imbrace Immigrants' Vulnerabilities and Adaptation Strategies to Climate Health Effects

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Drivers of Vulnerability to Health Impacts of Flooding and Extreme Rainfall for Migrants in European Cities

A scoping review of the existing literature

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1 Introduction

IMBRACE (Embracing Immigrant Knowledges for Just Climate Health Adaptation) is a five-year research initiative funded by the European Research Council.

It explores the intersection of climate change, health, and migration, focusing on racialized migrants from the Majority World (MW)[i] living in European cities. This report marks an early milestone in the project, offering a scoping review of existing academic literature on how climate change—particularly **flooding, and heavy precipitation**—impacts migrant health vulnerability[ii].

Our goal is twofold: to map what's currently known and to build on this foundation through dialogue with local stakeholders, global experts, and in-depth participatory research with migrants. The upcoming qualitative research on flood-related impacts will focus on four European cities: Dublin, Antwerp, Marseilles, and Valencia. This report is the first step in a longer-term effort to co-create knowledge that centers migrant[iii] experiences and promotes more just, inclusive climate health policies.

In Europe, not only is extreme heat becoming more frequent but precipitation patterns are also changing, with downpours and other precipitation extremes increasing in severity[1]. Recent years have seen catastrophic floods in various regions, with the 2021 events in Germany, Belgium and the Netherlands causing hundreds of human deaths[2].

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[i] Majority World (MW) immigrants (Africa, Asia, and Latin America). The term has been coined by Bangladeshi photographer and activist Shahidul Alam, highlighting that the region traditionally known as "the Global South" encompasses most humankind.

[ii] This is one of two reports that examine the intersection of climate change, health and migration in European cities, with the other focusing on the impacts of heatwaves and extreme heat. Due to the nature of flood-related risks, which can be ongoing and recurrent during rainy seasons but also extremely sudden, unexpected, of large scale and catastrophic, we here have added the driver of Disaster Risk Reduction, which refers to a combination of strategies and actions aimed at minimizing the damage and human suffering caused by flood events.

Introduction

Catastrophic floods such as the DANA event in Valencia in October 2024, earlier floods in Marseilles in 2003, and the ongoing smaller-scale flooding that occurs in many cities in Europe, have become more frequent due to climate change, while changes in weather patterns are disrupting local ecologies and disease spread dynamics[3]. This impacts human health not only directly (e.g. drowning, injuries, or post-flood trauma) but also indirectly, through the spread of disease (e.g. dengue, gastrointestinal diseases[4,5]).

When thinking about climate change, health and immigration together, research has so far focused on countries of migration origin. Climate change is being studied as a push factor for migration, and the process of migration as an adaptation strategy[6,7]. In destination countries, while health inequities affecting racialized groups during and after climate-related disasters are often acknowledged, most research still focuses on North America. In Europe, health data is rarely broken down by race, ethnicity or immigration status. Although several studies point to migrants' socio-economic and health marginality[8], this lack of granularity obscures how systemic discrimination, xenophobia, and racism shape migrants' climate-related health risks, a critical aspect of climate injustice that remains understudied[9].

Migrants are often pushed to society's margins, facing poverty, precarious housing, inadequate healthcare access, and policy exclusion. Yet we lack a comprehensive understanding of how these intersecting issues heighten their exposure and reduce their resilience to climate shocks and reduce their resilience.

This report applies an intersectional lens focused on migrant groups [10], identifying drivers of flood-related health vulnerability as tangible and intangible indicators and structural conditions that explain why some groups are more vulnerable than others.

Catastrophic floods have become more frequent due to climate change, while changes in weather patterns are disrupting local ecologies.

[iii] By 'migrant(s)', we refer to first- and second-generation migrants (as they are facing similar barriers related to cultural exclusion, institutional and systemic racism) in Europe, whether they are documented or undocumented, asylum seekers or hold refugee status. As data by migration is not always available, we have also used proxies such as race, ethnicity, foreigner and minority status for this report.

[iv] A total of 42 articles were analysed, 37 results were selected through a Scopus search and 5 articles were added manually.

Introduction

Through an iterative process of literature searching and coding, we analyzed a range of academic and policy sources to identify and cluster these drivers[iv]. Importantly, since data or research specific to migrant populations and climate impacts in Europe is often lacking, we have drawn from studies that document challenges and constraints faced by populations to which MW migrants tend to belong to (e.g. low-income, racialized, marginalized, low education level, precariously housed), using these categories as proxies. These insights were then validated and discussed with key experts (activists, academics, NGO representatives, journalists, health practitioners, local administration) from across Europe during a two-day participatory workshop event held in Barcelona (June 2025).

The result is a structured set of nine vulnerability drivers to the impacts of flooding on the health of MW migrants in cities in Europe, ranging from systemic inequality and discriminatory policy environments to gaps in urban infrastructure and health systems, presented in the following sections. We see the first three drivers (Demographic characteristics and socio-economic status; Migration status and experiences of migration; Racism and intersectional discrimination) as representing a set of historically embedded structural conditions which function in relation to each other and interact to shape the following five drivers, as thematic expressions of these structural conditions (e.g. issues of housing, healthcare access, urban planning and climate policy impact).

By systematically discussing each aspect and highlighting these interactions and interrelations, this report lays the groundwork for deeper inquiry and action. We aim to move beyond siloed and fits-all vulnerability metrics and toward a richer, justice-centered understanding of vulnerability —and one that will allow for migrants also be active agents in addressing such vulnerability and in shaping climate adaptation.

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2 Drivers of Vulnerability to Health Impacts of Flooding and Extreme Rainfall for Migrants in European Cities

2.1 Demographic Characteristics and Socio-Economic Status

Demographic changes in European cities raise concerns about climate-health vulnerabilities and injustices, seeing how migration, population ageing, growing numbers of single-person households and social isolation are intensifying amid widening social and economic inequalities[11].

Furthermore, poverty is on the rise in many European cities[12] including a growing number of "working poor", among whom single parents, large families, unskilled workers, and migrants are overrepresented. Demographic and socio-economic characteristics are widely recognized as indicators of vulnerability to flooding[11,13–15]. The most common identified variables including income, age, employment status, education level, and presence of foreign-born residents[16]. In studies that use large scale demographic data, these indicators are often used as proxies for climate- or flood-related vulnerability.

However, no single indicator such as age, income, race, ethnicity, or gender—can explain vulnerability. [17]. Nor is any group—such as people living in poverty or those experiencing social isolation—vulnerable at all times or in all dimensions. As we discuss further in section 2.3, vulnerabilities are intersectional: for example, elderly people, ethnic minorities, and women are more likely to live in poverty.

This means that not all individuals within a certain category experience the same level of vulnerability [18], and that vulnerability is dynamic—shifting across time and context. For instance, studies show that while elderly people with limited mobility may be more vulnerable, in some cases older people report lower flood impacts [19] due to greater experience or available time to manage recovery.

Age is the most consistently examined demographic factor in flood vulnerability research [17,20]. Both the elderly and young children are considered particularly vulnerable before, during and after extreme weather events such as floods[14,21–24]. This is typically explained by their dependent status, lower mobility to respond during an event—for example, making evacuation more complicated—and the need for care after the episode[13,14,17,21,25]. Children are likely to be less aware and prepared for the risk of flood, which shows that age can also shape risk perception[17]. **LINK!!**

Social isolation, which is a major driver of vulnerability, is more prevalent among older people—especially those with a migrant background. The elderly are also more likely to experience energy poverty, live in substandard housing, have pre-existing health conditions, and limited access to information. For foreign-born older adults, vulnerability is compounded [18,24]. Although EU foreign-born populations tend to be younger, there is a growing segment of older individuals among them, especially in the working-age group (Eurostat, 2024).

Age also shapes the support individuals are likely to receive during and after flood events. A UK study found that elderly people (>65) were less likely to receive help, while households with young children were more likely to be supported [23]. In some cases, children can reduce a household's vulnerability by fostering community networks through schools and friendships [17]. On the other hand, having more time available to deal with the impacts might benefit older people's ability to recover.[19]

Children are particularly vulnerable to the mental, behavioural, and physical health effects of flooding [12]. UK-based research has shown that children suffer not only due to direct flood impacts, but also from the stress affecting their caregivers, family tensions, and the loss of meaningful items, spaces, and routines such as toys, games and books as well as privacy, special events and time with family and friends[18,21,26]. Children, like the elderly, are therefore more likely to suffer trauma during the recovery period following a flood event. Households with children under 10 may become more vulnerable, as caretaking responsibilities take precedence over emergency preparedness [23]. Although literature specifically addressing foreign-born children is limited, their pre-existing trauma—often tied to displacement, conflict, or poverty—suggests they face heightened health risks from climate-related events [21,23].

