



Implementation Science Collaboration on Urban Health in East Africa: Synthesis of Findings from the Three Country Urban Nutrition Assessment of Nutrition and WASH Among Children and Adolescents in East Africa

Introduction

This report “brief” presents key findings from a multi-country assessment, which used implementation science strategy to explore the nutrition and water, sanitation and hygiene (WASH) situation facing poor children (ages 0-5 years) and adolescents living in urban slum settings in Kenya, Tanzania, and Uganda. The assessment, supported by the USAID-funded Health Evaluation and Applied Research Development (HEARD) project implemented by University Research Co., LLC, consisted of information and data gathered from multiple sources by local partner institutions across the three countries. The results presented here reflect the analysis, triangulation, and synthesis of the information and data collected applying the UNICEF nutrition framework as a guide (Figure 2).

The “Synthesis of Findings” brief is one of three briefs that describe the Implementation Science Collaboration on Urban Health in East Africa’s work on nutrition and WASH. See the *Approach and Partnership Results* and *Gaps, Opportunities and Recommendations* briefs for more details on the partnership results and the gaps and opportunities identified, respectively, and please visit heardproject.org to access the country-specific reports and resources. It is hoped that findings from this report and the identified opportunities for future work will be used by researchers, policy makers, programmers, and community leaders to support efforts for health improvement among urban poor populations in their respective countries.

Overview: Nutrition and WASH Challenges Among Urban Poor in East Africa

It is now estimated that more than half (56%) of the urban population in Sub-Saharan Africa lives in slums, compared to an average of 29% across all developing regions (UN Habitat, 2016). Relative to cities in other low- and middle-income countries, urban health conditions in Sub-Saharan African cities tend to be far poorer overall, but also vary substantially within the

Working Draft June 30, 2020

region (WHO-UN Habitat, 2016). The focus of this assessment in East Africa is in Kenya, Tanzania, and Uganda, where the urban population in all three countries continues to increase rapidly. Tanzania is the most urbanized, with 32% of its population living in urban areas, followed by Kenya (26%) and Uganda (16%) (World Bank, 2015). In each of these countries, the majority of the urban population resides in areas that are considered slums. The proportion of slum dwellers in all three countries is estimated to be greater than 50%: 56% in Kenya, 54% in Uganda, and 51% in Tanzania (World Bank, 2015). In Nairobi alone, it is estimated that between 60-70% of the population resides in informal settlements or slums (African Population and Health Research Center (APHRC), 2014).

Significantly higher under-five mortality has been observed in slums compared to rural areas in Kenya using data from 2012-2013 (Mberu, 2016), and over the last 20 years, efforts to measure and understand the vulnerabilities faced by marginalized city dwellers have been implemented. However, data sources on the poorest urban inhabitants, or those living in slum settings, often are lacking. Without data on the most vulnerable urban residents, it is difficult to demonstrate the inequities in health status, as urban averages often mask the disparities that exist between wealthy and poor, or slum and non-slum (WHO-UN Habitat, 2016). Although definitions of slums vary across and within countries, for the purposes of this assessment, we consider a widely used definition by the United Nations (UN) (Box 1).

Box 1: Definition of a slum household according to UN Habitat

UN Habitat defines a slum household as one that is *lacking one or more of the following*:

- **Access to improved water:** Adequate quantities of water that is affordable and available without excessive physical effort and time
- **Access to improved sanitation:** Access to an excreta disposal system, in the form of a private or public toilet, shared with a reasonable number of people
- **Security of tenure:** Evidence of documentation that can be used as proof of secure tenure status, or for protection from forced evictions
- **Durability of housing:** Permanent and adequate structure in a non-hazardous location, protecting its inhabitants from the extremes of climatic conditions such as rain, heat, cold, or humidity
- **Sufficient living area:** Not more than three people sharing the same room

Rapidly expanding urban populations have led to overcrowded living conditions, poor infrastructure, and limited access to resources, as cities struggle to keep up with planning for such growth. The health impacts of residing in slum environments include the triple burden of malnutrition – undernutrition, overnutrition, and micronutrient deficiencies – due to poor access to nutritious foods and increasing susceptibility to the spread of infectious diseases from contaminated water sources and poor sanitation.

Approximately 200 million children live in urban Africa and are vulnerable to the consequences of extreme poverty (Save the Children, 2012). As urbanization has increased, urban poverty and urban food inflation have increased simultaneously, leading to food insecurity for children in many African countries (Save the Children, 2012). Food insecurity can impact both the quantity and the quality of food available. For urban poor children, nutritional issues include inadequate consumption of macro and micronutrient-dense foods, driven by food scarcity and/or poor quality of food. The impacts of these nutritional deficits can lead to a lifetime of physical and

cognitive impairment. Setting priorities for sustainable healthy cities necessarily means ensuring all children have consistent access to quality nutrition.

Having little or no formal recognition from governments, slums and informal settlements are characterized by limited or no access to clean drinking water, improved sanitation, and proper waste disposal. Living in environments lacking these basic resources make children under-five particularly vulnerable to sanitation-related diseases, including acute respiratory infections, diarrhea, and undernutrition, all leading causes of childhood mortality (UNICEF & WHO, 2015). UNICEF estimates that every day, more than 800 children globally die due to preventable WASH-related illnesses. Interventions to address WASH in urban settings are crucial for preventing substantial childhood morbidity and mortality.

