ADDRESSING UNDERNUTRITION IN THE CONTEXT OF URBANISATION IN LOW- AND MIDDLE-INCOME COUNTRIES

MQSUN REPORT

December 2015

ABOUT MQSUN

MQSUN aims to provide the Department for International Development (DfID) with technical services to improve the quality of nutrition-specific and nutrition-sensitive programmes. The project is resourced by a consortium of six leading non-state organisations working on nutrition. The consortium is led by PATH.

The group is committed to:

- Expanding the evidence base on the causes of undernutrition.
- Enhancing skills and capacity to support scaling up of nutrition-specific and nutrition-sensitive programmes.
- Providing the best guidance available to support programme design, implementation, monitoring, and evaluation.
- Increasing innovation in nutrition programmes.
- Knowledge-sharing to ensure lessons are learnt across DFID and beyond.

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ABOUT THIS PUBLICATION

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Executive summary

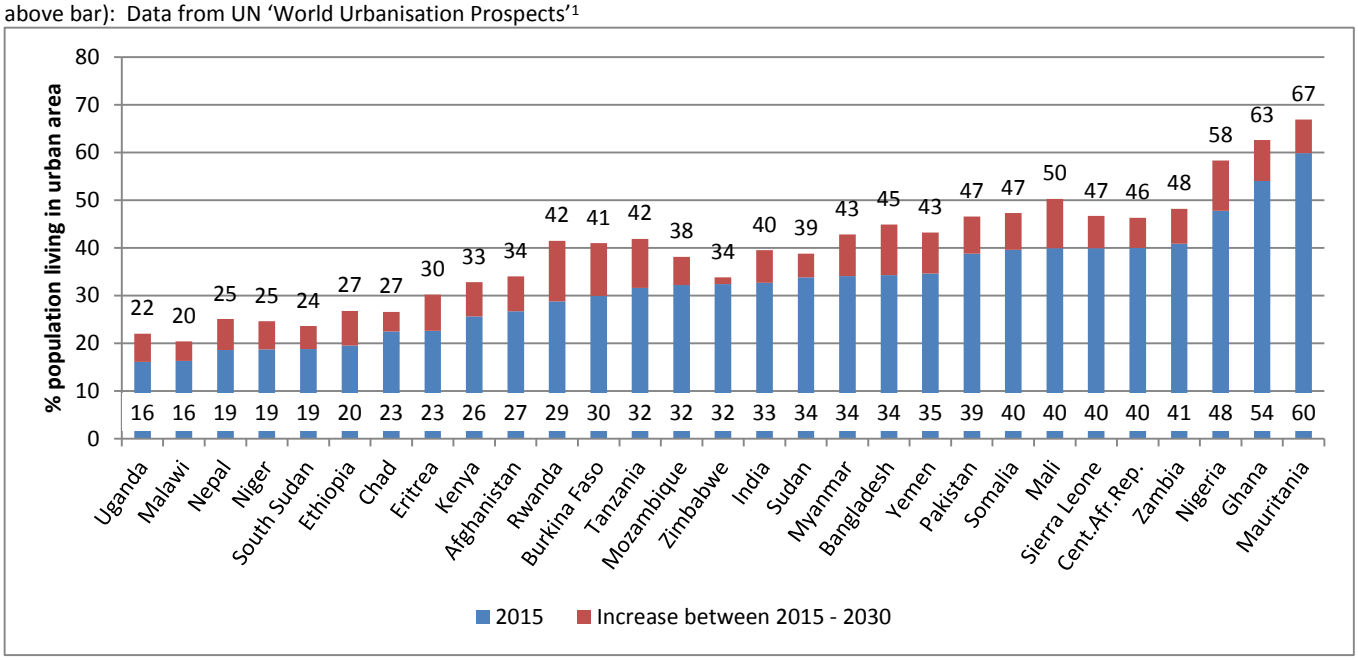
Urbanisation presents a set of challenges and opportunities for tackling undernutrition in low- and middle-income countries where DFID works. This evidence review considers the scale of urbanisation in these countries, appraises what works in urban settings and how this context differs from the rural context with regard to nutrition programming, and identifies the main evidence gaps.

The context –

Urbanisation statistics

Between now and 2030, the global urban population is expected to grow by more than 1 billion people, with most of this growth taking place in middle-income countries, predominantly in Asia. Of the countries which DfID supports, India, Nigeria, Pakistan and Bangladesh have the greatest current and projected (2030) urban populations. India currently accounts for about 10% of the world's urban population, projected to increase to 17% in 2030. At around 3% per year Rwanda has the highest estimated rate of increase in percent urban population, while Malawi, Uganda, South Sudan, Ethiopia, Nepal and Eritrea are expected to have the highest rates of increase in 2030. The Central African Republic and Chad have high proportions of urban population living in slum areas, and the Central African Republic, Mozambique, Zimbabwe and Nigeria have high national rates of urban poverty.

Estimated proportion of population living in urban areas of DfID countries in 2015 (lower value), and projected proportion in 2030 (value above bar): Data from UN 'World Urbanisation Prospects'[1]



For children under the age of 5 years, urban prevalence rates of undernutrition vary greatly between the countries supported by DfID, with rates of stunting ranging from 18% in Ghana to 47% in Afghanistan, and in wasting from 2.4% in Zimbabwe to 17% in Nigeria. Afghanistan, India, and Nigeria have high rates of urban young child undernutrition. In 2025 only Pakistan and Chad are expected to still have high prevalence rates of stunting in urban areas. However the absolute number will be highest by far in India, which is projected to account for nearly 45 million stunted urban young children in 2025. Average prevalence rates of undernutrition are lower in urban areas compared to rural, but national level data mask large differentials within urban and rural settings. Findings from analysis of secondary data from representative surveys indicate that stunting prevalence rates are similar in urban and rural areas when adjusted for economic status, and differentials in nutrition status related to wealth are more pronounced in urban areas.

Diet and food security

Most food consumed by urban dwellers is purchased, and food expenditures account for more than half of the urban household budget. The poor are therefore vulnerable to rises in food prices, which can have adverse consequences for child nutritional status if parents are unable to buffer their children from the shocks.
Street foods play an important role in the diet of poor urban residents, as they are convenient and can be purchased in small quantities. However their consumption is contributing to rising levels of urban obesity, and if not prepared hygienically can lead to food-borne disease. Supermarkets have an increasingly important role as a source of purchased foods in urban areas, but their significance for the livelihoods of the urban poor is not clear.

Livelihoods in urban areas are very diverse, with long hours and often long distances from home. Most work in is the informal sector, for example in construction and factory work, rickshaw-driving and street-vending, although the formal sector is important too. There is high participation of women in the workforce, which impacts on quality of childcare. Recent migrants to urban areas can be a particularly vulnerable group since they lack social support networks, and those migrating from rural areas have lower levels of education.

Programming –

Strengthening policy and planning

There is a paucity of evidence relating to actions that help create an enabling environment for urban nutrition improvement. From the literature on general nutrition governance we can infer that lack of capacity is a potential bottleneck for developing policy and implementing/scaling up interventions appropriate to each specific urban area, which are owned by municipal authorities and supported by civil society and the private sector. However this is likely to be less of a constraint in the urban context compared to rural because of the preference of trained workers to live in urban areas.

Local Food and Nutrition Policy Councils, which include varied stakeholders, could provide a mechanism for developing and implementing local urban nutrition strategies. There is a precedent in Belo Horizonte in Brazil, however there is little other evidence to guide actions in this regard.

The review identified only one study which specifically related to urban nutrition governance. The NICK Project in Kenya and Chile showed that a sensitively facilitated and supported action research process can enable municipal level multisectoral teams to plan and implement co-ordinated inter-sectoral actions, and successfully build capacities to tackle social determinants of urban child nutrition. Key insights from this project are firstly the necessity of repeated cycles of action, reflection and re-planning, and secondly the enormous potential of independent action within the intervention community as a result of their participation in planning and implementation of the project group's actions.

Nutrition-specific programming

There is an expansive body of contextual evidence on nutrition determinants in urban settings, and this evidence is most extensive for South Asia (in particular, Bangladesh, India, and Pakistan) and East and Southern Africa (in particular, Kenya, Ethiopia, and South Africa). The greatest insights relate to chronic undernutrition (stunting) rather than acute or short-term undernutrition (wasting), as differentials between urban and rural areas are greatest for the former rather than for the latter. Urban populations are also characterised by a 'double burden of malnutrition'; in particular, among the urban poor, the dual existence of child undernutrition and adult overweight/obesity within the same household is becoming increasingly prevalent.

In urban settings, fluctuations in food prices and suboptimal food hygiene are particularly important determinants of food security, dietary practices, and health outcomes that directly impact nutritional status (e.g., diarrhoeal disease). Given the reliance on foods prepared outside of the home, especially as a source of complementary

foods provided to young children, food preparers such as street and market vendors—not just mothers or caregivers—will be important target groups for nutrition improvement efforts in some urban settings.

Less is known regarding drivers of urban undernutrition for adolescents and women of reproductive age than for young children. There is a lack of attention within available literature on women's nutrition beyond its role as a determinant of child nutritional outcomes. This observation is not unique to urban nutrition programming; it is applicable to both urban and rural settings.

Whilst there is clarity regarding key nutrition determinants in urban settings, insights on "what works" in urban contexts is less clear. Intervention strategies in the general literature skew heavily towards conventional approaches such as nutrition education targeting mothers and caregivers; micronutrient supplementation of children, adolescent girls, and pregnant women; and supplementary feeding (e.g., through school feeding programmes). Although some intervention studies highlight particular challenges with targeting and compliance (e.g., for nutrition education interventions that require repeated contacts; micronutrient supplementation interventions) in urban settings, no inferences are drawn within the literature on urban adaptations or critical success factors for urban nutrition programming.

Nutrition-sensitive health programming

Through systematic reviews and in-depth, cross-country analyses involving globally endorsed datasets such as Demographic and Health Surveys, the literature makes a strong argument for the positive roles that family planning (FP) can play in contributing to efforts that address food availability, food access, and food utilisation and consumption. However, the published literature provides little insight on how the above relationships play out in urban settings. Whilst there have been many urban FP/sexual and reproductive health initiatives, nutritional outcomes are not a focus of those initiatives and thus go unmeasured.

Integrated health models, such as the state-of-the-art, child-focused integrated management of childhood illnesses (IMCI) and integrated community case management (iCCM) strategies, have gained traction in low-resource settings throughout the globe. However, there is a paucity of evidence on urban adaptations of the above approaches, as well as on their effectiveness in urban settings. The limited literature that document applications of the above strategies in urban contexts lack methodological rigor, thus limiting the ability to make definitive statements regarding the role that those integrated strategies can play in improving nutritional status in urban populations.

The general literature does, however, identify two themes—integration and a life-cycle approach—as critical success factors for nutrition-sensitive health programming. Rather than implementing nutrition-sensitive interventions such as FP in a standalone manner, the literature suggests that it is most effective to deliver an integrated health package that makes full use of both community-based and facility-based service delivery platforms to improve MNCH. A commitment to a life-cycle approach minimises missed opportunities to provide adolescent females, adult women of reproductive age, and infants/children with a constellation of nutrition-specific and nutrition-sensitive approaches that are appropriate for the target group. However, evidence is extremely limited on the viable models aligned with the above two themes.

Nutrition-sensitive agriculture programming

There is very little evidence relating to the nutritional impact of urban and peri-urban agriculture. Even the context-neutral literature provides only weak evidence of benefits to our ultimate nutrition outcomes, only to the intermediate outcomes of production and consumption of nutritious food. Findings relevant to urban programming were firstly that interventions that invested broadly in different types of capital (especially human capital including consideration of gender issues) were more likely to improve nutrition outcomes, and secondly

that effectiveness was enhanced when different kinds of intervention were implemented together, for example nutrition education in combination with home gardening.

Qualitative evidence indicates that urban agricultural production has a more important role with respect to employment and diversified income than its role as a contribution to household food availability and access. A third pathway via increased capacity for child care has been suggested, but this has not been verified.

Issues that particularly affect urban agriculture and must be taken into account when planning activities in this sector include: lack of space; lack of tenure and legality of activities; lack of safe water for irrigation; health risks from raising livestock in more crowded conditions, and distance between residence and land being cultivated.

Equity and resilience

Global and sub-Saharan Africa-specific systematic reviews suggest that intra-urban differences in child undernutrition (most notably ***between*** well-to-do individuals/households and the poorest individuals/households) are larger than urban/rural differentials in child malnutrition. There is a burgeoning body of evidence on the role of social protection/social safety net programmes on addressing proximate determinants of nutritional status. However, data on this issue within urban contexts is still limited, with the exception of selected countries such as Kenya.

The most robust body of evidence on urban poverty and resilience focuses on the "urban slum" and "informal settlement" phenomena. From the programme perspective, both nutrition and poverty-related literature identify high population turnover/flux and large numbers of undocumented individuals and households as operational challenges for interventions in urban slums and informal settlements.

Evidence on the nutrition effects of social protection schemes (e.g., cash transfers) focuses on child nutrition as opposed to adolescent or women's nutrition. The concept of gender-sensitive urban planning is, however, gaining traction as a way of prioritising women's and girls' greater access to livelihoods, safe and secure living conditions in urban slums and informal settlements, and increased access to quality infrastructure. However, once again, there is limited evidence on urban versus rural settings, and not all studies assessing various dimensions of equity or resilience make linkages, whether directly or indirectly, to nutritional outcomes.

Physical environment

The poorest residents of cities often live in exceptionally unhealthy and dangerous conditions, often with limited access to essential infrastructure such as water and sanitation and shelter.

The evidence suggests that promotion of hygiene can be an effective means of reducing urban under-nutrition only if access to safe water and basic sanitation also exists. Reduction in diarrhoeal disease which leads to poor nutrition status can thus best be achieved through an approach to improving WASH which simultaneously addresses constraints which exist at different levels. This comprehensive approach promotes improvements in key hygiene practices, while simultaneously both improving access to safe water and sanitation technologies and products, and supporting an enabling environment. In low-income urban contexts, successful WASH projects are locally owned and tailored to local realities.

Evidence gaps –

Priority research activities to address identified evidence gaps include:

- Mapping existing programmes, policies, and bodies that support resilient urban food security
- Developing and testing of a toolkit for urban vulnerability assessment, and applying this toolkit in varied urban contexts to develop an understanding of how to identify slow onset urban emergencies
- Exploring (a) differences in nutrition-specific programme approaches for urban/peri-urban versus rural areas and (b) features of effective nutrition interventions in urban/peri-urban settings

- Testing the effectiveness of integration models for nutrition-sensitive health, agriculture and WASH programming
- Exploring equity dynamics, and specifically the interplay between gender, poverty, and undernutrition in urban areas
- Exploring the source of food prepared by street vendors and how this affects others' livelihoods
- Undertaking WASH programme evaluations which incorporate nutrition outcome indicators.

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List of acronyms

BCC	Behaviour change communication
BMI	Body mass index
CAR	Central African Republic
CCT	Conditional cash transfer
CT	Cash transfer
DfID	Department for International Development
DHS	Demographic and Health Survey
FAO	Food and Agriculture Organization
FANTA	Food and Nutrition Technical Assistance project
FP	Family planning
GAM	Global Acute Malnutrition
HFA	Height-for-Age
HH	Household
HULC	Healthy Urbanization Learning Circle
iCCM	Integrated community case management
ICN	International Conference on Nutrition
IDRC	International Development Research Centre
IDS	Institute of Development Studies
IEC	Information, education, and communication
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
IMCI	Integrated management of childhood illnesses
IYCF	Infant and young child feeding
MICS	Multiple Indicator Cluster Survey
MNCH	Maternal, newborn, and child health
NUHDSS	Nairobi Urban Health and Demographic Surveillance System
ODI	Overseas Development Institute
OR	Odds ratio
PSNP	Productive Safety Nets Programme
QS	Quality Score
RCT	Randomised controlled trial
RMNCH	Reproductive, maternal, newborn, and child health
SC	Save the Children
SES	Socio-economic status
UN	United Nations
USAID	United States Agency for International Development
WASH	Water, sanitation, and hygiene
WFA	Weight-for-age
WFH	Weight-for-height
WFP	World Food Programme
WHO	World Health Organization

1 Introduction

The process of urbanisation is a demographic transition from rural to urban living, and an economic transition from an agriculture-based economy to industry, technology, and services. Urbanization also has profound social, political and environmental effects[2]. Already more than half the world's population live in urban areas and it is estimated that by 2050, two thirds of the world's population will be urban[1]. Development effort has tended to focus on rural areas, notably in the humanitarian and food security sectors[3]. Thus international development organizations need to increase their understanding of, and effectively address, the challenges associated with urbanisation.

