793) | Frequent ED visits (four or more visits per year) | Social deprivation (INSPQ deprivation index) ^l (ref: least deprived) Most deprived | Relative risk 1.47 | The risk of being frequent users is 47% higher for people living in the most materially and socially deprived areas than for people living in the least deprived areas. |

(continued)



Table 2. (Continued)

| Authors (year of publication) Country | Study design | Aim | Population | Emergency care indicators | Socioeconomic determinants of health | Statistics | Key conclusion |
|--|---|---|---|---|---|--|--|
| Whitney et al. (2017) United States | Insurance status and social deprivation Retrospective cohort study | To examine individual predictors of rehospitalization among individuals with advanced cancer | Patients diagnosed with advanced breast, colorectal, non-small-cell lung, or pancreatic cancer ($n = 25,032$) | Rehospitalizations (among individuals with advanced cancer in the year after diagnosis) ^m | a. Social deprivation (area-based SES quintile) ⁿ (ref: highest) i. Upper-middle ii. Middle iii. Lower-middle iv. Lowest b. Insurance status (ref: private) i. Public ii. Uninsured | IRR (95% CI) a.i. 1.09 (1.02–1.18) a.ii. 1.13 (1.05–1.22) a.iii. 1.14 (1.05–1.24) a.iv. 1.29 (1.18–1.42) b.i. 1.37 (1.23–1.47) b.ii. 1.17 (1.02–1.35) | Rehospitalization rates are significantly associated with sociodemographic characteristics, such as insurance status and socioeconomic quintile. |
| Singhal et al. (2016) United States | Income Retrospective cohort study | To determine the factors associated with a subsequent dentist visit after a dental ED visit | Adults enrolled in Medicaid ($n = 2430$) | Subsequent dentist visit after a dental ED visit | Reportable income (ref: no) a. Yes | Hazard ratio (95% CI) a. 1.05 (0.94–1.18) | No effect of reportable income on subsequent dentist visits was found after a dental ED visit among adults enrolled in Medicaid. |
| Finnegan et al. (2017) United States | Insurance status and income Observational, population-based study | To determine what factors are associated with an increased risk of ED visits following major joint replacement surgical procedures | Adult undergoing total hip or knee arthroplasty ($n = 152,783$) | 1. Total ED readmission (following intervention, within 30 days) 2. Specific ED readmission (following intervention, pain related, within 30 days) | a. Insurance status (ref: private) i. Medicare ii. Medicaid b. Median household income (ref: highest quartile) i. Second ii. Third iii. Fourth | Odds ratio (95% CI) 1.a.i. 1.38 (1.29–1.47) 1.a.ii. 2.28 (2.04–2.55) 1.b.ii. 0.98 (0.91–1.05) 1.b.iii. 0.96 (0.89–1.03) 1.b.iv. 0.97 (0.90–1.05) 2.a.i. 1.62 (1.40–1.87) 2.a.ii. 1.68 (1.36–2.09) 2.b.i. 1.12 (0.96–1.31) 2.b.ii. 1.00 (0.85–1.17) 2.b.iii. 1.04 (0.87–1.23) | Medicaid patients had almost double the risk of an ED or pain-related ED visit following a surgical procedure. No association between median household income quartile and increased risk for an ED visit was found. |
| Ladha et al. (2011) United States | Retrospective cohort study | To determine whether re-presentation to ED after discharge from hospital is related to insurance status and socioeconomic factors such as neighborhood income level | Trauma patients ($n = 6675$) | Total ED readmission (re-presentation to the ED within 30 days of discharge) | a. Insurance status (ref: private) i. Public b. Median household income (ref: >40,000 \$) i. 20,000–40,000 \$ ii. <20,000 \$ | Odds ratio (95% CI) a.i. 1.64 (1.30–2.06) a.ii. 1.60 (1.20–2.14) b.i. 1.42 (1.14–1.77) b.ii. 1.77 (1.37–2.29) | Re-presentation to ED is associated with being uninsured or underinsured and with lower neighborhood income level. |

(continued)



Table 2. (Continued)

| Authors (year of publication) Country | Study design | Aim | Population | Emergency care indicators | Socioeconomic determinants of health | Statistics | Key conclusion |
|---|---|--|--|--|--|---|---|
| Moy et al. (2014) United States | Retrospective cross-sectional analysis | To identify factors associated with the frequency of missed AMI diagnosis in the ED | Patient evaluated for chest pain or cardiac conditions within 1 week of hospitalization (n = 111,973) | ED missed diagnoses ^o (of AMI) | a. Insurance status (ref: private) i. Medicare ii. Medicaid iii. Uninsured b. Median household income (ref: highest) i. Moderate ii. Low iii. Lowest | Odds ratio (p-value) a.i. 0.801 (p = 0.0389) a.ii. 1.124 (p = 0.3938) a.iii. 0.871 (p = 0.2798) b.i. 1.067 (p = 0.6111) b.ii. 1.006 (p = 0.9606) b.iii. 0.906 (p = 0.4550) | The associations between missed diagnoses and expect payers (other than Medicare) and household income were not significant when controlling for other demographic and clinical conditions. |
| Shah et al. (2015) United States | Retrospective population-based cohort study | To determine the predictors of in-hospital complications and mortality among EGS patients | Patient: 16 years of age and older with primary diagnosis and subdiagnosis of an EGS condition ^p (n = 32,910,446) | 1. MAEs 2. In-hospital mortality | a. Insurance status (ref: private) i. Government ii. Uninsured b. Median household income quartile (ref: lowest) i. Second ii. Third iii. Fourth | Odds ratio (95% CI) 1.a.i. 1.15 (1.14–1.15) 1.a.ii. 1.06 (1.04–1.08) 1.b.i. 1.01 (1.00–1.02) 1.b.ii. 1.03 (1.02–1.04) 1.b.iii. 1.00 (1.00–1.02) 2.a.i. 1.08 (1.06–1.10) 2.a.ii. 1.25 (1.20–1.30) 2.b.i. 0.98 (0.96–0.99) 2.b.ii. 0.92 (0.90–0.93) 2.b.iii. 0.86 (0.84–0.88) | Uninsured patients were at higher risk for death compared to government- or private insured patients. Patients in the highest income quartile had the least likelihood of mortality after an EGS condition. |
| Education level with/without insurance status Yap et al. (2018) Australia | Retrospective cohort study | To examine patients' characteristics associated with presenting to ED around the time of diagnosis | Patient newly diagnosed with non-small cell lung cancer (n = 647) | "Emergency presenters" (presenting to an ED around the time of diagnosis) | a. Education level (ref: no school certificate) i. School certificate ii. Trade/Certificate/Diploma/HSC iii. University degree b. Insurance status (ref: private) Not private | Odds ratio (95% CI) a.i. 0.97 (0.58–1.63) a.ii. 0.67 (0.41–1.11) a.iii. 0.49 (0.24–0.99) b. 1.28 (0.86–1.90) | The risk of being an "emergency presenters" seems to follow an educational-level gradient. |
| Stecksén et al. (2014) Sweden | Retrospective cohort study | To test whether patient education level is associated with receiving reperfusion treatment | Patients with ischemic stroke (n = 85,885) | Specific procedure Reperfusion therapy | Education level (ref: primary) a. Secondary b. University | Odds ratio (95% CI) a. 1.08 (1.00–1.17) b. 1.14 (1.03–1.26) | Reperfusion therapy for stroke is associated with higher patient education level. |
| Health literacy Balakrishnan et al. (2017) United States | Observational cross-sectional study | To determine the association of health literacy with preventable ED visits | Adults and English-speaking patients (excluded patients with impaired vision, hearing problems, being in police custody, or being too ill to participate) (n = 1201) | 1. Total potentially preventable ED visits 2. Potentially preventable ED visits resulting in hospital admission 3. Potentially preventable treat-and-release ED visits | Health literacy (assessed by the REALM ^q) Limited (REALM < 61) vs. adequate (REALM ≥ 61) health literacy | Rate ratio (95% CI) 1. 1.93 (1.55–2.40) 2. RR 2.33 (95% CI 1.75–3.1) 3. RR 1.42 (95% CI 0.99–2.40) | Limited health literacy is a risk factor for potentially preventable ED visits. |

(continued)



Table 2. (Continued)

| Authors (year of publication) Country | Study design | Aim | Population | Emergency care indicators | Socioeconomic determinants of health | Statistics | Key conclusion |
|--|--|---|--|--|---|---|---|
| Shippee et al. (2014) United States | Financial and nonfinancial barriers Cross-sectional study | To examine the distinct associations financial and nonfinancial barriers to care have with patterns of ED use among a publicly insured population | Publicly insured patients ($n = 1737$) | ED visits (0, 1 or 2+ ED visits in 1 year) | a. Financial concerns ^f b. Nonfinancial barriers ^g | Odds ratio (95% CI) a. 0.939 (0.849–1.038) b. 1.210 (1.048–1.398) | Nonfinancial barriers are associated with actual ED visits. |

A p -value < 0.05 is considered significant.

A p -value < 0.001 is considered highly significant.

^aPercutaneous coronary center.

^bMAEs identified from ICD-9-CM codes (cerebrovascular accident, pneumonia, pulmonary embolus, acute respiratory distress syndrome, renal failure, urinary tract infection, myocardial infarction sepsis, septic shock, and cardiac arrest).

^cFTR: The odds of in-hospital mortality after an MAE.

^dCCG-LSOA: A block of CCG registered population residing within a neighborhood census unit called LSOA.

^eCarstairs score: An index of deprivation used in spatial epidemiology, based on four variables (male unemployment, lack of car ownership, overcrowding, and low social class).

^fQuintile of socioeconomic deprivation (Carstairs): a geographically based deprivation score based on four census indicators (low social class, lack of car ownership, overcrowding, and male unemployment).

^gPCOP: Program developed to address the projected increase in health service and social care use by older people in Scotland.

^hSIMD: The Scottish Government's official tool for identifying those places in Scotland suffering from multiple deprivation. By identifying concentrations of multiple deprivation, the SIMD can be used to target policies and resources at the places with greatest need.

ⁱCT/10: a coefficient that refers to the effect of a 10% increase in the percentage of the population in the CT who have household incomes below 200% of the federal poverty threshold. (The poverty coefficient indicates the effect of a 10% increase in the fraction of the population living in poverty).

^jON-MARG: a validated census- and geography-based index that measures marginalization at the level of the census DA, including economic, ethno-racial, age-based, and social marginalization.

^kA composite score originates from the following domain indices: income, employment, health, education, access to services, community safety, and physical environment.

^lINSPO deprivation index: an index based on six socioeconomic indicators calculated at the DA level. This index has two components, material and social. The material component is based on the proportion of people without a high school diploma, the employment-to-population ratio, and the average income. The social component is based on the proportion of people living alone, the proportion of separated, divorced, or widowed people, and the proportion of lone-parent families.

^m64.1% of all rehospitalizations are originated in the ED.

ⁿArea-based SES quintile: an index of seven components based on American Community Survey (education index, percent persons above 200% poverty line, percent persons with a blue collar job, percent persons employed, median rental, median value of owner-occupied housing unit, and median household income).

^oPatients who visited an ED with chest pain or cardiac conditions were released from the ED, subsequently returned to a hospital within 0 to 7 days, and were admitted with a principal diagnosis of AMI.

^pBased on the classification of the American Association for the Surgery of Trauma, which encompass 621 unique ICD-9-CM.

^qA reading recognition test comprised 66 health-related words arranged in ascending order of difficulty.

^rA set of seven self-reported financial concerns items: "insurance won't cover care," "the respondent will have to pay more than expected," "he/she will have to pay more than he/she can afford," "medications will cost too much," "not being sure about being dropped from the public healthcare program," "not knowing what the health plan covers," and "not knowing where to go with questions about coverage."

^sSeven self-reported nonfinancial barriers, including transportation difficulties, problems making appointments, not knowing where to go for care, work/family responsibilities, office/clinics not being open at suitable times, obtaining childcare, and not being able to utilize one's preferred provider.

AMI, acute myocardial infarction; CCG, Clinical Commissioning Groups; CI, confidence interval; CT, census tract; CVD, cardiovascular disease; DA, dissemination area; DNR, do not resuscitate; EGS, emergency general surgery; FTR, failure to respond; HMO, Health maintenance organization; IMD, index of multiple deprivation; INSPQ, Institut national de la santé publique du Québec; IRR, incidence rate ratio; LSOA, Lower Super Output area; ON-MARG, Ontario Marginalization Index; PCI, Percutaneous coronary intervention; PCS, primary care sensitive; PPM, permanent pacemaker; RCOP, Reshaping Care for Older People; REALM, Rapid Estimate of Adult Literacy in Medicine; RR, rate ratio; SES, socioeconomic status; SIMD, Scottish Indicator of Multiple Deprivation; STEMJ, ST-segment elevation myocardial infarction.



DeLeire et al. found an increase in total ED visits (Group 1) of 46% (p -value, $p < 0.01$) and ACSC ED visits (Group 1) of 38.7% (p -value, $p < 0.01$) after the introduction of a public insurance (Medicaid) among low-income childless adults.²⁴

Authors postulate that this may be not only due to insurance coverage increasing one's access to outpatient care but also to ED-based care. Similarly, Kerr et al., who compared ED visit rate (Group 1) among a cohort of HIV-positive patients with varying health insurance coverage ($n = 4947$), showed that uninsured patients used the ED significantly less than privately insured patients (incidence rate ratio [IRR] 0.65, 95% CI 0.61–0.70), but that patients with Medicaid (public insurance program in the United States) used the ED more frequently (IRR 1.26, 95% CI 1.18–1.36).²⁵

Social deprivation. Although social deprivation is measured by many different area-level indices among studies, it appears to be significantly associated with the three categories of indicators of emergency care identified in this review.

For example, Vanasse et al. show a relative risk of ED visits (Group 1) of 3.82 among women with mood disorders in Québec of the most deprived quintile in comparison with women of the least deprived quintile (based on an index combining social and material deprivation).²⁸ Then, Lazzarino et al., who used the Carstairs Index, highlighted a significant difference in the likelihood of having a brain scan on the day of admission (Group 2) for patients presenting to the ED with an acute stroke between the least and the most deprived quartiles (odds ratio 0.94, 95% CI 0.89–0.99).³⁶

Similarly, Thorne et al. demonstrate a significant association between 30-day mortality (Group 4) after ED admissions for hip fracture and social deprivation quintile with patients in the most deprived quintile at higher risk than those in the least deprived quintile, based on the Index of Multiple Deprivation (odds ratio 1.19, 95% CI 1.15–1.23).⁴⁵

Discussion

Findings of this systematic review, which identified 14 health equity indicators and 7 SEDH, suggest that administrative data allow for a broad analysis of health care equity in emergency care settings. Using these health equity indicators, each of which measure different aspects of the patient pathway through emergency

care, in combination with various SEDH described, presents a promising way forward in conducting health equity analyses of health care systems. Based on these findings, we have created a conceptual framework for assessing health care equity, combining SEDH through different categories of emergency care indicators, depicted in Figure 2.

The most frequently used indicator is ED visits/emergency admissions, but due to its lack of specificity, it must be interpreted with caution as there are notably many factors that could explain differences in ED visits or emergency admissions beyond health care equity, particularly differences in general health status and prevalence of diseases.⁵¹ ACSC ED visits/ACSC emergency admissions are arguably more specific as it focuses on ED visits/admissions that are potentially preventable with good access to primary care.^{15,52}

The indicators comprising Group 2 (indicators of quality of emergency care) directly analyze emergency care and are therefore more specific in their measurement of health care equity in emergency care settings compared to indicators in Group 1. We found that they are used considerably less. This may reflect difficulty in obtaining relevant data to measure these indicators through administrative datasets. However, they might be useful indicators to use in future studies analyzing health care equity.

Among outcome indicators (Group 3), in-hospital mortality seems to be the most reproducible and available administrative data-derived indicator.

Finally, 30-/90-/326-day mortality and ED readmission, which are more global equity indicators (Group 4), assess not only the lack of access to outpatient care following an ED visit but also potential issues during the emergency care that lead to inequities in health outcome.

Due to the inherent difficulties of measuring a complex concept like health care equity and the large number of potential confounding factors, using a combination of indicators instead of one sole indicator to measure health care equity in any given health care context is more likely to result in a well-rounded assessment. As such, we suggest combining indicators across the different groups when assessing health care equity. The choice of specific indicators will depend on the context of the study, the study objectives and availability of administrative data (and relevant variables) in the health care setting of interest.