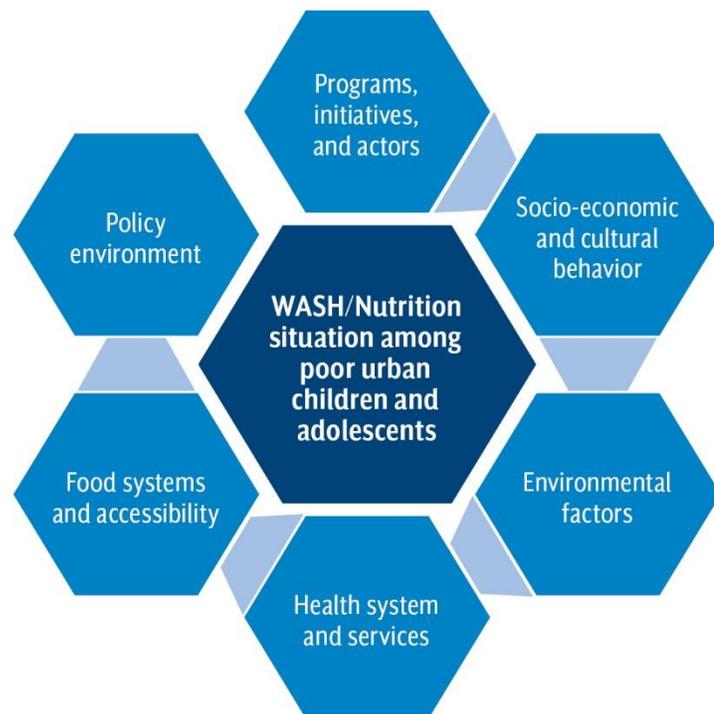
Undernutrition and infectious diseases, such as diarrheal diseases and intestinal parasitic infections, exacerbate poor health outcomes, particularly among children under-five. Persistent exposure to infections transmitted through water and sanitation pathways can lead to poor nutritional status through decreased appetite and insufficient nutrient intake. Research has shown an association between stunting and frequency of open defecation, with interventions improving access to improved water sources and sanitation reducing this risk (Spears, Ghosh & Cumming, 2013; Fink, Gunther & Hill, 2011). Poor nutritional status, can in turn, lead to compromised immune systems and increased vulnerability to further infections and diarrheal disease (Caulfield et al., 2004).

Assessment Design

The assessment was based on a consultative process and ongoing partner dialogue, which resulted in the development of copious ideas and interest in the area of nutrition and WASH among poor children and adolescents in urban East Africa. The inputs were integrated into a study design that could be conducted across the three sites within the available resource constraints. Ultimately, the co-directors from University California at Berkeley, UNICEF ESARO, and URC were guided by the overarching challenge: most agree that urbanization and its impact on health among the poor is a major issue, but insufficient evidence of the problem and subsequent political will result in limited or lagging action.

Therefore, the a “multi-level assessment” approach was adopted to provide a broader picture of the urban nutrition/WASH landscape by (1) reviewing existing critical information and evidence to provide an understanding of the policy, program, and research environment and (2) bolstering existing information by including voices and experiences from poor urban communities in each of the three countries. This information can help to push the discussion beyond “we do not know enough and therefore cannot act” to the

Figure 1: Target Population and Domains of Inquiry



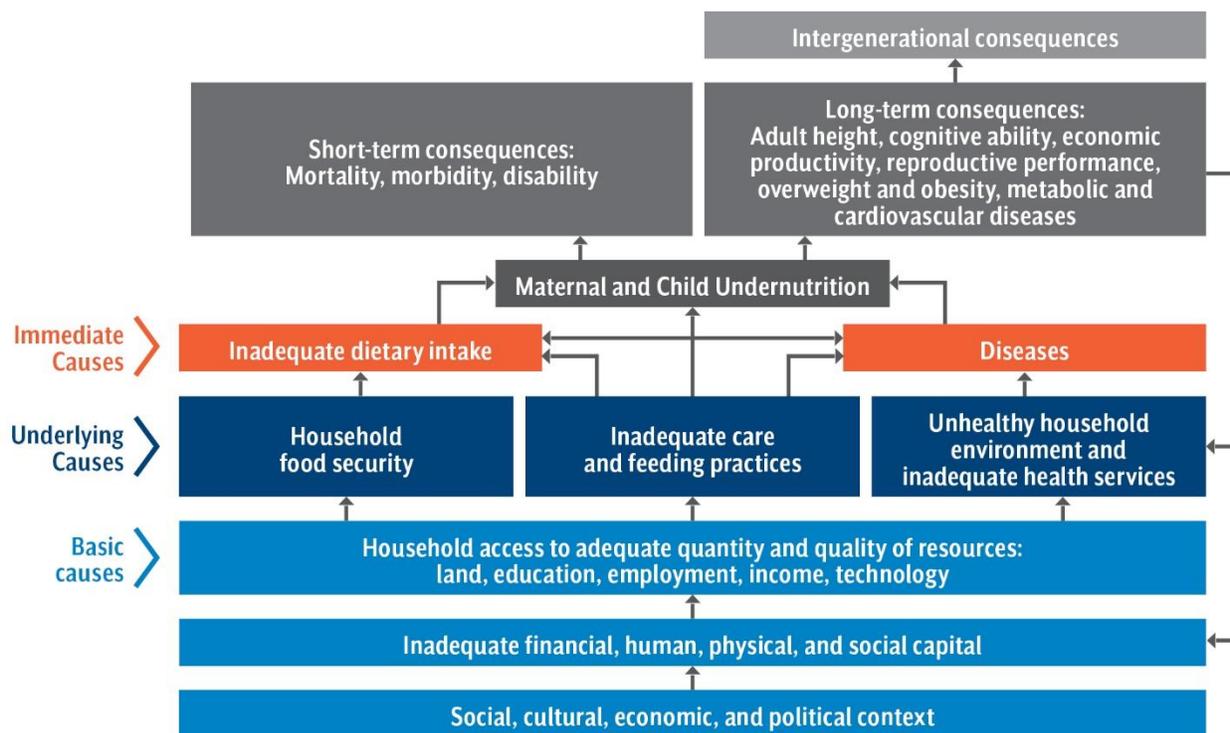
identification of critical areas for intervention. The design also allowed for the curation of available evidence and was used to inform the design of the qualitative data collection.

