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Adjacent Incomes, Unequal Health: Urban Health Disparities Between Slum and Lower-Middle-Income Households in Dhaka

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Abstract

Urban health disparities in Dhaka, Bangladesh, are shaped not only by household income but also by place-based inequalities in housing, sanitation, healthcare access, food security, and urban governance. Drawing on recent perspectives on place effects and geographical variations in health and social indicators, this study examines how everyday living environments produce unequal health conditions across adjacent socioeconomic groups. Using Korail slum and Sunibir Housing as comparative local settings, the study evaluates health conditions among low-income households (LIH) and lower-middle-income households (LMIH) through household surveys, structured questionnaires, and Urban Health Index (UHI) analysis. A total of 276 respondents participated, including 154 from Korail and 122 from Sunibir Housing. Indicators included disease symptom prevalence, exposure to health risk factors, healthcare-seeking behavior, sanitation access, and nutrition.

Findings show that LIH experienced substantially worse health conditions than LMIH, despite the two groups occupying relatively close income positions. LIH reported a higher prevalence of fever, cold, and cough, alongside poorer nutrition, inadequate sanitation, and limited healthcare access. UHI scores were consistently lower among LIH across all domains, demonstrating that place-based disadvantages can intensify health vulnerability beyond income alone. Framed through feminist political ecology, the study argues that these disparities reflect unequal urban power relations and uneven access to care infrastructures, rather than individual behavior alone. The study also highlights the value of community-based, citizen-informed data collection for making visible local health inequities that are often obscured in official statistics. These findings underscore the need for targeted, place-sensitive, and participatory urban health interventions in Dhaka's marginalized settlements.

Declarations:

- **Ethics approval and consent to participate**

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki. As there is no separate ethics approval entity in Bangladesh, ethical approval for this study was obtained from the Department of Geography and Environment, University of Dhaka, Dhaka, Bangladesh. All participants provided their informed verbal consent prior to participation in the study. All participants were over the age of 18. The purpose of the study and use of the data were explained to each participant. Individual informed verbal consent was obtained prior to participation. To ensure privacy and confidentiality, no personally identifiable information was collected before, during, or after the data collection process.

- **Consent for publication**

Not Applicable

- **Availability of data and materials**

The datasets generated and/or analyzed during the current study are not publicly available to maintain the privacy of participants. The aggregated questionnaire responses are available from the corresponding author upon reasonable request.

- **Competing interests**

There are no competing interests.

- **Clinical trial number**

Not Applicable

- **Funding**

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Introduction

Urban health inequity is a persistent feature of uneven development, where poorer households experience greater disease exposure, weaker healthcare access, and reduced capacity to recover from economic and health shocks. In Dhaka, these disparities are intensified by rapid urbanization, limited public resources, fragmented urban governance, and unequal access to housing, sanitation, healthcare, and livelihood security. From a feminist political ecology perspective, these conditions are not simply outcomes of poverty but are produced through power relations that determine who controls resources, whose health needs are recognized, and whose labor sustains everyday survival (Heynen, 2018; Ulloa, 2021; Ojeda et al., 2022).

Dhaka's low-income population includes many rural migrants who move to the city in search of economic opportunity. Over the past 25 years, rapid urbanization has been accompanied by population growth of 6.9 percent, with nearly 50% of the population living below the poverty line (BBS, 2001; 2011, 2024). Many low-income households live in one-room slum dwellings marked by overcrowding, inadequate sanitation, extreme poverty, and limited access to essential services. These conditions create heightened vulnerability to poor health outcomes. A World Bank report identifies major urban health governance challenges, including uncoordinated service delivery across national and local agencies, outdated regulations and facility coverage, weak oversight, and the absence of an overarching urban health policy (World Bank, 2018). These governance gaps reflect broader inequities in how urban resources and health protections are distributed.

The health landscape of Bangladesh's urban slums is shaped by infectious disease, limited formal healthcare access, and reliance on informal providers. Children, especially those under five, face recurrent risks of fever, diarrhea, skin infections, and other preventable illnesses. Evidence from slums in Khulna and Rajshahi shows that these conditions remain common among slum residents (World Bank, 2018). In Dhaka, studies report frequent illness among slum dwellers, including fever, cough, diarrhea, and skin problems, with prevalence rates of 39.5%, 7.8%, 4.3%, and 2.3%, respectively (IHE DU, 2015).

Healthcare access remains severely constrained. About 82.4% of slum residents rely on pharmacies or unqualified practitioners because they are more affordable, accessible, and faster than formal services, while only 13.9% use modern public healthcare facilities (IHE DU, 2015). Among children, informal care also dominates, with 56.3% of sick children treated by unqualified doctors (icddr,b, 2019). This reliance on informal care reflects constrained choice under conditions of poverty, limited mobility, institutional exclusion, and uneven service availability.

The COVID-19 pandemic further exposed these vulnerabilities. The economic shutdown threatened the livelihoods of informal-sector workers, leaving many households with little financial protection for healthcare. Yet evidence on the pandemic's impact on urban slum health remains limited, and much available data comes from the pre-pandemic period. A 2020 survey

found that 41% of respondents in Dhaka slums avoided regular health facilities due to fear of COVID-19 infection and perceived doctor unavailability (Mahmood et al., 2022). As a result, many relied more heavily on informal providers, increasing risks of delayed treatment, malpractice, and untreated complications, particularly in maternal healthcare (CARE et al., 2020; Barakat, 2020). COVID-19 testing was also difficult to access because public facilities were overcrowded and private testing was expensive (Mahmood et al., 2022).

Health disparities refer to differences in health outcomes and healthcare access across population groups and are strongly shaped by socioeconomic status (Miething & Yngwe, 2014). Comparing lower-income and lower-middle-income households is therefore important because these groups may appear economically adjacent but experience sharply different health risks. Lower-income households often face higher burdens of non-communicable diseases, including diabetes, cardiovascular disease, and respiratory illness (Arroyave et al., 2014; Peñas et al., 2020). These outcomes are linked to limited access to nutritious food, reduced opportunities for physical activity, and greater exposure to environmental hazards (Najafi et al., 2018; Gatimu & John, 2020). Lower-middle-income households may have comparatively better access to safer housing, healthier diets, preventive care, and physical activity opportunities (Allen et al., 2017; Al-Hanawi, 2021; Peñas et al., 2020; Lago et al., 2017). From a feminist political ecology perspective, this contrast reflects not only income difference but also unequal access to resources, care infrastructures, and urban protection.

Urban health research increasingly calls for integrated approaches that capture these intersecting social, environmental, and service-related determinants. Studies in Japan show that urban determinants collectively explain more than half of the variance in health outcomes across cities (Takano & Nakamura, 2001). The Urban Health Index (UHI) offers one way to consolidate multiple health indicators and improve spatial comparison across smaller urban areas. Applications in São Paulo and Atlanta show that the UHI can reveal sharp intra-urban inequalities, including disparities between central and peripheral neighborhoods and health-risk “disparity swaths” across census tracts (Lima et al., 2022; Rothenberg et al., 2014).

In Dhaka, applying this approach to compare lower-income slum settlements and lower-middle-income settlements can reveal how adjacent income groups experience unequal health conditions, healthcare access, and vulnerability. This study therefore aims to:

1. quantify and compare health disparities between lower-income slum settlements and lower-middle-income settlements in Dhaka; and
2. determine whether targeted healthcare interventions are required for marginalized urban households.