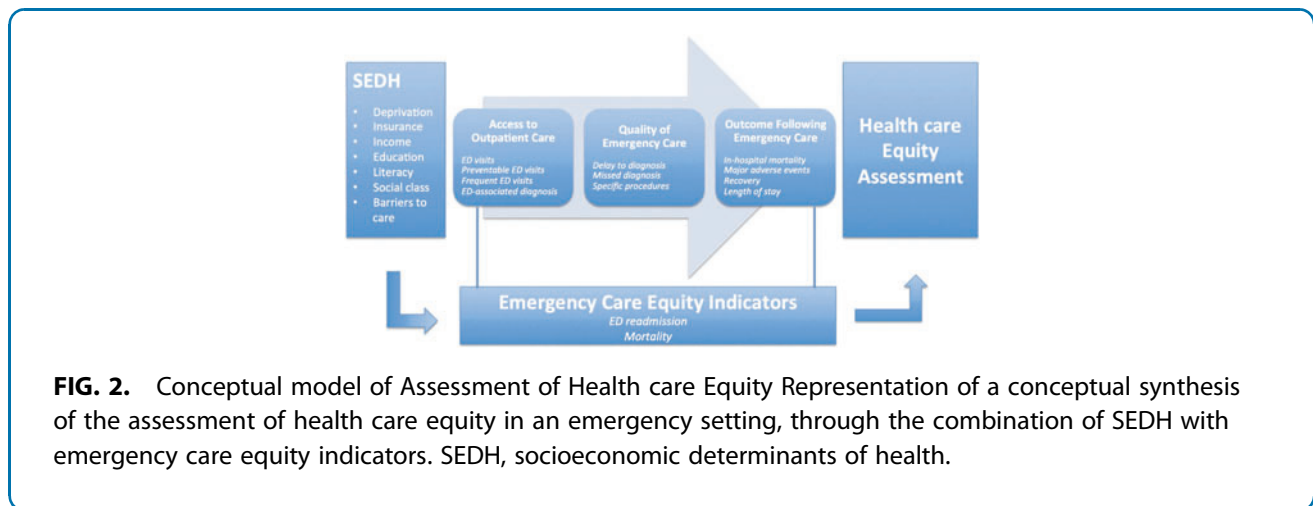


FIG. 2. Conceptual model of Assessment of Health care Equity Representation of a conceptual synthesis of the assessment of health care equity in an emergency setting, through the combination of SEDH with emergency care equity indicators. SEDH, socioeconomic determinants of health.

Health equity implications

An important implication of our research is the identification of four groups of indicators that can be used to analyze equity in emergency care of high-income countries. As most of the indicators identified in this review are not specific to emergency care settings, it seems possible to study health care equity in other areas of the health care system of high-income countries with similar administrative data-derived indicators, as for example, hospitalization,^{53,54} ACSCs during the total hospital admission,⁵⁵ and wait times.⁵² Such information could be useful for policy makers or health equity researchers to fill the gap in data about health care equity within different health care settings, particularly in high-income countries, using available administrative data.

Our findings suggest that SEDH such as insurance status or social deprivation (measured by area-based indices or median income) have a considerable impact on health care equity. The next step would also be to better characterize root causes for differences in emergency care utilization that lie outside the health care system.

For example, in a recent study, McCormick et al. demonstrate that emergency admissions are primarily due to a higher prevalence of illness in disadvantaged areas,⁵¹ while Pollack et al. who analyzed the relationship between neighborhood poverty and ED use in a 21-year randomized social experiment did not find a consistently significant connection between neighborhood poverty and ED use.⁵⁶ More studies like these are needed to improve our understanding of the complex interconnectedness between SEDH, health care use, and health care equity.

Limitations

Our review has some limitations that require consideration. First, the content and quality of administrative datasets are highly variable within countries (sometimes even within regions) and between countries. As such, many of the indicators identified in our review might not be available in many health care settings, reducing their generalizability and widespread applicability. However, important equity indicators such as preventable ED visits are frequently used and easily replicable between countries.

Second, administrative data are not designed for the purpose of equity monitoring, which implies a lack of robust quality control of the collected data, a time lag in data availability, differences in concepts and definitions used between datasets limiting comparability, and the possibility of missing records. To address this, further studies of health equity indicators and SEDH using different types of datasets would be helpful for the researchers.

Third, to define the criteria relevant to this review, it was necessary to make many normative choices before data analysis. Our focus has been indeed solely on SEDH and their associated inequities. It would also be important to analyze equity, in complementary studies, through determinants of health such as race/ethnicity, gender, or place of residence, to have a comprehensive picture of health care equity. As such, these results must be interpreted in the context of the concept of health care equity and the definitions we used. Finally, as more than half the studies were conducted in the United States, the extrapolation of the results should be carefully interpreted.



Conclusion

Measuring health care equity should be an integral component of all comprehensive assessments of a health care system's performance. However, to measure health care equity, indicators for making such measurements need to be identified, as was the goal of this review. Such indicators can be used by researchers and policy makers interested in measuring health care equity through thoughtful selection of the most relevant indicators defined by the local context and stated objectives. Using a combination of indicators is likely to lead to a more comprehensive, well-rounded analysis of health care equity than using any one indicator in isolation.

Although studies analyzed focused on emergency care settings, it seems possible to extrapolate these indicators to measure equity in other areas of the health care system. Meta-analyses focusing on specific SEDH such as health insurance coverage, income, or indices of social deprivation in combination with studies analyzing factors that could influence the use of emergency care related to social inequalities would help to further characterize root causes of ongoing health care inequity in health care systems.

Institutional Review Board Statement

Due to the design of the study (systematic review of the literature), no data involving participants were collected. IRB is therefore not applicable.

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Author Disclosure Statement

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Supplementary Material

Supplementary File S1
Supplementary File S2
Supplementary File S3
Supplementary Table S1

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Abbreviations Used

ACSCs = ambulatory care sensitive conditions
AMI = acute myocardial infarction
CCG = Clinical Commissioning Groups
CI = confidence interval
CT = census tract
DA = dissemination area
DNR = do not resuscitate
ED = emergency department
EGS = emergency general surgery
FTR = failure to respond
IMD = index of multiple deprivation
INSPQ = Institut national de la santé publique du Québec
IRR = incidence rate ratio
LOS = length of stay
LSOA = Lower Super Output area
MAEs = major adverse events.
ON-MARG = Ontario Marginalization Index
PCI = percutaneous coronary intervention
PCS = primary care sensitive
PPM = permanent pacemaker
RCOP = Reshaping Care for Older People
REALM = Rapid Estimate of Adult Literacy in Medicine
RR = rate ratio
SEDH = socioeconomic determinants of health
SES = socioeconomic status
SIMD = Scottish Indicator of Multiple deprivation
STEMI = ST-segment elevation myocardial infarction



STUDY 2

Prevalence of SARS-CoV-2 infection and associated risk factors among asylum seekers living in asylum centres: A cross-sectional serologic study in Canton of Vaud, Switzerland

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PhD candidate contribution:

Kevin Morisod conducted the background literature review, prepared the data, conducted the statistical analyses, and drafted the manuscript.



Prevalence of SARS-CoV-2 infection and associated risk factors among asylum seekers living in asylum centres: A cross-sectional serologic study in Canton of Vaud, Switzerland

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ABSTRACT

Background: Understanding the factors influencing SARS-CoV-2 transmission in asylum seekers and refugees living in centres is crucial to determine targeted public health policies protecting these populations fairly and efficiently. In response, this study was designed to explore the pandemic's spread into asylum centres during the first wave of the pandemic in Switzerland. Specifically, it aimed to identify the risk factors associated with a positive anti-SARS-CoV-2 seroprevalence test after the first semi-confinement period (16 March to 27 April 2020) amongst asylum seekers and refugees living in centres.

Methods: This research is part of SéroCOVID, a seroepidemiologic study of SARS-CoV-2 infection conducted in the canton of Vaud, Switzerland. Migrants living in two asylum centres, one known to have had an epidemic outbreak, were invited to participate in this study. Anti-SARS-CoV-2 IgG and IgA antibodies targeting the spike viral protein were measured in all participants using a Luminex immunoassay. Each participant also completed a questionnaire measuring socio-demographic characteristics, medical history (comorbidities, smoking status, BMI, flu-like symptoms), health literacy, public health recommendations (wearing a masque in a public area, social distancing and hands cleaning), behaviours and exposures (daily life activities, number of contacts weekly). The association of these independent variables with the serologic test result were estimated using a multivariable logistic regression model.

Findings: A total of 124 participants from the two asylum centres took part in the study (Centre 1, $n = 82$; Centre 2, $n = 42$). The mean participation rate was 36.7%. The seroprevalence in Centres 1 and 2 were 13% [95% CI 0.03, 0.14] and 50% [0.34, 0.65], respectively. Next, 40.63% of SARS-CoV-2 positive people never developed symptoms (asymptomatic cases), and no one had severe forms of the Covid-19 disease requiring hospitalisation. Participants report high compliance with public health measures, especially hygiene rules (96.3% of positive answers) and social distancing (88.7%). However, only 11.3% said they always wore a masque in public. After adjusting for individual characteristics, infection risk was lower amongst people with high health literacy (aOR 0.16, $p = 0.007$ [0.04, 0.60]) and smokers (aOR 0.20, $p = 0.013$ [0.06, 0.69]).

Conclusion: Despite the lack of severe complications of Covid-19 disease in this study, findings suggest that developing targeted public health measures, especially for the low health literacy population, would be necessary to limit the risk of outbreaks in asylum centres and improve this population's safety. Further investigations and qualitative approach are required to understand more finely how living conditions, risks and behaviours such as tobacco consumption, and the adoption of protective measures impact SARS-CoV-2 infection.

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1. Introduction

From the beginning of the Covid-19 pandemic, scientists and specialists alerted the additional danger that this epidemic could represent for migrant populations, especially asylum seekers (defined as people who have applied for asylum but whose procedure is still pending) and refugees (defined as people whose asylum application has been accepted by the host country). They also highlighted the need to consider social context and living conditions in managing and preventing the SARS-CoV-2 infection (Orcutt et al., 2020; Bhopal, 2020b; Kluge et al., 2020). Indeed, high population density, belonging to a minority ethnic group or social deprivation are risk factors for contracting SARS-Cov-2 infection (De Lusignan et al., 2020; de Souza et al., 2020; Rentsch et al., 2020). Thus, the International Organization for Migration (IOM), in a report published in December 2020, highlighted various vulnerability factors faced by forced migrant populations during this pandemic (Guadagno, 2020). They include in particular: social promiscuity and precarious living conditions promoting the virus's spread (Guadagno, 2020; Hayward et al., 2021; Clark et al., 2020), lower access to the healthcare system (Hayward et al., 2021; Clark et al., 2020; Page et al., 2020), including mental health care (Aragona et al., 2020), fear of legal repercussions (Clark et al., 2020), limited awareness of public health recommendation due to linguistic and cultural barriers (Guadagno, 2020; Clark et al., 2020) and underlying comorbidities (Guadagno, 2020; Clark et al., 2020; Greenaway et al., 2020). Before the Covid-19 pandemic, asylum seekers, refugees and undocumented migrants were already facing significant health inequities (Abubakar et al., 2018) and poorer access to care (Brandenberger et al., 2019). Thus, the Covid-19 pandemic appears to reinforce these populations' health inequities (Blukacz and Cabieses, 2020; Bhopal, 2020a; Mukumbang et al., 2020; Daniels, 2020; Bozorgmehr et al., 2020) and urge the need for adapted public health measures (Hayward et al., 2021; Alemi et al., 2020; Jozaghi and Dahya, 2020; Hargreaves et al., 2020; Valeriani et al., 2020).

The example of Singapore in the spring of 2020 illustrates the importance of not neglecting specific populations. While the public health authorities, through an effective screening and isolation system, had managed to contain the spread of the virus, many epidemic outbreaks occurred in unhealthy and overcrowded migrant worker households (Yi et al., 2021). Besides, a recent US community-based surveillance study carried out in 14 homeless shelters suggests that population density and sleeping arrangements (common room without separation vs single or shared room) are risk factors for SARS-CoV-2 infection (Rogers et al., 2021). These different studies confirm the importance of the housing and living conditions as risk factors for contamination and the risk of sharing a house with a positive case. Indeed, concerning migrant populations, many epidemic outbreaks have occurred in immigrant detention centres, notably in the United States (Erfani et al., 2021; Openshaw and Travassos, 2021). The scientific community has also warned on several occasions of the health challenges facing migrant populations living in centres in the context of the Covid-19 pandemic and of the need to adopt specific public health recommendations (Page et al., 2020; Garcini et al., 2020; Meyer et al., 2020; Douglas et al., 2020). Finally, a recent systematic review on clinical outcomes and risk factors for COVID-19 amongst migrant populations found that migrants are at increased risk of infection and advocated for better consideration of specific migrant groups such as migrants living in reception centres (Hayward et al., 2021).

Therefore, the management of the Covid-19 pandemic in asylum centres is a critical public health issue, both because of the high risk of outbreak clusters and the socio-economic health preconditions of its populations. A retrospective analysis based on national surveillance data in Greece highlighted a 2.5-to-3-time higher risk of COVID-19 infection amongst refugees and asylum seekers in reception facilities compared to the general population (Kondilis et al., 2021). However, to our knowledge, there are currently few prospective studies analysing the

associated risk factors of SARS-CoV-2 transmission amongst asylum seekers living in asylum centres.

Understanding these risk factors is crucial to determine targeted public health policies protecting these populations fairly and efficiently. In response, this study was designed to explore the pandemic's spread into asylum centres (half-closed spaces) during the first wave of the pandemic in Switzerland. It aimed to identify the risk factors associated with the seroprevalence of SARS-CoV-2 infection after the first semi-confinement period (16 March to 27 April) amongst asylum seekers and refugees living in asylum centres.

2. Methods

2.1. Study design and participants

This research is a cross-sectional seroepidemiologic study of SARS-CoV-2 infection conducted in two asylum centres (Centre 1 and Centre 2) in the canton of Vaud (French-speaking region of Switzerland, 806'088 inhabitants on 31 December 2019) and is part of a nationwide program of SARS-CoV-2 seroprevalence in Switzerland (West et al., 2020). The study was launched between 4 May and 27 June 2020, coinciding with the easing of semi-confinement measures in Switzerland.¹

The two centres are accommodation centres for people who have applied for asylum in Switzerland and whose application is either pending, provisionally accepted, accepted or rejected. We considered all residents of these centres as asylum seekers and refugees.

A venous blood sample was collected to proceed with serological testing. We collected additional information with a paper-version questionnaire in English and French. All participants (or their legal representative) provided written informed consent. The Cantonal Ethics Committee of Vaud, Switzerland (ID 2020-00,887) approved the protocol.

2.2. Procedures

The research team, in collaboration with the "Unité de soins aux migrants" (USMi)² of Unisanté (centre for Primary Care and Public Health) and the administrative team of the "Etablissement Vaudois d'Accueil des Migrants" (EVAM)³, presented the study to the residents during visits to each of the two asylum centres.

The procedure was slightly different between the two centres for logistical reasons.

In Centre 1, investigators divided participants by language into small groups of 3 to 12 people and organised presentations of the study by groups of participants' languages in one of the centre's common rooms in the presence of a community interpreter. At the end of study presentation, people decided if they wanted to participate or not. Interpreters were also present to help with the completion of the questionnaires. Data collection and serology were carried out over ten days.

In Centre 2, in the absence of a room for group presentations, an invitation letter was sent to each participant. The letter summoned the participants on the day of the presence of the adapted community interpreter. An epidemic outbreak occurred in Centre 2 before the study.

The time taken to complete the questionnaire varied between 20 and 60 min, depending on the cases' complexity and the participants English or French comprehension.

¹ Closure of bars, restaurants, schools, services and non-essential shops. Ban on public and private meetings, mandatory home working.

² Specialized care units for the healthcare management of asylum seekers in the canton of Vaud, mostly composed of specialized nursing staff

³ The EVAM is the institution mandated by the canton of Vaud to house, supervise and assist asylum seekers and provisionally admitted persons

2.3. Detection of anti-SARS-CoV-2 antibodies

We measured anti-SARS-CoV-2 IgG and IgA antibodies targeting the spike (S) protein using a Luminex immunoassay developed by the Lausanne University Hospital, Switzerland (Fenwick et al., 2020). The cut-off for a positive result was defined as a multiple immunofluorescence IgG or IgA antibody (MFI) ratio of ≥ 6 . A venous blood sample was collected to proceed with serological testing.

2.4. Data

The outcome (dependant variable) was a positive IgG or IgA serological test. The independent variables were obtained from the answers to the questionnaires divided into five main categories.

1 Socio-demographic characteristics and health literacy

The questionnaire included items assessing Age (*in years*), Gender (*male or female*), Education level (*no diploma, primary school, secondary school and university*). Health literacy was assessed by a self-reported validated question (Sarkar et al., 2011) and coded into two categories (*high vs low*).

1 Health conditions, clinical risk factors and symptoms

This section included questions assessing Smoking status (*non-smoker vs smoker*), Comorbidities⁴ (*No vs at least one*), Body Mass Index (BMI) (*below vs above 30*), Age (*More vs less than 65 years old*) and flu-like symptoms (*absence vs presence*).