The central question of the assessment was: how do the key domains illustrated in Figure 1 inform our understanding of the WASH/nutrition (NUT) situation among children under-five and adolescents living in urban informal settlements or slums in Kenya, Tanzania and Uganda? To understand the WASH/NUT vulnerabilities facing poor children and adolescents in these urban settings the study teams used a variety of desk review methods including review of grey and published literature and available datasets, assessment of the policy environment, and mapping of stakeholders and programs. Subsequently, to enhance and build on the former, a community case study from one urban slum or informal settlement from each country was completed. This deeper investigation was framed by the same domains and central question and employed stakeholder engagement and qualitative methods to collect new data that reflected the community-level perspective.

The UNICEF Malnutrition Conceptual Framework

For the analysis, UNICEF’s malnutrition framework (Figure 2) was employed as a guide to examine the interface between the multiple layers and factors influencing the health of children and adolescents living in slums, with the aim of advancing the urban health agenda and translating research into action. Through its depiction of basic, underlying, and immediate causes of malnutrition, the multidimensional UNICEF framework displays how truly intersectoral research approaches are needed to fully understand chronic malnutrition and its impact on population health. This assessment provides a thorough analysis of the factors contributing to poor health among children and adolescents living in slums, and reinforces the complex social, cultural, economic, and political dynamics impacting health that exist in these vulnerable environments.

Figure 2: UNICEF Malnutrition Framework



Sources of Data

Table 1: Overview of data analyzed in the assessment, by source and country

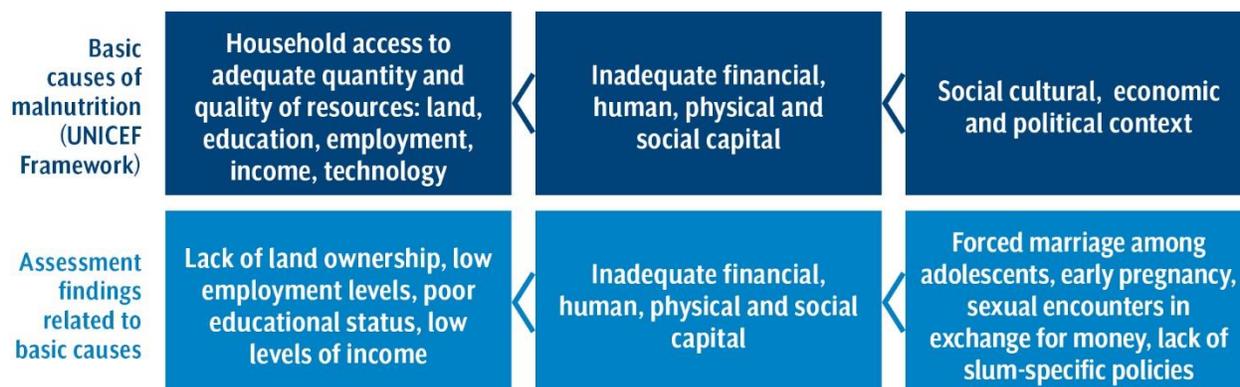
Source of Data	Policy Review	Stakeholder Mapping and Community-Based Data Collection*	Literature and Database Review	
Country	Domains of Influence			
	Policies and strategies	Programs and initiatives	Key actors	Formal/informal systems for healthcare and food and Environmental factors
Kenya	Policy and strategy documents reviewed (85)	Programs reviewed (67)	Stakeholder mapping (21)	Literature assessed (91) Databases assessed (48)
Tanzania	Policy and strategy documents reviewed (14)	Programs reviewed (10)	Stakeholder mapping (9)	Literature assessed (35) Databases assessed (6)
Uganda	Policy and strategy documents reviewed (11)	Programs reviewed (23)	Stakeholder mapping (16)	Literature assessed (27) Databases assessed (5)

* This includes FGDs and participatory workshops used to develop community case studies

Assessment Findings: Basic Causes of Malnutrition

Our assessment confirms the *limited household access to adequate resources* in urban slums in East Africa.