Methods

Study Design and Theoretical Orientation

This study used a comparative cross-sectional survey design to assess health disparities between low-income households living in an informal settlement and lower-middle-income households living in a low-rent formal neighborhood in Dhaka, Bangladesh. The comparative design was selected to examine whether health inequities are visible not only between poor and affluent populations, but also between adjacent income groups that occupy different positions within Dhaka's urban hierarchy.

The study was informed by a feminist political ecology perspective, which understands health vulnerability as the outcome of unequal access to resources, services, infrastructure, land, mobility, and institutional protection. Rather than treating poor health as an individual or household-level problem alone, this framing situates health outcomes within broader urban power relations. In this study, differences between low-income and lower-middle-income households are therefore interpreted as reflections of uneven urban governance, unequal resource distribution, insecure housing, constrained healthcare access, and differentiated capacities to manage illness, risk, and everyday survival.

Study Area Selection

Two study sites were selected within Dhaka: Korail slum and Sunibir Housing in Adabar Thana. These sites were chosen to compare health conditions across two economically vulnerable but structurally distinct urban populations.

Korail slum was selected as the primary study site representing low-income urban poor households. Korail is one of the largest and densest slum settlements in Dhaka North City Corporation. It is located near the affluent areas of Banani and Gulshan and extends across parts of Wards 19 and 20 of Dhaka City Corporation. The settlement is officially described as occupying approximately 99 acres of land, although residents estimate its area to be between 180 and 220 acres, reflecting the informal and contested nature of slum boundaries (Mridha et al., 2009).

Korail was considered suitable for this study because it contains a large population within a highly concentrated area and represents many of the structural conditions associated with urban poverty in Dhaka. Residents are engaged in diverse informal economic activities, including low-wage and precarious forms of labor. The settlement is also located within an economically active part of the city, making it an important site for examining how urban poor communities remain spatially close to wealth and opportunity while experiencing limited access to secure housing, sanitation, healthcare, and institutional support.

To assess whether the health conditions observed in Korail were specific to slum-based poverty, a comparison group was selected from Sunibir Housing in Adabar Thana. Sunibir Housing was chosen because it represents a lower-middle-income urban neighborhood where residents generally live in low-rent dwellings, earn below 40,000 Bangladeshi taka per month, and are primarily engaged in blue-collar or lower-paid occupations. This group was not treated as a

"control group" in the experimental sense, but as a comparison population that allowed the study to examine differences between two adjacent income groups. This comparison is important because even modest differences in income, housing security, and service access may produce meaningful differences in health outcomes and healthcare-seeking behavior.

Sample Size Determination

Because the population of Korail slum is highly fluid due to continuous migration, uncertain household turnover, and undetermined birth rates, the exact population size was unknown. Therefore, the sample size was estimated using the standard sample-size formula for an unknown population:

$$n = \frac{Z^2 \times p(1-p)}{d^2}$$

where $n$is the required sample size, $Z$is the Z-score for the selected confidence level, $p$is the assumed population proportion, and $d$is the margin of error. A 95% confidence level was used, corresponding to a Z-score of 1.96. Because the true population proportion was unknown, $p$was set at 0.5, which provides the most conservative estimate by maximizing variability.

Using an 8% margin of error, the required sample size was approximately:

$$n = \frac{1.96^2 \times 0.5(1-0.5)}{0.08^2} \approx 150$$

Using a 10% margin of error, the required sample size was approximately 96. Therefore, the target sample size for each study area was set between 96 and 150 respondents. The final sample included 154 respondents from Korail slum and 122 respondents from Sunibir Housing. These sample sizes were considered sufficient for comparing health indicators between the two study populations.

Sampling Strategy

A cluster-based household sampling strategy was used in both study areas. In Korail slum, the settlement was first scoped to identify residential clusters. Because many households in Korail live in shared structures, houses containing more than five households were treated as clusters. In some cases, a single structure contained more than 12 households, each occupying one or two rooms. From each selected cluster, up to three households were surveyed depending on respondent availability.

The same sampling logic was applied in Sunibir Housing to maintain comparability between the two study areas. This approach was appropriate because both sites contained dense low-rent housing arrangements where multiple households were spatially concentrated within shared or

closely adjacent buildings. The cluster-based approach also helped ensure coverage across different parts of each neighborhood while remaining feasible within the time and resource constraints of the survey.

Data Collection

Data were collected using a structured questionnaire developed in Kobo Toolbox. The questionnaire included both open-ended and closed-ended questions to capture quantitative indicators as well as contextual information related to health conditions, healthcare access, sanitation, and risk factors. The survey was conducted from July 5 to July 20.

The questionnaire collected information across three major domains:

First, symptomatic disease indicators were recorded, including asthma, cold, cough, diarrhea, fatigue, fever, headache, light-headedness, nausea, pain in any part of the body, skin disease, vomiting, and related symptoms.

Second, health risk factors were assessed, including alcohol consumption, diabetes, high blood pressure, lack of a balanced diet, lack of physical exertion, smokeless tobacco use, and smoking.

Third, healthcare-related and sanitation indicators were collected, including diagnosis-seeking tendencies, vaccination status, sanitation practices, and related healthcare behaviors.

These indicators were selected because they reflect both immediate health conditions and broader determinants of health vulnerability. From a feminist political ecology perspective, these indicators are not only biomedical measures but also proxies for unequal access to food, housing, sanitation, care infrastructure, income security, and everyday resources needed to maintain health.

Ethical Considerations and Participant Consent

The privacy and confidentiality of all research participants were maintained throughout the study. All respondents were over the age of 18. Before starting the interview, participants were informed about the purpose of the study, the nature of their participation, and how the data would be used. Individual verbal informed consent was obtained from each respondent.

No personally identifiable information was collected before, during, or after the survey. Although Bangladesh does not have a separate institutional entity for ethical approval for this type of academic research, approval was obtained from the Department of Geography and Environment, University of Dhaka. The study was funded by the National Science and Technology Fellowship awarded by the Ministry of Science and Technology, Government of the People’s Republic of Bangladesh.

Data Management and Indicator Selection

Survey responses were collected digitally through Kobo Toolbox and later compiled for analysis. Data reports generated from Kobo Toolbox were analyzed and visualized using Microsoft Excel. After data compilation, indicators were reviewed based on response completeness and relevance to the study objectives. Indicators with sufficient respondent participation were retained for analysis.

The selected indicators were used to compare health conditions, health risk factors, healthcare practices, and sanitation-related conditions between low-income households and lower-middle-income households. This process allowed the study to identify measurable differences between the two groups while also recognizing that quantitative indicators represent only part of a broader landscape of lived vulnerability.

Urban Health Index Calculation

The Urban Health Index (UHI) was used to standardize and compare health indicators across the two study areas. The UHI was selected because it provides a flexible method for selecting, combining, and presenting health data across defined geographic units. It is especially useful for examining intra-urban health disparities because it allows multiple indicators to be standardized and aggregated into a single comparative measure. The calculation followed the steps outlined in the Urban Health Index handbook (WHO Centre for Health Development et al., 2014).