1 Living conditions and public health recommendations

This section included questions assessing Location (*centre 1 vs centre 2*), Room (*single, two-people vs family room*), Bathroom and Kitchen (*common vs private*), Contact⁵ (*0 vs one or more*), Wearing a masque in public (*always, sometimes, never*), Respecting social distancing⁶ (*Yes, mostly yes, mostly no, no*) and Hygiene rules⁷ (*Yes, mostly yes, mostly no, no*).

1 Behaviour and exposure

This section included questions assessing Meeting⁸ (*0 to 5 vs more than five a week*), Place of meeting (*kitchen, bathroom, living room,*

⁴ We have only selected co-morbidities associated with an increased risk of complications of Covid-19 disease (Uncontrolled hypertension, uncontrolled diabetes, heart failure, history of heart attack or stroke, heart valve disease, impaired renal function, chronic respiratory disease, immune system weakness, cancer currently under treatment)

⁵ The question was: apart from the people living in the same room as you, how many people were you in close contact with (at less than 2 meters for more than 15 minutes) who had symptoms suggestive of COVID-19 (fever or cough or fatigue or out of breath or muscular pain or loss of tast/smell) while they were sick (or 48 hours before they were sick)?

⁶ Respecting "social distancing" rules (avoid shaking hands or kissing, stay at home, avoid leaving your home unless absolutely necessary, etc.)

⁷ Following simple hygiene rules (regular hand washing, sneezing into your elbow, using disposable tissues, etc.)

⁸ The question was: during the confinement (March 16 to May 10), on average, how many people did you meet per week apart from the people living in the same room as you?

garden), Context of meeting (*Work, society game, sport, family, friends*) and Transport⁹ (*public transport vs other*).

2.5. Statistical analysis

First, we used a Chi-2 test to compare our sample with the entire population of Centres 1 and 2 according to age and sex categories using EVAM administrative data. Then, we used Odds ratios (OR) to measure the association between each of the four categories of independent variables and serology test result (bivariate analysis). From the bivariate analyses, we developed a multivariate logistic model, according to the method proposed by Hosmer and Lemeshow (2000), Bursac et al. (2008). We, first, selected all variable with a p-value < 0.25 in the bivariate analysis, along with all variables of known clinical importance. Then, we tested the performance of different multivariate models obtained from the first selection using goodness-of-fit test (Hosmer-Lemeshow) and sensitivity/specificity analysis using the command "lstat" and "Iroc". Lastly, we selected the best explanatory model to estimate the adjusted associations of living conditions, individual characteristics and behaviours with serologic test results (IgG or IgA seropositivity). We performed comparison with and without imputation of missing data, but no significant difference in the overall results were found. Hence, this paper is presented without imputation. Statistical analysis was performed using Stata/IC version 16.1.

3. Results

3.1. Sample size and representativeness

Amongst a total population of 338 people, 124 took part in the study (participation rate 36.7%), including 17 children under 12 (13.7%), 16 teenagers between 12 and 20 (12.9%) and 91 adults over 20 (73.4%), with a mean age of the adult sample of 35.8. Our sample is composed of 32 women (25.8%) and 92 men (74.2%). Lastly, 82 participants live in Centre 1 (66.1%) and 42 in Centre 2 (33.9%). (See **Supplementary File**) Based on the chi2 tests realised, there were no significant differences between our sample and the two asylum centres' whole population for the age categories and gender (See **Supplementary File**).

3.2. Socio-demographic characteristics and asylum centres

Table 1 presents the associations between serologic test and the socio-demographic characteristics (centre, age, gender, education level and health literacy). An unadjusted odds ratio (naOR) with its 95% confidence interval was calculated for each socio-demographic variable (column 3). There was a significant difference in seroprevalence between people living in Centre 1 and Centre 2 with a naOR of 6.46 [95% CI 2.69, 15.52] and between participants with low health literacy compared to participants with high health literacy with naOR of 2.60 [95% CI 1.02, 6.66].

3.3. Smoking status, clinical risk factors and symptoms

Table 2 presents the association between serologic test results, smoking status and clinical risk factors (comorbidities, BMI > 30 kg/m², age > 65 years).

Moreover, amongst people with a positive serologic test result, 40.6% never developed symptoms (asymptomatic cases). None of the participants had described clinical complications due to Covid-19 and

⁹ This data is a combination of the two following questions: During the confinement (March 16 to May 10), what mode of transport did you use most of the time and what other mode of transport did you use? The answers were then dichotomized into public transport or other (car, bike, scooter, motorcycle, on foot)

Table 1
Association between serologic test results and socio-demographic characteristics.

| Variables | Seropositive (proportion) | Seronegative (proportion) | Non adjusted OR [95% CI] | (p-value) |
|--|---------------------------|---------------------------|--------------------------|-----------|
| All sample (n = 124) | | | | |
| <i>Location</i> | | | | |
| Centre 1 (ref.) | 11 (0.13) | 71 (0.87) | | |
| Centre 2 | 21 (0.50) | 21 (0.50) | 6.46 [2.69–15.52] | p < 0.001 |
| <i>Age (y)</i> | | | | |
| 0–12 | 0 (0.00) | 17 (1.00) | – | – |
| 12–20 (ref.) ¹ | 5 (0.31) | 11 (0.69) | | |
| >20 | 27 (0.30) | 64 (0.70) | 0.93 [0.29–2.93] | p = 0.899 |
| <i>Gender</i> | | | | |
| Female (ref.) | 6 (0.19) | 26 (0.81) | | |
| Male | 26 (0.28) | 66 (0.72) | 1.71 [0.63–4.63] | p = 0.293 |
| Only Adults and Teenagers (n = 107) | | | | |
| <i>Education</i> | | | | |
| No diploma (ref.) | 2 (0.25) | 6 (0.75) | | |
| Primary school | 8 (0.32) | 17 (0.68) | 1.41 [0.23–8.61] | p = 0.708 |
| Secondary school | 8 (0.26) | 23 (0.74) | 1.04 [0.17–6.26] | p = 0.963 |
| University | 10 (0.29) | 25 (0.71) | 1.20 [0.21–6.98] | p = 0.839 |
| <i>Health literacy²</i> | | | | |
| Low (ref.) | 14 (0.39) | 22 (0.61) | | |
| High | 11 (0.20) | 45 (0.80) | 0.38 [0.15, 0.98] | p = 0.046 |

¹ In the absence of positive cases amongst children aged 0–12 years, we limited the comparison between adolescents (12–20 years) and adults.

² Health literacy is measured by the question “Do you feel comfortable filling out a medical form on your own?” (i.e. form with health questions when you go for the first time to see a doctor)” dichotomized into high vs low health literacy.

did require hospitalisation.

3.4. Living conditions and public health recommendations

Table 3 describes the associations between a positive serological test and the living conditions of asylum seekers and refugees in the centres (single, double or family room, shared or in separate kitchen and bathroom). None of these living conditions was associated with a positive serological test. Table 3 also describes the associations between serological results and public health recommendations. Wearing a masque in public, respecting social distances and following hygiene rules were not associated with a decreased risk of a positive serological test result. While the respect of hygiene rules (96.26% of positive answers) and social distances (88.68%) is very high in our sample, only 11.32% of the participants wear always a masque in public, 53.77% sometimes and 34.91% never.

3.5. Behaviours and exposures

Table 4 summarises the main exposure places (common kitchen or bathroom, living room, garden, transports) and reasons of potential exposures (sport, friend, family, work) and their association with serological results. No significant associations were found.

3.6. Multivariable adjusted model

From the bivariate analyses, we developed a multivariable adjusted model (Table 5). The performance of the selected model are the

Table 2
Association between serologic test results and clinical risk factors or symptoms.

| Variables | Seropositive (proportion) | Seronegative (proportion) | Non adjusted OR [95% CI] | (p-value) |
|---|---------------------------|---------------------------|--------------------------|-----------|
| Risk factors (n = 107) | | | | |
| <i>Smoking status¹</i> | | | | |
| Smoking status ¹ | 22 (0.37) | 36 (0.62) | | |
| Non smoker (ref.) | 10 (0.20) | 39 (0.80) | | |
| Regular | | | 0.42 [0.18, 1.01] | p = 0.051 |
| <i>Comorbidities²</i> | | | | |
| Comorbidities ² | 26 (0.29) | 64 (0.71) | | |
| No (ref.) | 6 (0.35) | 11 (0.65) | | |
| | | | 1.34 [0.45, 4.01] | p = 0.598 |
| <i>At least one BMI³ (y)</i> | | | | |
| Below 30 (ref.) | 27 (0.30) | 64 (0.70) | | |
| >30 (obese) | 2 (0.25) | 6 (0.75) | 0.79 [0.15, 4.17] | p = 0.781 |
| Symptoms | | | | |
| <i>Flu-like symptoms</i> | | | | |
| No (ref.) | 13 (0.19) | 57 (0.81) | | |
| Yes | 19 (0.51) | 18 (0.49) | 4.63 [1.92, 11.18] | p = 0.001 |

¹ We consider as regular smokers people who smoke at least one cigarette a week.

² We have only selected co-morbidities associated with an increased risk of complications of Covid-19 disease (Uncontrolled hypertension, uncontrolled diabetes, heart failure, history of heart attack or stroke, heart valve disease, impaired renal function, chronic respiratory disease, immune system weakness, cancer currently under treatment.

³ Adult only.

following: area under ROC curve = 0.83. The sensitivity is 64.0% and the specificity 93.94%. In this adjusted model, three independent variables were associated with a lower risk of a positive serological test: living in Centre 1 (aOR 0.04 [0.01, 0.21]), high level of health literacy (aOR 0.16, [0.04, 0.60]) and active smoker status (aOR 0.20 [0.06, 0.69]).

4. Discussion

This cross-sectional seroepidemiological study is, to our knowledge, one of the first studies focusing on the risk factors associated with positive anti-SARS-CoV-2 serologic test amongst asylum seekers and refugees living in centres. It aimed at better understanding the individual and contextual risk factors for SARS-CoV-2 infection associated with living in an asylum centre.

First, our sample’s high total seroprevalence, especially in Centre 2 -where a known epidemic outbreak occurred- confirm the challenge of managing this pandemic in asylum centres. It suggests that living conditions in community places and the associated social promiscuity require particular attention to limit viral transmission. Notably, these populations should have a priority access to testing and vaccination. Our data confirm other studies of community living populations.

Secondly, we highlighted that asylum seekers and refugees with a lower health literacy had an increased risk of SARS-CoV-2 infection than those with high health literacy, confirming a previous cross-sectional study analysing the association between health literacy and SARS-CoV-2 infection amongst outpatient department participants (Nguyen et al., 2020). Improving the health literacy of asylum seekers and refugees could, therefore, improve the implementation of public health responses (Wernly et al., 2020). In this epidemic context, it is necessary to consider people’s health literacy and adapt public health messages and recommendations (Cangussú et al., 2020; McCaffery et al., 2020).

Thirdly, being an active smoker was, in our study, a protective factor. Confirming previous publications, active smokers seem to be protected against the risk of SARS-CoV-2 infection, possibly due to the specific

Table 3
Association between serologic test results and living conditions or public health recommendations.

| Variables | Seropositive (proportion) | Seronegative (proportion) | Non adjusted OR [95% CI] | (p-value) |
|--------------------------------------|---------------------------|---------------------------|--------------------------|-----------|
| Living conditions | | | | |
| <i>Room</i> | | | | |
| Alone (ref.) | 14 (0.29) | 34 (0.71) | | |
| Two-people room | 15 (0.35) | 28 (0.65) | 1.30 [0.54, 3.15] | p = 0.559 |
| Family room | 3 (0.20) | 12 (0.80) | 0.61 [0.15, 2.49] | p = 0.488 |
| <i>Bathroom</i> | | | | |
| Private (ref.) | 2 (0.18) | 9 (0.82) | | |
| No | 30 (0.32) | 65 (0.68) | 2.08 [0.42, 10.21] | p = 0.368 |
| <i>Kitchen</i> | | | | |
| Private (ref.) | 1 (0.13) | 7 (0.87) | | |
| No | 31 (0.32) | 66 (0.68) | 3.29 [0.39, 27.90] | p = 0.287 |
| Public health recommendations | | | | |
| <i>Contact¹ (ppl)</i> | | | | |
| 0 | 23 (0.29) | 57 (0.71) | | |
| 1 or more | 8 (0.32) | 17 (0.68) | 1.17 [0.44, 3.08] | p = 0.756 |
| <i>masque²</i> | | | | |
| Always/sometimes | 21 (0.30) | 48 (0.70) | | |
| No | 11 (0.30) | 26 (0.70) | 0.97 [0.40, 2.31] | p = 0.940 |
| <i>Social Distancing³</i> | | | | |
| Yes/mostly yes | 28 (0.30) | 66 (0.70) | | |
| No/mostly no | 3 (0.25) | 9 (0.75) | 0.79 [0.20, 3.12] | p = 0.732 |
| <i>Hygiene rules⁴</i> | | | | |
| Yes/mostly yes | 31 (0.30) | 72 (0.70) | | |
| No/mostly no | 1 (0.25) | 3 (0.75) | 0.77 [0.08, 7.73] | p = 0.828 |

¹ The question was: apart from the people living in the same room as you, how many people were you in close contact with (at less than 2 m for more than 15 min) who had symptoms suggestive of COVID-19 (fever or cough or fatigue or out of breath or muscular pain or loss of tast/smell) while they were sick (or 48 h before they were sick)?.

² Wearing a masque in public.

³ Respecting “social distancing” rules (avoid shaking hands or kissing, stay at home, avoid leaving your home unless absolutely necessary, etc.).

⁴ Following simple hygiene rules (regular hand washing, sneezing into your elbow, using disposable tissues, etc.).

infection mechanism of SARS-CoV-2 (Simons et al., 2020; Israel et al., 2020). However, this topic is controversial and recent data also highlighted a positive association between smoking status and infection’s risk (Shastri et al., 2021; Hopkinson et al., 2021). Whereas the causal explanations of this link remain uncertain, meta-analyses have shown that smokers tend to develop more severe forms of the Covid-19 disease (Patanavanich and Glantz, 2020). Moreover, in our study, we suspected that active smokers were more protected due to their specific behaviour compared to non-smoker. Indeed, field observations suggested that they tend to be outside more often during the lockdown period to smoke. We need, however, new data, including ethnographic observation, to confirm this hypothesis. Finally, smoking is a significant public health issue amongst asylum seekers and refugees, as smokers’ prevalence amongst these populations is high, as confirmed by our data (Amiri, 2020).

Fourthly, 40% of participants having a positive serologic result were asymptomatic and none of the individuals who contracted the virus required hospitalisation. It is probably due to the absence of older people (above 65 years old), the young mean age of the sample and the small number of participants with clinical risk factors for complications of Covid-19 infection. These data are consistent with the results of a rapid systematic review published in July 2021, suggesting a lower

Table 4
Association between serologic test result and behaviours and exposures.

| Variables | Seropositive (proportion) | Seronegative (proportion) | Non adjusted OR [95% CI] | (p-value) |
|---------------------------------------|---------------------------|---------------------------|--------------------------|-----------|
| Behaviours and exposures | | | | |
| <i>Meeting¹ (ppl/week)</i> | | | | |
| 0–5 (ref.) | 19 (0.30) | 44 (0.70) | | |
| >5 | 13 (0.30) | 30 (0.70) | 1.00 [0.43, 2.36] | p = 0.994 |
| <i>Kitchen</i> | | | | |
| No (ref.) | 7 (0.21) | 27 (0.79) | | |
| Yes | 25 (0.34) | 48 (0.66) | 2.01 [0.77, 5.26] | p = 0.155 |
| <i>Bathroom</i> | | | | |
| No (ref.) | 17 (0.30) | 39 (0.70) | | |
| Yes | 15 (0.29) | 36 (0.71) | 0.96 [0.42, 2.19] | p = 0.915 |
| <i>Living room</i> | | | | |
| No (ref.) | 20 (0.27) | 54 (0.73) | | |
| Yes | 12 (0.36) | 21 (0.64) | 1.54 [0.64, 3.70] | p = 0.332 |
| <i>Garden</i> | | | | |
| No (ref.) | 15 (0.31) | 34 (0.69) | | |
| Yes | 17 (0.29) | 41 (0.71) | 0.94 [0.41, 2.16] | p = 0.883 |
| <i>Society game</i> | | | | |
| No (ref.) | 29 (0.32) | 61 (0.68) | | |
| Yes | 3 (0.18) | 14 (0.82) | 0.45 [0.12, 1.69] | p = 0.238 |
| <i>Friends</i> | | | | |
| No (ref.) | 23 (0.30) | 55 (0.70) | | |
| Yes | 9 (0.31) | 20 (0.69) | 1.08 [0.43, 2.71] | p = 0.877 |
| <i>Family</i> | | | | |
| No (ref.) | 29 (0.32) | 63 (0.68) | | |
| Yes | 3 (0.20) | 12 (0.80) | 0.54 [0.14, 2.07] | p = 0.372 |
| <i>Sport</i> | | | | |
| No (ref.) | 27 (0.29) | 65 (0.71) | | |
| Yes | 5 (0.33) | 10 (0.67) | 1.20 [0.38, 3.90] | p = 0.755 |
| <i>Work</i> | | | | |
| No (ref.) | 26 (0.30) | 61 (0.70) | | |
| Yes | 6 (0.30) | 14 (0.70) | 1.01 [0.35, 2.91] | p = 0.992 |
| <i>Reduction meet</i> | | | | |
| Yes (ref.) | 25 (0.29) | 61 (0.71) | | |
| No | 5 (0.31) | 11 (0.69) | 1.11 [0.35, 3.52] | p = 0.861 |
| <i>Public Transport²</i> | | | | |
| Yes (ref.) | 17 (0.24) | 53 (0.76) | | |
| No | 11 (0.42) | 15 (0.58) | 2.29 [0.88, 5.92] | p = 0.088 |

¹ The question was: during the confinement (March 16 to May 10), on average, how many people did you meet per week apart from the people living in the same room as you?.