Figure 3: Basic causes of malnutrition assessment findings



Ownership of land, employment, education and income, among other resources, were found to be lacking in the study slum communities. For example, the majority of the populations in informal settlements in Dar es Salaam, Tanzania, are characterized by extreme poverty. About 75% of residents were unemployed or underemployed and nearly half (46%) of the population was categorized as poor or very poor (World Bank, 2002).

Socio-cultural factors linked to poor health in deprived urban environments were also acknowledged. Negative practices that adolescent girls in slums are subjected to, such as early forced marriage, and risky sexual behaviors they have been found to engage in, can lead to the *intergenerational perpetuation of female poverty* (Stark, 2018). Literature reviewed in the assessment noted that adolescent girls in Tanzanian slums are often disadvantaged due to the

common practice of forced early marriage, named locally as *ndoa ya mkeka* (or marriage at the mat) (Stark, 2018). Researchers also noted that sexual encounters in exchange for money were not uncommon among adolescent girls in the Tandale slum in Tanzania.

Politically, slum dwellers often are excluded from services and policies that are put in place to provide support for disadvantaged members of the population. Analysis of policies in our study verifies this marginalization and indicates that very few policies exist with a focus on the health and/or environmental needs of slum residents. In Kenya, for example, out of 85 policies reviewed, only three were found to be explicitly focused on urban areas, although not specifically slums, and five policies address issues related to the urban poor. Tanzania’s policies largely exclude urban health, with only one development plan containing a focus on slums/poor urban settings. Although no policies with an explicit urban focus were found in Uganda, a national urban health policy is under development.

Assessment findings: Underlying Causes of malnutrition

Figure 4: Underlying causes of malnutrition assessment findings

Underlying Causes	Household food security	Inadequate care and feeding practices	Unhealthy household environment and inadequate health services
Assessment findings	Socio-economic and cultural behavior insufficient household food security	Poor infant and young child feeding practices, low rates of exclusive breastfeeding, inadequate feeding practices in schools	Poor access to safe water and sanitation, seasonal challenges, food contamination, limited access to health services, poor quality health services

Insufficient household food security

Household food security is insufficient in slums in the study. For example, in the Nairobi slums of Viwandani and Korogocho, data from the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) indicates high levels of food insecurity, with 64% of households categorized as severely food insecure, according to the Household Food Insecurity Access Scale (HFIAS) in Korogocho and 33% in Viwandani (Kimani-Murage et al., 2014). In Tanzania, we found that although urban markets are stocked with a variety of food items, food insecurity is still a problem at the household level as a result of weak household economic capacity. Urban slum residents afflicted with disease – some of the most vulnerable residents– have even poorer food security. Children cared for by people living with HIV in urban poor settings have decreased food security, according to studies on the issue. This might be in part because HIV-positive people spent more on medical costs and less on food (Bukusuba, Kikafunda, & Whitehead, 2009; Bukusuba et al., 2007; Yager, Kadiyala, & Weiser, 2011). Data from the community level in slum settings reveal that slum residents use a variety of unhealthy coping strategies to manage this. The Uganda assessment discovered that slum dwellers often adjust their eating habits to eat one meal a day. Families have limited ability to farm at home, and as such diversify their food sources to include fruits, vegetables, cereals, legumes and tubers. Similarly, they have difficulty negotiating for access to land for urban farming, plus gathering of wild food is limited (Mollee et al., 2016; Pottier, 2015; Yeudall et al., 2007).

Inadequate care and feeding practices

The assessment documented poor infant and young child feeding practices in slums – in particular, *low rates of exclusive breastfeeding*. In slum settings, women often work outside of the home as casual laborers in workplaces that are not supportive of breastfeeding and limit the opportunity for mothers to prepare nutritious foods for young children. Findings from Uganda indicate that women in slums play a central role in the production, securing, preparation and distribution of food and other resources critical to nutrition and wellbeing. In Kenya, the suboptimal feeding practices and care in slums were found to be linked to challenges faced by urban poor women, such as a lack of knowledge on infant and young child feeding, poverty, and the need to return to/find employment shortly after birth, all of which have a negative impact on breastfeeding and childcare (APHRC, 2014; Kimani-Murage et al., 2014; Kimani-Murage et al., 2015). In Tanzania, exclusive breastfeeding among urban slum residents was found to be as low as 9% and complementary feeding with watered down porridge was common. The risk of delaying initiation of breastfeeding within the first hour was high among mother aged less than 24 years and those with low education levels (uneducated/primary school level) (Kulwa et al. 2006; Falnes et al., 2010). Further, a mounting body of evidence in Uganda demonstrates that low maternal education is associated with poor nutritional status in of children of slum dwellers, including school children (Dimanin, 2012; Kikafunda & Tumwine, 2006; Kruitbosch & Heijmans, 2018).

Beyond the household, the assessment consistently found poor nutritional status among children in school or childcare settings in slums. In Kenyan day care centers, we found that one main driver of poor nutritional status among under-fives in slums was the common practice of sharing food, resulting in insufficient amounts consumed per child. In addition, according to community-based data gathered through the FGDs and community workshops, it was noted that school feeding programs in Kenyan slums are sometimes not fully functional, and as such, children are often given small amounts of money from their parents to purchase cheap and non-nutritious street food.