The UHI calculation involved two main steps: standardization of indicators and amalgamation of standardized indicators.

- **Indicator Standardization**

Because the selected indicators were measured on different scales, each indicator was standardized before aggregation. Standardization was conducted using the following formula:

$$IS = \frac{I - MIN^*(I)}{MAX(I) - MIN^*(I)}$$

where Irepresents the value of an indicator for a given unit, $MAX(I)$is the maximum value of that indicator across all units, $MIN^*(I)$is the minimum value of the indicator minus a small constant, and $IS$is the standardized indicator value. This procedure rescales the indicators so that they can be compared and combined across different measurement units.

- **Indicator Amalgamation**

After standardization, the standardized indicator values were combined into a composite Urban Health Index. The UHI was calculated using the geometric mean of the standardized indicators:

$$UHI = \left(\prod_{i=1}^{j} I S_i \right)^{1/j}$$

where $j$is the number of standardized indicators included in the index. The UHI ranges from 0 to 1, where values closer to 1 indicate better health conditions and values closer to 0 indicate poorer health conditions (WHO Centre for Health Development et al., 2014).

The geometric mean was used because it reduces the possibility that a very high value in one indicator will fully compensate for a very low value in another. This is methodologically important for health equity analysis because poor performance in one essential domain, such as sanitation or healthcare access, may substantially affect overall health vulnerability.

Validation and Quality Assurance

Several steps were used to strengthen the validity and reliability of the study. First, site selection was theoretically and empirically justified. Korail slum was selected because it represents a highly dense, low-income informal settlement, while Sunibir Housing was selected as a lower-middle-income comparison area. This allowed the study to examine whether health disparities exist across adjacent income groups rather than only between extreme socioeconomic categories.

Second, the questionnaire was structured around clearly defined health, risk-factor, healthcare, and sanitation indicators. The use of Kobo Toolbox helped standardize data collection and reduce inconsistencies during field entry. The inclusion of both open-ended and closed-ended questions also allowed the survey to capture measurable patterns while retaining space for contextual responses.

Third, indicator selection was based on response completeness and relevance to the study objectives. This helped ensure that the UHI calculation was based on indicators with sufficient data support. Finally, the use of standardized UHI procedures provided a consistent framework for comparing indicators across the two study areas.

Analytical Approach

The analysis compared low-income households in Korail slum and lower-middle-income households in Sunibir Housing using selected health symptoms, risk factors, healthcare-related indicators, and sanitation practices. Descriptive statistics were first used to summarize patterns in each study area. The Urban Health Index was then calculated to provide a standardized measure of comparative health conditions.

The analysis was guided by the central question of whether lower-income slum residents experience distinct and more severe health vulnerabilities than lower-middle-income residents living in low-rent but more formal housing conditions. Rather than interpreting these differences only as individual health behaviors, the study situates them within broader structures of urban

inequality. Differences in health outcomes and healthcare practices are therefore understood as linked to unequal access to income, housing security, sanitation, healthcare infrastructure, mobility, and institutional recognition.

Findings

Comparison of Health Disparities

Frequency of Disease Symptoms: In the lower-income households (LIH) of Korail Slum, the respondents admitted to being affected by fever every year, especially the children under 2 years old, who were said to suffer from frequent fevers, colds, and diarrhea. But this tendency lessens as these children grow up. The older children were said to be less affected by symptomatic disease diseases. Overall, between January 2020 and July 2022, 89.54% of the respondents admitted having suffered from fevers in their household. Followed by fever, cold (60.86%), cough (32.17%), headaches (13.4%) and pain in various body parts (15%) were common symptoms.

The respondents in Korail slum reported that initially, during the beginning of the pandemic, they did not notice any disease symptoms. Only 25 % of households attested to suffer from disease symptoms in 2020. This percentage escalated over the years 2021 and 2022 (Figure 2). The respondents agreed to the fact they could not recall the specific scenario of their diseases due to the fact 2 years have passed since then. 28% of the households in Korail reported that they did not notice any disease symptoms in the span of these 2.5 years.

The affliction of diseases in lower middle-income households (LMIH) in Sunibir Housing followed a very different pattern. Here, cold (60.18%), cough (58.24%), asthma (54.12%) were reported in over half of the households surveyed (Figure 3). Furthermore, they were more aware of their disease symptoms than the slum dwellers. However, the pattern of rise in the frequency of disease symptoms over till 2021 is evident here as well, but with vaccinations, they saw a decline in their symptoms associated with COVID 19.

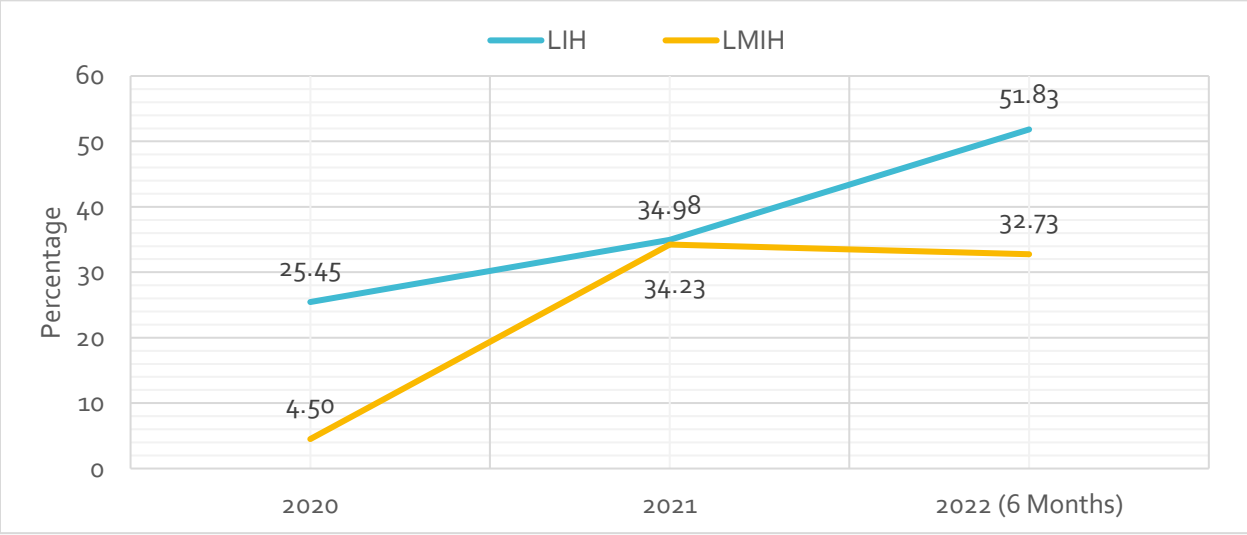


Figure 2: Disease symptoms recollected by the respondents in since 2020 (%)

