Vulnerability to housing and the environment in urban settings: Implications for residents and places

Girma Taye[1*], Sefonias Getachew[1], Muluken Gizaw[1], Mirgissa Kaba[1]

Abstract

Introduction: Across the globe, for a variety of socio-economic and health related reasons, people are choosing to reside in urban as opposed to rural areas. However, there is limited evidence on the profiles of people living in vulnerable sections of urban settings.

Objective: This paper aims to examine vulnerable sections and their residents in selected urban centers in Ethiopia in terms of access to selected facilities and services. More specifically, the study aims to develop profiles of vulnerable people in selected sections of urban centers.

Methods: A mixed study methods was used to address the objectives of the study. The study was carried out in 46 urban centers of five regions (Amhara, Oromia, Tigray, Southern Nations, Nationalities, and Peoples' (SNNP) and Harari) and two city administrations (Addis Ababa and Dire Dawa) in Ethiopia. Among vulnerable sections identified in each urban center, one, two or three sections were selected at random based on the status of the urban center (*woreda*, zone or regional). Thus, a total of 115 vulnerable sections of urban centers were selected in the Cities/towns. Twenty participants were selected from each center and were interviewed using a questionnaire developed for the study. Key informants were identified, interviewed and focus group discussions were conducted. Descriptive statistics, chi-square and t-tests were used for analysis.

Results: The majority of those interviewed were female. The average age of respondents was 45.6 (SD=14.4) and 42.3 (SD=14.8) years for male and female, respectively. Sixty percent of respondents were married, while 17% were widowed. Vulnerable places are small in size and are haphazardly distributed over urban settings. Housing conditions in vulnerable sections were ranked 'poor' based on the materials used for roofing, flooring, and the construction of walls. While the majority of the roofs were reported to be iron sheets, there were few thatched roofs, mainly in the Amhara and Oromia regions. Plastic roofs were not common, although a few were reported in Harari and Dire Dawa. The majority of houses were found to have mud or sand floors, while 39% had concrete floors. The walls of houses were mainly from mud, mud brick and wattle covered with mud, and hand-made bricks. Iron sheets and masonry were used as walls of the houses in a few cases and ordinary stones were common in Tigray and occasionally in Dire Dawa. Some respondents reported cooking in the same room that they live in. The availability of latrines in these vulnerable sections was encouraging. However, the disposal of liquid and solid waste was found to be challenging.

Conclusions: There are sections in urban settings that are characterized by poor housing, poor sanitation and hygiene, and poor sewerage systems. These require targeted interventions. [*Ethiop. J. Health Dev.* 2020; 34(Special issue 2):24-32]

Keywords: Vulnerability, urban settings, housing condition, latrine, solid waste

Introduction

An estimated 54% of the global population reside in urban areas, and this is projected to increase to 66% by 2050(1). The world is witnessing unprecedented urbanization, especially in developing countries, which has far-reaching implications(1). By the year 2030, an estimated six out of every 10 people will be living in Urban centers, with the most explosive growth expected in Asia and Africa(2). The populations in urban areas of Africa and Asia in particular are expected to grow from 1.9 billion in 2000 to 3.9 billion in 2030. As a hub for economic and social transformations with better literacy and education, life expectancy, improved housing and sanitation, access to services, participation in public affairs, better living conditions, better food security and better health indicators, urban settings are places of choice for living (3). Evidence indicates that urban inhabitants enjoy better health on average than their rural counterparts due to a decline in fertility and infant mortality rates, which is linked to various determinants, such as improved sanitation and nutrition, and easier access to contraception and health care (4).

Nonetheless, such a narrative appears to mask the realities of disadvantaged urban settings and their residents. While urban living has become attractive, with improved social and economic indicators, there are urban settings that are disadvantaged and their residents have become increasingly destitute with compromised health. While the rich and those who are relatively well off reap benefits from urbanization, the poor, who do not share the same level of privilege regarding access to opportunities, remain poor (2,4,5). The number of vulnerable dwellers in developing countries increased from 689 million in 1990 to 880 million in 2014, according to the United Nations World Cities Report in 2016. Urban residents in slum settings face a multitude of social and economic inequalities and are subjected to sub-standard living (5); a third of urban residents in Africa and Asia reside in slum settings (6,7). Related to population growth, the health challenges of urbanization are alarmingly multifaceted – residents in vulnerable sections are characterized by limited social services and facilities, including unsafe water supplies, and poor sanitation and housing structures (8, 9).