Aims: This literature review aims to increase understanding of the burden of undernutrition in urban contexts in the countries in which DfID works, both now and in the future, and enable their nutrition programming to take into account the best available evidence on how to tackle undernutrition in these diverse contexts. The review is also intended to identify where evidence is lacking, so that areas can be highlighted for further research to inform future programming. The full objectives are provided in Appendix 1.i.

Methods: The approach used was that of a narrative synthesis[4]. The review was an interactive process comprising the following tasks:

1) Development of an analytical framework to guide searches and structure reporting: See Annex 1.ii. Key outcomes relate to undernutrition in < 5 years old children, adolescent girls, and reproductive age women.

2) Initial scoping review of the literature, structured around the streams of work categories in the framework: The purpose was to gain an impression of the volume and strength of existing evidence and enable prioritization of the topics to be covered in the full review. The decision was made that, rather than undertake systematic searches of specific topics, the full review should include literature pertaining to all work streams.

3) Compilation of statistical data relating to urbanisation and nutrition: Data were obtained from institutional websites including those of the UN Department of Economic and Social Affairs, UN-Habitat, the World Health Organization (WHO), and the World Bank.

4) Rapid review of published and unpublished materials[a]: Inclusion criteria were publications in English language, published after 1990, and pertaining to urban nutrition intervention in low-income country or countries. Relevant literature was identified from academic databases (ASSIA[b], Highwire, Ingenta Connect, PubMed, Science Direct), institutional websites (including CaLP, CMAM forum, ENN, FAO, IDS, IFPRI, IIED, ODI, UN-Habitat, UNICEF, WFP, World Bank)[c], and using Google and Google scholar. The main focus was identification of literature relating to interventions, but literature pertaining to causal pathways in the urban context was also scanned. Both quantitative and qualitative data were collected to help assess not only which interventions are effective (or not), but how and under what circumstances. Literature not specific to residential area was appraised for points relevant to urban programming, especially for topics lacking evidence specific to the urban context.

5) Assessment of volume and quality of evidence relating to nutrition programming: Studies or reports that potentially provided evidence of effect of interventions in urban areas were appraised using three criteria to assess the strength of this evidence. The criteria related to study design, internal validity and outcomes addressed (see Annex 1.iii for details). Based on these criteria, a score of A to C was attributed to each study to enable appraisal of the size and strength of the body of evidence[5] for each of the workstream categories in the analytical framework. Studies providing weak evidence of effect often included practical information of relevance to urban programming, and for this reason a quality threshold was not used as a criterion for inclusion.

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[a] Given the large number of studies to be screened, there is a risk that important studies were omitted.

[b] ASSIA: Applied Social Sciences Index and Abstracts

[c] CaLP: Cash Learning Partnership; CMAM: Community-based Management of Acute Malnutrition; ENN: Emergency Nutrition Network; FAO: Food and Agriculture Organization; IDS: Institute of Development Studies; IFPRI: International Food Policy Research Institute; ODI: Overseas Development Institute; WFP: World Food Programme.

6) Summary of findings: For reporting, interventions were grouped according to the workstream categories. Annexes include data tables, supplementary charts, and tabulated outlines of the literature reviewed.

Definitions: The distinction between rural and urban is not binary—usually the boundary between the areas is "porous and indistinct"[6] and there is no internationally agreed definition for "urban". This report uses data from the UN and other international institutions that are reliant on national statistics. Some countries define urban populations as those from a locality with a population greater than a specified size, and others define them using administrative, economic or infrastructural criteria[7]. Thus national-level statistics relating to urbanisation are not strictly comparable between countries. The definition of slum used in this report is that specified by UN-Habitat; see Annex 1.iv.

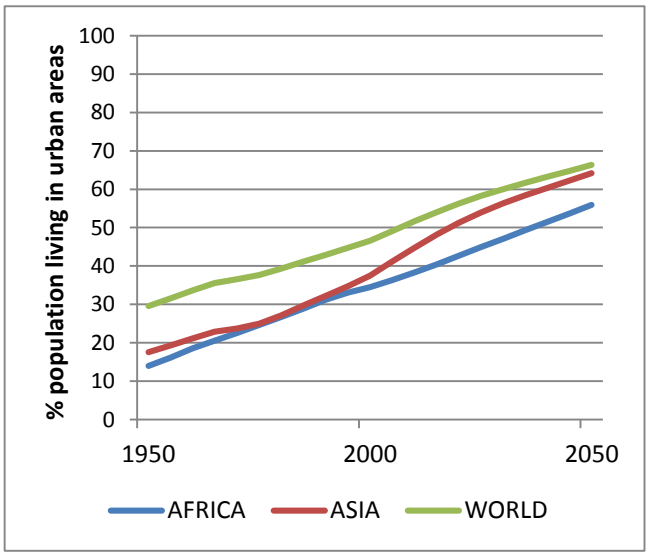
Structure of the report: Presentation of the findings of the review starts in Section 2 with a discussion of current and predicted trends in urbanisation that focuses on the countries in which DfID is operational. Section 3 discusses the current and projected prevalence of undernutrition in rural and urban contexts of DfID countries, while Section 4 describes the approaches used to address undernutrition in the urban context, along with the evidence identified by the review for their effectiveness. Section 5 closes the report by identifying gaps in the evidence base that DfID could potentially address.

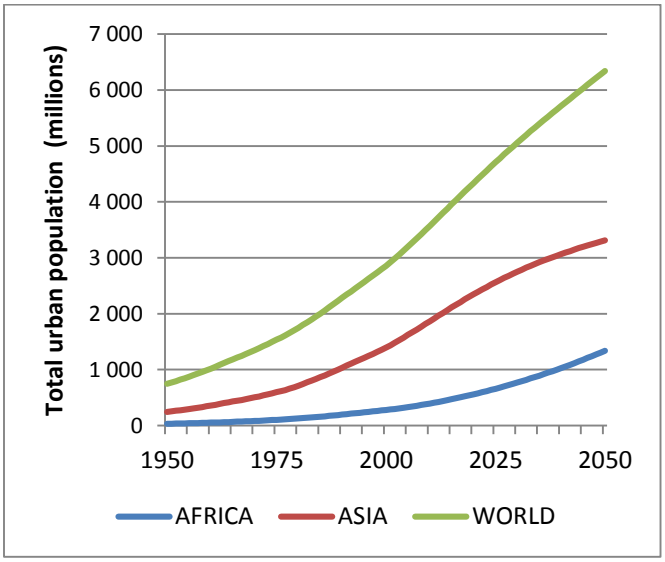
2 Current and predicted trends in urbanisation in DfID countries

In this section of the report, the current distribution and trends over time in urbanisation are examined.

The review of literature revealed that the growth of cities in the 20th century was exceptional. The total global urban population, which stood at just 10% of the global population at the start of the century, had by the millennium reached nearly 50% and is projected to reach nearly 70% by 2050 (Figure 1 below) This corresponds to around 6 billion people, of whom over half will reside in Asia (Figure 2 below).

Figures 1 and 2: Estimated and projected proportion per cent urban, and total urban population, by region



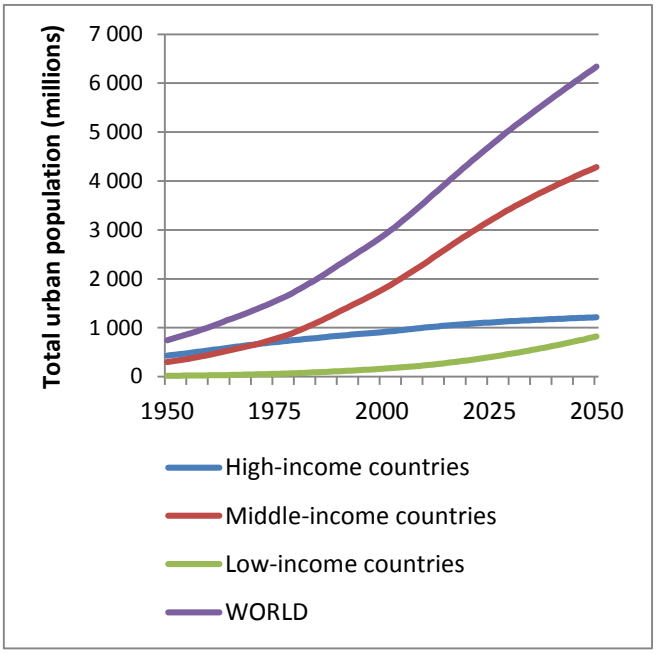


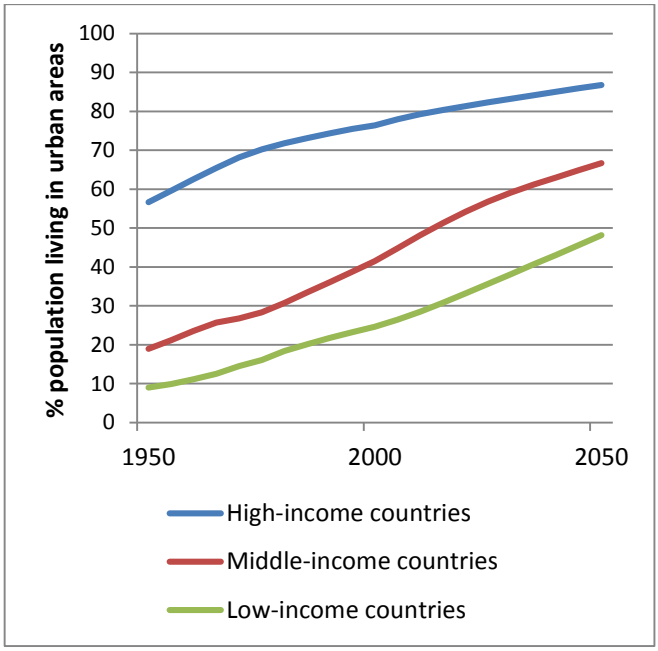
Data source for Figures 1–2: World Urbanization Prospects (http://esa.un.org/unpd/wup/).

Low- and high- income countries are projected to account for relatively small proportions of the total urban population. Most of the projected growth in global urban population between now and 2050 will be due to middle-income countries (Figure 4 below), but their per cent urban in 2050 is still not expected to equal the projected proportion of nearly 90% in high-income countries (Figure 3 below). Low-income countries had rapid

rates of urbanisation between 1950 and 1980 but now rates have settled down and are projected to remain at between 1% and 1.5% per year on average (Figure 5 below). Rates of urbanisation in Asia have been much higher than those in Africa since around 1990 but are projected to decrease from nearly 2% in 2000–2005 to just over 0.5% in 2045 (Figure 6 below).

Figures 3 and 4: Estimated and projected per cent urban, and total urban population, by income group

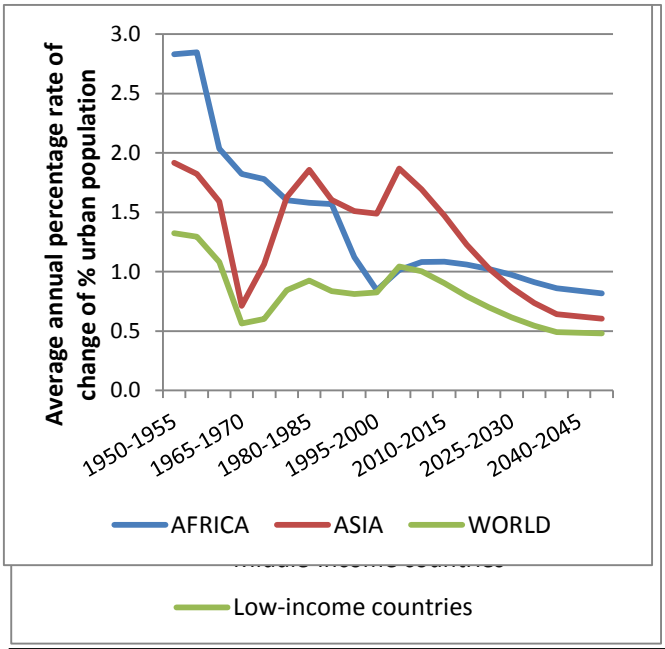




Data source for Figures 3–4: World Urbanization Prospects (http://esa.un.org/unpd/wup/).

Figures 5 and 6: Average annual rate of change of proportion urban (%) by income group and region

Data source for Figures 5–6: World Urbanization Prospects (http://esa.un.org/unpd/wup/).



Average per cent urban population is similar in Africa and Asia, and the rate of increase in per cent urban population is similar in both continents. Middle-income countries and Asia are expected to account for most of the growth in numbers in the global urban population between now and 2050.

There is great variation in levels of urbanisation between the countries in which DfID is operational. World Urbanization Prospects data indicate that in 2014, Mauritania had the highest proportion of the total population living in urban areas (59%) and Uganda the lowest (16%) (Table 1 in Appendix 2 and Figure 7 below). Ranging from 18% to 38%, the per cent urban of the six DfID Asian countries fell well below the continent's average (48%). Nigeria, the most-populous DfiD country in sub-Saharan Africa, is currently transitioning from a majority rural to a majority urban population by 2030 (Table 2 in Appendix 2).

In contrast, the level of urbanisation in all DfID-supported countries in Asia is still projected to remain below 50% in 2030. Mauritania, Ghana, and Nigeria are estimated to have the highest per cent urban in 2015 (Figure 7 below) and are projected to still have the highest proportion in 2030 (Figure 8 below). Rwanda currently has the highest estimated rate of increase in per cent urban at around 3% per year (Table 1 in Appendix 2 and Figure 9 below), but in 2030 other countries are projected to have the highest rates of increase: Malawi and Uganda at 2%; South Sudan, Ethiopia, and Nepal at 1.9%; and Eritrea at 1.8% (Table 1 in Appendix 2). India, Nigeria, Pakistan, and Bangladesh are the DfID countries with the highest current and projected (2030) urban populations (Figure 10 below). India alone currently accounts for about 10% of the world's urban population, increasing to 17% in 2030 (authors' calculations using data from Table 1 in Appendix 2).

However, there is uncertainty around these estimates. National level estimates of urban population and per cent urban can differ considerably between sources (Table 3 in Appendix 2). For Chad, Malawi, Nepal, and Sudan, UN-Habitat estimates of total urban population in 2030 are more than 40% greater than World Urbanization Prospects (WUP) estimates. For Mauritania, Rwanda, and Zambia, WUP estimates are more than 30% greater than those of UN-Habitat. Even larger discrepancies result when very recent and detailed analysis using census data, satellite images and secondary data sources are used, for example it has been recently been estimated that Nigeria's population is only 30% urban[2] (this contrasts with the two UN estimates at around 50%, see Tables 2 and 3 in Appendix 2). This highlights a risk that UN projections have overestimated future levels of urbanisation due to the projections being based on trends from the 1960s and 70s when many African countries were rapidly

urbanising. Since then economic growth gains in Africa have largely not been based in urban areas[2], so urban migration has slowed and for much of Africa, the population may remain mainly rural[d] for the foreseeable future. DfID should take this uncertainty into account when interpreting the official urbanisation figures for Africa.