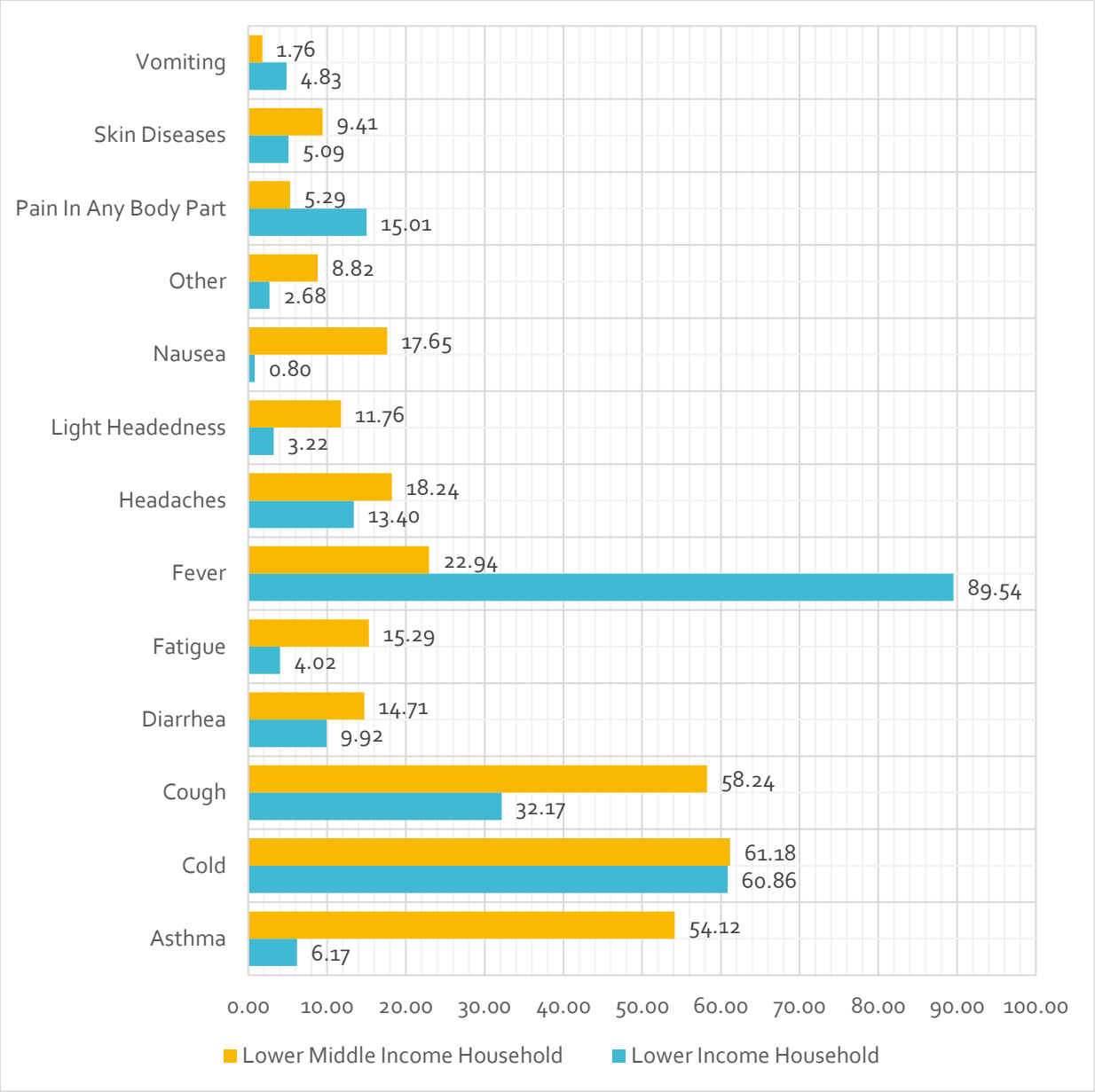


Figure 3: Prominent disease symptoms among respondents (%)

Exposure to Health Risk Factors: In Korail Slum, 55.25% of the respondents and their family members were exposed to some form of health risk factor (Figure 4). The most prominent among them were the lack of fruits in their diet (29.41%) and smoking (24.58%). In Sunibir Housing, the prominent risk factors were smoking (21.11%), lack of physical exertion (17.22%) and lack of fruits and vegetable consumption (17.22%) (Figure 4). Overall, the lower-income people were exposed to fewer health-risk factors.

All respondents had rice and vegetables in Korail slum and Sunibir Housing as their primary dietary intake. Their primary sources of protein were lentils and fish. Meat and fruits were luxurious items. Meat was consumed only once or twice a week. Fruit once or twice a month. One

difference between the study areas was that the respondents in Sunibir housing relied on eggs (90.16%). In most cases, the slum dwellers had rice as three meals in a day; only 21.43% of households had breakfast with bread. While vegetables are a staple in both types of households, they do not have the same type of food every day. Especially in Sunibir Housing, the food alterations were prominent. Over 45% of households in Korail Slum had no variation in their food. However, they prepared different types of vegetables every day.

In Korail Slum, the respondents informed us that they never actively measured their blood pressure or sugar levels. They were also reluctant to admit to smoking and drinking, especially in the presence of the opposite gender. These health risk factors were dominant and the tendency to hide them was common among male respondents and their male family members.