Ethiopia is one of the most populous countries in sub-Saharan Africa, with the one of the fastest urban growth rate in the world (10-14). Despite the low level of urbanization in Ethiopia compared to the rest of

[1] School of Public Health, College of Health Sciences, Addis Ababa University
*Corresponding Author

Africa, the pace at which Ethiopia is urbanizing is exceptionally fast (14-15). This is partly attributed to relatively high fertility compared to other African urban centers (14). Currently, with an estimated 19% of the population residing in urban areas, Ethiopia is one of the least urbanized countries in the world. However, at its current pace, by 2050, an estimated 42% of Ethiopians will be expected to live in urban settings.

Housing quality in Ethiopia, in terms of materials used for construction, is considered poor compared to other countries. It is estimated that 70-80% of the urban population in Ethiopia live in settings that are believed to be slums (9,16). The recent housing schemes, commonly referred to as 'condominiums', are partly meant for people who have moved from vulnerable areas that have been demolished for development. Condominiums pose challenges for human social connectedness. Unlike their previous places of residence, often with open spaces and easy for socialization, where dwellers could take collective actions against social challenges, in condominiums, decisions are made centrally following rules, which affects social relations (17).

Evidence reveals that despite claims that Ethiopia is on track to meet the Millennium Development Goal for sanitation, it is one of the countries in sub-Saharan Africa that has failed to meet this target (5,8). Recent studies report that only 11% of the population in Addis Ababa's slums and 41.2% of the city's total population have access to improved sanitation. Most people use unimproved sanitation facilities and some practice open defecation(18). The Ethiopian DHS survey of 2016 estimates that 84% of the urban population have no access to improved and private sanitation, and that 7% practice open defecation(12).

Poor housing conditions and lack of access to safe water and sanitation resulted in a range of health problems in urban settings (4,13). However, there is a paucity of data on national-level characteristics of people and places of such centers and those related to urban health problems specific to places and residents. A review by the World Bank Group recommended that Policymakers must weigh the long-term costs and benefits when making decisions, as the policies, institutions, and investments put in place will influence urban systems for years to come (16,19).

This study intends to generate, for national representative centers, evidence on the vulnerabilities of specific areas of selected urban settings and their residents to help define health and health-related problems. The rationale for this study lies in the fact that urban settings in Ethiopia are not uniform in distribution of services and infrastructure. Residents in some parts of urban centers lack information about services, either in the health facilities or administrative offices, and are relatively destitute; the expansion of services and infrastructure failed to match rapid population growth.

Objective

This paper aims to describe the vulnerability of urban settings in Ethiopia and provide profiles of residents in these settings, characterizing the vulnerable sections in terms of service provision.

Methods

A mixed, qualitative and qualitative research method was used in this study. For the qualitative approach, focus group discussions (FGDs) and key informant interviews (KIIs) were conducted using a pre-prepared interview guide. Community opinion leaders, health extension professionals and urban health focal persons in the selected vulnerable areas were purposively selected to participate in the study. For the quantitative approach, a cross-sectional study design was employed. A two-stage, stratified sampling method (first stage: urban centers; second stage: households) was used. A pre-tested survey tool helped generate household-level data on socio-economic, housing, sanitation, hygiene and related information. The study was conducted in 46 towns. In these urban centers, vulnerable sections were identified in a previously conducted study (unpublished report) by AAU and John Snow Inc. (JSI), and in this paper we use those locations identified in that study. From one up to three vulnerable sections were selected from these urban centers based on the status of the centers (*woreda*, zonal or regional). Three vulnerable sections were selected from regional cities, while only one vulnerable section was selected from *woreda* towns. Based on the Central Statistical Agency's principle of selecting about 20 households (HHs) per enumeration area (EA) in standard population surveys, between 20 and 60 HHs were selected from each urban center, based on whether the vulnerable section was equivalent to one or more EA. If the vulnerable section was equivalent to one EA, then 20 HHs were selected; otherwise, the number of HHs selected increased with the size of vulnerable sections. Hence, a total of 1,220 HHs were used for the quantitative study. One individual per HH was interviewed. The person interviewed was not necessarily the head of the HH, but could be anyone found at home. The respondents were briefed about the study, in particular the concept of vulnerability.