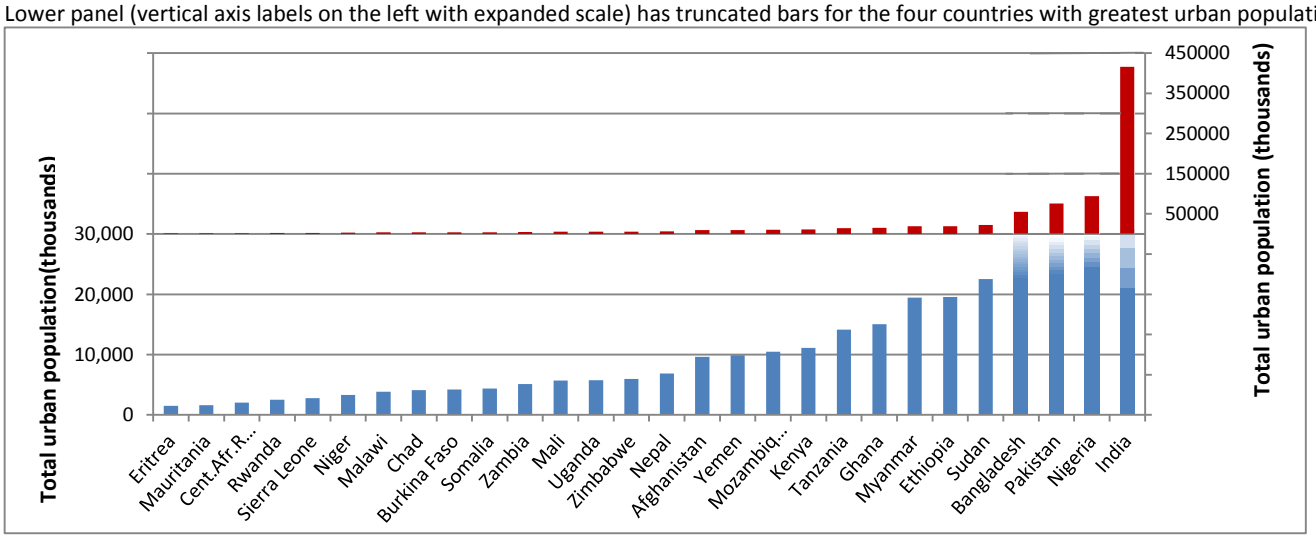
Figure 7: Map showing estimated proportion of population living in urban areas in 2015 for DfID-supported countries

Figure 8: Map showing projected proportion of population living in urban areas in 2030 for DfID-supported countries

Figure 9: Map showing estimated average annual rate of change of the % urban population (%) 2015–2020 for DfID-supported countries

[d] This premise does not imply that urban populations have stopped growing in many African countries. It simply proposes that the rate of growth of these urban populations is slower than that of the overall populations.

Figure 10: Recent estimates of total urban population in DfID countries. Upper panel (vertical axis labels on the right) shows all countries. Lower panel (vertical axis labels on the left with expanded scale) has truncated bars for the four countries with greatest urban populations.



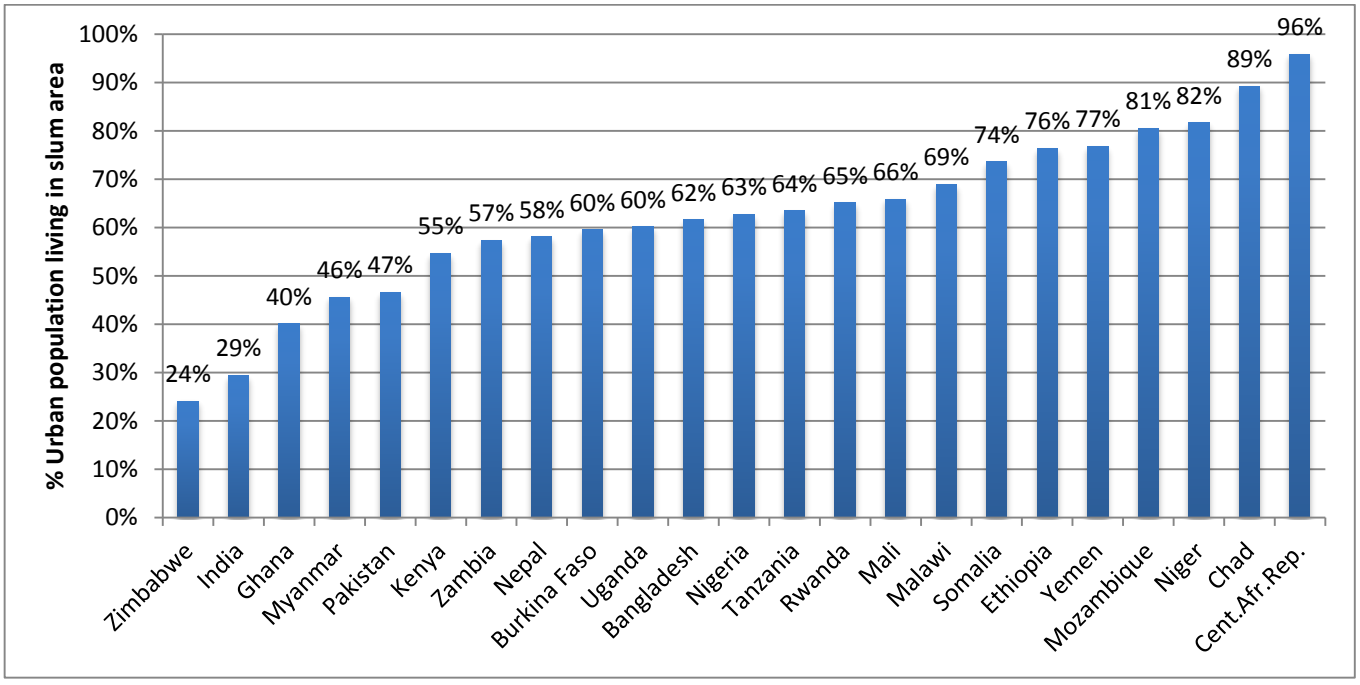
Data source: UN-Habitat (http://urbandata.unhabitat.org/).

- *UN-Habitat estimates for 2015 indicate that at 55% Ghana has the highest* per cent urban population, while WUP estimates for 2015 indicate that at 60% Mauritania currently has the highest per cent urban followed by Ghana (54%) and Nigeria (48%). By 2030 these proportions are projected by WUP to increase to 67%, 63%, and 58%.*
- *Rwanda currently has the highest* estimated rate of increase in per cent urban (around 3% per year), but in 2030 Malawi, Uganda, South Sudan, Ethiopia, Nepal, and Eritrea are projected to have the highest rates of increase.*
- *India, Nigeria, Pakistan, and Bangladesh have the greatest* current and projected (2030) urban populations. India accounts for about 10% of the world's urban population, projected to increase to 17% in 2030.*

** of DfID-supported countries with available data*

Different regions experience different forms of urbanization, for example in contrast to parts of Asia, urban areas across most of Sub-Saharan Africa are growing without proportionate industrialization, which results in complex patterns of migration and settlement in "hollow" cities devoid of commensurate services and employment opportunities[8]. Also within urban areas there are great differentials in living conditions. Estimates from UN-Habitat[9] indicate that in 2012 about a third of the urban population in the developing world—about 860 million people—lived in slums[e]. Sub-Saharan Africa had the largest urban slum population (213 million), followed by East Asia (207 million), South Asia (201 million), Latin America and the Caribbean (113 million), South-east Asia (80 million), West Asia (36 million), and North Africa (13 million). In Sub-Saharan Africa, urbanization has become virtually synonymous with slum growth[8]; almost two-thirds of the region's urban population currently lives in slum conditions, compared to a global average of one third[9]. In 2009, of the DfID countries with available data, more than 80% of the urban population lived in slum areas in the Central African Republic (CAR), Chad, Niger, and Mozambique (Figure 11 below).

Figure 11: Proportion of urban population living in slum areas of DfID countries, 2009



Data source: UN-Habitat (http://urbandata.unhabitat.org/).

Trends in urbanisation must also be examined within the context of poverty. Most of the urban poor do not reside in megacities (a metropolitan area with a total population in excess of ten million people, of which there

[e] Settlements where the inhabitants have inadequate housing and basic services. See Annex 1 iv for the criteria.

were 28 in 2014[1]) but in large and mid-sized cities in South Asia and Sub-Saharan Africa[8]. While there is no common definition of urban poverty, consensus does exist that the number and proportion of urban poor are increasing, as is their share in overall poverty, and that the locus of poverty is changing from rural to urban areas[8]. Of the DfID countries with available data, the urban poverty gap is highest in CAR at 30%, followed by Mozambique, Zimbabwe, and Nigeria. These countries also have the highest rates of another measure of poverty, the proportion of the urban population living below the national poverty line (Figure ii and Table 4 in Appendix 2).

- *CAR and Chad have high proportions of urban population living in slum areas (96% and 89%)*
- *CAR, Mozambique, Zimbabwe and Nigeria have very high rates of urban poverty*

Comparisons included DfID countries with available data

It is important to note that averages mask large differentials within urban and rural settings. Although in DfID-supported countries the proportion living in poverty is consistently higher in rural areas than urban (Table 4 in Appendix 2), the poorest and most vulnerable segments of urban populations—for example, poor, female-headed households or households with high dependency ratios—often experience vulnerabilities and threats to nutrition that rival their rural counterparts[3]. For example the urban poor are more likely to employ risky coping mechanisms including high levels of debt, since they tend to be dependent on income from precarious informal sector jobs that rarely meets their consumption needs[3]. Also environmental hazards including over-crowded and poor quality housing, contaminated water, and open sewerage, are particularly acute in urban informal settlements or slums[10].

Patterns of poverty and urbanisation between countries do not necessarily match patterns observed in nutrition. The proportion of stunted children does not correlate well with the two measures of urban poverty examined (see Appendix 2, Figure ii). Also some countries with a ratio of rural-to-urban poverty head count close to 1 still have large rural-urban disparities in child stunting (Ethiopia, Mozambique, and Nigeria, Figure 12 below) and child wasting (Ethiopia and Afghanistan, Figure 13). Clearly sources of national-level data serve only as a crude starting point with respect to developing an understanding of the relative burden of undernutrition in urban contexts and its determinants, and can be misleading. A nuanced understanding of the interplay of various factors is necessary, which can only be attained by using data sources relating to sub-national and more local levels. We discuss the association between poverty and nutrition in greater detail in Section 4 iv.

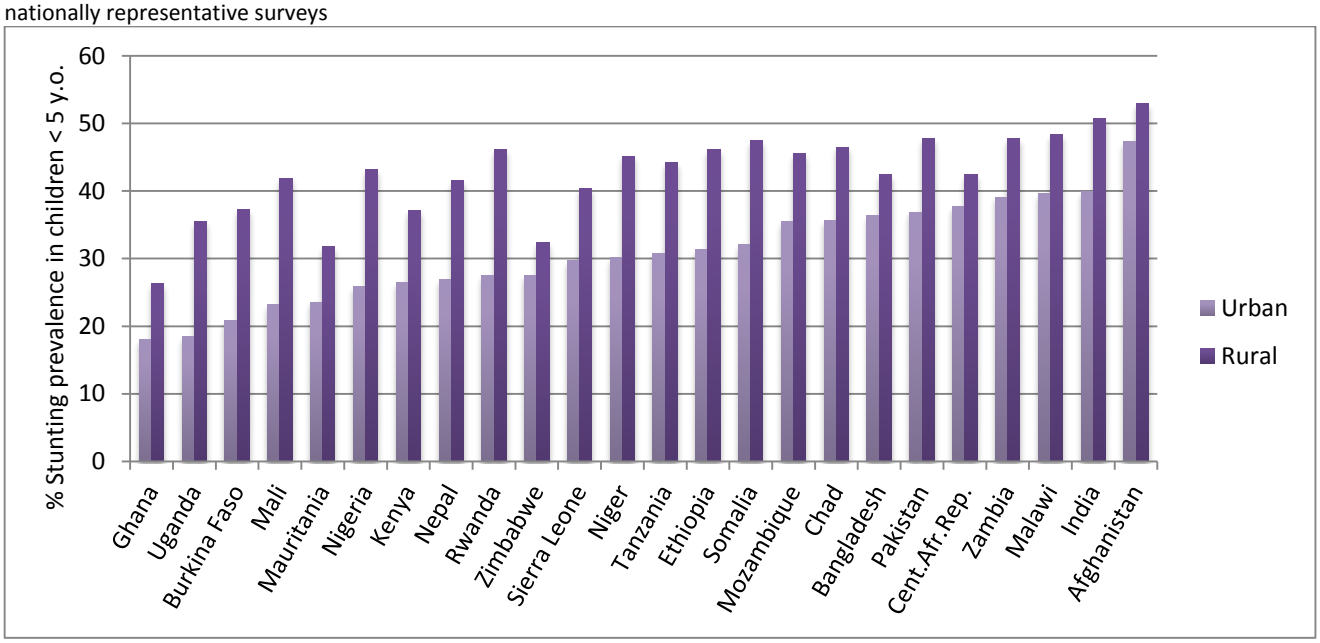
3 Current and projected prevalence of undernutrition in rural and urban contexts of DfID countries

In this section of the report, the current national rates of urban undernutrition are examined and compared to rural rates, together with estimates of projected urban rates. All tables of data are included in Appendix 3.

For children under the age of 5 years, urban prevalence rates of undernutrition vary greatly between the DfID countries for which recent nationally representative data are available, with rates of stunting ranging from 18% (Ghana) to 47% (Afghanistan), and in wasting from 2.4% (Zimbabwe) to 17% (Nigeria). Stunting rates are highest in Afghanistan and India, rate of underweight is highest in India, and rates of wasting are highest in Nigeria and India (Figures 12–13 below and Tables 5–7 in Appendix 3). Prevalence rates of urban stunting are projected to have decreased by 2025 in all countries except Pakistan (see Appendix 3, Figure ii and Table 8; authors' calculations), and Pakistan and Chad are the only DfID countries projected to still have a high or very high prevalence of urban stunting in 2025 (Table 8 in Appendix 3). In 2025 India is projected to have by far the highest number of stunted urban children at nearly 45 million, followed by Nigeria, Pakistan, and Bangladesh (see Figure iii in Appendix 3).