Inadequate environment with poor water and sanitation service access

The negative feeding behaviors we described previously are widespread in slum settings and combine to produce an *unsupportive environment* in which a child is unable to thrive and grow to his/her potential. Findings from our assessment indicate that residents in slums are faced with general *unhealthy environmental factors and inadequate health services* impacting health including lack of access to safe water and sanitation. In Kenya, water treatment costs were considered a main barrier to accessing safe water in slums. In Tanzania, water costs during periods of water shortage were also cited as a major barrier among slum residents:

“In our area, availability of water is a challenge. We have pipes but sometimes no water, in time of water shortage they sell one bucket for 200 or 150 or more.”

– Adolescent FGD Respondent, Tandale slum, Tanzania

The literature reviewed from all slums in our assessment demonstrates the extreme challenge of slum dwellers accessing safe water in poor urban settings. One study conducted in Tanzania reported that 68% of the population in low-income areas received water from informal service providers while only 23% received drinking water from the public licensed service provider (Pauschert et al. 2012).

In slums in all study countries, poor sanitary conditions were found, including the use of flying toilets, open defecation, and sharing unimproved latrines. A study conducted by Kasala et al. (2016) in two informal settlements around Dar es Salaam (Keko Machungwa and Maguruwe)

reported that in Keko Machungwa there were 492 unimproved pit latrines and only 35 improved latrines while in Maguruwe 85% used unimproved pit latrines. The study also reported that twenty-two households out of 30 surveyed in Maguruwe had toilets in poor condition. These unimproved latrines pose major challenges for vulnerable groups, including children, the elderly, and people with disabilities. In these slum settings, it was reported that one toilet was shared with between two to four households, with an average of five members in each household (Kasala et al., 2016). In Dar es Salaam, the vast majority (71.7% to 97.3%) of informal settlement residents had no access to improved sanitation (Reggio, 2012). Sewage systems in Tanzanian cities was very limited, with only 8% of Dar es Salaam slums being connected to the central sewage network. Kulwa et al. (2006) also reported that half of the households visited used public pit latrines and public dumping bins for garbage disposal. Similarly, in Mwanza, the sewage system was severely deficient and between 10-15% do not have a toilet in their households. Residents were unable to build latrines due to the hillside location. It was reported that household with no improved latrines connected to a cesspit or sewage network usually empty their latrines into the ground, river or lake while water from these sources are mainly for domestic uses. (ODI, 2016).

The factors influencing access to sanitation facilities at an individual level in Uganda include household ownership, number of families sharing a toilet stand, cost of the sanitation facilities, stability of the income of household members, and cleanliness of the facilities used (Tumwebaze & Lüthi, 2013). Even in Ugandan slums with high access to sanitation facilities, more than half of slum dwellers (51.7%) were found not to be satisfied with their sanitation facilities. Their dissatisfaction was driven by the nature and type of toilet facilities, cleanliness, and the number of families sharing the facilities and long lines (Tumwebaze et al., 2013).

“There is no toilet where I rent, I can’t afford that 300/- for public toilet for each child, so now when I child says mummy I want to do pupu (defecate), I tell him/her to get a polythene, she does and then throws into the rubbish.”

– Resident, Katwe II Slum

Residents from Katwe II in Uganda reported several barriers related to the proper disposal of waste in the settlement. Rubbish collection was said to be expensive, resulting in residents opting to hide their rubbish to dispose of it in improper ways. In addition, rubbish collection companies were not consistent in garbage collection in terms of timing for garbage collection, leaving residents with no option but to dump the rubbish in the drainage channel or burn it. Furthermore, participants felt that most homes are inaccessible for garbage collection vehicles due to the road network thus only houses close to main roads have access to garbage collection.

Seasonal challenges impacting water and sanitation access

Seasonal challenges to accessing sanitation in slums were also noted in our assessment. In Tanzania, during the rainy season, pit latrines were subjected to flooding or were manually emptied leading to contamination in the surrounding human settlements, soil and water sources. This resulted in informal settlement dwellers frequently experiencing different water-borne diseases such as diarrhea, cholera, and typhoid (Kulwa et al., 2006; Penrose, 2010; Pauschert, 2012; ODI, 2016). Community-level data from our assessment further showed that in the Tandale slum in Tanzania, flooding was found to perpetuate the unsanitary conditions in which residents live, posing additional health risks and challenges:

“In Tandale floods do happen. When it happens, you could probably vacate the place since you find feces floating around. You see?it is during floods when the outbreaks occur, diarrhea, cholera are the most common disease. You see? Because the sewage waste comes out, you know why? Because the houses are cramped here and there.”

– Female Resident, Tandale Slum

Data from FGDs done in Katwe II slum in Uganda indicated that residents were facing major challenges due to flooding during the rainy season. The floods in the settlement are worsened by the fact that the drainage channels are not well maintained, and are often blocked by sand, mud, and dumping waste. As a result, stagnant water becomes a breeding ground for disease-causing organisms. Flooding in these areas often destroys homes, leaving the already poor slum residents without shelter:

“This week, the floods destroyed the houses of many residents in Base zone, and many people including their little children do not have where to stay and their property has been destroyed.”