Descriptive statistics were used to depict socio-demographic and related information regarding responses from participants. Chi-square test was used to check whether there was association between various measurements carried out on places and residents. Test statistics (t-test) was also used to detect differences between various groups. Ethical clearance was obtained from the College of Health Sciences at Addis Ababa University.

Results

Profile of vulnerable sections of urban centers

Profile of residents: The majority of residents (75%) in the vulnerable sections of the urban centers interviewed were female (Table 1), with variations from town to town. Women were the main interviewees because they were in or around their home during data collection.

The average age of respondents was 45.6 (SD=14.4) and 42.3 (SD=14.8) years for males and females, respectively. The mean age of respondents (regardless of sex) was 43.2 (SD=14.8) years. In terms of distribution, 7%, 50%, 32% and 11% of respondents were in the age ranges of 15-24, 25-44, 45-64 and 65+ years, respectively (Table 1). The majority (84%) of respondents in vulnerable sections were found to be Christians. Amhara (43%), Oromo (25%) and Tigrayan (14%) constituted the major ethnic groups in the study settings.

Table 1: **Age distribution of respondents by sex**

Age	Sex		Total
	Male	Female	n (%)
15–24	17.2%	82.8%	87 (7.1)
25–34	21.4%	78.6%	299 (24.6)
35–44	22.2%	77.8%	306 (25)
45–54	35.7%	64.3%	213 (17)
55–64	23.9%	76.1%	180 (15)
65+	30.4%	69.6%	135 (11)
Total	305	915	1,220

Sixty percent of respondents were married, while 17% were widowed (Table 2). On the one hand, while there is a tendency to face life as couple in vulnerable quarters of urban centers, on the other hand, there was a high rate of spouses having died, perhaps partly due to vulnerability, because of those who had lost their lives, 90% had died of various diseases. There is significant association between education level and marital status ($p< 0.01$): residents of vulnerable sections tend to be married as their educational level increases. Residents of vulnerable sections attained higher education in all towns in comparable proportions across the study settings. In small towns such as Batu, 60% of residents attained high school or higher education, indicating that a considerable proportion of residents of vulnerable sections are educated individuals, although a comparison was not made with non-vulnerable sections of urban centers. The number of residents in a house ranged from 1 to 20, with a mean of 4.5 people (SD =2.2 people) per HH. Vulnerable sections in Addis Ababa were found to have large family sizes, as high as 15, followed by Hawassa; while Batu and Harari had the smallest family sizes.

Table 2: **Education of respondents by marital status**

Marital status	What is the highest level of school you completed? (%)					Total
	No education	Primary	Secondary	Technical/ Vocational	Higher	
Married	30.94	34.81	23.62	4.70	5.94	724
Living together	16.67	50.00	16.67	16.67	0.00	6
Divorced	42.96	42.96	13.33	0.00	0.74	135
Separated	38.89	38.89	20.37	0.00	1.85	54
Widowed	68.78	22.44	8.29	0.49	0.00	205
Never married but engaged	0.00	14.29	57.14	0.00	28.57	7
Never married and not engaged	12.05	22.89	39.76	10.84	14.46	83
Total	37.48	32.95	21.00	3.71	4.86	1,214

Profile of places

Vulnerable areas of urban centers were explained in terms of their residents' exposure to health problems due to factors that facilitate this. Accordingly, places that are considered vulnerable were relatively small in terms of land and population size. Although vulnerable places exhibit common characteristics, they are haphazardly distributed across urban settings.

Respondents categorized their habitats as slum, semi-slum or non-slum after the concept of each was explained to them. Findings showed that 55% indicated their residential area as slum, and 33.6% indicated their residence as semi-slum (Table 3) due to over-crowding, type of houses, infrastructural development and characteristics of residents (see Photos1 and 2). Residents from regional cities (Addis Ababa, Bahir Dar, Adama, Mekelle and Hawassa) more readily

endorsed that their residential settings are 'slum' or 'semi-slum'.