Although women have a longer life expectancy than men, they tend to face a lower life expectancy during climate disasters [24,27]. The experiences of older women—particularly those with disabilities, cognitive decline, or reliance on care services—are often under-researched. Even in contexts where welfare services appear to offer protection, systemic gaps can emerge during disasters, as these individuals depend on home carers, regular services, and accessible evacuation plans—all of which may be disrupted [11,22,23].

Gender also shapes how people experience and express the emotional impacts of flooding. Studies show that men often report anger, while women more frequently report sadness, pointing to how social norms and power dynamics influence how impacts are perceived and lived [28] (see section 2.3).

At the same time, some studies note that women may exhibit greater resilience due to stronger social networks and coping capacities [17]. Men, on the other hand, are more likely to work in outdoor sectors or participate in rescue services, both of which increase flood exposure. One study from Italy suggested, participation in rescue services may also make individuals less vulnerable to climate hazards.[23]

For people with **disabilities**, it is often not the impairment itself but the lack of inclusive infrastructure and services that creates vulnerability—especially when intersecting with poverty or mental health conditions. While literature on the intersections of disability, gender, and migration status in relation to flood impacts is still scarce, it is evident that these characteristics shape and compound vulnerability.

No single indicator such as age, income, race, ethnicity, or gender can explain vulnerability.

Research in Europe has shown that people facing **disadvantaged socio-economic conditions** suffer more than wealthier neighbours from environmental exposures, including flood events[2]. In the UK, for instance, people living in **poverty and working-class groups** not only face higher flood risks than the middle classes, but are also less able to cope in the event of a flood [18,26,29]. Poverty in Europe is also linked to both denser neighbourhoods and reduced access to green spaces[21]—urban characteristics that further reinforce vulnerabilities (see also Section 2.7). Crucially, pre-existing socio-economic differences often widen as a result of disasters such as extreme flooding[19].

Income appears to be a key determinant of people's ability to prepare for and respond to the impacts of flooding. People on low incomes have fewer resources to prepare for floods—such as purchasing insurance—and are also more likely to live in lower-quality housing [12,18]. Lower income also affects people's ability to recover from material losses and displacement[12], limiting their capacity to replace essential goods, cover extra costs associated with displacement and temporary accommodation, manage refurbishment expenses, and absorb financial losses overall [11,18,19] (see also Section 2.5 on employment). For short-term flood impacts, differences between social groups may be relatively small, but these differences grow over time, with household income playing a larger role in long-term outcomes. This suggests that immediate post-flood studies may underestimate future social inequalities, as recovery is shaped by existing social structures[30].

The impacts of flooding are typically more severe for poorer households also because they are more vulnerable to health impacts than other groups[31]. Poverty and low income are directly associated with greater climate-health impacts—both due to the psychological and physical health effects of the disaster and recovery process, and due to unequal access to healthcare [12,18,32].

Some studies also link lower education levels to reduced risk awareness and preparedness for floods,[25] and show important differences in the receipt of early warnings across social categories, with lower socio-economic groups less likely to receive alerts[23]. While race, ethnicity, and migration are themselves characteristics that can increase (health) vulnerability related to flooding (see also Sections 2.2 and 2.3), it is important to highlight that within the European Union, MW migrants are considerably more vulnerable to poverty (45.5%) than migrants from the EU (27.9%) or nationals (18.9%).[4] The elderly, single parents, ethnic minorities, and disabled people are also more likely to be poor, further compounding the vulnerabilities of migrants who fall into one or more of these categories.

Racialised people and MW migrants experience specific barriers that increase their vulnerability to floods, including **discrimination and barriers** in access to employment, housing, health, and education[33,34]. Migrant women must navigate both gender- and immigration-related inequalities in the labor market, public life, and at home. These vulnerabilities are further intensified for those facing intersecting stigmas related to religion, sexuality, or disability, as discussed in more detail below.

2.2 Migration Status and Experience of Migration

Despite growing attention to climate change and migration on a global scale, there is still little research exploring how MW migrants living in Europe experience climate-related events, such as extreme rainfall and flooding. Migrants are not a single, homogeneous group, but a broad and complex spectrum of people including illegalised and undocumented persons, refugees, asylum seekers, skilled and unskilled labor migrants, international students, and long-term residents who are active, well-integrated citizens and may have acquired the nationality of their host country.

In addition, migrants may also still be on the move between countries, which can make it harder to access stable housing, register for public services, or be included in early warning systems and disaster preparedness efforts. This diversity means that vulnerability to flooding, and extreme rainfall varies significantly within migrant populations.

MW migrants often face language and cultural barriers in their host country. Flood warnings, evacuation instructions, and public information campaigns might not reach certain groups because of these barriers[11,15,18]. Migrants with limited proficiency in the local language or unfamiliarity with their surroundings and emergency procedures may not receive—or fully understand—crucial information about how to stay safe and how to get support during and after a disaster [12,14,29] .

For example, in Barcelona, Spain, climate information is only shared in Catalan, despite 23% of the population of the city being foreign born (data for 2017).[v]

Lack of social networks and social isolation can also be associated with reduced access[21]. For instance, some people rely only on foreign media and therefore will not be reached by television and radio, which play important roles in national alerting systems[11]. Migrants, particularly those who have recently arrived in a country, may lack informal networks that help people share local knowledge, such as whether a neighbourhood is prone to flooding.

Familiarity with local environments and institutions also plays a role. Migrants, particularly those who have recently arrived in a country, may struggle to navigate municipal support services in an emergency due to limited knowledge of where to go or how to ask for help.[21,24] Feelings of isolation from the wider community can significantly reduce access to post-disaster support[18].

Some groups of migrants may face specific vulnerabilities to flooding due to both their living conditions and their legal/political status. For example, during the 2023 floods in Thessaly, Greece, approximately 900 asylum seekers living in the Koutsochero camp were reportedly told to leave the facility

to make space for flood-displaced Greek residents. This incident illustrates how migrants, especially those in temporary or institutional accommodation, may be deprioritised in crisis response and recovery efforts, reflecting broader patterns of exclusion.[vi]

In addition, undocumented migrants face a distinct set of risks that make them especially vulnerable to climate-related hazards[35]. Unlike other migrants who may be integrated to some degree through schools, workplaces, or neighbourhood networks, undocumented individuals often remain invisible to authorities.

Undocumented migrants face a distinct set of risks that make them especially vulnerable to climate-related hazards.

One major issue is isolation both from the wider population and even from others in similar circumstances. Many undocumented individuals lead highly self-reliant lives, often avoiding interaction with state services due to fear of arrest or deportation. This mistrust of state institutions typically results in limited access to healthcare and a reduced likelihood of reporting problems or seeking help during emergencies.

There is evidence that certain programmes, particularly those provided by non-governmental organisations (NGOs), targeting marginalised groups, including undocumented migrants, can help to build trust and create points of contact that are important during crises.

In Zurich, Switzerland, undocumented individuals may avoid official evacuation orders and hide due to fear or mistrust, but established relationships and inclusive policies—such as Switzerland's progressive drug policy—can improve engagement and support more effective disaster management. [11]

[v] Feedback from IMBRACE workshop participants.
[vi] Feedback from IMBRACE workshop participants.

2.3 Racism and Intersectional Discrimination

Intersectional discrimination and oppression refer to how different forms of inequality—such as racism, sexism, classism, ableism, and others, interact and are mutually constituted in ways that create complex and unique experiences of disadvantage and oppression. These are complex processes that can exacerbate flood-related health vulnerabilities for specific subgroups within the migrant population and racial/ethnic minorities. While referring to "vulnerable groups" in the context of climate risks can help make inequalities visible, this framing can obscure important differences within and between categories.