– Community Leader, Katwe II Slum

Environmental and food contamination

Environmental pollution, specifically soil contamination, is common in urban poor areas in Kenya and is associated with diarrhea, iron deficiency and soil-transmitted infections among pre-school and school aged children (Suchdev et al., 2014). Soil samples from slum areas have been shown to contain high levels of fecal bacteria (Bauza et al., 2017). This can be attributed to lack of safe and hygienic toilet facilities and lack of proper sewerage systems, which in turn leads to exposure to human waste (Corburn & Hildebrand, 2015; Corburn & Karanja, 2016, Muoki et al., 2008). Inadequate personal hygiene and poor food storage were also associated with food contamination in Ugandan slums. A study on food contamination in Nakawa and Naguru parishes of Uganda found that although food sold by vendors tested negative for Salmonella, there were high levels of E. coli contamination (60-100%) in the samples (Nyonyintono & Nakitto, 2013). Poor utilization of toilets can be attributed to lack of security and safety in slums which limits access to these facilities by women, especially at night (Corburn & Hildebrand, 2015). Proximity and cost of toilet facilities also influences access especially in cases where households need to pay for toilets (Corburn & Hildebrand, 2015; Corburn & Karanja, 2016). In addition to evidence of fecal/biological contamination in slums, data from Kenya shows heavy metal contamination in slums (Gallaher et al., 2013), but little is known about its impact on the health of children and adolescents in this context.

Limited access to health services

In addition to poor access to basic WASH services, lack of access to quality and affordable health care was considered a significant barrier to the health and wellbeing of slum residents in all study locations. Findings from our assessment indicate that poor health outcomes in Kenyan slums were attributed to poor environmental conditions and infrastructure, limited access to health services due to lack of income to pay for treatment and preventive services, and reliance on poor quality, mostly informal and unregulated health services that are not well suited to meeting the unique realities and health needs of slum dwellers (Zulu et al., 2011)

In Kenya, poor adolescents are less likely to access health facilities (Banke-Thomas et al., 2017). Poor access to health services among adolescents in slums was found to be associated with lack of adolescent-friendly services, inadequate school health services, and lack of adequate awareness among adolescents on available preventive reproductive health services (Kamau, 2006).

FGD results from the assessment in Uganda showed that in the Katwe II slum, it was often mentioned that there is no single public/government health facility in Katwe II, thus forcing residents to seek care services outside the settlement. Although private health services are found within the settlement, they are not easily accessible to residents because they are expensive:

“We would have been able to go to Nsambya Hospital because it is just next door, just using this road in our community but the services there are so expensive and only those who are rich can afford to go there or take their children.”

– Resident, Katwe II Slum

In Tanzania the assessment found that services and infrastructure may be more available in urban than in rural areas, but accessing them often requires cash payments that the poor cannot afford (UNICEF, 2012). In Dar es Salaam, the study found differences in the health services provided in private and government facilities. Women living in worse conditions consulted private health services less often and relied more often on governmental health services than those living in better conditions. In terms of resources, private facilities had better basic equipment and more doctors (Boller et al, 2003).

Quality of care at health facilities

Even when residents of Katwe II are able to access the government facilities located outside of the settlement, their experience with providers, quality of care, and waiting time often is negative. Overcrowding prevents Patients sometimes from seeing a health worker; therefore, they leave the facility unattended. Also, respondents complained about mistreatment they suffered at the hands healthcare workers – especially those from public/government health facilities:

“They take their time to work on someone, and when your turn finally comes, they are not even attentive. The nurses are rude and bark at us but I still have to go there because we don’t have a better alternative.”

– Resident, Katwe II Slum

Informal providers and traditional healers

Outside of the formal health care providers, data gathered during the FGDs identified that traditional healers and herbalists are key health service providers in Katwe II. Most herbalists operate stalls in the informal markets within the settlement and offer a wide range of herbs which they claim to cure different diseases. FGD participants also postulated that the main reason why residents opt for herbalists is that the services offered are relatively cheaper than those provided by the medical facilities, and the herbs offered by the herbalists can cure more than one ailment. The majority of the participants reported having consulted and used herbal remedies at least once in their lifetime.

Assessment Findings: Immediate Causes

Figure 5: Immediate causes of malnutrition assessment findings

Immediate Causes	Inadequate dietary intake	Diseases
Assessment findings	Inadequate dietary intake (adolescents and school children)	Diarrhea, typhoid, cholera, worms, schistosomiasis, E. coli

The findings from the assessment demonstrate how the lack of access to basic resources, inadequate financial and social capital, and the vulnerable nature of the social, economic, and political context within slums compounded by poor feeding behaviors, environmental factors, and food insecurity, leads to the immediate causes of child undernutrition.

Inadequate and poor-quality dietary intake

Inadequate dietary intake is marked by the consumption of convenience foods by slum dwellers as an effort to save time needed for employment seeking or work itself and leads to a lack of consumption of nutritious and diverse foods. In all assessment countries, slum residents were found to have predominantly poor diets often composed of convenience, low-quality, non-nutrient dense foods (higher energy density but lower in micronutrients). In Kampala, decreased availability and price increments cause slum dwellers to shift from eating their staple food to cheaper more readily available foods (e.g. maize flour). Rural-urban migrants in Tanzania shifted from home traditional staples (cassava, maize and banana) to high sugar, more conveniently consumed and prepared foods. These changes were driven by transition out of farming, differences in food prices, preparation time, and income changes (Lara et al 2018). Another study in Tanzanian slums found that expensive food items such as milk and meat products, fruit, and vegetables rarely were consumed by low-income urban dwellers (Reggio, 2012). Additionally, increased consumption of rice, bread, and other cereal products was common in urban lifestyles. In the Mukuru slum in Nairobi, one study found that households will spend up to 70% of their income on basic foods (Save the Children, 2012).