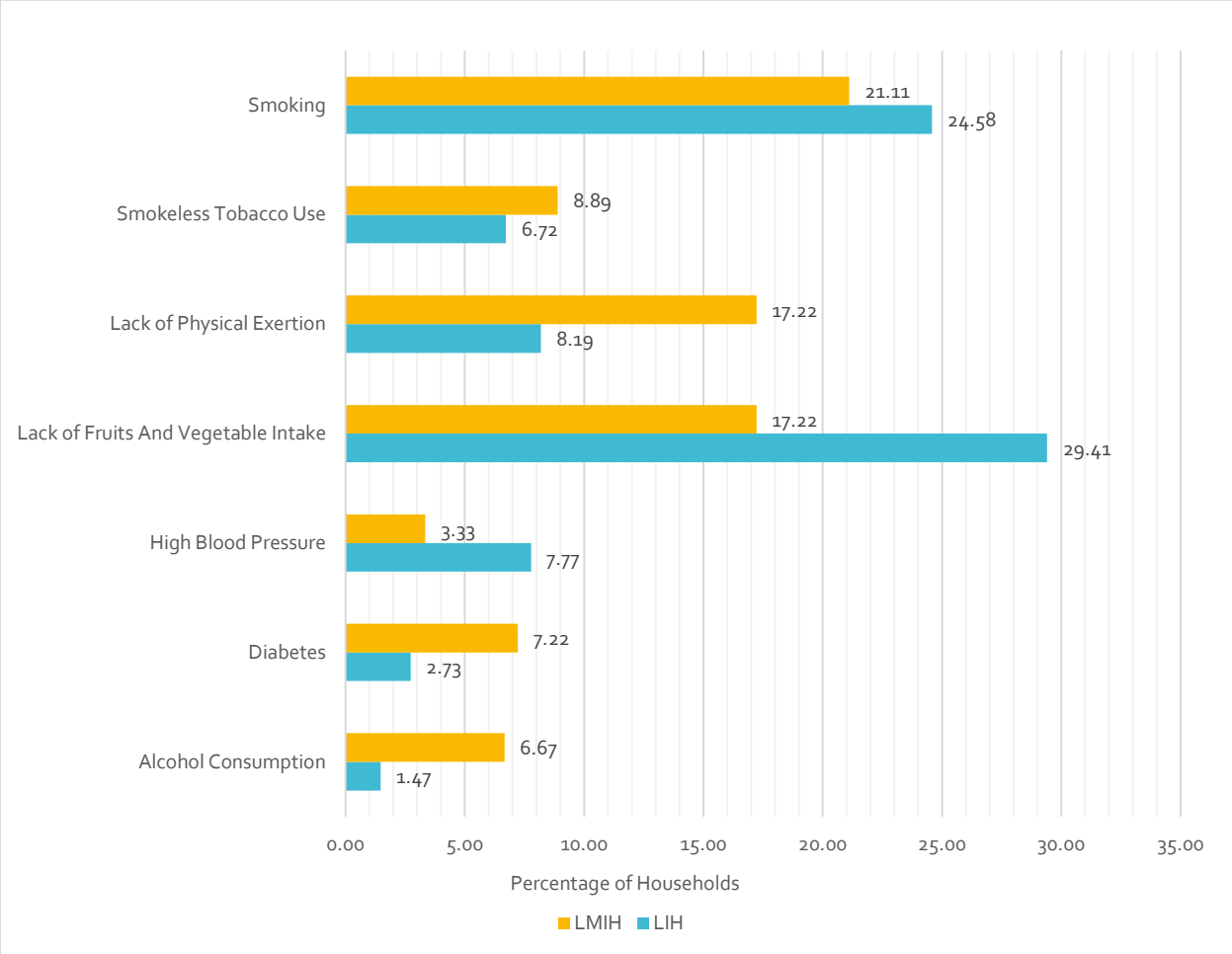


Figure 4: Exposure to health risk factors (%)

Access to Healthcare and Sanitation: The slum dwellers (53.25%) visited the pharmacy when they became visibly ill after waiting for 1-3 days. Some of them visited a doctor at a nearby health center. However, over 34.42% of households did not seek healthcare unless they got critically ill. The reasons behind this healthcare-seeking pattern are that they simply did not feel the need to do

it (30%) and they did not have enough finances to cover the cost (43%). These findings are shown in Figure 5.

The tendency to not seek healthcare and rely on self-medication was high in Sunibir Housing (38.52%). Some households reported seeking health care only if they were critically ill or when it hampered their daily activities. The reasons behind not seeking healthcare were the same for the dwellers of Sunibir housing as well.

Over 50% of households in Korail slum had 2 doses of COVID-19 vaccines. Only 17% of the respondents and their family members had full coverage of three doses. 17% of the respondents said that they had a person in their family with no form of vaccination.

In Sunibir housing, unvaccinated people against COVID-19 were rare. Everyone had at least one dose of the vaccine and over 80% of the family members had 2 doses of vaccines. The mask-wearing tendency was high in lower middle-income households (58.22%). They also faced many obligations to wear masks (25.41%). The tendency to wash hands was also high in this area (71.31%). These tendencies were 46.1% and 53.57%, respectively, in the lower-income area. The vaccination status, tendency to wear masks and wash hands are compared in Figure 6, 7 and 8.