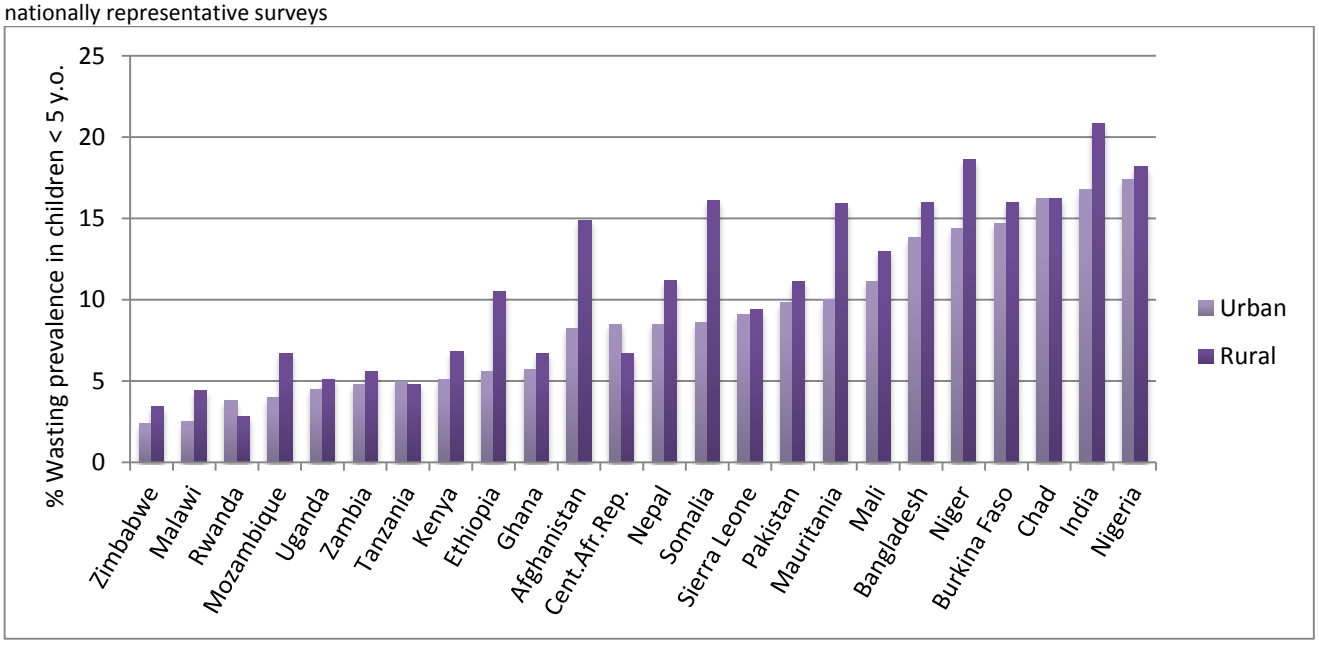
The data for DfID countries (Figures 12–13 below and Tables 5–7 in Appendix 3) show that on average young urban children are better nourished than rural children. This is shown consistently with respect to stunting and for underweight, while differences between urban and rural prevalence of wasting are lower and are less consistent. For the 24 DfID-supported countries for which data were available, rural wasting rates are 17% higher on average than urban, while rural stunting rates are 28% higher than urban on average. For several DfID countries average wasting rates are similar in urban and rural areas, while for Ethiopia, Afghanistan, Somalia and Mauritania there are large differences (see Figure 13 below).

Figure 12: Stunting prevalence (%) in children < 5 years old living in urban and rural areas of DfID countries, recent estimates from nationally representative surveys



Source: UNICEF/WHO/World Bank Joint child malnutrition estimates (http://www.who.int/nutgrowthdb/estimates/en/).

Figure 13: Wasting prevalence (%) in children < 5 years old living in urban and rural areas of DfID countries, recent estimates from nationally representative surveys



*Source: UNICEF/WHO/World Bank Joint child malnutrition estimates (*http://www.who.int/nutgrowthdb/estimates/en/).

India and Niger are the DfID-supported countries with the highest proportion of underweight urban adolescent girls (Figure iv in Appendix 3; data available for 20 countries), and India and Eritrea have the highest proportion of underweight urban women of reproductive age (WRA) (Figure v in Appendix 3; data available for 24 countries).

Bangladesh, India, Nepal, and Yemen have high proportions of urban WRA with height < 145 cm (Figure vi in Appendix 3; data available for 24 countries).

Urban/rural comparisons of childhood and WRA undernutrition in DfID countries show that their urban populations are better off than rural populations (see Figures 12–13 above, and Figures iv–vi and Tables 5–8 in Appendix 3), consistent with recent reviews that have found that young urban children are taller and heavier than their rural counterparts in almost all low-income and middle-income countries[11,12]. However simple comparisons of urban and rural populations mask inequalities within the populations. Findings from representative surveys show that stunting levels increase significantly from lower to higher poverty quintiles in both urban and rural areas, but such differences are more pronounced in urban areas (details and figures are provided in Annex 3 iv). The evidence implies that stunting prevalence rates are similar in urban and rural areas when adjusted for economic status, and that the reason urban populations have lower overall rates of stunting is because a higher proportion of the urban population are in the higher socio-economic groups.

These data show that effective targeting of nutrition programmes to the poorest segments of the urban population will be critical to their success and cost-effectiveness.

We shall now consider the evidence to support such interventions.

4 Approaches to address undernutrition in the urban context

i. Introduction

Much is now known about which nutrition-specific interventions are most important and cost-effective early in life[13], and knowledge is growing about how best to incorporate nutrition into interventions in sectors other than nutrition. This is vital given that nutrition-specific interventions, implemented at scale, would be expected to avert just one fifth of the burden of undernutrition[13]. Thus in addition to nutrition-specific interventions, we examine the issues specific to urban contexts for nutrition-sensitive interventions relating to health, agriculture, social protection, and the physical environment. The importance of creating an "enabling environment"[f] for nutrition programming is increasingly recognised, so we also discuss evidence and urban initiatives in this regard.

We do not cover activities that address urban undernutrition in the context of emergencies, such as targeted household food distribution and wet feeding programmes. This is a topic for which little firm evidence exists. There are context-neutral reviews of the impact and effectiveness of emergency nutrition-related interventions[14,15], and those just on nutrition-specific interventions[16], and all of these reviews found a lack of evidence on which to base choice of humanitarian response. The urban context was hardly noted in either of the recent studies[14,16]. Technical information and lessons learned relevant to the design and implementation of emergency food assistance programmes in urban and periurban settings were summarised by FANTA in 2008[17].

In this section we examine evidence about interventions which potentially address urban undernutrition, attempt to identify which of them have been shown to be effective in the urban context, and identify characteristics of the urban context that appear to impact on programme effectiveness. Figure 14 below summarises the key differences that emerged during the literature review between the rural and urban contexts for each workstream category of the analytical framework (see Annex 1.ii for the framework).To provide the context for the review of

[f] "The social, economic, political, and ideological factors which determine a household's basic access to resources and services, and which structure knowledge and power relations" (Nisbett et al. (2014) World Development. 64:420-433).

programming issues, we first provide an overview of existing knowledge on urban diets and livelihoods. Further details of findings about these topics from specific locations are provided in later sections.

Figure 14: Summary of differences between urban and rural contexts in approaches to address urban undernutrition in low- and middle-income countries

Strengthening Policy and Planning

Characteristics of poor urban areas that differ from rural

- Population density is high so the population "closer" to politicians and accountability relationships are stronger
- Larger and more diverse range of stakeholders (private sector has more important role)
- Government authorities play larger roles in daily life
- Trained workers prefer to live in urban areas so individual and institutional capacity is greater
- Many living in informal settlements are regarded as illegal squatters and thus lack rights to influence decision-making processes
- The poor lack "voice"
- Urban areas are very heterogeneous–there are wide disparities in health, socio-economic status and culture within small areas
- Type and size of needs may be very different within small geographical areas

Implications for urban nutrition programming

- Need to inform and involve all local authorities and organizations when planning activities
- Need to work through community-based organisations to enable those without rights to participate
- Governance systems need to strengthen the ability of the poor to express their needs, including by connecting them to local government
- Evidence from small-scale studies is needed to advocate for action, since urban averages can mask vulnerabilities

Nutrition and Health Programming

Characteristics of poor urban areas that differ from rural

- Households are dependent on purchase of food, often of substandard quality/hygiene, from outside the home
- Lack of access to foods for traditional diets, and exposure to advertisements
- Food-based coping strategies in times of food or income insecurity elevate risk of malnutrition
- Growing prevalence of obesity
- Urban areas are often very heterogeneous
- Dependence on employment in informal sector, which may be long distances from home
- Populations have high residential mobility
- Lack of legal access to land for own food production

Implications for urban nutrition programming

- Must target street/market vendors for hygiene progs.
- Community targeting will not be effective in sites where the poor do not cluster geographically
- Can deploy mobile health teams and community based outreach workers who are trusted by client population
- Working parents cannot participate in programmes needing attendance /regular contacts during the day
- Sustained participation in programmes is difficult – need reinforcement of educ. messages e.g., via one-to-one interaction and mobile phone messaging
- Agricultural interventions need involvement in land market to reserve land for agricultural purposes
- Actions to increase income will have a nutrition impact, so ideally integrate income activities with health progs

Physical Environment

Characteristics of poor urban areas that differ from rural

- Higher population density and over-crowded housing
- Varied land tenure conditions affect service provision
- Poor housing, indoor air pollution, and lack of sanitation facilities can affect health more seriously
- Outdoor air pollution is higher
- Lack of security affects sanitation facility use eg at night
- Private sector is more important for service delivery

Implications for urban nutrition programming

- Solutions must be appropriate for local context
- Communal toilets can serve groups of households
- Promotion of behaviour change is needed at same time as provision of improved water/sanitation e.g. through women's groups, schools and workplaces, and combined with other programmes e.g., health and livelihood
- Mobile phone messaging can be used for WASH promotion

Equity and Resilience

Characteristics of poor urban areas that differ from rural

- High mobility and population turnover
- Large numbers of undocumented individuals and HHs
- Urban populations are more diverse
- Vulnerability to market fluctuations (e.g., in food and housing prices)
- Livelihood strategies are more diverse
- Livelihood security is dependent on cash income
- Work environments often incompatible with childcare
- Households need to spend more money on housing
- Unique gender dynamics related to livelihoods, HH structure, decision making, and safety/security

Implications for urban nutrition programming

- Mobility complicates targeting (may miss the most vulnerable) and can reduce programme impact
- Community targeting will not be effective in sites where the poor do not cluster geographically
- Livelihood support programmes should improve the context for growth (e.g., training to increase worker productivity; providing credit) rather than focus on a single sector
- Provision of childcare is an alternative means to support women's livelihoods and improve nutrition

ii. Urban diets and livelihoods

Diets and sources of food

Patterns of urban diets generally are quite different from rural diets. They also vary within urban areas themselves, since an important influence is distance from the surrounding rural areas that are usually the main source of fresh foods[3]. Urban food systems are also quite reliant on imported food items. Rice and wheat (mainly consumed as bread) are the most important staple foods in urban diets, and these crops tend to be internationally traded. Thus price increases of food in the international market affect urban residents more than rural residents[g] [18]. In rural areas sorghum, millet, maize, and root crops like cassava are the most important[18], and roots and tubers are generally not traded. On average incomes are higher in urban areas than rural, which enable urban residents to consume more meat and milk, and a greater variety of vegetables and fruits[19], although variety may still not be high[20h]. The better dietary diversity at household level is likely to be one factor contributing to the better average growth of urban children shown in Figures 12 and 13 above. However, urban diets contains more saturated and trans-fats, sugar and salt, and less fibre, and these, combined with more sedentary lifestyles, raise risks of obesity and chronic diseases[21].

In very poor urban households, food accounts for more than half of expenditure. Most obtain 90-100% of their food from purchases[21], and informal markets play a key role in poor urban household food security[22]. High density of housing means there is little land available for own food production, and in any case in many cities urban agriculture is illegal. Thus most urban residents lack the capability to buffer shocks via their own food production. Across the Southern Africa region only 3% of households derive income from urban agriculture, although around 20% mention urban agriculture as a source of food[20]. Reciprocal relationships involving food (and also assets, income and labour) with rural households can be important for the economy of poor urban households[3,23].

Informal safety nets are often lacking compared to their existence in rural areas. Mobility and transience enable urban residents to take advantage of economic opportunities, to the detriment of community[21]. Urban residents usually have better access to formal assistance programmes where they exist, but informal safety nets based on trust are often weaker, especially for new arrivals. Established migrants with kinship or village ties may support new arrivals, and organized crime groups have also been identified as a source of assistance[21].

Urban residents consume more street foods and processed, ready-to-eat foods than rural. For example across the Southern Africa region, 70% of urban households reported using informal markets/street foods, with 31% on a daily basis[20]. Their popularity is related to the greater participation of women in the labour market, and the consequent reduced time available for food preparation. Other factors contributing to their importance in the urban diet are restricted space for food preparation and storage in overcrowded housing, poor cooking facilities, and the expense of cooking fuel[22,24]. They are convenient because informal markets and vendors set up where need is greatest, and foods can be purchased in small amounts[22]. When food and cooking fuel prices rise, consumption increases as their cost generally increases more slowly due to economies of scale of production. Disadvantages are that their preparation in often unhygienic conditions can result in food-borne diseases[25], and as mentioned above they often contain high levels of energy, salt, refined sugars and saturated fats[18].

Studies of urban areas indicate the increasingly important role of supermarkets as a source of purchased food[20]. Their food prices are lower than other sources, for example In Cape Town, the price difference between supermarkets and small shops can be as high as 20–26 per cent[26]. However supermarkets may be less important for residents of slum areas, as supermarkets are not usually located close to slums and so transport costs may be

[g] although the poorest of the poor in rural areas have the same constraints of landlessness and dependence on markets as the very poorest in urban areas so are affected by food price increases to the same degree (see reference 18).

[h] However the African Food Security Urban Network (AFSUN) 2008-9 baseline food security survey showed that three quarters of households were food insecure, and that in general, dietary diversity scores were low (the AFSUN Urban Food Security Survey was conducted simultaneously in late 2008 in eleven cities in nine countries: Blantyre, Cape Town, Gaborone, Harare, Johannesburg, Lusaka, Maputo, Manzini, Maseru, Msunduzi (Durban Metro) and Windhoek)

prohibitively high. Also since poor residents are usually reliant on daily wages, they can only afford to buy small quantities of food at a time, so cannot take advantage of savings related to buying in bulk. Another reason they rely mainly on local shops for daily purchases is that most offer credit. Even were supermarkets close to slums and informal settlements, it is unknown if the prices offered would be sufficiently low for poor to change their purchasing patterns[27].

Livelihoods

Unemployment, underemployment, and child labour (especially for Sub-Saharan Africa) are all characteristic of urban poverty in many countries[28]. The jobs of urban poor people, both male and female, are mainly in the informal sector, which is vulnerable to economic fluctuations, which particularly affect the poor who have few savings[28]. They work long hours in often precarious conditions for low wages, for example in construction and factory work, rickshaw-driving and street-vending[27]. Although many jobs are irregular and insecure, they tend to be permanent in the sense that poor people do not change jobs each day. Also many urban residents, even poor ones, have jobs in the formal sector, for example in government or the private sector, and agriculture is an important source of both formal and informal work, such as in food processing, transport and sales[27]. The growing dominance of supermarkets in urban food systems may have a negative effect on some urban livelihoods, since many of the urban poor work as food vendors or transporters, but evidence is lacking on this issue.

Urban incomes are affected by seasonality in a similar way to rural incomes. For example rain halts the activities of casual labourers such as rickshaw drivers, construction workers and street vendors. It can also hinder transport of products to the cities resulting in higher food prices, and factories may need fewer workers during slack seasons[21]. Increased migration from rural areas when labour needs are low, for example after harvest, increases pressure on scarce jobs in urban areas, and seasonal food security in urban centres has been shown to be correlated to cyclical food security patterns in rural villages, for example in Niger[3].

Food-based coping strategies

Poor urban residents use several strategies to manage increasing food prices and income insecurity. The most frequent is reducing the quality and quantity of food consumed. Also non-food expenditure is reduced, for example by foregoing health care, and work time increased[26]. Maternal and child malnutrition is often affected especially levels of micronutrient deficiencies, as households tend to sacrifice dietary quality over quantity[18].

For example, evidence from urban West Africa (Brazzaville, Congo) following currency devaluation indicate the coping strategies did not completely protect vulnerable family members, since both maternal and child nutritional status deteriorated during this period[29]. Breast-feeding patterns and timing of introduction of complementary foods were mainly unaffected by the crisis, but poor families used local gruels with lower micronutrient and energy density instead of their normal complementary foods using imported fortified flours[29]. Similarly in urban Peru in 1989, the more severe seasonal reduction in weight-for-height and a subsequent trough in height-for-age was correlated with political and economic changes than adversely affected food access in Peru at that time [30].