Not all women, migrants, or disabled people are equally at risk. For example, disabled people, older people, or women from ethnic minority groups and migrants are more likely to be poor[20]. In addition, some individuals may move in and out of vulnerability based on changing circumstances, such as pre-existing health conditions, employment status, or access to support. An intersectionality lens reveals that vulnerability is not a fixed trait of certain "groups" but is a dynamic condition that reflects broader patterns of oppression and marginalisation.[18]

Racism and climate change intersect in ways that disproportionately impact the lives of racialised populations, including MW migrants living in European cities[36]. Racialised people often face systemic discrimination and exclusion, which can put them in a disadvantage during a flood emergency. For instance, research in Wales found that flood risk was experienced differently by white and non-white residents, suggesting that the rise of anti-immigrant sentiment and racism may indirectly affect how communities are protected or supported during disasters.[29] However, **racism remains largely overlooked in flood preparedness, response, and recovery efforts across Europe**. This omission is also evident in academic discussions on flood risk and vulnerability: we found only two articles that specifically addressed how race shapes vulnerability to flooding. As Michael Lomotey notes:

"Parts of academia and many environmental western-based NGOs and entities like the IPCC (2022) and IPBES (2019) claim to seek to counter the causes of climate hazards, but are often silent on the ways in which racism shapes these impacts (and debates)." [37(p210)]

Overall, there is limited research on how impacts of flood differ between different ethnic groups[18]. Data from the UK shows that non-white ethnic groups are less aware of flood risk across England and Wales[17,29]. One study from the UK showed that racialised groups are more likely to live in areas more exposed to flooding, which often overlap with areas of social deprivation[29].

In addition, in the UK, areas where ethnic minorities live receive lower priority during immediate disaster response and longer-term recovery efforts.[19] Research conducted in Banbury demonstrated that impacts of flood were worse for the Asian community because of economic problems, language and cultural barriers, lack of knowledge of systems for protection and reduction and difficulties in accessing social support networks[18].

In Banbury, UK, Pakistani women reported higher levels of psychological and physical ill-health after floods, which were compounded by language barriers, cultural norms around seeking help, and a lack of accessible support systems. A follow-up study found that many non-English speakers in the area still lacked knowledge of local flood protection schemes, highlighting gaps in outreach and communication persisting long after the waters recede.[29,38] Conversely, some studies highlight strong community cohesion, which can strengthen resilience and facilitate recovery. Some minority ethnic groups may have a stronger sense of belonging and mutual support within their communities than the majority population.[29]

In European studies, **race is often rendered invisible** in discussions of Disaster Risk Reduction and climate adaptation. Vulnerability is typically framed through socio-economic status or migrant status, such as being "foreign-born", while race is rarely considered. However, racialised people face structural discrimination in housing, employment, and public services, which also impact their vulnerability to climate hazards such as flooding.[34] In some contexts, the erasure of race is built into public systems. For instance, France has adopted a 'colourblind' approach that limits data collection on race and ethnicity. While claiming to treat everyone equally by disregarding race, such an approach reinforces discrimination by ignoring existing systemic inequalities.[39]

Even in countries that allow for disaggregated data collection, public agencies often do not collect or report racial data—whether in education, health care, housing, or law enforcement. This kind of erasure of potential discrimination or unequal outcomes can hide patterns of inequality from public view and from policy analysis. For instance, in Hull, UK, the 2007 floods impacted a significant and historically marginalised Black community, yet their experiences were largely excluded from both policy responses and scholarly analyses[34]. Furthermore, when ethnic minorities are considered, flood adaptation programmes don't acknowledge the specific histories and positions of different racialised communities.[29,34]

Flood events can also intensify and **reproduce the structural vulnerabilities migrants already face**. For example, during the DANA floods in Valencia in October 2024, and despite migrant communities playing a central role in recovery—leading cleanups, delivering food, and supporting neighbours—far right actors and political parties weaponised these efforts to stoke xenophobic narratives. Migrants were blamed for poor crisis management and portrayed as undeserving recipients of support.[vii]

After a flood, women are more likely to stay in temporary accommodation in the case of evacuation, manage the household, and support children and other family members, while men go back to work. For women who also work outside the home, this can be a double burden as they balance their responsibilities at home with waged labor.[12,13], while the psychological impacts are often also experienced more strongly by women. As illustrated by interviewees in the study by Dodd et al. (2024) [28]:

"The horrible thing is I don't feel safe over here anymore … In your house, you should be able to come in and feel safe, but I don't feel like that anymore … there is a little bit at the back of my mind, where you think that if it has happened once, it can happen again, no matter what others say." [28] (p6)

"[...] as a man I think you have to, you know, stand up and be … not going to be crying on my wife's shoulders. I think it should be the other way round. Now I know that's a bit old fashioned but that's the way I am." [28] (p6)

[vii] Feedback from IMBRACE workshop participants.

Flooding can also exacerbate gender-based violence, including intimate partner violence, which disproportionately affects women and violence towards LGBTQI+ individuals[27] . Despite the limited research done on the impacts of flooding, or climate events in general on LGBTQIA+ individuals, emerging evidence suggests that LGBTQIA+ people can face discrimination in disaster contexts, particularly in spaces such as evacuation shelters.

This intersects with higher rates of homelessness, care labor, sex work, chronic illness, and poverty that they are also often facing. Likewise, the experiences of older LGBTQ+ individuals, racialised sexual minorities, or queer migrants are nearly invisible in climate health and disaster literature.[27] Given the intersecting inequalities and exclusions experienced by migrant women and LGBTQIA+ individuals based on gender, sexual orientation, migration status, and ethnicity, addressing flood vulnerability, adaptation, and preparedness requires an intersectional approach.

Across all phases of the disaster cycle, before, during, and after flooding, ableism can shape who is protected and who is overlooked. Emergency systems often lack inclusive design, accessible information formats, and trained staff to support people with diverse physical, sensory, cognitive, or psychosocial needs. This systemic neglect compounds vulnerability and reinforces patterns of exclusion.[viii]

Racism remains largely overlooked in flood preparedness, response and recovery efforts across Europe.

[viii] Feedback from IMBRACE workshop participants.

2.4 Housing Conditions and Access to Housing

Precarious and inadequate housing conditions—such as overcrowding, insecure tenancies and substandard living conditions—are particularly widespread among MW migrants, whose needs tend to be overlooked in public policy, and who face issues of housing affordability as well as discrimination and barriers in access to housing[40]. In turn, housing precarity is deeply associated with vulnerability to flooding and extreme precipitation in urban areas.

Migrants represent a growing proportion of those unhoused in European cities[41]. Flooding affects people differently depending on whether they have stable shelter. Unhoused individuals face direct exposure to extreme rainfall, flooding, and related hazards such as exposure to the cold, or lack of access to sanitation. During floods, basic services like public bathrooms or shelters may be inaccessible or overwhelmed, further impacting those living in precarious conditions who depend on these spaces for their day-to-day life.

People experiencing homelessness are also more likely to occupy high-risk urban areas. Despite their vulnerability, homeless people are often invisible in disaster preparedness plans and data collection systems, and are rarely consulted or considered in emergency response strategies.[11,42]

In Ireland, for example, the direct provision system has traditionally provided formal accommodation to international protection applicants. However, in recent years —amid acute housing shortages and rising anti-immigration sentiment, the government has increasingly resorted to issuing tents rather than rooms or apartments. This shift has particularly dire consequences in Ireland's persistently wet and cold climate. Asylum seekers have been left sleeping in tents through storms, floods, and freezing temperatures, with reports of deteriorating health, lack of sanitation, and unsafe conditions.[ix]

Housing tenure reflects broader social inequalities and is a significant, though complex, factor influencing vulnerability to flooding. Whether an individual owns their home, rents privately, lives in social housing, or resides in temporary accommodation can deeply shape their capacity to prepare for, respond to, and recover from flood events. A 2011 study from the UK found that white households are more likely to own their homes outright or with a mortgage (67%), while Black households are disproportionately represented in social housing (42% compared to 17% of white households).

[ix] Feedback from IMBRACE workshop.