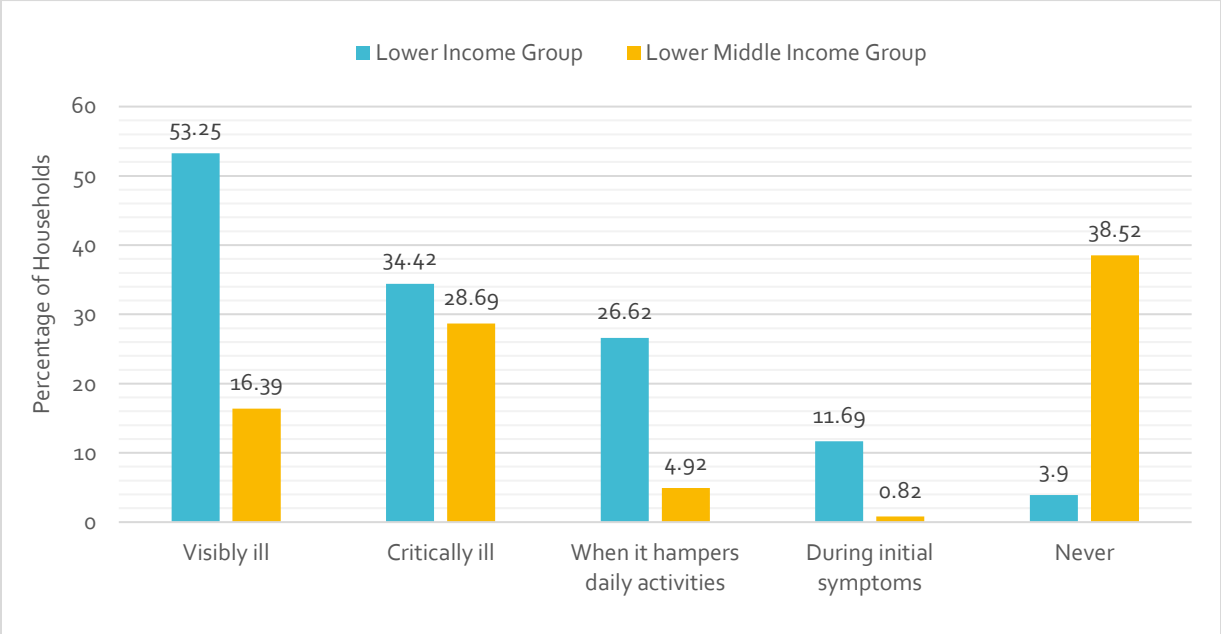


Figure 5 Healthcare seeking behavior

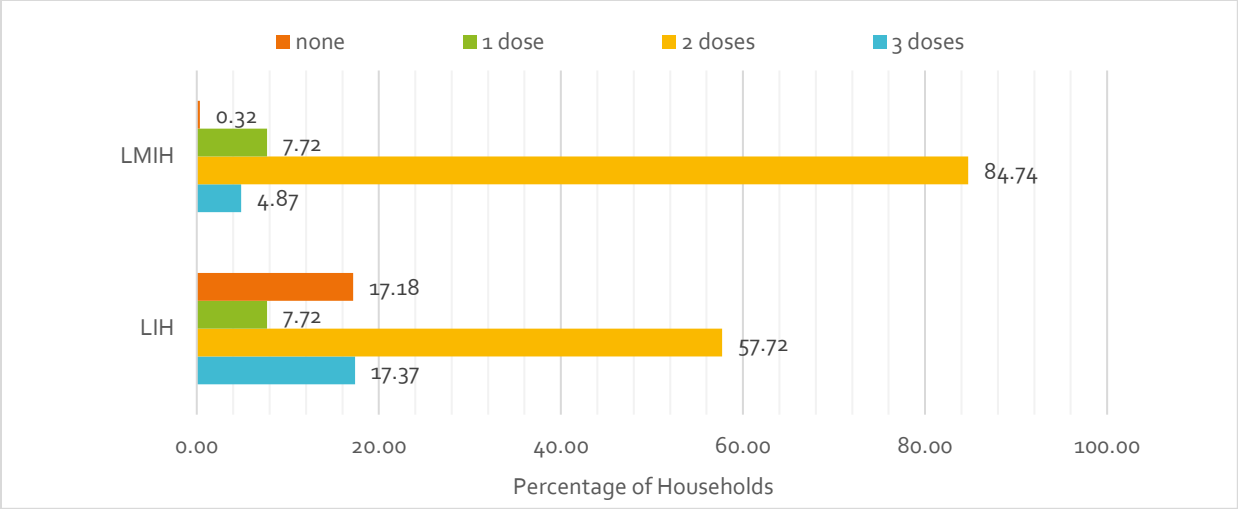


Figure 6 COVID 19 vaccination status during the time of survey

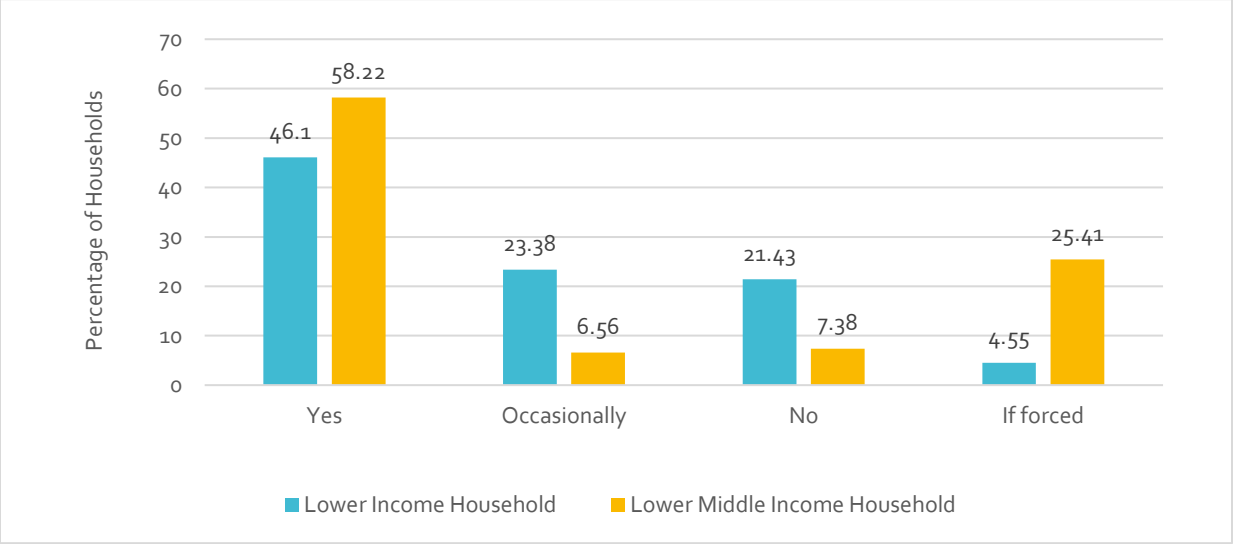


Figure 7 Tendency to wear masks (%)

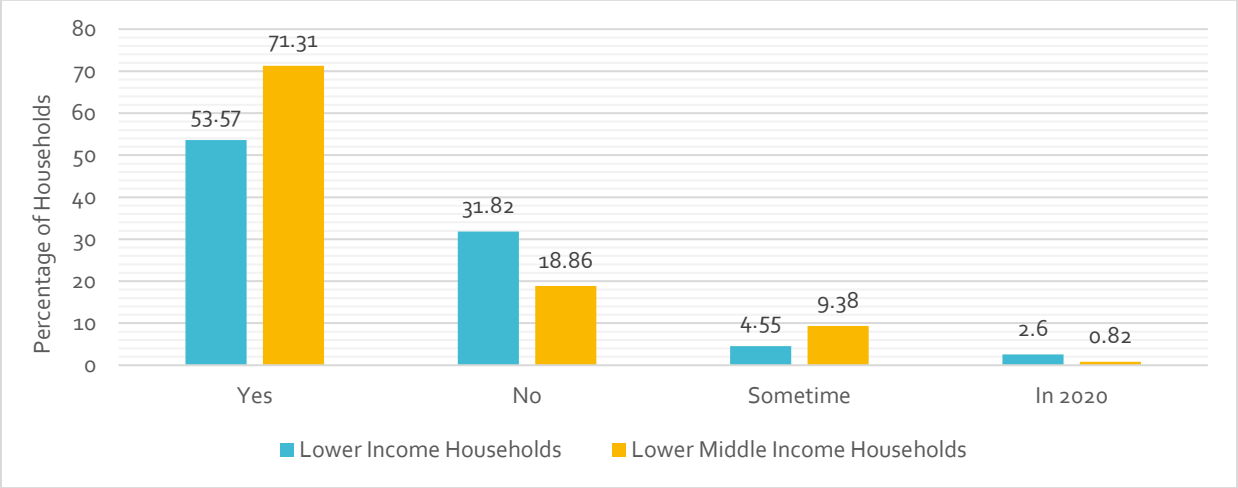


Figure 8 Tendency to wash hands.

In the lower-income households in Korail slum, 61% of the respondents used sanitary toilets. 24% of the households used pit latrines and 15% used hanging toilets. On the contrary, 99% of the households used sanitary toilets in Sunibir Housing. In the slum, an average of 4.27 households shared one toilet, with a standard deviation of 3.3 households. The water supply was very limited, and it had to be collected and preserved during specific times of the day. Sometimes, NGOs such as BRAC had constructed sanitary toilets for the dwellings. Toilet sharing practices were very few in the lower middle-income households.

In both locations, the garbage was generally cleaned by a garbage man. But the scenario is different between the two areas. In Korail slum, 68.18% of the household's that attest to this practice have a garbage bin provided by the city corporation in which they dispose of the waste and then it is collected by the garbage man. The frequency of garbage collection was different in different areas of the slum. Only 38.38% of households reported that their garbage was collected every day, whereas 73.77% of the households in Sunibir Housing reported that it was collected every day. 33.77% of the households in Korail Slum reported that they were collected once a week and 2.6 percent of the households responded that they were never collected. Moreover, 4.55 percent of the households reported that they did not dispose of it in any fixed place. One household, when asked the location for garbage disposal, informed us that they dumped it in a nearby waterbody. Sunibir Housing was not provided with a bin for waste disposal; they had to arrange a bin themselves and move it when the garbage man arrived.

The dwellings in Korail slum did not have sufficient ventilation. 48.05% of the households had one window, which was blocked by the dwelling beside it. Only 10.39% of the households had more than one window. 51.96% of the households did not have any form of windows in their households. 18.19% of households had vents or ducts that allowed some form of air flow. The rooms remain dark even in sunlight. On the opposite side, dwellings in Sunibir Housing had at least one window (Figure 9).