Diversity

Urban areas are very heterogeneous— groups with very varied socio-economic status and cultural background can live within close proximity of each other. Certain groups such as refugees and recent migrants have greater vulnerability compared to other city dwellers. Recent migrants to urban areas can be a particularly vulnerable group since they lack social support networks, and those migrating from rural areas have lower levels of education than existing residents[i]. Evidence from India shows how migration status can affect maternal and child nutrition outcomes[31]. Those migrants of rural origin were more likely to be disadvantaged in terms of nutrition

[i] Figure 25 compares literacy rates for urban and slum areas of DfID countries, and indicates how in several DfID countries, those coming from rural areas are severely disadvantaged even compared to those from slums. However rural migrants do not automatically become the majority of the urban poor, nor are they the only residents of slums (Mohiddin et al 2012, reference 3)

insecurity, while urban migrants' situation was nearly equivalent to that of non-migrants. The lower status of rural migrants was attributed to high rates of women's illiteracy, low skills and gender discrimination in rural areas[31].

Implications for programming

- Programmes to address vulnerability in urban areas need to implement targeting differently to how it would normally be done in rural areas. Targeting should be either at the individual or group level, but not at the community (geographic) due to the heterogeneity of welfare within small areas[27]. Also mobility of the population needs to be taken into consideration, and for those households
- The diversity of livelihood strategies means that programmes to raise employment and income will be most effective if focussed on providing the context for growth by providing credit for example, rather than pursuing a sector focus, such as might be done in rural areas[27]. More women work away from home, and substitute child care is affected by different family structure and social networks compared to rural areas[19]. Thus programmes providing child care can provide an effective means of improving nutrition.
- Finally, given the high proportion of urban household expenditure on food, interventions that aim to reduce the cost of food for the urban poor, such as food subsidies, urban agriculture, and policies to reduce food prices are particularly pertinent for urban livelihood support[27].

iii. Strengthening policy and planning

Summary of what is already known about strengthening policy and planning in nutrition:

Nutrition needs strong leaders to keep it on the policy agenda. Lack of capacity at any level can act as a bottleneck. It is important to use a multisectoral approach to address undernutrition. There are many ways to do this, ranging from exchanging information, through collaboration — where partners modify activities, and share resources — to integration, where partners share activities and management.

What this review tells us about actions to strengthen nutrition policy and planning in the urban context:

Evaluation of the Project "Nutritional Improvement for children in urban Chile and Kenya" (NICK) Project shows that a sensitively facilitated and supported action research process can enable municipal level multisectoral teams to plan and implement co-ordinated intersectoral actions. These actions can build community capacities to tackle social determinants of urban child nutrition.

Evidence: *There is a lack of studies which address issues related to strengthening policy and planning for urban nutrition. There is just one quantitative study of low strength-of-evidence rating, which does not provide evidence that activities to strengthen policy and planning are effective in improving nutrition status.*

This section focuses on actions that help create an enabling environment for urban nutrition improvement. Our review of the literature indicates a paucity of evidence. There is a growing body of literature on general nutrition governance (not in the specific urban context), on governance of health and service delivery in the urban sector (not nutrition-specific), and on strengthening food systems. We structure the discussion below using the three critical domains identified by Gillespie et al. (2013)[32] *viz.* "politics and governance", "capacity and resources" and "knowledge and evidence".

Strengthening policy and planning - Politics and governance

One might expect that the provision of services would be better in urban areas compared to rural, because city dwellers may be wealthier and feel better able to command improved services, because accountability relationships would be stronger with service providers and politicians as they are 'closer', and because politicians may sense more benefit in providing services to urban populations that may be more likely to vote than rural[33].

However, the poorest within cities and towns in low-income countries do not necessarily benefit from these dynamics, especially given that many living in informal settlements are regarded as illegal squatters and thus lack property rights or 'voice' within local governance structures to influence decision-making processes.

The potential power of citizens' 'voice' in holding officials accountable and reducing malnutrition has been described for Maharashtra[34] and Madagascar[35]. Related to this theme, in the specifically urban context, a key premise running through the urban governance literature is the need to work with and through community organisations and the importance of local ownership of activities[33,36,37]. Methods for engaging people and communities have been developed by the WHO Health Urbanization Project[38] and are discussed below.

Mirroring the literature relating to governance at the national level[32,39-41] the benefits of using a multisectoral and multistakeholder approach (private, public, and civil society) to attaining health improvement is a common theme in the urban governance literature[33,36,42,43]. There are many ways to do this, ranging from exchanging information, through collaboration—where partners modify activities, and share resources—to integration, where partners share activities and management[44]. Challenges encountered to using this approach are unlikely to differ in the urban context (particularly relating to capacity, see below) and, similarly, lessons learnt relating to the package of principles and actions that can improve chances of success in multisectoral nutrition initiatives are pertinent to such initiatives in the urban context. These lessons have been distilled as the following[44]

- Put and keep nutrition on the policy agenda
- Locate strong leaders at multiple levels
- Generate and disseminate evidence to support political commitment and increase the effectiveness of actions
- Promote an approach that values partners and partnerships, not a specific action or blueprint
- Ensure lateral leadership
- Provide incentives to work together
- Hold actors accountable
- Ensure programs have good managers and leaders
- Reduce risks and prepare for political change.

A potential challenge for multisectoral urban initiatives is coordination of a greater diversity of stakeholders and stronger political factions. This issue was mentioned in the draft urban nutrition policy for Kenya[45] however the review was unable to ascertain its importance in practice. Another challenge is lack of the necessary evidence to support political commitment and increase the effectiveness of actions to address urban malnutrition (this is discussed below under "Knowledge and evidence").

The review found that the urban context is often mentioned in country nutrition strategies, action plans and policies, but this is mainly to highlight differences in urban statistics compared to rural with respect to under- or over-nutrition and non-communicable diseases or relates to WASH in urban areas. Specific actions for the urban context were specified for around half of the countries for which documents were reviewed. Although this may seem a high proportion, the countless number of actions contained in each of these documents still indicates that urban issues are a low priority for nutrition policy makers at national level in these countries.

Only two examples of nutrition policies that were developed specifically for the urban context were found—Kenya[45] which has not been officially ratified, and Delhi state in India[46] which is even more incipient—and only one mention of a specifically urban model for a multisectoral programme (India[47]). At subnational municipal level, unlike at national level, the review found no examples of institutional mechanisms that focus specifically on improving nutrition[j].

[j] The Kenya Urban Food and Nutrition Strategy describes a plan to have Food and Nutrition Committees for urban districts, which would feed into the planned national-level Inter-Ministerial Steering Committee on Food and Nutrition. However, this system remains to be piloted.

However, several cities in low- and middle-income countries have programmes, policies, and bodies that support resilient urban food systems, and FAO's new "Food for the Cities" Programme, a capacity-building and governance initiative, has aims that include nutrition security[48]. Belo Horizonte in Brazil has a particularly successful local government programme for food security. There, an inter-departmental body, the Municipal Secretariat for Food Policy and Supply, has an administrative structure and budget which is separate from the other municipal bodies, and has centralized the policy and programs related to food in the city. The programme is advised by a council which includes representatives from government, labour unions, food producers and distributors, and civil society organizations. Nutrition activities have been part of their remit since the programme started in 1993[49]. Other activities include subsidised food sales, supply and regulation of food markets, support to urban agriculture and education. While such activities have been appraised as being successful, operational challenges include the continuous need to advocate for an integrated food policy for the city, and periodic uncertainty surrounding survival of the institution when the city administration changes[49].

Belo Horizonte is the only case encountered in this review in which urban nutrition has been integrated as a priority with a municipal food security initiative. In other cases nutrition is integrated with health programmes, for example in India[50], where a mid-term evaluation of a programme to increase the health of the urban poor identified the high variability in policy environments for urban health, and the lack of an overall state urban health plan as constraints on success[50]). The review revealed no examples of a municipal-level governance initiative with an explicit nutrition focus. As an urban nutrition strategy would need to cross different policy domains, a key challenge in its development and execution would be to organise the political and administrative responsibility for such a strategy. Options, as discussed by de Zeeuw with respect to urban food strategies[51], would be to have a municipal department of nutrition (but this option loses the opportunity to link varied policy domains and goals), for this function to sit under the responsibility of the planning department (this can bring a more holistic understanding of issues), or to develop a separate food policy council with actors from public, civil society, and private sectors[51]. The third of these options is most consistent with the guidelines for successful multisectoral initiatives[44] listed above, since it involves stakeholders of different types working in partnership. It also may be less vulnerable to political change. However, apart from the case of Belo Horizonte[49] there is no evidence from urban contexts to guide nutrition-related activities in this regard. More evidence will soon be forthcoming as a result of the FAO Food for Cities initiative[43,48].

Strengthening policy and planning - Capacity and resources

Lack of capacity and commitment at provincial level was a bottleneck to vertical translation of national policy intent and frameworks in Vietnam[32]; weakness in human and organizational capacities at all levels constrained the pace and quality of developing and implementing operational plans for nutrition in five country case-studies[52], while "convergence" across sectors for nutrition action in India was perceived by implementers an almost insurmountable barrier[53]. In most municipal contexts, lack of capacity related to nutrition governance is expected to correspond to these descriptions, although the situation is probably somewhat mitigated by the general preference of trained workers, for example in health, to live in urban rather than rural areas[54].

The capacity-building component of the WHO Health Urbanization Project—the Healthy Urbanization Learning Circle[38] (HULC)—consists of "networks of multisectoral and interdisciplinary teams in different urban sites that undertake action research projects at the city or municipal level through a guided process… that introduce public health methodologies for action to improve governance". Future actions to strengthen nutrition governance could be based on this approach; however it has not been formally evaluated so no clear lessons can be drawn at this time.

There is one research project that provides directly relevant evidence for DfID in this regard: the NICK Project (Nutritional Improvement for children in urban Chile and Kenya)[55]. Multisectoral nutrition working groups were formed in Mombasa and Valparaiso with three biannual cycles of participatory action research, with the aim of

broadening community and stakeholder participation to change the social determinants of nutritional status. Although findings from Kenya regarding nutritional status were in the opposite direction to that expected, those related to the aim of broadening participation were positive. The unexpected findings regarding decline in nutritional status were attributed to greater negative changes in employment, food security, income, and in- and out-migration in the intervention area. Here economic collapse had followed closure of the Export Processing Zones, a source of vital employment in Mombasa. Residents became petty traders, and despite increased access to fresh vegetables from their urban farming and income from selling surplus produce they needed to use coping mechanisms including consumption of less preferred foods and skipping meals. The control area was closer to the city centre and tourist hotels which provided ongoing employment[56]. This indicates the sensitivity of child nutrition status to variability in economic conditions, and the need to take this into account when designing and evaluating programmes to improve nutrition. For example, in Mombasa the key determinant of child stunting was identified as poverty, while in Valparaiso it was the 'obesogenic environment'[56].

Four factors were identified as having been crucial for creating the enabling environment for effective intersectoral action in the NICK project[56]:

- Supportive government policy
- Broad participation and capacity building
- Involving policy makers as advisors and establishing the credibility of the research and
- Strengthening community action.

Key relevant insights from this project in relation to nutrition programming in urban contexts are

- The importance of the repeated cycles of action, reflection and re-planning. In the NICK project these enabled vital changes in the groups' ability to plan both 'up-stream' and 'down-stream' interventions and to involve the community in assessing outcomes[56].
- The enormous potential of independent action within the intervention community. In the NICK project this came about as a result of identifying, training and supporting community groups to help implement the working groups' action plans, and individuals from these groups participated in planning meetings[56].

Strengthening policy and planning - Knowledge and evidence

Policymakers and other stakeholders need good up-to-date evidence to argue for action, to influence the choice of interventions, and to guide their implementation. There are several instances where nutrition surveillance activities in urban areas have detected effects of national economic crises on nutrition outcomes, and helped target interventions in urban areas, for example in Bangladesh and Indonesia[57]. Where regular surveys of food security exist, they could be used as a foundation for a permanent food security and nutrition surveillance system, which would enable the effect of external shocks to be detected[58].

So an important activity that supports policy making and strengthens planning for interventions to address urban nutrition is building the capacity of municipal governments and other official agencies tasked with surveillance to routinely sample urban slums and focus on the urban poor—a requirement identified a decade ago in relation to general health programming[59]. Data collection in urban areas has a specific set of challenges, which include[59]

- being able to sample a large enough population to capture the urban poor randomly
- sampling illegal settlements where many of the urban poor reside
- using indicators adapted to an urban setting (for example locally specific coping strategies)
- finding people who do not have fixed addresses.

In contrast, the use of information and communication technologies for data collection is likely to be easier in urban compared to rural areas, due to stronger telephone signals and better internet coverage which would facilitate transmission of data from hand-held devices to local servers where data can be merged[57].

The methods to be used for such surveillance are not clear-cut. It is recommended to use urban mapping to identify the most vulnerable areas, and then nutrition analysis can be focussed on the most vulnerable areas of the city in order to avoid average numbers masking specific nutritional problems amongst the poorest[60]. Sampling is generally difficult in urban areas compared to rural due to lack of information on the actual population, and complex arrangements of households that differ from rural villages where they are based on a roughly circular group of dwellings[60]. Guidance on urban sampling for nutrition surveys is easily accessible[61], but it is challenging to implement, and remains a topic of discussion amongst practitioners[60].

With respect to distinguishing when a situation becomes serious, there are concerns over using the same triggers for action in urban areas as for rural, for example 15% Global Acute Malnutrition. This indicator is difficult to measure accurately in urban areas because it requires high levels of data disaggregation—for example, by slums[62]. Also such triggers could be viewed as inappropriate for a population in a densely populated urban setting where absolute numbers affected relative to the availability of services may be considered more important in determining the need for intervention[63].

iv. Nutrition and health programming

THE EVIDENCE BASE: Information on both the drivers of undernutrition and nutrition programming in urban settings is most extensive for South Asia (in particular, Bangladesh, India, and Pakistan) and East and Southern Africa (in particular, Kenya, Ethiopia, and South Africa). Annex 4.ii summarises a total of 42 studies (33 on nutrition-specific programming, 9 on nutrition-sensitive programming). There is tremendous variation in strength of evidence, particularly among nutrition-specific studies. Of the 42 nutrition and health studies reviewed, 8 were systematic reviews, 10 were RCTs, 2 were cohort studies, 8 were based on other controlled study designs, and 14 were non-controlled studies. The majority of studies used some form of counterfactual evidence; the most-frequent shortcoming related to sampling. Only 28 out of the 42 studies considered the ultimate nutrition outcomes of interest (e.g., stunting, wasting, underweight, or micronutrient deficiencies). There was a preponderance of evidence on proximate determinants of nutrition (e.g., knowledge/practices related to infant and young child feeding; diarrhoea occurrence).

Nutrition-specific programming

Summary of what is already known about nutrition-specific programming:

Within available literature, wasting/weight-for-height is not assessed as frequently as other anthropometric measures such as stunting or underweight. Differentials between urban and rural areas are greater for chronic malnutrition than for wasting. Even when acute malnutrition is assessed, impacts are generally not statistically significant, and the emphasis is on short-term changes in weight, weight-for-height z-score (and, in some instances, height-for-age z-score), rather than wasting prevalence per se.

We know very little about women's nutrition issues beyond their role as determinants of child nutritional outcomes. Studies on women's nutrition status are largely limited to outcomes within the context of pregnancy. This observation is not unique to urban nutrition programming; it is applicable to all settings.

What this review tells us about nutrition-specific programming in urban contexts:
General literature from urban nutrition programmes suggests the need to extend targeting beyond mothers/caregivers to include other critical players who might impact proximate and distal determinants of nutritional status in urban settings (e.g., street/market vendors from whom mothers purchase complementary foods given to small children).

Consistent with the above theme, the literature also suggests a need to address food hygiene, not just conventional issues such as safe water and sanitation, given the reliance on foods prepared outside of the home in urban areas.