Migrants, especially recent arrivals to Europe, are more likely to live in rented or temporary accommodation, often in poorer-quality or more hazard-prone areas.[29] However, the relationship between tenure and social vulnerability varies across countries. In Germany, for example, housing tenure is less correlated with poverty than in the UK or France.[17] There is also geographical variation in the distribution of tenure across flood-risk areas within countries. In a study of 100 French cities, home non-ownership rates were higher in flood-prone areas in most cases, though some cities showed higher ownership rates in such areas.[39]

Housing tenure is closely linked to risk perception and preparedness behaviour. Homeowners are likely to be more aware of flood risk, as are those with longer-term residence in a place.[17,23] Homeowners are also more likely to implement preparedness measures, such as retrofitting their properties, purchasing insurance, making structural improvements to prevent future flood losses following a flood event,[17,23] and actively taking measures to protect their houses once they receive a warning (although often without success).[23] Property owners also tend to have a greater control over the pace of the reconstruction process, rebuild faster, and are less likely to seek temporary shelter.[17] In contrast, renters typically have less power to adopt protective measures to reduce flood risk, and less control over the recovery process.[17,18]

Renters are dependent on landlords for repairs, retrofits and home-modifications to protect against climate risks.[12,17] During the recovery phase, they frequently experience more stress and negative health effects, particularly when they face displacement, rent increases and uncertainty about outcomes. One study describes the fear among renters of not being able to return to their homes after evacuation and displacement, especially in places where there is limited affordable housing.[26,38] This can be exacerbated by **insurance companies monopolising available rental accommodation for their clients following flooding**, and leading to a reduction in affordable housing for renters, which itself can negatively impact people's health and finances.[17]

The condition and type of housing significantly influence how people experience flooding and its aftermath. Poor-quality housing and housing in need of repair can make both the immediate impact of flooding and the long-term recovery more difficult.[11,18] Homes at the lowest floors at or below ground level are especially prone to flood damage. After flooding events, flood-damaged homes can also have health impacts such as increased respiratory problems due to mould exposure.[43] Sometimes, people can be unaware that they are living in or have moved into previously flooded homes and later discover secondary damp or other issues, only to face disputes with landlords, insurers, or mortgage providers over responsibility. These disputes can add to the stress and financial burden for families.[38]

Whether or not households have **insurance is crucial in determining how people experience and recover from flooding**.[19] For low-income households, insurance can be unaffordable.[20,18] Renters are especially under-covered for contents insurance compared to homeowners.[12] In addition, in various countries in Europe, private insurance companies are allowed not only to elevate premiums but also to deny coverage based on assessed flood risk.[29,44] European countries vary in their approaches to insurance policy, with the UK following a market-based model that can lead to high premiums in flood-prone areas, while countries like France adopt a collective risk-sharing system that standardizes insurance costs nationwide.[18]

If houses are deemed uninsurable, they become harder to sell, leading to a decline in property values in flood prone areas. This may result in a concentration of lower income groups – including new migrants excluded from housing markets – in flood-prone areas.[29] In some countries, such as the UK, areas of high crime rates and social deprivation can also have higher insurance premiums for contents insurance, making them unaffordable for many. Yet these are exactly the communities that might have fewer financial resources to recover following a flood event.[18] Without insurance, families often face immense hardship during the recovery phase.[17] Even for those who have insurance, receiving a payout can be highly challenging. Insurance policies may include clauses that exclude certain types of water damage, and this may lead households affected by flooding to remain without compensation.[18,38]

Even when people eventually get payments, they often experience long delays waiting for surveyors' reports or become caught in disputes over whether their home qualifies as having the "flooded status" that allows them to access insurance, or other recovery support. **These delays can leave families living in damp, damaged homes or stuck in temporary accommodation with no clear timeline for return**.[18,26] When temporary housing is provided, it often comes with hidden costs, like additional travel expenses to reach school or work, which are rarely covered by insurers. Individuals are expected to absorb these costs, further compounding the financial toll of the flood.[26]

The condition and type of housing significantly influence how people experience flooding and its aftermath.

For instance, during the 2007 Hull flood in the UK, the city council mapped flood-affected households using visible damage to assign vulnerability and support. However, many residents experienced secondary flooding—invisible water damage that emerged through damp, mould, and structural decay as late as one year after the event. Without formal confirmation, affected households struggled to access insurance and support, resulting in stress, disputes, and financial strain.

Overall, the process of filing claims, disputing assessments, or understanding entitlements can be particularly difficult for older people and those unfamiliar with bureaucratic systems. In some cases, insurers were accused of targeting vulnerable groups, delaying or underpaying claims for those less able to challenge a decision.[18,38] Migrants might be particularly vulnerable to these processes and constraints.

As detailed in section 2.7, in many European cities, **housing market dynamics** have concentrated lower-income populations in flood-prone areas, creating spatial clusters where social and environmental vulnerabilities compound. Following flood events, lower-income households often face displacement due to property damage, rising rents, and housing shortages, with some areas also experiencing regeneration and gentrification that further limit their ability to return.

2.5 Employment and Labor Conditions

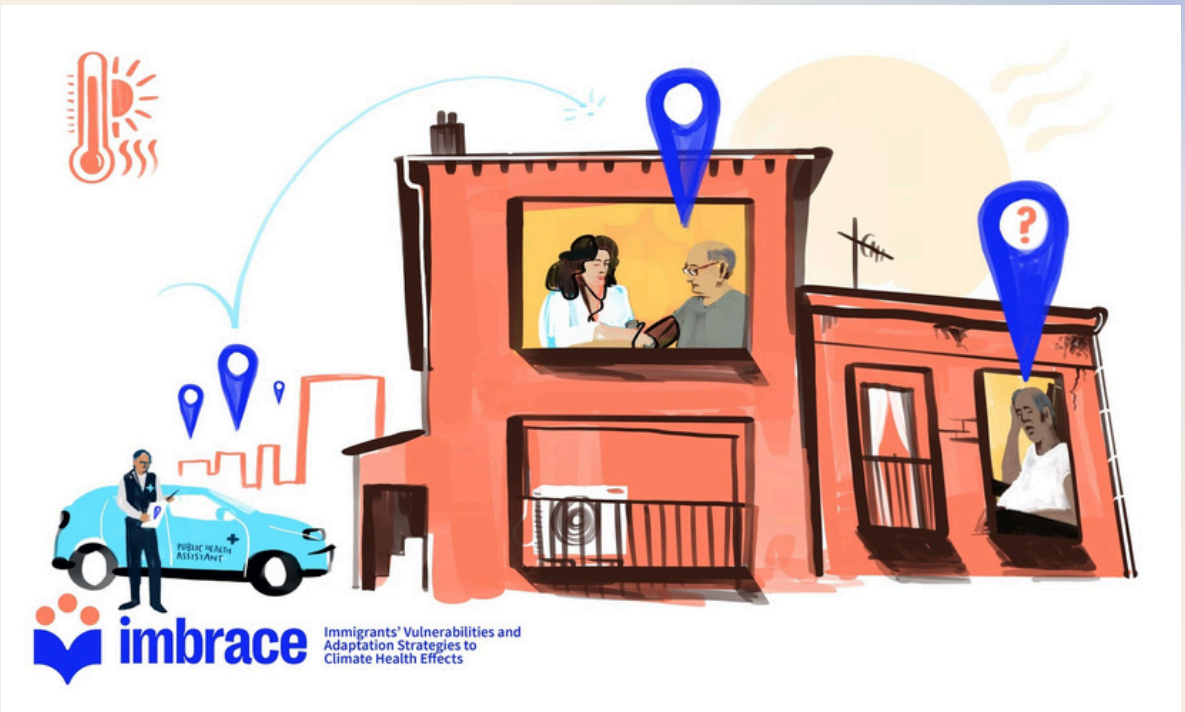
MW migrants' flood-related health vulnerability is deeply influenced by labor markets and social policies, which collectively shape employment, working conditions and access to essential public services[45]. The 2007 European Working Conditions Survey showed that migrants are significantly more likely than native-born workers to be exposed to harmful working conditions. Migrants were also more likely to be employed without contracts and under unfavourable work schedules, particularly in sectors that already carry high occupational health risks. Despite these clear risks, few European studies explicitly address the intersection of migration, employment conditions, and flood vulnerability[46].

In quantitative or mixed methods studies, **unemployment** rates are frequently used as indicators of social vulnerability. People without work may face higher levels of social isolation, reduced access to information, and fewer financial resources to prepare for and recover from flooding events.[13] For many migrants, however, being employed does not necessarily translate to stability or safety. **Migrant workers are more likely to be employed under precarious conditions—**short-term contracts, informal or undocumented arrangements, low wages, and unsafe working environments (see also section 2,1 for vulnerability connected to income).

In these settings, taking time off due to flood-related disruptions, for reasons such as the need to avoid hazardous commutes, the loss of vehicles, or the increase of caring responsibilities, can mean lost income or even job loss. The fear of job loss, combined with unfamiliarity with bureaucratic systems and a reluctance to engage with authorities can discourage people from seeking support or accessing recovery schemes.[19] People working low-skilled jobs—often the case for migrants—have less flexibility to take time off work and may also lack the social and cultural capital needed to navigate the bureaucracies of recovery systems[19].