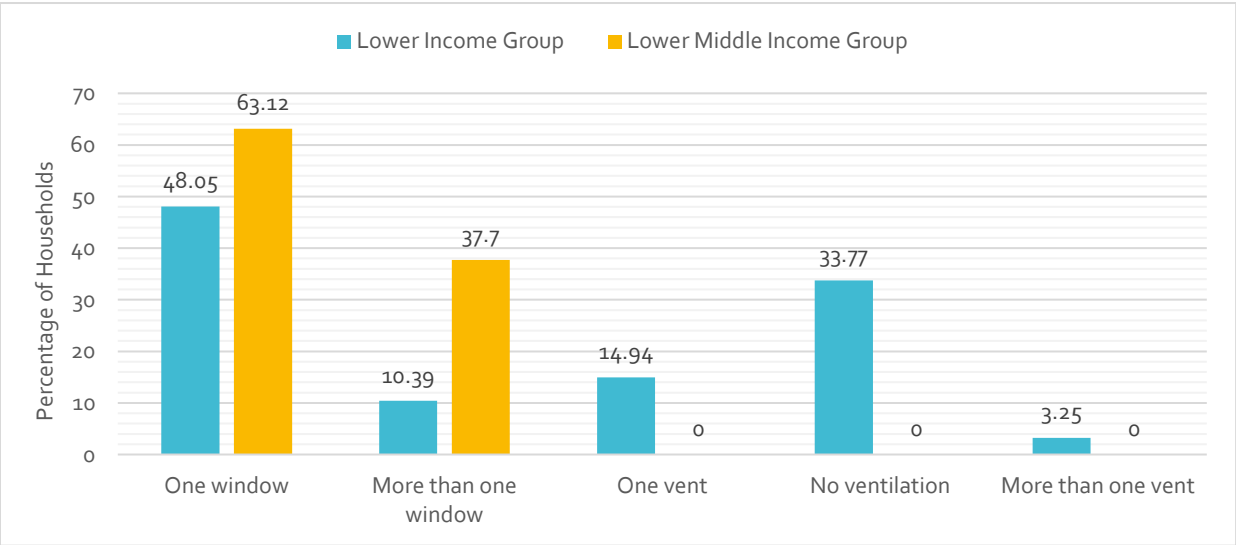


Figure 9 Ventilation in the households

UHI Comparisons

In terms of disease symptoms, with a UHI score of 0.449, LMIHs show significantly better conditions regarding disease symptom frequency. This means that LMIH reports fewer symptoms of illness such as fever, cold, cough, asthma, and diarrhea, which indicates better overall health. LIHs have a much lower UHI score of 0.029, suggesting worse health conditions and a higher frequency of disease symptoms (Table 1). This implies that residents of LIH are more likely to experience symptoms, reflecting poorer health and higher disease burdens.

Table 1: Frequency of Prominent Disease Symptoms

Indicators	LMIH	LIH	UHI LMIH	UHI LIH
Fever	58.24	89.54	**0.449**	**0.029**
Cold	61.18	60.86		
Cough	54.12	32.17		
Asthma	15.29	6.17		
Diarrhea	5.29	9.92		
Vomiting	8.82	4.83		
Fatigue	18.24	4.02		
Light Headedness	11.76	3.22		
Headache	22.94	13.40		
Skin Disease	17.65	5.09		
Pain In Body	14.71	15.01		
Nausea	9.41	0.80		

When we look at exposure to health risk factors, a UHI score of 0.165 for LMIH indicates relatively better conditions than LIH by a small difference. Though not ideal, lower-middle-income households show less exposure to risky behaviors such as smoking, lack of physical activity, and poor diet compared to LIH, reflecting better health practices and environmental conditions (Table 2). The UHI score of 0.088 for LIH is slightly lower, indicating worse exposure to health risk factors. These households face greater challenges related to unhealthier behaviors and living environments, such as poor diet, smoking, and lack of exercise, which exacerbate health risks.

Table 2 Exposure to Health Risk Factors

Indicators	LMIH	LIH	UHI LMIH	UHI LIH
Diagnosed Diseases	16.61	17.86	**0.165**	**0.088**
Smoking	21.11	24.58		
Alcohol Consumption	6.67	1.47		

Lack of balanced Diet	17.22	29.41		
Lack Of Physical Activity	17.22	8.19		
Smokeless Tobacco Consumption	8.89	6.72		
Diabetes	7.22	2.73		
High Blood Pressure	3.33	7.77		
No Vaccinations	24.32	9.07		
Diagnosis Tendency	30.88	45.05		

For access to sanitation and healthcare, The UHI score of 0.303 in LMIH reflects significantly better conditions (Table 3). These households have better access to healthcare services, vaccinations, sanitary toilets, and regular garbage collection. For example, a higher proportion of individuals from LMIH received COVID-19 vaccines and have access to sanitary conditions.

In contrast, the UHI score of 0.053 for LIH indicates substantially worse conditions in terms of access to sanitation and healthcare (Table 3). Limited access to healthcare, sanitation, and waste management infrastructure puts LIH residents at a considerable disadvantage. For instance, fewer LIH households had access to sanitary toilets, and garbage collection services are far less frequent.

Table 3: Sanitation Practices and Healthcare Tendencies

Indicators	LMIH (%)	LIH (%)	UHI LMIH	UHI LIH
Two doses of Covid Vaccine	**84.74**	**57.72**		
Covid Test Frequency	**26.1**	**9.4**		
Tendency to Wear Masks	**46.1**	**58.22**		
Tendency to Wash Hands	**53.57**	**71.31**		
Tendency to seek Healthcare	**50.02**	**74.68**	**0.303**	**0.053**
Some form of Ventilation	**100**	**66.23**		
Regular Garbage Collection	**73.77**	**38.31**		
Social distancing	**67.21**	**31.82**		
Sanitary Toilets	**99**	**61**		

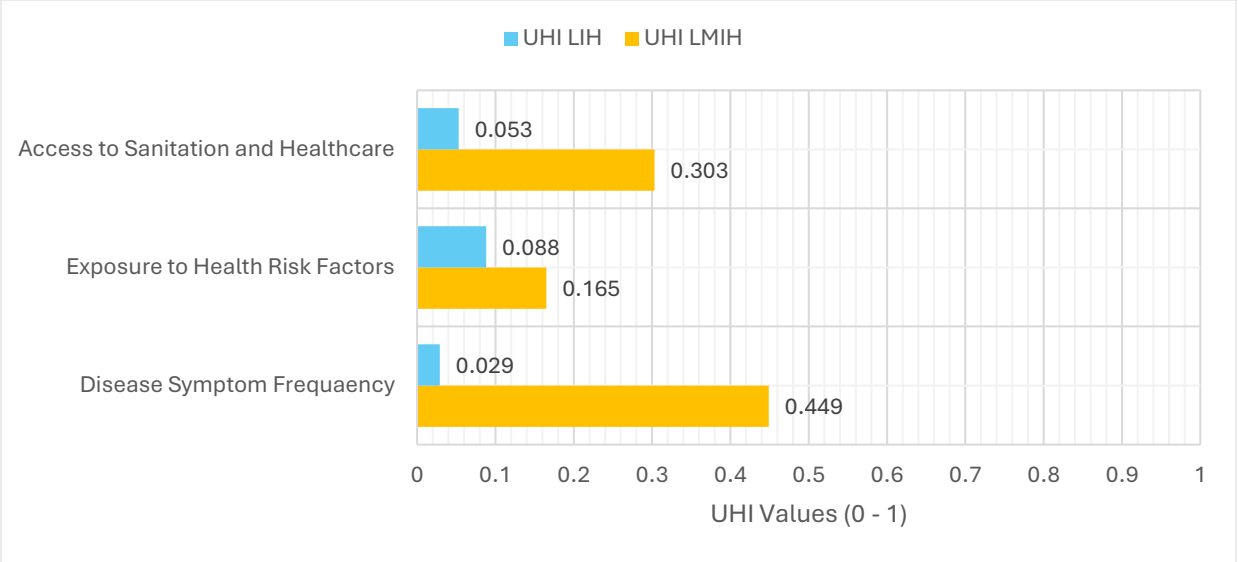


Figure 10 UHI Comparison (ranges from 0 to 1, with 1 being ideal health condition)

The higher UHI scores for LMIH across all categories reflect better conditions in terms of disease frequency, exposure to health risks, and access to healthcare and sanitation. LIH, with their lower UHI scores, face worse conditions in all these areas. The disparities emphasize that low-income households endure significantly greater health challenges, poorer sanitation, and limited access to necessary healthcare services, making them more vulnerable to both chronic and infectious diseases.