² This data is a combination of the two following questions: During the confinement (March 16 to May 10), what mode of transport did you use most of the time and what other mode of transport did you use? The answers were then dichotomized into public transport or other (car, bike, scooter, motorcycle, on foot).

hospitalization rate amongst forcibly displaced populations (Hintermeier et al., 2021).

Fifthly, the application of standard health recommendations (wearing masks in public, hand, hygiene and social distancing) was not significantly associated with a higher protection in our study, highlighting the difficulty to implement properly public health measures in community centres. The higher Sars-CoV-2 seroprevalence amongst participants with low health literacy suggested that poor access to and understanding of adequate public health recommendations could partly explain this result. It also suggested the need for additional and adapted

Table 5
Multivariable logistic model (adjusted by age and gender).

| Positive serologic test | Adjusted OR [95% CI] | (p-value) |
|--|----------------------|-------------|
| Location (ref. : Centre 2) | | |
| Centre 1 | 0.05 [0.01, 0.21] | $p < 0.001$ |
| Smoking status (Non-Smokers) | | |
| Smokers | 0.20 [0.06, 0.69] | $p = 0.011$ |
| Wearing a masque in public (No) | | |
| Yes | 0.31 [0.08, 1.17] | $p = 0.085$ |
| Health literacy (Low) | | |
| High | 0.16 [0.04, 0.60] | $p = 0.007$ |

public health measures to social (Alemei et al., 2020) and cultural context (Airhihenbuwa et al., 2020). This can also be explained by a potential desirability bias of the participants. Indeed, their self-reported compliance with health recommendations is particularly high in this sample.

However, all the results have to be cautiously interpreted due to the different limitations of this study and further research is needed to better determine how to implement public health recommendations in asylum centres and to understand how people negotiate the use of space practically, relationally and symbolically.

4.1. Limitations

This study has several limitations. First, the sample size and participation rate were small, limiting the collected data's statistical power. Besides, the high proportion of participants with a high level of education suggests a potential selection bias that could be explained by the lengthy questionnaire and potential language issues. Conducting studies with these populations remains a significant methodological and logistic challenge, explaining the low proportion of studies published to date. However, our sample did not statistically differ from the whole population of two centres regarding age and gender, reassuring this study's external validity. Other variables non identified in the survey could nevertheless have influenced the participation to the study. For example, asylum seekers having developed symptoms upstream of the study could have been more motivated to take part to a seroepidemiological study than asymptomatic asylum seekers. The goal of our study was, however, to assess the risk factors associated with a positive serological test result. It was not to compare the seroprevalence of asylum seekers with the seroprevalence of the general population. Thus, a potential overrepresentation of symptomatic participants does not influence the interpretation of the results regarding the risk factors associated with Sars-CoV-2 infection. Eventually, the presence of community interpreters and specialized nursing staff had ensured the participation of allophone and less integrated asylum seekers and refugees.

Another limitation lies in the cross-sectional design of the study. Indeed, it does not allow us to verify the evolution of the data over time or conclude causal relationships between seroprevalence and risk factors. Longitudinal research will be necessary to clarify the temporal association between seroprevalence and risk factors.

A third limitation concerns the presence of missing data. The large questionnaire size and the participants' language and cultural barriers probably explained the missing data for some questions. However, none of the variables analysed had more than 8% of missing data, and most variables had none at all.

Fourthly, the non-significant correlation between the results of serological tests and certain independent variables (especially public health recommendations) could be a result of the low variability of these variables within the sample population.

Fifthly, the choice of asylum centres was not made randomly. It is due to practical reasons linked to the pandemic context and the limited mobility possibilities induced by the public health measures. However, the choice of two of the largest centres in the Canton of Vaud guarantees a certain external validity to the study.

5. Conclusion

While the Covid-19 pandemic has highlighted and reinforced health inequities between different population categories worldwide (Bambra et al., 2020), this study confirms the social vulnerability of populations living in asylum centres. It also illustrates the need to adapt public health measures to them, considering the social promiscuity, the low health literacy and the difficulty of strictly adhering to health recommendations. Despite the absence of severe complications of the Covid-19 disease, developing targeted public health measures, including priority access to vaccination, would be necessary to limit the risk of epidemic clusters in asylum centres and improve this population's safety.

Further analyses are required to understand better the global consequences of the Covid-19 pandemic amongst migrant populations living in asylum centres. Areas of future work should include the analysis of socio-economic and psychological impacts of the pandemic, the role of the health literacy, linguistic and cultural barriers in the spread of the SARS-CoV-2 virus and its health consequences.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jmh.2023.100175](https://doi.org/10.1016/j.jmh.2023.100175).

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STUDY 3

Asylum Seekers' Responses to Government COVID-19

Recommendations: A Cross-sectional Survey in a Swiss Canton

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Kevin Morisod helped conceive the study and its design, conducted the background literature review, managed and prepared the data, conducted the statistical analyses, and drafted the manuscript.



Asylum Seekers' Responses to Government COVID-19 Recommendations: A Cross-sectional Survey in a Swiss Canton

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Abstract

Asylum seekers face multiple language, cultural and administrative barriers that could result in the inappropriate implementation of COVID-19 measures. This study aimed to explore their knowledge and attitudes to recommendations about COVID-19. We conducted a cross-sectional survey among asylum seekers living in the canton of Vaud, Switzerland. We used logistic regressions to analyze associations between knowledge about health recommendations, the experience of the pandemic and belief to rumors, and participant sociodemographic characteristics. In total, 242 people participated in the survey, with 63% of men ($n = 150$) and a median age of 30 years old (IQR 23–40). Low knowledge was associated with linguistic barriers (aOR 0.36, 95% CI 0.14–0.94, $p = 0.028$) and living in a community center (aOR 0.43, 95% CI 0.22–0.85, $p = 0.014$). Rejected asylum seekers were more likely to believe COVID-19 rumors (aOR 2.81, 95% CI 1.24–6.36, $p = 0.013$). This survey underlines the importance of tailoring health recommendations and interventions to reach asylum seekers, particularly those living in community centers or facing language barriers.

Keywords Asylum seekers · COVID-19 · Public health recommendations · Health equity

Background

The burden of the COVID-19 pandemic is notably high among migrant populations—especially asylum seekers and refugees worldwide [1–5]. Preliminary data highlighted the need to consider social context and living conditions, as high

population density, belonging to a minority ethnic group, or social deprivation are risk factors for contracting SARS-CoV-2 infection [6–11]. A recent systematic review by Hayward et al. found, for example, that asylum seekers and refugees are at increased risk of infection and have been disproportionately affected by the COVID-19 pandemic. [12]

Among the different factors associated with the additional burden of the pandemic on asylum seekers, poor access to

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COVID-19 health recommendations seems to play an important role. A recent report by the International Organization for Migration (IOM) confirmed that limited awareness of public health recommendations due to linguistic and cultural barriers was a vulnerability factor for asylum seekers [13–15]. Similarly, lower access to healthcare systems, including mental health, and the fear of legal repercussions increased the risk of health inequities [12, 14–16]. For example, asylum seekers living in community centers during the pandemic face somatic and mental health challenges which require specific public health recommendations [15]. Reception centers are indeed characterized by crowded living conditions, shared rooms and little or no privacy, which could increase both the risks and the fears of being infected [17–20]. Accordingly, a recent systematic review advocates for better consideration of asylum seekers living in reception centers during the pandemic [8] and urge the need for adapted public health measures [12, 21–24].

The current literature suggests that linguistic and cultural barriers, poor health literacy, living conditions, and legal status could contribute to mistrust of authorities and increase the COVID-19 pandemic burden among asylum seekers and refugees [25–27]. However, there is little current data on asylum seekers' access to and understanding of health recommendations and their perception of the COVID-19 pandemic. Moreover, the experience of the pandemic and the understanding of health measures among asylum seekers might vary according to place of living (community center vs private apartment), legal status, level of proficiency in French (the official language of the Swiss Canton studied) or health literacy. We, therefore, aimed to explore asylum seekers' attitudes and knowledge concerning COVID-19 recommendations and to describe associations between these variables and participants' socio-demographic characteristics.

Methods

Participants and Data Collection

We conducted a self-administrated cross-sectional survey about participants' knowledge, attitudes and perceived adherence to recommendations about COVID-19. Most survey questions were adapted from an online survey of the general population of the Canton of Vaud [28]. We simplified the language of the questions to a lower readability level in English. Then we translated it into the nine most common languages among asylum seekers residing in the Canton of Vaud: French, Tigrinya, Dari, Arab, Somali, Georgian, Tamil, Albanian and Serbo-Croatian. We translated the English questionnaire into these nine languages with the help of bilingual medical and nursing students from a local NGO

and community interpreters. Except for Tigrinya and Tamil, a second translator proofread each translation.

We included asylum seekers, defined as asylum applicants with a pending procedure (N permit in Switzerland), as temporarily admitted (F permit), fully admitted (B permit) or rejected (emergency aid) residing in the Canton of Vaud. We excluded children under 18 years old, individuals not living in the Canton of Vaud, and former asylum seekers with a settlement permit (C Permit). Asylum seekers who cannot read or write were also excluded. In October 2020, according to the cantonal administrative data, 744 asylum seekers lived in one of the ten cantonal asylum community centers.

We identified 29 NGOs helping asylum seekers in the Canton of Vaud. We contacted them by email and phone to present the study and the survey questionnaires. We also worked closely with the persons in charge of the community centers in the canton of Vaud. We organized visits to all the centers to present the study and questionnaires to the residents. Finally, the questionnaire was also available online with a link sent to all study partners, including the identified NGOs.

The first page of the survey provided information in the selected language explaining that the study would like to know how they feel about the COVID-19 public health recommendations to improve the canton response and help research in this area. We also informed participants that the survey was anonymous and voluntary, and that they would not be contacted again. No incentive was used to encourage participation. The questionnaire took 15–20 min to complete.

We distributed the questionnaires (online and paper form) and collected data between August and October 2020. Online questionnaires were developed using the REDCap web application. We added the paper form data to the REDCap database in a second step. At the time of the data collection, the following health measures were in force in Switzerland: wearing masks in public transport, respecting social distance of 1.5 m, encouragement of hand hygiene, and recommended home office work. In addition, quarantine and isolation measures were mandatory.

All procedures were conducted following the ethical standards of the Human Research Ethics Committee of Canton de Vaud and the Swiss Law on Human Research. As all data collected were anonymous, an ethics approval by the Ethics Committee was not required. (Article 2 of the Swiss Law on Human Research).

Measures

Sociodemographic Characteristics

Sociodemographic characteristics collected included age, gender, level of education, French language proficiency,

adapted and translated versions of a validated health literacy item [29], place of living (community centers vs private apartments) and legal status. The legal status variable is a dichotomization of the participant into two groups: the one with a permit (N permit, F permit or B permit) and the one with the *Emergency aid* status (rejected asylum seekers). This group represents indeed a particularly vulnerable category of asylum seekers and refugees as their legal status in Switzerland is highly insecure.

COVID-19 Data

The following questions asked participants whether they had been tested positive for COVID-19, were part of a group at risk (defined as people with comorbidities such as hypertension, diabetes, heart or lung problems or weaker immune system) and knew what to do if they had COVID-19 symptoms.

Then, the questions investigated the participants' understanding of the COVID-19 pandemic and public health recommendations. A knowledge score was developed with six

true–false items about current government recommendations adapted from a previously published survey [28] (Fig. 1). Participants were also invited to answer six statements regarding COVID-19 rumors (Fig. 2). Visual analogue scores were used to measure self-reported adherence and perception of government measures.

The survey finally assessed the means of access to COVID-19 information and why participants stopped following the recommendations (Supplementary Information).

Statistical Analysis

We described study participant characteristics and answers to the questions using frequency (n) and relative frequency (percentage) for categorical variables and median and interquartile range (IQR) for non-normally distributed continuous variables (mean and standard deviation otherwise).

We used logistic regressions to explore associations between the outcomes of interest and participant characteristics, such as place of living (community center or private apartment), legal status (asylum seekers with a

Fig. 1 Knowledge score on six true/false questions

| Question: Which of the following things are currently recommended by the government to slow the spread of the new coronavirus? | Correct Answers (at the time of data collection) |
|---|---|
| 1. Stay outside as long as possible each day | False |
| 2. If you have fever or cough, stay home for ten days and 48 hours without symptoms | True |
| 3. Stop using public transports | False |
| 4. Stay 1.5 meters away from others | True |
| 5. Spontaneous gatherings of up to 30 people are allowed | False |
| 6. Work at home as much as you can | True |

Fig. 2 COVID-19 rumors and official statement

| Question: Do you think that the following statements are true? | Rumor / Official statement |
|--|-----------------------------------|
| 1. The new coronavirus was created intentionally in a laboratory | Rumor |
| 2. The new coronavirus occurred naturally due to mixing of human and animal viruses | Official statement |
| 3. The new coronavirus was created as a weapon, probably by China or the United States | Rumor |
| 4. The new coronavirus has disproportionately affected poorer people | Official statement |
| 5. The effects of the coronavirus have been intentionally exaggerated so that governments can better control their populations | Rumor |
| 6. The new coronavirus was created to scare asylum seekers and make them leave | Rumor |

permit vs rejected asylum seekers), health literacy (high vs low health literacy), education level (high vs low education level) or official language proficiency (high vs low French proficiency). Regression models were adjusted for age, gender and relevant confounders. Models' calibration was tested using the Hosmer–Lemeshow goodness-of-fit test. Associations with a p -value < 0.05 were considered statistically significant. Missing values were assumed to be missing at random. All analyzes were performed with STATA version 16.

Results

In total, 242 persons participated in the study. About two-thirds were men ($n = 150$), with a median age of 30 years old (IQR 23–40). Half of the participants (55%, $n = 132$) lived in a community center and 45% ($n = 110$) in a private apartment. The legal status of the participants was divided between participants with a permit (74%, $n = 173$) and participants with the *Emergency aid* status (26%, $n = 60$). All languages of the questionnaire were used. In descending order, the languages used were French (34%, $n = 82$), Dari (18%, $n = 44$), Tigrinya (12%, $n = 29$), Arab (12%, $n = 29$), Tamil (6%, $n = 15$), English (6%, $n = 14$), Georgian (5%, $n = 12$), Somalian (3%, $n = 8$), Albanian (3%, $n = 7$) and Serbo-Croatian (0.5%, $n = 1$). Health literacy was low in 42% of the participants ($n = 100$), and 62% ($n = 119$) had a low to moderate level of education (compulsory education or apprenticeship). In addition, 35% ($n = 83$) of participants described a low level of French comprehension (see Table 1).

Knowledge About COVID-19 Recommendations

In our study, only 43% ($n = 104$) of the participants had a high knowledge score (correctly answered at least 5 of the six questions of the knowledge score in Fig. 1), with a median score of 4/6. (See Table 2) After adjustment for age, gender and education, a lower knowledge score was associated with lower French language proficiency (aOR 0.34, 95% CI 0.13–0.89, $p = 0.028$) and living in a community center (aOR 0.41, 95% CI 0.20–0.84, $p = 0.014$), but not with health literacy level (aOR 1.52, 95% CI 0.81–2.84, $p = 0.188$).

Similarly, participants living in a community center were less confident about what to do if they got COVID-19 symptoms (naOR 0.30, 95% CI 0.15–0.60, $p < 0.01$), as well as participants with low health literacy (naOR 0.44, 95% CI 0.23–0.83, $p = 0.01$). (See Table 2) After adjustment, confidence remained associated with place of living and health literacy.