Household food insecurity in slums, as described previously, leads slum residents to develop coping strategies, such as skipping meals and sleeping hungry, begging and stealing for food, and scavenging for food in waste dump sites. In Kenyan slums, the community assessment found that adolescents frequently look for food in waste dump sites:

“Nutrition for adolescents is not good and this is caused by poor economic background, maybe their families are not financially able and this contributes to many adolescents going to dump sites. Like right now the largest population at the dumpsite is of our young age, someone eats dirty food that has not been inspected and many fall sick. All this is because they are not financially stable.”

– Adolescent resident, Korogocho Slum

In school settings, our study noted that it is not uncommon to find school children in slums rationing out their school meals to share with siblings at home:

“...There are some children who come from homes that can't afford the luxury of three meals in a day. They will even take the leftovers from school to go and give to their siblings at home...”

– KII, Stakeholder from CBO/NGO

In some instances, the coping mechanisms employed by slum residents to combat food insecurity are extremely harmful. Data gathered in our assessment indicate that children in slums have been found to participate in child labor to generate income to purchase food, or for the exchange of food itself. Even more worrisome is the finding that adolescent slum residents engage in commercial sex work for food.

Diseases

Exposure to environmental contaminants as a result of poor water and sanitation infrastructure in slums leads to increased susceptibility to *chronic infections and disease* among infants, young children, and adolescents, and this was confirmed through the data collected in the three-country assessment. In Tanzania, our assessment showed high contamination (52.6%) of E. coli in water samples collected from 207 households in Mwanza slums, which indicated an increased exposure to fecal contaminants in households around slums (Mushi et al. 2018). Due to poor access to safe water and unsafe waste disposal, several water-borne diseases were reported in slums and under-five children were impacted more than other age groups.

One study conducted by Nuhu and Mpambije (2016) in Tandale slum showed that common water-borne diseases affecting the families in Tandale were diarrhea (31%), typhoid (19%), cholera (16%), worms (10%), and Schistosomiasis (6%). The main causes of the mentioned water-borne diseases reported by respondents were unsafe water (70%), uncollected waste (14%) and poor water supply (12%). One study conducted by Penrose (2010) in an unplanned settlement reported a high incidence of cholera with a total of 8,753 cases reported, of which 42.8%, 32.5% and 24.7% were from Ilala, Kinondoni, and Temeke slums respectively (Penrose et al. 2010).

Assessment Findings: Malnutrition among Slum Dwellers

In a study by Lwanga et al. (2012), children in urban slum schools in Uganda were found to have higher levels of malnutrition. The study also revealed that 26.6%, 46% and 10.3% of incidences of stunting, underweight and moderate acute nutrition respectively were attributable to helminth infections (Lwanga et al., 2012). In Tanzania, findings from the recent Levira & Todd (2017) study suggest significant disadvantages among urban populations when it comes to health outcomes and disease. This is shown when the urban data are not disaggregated by slum status/neighborhood/SES.

Research conducted in poor urban settlements in Tanzania have documented a higher burden of malnutrition among children under 5 years living in slums. A small study conducted by Kulwa (2006) with a sample of 100 randomly selected households in slums of Dar es Salaam found a stunting malnutrition prevalence of 43% in children under 5 years – much higher than the national average (34%) – while severe stunting was 11% (Kulwa, Kinabo and Modest, 2006). Another study reported a stunting rate of 56% and an underweight prevalence of 36% in under-

fives (FAO, 2009). High stunting rates were considered a result of a lack of exclusive breastfeeding, as 80% among those who were not breastfed exclusively were stunted (Kulwa, Kinabo and Modest, 2006).

Community-level data gathered in the assessment from the Korogocho slum in Nairobi indicates that undernutrition was common, especially among children under 5 years – consistent with findings from quantitative studies in slums of Nairobi, which report stunting rates of up to 50% (Kimani-Murage et al., 2015). The literature reviewed in this assessment from Ugandan slums showed that malnutrition (underweight, overweight, and obesity) was high among children attending both public and private schools and in residential homes. Children in residential homes also suffered from micronutrient deficiencies in addition to commonly evaluated malnutrition. Being overweight and obese were more prevalent among private school children thus highlighting the need to address the other forms of malnutrition in slums (Berg, Magala-Nyago, & Iversen, 2018; Chebet et al., 2014; Vogt et al., 2016).

Strengths and Limitations of the Assessment

The assessment's analysis of the policy environment in each country was often missing relevant sectors (such as housing) outside of WASH, nutrition and health. A broader scope within this part of the assessment would have strengthened the information gathered on slum upgrading policies and programs, for example, which have a direct link to improving the health and wellbeing of children and adolescents in slum settings.