Table 3: **Respondents' definitions of residence**

Region	Do you consider your residential area as (%):			Total(n)
	Slum	Semi-slum	Not Slum	
Addis Ababa	55.42	41.25	3.33	240
Amhara	41.82	42.73	15.45	220
SNNP	57.00	39.00	4.00	200
Dire Dawa	66.67	31.67	1.67	60
Harari	83.33	11.67	5.00	60
Oromia	52.84	23.08	24.08	299
Tigray	60.71	31.43	7.86	140
Total	55.13	33.63	11.24	1,219

Housing conditions

The housing condition of residents in vulnerable areas in urban settings were assessed based on materials used for roof, floor, and wall construction; whether residents have a separate place for living and cooking; and home ownership.

Ninety-seven percent of house roofs in vulnerable quarters have iron sheets, while 1.6% have thatched roofs. While the majority of those with thatched roofs are from Amhara and Oromia regions, two of the houses were in Addis Ababa. Plastic roofs are not common (1%), although such houses were common (higher than the national average) in Harar city (6.7%) and Dire Dawa (1.9%) (see Table 4). Tiles were relatively common in Adigrat, Sekota and Shashemene.(Table not presented) The floors of most houses (58%) in vulnerable sections of urban settings were made from mud or sand, while 39% had concrete floors. These were common in Addis Ababa (69%) and Oromia (70%), but far less common in Amhara Region (10.4%) (see Table 4).

Mud walls are common features of houses in vulnerable quarters of study settings – 92.6% have mud walls made from either mud brick (14%) or wattle covered with mud (78.5%). Mud brick is relatively common in Harari, Oromia and Addis Ababa, and are explained to be defective leftovers from construction sites. Types of wall also include iron sheet and masonry, accounting for 3.5% and 3.9%, respectively. Dire Dawa and Addis Ababa reported mainly using iron sheets for walls. About 7% of houses in vulnerable sections reported using concrete or fired brick for walls. Most masonry constructions (3%) were found in Mekelle, followed by Adigrat (0.3%) and Dire Dawa (0.3%).

Table 4: **Main materials used to construct roofs, walls and floor of houses, by region**

Region	Main Material of the roof (%)					Main material of the floor of the main house (%)					Main material of the walls of the main house (%)					
	Thatch	Iron sheet	Tiles	Plastic	Total (n)	Dirt/mud /sand	Wood	Concrete	Asbestos	Total (n)	Concreted/ fired brick	Mud/ wattle	Mud/w attle	Iron Sheet	Masonry	Total (n)
A.A	0.9	98.7	0.0	0.4	236	25.0	5.6	69.4	0.0	232	2.1	16.3	75.4	6.3	0.0	240
Amhara	2.8	93.5	3.2	0.5	216	85.9	3.6	10.5	0.0	220	2.7	3.2	94.1	0.0	0.0	220
SNNP	0.5	99.58	0.0	0.0	192	74.8	3.0	22.2	0.0	198	1.0	0.0	98.5	0.5	0.0	199
DD	0.0	98.2	0.0	1.78	56	61.7	0.0	38.3	0.0	60	13.6	15.3	18.6	45.8	6.8	59
Harari	1.67	91.5	0.0	6.8	59	93.2	1.7	5.1	0.0	59	3.3	48.3	48.3	0.0	0.0	60
Oromia	3.0	95.3	1.45	0.3	296	43.4	1.7	54.6	0.3	297	10.7	20.7	68.5	0.0	0.0	299
Tigray	0.0	99.36	0.7	0.0	135	62.7	0.0	37.3	0.0	134	20.7	8.6	39.3	0.0	31.4	140
Total	1.6	96.7	1.0	0.7	1,190	58.3	2.8	38.3	0.1	1,220	6.9	13.0	72.6	3.5	3.9	1,217

In terms of house ownership, 62% of the respondents in vulnerable sections live in rented houses, while 34% own their house; 3.5% live in neither owned nor rented houses that are either under construction by other owners, abandoned, being demolished and plastic houses. Living in rented properties is common in Addis Ababa, regional cities, and some zonal towns; Addis Ababa (82%), Adama (83%), Asela (88%), Harar (71%), Hawassa (88%), Woldiya (78%) and Wolkitie (75%) accounted for the majority, while ownership is common in zonal towns. Some people live in abandoned, demolished or houses under construction, as depicted in Photos 1 and 2.