Table 1 Socio-demographic and COVID-19 related characteristics of participants (N = 242)

| Characteristics | Value, n (%) |
|--|--------------|
| Age (years) | |
| 18–39 | 176 (73) |
| 40–64 | 54 (22) |
| ≥ 65 | 12 (5) |
| Gender (2 missing) | |
| Female | 90 (38) |
| Male | 150 (62) |
| Legal status (9 missing) | |
| Asylum seekers with permit | 173 (74) |
| Rejected asylum seekers | 60 (26) |
| Education level (7 missing) | |
| Compulsory | 59 (25) |
| Apprenticeship | 60 (26) |
| High School | 43 (18) |
| University | 47 (20) |
| Don't know | 26 (11) |
| Health literacy ^a (5 missing) | |
| High | 137 (58) |
| Low | 100 (42) |
| Place of living (0 missing) | |
| Community centre | 132 (55) |
| Private apartment | 110 (45) |
| French language proficiency (3 missing) ^b | |
| High | 156 (65) |
| Low | 83 (35) |
| Tested for Covid-19 (3 missing) | |
| Positive | 11 (5) |
| Negative | 25 (10) |
| Awaiting result | 3 (1) |
| No | 192 (80) |
| Don't know | 8 (3) |
| Social worker or community help (6 missing) | |
| Yes | 99 (42) |
| No | 128 (54) |
| Don't know | 9 (4) |
| At-risk (at least one comorbidity) (3 missing) | |
| Yes | 40 (17) |
| No | 172 (72) |
| Don't know | 27 (11) |

^aDichotomized, “Often” and “Always” as high and “Never”, “Rarely”, “Sometimes” and “I don't know” as low health literacy

^bDichotomized, “Very well” and “Well” as high, and “Not well”, “Not at all” and “I don't know” as low French language proficiency

Access to Information About COVID-19 Recommendations

Most participants accessed information about COVID-19 recommendations on television (55%, $n = 133$), social media

Table 2 Non adjusted Odd Ratio of socio-demographic characteristics and knowledge, confidence and COVID-19 rumors (with 95% CI and p-value)

| | Knowledge ^a | Confidence ^b | Rumors ^c (overall) | Natural origin of COVID-19 ^d | Control of population ^e |
|---|---------------------------------------|---------------------------------------|------------------------------------|---|------------------------------------|
| Gender (Female) | 0.86 (0.51–1.47, p=0.59) | 0.86 (0.45–1.64, p=0.65) | 0.91 (0.53–1.56, p=0.73) | 0.75 (0.41–1.37, p=0.35) | 0.86 (0.39–1.87, p=0.70) |
| Legal status (Rejected asylum seekers) | 0.55 (0.30–1.03, p=0.60) | 0.80 (0.38–1.67, p=0.55) | 1.36 (0.75–2.46, p=0.31) | 0.38 (0.17–0.82, p = 0.01) | 2.79 (1.28–6.09, p = 0.01) |
| Education level (Low education level) | 1.13 (0.67–1.93, p=0.64) | 1.17 (0.60–2.89, p=0.65) | 1.59 (0.93–2.72, p=0.09) | 1.13 (0.63–2.01, p=0.69) | 1.12 (0.52–2.39, p=0.77) |
| Health literacy (Low health literacy) | 0.87 (0.51–1.46, p=0.59) | 0.44 (0.23–0.83, p = 0.01) | 1.14 (0.67–1.92, p=0.63) | 0.58 (0.32–1.04, p=0.07) | 1.08 (0.51–2.28, p=0.85) |
| Place of living (Community centers) | 0.45 (0.27–0.75, p < 0.01) | 0.30 (0.15–0.60, p < 0.01) | 1.13 (0.67–1.90, p=0.65) | 0.49 (0.28–0.87, p = 0.01) | 1.25 (0.59–2.67, p=0.56) |
| French language proficiency (Low level) | 0.43 (0.25–0.76, p < 0.01) | 0.78 (0.40–1.50, p=0.45) | 0.81 (0.47–1.41, p=0.46) | 0.31 (0.16–0.62, p < 0.01) | 0.70 (0.31–1.60, p=0.40) |
| Social worker (absence of) | 1.09 (0.65–1.84, p=0.75) | 1.09 (0.57–2.09, p=0.80) | 1.81 (1.05–3.12, p = 0.03) | 1.33 (0.74–2.40, p=0.34) | 1.45 (0.66–3.16, p=0.35) |
| Tested positive for COVID-19 | 0.49 (0.13–1.89, p=0.30) | 1.28 (0.27–6.12, p=0.76) | 2.89 (0.82–10.16, p=0.09) | NA | 1.47 (0.30–7.12, p=0.64) |
| At-risk (at least one comorbidity) | 1.03 (0.52–2.06, p=0.93) | 0.34 (0.16–0.73, p < 0.01) | 1.07 (0.53–2.16, p=0.85) | 0.40 (0.16–1.00, p=0.05) | 0.65 (0.21–2.00, p=0.46) |

A p-value < 0.05 is considered statistically significant (in bold in the table)

^aComparison based on the knowledge score (Illustration 1) dichotomized into high knowledge (at least 5/6 correct answers) and low knowledge (< 5/6 correct answers)

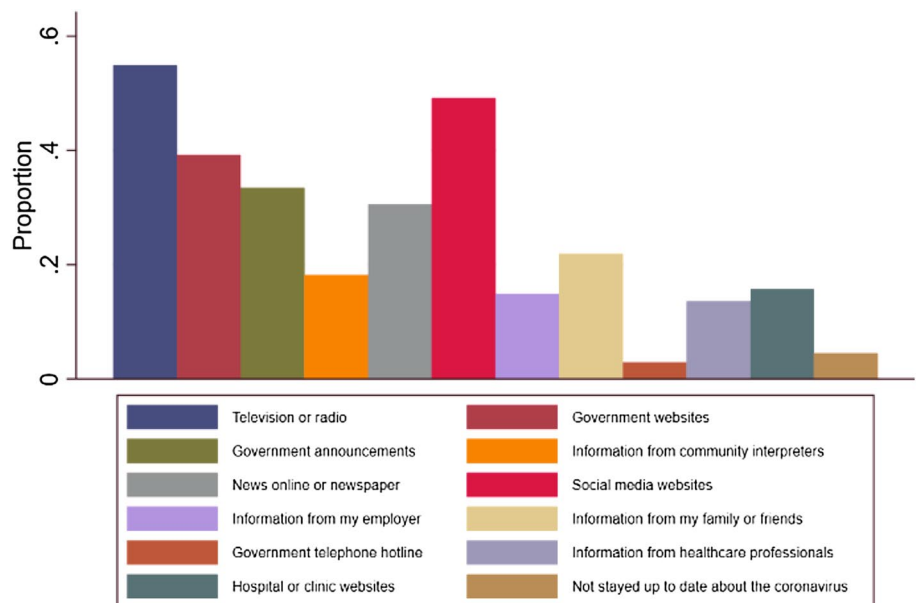
^bComparison between participants about “Knowing what to do if sick or if COVID-19 symptoms”

^cComparison based on the answers of rumors questions (Illustration 2). Positive if adhesion to at least one COVID-19 rumor

^dComparison based on the official statement “The new coronavirus occurred naturally due to mixing of human and animal viruses”

^eComparison based on the COVID-19 rumor “The effects of the coronavirus have been intentionally exaggerated so that governments can better control their populations”

Fig. 3 Means of access to COVID-19 recommendations



(49%, n = 119) and government websites (39%, n = 95) (Fig. 3).

Participants living in community centers were statistically less likely to use television as a means of information. However, they were twice as likely to have accessed information via community interpreters than participants living in private apartments (22.3% vs 9.6%). These differences were statistically significant after adjusting for age, gender and education level for the use of television (aOR 0.42, 95% CI 0.23–0.75, p = 0.003) and community interpreters (aOR 2.99, 95% CI 1.29–6.91, p = 0.011).

Adherence to and Attitudes About COVID-19 Recommendations

Self-reported adherence to COVID-19 recommendations was high, with 67% of participants reporting a high degree (score > 80) and a median adherence of 95 (IQR 70.5–100). Adherence was lower for participants on emergency aid,

although the difference wasn't statistically significant (naOR 0.58, 95% CI 0.31–1.11, p = 0.10) (See Table 3).

About 51% of participants found that the COVID-19 measures were “about right”, 11% found them not restrictive enough and 38% too restrictive. In a non-adjusted analysis, asylum seekers living in community centers considered the government COVID-19 measures as too restrictive (naOR 1.91, 95% CI 1.09–3.35, p = 0.03), whereas asylum seekers with low education level statistically significantly considered the measures as not strong enough (naOR 3.50, 95% CI 1.16–10.60, p = 0.03) (See Table 3).

Reasons to Stop Following COVID-19 Recommendations

The main reason for not following health recommendations was “the need to leave the house for food and essentials” (26.4%). In a non-adjusted analysis, this reason was statistically associated with a higher socioeconomic

Table 3 Non adjusted Odd Ratio of socio-demographic characteristics and opinion on government recommendations, adherence to recommendations and main reasons to stop following COVID-19 measures (with 95% CI and p-value)

| | Measures too restrictive ^a | Measures not strong enough ^b | Adherence ^c | Main reason to stop 1 ^d | Main reason to stop 2 ^e | Main reason to stop 3 ^f |
|---|---------------------------------------|---|----------------------------|------------------------------------|---------------------------------------|---------------------------------------|
| Gender (Female) | 0.69 (0.38–1.23, p = 0.21) | 0.82 (0.27–2.49, p = 0.73) | 0.96 (0.53–1.73, p = 0.89) | 1.16 (0.59–2.30, p = 0.66) | 1.23 (0.52–2.95, p = 0.64) | 0.90 (0.50–1.60, p = 0.71) |
| Legal status (Rejected asylum seekers) | 1.10 (0.59–2.06, p = 0.76) | 1.88 (0.59–5.97, p = 0.29) | 0.58 (0.31–1.11, p = 0.10) | 1.07 (0.50–2.30, p = 0.86) | 0.34 (0.15–0.76, p < 0.01) | 1.60 (0.86–2.98, p = 0.14) |
| Education level (Low education level) | 1.00 (0.57–1.77, p = 0.99) | 3.50 (1.16–10.60, p = 0.03) | 1.44 (0.80–2.61, p = 0.23) | 1.24 (0.62–2.46, p = 0.55) | 1.49 (0.83–2.68, p = 0.18) | 0.94 (0.53–1.69, p = 0.85) |
| Health literacy (Low health literacy) | 1.15 (0.66–2.01, p = 0.61) | 2.16 (0.74–6.28, p = 0.16) | 0.96 (0.54–1.71, p = 0.89) | 1.31 (0.67–2.55, p = 0.43) | 0.36 (0.19–0.69, p < 0.01) | 0.73 (0.41–1.30, p = 0.28) |
| Place of living (Community centers) | 1.91 (1.09–3.35, p = 0.03) | 1.72 (0.57–5.20, p = 0.34) | 0.82 (0.47–1.45, p = 0.50) | 1.63 (0.82–3.25, p = 0.17) | 0.46 (0.26–0.83, p = 0.01) | 1.37 (0.78–2.40, p = 0.28) |
| French language proficiency (Low level) | 1.28 (0.73–2.27, p = 0.39) | 1.44 (0.48–4.30, p = 0.51) | 1.28 (0.70–2.36, p = 0.42) | 1.05 (0.53–2.11, p = 0.88) | 0.48 (0.25–0.93, p = 0.03) | 0.84 (0.46–1.52, p = 0.56) |
| Social worker (absence of) | 0.94 (0.53–1.64, p = 0.82) | 2.07 (0.64–6.71, p = 0.22) | 0.99 (0.55–1.77, p = 0.97) | 1.16 (0.58–2.31, p = 0.68) | 2.13 (1.14–3.97, p = 0.02) | 1.01 (0.57–1.79, p = 0.98) |
| Tested positive for COVID-19 | 0.48 (0.10–2.29, p = 0.36) | 3.68 (0.72–18.78, p = 0.12) | 0.59 (0.15–2.28, p = 0.45) | 1.88 (0.48–7.39, p = 0.37) | 0.61 (0.13–2.90, p = 0.53) | 2.18 (0.64–7.41, p = 0.21) |
| At-risk (at least one comorbidity) | 1.11 (0.53–2.32, p = 0.78) | 1.47 (0.38–5.69, p = 0.58) | 1.77 (0.78–4.01, p = 0.17) | 1.23 (0.52–2.95, p = 0.64) | 0.80 (0.35–1.80, p = 0.58) | 0.21 (0.07–0.61, p < 0.01) |

A p-value < 0.05 is considered statistically significant (in bold in the table)

^aSatisfaction with government recommendations

^bIbidem

^cA score > 80 for self-reported adherence were considered as high adherence

^dMain reason 1 to stop following the COVID-19 measures: “My home is too small to stay inside all the time”

^eMain reason 2 to stop following the COVID-19 measures: “I have to leave the house for food and essentials”

^fMain reason 3 to stop following the COVID-19 measures: “I don't have the choice (ex: must keep working or don't have the means)

position. Indeed, rejected asylum seekers (naOR 0.34, 95% CI 0.15–0.76, $p < 0.01$), asylum seekers with lower health literacy (naOR 0.36, 95% CI 0.19–0.69, $p < 0.01$), lower French language proficiency (naOR 0.48, 95% CI 0.25–0.93, $p = 0.03$) and asylum seekers living in a community center (0.46, 95% CI 0.26–0.83, $p = 0.01$) were all less likely to stop following COVID-19 measures due to this reason. Another important reason to stop following COVID-19 measures was “*a too small home to stay inside all the time*” (17.4%) (Fig. 4). No association were found between this reason and the sociodemographic characteristics of participants (See Table 3).

COVID-19 Rumors

First, 39% of participants agreed with at least one alternative theory (categorized here as COVID-19 rumors without evidence) about the origin of the new coronavirus or the origin of the pandemic (Fig. 2; See Table 2).

After adjustment for age, gender and education, rejected asylum seekers were statistically more likely to think that “*The effects of the coronavirus have been intentionally exaggerated so that governments can better control their populations*” (aOR 2.81, 95% CI 1.24–6.36, $p = 0.013$).

Similarly, rejected asylum seekers (aOR 0.32, 95% CI 0.14–0.75, $p = 0.008$) and participants with a lower French language proficiency (aOR 0.31, 95% CI 0.15–0.63, $p = 0.001$) were less likely to believe that “*The new coronavirus occurred naturally due to mixing of human and animal viruses*”.

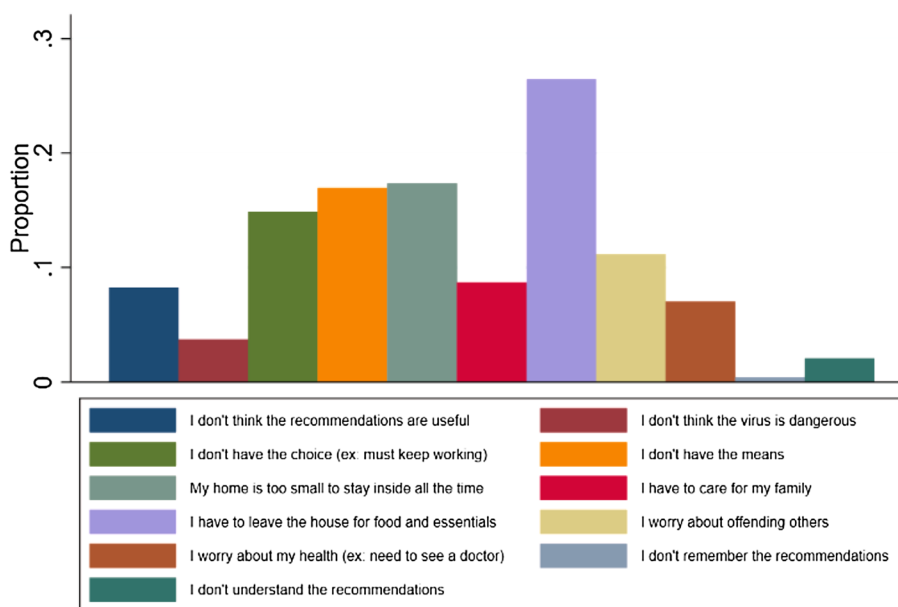
Discussion

In this cross-sectional survey of asylum seekers in Switzerland during the Covid-19 pandemic, almost half of the participants had low knowledge regarding COVID-19 measures, despite high self-reported adherence and satisfaction with the recommendations. The need to leave the house for food and essentials was the main reason for not following health recommendations. In addition, participants identified television, social media and government website as the primary sources of information about COVID-19 health recommendations. Moreover, living in a community center, being a rejected asylum seeker or having lower French language proficiency were significantly associated with lower knowledge and stronger beliefs in COVID-19 rumors.

A similar study conducted among the general population of the same region (Canton of Vaud, Switzerland) showed a high level of knowledge among 67% of participants (versus 43% in our study) [28]. This difference is most likely caused by differences in educational attainment, health literacy level, French language proficiency, and consequently access to and comprehension of information. Our results are also consistent with other surveys assessing COVID-19 knowledge, notably among Afghan and Syrian refugees in Germany [30], Somali, Karen and Latinx community members in the US [31] or Syrian refugee women in Jordan [32].