A noteworthy strength of the assessment is the fact that it is based on multiple data sources and combines existing data with the collection of new data from slum communities. The assessment collected data through focus group discussions and key informant interviews, providing in-depth information from slum communities on reasons why slum residents are hesitant to access health services, the barriers they face in accessing clean water and sanitation, and the challenges they experience regarding feeding their families.

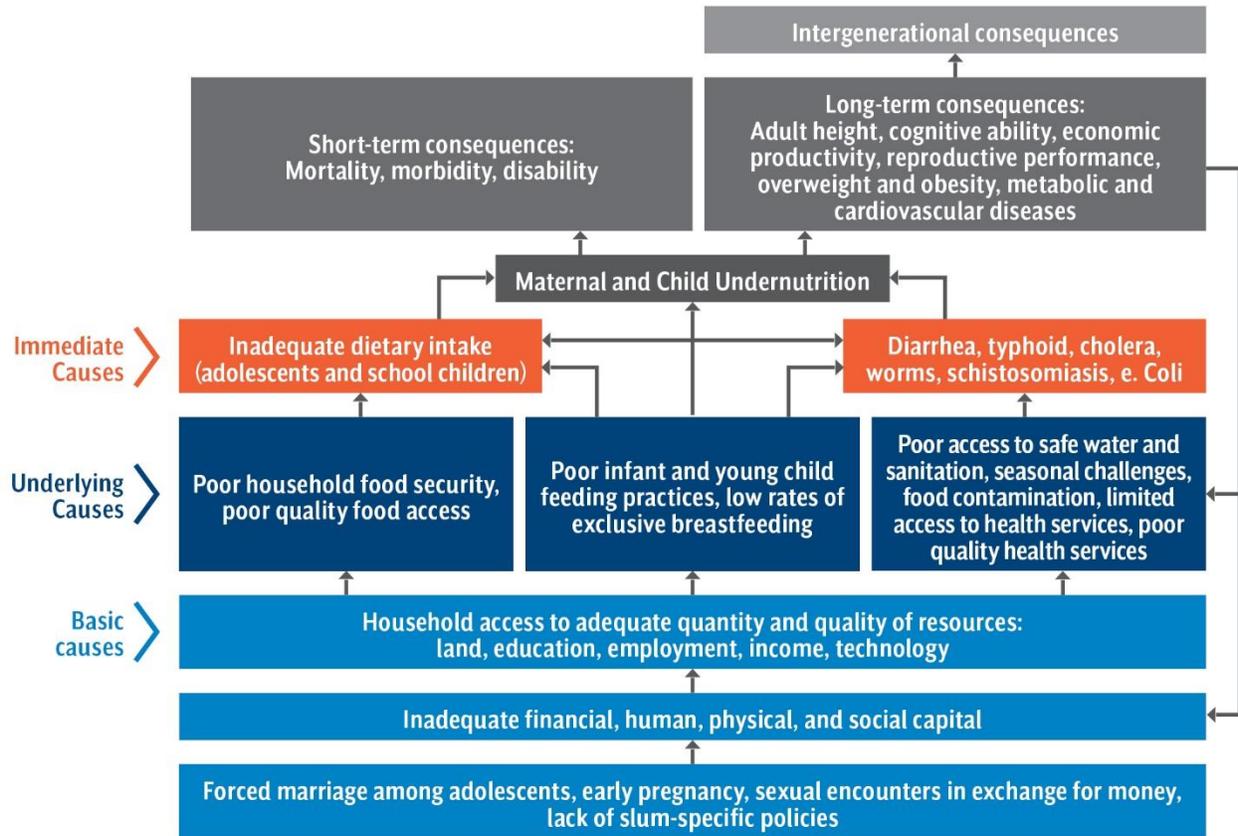
In addition, a substantial achievement of this assessment is the compilation of evidence from all three study countries. There is an opportunity to continuously update the database and create a continual cycle of information sharing as new research is published, interventions implemented, and policies are developed in Kenya, Tanzania, and Uganda.

Summary of Findings

The assessments carried out in Kenya, Tanzania, and Uganda, reviewing policies, programs, and literature around the WASH and nutrition vulnerabilities facing children and adolescents in slums support the notion of multidimensional causes, and relationships leading to malnutrition (Figure 6). Consistent with the causes described in the framework, the assessment reveals several basic causes of malnutrition, including social and cultural influences, such as forced early marriage, early pregnancy, and transactional sex, as well as political barriers such as the lack of slum-specific policies. In addition, in line with the basic causes of malnutrition in the framework, the assessment finds poor household access to resources – such as lack of land ownership, low employment levels, poor educational attainment, and low income – as substantial factors in slums. In relation to the underlying causes of malnutrition represented in the framework, the assessment reports poor household food security and poor quality food access in slums, suboptimal infant and young child feeding practices and low rates of exclusive breastfeeding, and a number of considerable environmental challenges, including: poor access to safe water and sanitation, seasonal challenges contributing to poor environmental conditions,

food contamination, limited access to health services, and poor quality of health services available to slum residents. Immediate causes of malnutrition per the UNICEF framework, such as inadequate dietary intake and several waterborne diseases, were also found in the multi-country assessment to be commonly reported in slums in the three countries.

Figure 5: Adapted UNICEF malnutrition framework applied to the assessment



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