Type of employment can also increase exposure to climate-related hazards. Many migrants work in physically demanding, low-paid jobs that involve outdoors labor, such as agriculture, construction, or street cleaning, where they are more likely to experience harm during extreme rainfall or flooding. These jobs can also carry health risks in the aftermath of floods. For example, workers involved in plumbing or waste removal may face exposure to diseases like leptospirosis, especially when lacking appropriate protective equipment or training.[47] Commuting to and from work can significantly elevate flood risk, with a European study finding it was the most common activity during fatal flood events [47, 48].

2.6 Health Histories and Healthcare



Migrant communities often face **unequal access to healthcare** in host countries[33,49]. This compounds the health impacts of climate-related hazards by delaying diagnosis and treatment, reducing access to preventative care, and limiting the ability to manage existing conditions. Barriers to access for migrants can be related to issues of poverty, homelessness, lack of documentation, language barriers, unfamiliarity with health systems, and working conditions, such as long work hours and inability to get time off for appointments.[46] Women may face additional barriers, such as having to find childcare to attend appointments.[46] Refugees and undocumented migrants may avoid medical services out of fear or mistrust, further compounding health risks.

Moreover, even when healthcare is, in principle, accessible for migrants, cultural differences and discrimination can affect how people access care during and after disasters.[21] Racism, gender inequalities, and health system bias can reduce the likelihood of diagnosis or treatment for certain groups, including Black and ethnic minority communities and undocumented migrants. For example, one study in Europe has shown that older adults from racialised groups may receive less pain relief or lower rates of treatment for chronic conditions[27] —a pattern that may apply to other age groups as well.

Pregnant migrant women are particularly vulnerable to adverse health outcomes, which are compounded in the case of extreme weather. According to the WHO's 2018 report, they experience significantly poorer pregnancy outcomes compared to non-migrant women. Another study highlights increased risks of mental health disorders, maternal mortality, preterm birth, and congenital anomalies. Contributing migration-related factors include poor living conditions, poverty, unemployment, and limited access to healthcare.[33]

Pre-existing mental and physical health conditions, including disabilities, significantly affect people's ability to recover from flooding[21]. People with pre-existing conditions including mobility issues, disabilities, or sensory impairments might face additional risks during a climate event.[19,48] For example, conventional early warning systems like sirens or radio may not reach deaf residents, while those with physical limitations may be unable to evacuate independently or access relief services, particularly if they use mobility aids, such as wheelchairs, or receive care at home.[11,24,27]

If people are displaced due to flooding, inaccessible shelters, unsuitable temporary accommodation, and lack of inclusive communication (e.g. sign language interpretation) further increase their risk. Isolated or housebound individuals may wait longer for rescue and institutionalised or homeless people are especially vulnerable.

Pre-existing mental health conditions, or trauma related to migration and conflict, can also be retriggered by the experience of a disaster, especially among refugee or undocumented communities.[11] Furthermore, according to health experts in Zurich, people with pre-existing mental health conditions and in the process of social isolation can be slow to accept change, tend to have lower self-efficacy and can resist external inputs all of which will affect ability to take on protective measures in case of flooding[11].

Flooding can cause direct health effects such as drowning, electrocution, and other accidental injuries or deaths.[43,48] The increase in stagnant water caused by flooding can also cause outbreaks of waterborne diseases such as diarrhoea, hepatitis, leptospirosis, legionnaire's disease and an increase in skin and wound infections (e.g. due to non-cholera Vibrio).[20,47] People with pre-existing illnesses, children, and older adults are especially vulnerable to complications from such exposures.[50] Additionally, increased standing water and changing temperature patterns due to climate change can support the spread of vector-borne diseases such as dengue, chikungunya, and West Nile virus[51]. In parts of Southern Europe, outbreaks of these diseases have already occurred. Migrant populations living in basic shelters, tents, or informal housing are particularly exposed to these risks.[43,52] Damage to essential assets like vehicles can also have wide-ranging effects on health, such as preventing travel to work—leading to income loss—and reducing opportunities for social interaction[53]. In Hull, children affected by the 2007 floods described how displacement and school closures led to the breakdown of friendships, with lasting effects on their wellbeing. Family tensions at home, often worsened by financial strain and fear of repeat disasters, further added to feelings of disconnection[26].

The psychological impacts of flooding often last much longer than the physical ones. Post-traumatic stress disorder (PTSD), depression, anxiety, and substance use are all associated with extreme weather events.[22,32,43] These effects are often intensified by so-called "secondary stressors," such as displacement, lack of access to healthcare, and damage to social networks.[44]

Emotional trauma is thus linked not only to the event itself but to response and recovery, including evacuation, dealing with insurance, cleaning, making repairs and dealing with builders[18]. One review found that not having insurance or having difficulties with insurance companies were among the leading precursors to psychological impacts following flooding. [17,44] After the 2007 floods in Hull[38], some households avoided reporting flood damage due to fears of losing tenancy, rising insurance costs, and stress linked to the recovery process.

Research identifies challenges to self-identity caused by flood, namely by notions of self-reliance, and the threat and fear of future flooding, as major long-term mental health impacts resulting from flooding[19,28]. Severity of flooding, economic losses and duration of time displaced from home are both strongly associated with impacts on mental health[19,24]. Despite the scale of these impacts, many people report receiving insufficient psychological or moral support. Those on lower incomes or with less education are not only more likely to suffer stress but less likely to receive follow-up care.

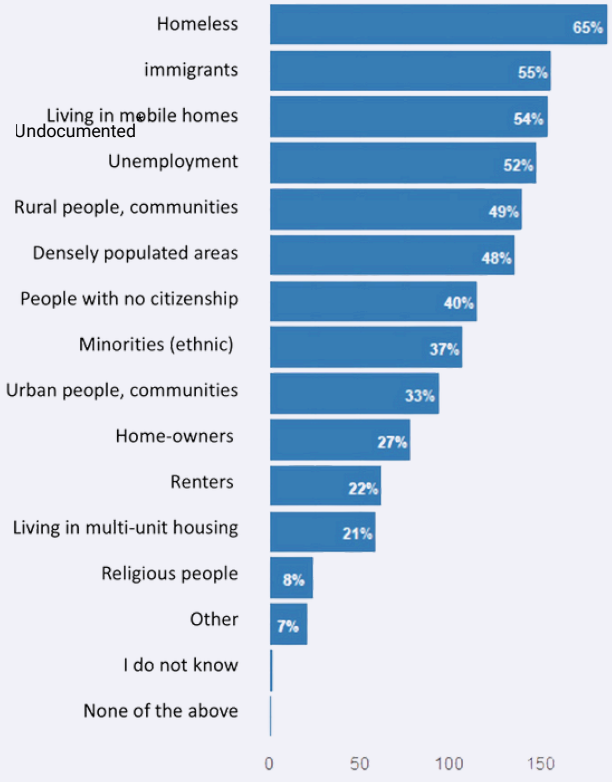
Certain populations may be more impacted in terms of health than others (see also section 2.3). For example, older people often experience profound grief over the loss of possessions[38]; children may suffer anxiety and physical symptoms like worsened asthma[18,54]; and women frequently carry the emotional and logistical burden of recovery and caregiving.[24,32] Older people and those with chronic illnesses may lose access to medication or life-sustaining equipment due to power cuts.[12] In addition, newly arrived migrants, besides not having access to healthcare, may not be aware of public health risks if those differ from places where they have previously lived. For example, a study with refugees in Greece, mostly arriving from the Middle East, showed there were gaps in knowledge related to vector-borne diseases, some of which may not have been experienced in their countries of origin.[52]

Flooding puts severe strain on health systems—not only are health facilities likely to experience a surge in patients, but they also may experience flood-related complications such as power outages, supply disruptions, understaffing, and blocked transport routes, which can severely impact emergency services.[12,24] Health facilities themselves—hospitals, clinics, nursing homes—are not always flood-resilient.

Damage to infrastructure can disrupt services for extended periods, especially in under-resourced areas. In addition, flooding in hospitals can lead to increased healthcare associated infections in patients.[50] Care services that support older or disabled people, such as home care providers or community nurses, may also be affected. If care staff themselves are impacted by a disaster, support for those who rely on them can abruptly disappear.[22,28]

Experts working at the intersection of climate, migration, and health point to major gaps in knowledge, not only regarding the health impacts of climate change, but also the health impacts of migration.[55]

FLOODS: Which conditions contribute to people's vulnerability?