Second, although participants described a high adherence to recommendations, almost 40% believed at least one COVID-19 rumor. This result confirms previous data from male migrant workers in Singapore, where authors found a high rate of participants believing in COVID-19 rumors [33].

Fig. 4 Reasons to stop following COVID-19 recommendations



Social determinants such as housing conditions (community center vs private apartment), legal status and language barriers (low French language proficiency) were associated with lower knowledge and belief to rumors. These factors should be considered in health decisions related to the COVID-19 pandemic to mitigate health inequities [34, 35].

Our study also describes the means of communication used by asylum seekers and refugees to access to COVID-19 recommendations. It is interesting to note the critical role of community interpreters for participants living in community centers where access to other means of information such as television is limited.

Our findings suggest that linguistically and culturally adapted communication seems essential to improve asylum seekers' and refugees' knowledge and adherence. Participatory approaches through community engagement and co-production could be helpful to actively build trust and strengthen public health campaigns, such as COVID-19 vaccination [36–38].

Our study has some limitations. First, the observational cross-sectional design of our study precludes temporal or causal interpretation of the observed associations. That being said, the cross-sectional findings provide a basis for further research on equitable pandemic responses. Second, the survey translations were not back-translated or tested for concordance with the original French questionnaire, although proofreading by another translator was possible for most of the languages translated. Third, the self-reported questionnaire may be subject to desirability bias. This bias is, however, limited by the anonymous nature of this survey. Fourth, our study may have potential confounding biases. Even though we adjusted for a range of potential confounders, it is possible that other factors not considered may interfere with the results. Notably, we have not assessed the cultural backgrounds of the participants. Fifth, our study has potential selection bias. Participants may have a higher degree of integration in society than the overall population of asylum seekers in the canton of Vaud. However, through our recruitment method and the translation of the questionnaires into nine languages, we hoped to limit selection bias. The proportion of participants with a low French language proficiency or in a very precarious social situation (rejected asylum seekers) suggests that this bias is likely limited.

In conclusion, the burden of the pandemic on asylum seekers and refugees is partly related to issues of understanding health recommendations, access to information and the consequences of health restrictions on their daily lives. And this access to information about recommendations and the belief to rumors are associated with language barriers, socioeconomic living conditions and legal status. Therefore, better anticipation of asylum seekers' specific communication and information needs in future public health crises is required. More systematic use of community interpreters

or the involvement of communities in disseminating public health messages are potential solutions to tackle those issues and limit the spread of misinformation. Similarly, identifying specific social networks used by asylum seekers could facilitate the dissemination of targeted public health messages. However, further studies, including studies in other countries and longitudinal analyzes, are required to understand better the issues of access to COVID-19 information among asylum seekers and refugees.

New Contribution to the Literature

Our study found that asylum seekers living in community centers or with language barriers were at risk of health inequities related to poor access to or understanding of COVID-19 public health recommendations. Our study underlined the importance of tailoring public health recommendations and interventions to reach vulnerable populations and considering social determinants of health such as living conditions or language barriers in managing the COVID-19 pandemic among asylum seekers. In addition, findings suggested that more systematic use of community interpreters could help spread public health recommendations more efficiently.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10903-022-01436-3>.

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Author Contributions All authors of the manuscript (KM, M-AD, KS, M-ALPMLP, VSG, JSZ, CvP, PB) designed the study. KM, M-AD, VSG, KS, M-ALPMLP and CvP developed the questionnaire. All authors validated the questionnaire. KS and KM managed the Red-Cap platform to collect and extract data. KM, M-AD and JSZ coordinated the translations of the questionnaire. KM, JSZ, M-ALPMLP and PB coordinated the data collection. KS and KM conducted the data extraction and the data analysis, with the supervision of M-AD, PB, VSG, M-ALPMLP and CvP. KM wrote the first draft of the manuscripts. M-AD, KS, M-ALPMLP, VSG, JSZ, CvP and PB reviewed and commented on the manuscript. All authors read and approved the final manuscript.

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Data Availability The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest Marie-Anne Durand has contributed to the development of Option Grid patient decision aids (from which Picture Option Grid is derived). EBSCO Information Services sells subscription

access to Option Grid patient decision aids. She receives consulting income from EBSCO Health, and royalties. No other competing interests declared.

Ethical Approval According to article 2 paragraph 2c of the Swiss Federal Law on Human Research (LRH), no ethical approval is required for data collected anonymously. Therefore, the survey of this manuscript, whose data are strictly anonymous, does not require validation by the ethics committee.

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STUDY 4

Facing the COVID-19 Pandemic: A Mixed-Method Analysis of Asylum Seekers' Experiences and Worries in the Canton of Vaud, Switzerland

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PhD candidate contribution:

Kevin Morisod conceived the study and its design, conducted the background literature review, managed and prepared the data, conducted the statistical analyses, and drafted the manuscript.



Facing the COVID-19 Pandemic: A Mixed-Method Analysis of Asylum Seekers' Experiences and Worries in the Canton of Vaud, Switzerland

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Objectives: The clinical and social burden of the COVID-19 pandemic were high among asylum seekers (ASs). We aimed to understand better ASs' experiences of the pandemic and their sources of worries.

Methods: Participants ($n = 203$) completed a survey about their worries, sleep disorders, and fear of dying. We also conducted semi-structured interviews with ASs living in a community center ($n = 15$), focusing on how social and living conditions affected their experiences and worries.

Results: ASs in community centers experienced more sleep disorders related to the COVID-19 pandemic than those living in private apartments (aOR 2.01, $p = 0.045$). Similarly, those with lower education had greater fear for their life due to the COVID-19 pandemic (aOR 2.31, $p = 0.015$). Qualitative findings showed that sharing living spaces was an important source of worries for ASs and that protective measures were perceived to increase social isolation.

Conclusion: Our study highlighted the impact of the COVID-19 pandemic for ASs and the importance of tailoring public health measures to their needs and living conditions.

Keywords: COVID-19, experiences, worries, mixed-methods study, asylum seekers, community health

INTRODUCTION

The clinical and social burden of the COVID-19 pandemic was notably high among migrant populations—especially asylum seekers and refugees worldwide [1, 2]. A systematic review found, for example, that asylum seekers and refugees were at increased risk of infection, hospitalization, and higher mortality [3]. High population density, belonging to a minority ethnic group, or social deprivation were all

identified as risk factors for contracting SARS-CoV-2 infection [4–7]. Moreover, the impact of inappropriate COVID-19 public health measures disproportionately affected migrant populations [8–11]. For example, in a large international survey, authors found that refugees who had more difficulties accessing COVID-19 preventive measures had worse mental health and faced more discrimination [12].

These effects were stronger for those with more insecure housing and residence status, highlighting the need to consider social context and living conditions in the management of the COVID-19 pandemic [13]. Yet, migrant populations are not a homogenous group. Some communities seem to have been particularly exposed during this pandemic due to poor social determinants of health, such as undocumented migrants and those living in community centers [14–18]. Community centers are, indeed, characterized by a high population density, shared rooms, and little or no privacy, factors that may have amplified the negative experience of the pandemic for the resident populations and increased their worries [19].

Similarly, asylum seekers with limited awareness or a lack of understanding of public health recommendations due to inadequate communication and language or cultural barriers may have experienced more worries about the COVID-19 pandemic (fear of being infected or dying) and greater mental health deterioration [20, 21]. Previous literature has indeed identified inequities surrounding communication during pandemics, affecting linguistic minorities and socially excluded. This unequal access to information created mistrust, causing stress, anxiety and apprehension in the face of a pandemic [22].

Therefore, our goal was to measure and understand asylum seekers' pandemic experiences and worries. Specifically, we aimed to explore and deepen the understanding of ASs' experiences of the COVID-19 pandemic according to their living conditions and other social factors, such as immigrant status, education level, language proficiency and health literacy.

METHODS

Design

We applied a sequential explanatory mixed method design, i.e., we started with a quantitative survey followed by qualitative semi-directed interviews to explain the survey results [23]. Interview participants were not among those who completed the survey.

Participants

According to cantonal administrative data, 744 asylum seekers (ASs) were living in one of the ten community centers of the Canton of Vaud in October 2020, i.e., ten percent of ASs in Switzerland.

Study participants were ASs with a pending procedure, temporarily admitted (with a residence permit), or rejected (without a residence permit). ASs with a permit have access to the labor market. We excluded children, individuals not living in the Canton of Vaud, and former refugees who had obtained a settlement permit. We also excluded ASs unable to read or write.

Procedures Recruitment

We distributed the questionnaire in ten ASs' centers from the Canton of Vaud between August and October 2020. We conducted qualitative interviews in one of them from spring to the end of summer 2021. For both quantitative and qualitative data collection, participants were contacted by the center staff. This approach facilitated access to this population, usually under-represented in research and particularly difficult to reach during the pandemic.

During data collection, face masks were mandatory within community centers, protective measures (i.e., hand hygiene, social distancing, and limited contacts) were recommended, and positive cases for SARS-CoV-2 were subject to quarantine and isolation. In the Canton of Vaud, vaccination was available and free of charge for people over 18 years, including ASs, from April 2021.

The center where the interviews were conducted is located between the industrial area and a forest on the periphery of the major city of the Canton. It is geographically and socially isolated, with no residential areas nearby. The center has several buildings and can accommodate up to 296 people when running at maximal capacity. During data collection, 250 people were living in the center. Most rooms were shared and measured twelve square meters (single rooms were less than 9 square meters). Facilities included one bathroom and one kitchen for about 18 residents.

Quantitative Assessment (Surveys)

Participants completed a self-administrated cross-sectional survey about their experiences and worries with the COVID-19 pandemic. The (online and paper) questionnaires were developed using REDCap (**Supplementary Material S1**).

Qualitative Assessment (Interviews)

We conducted thirteen semi-structured face-to-face interviews with 15 participants at one of the community centers, including five women and ten men (**Supplementary Material S2**). These were individual or group interviews (i.e., one with the participant's partner and one with a participant's friend). Most were conducted in French, two in English, one in Spanish, and four in the participant's language of origin with the help of a professional interpreter. The interviews lasted between 27 and 90 min (mean 58 min, SD 17.2 min). They were recorded on a smartphone and transcribed literally.

In addition, we interviewed the center manager, a nurse, and a social worker to understand how they dealt with the COVID crisis and the challenges they faced, to gain a different perspective on the experiences of ASs. For this article, we have only analyzed ASs' interviews because we wanted to account for their subjective experiences of worries.

Quantitative Measures

The questionnaire was adapted from a previously used online survey conducted on the general population of the Canton of Vaud [24]. First, with the help of a group of experts, we adapted the questions for a lower English reading level. Thus, bilingual

medical and nursing students from a local nonprofit organization and community interpreters translated the questions into the nine most common languages among ASs residing in the Canton of Vaud: French, Tigrinya, Dari, Arab, Somali, Georgian, Tamil, Albanian, and Serbo-Croatian. Except for Tigrinya and Tamil, a second translator proofreads each translation.

Socio-Demographic Characteristics, Health Literacy, and COVID-19-Related Measures

A set of single items assessed socio-demographic characteristics, including age (in years), gender (male vs. female), level of education (low vs. high), French language proficiency (low vs. high), adapted and translated versions of a validated health literacy item (low vs. high) [25], type of residence (community centers vs. private apartments), legal status (with or without a resident permit) and contact with a social worker (yes vs. no). Then, participants had to answer whether they had tested positive for COVID-19, were in a medically at-risk group (i.e., people over 65 years with comorbidities such as hypertension, diabetes, heart or lung problems, or a weakened immune system), and knew what to do if they had COVID-19 symptoms.

Experiences and Worries During the COVID-19 Pandemic

In a multiple-choice question (9 items), we first asked participants to identify the main consequences of the COVID-19 pandemic protective measures on their daily lives. Then, participants were asked to indicate their degree of worry about the COVID-19 pandemic. They scored “general worry” and “worry about poor access to care” on a Likert-type scale (0–10, with 0 indicating “no worry at all” and 10 “extremely worried”). They also scored the magnitude of death fear and sleep disturbance associated with the COVID-19 pandemic using a 5-point Likert-type scale (**Supplementary Material S1**).

Qualitative Measure

We conducted semi-directed interviews using an interview guide (**Supplementary Material S3**) to explore ASs' experiences of the pandemic and its impact on different aspects of their daily life (including their migration process).

Data Analysis

Quantitative Analysis (Surveys)

We described study participants' characteristics and outcomes using frequencies (*n*) and relative frequencies (percentage) for dichotomous and categorical variables and median and interquartile ranges (IQR) for non-normally distributed continuous variables (mean and standard deviation otherwise).

We used logistic regressions to explore associations between the outcomes of interest and participant characteristics, such as place of living (community center or private apartment), legal status (ASs with a permit vs. rejected ASs), health literacy (high vs. low health literacy), education level (high vs. low education level) or official language proficiency (high vs. low French proficiency). Regression models were adjusted for age, gender and relevant confounders. We also conducted subgroup analysis by gender. Models' calibration was tested using the

Hosmer–Lemeshow and Pearson goodness-of-fit test. Associations with a *p*-value < 0.05 were considered statistically significant. Interactions between independent variables were assessed with the Chi-square test. Missing values were assumed to be missing at random. We compared with and without imputation of missing data, but no significant difference in the overall results was found. Hence, this paper is presented without imputation of missing data. All analyzes were performed with STATA version 16.

Qualitative Analysis (Interviews)

We performed inductive thematic analysis on the interview transcripts [26]. First, we reviewed the interviews to identify recurring categories, including ASs' experiences and worries. Then, we used the qualitative data analysis software MAXQDA (release 22.1.1) to code the interview transcripts and perform systematic analysis. We reviewed the codes and discussed them during regular research team meetings.

RESULTS

Quantitative Results (Surveys)

In total, 203 persons participated in the study. About two-thirds were men (*n* = 121), with a median age of 30 (IQR 23–39). More than half of the participants (58%, *n* = 118) lived in a community center, and 42% (*n* = 85) in a private apartment. Regarding legal status, 138 participants reported having a permit (70%), and 58 mentioned being without legal status (30%). Health literacy was low in 43% of the participants (*n* = 85), and 37% (*n* = 74) had a low level of education (compulsory or no education). In addition, 34% (*n* = 68) of participants described a low level of French comprehension (**Table 1**).

Impact of COVID-19 Pandemic Measures on Daily Life

The main reported impact of COVID-19 pandemic measures among ASs were social isolation (0.36, 95% CI [0.30–0.43]), increase in loneliness (0.35, 95% CI [0.29–0.42]), increase in anxiety (0.32, 95% CI [0.25–0.38]) and economic losses (0.17, 95% CI [0.12–0.23]) (**Table 2**). Moreover, in multivariable analyses, ASs with high French proficiency and those living in single apartments were statistically more impacted economically than those with low French proficiency (aOR 0.2, *p* = 0.009, 95% CI [0.036–0.73]) and those living in community center (aOR 0.4, *p* = 0.045, 95% CI [0.16–0.98]). In the subgroup analysis, for males, the presence of a social worker was associated with lower social isolation (OR 0.41, *p* = 0.02, 95% CI [0.19–0.88]) and loneliness [OR 0.34, *p* = 0.01, CI [0.15–0.77]], but not for females. Females at risk of COVID-19 complications had more anxiety than those non at risk (OR 3.50, *p* = 0.046, CI [1.02–12.00]) (**Supplementary Table S1**).