Micronutrient supplementation of children has shown promise in improving micronutrient levels and height-for-age in urban settings. Asia (in particular, India and Indonesia) has generated the most evidence on the effectiveness of that strategy in those contexts, although selected African countries (e.g., Chad, South Africa) have also produced limited evidence. Within the micronutrient literature, five studies on food fortification (e.g., through the use of fortified powders or cereals) suggest effectiveness of that strategy in improving nutritional outcomes such as micronutrient serum levels in young children. A global systematic review also exists on the issue, although the evidence on urban settings remains highly limited.

***Evidence:** As stated in the opening paragraph of this section on nutrition and health programming, high-quality systematic reviews and cross-country analyses provide solid contextual evidence on drivers of undernutrition in urban areas. However, there is a major gap in our knowledge base on what works to improve nutrition in urban contexts. The rigor of the research on micronutrient interventions is much higher than that of interventions focused on nutrition education or school feeding. In general, the latter two intervention areas (nine studies were reviewed on nutrition education interventions and four were reviewed on school feeding) did not establish direct links between the interventions and ultimate nutrition outcomes of interest, focusing instead on proximate determinants such as immediate and/or exclusive breastfeeding, complementary feeding practices, and maternal knowledge and practices related to quality of diet. They were also characterised by flawed sample designs/small sample sizes.*

Contextual evidence: Rates of undernutrition in women and children are generally lower in urban areas than in rural areas; however, as alluded to earlier in the report, urban settings are characterised by a unique set of vulnerabilities, particularly for the poorest segments of urban populations[64,65]. The literature provides insight on the roles of intermediate outcomes as contributors to urban undernutrition. A 2015 systematic review[66] documented the role of food, not just water, as a critical route of transmission of diarrhoeal disease in poor settings[67,68]. The same systematic review also noted that, in addition to responding to fluctuations in food prices, some mothers and caregivers in urban settings in Africa and Asia resort to purchasing foods prepared by street and market vendors as sources of complementary foods given to young children. A cross-sectional study of 4–15 year olds in rural and urban locations in Amhara region of Ethiopia corroborated the importance of food preparation as a determinant of stunting in children[64]. In that Ethiopian study, there was a statistically significant relationship between childhood stunting and both the age and education level of the food preparer—an association that was not observed in rural areas (where more-conventional factors such as the occurrence of malaria and other childhood illnesses were stronger determinants of chronic undernutrition). There is also limited qualitative evidence from urban/peri-urban settings in South Africa[69] that highlight suboptimal infant and young child feeding (IYCF) practices, particularly for teenage mothers[70].

One evaluation of an urban school-feeding programme in Bangladesh documented urban slum residence (in addition to child age, mother's BMI, mother's education, household size, and the number of female children under 5 years of age in the household) as a statistically significant determinant of child nutritional status. Using BMI as the main nutritional outcome variable, children from urban slums actually had worse nutritional status than their counterparts in rural areas[71].

There is also a growing body of evidence on the "double burden of malnutrition"; that is, the coexistence of underweight and overweight/obesity within the same population[72]. In poor urban households, the aforementioned double burden often manifests as chronic malnutrition (e.g., underweight) in children and

overweight/obesity in adults within the same household[73,74]. There is limited literature, based primarily on ethnographic research from South Asia, describing food-provisioning decisions and behaviours when poor urban women must contend with rising food prices and resort to cheap, energy-dense, processed foods to meet their own nutritional needs[75]. This, coupled with reduced physical activity in urban settings, contributes to rising obesity among poor urban women.

"What works": Even when programmes are (a) implemented solely in an urban setting or (b) implemented in both urban and rural settings, no inferences are drawn within the literature on the nuances of addressing nutrition in an urban context. Intervention strategies in the general literature skew heavily towards conventional approaches: (a) information, education, and communication/behaviour change communication (IEC/BCC); (b) treatment of undernutrition through ready-to-use foods and/or supplementary feeding programmes; and (c) micronutrient supplementation in pregnant women and children. This is borne out in studies specifically targeting urban populations, as well.

Many of the published intervention studies were based on extremely short periods of follow-up/evaluation (e.g., 1–6 months after the intervention was introduced) to assess programme effectiveness[76-79]. This limitation in the data limits the ability to draw conclusions regarding the sustainability of outcomes.

- **Urban programming insights:** Urban-specific evidence on what works is sparse, and a high-quality 2010 World Bank systematic review of nutrition impact evaluations also documented a notable phenomenon: the "scale-up" of effective rural programmes/interventions to urban areas, with limited evidence on necessary adaptations of the implementation models to urban settings[80]. The systematic review cited one such example from Colombia, *Familias en Acción*, for which a conditional cash transfer programme with various nutrition components (e.g., a feeding programme for children, growth monitoring and promotion, micronutrient supplementation) improved height-for-age z-scores among children aged 0-24 months in rural areas, and was simply replicated in urban areas. The systematic review also documented a disconnect between the aspects/components of programmes that were being brought to scale and features that were actually evaluated[80]. The systematic review cites Madagascar ("Expanded Project for Monitoring and Education of Schools and Communities in Food and Nutrition" [referred to as the French acronym, SEECALINE]) as an example in which a nutrition programme was scaled up but several intervention strategies were dropped as a cost-saving measure. The original package included interventions such as vitamin A supplementation of children, growth monitoring, cooking demonstrations, and treatment of severely malnourished children; however, the review does not highlight which components were excluded when the programme went to scale.

- *Improving infant or child nutritional outcomes:* Four studies described in the annexes relate to the effectiveness of IEC/BCC approaches in effecting short-term improvements in knowledge and practices related to infant and young child feeding (IYCF)[76,77,81,82]. The IEC/BCC intervention is often implemented as a standalone approach, although there are documented instances of pairing of IEC/BCC with nutrition services such as growth monitoring or micronutrient supplementation[83]. Pregnancy-based nutrition interventions tend to focus on neonatal outcomes such as birth weight, immediate breastfeeding and exclusive breastfeeding[77]. An urban intervention study in Dhaka, Bangladesh documented much lower rates of low birth weight in the intervention group (10.5%) than in the comparison group (48.3%). In addition, 75.4% of intervention mothers and 34.5% of comparison mothers initiated breastfeeding within 1 hour after birth. The rate of exclusive breastfeeding was 65.9% in the intervention group and 37.9% in the comparison group. Although all findings were statistically significant, sample sizes in both groups were quite small, the sample was limited to antenatal care (ANC) clients, and the follow-up period was short (only one month), thus limiting generalizability to urban Dhaka at large.

Another urban study in Nepal tested the effects of postnatal health education targeting mothers on infant care and family planning practices[78]. Although outcome measures included IYCF-related measures such as the duration of exclusive breastfeeding and continued breastfeeding during diarrhoeal episodes, the study documented no statistically significant impact of the intervention on those outcomes. In addition, despite being an RCT, the study was characterised by many of the same shortcomings as the aforementioned study in Bangladesh (small sample sizes, selection bias).

- **Urban programming insights:** Key themes that emerged from the evidence include challenges with targeting and ensuring sustained participation of targeted beneficiaries (e.g., mothers of young children) in urban areas[83]. Some interventions experienced success with one-on-one interaction rather than group-based formats for IEC/BCC, although the quality of evidence was relatively low, particularly in relation to sample size and sample design.[76,82,83].

  A 2012 study evaluating the effectiveness of vitamin A supplementation on nutritional outcomes in urban slum children in Indonesia showed that a facility-based vitamin A supplementation program in an urban setting can address proximate determinants of nutrition such as the occurrence of fever or diarrhoea, as well as reduce rates of anaemia[84]. The analysis was based on an extremely large sample (N= 138,956 children with data in Indonesia's Nutritional Surveillance System) and thus produced results of statistical significance that were not necessarily programmatically meaningful. More specifically, children who received vitamin A supplementation had lower rates of stunting and underweight (although stunting rates only differed by 2 percentage points between children who did and did not receive supplements, and underweight rates differed by approximately one percentage point). Wasting rates were virtually identical between the two groups. Other noteworthy findings included the fact that males were less likely to receive vitamin A supplementation than girls, as were children whose parents who had little education, or whose caregivers had to walk farther/longer to the health post from which supplementation was administered.

  A 2011 study that covered rural areas and urban slum areas in Indonesia documented the effectiveness of fortified milk powder and fortified noodles in reducing stunting among children aged 12-59 months[85]. Notably, stunting rates among children living in rural areas and children living in urban slums were fairly comparable, whether or not the child consumed any fortified food items. As with the 2012 study described above, the 2011 study was based on a subset of data from Indonesia's Nutritional Surveillance System and thus involved an extremely large sample size (N= 222,250 families from rural areas and 79,940 families from urban slum areas) with robust methodology[85].

  A 2013 Cochrane review on home fortification of complementary foods included a small number of studies specific to urban areas[86]. Use of micronutrient powders for home fortification of complementary, semi-solid foods given to children aged 6–23 months yielded no better results than conventional approaches to micronutrient supplementation[81,86,87]. It should be noted, however, that the main measures of focus were rates of diarrhoea or fever and, to a much lesser extent, micronutrient deficiency (e.g., iron-deficiency anaemia), not on anthropometric measures such as weight and height. Two trials included in the Cochrane review (one in Cambodia, the other in Ghana) found no statistically significant effect on either weight-for-height z-score or height-for-age z-score.

  In general, wasting is not as frequently assessed as other anthropometric measures such as stunting or underweight. As stated earlier in the report, urban-rural differences in wasting are much less pronounced than urban-rural differences in stunting. Because wasting prevalence is generally much lower than stunting prevalence, the few published studies that included wasting or weight-for-height as an outcome

measure did not document statistically significant effects[80,86,88-90] This, however, might also be due to the methodological limitations of those studies, namely small sample sizes.

A 2010 World Bank systematic review of nutrition impact evaluations also found that only 14 of 46 studies selected for the review assessed wasting[80]. The World Bank review also noted that because weight-for-height is amenable to change in the short term as a result of factors (e.g., illness) that can be completely independent of a particular intervention, it is challenging to determine programme effects on wasting.

- *Improving nutritional outcomes in women of reproductive age:* Evidence on what works to improve women's nutritional status is highly limited and focuses primarily on what occurs within the context of pregnancy. For those studies, the outcomes of interest are usually maternal weight gain during pregnancy, iron-deficiency anaemia in pregnancy, and infant birth weight, with iron supplementation and nutrition education as the main intervention strategies[77,78,83]. Just one study of low quality reported a statistically significant effect of the intervention (3-month IEC/BCC during the final trimester) on the outcome, which in this case was weight gain during the final trimester.

  - **Urban programming insights**: Data quality in this area is quite low, with studies characterised by small sample sizes and sampling strategies that limit generalizability to all women of reproductive age (e.g., by focusing solely on clinic attendees). Given the fact that published studies pertain to intervention approaches that are not tailored to urban settings, as well as the fact that there is a paucity of quality evidence on programme effectiveness in urban areas, it is not possible to draw conclusions regarding viable strategies to improve urban women's nutritional status.

- *Improving nutritional outcomes in adolescent females*: The Framework for Action emerging from the Second International Conference on Nutrition (ICN) in 2014 outlines a series of recommendations and critical actions related to adolescent nutrition (e.g., preventing teenage pregnancy and promoting adequate birth spacing, increasing demand for healthy foods, preventing and controlling anaemia in females)[91]. However, there is a paucity of literature that explicitly addresses adolescent nutritional outcomes, with even less evidence on the realities of urban adolescents vis-à-vis intermediate nutritional outcomes. Nutrition is not a major theme of adolescent-focused interventions, and the majority of literature on adolescent nutrition yields contextual evidence rather than evidence on the effectiveness of specific intervention strategies targeting adolescent girls[92-95]. South Africa has produced extensive data based on longitudinal studies of urban birth cohorts (e.g., the "Birth to Twenty" cohort) and cross-sectional assessments (both quantitative and qualitative), identifying factors such as residential mobility as important determinants of nutritional status in adolescents[94]. A published analysis based on a subset of the Birth to Twenty cohort (774 males and 840 females age 15) to explore the relationship between residential mobility, socioeconomic status, and BMI found that 20% of the males in the cohort and 10% of the females in the cohort were underweight; corresponding estimates of overweight/obesity were 8% in males and 25% in females[94]. Through unadjusted regression modelling, the analysis determined that neither residential mobility nor changes in socioeconomic status affected the BMI of males in the urban cohort. In contrast, both residential mobility and improvements in socioeconomic status were associated with higher BMI in girls within the urban cohort.

  With respect to nutrition interventions, micronutrient supplementation is the major emphasis amongst the few published intervention studies[79,87].

  - **Urban programming insights**: Evidence in urban slum populations in India, Kenya, and South Africa underscores that nutrition is not a major focus of interventions targeting adolescent females or non-

pregnant women of reproductive age[96]. Education and livelihoods, sexual and gender-based violence, and sexual and reproductive health are prioritised over nutrition issues. One particular study in India that entailed weekly micronutrient supplementation of adolescent girls (14–19 years old) in urban slums and rural tribal communities documented lower programme effectiveness in urban settings, attributed in part to challenges with targeting and ensuring compliance with regimens in urban settings[79]. A study focused on slum populations in Dhaka, Bangladesh also highlighted operational challenges[97]. Those implementation experiences are consistent with challenges highlighted earlier for women of reproductive age, and the two studies represent rare instances within the reviewed literature in which the authors highlighted unique operational challenges unique to urban settings.

Health-related nutrition-sensitive programming

Summary of what is already known about health-related nutrition-sensitive programming:

The literature on health-related, nutrition-sensitive programming is based primarily on programmes and studies implemented in rural settings. Three high-quality global systematic reviews have positioned family planning (FP) as a major investment in achieving nutritional aims (via improved food security and nutritional outcomes). Nutrition-sensitive health programming centred on a life-cycle approach is also key. Tailoring strategies for different target groups (e.g., young children, adolescents, non-pregnant women of reproductive age, pregnant women, caregivers of young children) along the continuum of care from pre-conception through adulthood reduces missed opportunities to link beneficiaries with a constellation of interventions that can improve nutritional status. This point is particularly salient given the lack of intervention studies focusing on adolescents and non-pregnant women of reproductive age.

The literature underscores the effectiveness of integrated service delivery, making full use of the maternal, newborn, and child health (MNCH) platform, and building on what we know regarding (a) the role of FP as a contributor to certain nutritional outcomes, (b) the need to move beyond IEC/BCC as a strategy targeting women of reproductive age to improve nutritional outcomes, and (c) success with integrated models such as IMCI/iCCM (integrated management of childhood illnesses/integrated community case management).

What this review tells us about nutrition-sensitive programming in urban contexts:

Whether the intervention strategies are woman-focused (e.g., FP) or child-focused (e.g., IMCI), the challenge lies in adapting proven and effective rural models for urban populations, and documenting their effectiveness. Three studies were reviewed from African settings (Nigeria, Uganda, Zambia), and although the IMCI approach was implemented in urban areas for those studies, the literature does not shed light on specific urban adaptations or critical success factors. While there is contextual evidence on FP use, this review confirms a gap in intervention evidence on nutrition contributions of FP/sexual and reproductive health programmes in urban settings.

Evidence: *In sum, both the quantity and quality of evidence on nutrition-sensitive programming in urban settings are limited. Unlike the literature on nutrition-specific programming, for which Asian countries accounted for the majority of studies, African studies (namely from Kenya, Nigeria, Uganda, and Zambia) produced the bulk of literature reviewed on nutrition-sensitive health programming. This is particularly true for the application of integrated child health strategies (such as IMCI) in urban settings. However, that literature is not without methodological limitations; selection biases and the absence of data on ultimate nutrition outcomes are two such shortcomings.*

Contextual evidence: Health and nutrition are inextricably linked, and the body of evidence is expanding on the role of health interventions in improving nutritional status. The 2015 Global Nutrition Report underscores the importance of women's access to reproductive health care and the prevention and treatment of malaria[98]. Several analyses, many of which rely on Demographic and Health Survey (DHS) datasets, establish a strong link between fertility intention, family planning (FP), and the ultimate nutritional outcomes of interest[99,100]. *(These studies are not intervention studies, nor do they focus on urban settings, and therefore are not included in the set of publications described in the annexes.)* At a macro level, evidence establishes a link between FP and (a) food availability (primarily due to the effect on fertility and population growth/size); (b) food access (largely through family size and dependency ratios that stretch household resources and/or place constraints on female work force participation); and (c) food utilisation and consumption (although the focus is mainly from a biological perspective, whereby pregnant and lactating women have higher energy requirements, or there are environmental threats that limit food absorption).