Photos 1 and 2: **Houses where the poor live within a city. Several people live in the same room and are overcrowded**

Source of water

About 89% of respondents reported using tap water (improved water by the standard of UN-Habitat). Many respondents fetch water from a tap in their neighbourhood. An analysis of the time it takes to fetch water from a tap, well, community water point, or river/stream and standing water point, was found to be on average about 6, 8, 17, 30 and 11 minutes, respectively. In general, the average time to reach a water point, regardless of source, ranged from 19.5 minutes in Sodo (SD=16.9 minutes) to 1.2 minutes in Ambo (SD = 0.88).

The majority of HHs (86%) do not treat water for use, regardless of its source. A small proportion of respondents in Batu (48%), Mekelle (38%), Adama (33%), Addis Ababa (25%) and Dire Dawa (20%) reported treating water before use. Sedimentation, filtration using a cloth, boiling and using bleach/chlorine were common methods to treat water. Of those who treat water, 70% reported using bleach or chlorine, while a few (1.8%) strained or boiled water.

Hygiene practice

Although 72% of all respondents wash their hands before preparing food, only 77% of the respondents use soap. The use of soap is relatively high in Addis, Ambo, Kemissie, Adigrat (about 92% each), Hawassa (98%), Mychew (88%) and Mekelle(85%); relatively low soap use was found in Bahir Dar (32%), Sekota (20%) and Shashemene (22%). Wolkitie and Woldiya towns recorded the lowest proportions (each about 7.5%). It was also found that the majority of those in Sekota, Jimma, Arba Minch and Wolkitie towns, and considerable proportions in Kemisie, Nekemt and Bahir Dar, do not wash their hands before food preparation (Table 5). Thirty four percent of the respondents admitted that they do not wash their hands before feeding children and 27% after bathing their children.

Table 5: **Respondents' hand washing experience**

Washing hands	Response (number/Percent)	
	n	%
Before food preparation	883	72.4
Before feeding children	456	37.4
After defecation	850	69.7
After attending to child who has defecated	337	27.6
Before eating food	1,145	93.9
After eating food	1,104	90.6
Soap or detergent or any cleansing agent for hand washing	837	77

Sewerage system

The sewerage system is a critical concern in vulnerable sections of urban settings. Only 13% of respondents suggested that sewerage construction followed the standards of the municipalities. A large proportion of respondents (68%) did not have a functioning sewerage system. In Addis Ababa, it was observed that sewerages were filled and blocked by dry and liquid waste.

There is significant association between levels of towns (whether regional, zonal or woreda) and the availability of a sewerage system (P< 0.0001). Sewerage systems are associated with regional cities. Study participants in Harar (70%), Addis Ababa (88%), Shashemene (100%) and Mychew (30%) reported availability and functionality of a sewerage systems, while those in Dire Dawa, Batu, Adigrat, Arba Minch, Mekelle and Ambo reported the contrary.

Disposal of liquid waste is challenging in almost all vulnerable quarters of urban centers (see Photos 3 and 4). Respondents dispose waste onto open fields (54%), into pits (19%) and discharge into sewerage pipes (15%). Discharging liquid waste into open ditches, to water bodies or rivers, or into toilets, is not popular among respondents in general. The disposal of waste into a sewerage pipe is more common in Addis Ababa compared to other urban centers.

Solid waste

Six solid waste disposal methods are practiced among respondents in the study setting. They are: on-site storage and collection by municipality for disposal (44.3%), disposal in open field (22%), burning(18%), on-site storage and disposal at temporary site(9.7%), , disposal to water body (3.8%) and disposal in dup pit (2.3%), in order of priority. Solid waste disposal methods are significantly associated with study settings (towns) (p< 0.02). Solid waste disposal in the regional cities (Addis Ababa, Adama, Bahir Dar and Mekelle) was reported to be collected and disposed by the municipality. The majority of respondents in Harari and Wolkitie reported storing solid waste on site and disposing it at temporary locations. Open-field disposal is commonly practiced in Dire Dawa, Hawassa, Kemisie and Sekota, while burning is commonly practiced in Ambo, Arba-Minch, Batu, Shashemene and Sodo. Disposal into a pit is rarely practiced in the study settings.