Fekete A, Rufat S. Should everyone in need be treated equally? A European survey of expert judgment on social vulnerability to floods and pandemics to validate multi-hazard vulnerability factors. Int J Disaster Risk

*This graph was edited to read "undocumented" in place of "illegal" immigrants.

However, data on health inequalities among migrant and marginalised groups is often not collected or not disaggregated. Respondents in one review highlighted the need for better migration-related health surveillance, baseline datasets, and integrated monitoring systems to support targeted, long-term planning.[55] Another issue concerns the lack of integration between public health authorities and climate adaptation initiatives[56].

Flooding puts severe strain on health systems—not only are health facilities likely to experience a surge in patients, but they may themselves be flood-affected.

2.7 Neighbourhood, Social and Urban Infrastructures

Urban development processes typically reflect broader structural inequalities, resulting in the spatial concentration of socially and economically marginalised groups—such as migrants, low-income households and racialised communities—in neighbourhoods that are more densely populated, have poorer environmental conditions and infrastructures, and face greater exposure to flood risks.[12,29]

For example, stemming from historical development patterns, where higher-value housing was built on elevated ground, and cheaper housing was built on flood-prone land closer to industrial hubs, many European cities have large working-class communities living in low-lying areas, or along watercourses with elevated flood risk[13,18,25]. Across flood-risk areas in France, poverty rates are consistently higher than in non-flood zones, further suggesting that areas of flood-risk and social deprivation are spatially correlated.[39]

Unregulated urban expansion alongside poor spatial planning practices further exacerbates the vulnerabilities of marginalised groups. For example, lack of regulation and control has resulted in increased urbanization of floodplains, often by those on lower incomes [13].

In addition, when critical urban services and infrastructures, such as hospitals, schools, water systems, waste management facilities, road networks, and public transport, are in flood-prone areas this amplifies disruption during a disaster, and further affects communities' ability to cope.[13,15,21,57] For response and recovery support systems in a flood event, population and built environment density exposes more people to risk and can strain operations.[43]

Also linked to urbanization trends, the extensive impermeabilization of urban surfaces with concrete and asphalt, reduces natural infiltration and increases surface run off and flood risk [13,25]. This is particularly problematic in denser urban areas with fewer green spaces, gardens and other unsealed surfaces. Deprived areas often lack access to green spaces as well as other amenities compared to more affluent areas.[21] Green spaces are not only important for water infiltration, but they also support health, wellbeing and social interaction.[12]

The **quality of infrastructure** and services can deeply affect neighbourhoods' vulnerability to flooding. Old, poorly maintained or under-dimensioned drainage systems, disconnected governance between different agencies (e.g. water), and under-maintained public assets more generally can all contribute to severe flooding.[38] In many European cities in recent years, the privatisation of urban services has been linked to declining infrastructure quality.

Gentrification is another key dynamic. Efforts to reduce flood risk—such as green infrastructure projects—can unintentionally displace long-term, low-income residents as wealthier groups move in. For instance, projects focusing on increasing access to green spaces as part of climate adaptation, have led to gentrification of certain urban districts across Europe[4]. After a flood, housing markets often shift rapidly. Insurance payouts may enable landlords to raise rents, pricing out existing tenants—especially in areas dominated by rental housing[26]. In the Netherlands, a review found that property values only drop significantly after a flood has occurs while in other contexts, flood risk alone depresses housing prices.[14] Flood events can impact housing markets often leading to displacement of lower-income communities, regeneration and (subsequent) gentrification processes, and growing difficulties in accessing affordable housing.

Social networks and community organisations are vital in shaping how individuals and communities experience and recover from flooding.

For lower-income households, the combination of property damage, rising rents, and housing scarcity can make it impossible to return after evacuation, leading to displacement.[17]

In addition, migrant communities may have contributed to the design or stewardship of such green spaces, such as through community initiatives, cultural events, or local labor, only to be priced out or excluded as these spaces become commodified. This represents a double injustice first, through historical marginalisation and underinvestment in their neighbourhoods; and second, through displacement via climate-oriented urban redevelopment that they helped shape but can no longer access.

Social networks and community organisations are vital in shaping how individuals and communities experience and recover from flooding. Across the literature, strong social networks were repeatedly associated with greater resilience, while social isolation emerged as one of the most consistent drivers of vulnerability.[12,20] People with strong local networks are more likely to receive early warnings, help with evacuation, and support during recovery.[28] Children, through their school-based networks, can also enhance household resilience.[17] In contrast, individuals who are socially isolated—due to age, illness, migration status, or poverty—may miss critical information or assistance. Older immigrants are particularly vulnerable to loneliness and disconnection.

Social institutions, such as schools, food banks, homeless shelters, and religious spaces, are also critical for social cohesion, acting as hubs of connection, care, and information, particularly for marginalised groups. Their temporary or permanent closure due to flooding can have serious consequences for those who rely on them. For ethnic minority communities, the loss of religious or cultural meeting spaces can mean not only a practical disruption but also a break in the emotional and spiritual support that sustains everyday life[11].

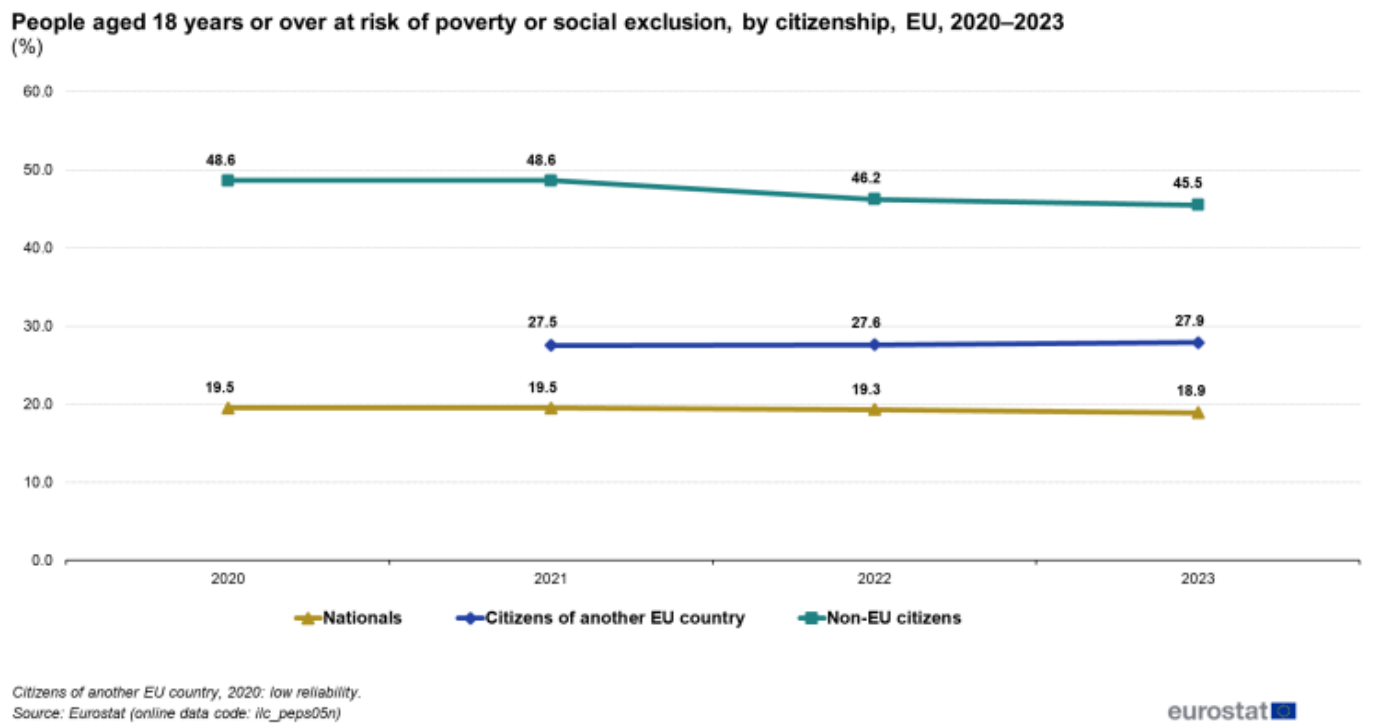
Social infrastructures also shape how risk awareness and preparedness. In many communities, informal networks—friends, neighbours, faith groups—are more trusted and effective than mass media or official government channels. These networks often carry lived knowledge of past disasters and can help spread warnings and preparedness strategies, especially for communities who are not reached by state or municipal level services.[17]

Social networks are crucial also in processes of recovery after a disaster (see also section 2.9). One study argues that while government agencies focus mostly on material displacement, it is social displacement that is most problematic[58]. People with mental health issues living in social isolation are particularly vulnerable because "their material and immaterial losses are not absorbed or mitigated by their social environment" [59(p13)].