Global Worries and Worries About Access to Care

Our results showed that about 60% of participants were globally worried about the COVID-19 pandemic, and 50% worried about access to medical care. In univariate analyses, ASs without a residence permit were less worried about the COVID-19 pandemic than ASs with an established legal status. (OR 0.5,

TABLE 1 | Characteristics of survey participants (n = 203) Switzerland, October 2020.

| Characteristics | Total, n (%) | Female, n (%) | Male, n (%) |
|---|--------------|---------------|-------------|
| Age (years) | | | |
| 18–39 | 148 (75) | 57 (74) | 89 (75) |
| 40–59 | 40 (20) | 16 (21) | 24 (20) |
| ≥60 | 9 (5) | 4 (5) | 5 (4) |
| Gender | | | |
| Female | 80 (40) | 80 (100) | 0 (0) |
| Male | 121 (60) | 0 (0) | 121 (100) |
| Legal status | | | |
| Asylum seekers with permit | 138 (70) | 61 (80) | 76 (64) |
| Asylum seekers without a permit | 58 (30) | 15 (20) | 42 (36) |
| Education level | | | |
| High (University or high school) | 78 (39) | 29 (38) | 49 (41) |
| Middle (Apprenticeship) | 46 (23) | 14 (18) | 32 (27) |
| Low (Compulsory) | 74 (37) | 34 (44) | 38 (32) |
| Health literacy ^a | | | |
| High | 113 (57) | 46 (60) | 65 (55) |
| Low | 85 (43) | 31 (40) | 54 (45) |
| Type of residence | | | |
| Community center | 118 (58) | 47 (59) | 69 (57) |
| Private apartment | 85 (42) | 33 (41) | 52 (43) |
| French language proficiency ^b | | | |
| High | 132 (66) | 50 (64) | 81 (68) |
| Low | 68 (34) | 28 (36) | 39 (32) |
| Tested for COVID-19 | | | |
| Positive | 5 (2.5) | 2 (2.5) | 3 (2.5) |
| Negative | 23 (11.5) | 6 (7.5) | 17 (14) |
| Awaiting result | 3 (1.5) | 0 | 3 (2.5) |
| No | 165 (82) | 69 (87) | 95 (78.5) |
| Don't know | 5 (2.5) | 2 (2.5) | 3 (2.5) |
| Social worker or community help | | | |
| Yes | 80 (41) | 25 (32) | 54 (45) |
| No | 117 (59) | 52 (68) | 65 (55) |
| At risk of medical complications (at least one comorbidity) | | | |
| Yes | 31 (15) | 13 (16) | 17 (14) |
| No | 170 (85) | 67 (84) | 103 (86) |

^aDichotomized, "Often" and "Always" as high and "Never," "Rarely," "Sometimes" and "I do not know" as low health literacy.

^bDichotomized, "Very well" and "Well" as high, and "Not well," "Not at all" and "I do not know" as low French language proficiency.

TABLE 2 | Non-adjusted Odd Ratio of participants' characteristics and COVID-19 pandemic impact on social isolation, loneliness, anxiety and economic losses. (with 95% CI and *p*-value)^a Switzerland, October 2020.

| | Social isolation ^b | Loneliness | Anxiety | Economic losses |
|---|-----------------------------------|---|---|--|
| Gender (female) | 0.69 (0.38–1.26, <i>p</i> = 0.23) | 1.01 (0.56–1.83, <i>p</i> = 0.97) | 1.39 (0.77–2.55, <i>p</i> = 0.28) | 0.68 (0.31–1.48, <i>p</i> = 0.33) |
| Age (in years) | 1.00 (0.98–1.03, <i>p</i> = 0.72) | 1.00 (0.98–1.02, <i>p</i> = 0.99) | 1.03 (1.00–1.05, <i>p</i> = 0.04) | 1.00 (0.97–1.03, <i>p</i> = 0.85) |
| Legal status (rejected asylum seekers) | 1.08 (0.57–2.03, <i>p</i> = 0.82) | 0.72 (0.37–1.39, <i>p</i> = 0.33) | 1.08 (0.56–2.07, <i>p</i> = 0.83) | 0.72 (0.31–1.71, <i>p</i> = 0.46) |
| Education level (low education level) | 0.66 (0.36–1.18, <i>p</i> = 0.16) | 2.07 (1.11–3.87, <i>p</i> = 0.02) | 0.67 (0.36–1.23, <i>p</i> = 0.19) | 0.59 (0.28–1.25, <i>p</i> = 0.17) |
| Health literacy (low health literacy) | 0.89 (0.49–1.59, <i>p</i> = 0.69) | 0.67 (0.37–1.21, <i>p</i> = 0.18) | 1.60 (0.87–2.92, <i>p</i> = 0.13) | 0.68 (0.32–1.47, <i>p</i> = 0.33) |
| Place of living (community centers) | 0.71 (0.40–1.26, <i>p</i> = 0.24) | 0.93 (0.52–1.66, <i>p</i> = 0.80) | 1.18 (0.65–2.17, <i>p</i> = 0.58) | 0.28 (0.13–0.61, <i>p</i> = 0.001) |
| French language proficiency (low level) | 1.02 (0.55–1.87, <i>p</i> = 0.96) | 0.71 (0.38–1.32, <i>p</i> = 0.28) | 1.44 (0.77–2.67, <i>p</i> = 0.25) | 0.15 (0.04–0.51, <i>p</i> = 0.002) |
| Social worker (presence of) | 0.57 (0.31–1.06, <i>p</i> = 0.08) | 0.56 (0.30–1.04, <i>p</i> = 0.07) | 1.85 (1.00–3.45, <i>p</i> = 0.05) | 0.79 (0.36–1.74, <i>p</i> = 0.56) |
| At-risk (at least one comorbidity) | 1.59 (0.73–3.45, <i>p</i> = 0.24) | 2.29 (1.06–4.97, <i>p</i> = 0.04) | 1.73 (0.79–3.80, <i>p</i> = 0.17) | 1.54 (0.61–3.94, <i>p</i> = 0.36) |

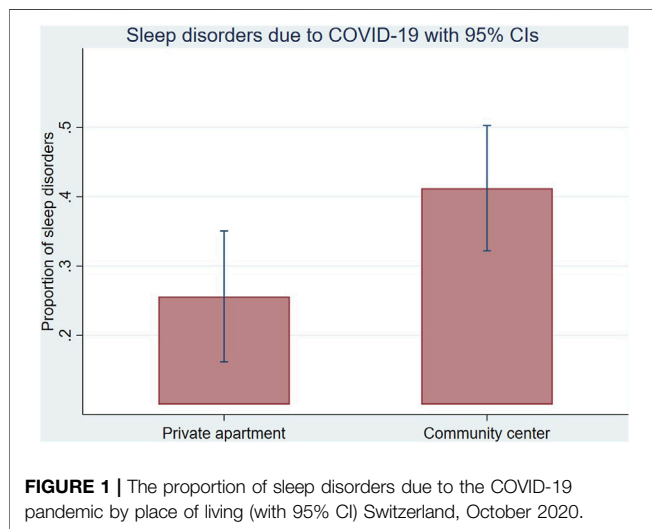
^aA *p*-value < 0.05 is considered statistically significant (in bold in the table).

^bNot living home for days at a time.

TABLE 3 | Non-adjusted Odd Ratio of participants' characteristics and COVID-19 pandemic global worry, worry about access to care, associated sleep disorders and fear for one's life (with 95% CI and *p*-value)^a Switzerland, October 2020.

| | Global worry | Worry about access to care | Sleep trouble | Fear for life |
|---|---|-----------------------------------|--|--|
| Gender (female) | 1.14 (0.61–2.11, <i>p</i> = 0.69) | 1.62 (0.89–2.97, <i>p</i> = 0.11) | 0.69 (0.37–1.27, <i>p</i> = 0.23) | 1.29 (0.68–2.43, <i>p</i> = 0.43) |
| Age (in years) | 0.98 (0.96–1.00, <i>p</i> = 0.08) | 0.99 (0.96–1.01, <i>p</i> = 0.27) | 1.01 (0.99–1.03, <i>p</i> = 0.39) | 1.02 (0.99–1.04, <i>p</i> = 0.15) |
| Legal status (rejected asylum seekers) | 0.50 (0.26–0.98, <i>p</i> = 0.04) | 0.80 (0.42–1.51, <i>p</i> = 0.49) | 1.35 (0.71–2.57, <i>p</i> = 0.37) | 1.29 (0.66–2.55, <i>p</i> = 0.46) |
| Education level (low education level) | 1.40 (0.74–2.66, <i>p</i> = 0.30) | 1.37 (0.74–2.54, <i>p</i> = 0.32) | 0.89 (0.48–1.65, <i>p</i> = 0.71) | 2.46 (1.30–4.67, <i>p</i> = 0.006) |
| Health literacy (low health literacy) | 0.85 (0.46–1.58, <i>p</i> = 0.61) | 1.09 (0.60–1.97, <i>p</i> = 0.78) | 1.65 (0.90–3.00, <i>p</i> = 0.11) | 2.09 (1.11–3.94, <i>p</i> = 0.02) |
| Place of living (community centers) | 0.97 (0.53–1.79, <i>p</i> = 0.93) | 0.75 (0.41–1.34, <i>p</i> = 0.33) | 2.04 (1.10–3.79, <i>p</i> = 0.025) | 1.40 (0.73–2.65, <i>p</i> = 0.31) |
| French language proficiency (low level) | 0.82 (0.44–1.55, <i>p</i> = 0.54) | 0.67 (0.36–1.25, <i>p</i> = 0.21) | 1.36 (0.73–2.53, <i>p</i> = 0.33) | 1.13 (0.59–2.17, <i>p</i> = 0.72) |
| Social worker (presence of) | 0.65 (0.35–1.21, <i>p</i> = 0.17) | 0.76 (0.41–1.39, <i>p</i> = 0.37) | 0.75 (0.40–1.40, <i>p</i> = 0.36) | 1.22 (0.64–2.34, <i>p</i> = 0.55) |
| At-risk (at least one comorbidity) | 1.04 (0.46–2.34, <i>p</i> = 0.92) | 2.28 (0.96–5.39, <i>p</i> = 0.06) | 1.67 (0.75–3.72, <i>p</i> = 0.21) | 1.21 (0.51–2.85, <i>p</i> = 0.66) |

^aA *p*-value < 0.05 is considered statistically significant (in bold in the table).



p = 0.044, 95% CI [0.26–0.98]) (Table 3). However, after adjustment, the association between worries about the pandemic and legal status was not statistically significant anymore (aOR 0.48, *p* = 0.072, 95% CI [0.22–1.067]).

ASs with at least one clinical risk factor for COVID-19 complications were more worried about access to medical care than those without clinical risk factors (aOR 3.33, *p* = 0.017, 95% CI [1.23–8.95]).

Sleep Disorders and Fear of Dying

About 35% of participants reported varying degrees of pandemic-related sleep disorders, and 33% agreed or strongly agreed with the statement “I am afraid of losing my life because of the new coronavirus.” The multivariable analyses indicated that participants living in community centers had statistically more sleep disturbances due to the pandemic than participants living in single apartments (aOR 2.21, *p* = 0.023, 95% CI [1.12–4.39]) (Figure 1). Furthermore, in the unadjusted analyses, participants with lower health literacy and lower education were statistically more afraid for their life compared to participants with higher health literacy (OR 2.09, *p* = 0.023, 95% CI [1.11–3.94]) and higher education, respectively (OR 2.46, *p* = 0.006, 95% CI [1.30–4.67]). After adjusting for age, gender, and being at risk

of medical complications, participants with lower education remained statistically more afraid of dying of COVID-19 than those with higher education (aOR 2.31, *p* = 0.017, 95% CI [1.16–4.58]). In the subgroup analysis, the presence of a social worker was associated with fewer sleep troubles for males (OR 0.35, *p* = 0.01, 95% CI [0.16–0.80]) but not for females (OR 2.39, *p* = 0.12, 95% CI [0.81–7.06]) (Supplementary Table S2).

Qualitative Results (Interviews)

Worries among ASs could be grouped into two broad categories. First, shared spaces in residence centers were a significant source of worry for most residents, due to the proximity it imposed on people. Second, as the pandemic put on hold many social activities, it postponed the prospect of obtaining a permit to an uncertain future, generating feelings of isolation and worries about the future, which were heightened among interviewees.

Shared Spaces

Negotiating Risk in Common Spaces

Common areas (i.e., kitchen and bathrooms) were considered a source of worry for many participants. Indeed, except for one, all buildings have shared kitchens and bathrooms. Therefore, due to their living conditions, they could neither follow quarantine measures (no private kitchen or bathroom) nor respect social distances.

Residents developed strategies to deal with their worries, such as avoiding these common spaces. For example, a mother of two children, one with immunodeficiency, was very worried about access to care during the COVID-19 pandemic. According to this participant, her daughter would not have been able to receive her medical treatment if she had contracted the virus. Overseeing her daughter's health increased her anxiety because the consequence of being contaminated would be double, for herself and her child, whose health was fragile. The participant explained, for instance, that she never took the lift because she was afraid of being in that small area with people who could potentially transmit the virus: “[About feeling safe when using other spaces than the bedroom] Really, I don't go (laughs) I go only to stairs. . .” (Int_2). Even if the regular cleaning reassured her, she avoided common areas as much as possible.

Strategies adopted to limit risks also involved staying outside or cooking early in the morning. Thus, residents changed their

daily routines to avoid contact with others, increasing stress and social isolation: “*We have no contact, we do not...go out*” (Int_02). Isolation was reassuring for some of them regarding the risk of contamination but stressful because of the confinement in tiny rooms. In addition, the social and health professionals confirmed that because of the small spaces and the stigmatization infected people experienced, quarantines increased their worries.

Others' Behavior as a Source of Worries

Shared spaces were not only a source of worry because of the increased risk of contamination but also because of their social implications. By sharing personal space, residents were confronted with how others were or were not protecting themselves. Indeed, having to show how well they were complying with the protective measures constantly exposed them to the moral judgment of others. For example, one father judged the others' behaviors because he was very worried about his family, especially his pregnant wife. He wanted to protect them from the virus that he thought was circulating a lot in the center because of the irresponsibility of the other residents: “*And if besides the fact that they offer you everything [talking about the protective equipment provided by the center], you decide not to do it, it's your fault*” (Int_01). Thus, others' behaviour led to judgements between residents and increased fear and tensions for some.

Despite worrying about the lack of compliance with protective measures, some residents expressed their understanding regarding the challenge of following those measures in such a setting: “[*About the feeling that people are not respectful of the rules*] I mean, to some extent, it's not possible, so” (Int_11). This participant was not worried about the virus because he did not feel medically at risk of COVID-19 complications and found these measures irrelevant and uncomfortable. However, he still respected them because of the injunction of solidarity to protect others. In addition, some reported that, sometimes, more than ten residents living on the same floor could be in the same kitchen cooking. In those cases, maintaining social distancing and wearing a mask could be difficult, if not impossible, to enforce. These two examples illustrate the complexity of risk reduction in crowded spaces and the differences in understanding risk and protective measures.

Isolated From the Social and Workspace Sudden Cessation of Educational and Leisure Activities and Job-Seeking

Most social activities of ASs were temporarily suspended during lockdowns. Residents could not search for work, and some lost their jobs. They could no longer practice physical activities or take French classes at the center: “*When COVID came, I was in my room, with no job, and no French classes. For almost ten months like that*” (Int_08). The COVID-19 period was complicated for this man because he felt disconnected from the world. He feared he would no longer have a job and would be unable to progress in French. These occupations usually allow residents to occupy themselves and create a weekly rhythm. Stopping these

activities meant not being able to find a job and become socially integrated:

It is complicated, even if I make 200-300 job offers, and then I am told, “it's interesting, but there aren't any; we're sorry.” If there were no virus, maybe I would have found a job. But now it's complicated. (...) I really want to work because I have been locked up for a year and a half (Int_07).

It is not a priority for me because I came here, I thought I would start a new life; there are many things for me to do, to build a life, (...) there are other problems more important than COVID. (...) Yes, I want to study to build my life (Int_06).

As the last interviewee expressed, avoiding COVID-19 was not a priority for most ASs because they had other priorities, like constructing a new life in Switzerland and getting a permit. This participant had a good social network because he was taking dance classes, but these were utterly closed, so he had to find alternative activities during the pandemic (e.g., watching series to learn French).

Residents have lost their social contact inside and outside the center. This isolation was excruciating for some: “*In terms of mental health, I see the place as a prison.*” (Int_07). Living with his two brothers in one bedroom, he felt trapped and isolated.

These experiences illustrate the challenges of social isolation during the COVID-19 pandemic and its impact on social integration. This situation also generated uncertainty about ASs' future in Switzerland and in the center, as they had little or no control over the situation.

Being Separated From the Family

The pandemic also increased the isolation of the residents from their families:

I was really isolated, and in my exile, I was cut off from my family, from my son and my wife, we had telephone contact, and then the telephone I had was not a very good telephone; the connection was a problem (Int_10).

Here the participant, who left his wife and child behind in his home country, explained that regular phone contact was impossible due to an unusual problem with the internet connection and described his experience of being away from his family as an exile. If the separation from the family is generally perceived as painful for most ASs, it was exacerbated by the pandemic as they were cut off from other social contacts. Although their permit does not allow them to visit their families in their home country, the need to be with them was much more vital given the complex health situation. In particular, they worried about the impact of the pandemic on their relatives and their health due to the fragility of health systems in their home country. The lack of contact and distance with their families were therefore experienced as an essential missing resource, which aggravated their worries during the pandemic.

DISCUSSION

Our mixed-method study highlighted that the experiences and worries of AS during the COVID-19 pandemic were influenced by social determinants of health, such as gender, living conditions and education. We could observe two main forms of worry. For some participants, the worries focused on virus contamination and disease. For those, the worries were generated mainly by shared spaces, the inappropriateness of measures in community centres, and their inability to protect themselves sufficiently due to living conditions. In contrast, others worried about the consequences of public health measures and what it meant for their wellbeing and life perspectives. Moreover, we found that a significant minority of participants reported no specific worry about the pandemic and associated protective measures. Based on our interviews, we could hypothesize that their worries were more oriented towards other priorities, for instance, access to language courses, getting a job and maintaining social contacts. These divergent positions were also generated by protective measures and how people perceive the risks and decide to react to them.