Discussion

This study demonstrates that health disparities in Dhaka are not limited to broad differences between poor and wealthy populations; they are also visible between adjacent income groups living under different urban conditions. Although low-income households (LIH) in Korail and lower-middle-income households (LMIH) in Sunibir Housing occupy nearby socioeconomic positions, LMIH consistently scored higher across all Urban Health Index (UHI) domains. This suggests that even modest differences in income, housing security, sanitation, and service access can produce substantial differences in health. From a feminist political ecology perspective, these disparities are not simply biomedical or behavioral outcomes. They reflect unequal access to urban resources, uneven governance, and the everyday power relations through which some households are better positioned to protect health while others are forced to absorb risk (Heynen, 2018; Ulloa, 2021; Ojeda et al., 2022).

The most striking disparity appeared in disease burden. LIH had a disease-frequency UHI score of 0.029, compared with 0.449 for LMIH, indicating a severe concentration of illness among slum residents. Fever, cold, cough, and diarrhea were more frequently reported in Korail, reflecting the combined effects of overcrowding, inadequate sanitation, limited healthcare access, and environmental exposure. These findings are consistent with studies showing that infectious

disease risks are intensified in marginalized urban settlements where poor housing and limited services create persistent health vulnerability (Nolan, 2015; Gupta et al., 2023). The increase in disease reporting during and after the COVID-19 period further suggests that pandemic-related disruptions worsened already fragile living conditions, particularly where preventive resources, vaccination access, and formal healthcare were limited (Khan et al., 2017; Hooley et al., 2022).

Respiratory symptoms complicate a simple income-based interpretation. While LIH had fewer formal ventilation channels, many households used shared open kitchens. In contrast, LMIH households often had individual kitchens and windows, but these windows were small, blocked by furniture, or obstructed by adjacent buildings. This finding shows that housing quality cannot be assessed only by income category or formal housing status. Poor ventilation, dense construction, and constrained domestic space create respiratory risks across both groups, although the causes and spatial arrangements differ. This supports the need to examine health through everyday living environments rather than through income alone.

Health risk factors also reveal an important pattern. The UHI difference between LIH and LMIH was smaller for risk factors, with scores of 0.088 and 0.165, respectively. Smoking, poor diet, and limited physical activity were common in both groups, suggesting that behavioral risks are embedded in wider urban conditions rather than individual choice alone. LMIH appeared slightly better positioned, likely because of better access to health information, food variety, and resources that support healthier practices. This aligns with evidence that socioeconomic position shapes access to healthier diets, physical activity, and preventive health knowledge (Miething & Yngwe, 2014; Verguet et al., 2017). Therefore, interventions should not rely only on individual behavior-change messages. Anti-smoking and substance-use campaigns, especially among men in Korail, may be useful, but they must be paired with broader improvements in living conditions, health literacy, and community-based support (Akanni et al., 2022; Nunbogu et al., 2019).

Dietary patterns further demonstrate how inequality operates through everyday survival. Rice and vegetables were the dominant foods in both communities, indicating limited nutritional diversity. However, LMIH reported more varied diets, including eggs, while LIH reported more monotonous food consumption. This difference is important because diet reflects not only preference but purchasing power, market access, household stability, and the ability to prioritize nutrition under economic stress. Limited dietary diversity among LIH may increase vulnerability to malnutrition, weakened immunity, and long-term chronic disease. Food assistance, subsidized nutritious foods, urban gardening, and community-based nutrition education could help reduce these risks, especially for children and other vulnerable household members (Gupta et al., 2023; Hasan, 2020).

The strongest evidence of structural inequity emerged in healthcare and sanitation. LIH scored 0.053 in this domain, compared with 0.303 for LMIH. This gap shows that slum residents are not merely experiencing worse health; they are also denied the conditions needed to prevent,

manage, and recover from illness. Financial barriers cause many slum residents to delay healthcare until illness becomes severe, increasing the likelihood of untreated disease, complications, and higher long-term costs. This finding is consistent with research showing that cost remains a major barrier to timely healthcare among low-income urban populations (Khan et al., 2017; Hooley et al., 2022).

Sanitation disparities reinforce this structural argument. Most LMIH respondents had access to sanitary toilets and regular garbage collection, while many LIH households depended on pit latrines or hanging toilets and faced inconsistent waste collection. These differences are not minor service gaps; they represent unequal exposure to disease-producing environments. Poor sanitation increases infectious disease transmission and worsens the broader living environment, producing long-term health risks (Panigrahi & Das, 2014). Improving sanitation in Korail requires coordinated action from local government, NGOs, and service providers, including sanitary toilet construction, reliable waste management, and public handwashing stations in dense residential areas (Hamza et al., 2017; Musoke et al., 2018).

The findings have direct policy implications. The health gap between LIH and LMIH shows that targeted interventions are urgently needed in slum settlements, especially in healthcare access, disease prevention, sanitation, vaccination, and housing improvement (Nuryadi et al., 2023). Mobile health clinics could provide basic care, screenings, vaccinations, and health education in Korail, especially for residents who delay treatment because of cost or distance (Mukama et al., 2016). Subsidized healthcare programs and community health workers could also reduce dependence on informal providers and improve follow-up for chronic and infectious conditions. Vaccination campaigns should target both LIH and LMIH communities, since gaps in immunization can persist across adjacent income groups (Yazdani et al., 2021; Akinyemi et al., 2022).

Beyond service delivery, the study points to the need for urban health policy that treats slum health as a matter of rights, infrastructure, and governance rather than charity. Expanding syndromic surveillance could help detect outbreaks early, while housing improvements such as better ventilation could reduce respiratory risks (Akinyemi et al., 2022; Safdar et al., 2022). Health education on diabetes, hypertension, smoking, nutrition, and sanitation should be gender-sensitive and locally grounded, creating safe spaces for men and women to discuss health risks and care practices (Panigrahi & Das, 2014; Goudet et al., 2018). Rainwater harvesting and improved water access could also reduce everyday health burdens in Korail (Musoke et al., 2018).

Conclusion

Overall, this study shows that the urban health divide in Dhaka is produced through layered inequalities in income, housing, sanitation, food access, healthcare, and governance. The comparison between LIH and LMIH is especially important because it reveals how small economic differences can translate into large differences in health protection. The UHI results

therefore do more than quantify disparity; they expose how unequal urban systems distribute care, risk, and survival unevenly across neighboring populations. Addressing these disparities requires moving beyond isolated health campaigns toward integrated urban policies that improve healthcare access, sanitation infrastructure, housing conditions, food security, and institutional accountability for marginalized urban residents.

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