Cmmunity support can take different forms during recovery, from emotional support to practical help. While in some places community cohesion can increase in the aftermath of an event, disasters can also generate conflicts within communities, particularly along ethnic, racial, or migration lines, due to competition for resources or perceived inequities[26,28].

These tensions can alter people's sense of home[26] and have a profound impact on migrants, who are already struggle with belonging and integration.

Migrants are also embedded in transnational networks. When a climate event disrupts work, especially in low-wage or informal sectors where migrants are overrepresented, the impacts ripple beyond the immediate locality. Lost income not only affects the migrant's ability to recover from a climate event but also undermines their capacity to send remittances to their communities in their countries of origin. The pressure to send money home can intensify migrant vulnerability. Even when struggling with poverty or displacement in the host country, many migrants feel obliged to prioritize remittances over their own recovery needs. This transnational burden can lead to stress, mental health strain for migrants and their families.[x]



[x] Feedback from IMBRACE workshop.

2.8 Urban Planning and Policy for Climate

Climate mitigation and adaptation policies and urban planning more broadly play a key role in shaping the vulnerability of urban dwellers to flooding and extreme precipitation, and in addressing or jeopardising social, spatial and environmental inequalities. The needs and experiences of marginalised groups, including migrants, are often neglected in public policy. These groups are typically under-represented in decision-making processes[12]. In 2014, only 6 out of 21 national adaptation strategies in Europe acknowledged climate change as a social justice issue. Meanwhile, 17 of these strategies framed migration and demographic shifts as risk factors linked to climate change[12]. Researchers have proposed principles for promoting procedural equity in adaptation, including calls for consideration of justice criteria and broader participation in adaptation planning[12].

Urban planning is a key element in DRR strategies (see also section 2.9). Planning regulations can limit exposure of people and essential infrastructures to floods by guiding where and how development happens. For instance, urban planners can prevent construction in flood-prone areas and enforce building and design regulations that reduce flood vulnerability[13,25].

However, rapid urban growth and development pressures often lead to construction in flood-prone areas[13,18]. Planning authorities often allow development in floodplains, with lower-income housing, often occupied by migrant groups, disproportionately placed in these areas—raising key concerns of urban justice[18].

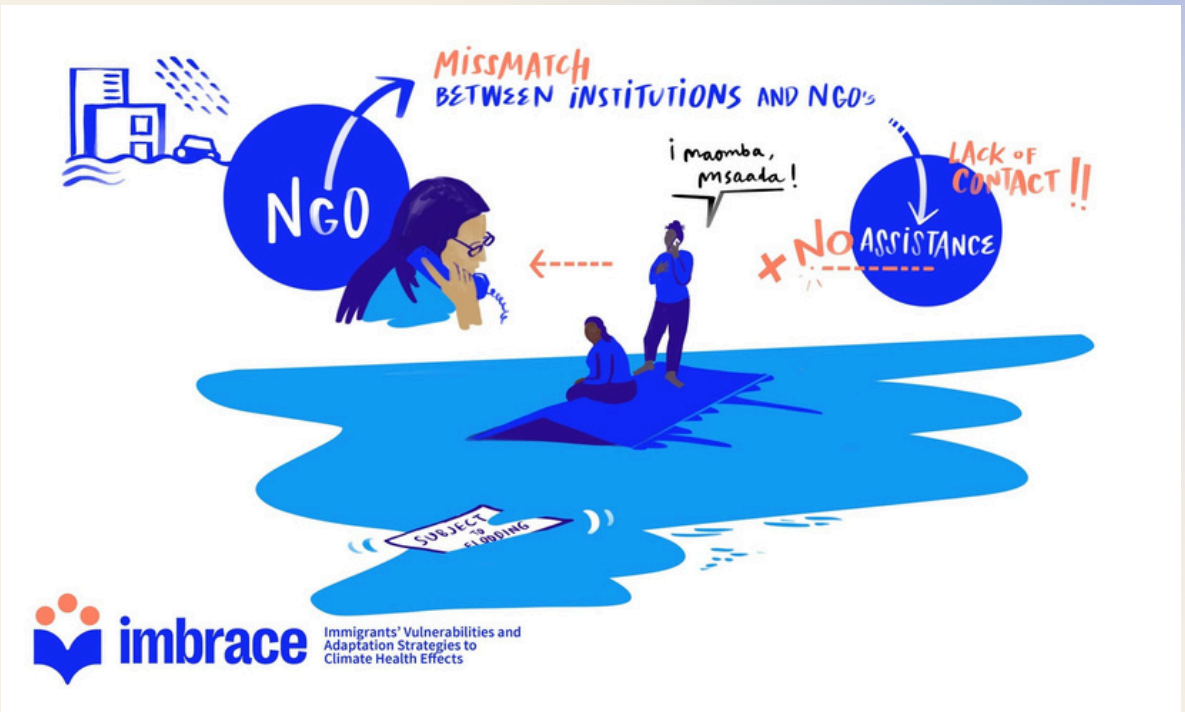
Climate adaptation, and in particular health adaptation, is key to limiting climate-health risks. It is thus vital that urban climate adaptation works with the public health sector[56]. Yet, research on climate adaptation efforts at city level highlight the lack of integrated approaches between different departments and sectors. Typically, climate adaptation is led by environmental, infrastructure, or sustainability departments, with limited coordination with sectors focused on social issues, such as welfare or public health[56] . As a result, adaptation strategies are often disconnected from the needs of migrants.

When social dimensions are considered, they are usually addressed through isolated projects—such as retrofitting social housing or supporting the elderly. A comparative study of climate adaptation initiatives in European cities found significant variation in the level of cooperation between sectors—such as urban planning and primary healthcare—and with local NGOs. Where such collaborations occurred, planners reported that they helped expand awareness of climate impacts and improved the relevance of adaptation strategies[56].

The quality of mitigation and adaptation policies and practices is also undermined by knowledge gaps among local decision-makers and public authorities, as well as by the disconnects between national policies and local realities [12,28]. Limited resources—both time and funding—are frequently cited as barriers to effective adaptation planning[56].

For instance, while local governments are encouraged to enhance participatory processes to ensure communities' voices are heard, including those of migrants, they often lack the funding to support meaningful engagement[19]. Most studies around participation and representation in policymaking highlight the need to strengthen these processes to include a broader range of groups—particularly marginalised populations such as racialised communities[29,34], people experiencing homelessness[11], and children[26]. Another major barrier is the lack of adequate data to aid decision-making in climate adaption, including a shortage of disaggregated public health data[56] and more specifically, data disaggregated by country of origin, race, or ethnicity (see also section 2.6 and 2.9).

2.9 Disaster Risk Reduction Policy and Approaches



DRR typically involves four phases—Mitigation and Preparation (before the disaster event) & Response and Recovery (after the disaster event)— which are normally represented by means of a 'disaster cycle' to highlight their interconnectedness and overlap. DRR efforts play a crucial role in shaping the experience of and the recovery from these events. Research shows that vulnerability changes throughout these different phases, meaning that some individuals and groups might be vulnerable in one phase and not in another[23]. Immersed in broader societal structures, **DRR efforts often reproduce axes of oppression and discrimination, such as racism and class inequalities**[29,34,61,62].

The **mitigation** phase of DDR plans typically involves developing preventive laws and regulations, implementing construction standards, establishing zoning requirements, purchasing insurance and constructing barriers. **Preparedness** includes training, planning and educational activities to avoid the worst impacts. Over the past two decades, DRR policies have increasingly emphasized individual awareness of flood risk and the adoption of protective measures at as a key element in flood management[22,28] (see also section 2.4).

Household-centred preparedness approaches can result in unequal levels of protection among different groups[63], placing a burden on individuals to manage risks that they may be ill-equipped to handle. The growing privatization of DRR is arguably linked to broader neoliberal trends promoting the **individualization of responsibilities** in different domains such as health, education, labor and housing[63].