Our findings confirm previous studies highlighting the clinical and social impact of the COVID-19 pandemic on migrant populations. First, four cross-sectional surveys highlighted the mental health burden of the COVID-19 pandemic on refugees [19, 20, 27] and migrant workers [28]. One found, for example, that 78.7% of participants suffered a decrease in their wellbeing since the beginning of the pandemic [19]. Then, a mixed-method study showed a high prevalence of exposure to COVID-19, poor mental health, and frequent avoidance of healthcare among undocumented migrants [9]. Similarly, a qualitative study described the social and economic burden of the COVID-19 pandemic experienced by migrant populations [21]. Regarding the perception of migrant populations towards public health measures, such as lockdowns, our study confirms the ambivalent feelings also observed in shelters in France. For some people, lockdown was perceived as positive because of the security it provided against the COVID-19 infection. For others, it was incompatible with their living conditions and affected them negatively [18].

Another significant result of our study shows that AS living in centers had significantly more sleep disorders due to the COVID-19 pandemic than those living in single apartments. These results suggest a higher burden of living conditions on the pandemic experience. If space was perceived as problematic during the pandemic for the general population because of social isolation, it was even more challenging for AS in community centers where space was reduced and shared, creating an increased risk for contamination. These findings confirmed the results of a large online international survey among AS and refugees, where asylum centre participants reported a higher sleep deterioration than those living in a single apartment [29].

Moreover, worries were not only generated by shared spaces but also by social isolation and loss of social resources. Most social activities had to be stopped, restraining residents in their socialization. This suspended time, described as a prison by some participants, completely disconnected them from the society where they were trying to construct a new life. For AS,

the feeling that their lives were “on hold” had negative consequences for their emotional and physical health, likely compounded by the restrictions associated with the pandemic [30].

Living in a center became a factor of clinical (increased risk of contamination), psychological (more anxiety), and social (isolation) vulnerability. To cope with it, participants developed strategies to avoid common spaces, as also identified in a previous study [18]. Moreover, because of the protective measures, residents were disconnected from and had to reorganize their social lives, resulting in increased social isolation for some.

Then, our study highlighted the higher economic impact of the COVID-19 pandemic and associated measures on AS with high French proficiencies and those living in single apartments. These unintuitive results mainly reflected the difficulties for AS with low language competencies and those living in community centers to access the work market before the COVID-19 pandemic.

Eventually, the subgroup analysis described gender-related differences in the pandemic experience. Specifically, social workers appeared to be a protective factor for male participants regarding loneliness, social isolation and sleep trouble, but not for females. Further research is needed to better understand these results.

Our study has some limitations. First, the cross-sectional survey did not allow the assessment of changes over time, which precludes drawing temporal associations. Second, our survey may be subject to desirability bias because residents were self-selected for participation, although anonymity should limit this risk. Third, our study had potential selection bias. Indeed, participants may have a higher level of education or social integration than the overall population of AS and refugees in the Canton of Vaud. However, thanks to the collaboration with NGOs and cantonal asylum authorities and the translation of the questionnaires into ten languages, we hope to have limited this bias. Fourth, due to the rapid turnover of residents in community centers, participants who answered the survey differed from those who underwent qualitative interviews. We considered their situations and conditions similar because both were AS living in the same region of Switzerland. Fifth, we restricted the interviews to one center because of the challenges in accessing fieldwork during the pandemic. Nevertheless, a saturation level was reached for this center. Finally, although ethnographic field observations were initially planned, we restricted them during the interview visits due to the pandemic.

In conclusion, our study highlights the importance of proposing public health measures adapted to the needs of asylum seekers and their living conditions at the outset of a crisis such as the COVID-19 pandemic. Such measures could include: avoiding high-density facilities and encouraging the transfer of asylum seekers from community centers to private facilities, ensuring the applicability of measures such as quarantine and isolation in the different living places of asylum seekers, adapting the communication of health recommendations for asylum seekers, managing mental health with preventive actions and adapting (instead of cancelling) social activities to the pandemic protective measures. Policymakers

should also consider addressing adverse social and structural determinants of the health of asylum seekers through fair asylum policies, good living conditions, and full access to care. These results have served as a basis for developing recommendations for local authorities and professionals. Worries about overcrowding and social isolation were recognized by the professionals interviewed, who are also willing to make changes within their facilities in line with the proposed recommendations and with the support of the authorities.

ETHICS STATEMENT

The studies involving humans were approved by Ethics Commission of the Canton of Vaud. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

KM and TM conducted the analyses and drafted the manuscript. PB, NB, VG, CP, M-AD, KS, and M-AP edited and critically reviewed the manuscript. CR conducted parts of the qualitative assessment, edited and critically reviewed the manuscript. All

authors contributed to the article and approved the submitted version.

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CONFLICT OF INTEREST

The authors declare that they do not have any conflicts of interest.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.ssph-journal.org/articles/10.3389/ijph.2023.1606229/full#supplementary-material>

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STUDY 5

COVID-19 Vaccination Program for Undocumented Migrants: Notes from the Field of a Regional Center of General Medicine and Public Health, Canton of Vaud, Switzerland

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PhD candidate contribution:

Kevin Morisod helped conceive the study and its design, conducted the background literature review, and drafted the manuscript.



COVID-19 Vaccination Program for Undocumented Migrants: Notes from the Field of a Regional Center of General Medicine and Public Health, Canton of Vaud, Switzerland

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Abstract

The COVID-19 pandemic highlighted health inequities for vulnerable populations and the need for more equitable care and access to vaccination. This article described the implementation of a COVID-19 vaccination program for undocumented migrants in a regional academic center of general medicine and public health (Unisanté). The vaccination program's specific components included: triple coordination between the health authorities, the regional center and community partners, a walk-in and free service, no health insurance required, qualified nursing and administrative staff with previous experience with vulnerable populations, translated information materials and interpreters, a guarantee of confidentiality and a widespread communication campaign within the communities. In total, 2'351 undocumented migrants from 97 nationalities received at least one dose of mRNA COVID-19 vaccine (Spikevax) and 2242 were considered fully vaccinated. Although it was hard to assess its global effectiveness, the program vaccinated a significant number of undocumented adult migrants in the Canton of Vaud. The difficulties linked to the pandemic context, the heavy workload for healthcare staff and the limited resources were overcome by strong collaborations between the different actors involved throughout the program. Targeted public health policies, such as vaccination programs for undocumented migrants, are essential to guarantee equitable care, especially in pandemic times.

Keywords Undocumented migrants · COVID-19 vaccination · Health equity

Background

The COVID-19 pandemic widened the health inequity gaps in vulnerable populations. In high-income countries, studies have consistently highlighted the highest burden of the

pandemic on the most socio-economically deprived residents [1–3]. In October 2021, the WHO published a report entitled “COVID-19 and the social determinants of health and health equity”, which summarized the most crucial health equity issues during this pandemic and highlighted

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the high burden of the pandemic on migrant populations [4]. The report noted the risk of additional exposure to the Sars-CoV-2 virus due to occupational and living conditions and less access to protective measures. It advocated for more equitable access to COVID-19 vaccination for these populations [4].

Among them, undocumented migrants – people living in a country without legal documents and permits¹ – are particularly at risk of health inequities. Indeed, their living and social conditions (high population density, belonging to a minority ethnic group, cultural and language barriers, social deprivation, and being “essential workers”) increase their exposure to COVID-19 [2, 5–8]. Moreover, they have limited healthcare access, especially if they are uninsured. In this context, ensuring equitable access to vaccination for undocumented migrants is not only an ethical priority but also a significant public health issue to prevent new outbreaks [8–11]. A recent review highlighted the numerous barriers faced by undocumented migrants to access COVID-19 vaccination, including systemic restrictions and practical barriers both on the supply- and demand-side [8]. For example, the authors described the lack of interpreters in vaccination centers and the lack of adaptation of the vaccination campaigns to the living and working conditions of undocumented migrants as significant practical supply-side barriers to COVID-19 vaccination. Moreover, the undocumented migrants’ mistrust of the government and the fear of transfer of personal data to immigration authorities, associated with a low perception of the threat of COVID-19 and the large circulation of fake news regarding vaccination were all identified as critical demand-side barriers to COVID-19 vaccination [8].

Although complex, the challenge of ensuring equitable access to vaccination for undocumented migrants is achievable. Through this article, we aimed to describe a vaccination program for undocumented and uninsured migrants conducted at Unisanté, a regional center of general medicine and public health located in the Canton of Vaud, Switzerland’s third most populous canton with estimated 800’000 residents in 2021, or 10% of the total population of the country.

Vaccination Program

The three main steps allowing the vaccination of undocumented migrants were: the communication campaign, the implementation of the vaccination program and the vaccination uptake.

¹ <https://apps.who.int/iris/bitstream/handle/10665/326342/9789289051118-eng.pdf?sequence=1&isAllowed=y>.

Communication Campaign

Communication about the vaccination program was essential due to the lack of access to public health information and the poorer health literacy of undocumented migrants. The communication campaign was explicitly conducted in communities and adapted to be readable, understandable, and generate action. Many documents have been translated due to the low French proficiency of a significant part of this population. Moreover, the communication campaign was explicitly delivered in the communities. We contacted at least 50 community partners (such as migrant associations, churches, NGOs, etc.). They were informed about the vaccination program and played a crucial role in promoting it.

First, the community partners shared the communication campaign messages informing of the COVID-19 vaccination message through existing communities’ online social network groups, such as WhatsApp or Telegram. For example, a physician formerly working at Unisanté and his wife, members of the Asian community in Switzerland, sent a message translated into both Cantonese and Mandarin to a community’s WeChat group with thousands of Asian members, including many undocumented migrants. Second, the communication campaign promoted the vaccination program through influencers such as community-associated media (e.g. AlbInfo, an Albanian-speaking TV channel). Third, the communication campaign distributed documents inside the communities informing about the COVID-19 vaccination (type of vaccines, side effects, etc.) and translated them into ten languages.

Implementation of The Vaccination Program

Cantonal health authorities mandated Unisanté in May 2021 to initiate a vaccination program for uninsured undocumented migrants. At that time, COVID-19 vaccination was already available for the general population in vaccination centers, general practitioners’ offices and hospitals. However, the requirement to show a health insurance card made these places inaccessible for uninsured undocumented migrants.

A multidisciplinary working group composed of administrative, medical, nursing and pharmacy managers, with expertise in vaccination and migrant population, was formed to implement the program. The system already in place - intended for the general population - was adapted to address the barriers to healthcare that undocumented migrants typically face. Emphasis was placed on reducing administrative barriers, ensuring confidentiality, and providing linguistically and culturally appropriate care. Specific actions taken to ensure the implementation of the program included: [1] no health insurance required for registration, [2] no

appointment needed to receive the free vaccine, [3] possibility of anonymous vaccination, [4] extension of the opening hours to Saturday morning, [5] adapted administrative form to limit the collection of personal information and maintaining trust, [6] qualified nursing and administrative staff with previous experience with vulnerable populations [7] translated information materials and interpreters if needed. Since no appointments were scheduled, the organization was adapted to offer greater flexibility and to cope with the irregular patient flow. Administrative, pharmacy and nurse's back-up was available when needed. Twice-daily checks were set up between the nurses and the pharmacy to prepare the required number of vaccine vials while avoiding wasting doses. The working group met weekly to monitor the project and perform any necessary modifications.

Vaccination Uptake

The vaccination program began on 26 May 2021. Initially, vaccination service was provided everyday from Monday to Saturday. Three months later, vaccination was eventually suspended on Saturday owing to limited resources and low turn-out of patients.

The vaccination uptake involves the following sequence:

- 1) Arrival at the regional center and orientation by the administrative staff.
- 2) Registration for vaccination by administrative staff.
- 3) Waiting room before vaccination.
- 4) Vaccination. Before vaccination, healthcare staff checked medical history to rule out any contraindications. If participants did not speak the same language as the healthcare staff, they received a written questionnaire translated into ten languages. In many cases, participants came spontaneously with an interpreter.
- 5) Observation of participants. As specified by the national COVID-19 vaccination guidelines, the participants were monitored 15 min after the first vaccine dose and 5 min after the second dose to assess the occurrence of side effects.
- 6) Appointment for the second dose and Covid-19 vaccination certificate. Administrative staff scheduled the appointment for a second dose if needed and delivered the vaccination certificate on the way out.

Ethics Approval

The vaccination campaign strictly followed policies on vaccination in Switzerland. After clarification of responsibility, this project (Reg-2021-01493) was approved by the Ethical Commission of Canton of Vaud (CER-VD).

Metrics

We used administrative data of participants to monitor the COVID-19 vaccination program. Vaccination data on undocumented migrants were recorded throughout a five-month period ranging from late May through late October. The recorded data included the following variables: age (in year), nationality, health insurance status (yes or no) and appointment for the second dose (yes or no).

During the 5-month vaccination program organized by Unisanté (from 26 May to 25 October 2021), 2351 undocumented migrants without health insurance received at least one dose of mRNA COVID-19 vaccine (Spikevax). Among them, 2164 (92%) received an appointment for a second dose, as some of the participants had a history of COVID-19 and were therefore considered fully vaccinated after one dose. About 95% came back to receive it. Thus, 2055 undocumented migrants received two doses during the program, and 2242 were considered fully vaccinated. The mean participants' age was 38 years, and 48% were female. Migrants from 97 different nationalities took part in this vaccination campaign.

Discussion

More than 2,000 undocumented migrants without health insurance and originating from 97 different countries were fully vaccinated during the vaccination program. The main reasons for this success were the coordination between the health authorities, the regional medical center and the communities and the long-term upstream work to build and maintain trust with these populations. On one side, the top-down approach through the public health authority's impulse gave resources to implement the vaccination program and coordinate the communication campaign. On the other side, the bottom-up approach through interventions by community partners enabled targeting those populations and maintaining trust. The example of the physician member of the Asian community in Switzerland highlighted the importance to use community social networks to promote the vaccination program. Since many members only use Asian social networks and search engines, public health messages on western social media would not reach them. Word-of-mouth within communities may also have played a role: some communities were overrepresented at times and then much less present. After being vaccinated, participants may have encouraged some of their acquaintances to come and get vaccinated. In addition, the reputation of Unisanté as social medicine center and its experience in care for vulnerable populations facilitated the implementation and maintained trust through the program. The vast majority

of participants showed up for the second dose, and only a few wanted the anonymous vaccination, suggesting that an atmosphere of trust was made possible. The positive feedback of participants from countries where vaccine hesitancy is widespread also demonstrated the strength of this vaccination program. Thus, such a vaccination program is feasible and effective under the right conditions. It requires a limited increase in resources, mainly the reorganization of qualified administrative and nursing staff.

However, it was difficult to establish the global effectiveness of the vaccination program due to the lack of data regarding undocumented migrants in the Canton of Vaud. The only available study estimated in 2015 that about 12,000 undocumented migrants lived in the Canton of Vaud [12]. However, this estimate includes children (13% of the undocumented migrants) who were not eligible for COVID-19 vaccination. Then, the study did not specify the proportion of undocumented migrants having health insurance. Therefore, we cannot precisely calculate the proportion of undocumented (and uninsured) migrants vaccinated through the vaccination program. Interestingly, however, the gender ratio of participants was close to the gender ratio of this study (48.7% of female vs. 51%). Together with the vast number of nationalities, we thus estimate that we were able to vaccinate a large proportion of undocumented and uninsured migrants.

Limitations of the Program

The vaccination program was mainly challenging due to logistical barriers, the short delay in achieving it and the heavy workload due to the COVID-19 crisis.

Multidisciplinary collaboration with stakeholders from different institutions was challenging but necessary. It helped overcome barriers like the short deadline to implement the vaccination program and coordinate the communication campaign.

An important issue was to provide quality care while being flexible about the number of people who can be vaccinated daily. Sometimes, the vaccination area was surprisingly overcrowded, as it was impossible to anticipate the number of patients a day. Especially at the beginning, there were so many people that the queue stretched out until the street and administrative staff was deployed outside to direct patients. Accordingly, administrative managers defined different scenarios and appropriate action plans. For instance, lack of space was a problem. The different rooms for the vaccination were too small during high attendance days. Therefore, some waiting rooms had to be improvised in less suitable places, and participants were invited to come back later.

Lastly, the healthcare staff was already exhausted by the Covid-19 pandemic workload [13]. Managers had to consider this and reduce working time spent on other consultations. They also organized weekly meetings with healthcare staff to discuss what could be improved in managing the vaccination program.

Conclusion

Implementing specific COVID-19 vaccination programs targeting undocumented migrants is a practical health policy that improves equitable care and protects the entire population by reducing the risk of COVID-19 outbreaks. We hope this article will serve as evidence for supporting COVID-19 vaccination programs for undocumented migrants elsewhere.

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