- **Insight on urban dynamics**: The published literature provides little insight on how the above relationships play out in urban settings. Thus, this is one area for which evidence is needed. One systematic review did attempt to analyse the link between FP and food security[101]. The published report from the review did not provide extensive detail on the inclusion criteria for the review (citing only that the review culled literature from peer-reviewed journals, electronic databases, key agencies involved in FP and/or food and nutrition security), nor did it present strength-of-evidence classifications for studies included in the review. Its primary sources of evidence on urban versus rural dynamics came from UN agencies (UNDP, UNFPA, FAO, WFP). According to the review, in urban areas, high fertility compromises food access and contributes to poor food utilisation and/or consumption. The study also highlighted the role of FP in improving resilience for women, by reducing the probability of high-risk pregnancies and maternal mortality and morbidity which, the authors purport compromise women's mobility and time to pursue endeavours that contribute to household food security.

"What works": Within recently published literature, FP is being positioned as a means of amplifying nutrition goals. The Food and Nutrition Technical Assistance (FANTA) project and The Futures Group recently completed separate systematic reviews of integrated health and nutrition initiatives between 2000 and 2013, as well as reviews of programmes linking FP to nutrition and food-security outcomes [69,101,102]. Evidence establishes a direct link between FP and proximate determinants of health[69].

- **Urban programming insights**: Existing data on the role of FP on nutrition outcomes do not shed light on key successes or critical considerations for urban programmes. Whilst there have been many urban FP/sexual and reproductive health initiatives, nutritional outcomes are not a focus of those initiatives.

The integrated management of childhood illnesses (IMCI) and integrated community case management (iCCM) are state-of-the-art, child-focused, nutrition-sensitive intervention strategies that have been implemented in low-resource settings throughout the globe[103].

- **Urban programming insights:** There is a paucity of evidence on urban adaptations of the above approaches, as well as on their effectiveness in urban settings. A 1997 IMCI evaluation in Zambia[104] was process-oriented, focusing on adherence to IMCI protocols by urban health centre staff and short-term improvements in maternal knowledge of key practices linked to infant and child health. Whilst being very weak on the level of detail presented on operational issues in adapting IMCI to urban areas, the evaluation, which entailed a baseline facility-based survey with health workers and clients, and two follow-up surveys at three and nine months after health worker IMCI training, documented a vast improvement in the clinical performance of health workers who underwent IMCI training. The evaluation also documented an improvement in clinical performance of health workers who did not receive IMCI

training but who worked in the same facilities as IMCI-trained health workers. However, the improvement over baseline was not the marked difference noted amongst IMCI-trained health workers. The evaluator speculated that trained health workers had a positive influence on their untrained counterparts; however, the evaluation did not yield evidence to explore this theme within the analysis. Whilst clinical performance improved, IMCI-trained health workers faltered on the counselling aspects of IMCI. Based on exit interviews with mothers who had brought their children to clinic and underwent consultations with IMCI-trained health workers (also under the auspices of the evaluation), IMCI counselling messages were not well understood. Another study in urban areas of Kano, Nigeria documented statistically significant differences (in support of IMCI) between IMCI and non-IMCI administrative area on various maternal, newborn, and child health outcomes[105]. However, because the assessment was cross-sectional in nature, it is not possible to make definitive statements regarding the role that IMCI played in effecting the observed changes in outcomes. In Peru, IMCI has been scaled up nationally, inclusive of urban and rural jurisdictions; however, a published evaluation of that national programme yielded no data that shed light on adaptation of IMCI in urban versus rural areas[106].

The general literature does, however, identify two themes—integration and a life-cycle approach—as critical success factors for nutrition-sensitive health programming.

***Integration*:** A 2015 systematic review of integrated FP–nutrition and FP–food security programmes examined different levels of FP integration in those programmes: (1) FP-related IEC/BCC only; (2) FP-related IEC/BCC, plus explicit FP counselling (e.g., to promote specific FP methods) at food security or nutrition points of contact; and (3) the combination of FP IEC/BCC, FP counselling, and direct provision of FP commodities[102]. Of the 102 programmes reviewed, 64% entailed the combined IEC/BCC, counselling, and provision of FP commodities. What works is when FP is part of larger integration packages. FP was rarely implemented as a standalone health intervention; it was most effective as a component of an integrated health package that contributed to nutritional aims but made full use of both community-based and facility-based service delivery platforms to improve MNCH (e.g., building on IMCI and iCCM)[102]. In addition to the integrated child heath studies described earlier in this section, there is a forthcoming initiative focused on adolescent girls in Kenya (including but not limited to girls from Kibera slums in Nairobi) that will test the impact of different intervention packages (e.g., violence prevention only; violence prevention and education interventions; violence prevention, education, and health interventions; and violence prevention, education, health, and wealth creation interventions[96]. Only baseline study data are currently available on the aforementioned initiative, although Population Council will be testing the above models using an RCT design. The baseline study did not present nutrition-related data, although the authors note that intervention modules will address nutrition and hygiene. In the Asia region, a 2004 study from Bangladesh was rigorous in its design (longitudinal in nature with multiple intervention groups) and tested health equity strategies that entailed micro-credit, female education, and provision of health services, although it did not test that package of interventions in an urban population[107]. Nevertheless, the study demonstrated how a multi-faceted programme that does not focus on nutrition explicitly can reduce childhood stunting as well as narrow the gender gap in stunting. A subsequent section of this report on equity and resilience highlights non-health urban strategies and their contributions to addressing proximate determinants of nutritional status and/or ultimate nutrition outcomes.

***Life-cycle approach**:* Two multi-country reviews, the first being a 2014 systematic review that analysed evidence from sub-Saharan Africa and the other being a 2015 desk review of programmes integrating FP and food security or nutrition, suggest that a commitment to the life-cycle approach minimises missed opportunities to provide adolescent females, adult women of reproductive age, and infants/children with a constellation of nutrition-specific and nutrition-sensitive approaches that are appropriate for the target group[102,108]. The 2014 systematic review suggested that rural-urban residence is a mediating factor in child nutritional status, that childhood

stunting might be a risk factor for overweight/obesity in adolescence and adulthood, and that optimal child health practices such as exclusive breastfeeding can prevent both stunting and overweight later in life, a relationship that the investigators claim warrants further exploration. The 2015 desk review did not explore either integration or the life-cycle approach in urban settings but did underscore the importance of the 'first 1,000 days" (from the mother's pregnancy through the child's second birthday) as a critical period for providing a continuum of interventions, one of which is FP.

In sum, there is a scarcity of literature to inform strategic decisions regarding nutrition-sensitive health programming in urban areas. Existing literature documents programme effectiveness of conventional approaches, with little or no adaptation to urban contexts.

Agriculture-related nutrition-sensitive programming

Summary of what is already known about nutrition-sensitive programming in agriculture:

Agricultural interventions improve the production and consumption of nutritious food among poor households. They probably also have a direct impact on the anthropometric status of children but evidence for this is lacking.

Summary of what this review tells us about agriculture-related programming in the urban context:

There is no strong evidence that activities in urban agriculture improve nutrition status. However, these activities have an important role in providing income and thereby increasing resilience.

With respect to programming for improved nutrition outcomes, agriculture-related programs in the urban context are most valuable as part of a multisectoral approach—for example, combined with nutrition education and consideration of gender issues.

***Evidence**: There is a medium size body of evidence, of mainly low strength of evidence, which shows mixed effects with respect to the ultimate nutrition outcomes of the framework.*

There are eight studies with low strength-of-evidence rating and one review of medium rating which provide evidence of effectiveness.
There are eight studies of low strength-of-evidence rating which do not provide evidence that programming in agriculture is effective in improving nutrition status.

Our review of the literature on the nutritional impact of urban and peri-urban agriculture indicates a paucity of evidence relating to nutrition outcomes in urban settings. Even the context-neutral literature does not provide strong evidence of benefits to our ultimate nutrition outcomes, only to intermediate outcomes. Specifically, a recent good quality systematic review of the nutritional impact of generic agriculture interventions[109] indicated these interventions improve the production and consumption of nutritious food among poor households but could not identify a direct impact on the nutritional status of children because most studies were too small to detect an impact. The authors specified only inadequate sample size, but insufficient duration of the studies was likely to have contributed to the lack of definitive findings. An earlier, less-rigorous review[110] had similarly found that most of the interventions increased food production but did not necessarily improve dietary, anthropometric, biochemical/clinical, or morbidity indicators within participating households. A finding relevant to urban programming was that interventions that invested broadly in different types of capital (especially human capital including consideration of gender issues) were more likely to improve nutrition outcomes. Also, effectiveness was greater when different kinds of intervention were implemented together, for example nutrition education in combination with home gardening[110].

A recent systematic review to assess the impacts of urban agriculture programmes on food security (that included nutrition indicators as outcome variables) in low- and middle-income countries[111] unfortunately found no evaluations of interventions that met the study's inclusion criteria. Analysis of secondary data does provide support for the concept that participation of urban households in agricultural activities leads to greater dietary diversity[112]. There are also findings from quantitative cross-sectional observational studies[113] that indicate farming by urban households can enable their diets to be more nutritious than non-producer households. Some studies have even found better nutrition status in children of farming households[114-116] although these also used a cross-sectional design, and confounding can be introduced by unobserved factors that influence both engagement in urban agriculture and the nutrition status of children. Findings from these studies are discussed below.

A recent World Bank review that included four case studies of urban agriculture[113] argued that the contribution of urban agricultural production to food availability and access is less clear than its important role in employment and diversified income generation. By providing a household buffer against shocks (e.g., due to raised food prices) urban agriculture appears to protect nutrition rather than improve it. In this case benefit to nutrition status would not be apparent in the short term, for example in the time scale of studies designed to assess impact of interventions. Evidence from Kampala, Uganda, supports this view in that there were no significant differences in household food security between farming and non-farming households but the size of land-holding being farmed mitigated the association between wealth and household food security such that greater access to land alleviated the effects of urban poverty on food insecurity[117]

There is little evidence from the literature of the relative importance of pathways by which home production of food benefits urban household nutrition.

- The most obvious pathway is via home-grown foodstuffs increasing the total amount of food available to a household, and specifically, the availability of fruits and vegetables allowing consumption of a diverse diet that is richer in valuable micronutrients. The operation of this pathway is supported by an analysis of secondary data from household surveys for developing or transition countries, whereby in 10 of the 15 countries analysed there was a correlation between an active participation of urban households in agricultural activities and greater dietary diversity, after controlling for economic welfare and household characteristics[112]. However, findings from primary data collection provide inconsistent evidence. For example across the four World Bank case studies of urban agriculture in Ghana, India, Kenya and Peru, with respect to food groups consumed there were no major differences between producers and non-producers, though some differences were found for particular food groups such as green leafy vegetables and beta-carotene rich foods[113]. Dietary differences were not all in favour of producers, for example in Accra, tubers were consumed more by non-producers than producers, as were milk and dairy products in Lima. The trends did suggest that farming enabled the very poor to diversify their diet but few differences were statistically significant[113]. In Kampala, dietary diversity was significantly higher in livestock-farming households than crop-farming or non-farming households, but crop farming households had similar scores to non-farming households[116].

- The second pathway by which home production of food could benefit urban household nutrition is via increased cash income from the sale of products. The existence of this pathway is dependent on the increased cash being spent on nutritious food. Households with a low calorie elasticity of income (the relation between a change in income and a change in calorie consumption) might not experience improved levels of nutrition linked to the increase in income[111]. Circumstantial evidence supports this existence of this pathway, for example, it was suggested that higher consumption rates of protein-rich food in Nairobi by producers compared to non-producers was associated with a higher purchasing power from the sale of vegetables[113], but the literature revealed no quantitative findings to support it.

- A third pathway via maternal care was suggested by Maxwell[115] who argued that mothers who engaged in urban agriculture, as opposed to other forms of non-farm employment away from home, have an increased

capacity to take care of their children with positive impacts on child nutrition. Again there is no evidence to support this proposition.

Issues that particularly affect urban agriculture as opposed to rural are –

- Lack of space: A different approach is needed in urban areas where space to cultivate and keep livestock is severely limited compared to rural areas. For example, for school and community gardens, simple locally appropriate irrigation methods are more sustainable than drip irrigation technology which is more suitable for medium size producers[118].
- Lack of tenure and legality of activities: In each of the World Bank case studies, not only was availability and access to land a major challenge, but there was widespread lack of secure tenure[113], and this issue is mentioned elsewhere in the literature[115,119]. Where agriculture is practiced on public, community, or institutional land, the use of these spaces is often not regulated and lacks legal protection for producers. In many cases much of the urban agriculture occurring is technically illegal, and so farmers do not make investments to improve production[113].
- Lack of safe water for irrigation: Untreated water is often used for irrigation with accompanying health risks[113,120].
- Health risks from raising livestock in more crowded conditions: Findings from studies of animal-to-human disease transmission indicated that brucellosis was widespread in livestock in both urban and peri-urban areas of Kampala[120]. However, human infection was low in both producer and non-producer households, so there seemed to be good awareness of the dangers associated with consumption of raw milk[120].
- Distance between residence and land being cultivated[121]: Distance can constrain participation in interventions, for example in a livelihood strengthening project in Nakuru, Kenya, participation in farm labour was often difficult due to the considerable distance of some farms from participants' living quarters[121]. A defining feature of an urban food garden project in Johannesburg was said to be "dislocation, distance and the need for transport"[122].

v. Equity and resilience

The evidence base: The annexes summarise twelve studies, five of which are systematic reviews/cross-country reviews. Three of the systematic reviews are global in purview, while the other two reviews centre on evidence and experiences from sub-Saharan Africa. Three of the individual studies describe experiences in Kenya, and include pre- and post-intervention data but do not include a control group. One study describes implementation of a conditional cash transfer project in Colombia which includes pre- and post-intervention comparisons as well as control group. One study describes a micro-credit project in Peru with a purely cross-sectional comparison and no control group. The final study describes a daycare programme which addresses the needs of urban working mothers in Guatemala

There is a burgeoning body of evidence on the role of social protection/social safety net programmes on addressing proximate determinants of nutritional status. However, data on this issue within urban contexts is still limited, with the exception of selected countries (e.g., Kenya).

Summary of what is already known about actions to address equity and resilience:

Equity and resilience efforts, many of which focus on poverty and gender equality, generally do not have explicit nutrition aims. Nevertheless, available literature suggests that multi-sectoral coordination (e.g., between agriculture, social protection, and nutrition/health sectors) is the optimal course to address root causes and/or drivers of undernutrition.

The literature highlights gender issues in two ways: (1) gender differentials in child nutrition outcomes and (2) the documented relationship between women's status and nutrition outcomes in children. Multi-country analyses using DHS data suggest a "male disadvantage," particularly in relation to childhood stunting, in sub-Saharan Africa. Rural data from Bangladesh suggest that an opposite pattern may exist in some Asian countries, and that woman-focused poverty alleviation strategies show promise in narrowing the gender gap in child malnutrition. A global systematic review conducted by IFPRI in 2003 supports the notion that women's status is a prominent mediating factor for child nutrition in South Asia.

What this review tells us about actions to address equity and resilience in urban contexts:

Intra-urban differences (most notably between well-to-do individuals/households and the poorest individuals/households) in child undernutrition are larger than urban/rural differentials in child malnutrition, with Mozambique, Tanzania, Kenya, Nigeria, and Uganda having the widest intra-urban differentials.