This has implications for migrants who may lack access the financial knowledge and informational resources to implement such measures. Flood risk reduction activities conducted by wealthier groups or organisations representing them can also have adverse effects on less privileged groups such as migrants, thereby reinforcing inequalities[63].

DRR efforts often focus on risk perception and awareness of extreme weather, as these are seen as crucial factors of vulnerability[21,64,19]. While understanding hazards can help explain disasters, it may misleadingly suggest that extreme weather affects everyone equally, highlighting the growing importance of recognizing diverse vulnerabilities in DRR[21].

Although some studies have linked low risk awareness to low social class, high social vulnerability, and deprived areas [18,29,65,] there are no clear one-size-fits-all links between risk perception and demographic, social, environmental and locational factors[17,65,66]. This makes it difficult to associate risk perception with migration status in the absence of specific studies or data focusing on migrants.

State-citizen relationships, place attachment, and previous flood experiences have been found to significantly influence risk perception[63]. For instance, a study in Italy found that high levels of trust in local authorities and DRR-related policy and action were associated with lower levels of risk awareness and increased vulnerability during the preparedness phase.[17]

Conversely, in areas with higher crime rates, or distrust among local communities and institutions, residents may choose not to evacuate out of fear of looting or personal safety.[12] A UK study found that perceived failure of local institutions to provide expected protection during a flood was associated with reduced preparedness, as people reported not knowing how to protect themselves[28]. This can be worsened by language and cultural barriers faced by many MW migrants, as well as by the lack of trust towards state institutions, especially among undocumented migrants.

Prior flood experiences are closely associated with greater awareness of flood risk [17,67]. However, these links may be shaped by class and ethnicity[29]. In some cases, previous flood experiences can lead to underestimation of risks, particularly if previous events were less severe[17,23]. A study from Germany described how people accustomed to flooding were surprised by the scale of the 2002 river floods.[23] This may also apply to migrants whose previous flood experiences occurred in very different contexts. Overall, while risk communication is central to DRR, the assumption that awareness leads to action is flawed. Factors such as personal experience, social dynamics, access to resources, and language barriers—especially for migrants—can hinder effective responses.[63,19]

After extreme weather events, the **response phase** includes evacuation and rescue operations, damage assessments, and the provision of first aid, assistance, and shelter. The recovery phase involves reconstruction, restoration of livelihoods, and community development.

As discussed in earlier sections, state policies for response and recovery often fail to meet the needs of marginalised groups, such as migrants, thereby worsening health inequalities,[37,64,65] for example through processes of displacement and gentrification (see also section 2.4 & 2.7).[28,66]

In terms of evacuation capacity, dependence on public transport has been linked to immobility prior to an event and the failure of evacuation plans[21]. High population and building density are also seen as barriers to timely evacuation[17]. Migrants often belong to groups that rely on public transport and live in densely populated neighbourhoods. Moreover, authorities and NGOs may have limited engagement with certain racialised or religious communities—groups to which many migrants belong. This lack of contact results in poor understanding of how to reach people in a crisis, what kinds of support they might need, or how to communicate effectively.[14,55]

State policies for response and recovery often fail to meet the needs of marginalised groups.

Recovery is often lengthy, follows a non-linear path, involves many unpredictable turns, and is marked by uncertainty[26]. Although the recovery process tends to be framed as a "brief interlude following the tightly defined disaster event" in policy and practice[38(p2318)], there is no clear endpoint to recovery[38]. In addition, the impacts of flooding often cannot be undone or forgotten and have interlinked social and economic effects that extend far in time and space[38]. For instance, floods reach beyond areas directly affected by water, affecting carers and relatives of those whose homes were affected[26]. In the case of migrants, these links might also be transnational.

Research shows that policies and practices that allow individuals and communities to exercise agency in their recoveryenhance psychological, emotional and social resilience and act synergistically with the community and institutional support people receive [68,28]. At the same time, the lack or inadequacy of support for recovery can result in loss of agency and feelings of powerlessness. This might further lead to mental health issues as people lack control over the recovery process [68]. Poorly designed support services can exacerbate distress. For instance, insufficient information on evacuation procedures[68] or prolonged dependency on bureaucratic recovery systems can undermine autonomy, leaving individuals in limbo as daily life, work, education, and other responsibilities continue without them.[58]

The need for support during recovery phase is not always straightforward to get recognized by authorities, insurance companies and other actors. "Flooded status", for example, is defined is the basis on which households can access support and claim insurance. During the 2007 Hull flood[69], the city council mapped flood-affected households using visible damage to assign vulnerability and support. However, many residents experienced secondary flooding—invisible water damage that emerged later through damp, mould, and structural decay, often only becoming visible one year after the event. Such households struggled to access insurance and support, resulting in stress, disputes, and financial strain. This illustrates how flood experiences are mediated by power structures, technical definitions, and the material ambiguities of water, with significant implications for justice.

3 Insights and Future Directions

This report has identified and analyzed nine key drivers of flood-related health vulnerability for MW migrants in European cities. These relate to demographic characteristics, migration status, racism and intersectional discrimination, housing, employment, health, neighborhood infrastructures, urban planning, and DRR policies. While analytically distinct, these drivers often overlap and reinforce each other, creating complex and compounding vulnerabilities. Crucially, structural factors like racism, class inequality, and migration policy shape many of the institutional and environmental conditions migrants face.

These structural drivers operate across multiple domains—from labor and housing to healthcare access and exposure to unsafe public spaces—deepening migrants' vulnerability to flooding and extreme rainfall. This underscores the urgent need for a fresh perspective—one that doesn't just react to climate risks but interrogates the deeper, structural inequalities that shape them. To effectively address flood-related vulnerability, we must centre the experiences of migrants in European cities and reckon with both short-term crises and long-term, everyday hardships.

Strikingly, our review uncovered a significant gap: there is virtually no academic literature addressing the specific health vulnerabilities of MW migrants in Europe in relation to flooding or extreme precipitation. Racialised communities and ethnic minorities are similarly overlooked. While there is a growing body of work in the U.S. examining the intersection of race, health, and climate—particularly post-Hurricane Katrina—this conversation has barely begun in Europe. Notable exceptions, like studies on the 2007 Hull floods in the UK, point to a broader neglect of racialised voices in both policy and scholarly spaces.

Most of the literature we reviewed treats flooding as a neatly contained event—something that happens, then ends. This mirrors the dominant DRR frameworks but fails to reflect the realities many communities face during and after floods. Long-term consequences like chronic flooding, water damage, mould, and dampness rarely make it into the conversation, nor does the far-reaching, networked nature of flood impacts across cities, countries, or even borders. Extreme, repeated and prolonged rain events, despite their increasing frequency, are almost entirely absent from the discourse.

Methodologically, the field remains heavily reliant on quantitative methods. While these are important for tracking exposure and health outcomes, they often miss the bigger picture. Qualitative, critical, or social science perspectives were scarce and, when present, mostly emerged from the UK. Moreover, in the absence of direct research on migrants and flooding, we expanded our search using broader indicators like socio-economic status, ethnicity, and marginalisation. While this approach offered a wider lens, it also risks conflating distinct forms of vulnerability and erasing the specificities of migrant experiences.

We also stress the importance of temporality: **vulnerability is not static**. Legal status can change, living conditions evolve, and communities adapt. There are both political and ethical implications to labelling individuals or communities as "vulnerable" without acknowledging the deeper structural causes of that vulnerability or the agency and dynamism communities bring to confronting it. Migrants are not passive victims; they are knowledge-holders and actors who respond to and contest risks in creative and collective ways—through individual strategies, household decisions, and political organizing.

Urban planning and policy must reflect these shifting and active realities. This means moving beyond neoliberal/individualized and infrastructure-heavy notions of "resilience," and towards justice-based support systems that value vernacular, bottom-up knowledge, and ones that invest in social infrastructures and welfare systems that empower communities to transform their realities.

We also recognize the limitations in this review, particularly the fact that we did not look at literature produced outside academic institutions—such as reports, insights, and reflections from NGOs, grassroots organizations, and migrant communities themselves. While this focus was intentional in the aim to map the current academic landscape, it inevitably narrows the scope of perspectives captured. Our keyword choices may have missed relevant research that used different terminology but was still highly relevant. And centering on climate-related studies, we may have overlooked health research—such as occupational studies on migrant workers—that could add vital context.

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