Photos 3 and 4: **Waste at a market place, and an open ditch filled with water and dirt, Addis Ababa**

Latrines

In total, 91% of the HHs reported to have latrines. Dire Dawa has a shortage of latrines, as indicated by most participants (74%), followed by Adigrat, Hawassa and Woldiya (50% or higher). The majority (95%) of residents use either unimproved latrines (71%) or traditional improved latrines (24%). Improved latrines with super structure, 'non-flush latrine connected to septic tank' and 'flush latrine connected to septic tank' registered 2.2%, 1.8% and 0.3%, respectively. The majority of residents in Addis Ababa and Adama use improved latrines, while non-flush latrines connected to septic tank are used solely in Mekelle town. Public latrines are rarely used in Nekemt, Shashemene and Hawassa; flush latrines connected to a septic tank are not generally available in the vulnerable sections under study.

Discussion

UN-Habitat defines 'slum residents' as a group of individuals living under the same roof in an urban area and who lack one or more of five conditions: housing, living space, hygiene, sanitation and security of tenure (20-21). Based on this definition, residents in vulnerable sections live in houses made from cheap materials and with limited space, compromised hygiene and poor sanitation. However, it is hard to completely delineate slum areas, as they are unevenly distributed over all the urban centers. Contrary to the UN report, not all residents in slum areas are entirely marginalized This is probably an indication of cultural differences posing challenges to intervention programs targeting slums.

The size of vulnerable sections in terms of population varies greatly, indicating the fact that vulnerable sections in urban settings range from small clusters in some urban settings to the whole *kebele* in others. The small clusters are often annexed to market places (for example, one vulnerable section in Dire Dawa), but used fully as a residential area. Therefore, it is difficult to set standards for the vulnerable sections in terms of area and population size.

Housing and types of materials used to construct houses were found to vary from city/town to city/town. Furthermore, observation of data collectors and supervisors showed some of the houses were abandoned or still under construction. This is striking in terms of what constitutes 'a house' in different urban settings, and calls for further study. Following the UN-Habitat's definition of house and measured by the materials used to construct the roofs, walls and floors of houses in the study setting, they generally do not meet UN-Habitat's standards. Yet, findings from this study are in agreement with UN-Habitat's finding (22,23) that Ethiopia, as well as countries such as Angola, Democratic Republic of the Congo, Guinea-Bissau, Madagascar, Mozambique, Niger and Rwanda, have more than one fifth of the slum population living in extremely poor houses. The same report considered countries such as Central African Republic, Chad and Sudan to be the worst in terms of housing standards.

Hygiene and sanitation are critical public health problems, particularly in vulnerable sections of urban settings. Poor hygiene and sanitation compromise health –open solid and liquid waste disposal make people vulnerable to various health problems. Integrated waste management is highly compromised in vulnerable sections of urban settings.

Based on a definition given by the Joint Monitoring Program for Water Supply and Sanitation (JMP-WSS)(24), 94% of HHs in the study area reported using either unimproved latrines (71%) or traditional improved latrines (23%) that may not be connected to septic tanks and may be shared by several HHs. This clearly shows that a high proportion of HHs in vulnerable sections are in poor sanitation condition.

Beyene *et al.*, in their study of sanitation conditions in slum quarters of Addis Ababa, found that 88.6% of Addis Ababa's slum dwellers and 73% of its total population use unimproved sanitation facilities(18), which is similar to the findings from this study. UN-Habitat has estimated unimproved sanitation for Addis Ababa to be about 75% – Bole being the lowest (59%) and Akaki-Kality the highest (89%) – which means there has been an upsurge in the deterioration of sanitation in Addis Ababa. The difference between the current study and those of Beyene *et al.* and UN-Habitat is that the current study covered selected slums in selected sub-towns, while Beyene *et al.* and UN-Habitat studied residents in sub-towns. Yet, a study on urban poor in the slum areas of India shows that about two thirds of residents do not have a toilet (25), which is much worse compared to results from Beyene *et al.*'s and the current study.

Conclusions

Vulnerable sections of urban settings have multiple challenges, including housing, hygiene and sanitation, latrines and water. The problems are intertwined, working in tandem to sustain vulnerability of such settings and their residents. The fact that such settings are neither distributed in the same pattern in all urban centers nor uniform in land and population size makes it difficult to design focused programs. This calls for more coordinated and targeted programming at neighbourhood level.

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