Available evidence on urban social protection efforts suggests that, in urban areas, cash transfers targeting the extreme poor must be large enough to facilitate food purchase, and they should reflect urban and rural food price differences in order to positively contribute to nutrition gains in urban areas.

The concept of gender-sensitive urban planning is gaining traction as a way of prioritising women's and girls' greater access to livelihoods; cash, credit, and/or in-kind transfers; safe and secure living conditions in urban slums and informal settlements; and increased access to quality infrastructure. Extension of access to voluntary FP and the promotion of girls' education are complementary empowerment strategies for women (and ultimately families) that are associated with positive nutrition and health outcomes in women and children.

***Evidence:** As described in the opening paragraph for this section on equity and resilience, systematic reviews are an important source of evidence on equity and resilience efforts that contribute to nutrition aims. Individual intervention studies exist in limited number, and their quality is suboptimal (e.g., lack of counterfactual evidence for some studies). Kenya yields insights on the role of urban social protection efforts (e.g., cash transfer programmes) in improving proximate determinants of nutrition, although the impact of those efforts on ultimate nutrition outcomes is not well documented. Similar efforts in other sub-Saharan African countries (e.g., Ethiopia) are in the nascent stages and pose opportunities for more-rigorous monitoring and evaluation of proximate determinants of nutrition and ultimate nutrition outcomes.*

Contextual evidence: This section examines the issue of equity and resilience and their relation to undernutrition, with a focus on (a) poverty and (b) gender equality.

- **Poverty**: There is no shortage of evidence on the link between socioeconomic status and undernutrition or on the higher undernutrition burden in rural areas relative to urban areas (Figures 17–19). However, a high-quality 2006 study that entailed secondary analysis of DHS data from 15 sub-Saharan African countries, documented that intra-urban differences (most notably between well-to-do individuals/households and the poorest individuals/households) in child stunting are larger than urban/rural differentials in child malnutrition[123]. The widest intra-urban gaps existed in Mozambique, Tanzania, Kenya, Nigeria, and Uganda, and the narrowest gaps exist in Chad, Ghana, Zambia, and Zimbabwe[123]. However, caution should be exercised in drawing general conclusions regarding the role of urban population growth in fuelling child malnutrition. For example, Tanzania had the fastest urban population growth, the largest urban-rural gap in malnutrition, and a modest level of intra-urban inequities, and yet it had a relatively low level of urban malnutrition. This shows that multiple contextual factors determine nutrition outcomes in urban contexts and thus require further investigation.

- **Urban programming insights:** It is important to disentangle factors contributing to the disadvantage of the extremely poor in terms of malnutrition in urban settings. Precise evidence is currently lacking.

The most robust body of evidence on urban poverty and resilience focuses on the "urban slum" and "informal settlement" phenomena. The UN uses five criteria to define a "slum" (Annex 1.iv). However, the dynamics within slums differ considerably across regions. The HIV/AIDS and malaria epidemics overlay urban poverty and slum existence in many sub-Saharan African countries, where access to safe drinking water and improved sanitation facilities are also amongst the lowest in the world[28,124,125]. In South Asia, the sheer sprawl of urban slums poses challenges in terms of both governance and implementation of programmes. Slums in South Asia are also characterised by an ever-expanding working-middle class of residents who are gainfully employed but do not have the means to live outside of the slums[126]. There is also a delicate interplay between poverty, caste, and religion[127].

A confluence of the above contributes to population turnover and/or large numbers of undocumented individuals and households, which the literature (both nutrition and poverty-related) identifies as a challenge in terms of interventions targeting in urban slums and informal settlements[83,128].

Factors such as household level of income, livelihoods, household size, and dependency ratio have been directly linked to food security[24,129]. A large-scale study in Korogocho and Viwandani to examine vulnerability to food insecurity in two urban slums in Nairobi documented how some extremely poor urban households in Kenya deal with acute crises and bouts of food insecurity[24]. In that study, purchasing precooked food from street vendors was a common coping strategy adopted by poor households in urban slums to save on cooking fuel, despite the recognition that street food is associated with lower dietary quality and poor hygiene standards in preparation[24]. Other coping strategies documented in the study included buying poorer-quality food such as old, less-fresh vegetables and fruits; scavenging for discarded and/or expired food items from local markets or dumpsites; and prioritising food for children over adults.

- **Gender equality:** A 2003 International Food Policy Research Institute (IFPRI) study, which analysed DHS data on 117,242 children under three years of age from 36 countries, examined the relationship between women's status and children's nutrition in South Asia, sub-Saharan Africa, and Latin America and the Caribbean[129]. Although there was a strong, positive relationship between improved status of women and improved nutritional status of them and their children, there was regional variation in both the strength of that relationship and the pathway through which women's status impacted child nutrition[129]. For example, the study estimated that if women and men had equal status in South Asia, the child-underweight prevalence would drop by an estimated 13 percentage points, achieved primarily through the following pathway: (a) women's nutritional status → (b) antenatal and delivery care → various optimal caregiving practices: (c) optimal complementary feeding practices for children, (d) treatment of childhood illnesses, (e) child immunisation, and (f) quality alternative child caregivers[129]. In sub-Saharan Africa, if women and men had equal status, child-underweight prevalence would only decrease by almost 3 percentage points[129].

The study attributed higher rates of child malnutrition in South Asia than in sub-Saharan Africa to: (1) women's status, (2) sanitation, and (3) urbanisation, with the conclusion that women's status was largely responsible for regional differences in child nutritional status. Notably, while standard DHS surveys yield some data on women's status, the data are quite limited in scope vis-à-vis women's status (e.g., the surveys document women's participation in household decision-making), so this area warrants further investigation. In addition, the IFPRI analysis did not include a similar assessment to determine drivers of undernutrition in adolescent and adult females.

- **Urban programming insights:** The analysis was not specific to urban settings, although it included urban location and rural location as variables in the analysis. According to the analysis, living in an urban area compromises a child's nutritional status in South Asia, whereas the converse was observed in sub-Saharan Africa. In Latin America and the Caribbean, urban residence did not affect short-term nutritional status but did have a bearing on long-term nutritional status. In all three regions, urban residence is negatively associated with the quality of breastfeeding practices (i.e., early initiation of breastfeeding, exclusive breastfeeding among 0-4 month olds) but not breastfeeding duration. In Latin America, work environments for women were deemed incompatible with childcare, which in turn impacted feeding practices.

There is also convincing general evidence on gender differentials in child nutritional status. A 2007 analysis of DHS data from 10 sub-Saharan African countries shed light on a noteworthy "male disadvantage" among children under the age of five, with boys having higher stunting rates than girls, suggesting the need for further attention to how health and other inequalities play out in that age group, particularly in the poorest segments of a given society[130]. However, that study did not stratify the analysis according to urban-rural residence. A second, more-recent study entailed a systematic review of 18 DHS studies conducted between 1990 and 2012. According to that study, with the exception of South Africa, stunting was consistently higher among boys than among girls[108]. Rural versus urban residence was included in that analysis, and results suggest that urban-rural location is an 'environmental' determinant of both stunting and overweight. Although the authors identified sanitation and access to healthcare as key contributors to urban-rural differences in malnutrition, the systematic review only documented that that stunting prevalence was higher in rural areas, and overweight was higher in urban areas, particularly among females. It did not analyse the phenomena of stunting and overweight separately for urban or rural areas, nor did it explore whether different factors such as sanitation or living conditions are more prominent drivers of malnutrition in urban versus rural settings. There is some evidence that a contrary relationship exists in Asia, although that longitudinal study was limited to a rural setting (Matlab, Bangladesh)[107]. Nevertheless, the study documented that, girls had higher stunting prevalence than boys at the start of the intervention (which was mainly a poverty alleviation approach focused on empowering poor women through microcredit schemes, female education, and increased access to health care), but over time, boys exhibited a much slower rate of improvement than girls. One year later, girls whose mothers were exposed to the intervention had nutritional status that was almost on par with that of boys. The gender divide remained among children whose mothers were not exposed to the intervention.

"What works": Very few social protection programmes have explicit nutrition aims. One exception is Ethiopia's Productive Safety Nets Programme (PSNP), which identifies nutrition impact as one of its many aims. Data emerging from the PSNP focus primarily on food security, although the 2014 Ethiopian Mini-DHS compared child nutritional status in PSNP vs. non-PSNP households. Interestingly, children in PSNP households had slightly higher stunting and underweight rates (47% and 31%, respectively) than children in non-PSNP households (42% and 26%, respectively). The DHS only provides confidence intervals of its key estimates according to geography; however, the weighted sample size for the Mini-DHS was quite large (PSNP sample: 486; non-PSNP: 3,814). This finding can be interpreted in multiple ways: (a) the level of PSNP support is insufficient to impact family capacity to improve nutritional status, (b) there is a need to support PSNP households in adopting practices that can improve child nutritional status, and/or (c) the PSNP is, in fact, reaching the most food-insecure, nutrition-compromised households, as is its original aim. To date, Ethiopia's PSNP has been limited to rural areas, although plans are underway for the Government of Ethiopia to launch an Urban Productive Safety Nets Programme[131]. Thus, there is potential to establish an explicit link between the Urban PSNP and nutrition measurement/evidence creation.

- **Urban programming insights:** Kenya has also achieved traction with its nutrition-sensitive social protection programming and research in urban slums and informal settlements[63]. Cash transfers (on average, US$15 to US$26) provided by Kenya's safety nets programme are higher than transfers provided

in other sub-Saharan African countries, and they are actually comparable to the food poverty line (as estimated in the 2005/06 Kenya Integrated Household Budget Survey, this value was US$14 in urban areas)[132].[k]

Additional evidence from Kenya suggests that the results of urban cash transfer programmes are mixed in terms of nutrition improvement. For example, a 2012 brief prepared by the Overseas Development Institute (ODI) for Save the Children (SC) UK highlighted the Korogocho Emergency and Food Security Cash Transfer Initiative, which targeted 1,958 households in Korogocho urban slum in Nairobi between November 2009 and July 2010. The initiative's results showed an increased quantity of daily meals consumed by beneficiary households (2.53 meals per day, compared with 1.61 meals per day at baseline) and a 24% decline in the proportion of beneficiary households classified as food insecure[132]. However, that same study documented that dietary diversity for beneficiary households was comparable to that of the wider slum population in Korogocho.

Latin America has generated a body of evidence on the 'impact' of conditional cash transfer (CCT) programmes on child nutritional status. Since that region does not fall within DfID's geographical priorities, those experiences are not described extensively in this report. However, two World Bank–supported CCT programmes in Colombia and Mexico documented positive impact on height-for-age z-scores as well as weight of children under the age of 24 months in urban areas[80]. In Colombia birthweight increased significantly in urban areas but not rural[133]. In Ecuador, there was an urban comparison of in-kind (food) versus cash transfers. There were few differences of note between the two modalities, although in-kind transfers had a larger impact on calories consumed whereas cash transfers had a greater impact on diet diversity[134].

Weak evidence from Peru, from an uncontrolled cross-sectional study, indicates that participation in micro-credit programmes can benefit the nutritional status of female clients (BMI and haemoglobin status)[135]. A study with stronger study design but with findings only related to intermediate nutrition outcomes provides evidence from Guatemala of the value to urban working mothers of daycare provision. This is especially important for the urban poor in low-income countries where public provision of childcare is virtually non-existent[136]. The evaluation of the government-sponsored Community Daycare Program in Guatemala shows the children benefited from a better diet than non-participants, and the income of beneficiary mothers was higher than the income of working mothers who used other child care alternatives[137]. This approach also provide advantages with respect to brain development, given the evidence that the benefits of high-quality childcare continue into school years[138].

In sum, evidence on the nutrition effects of social protection schemes (e.g., cash transfers) focuses on child nutrition as opposed to adolescent or women's nutrition. The concept of gender-sensitive urban planning is, however, gaining traction as a way of prioritising women's and girls' greater access to livelihoods, safe and secure living conditions in urban slums and informal settlements, and increased access to quality infrastructure—all to minimise drains on their time, financial resources, and so on[139]. A small number of multi-country studies and reviews (e.g., a 2002 IFPRI study on the link between women's status and child nutrition in developing countries, a World Bank review of nutrition-sensitive social protection programmes) yield limited evidence on urban versus rural settings. However, not all studies assessing various dimensions of equity or resilience examine the explicit link to nutritional outcomes[73,80].

[k] Original sources: on value of transfers: Republic of Kenya (2012) *The Kenya Social Protection Sector Review, Draft 2*; on food poverty line: 2005/06 Kenya Integrated Household Budget Survey (KIHBS) and Oxfam GB (2009) *Urban Poverty and Vulnerability in Kenya.* Background analysis for the preparation of an Oxfam GB Urban Programme focused on Nairobi.

vi. Physical environment

Summary of what is already known about nutrition-sensitive programming with respect to WASH and housing:

Lack of water, sanitation, and hygiene (WASH) facilities is associated with higher rates of infectious disease. However there is only limited evidence that lack of WASH translates through to impact child growth.

Summary of what this review tells us about urban nutrition programming with respect to WASH and housing:

Promotion of hand-washing can be an effective means of reducing urban undernutrition but only if access to safe water and basic sanitation also exist. Decentralized sanitation solutions are more feasible than piped sewerage in slums and informal settlements. Their implementation is best combined with hygiene and nutrition promotion activities, although evidence for the effectiveness of such programmes is currently lacking in the urban context.

***Evidence**: There is a small size body of evidence, of mainly low strength of evidence, which shows inconsistent effects of WASH and housing quality with respect to the ultimate nutrition outcomes of the framework.*

WASH – Effective: one study of low evidence rating. No effect: two studies of low evidence rating.
Housing – Effective: three studies of low evidence rating. No effect: one study of low evidence rating.

Poor urban residents face many of the same challenges in daily life as the rural poor, with the additional hardship of overcrowded and often unsanitary living conditions. As well as their severe lack of income, limited access to essential infrastructure such as water and sanitation, inadequate shelter, and restricted mobility contribute to a dimension of poverty beyond lack of income and assets, that of 'time poverty'[136l].

Water and sanitation

The poorest residents of cities often live in exceptionally unhealthy and dangerous conditions. Almost 160 million urban dwellers do not have access to safe drinking water, and over 700 million do not have adequate sanitation[m]. On average, urban areas are better served than rural with respect to these basic services, in that 96% of the global urban population uses improved drinking water sources, compared with 84% of the rural population, and 82% of the global urban population and 51% of the rural population use improved sanitation facilities[140]. But these values mask considerable variability between countries—of the DfID-supported countries, South Sudan has low values for urban coverage of both improved water and sanitation (Figures 23–24 in Annex 4). Also national level data do not show the between- and within-urban area variation. Smaller urban areas (those with population lower than 100,000) are significantly underserved with respect to WASH compared to larger urban areas[59], and the urban poor have greatly inferior access to basic amenities compared to the non-poor[141]. In addition to understanding the physical distribution of services, sources of data are needed to assess barriers preventing the poor from accessing these services, including hours of service, functionality of systems and cost. Personal insecurity can be an additional obstacle[142] especially with respect to accessing facilities at night[128]

Evidence and pathways

There is good evidence that urbanisation[143] and specifically lack of WASH facilities[144] is associated with higher rates of infectious disease, and more limited evidence that lack of WASH translates through to impact child growth from a systematic review[145] and studies using secondary data[146-148]. The estimated reductions in risk of

[l] Reference 136 discusses how this concept can help to identify unintended impacts of initiatives, for example CCTs that aim to improve children's schooling and health and remove them from unpaid work have a major impact on women's time poverty by considerably adding to their care-giving burden.
[m] Authors' calculations derived from the most recent UNICEF/WHO Joint Monitoring Programme data (http://www.wssinfo.org/).

morbidity from diarrhoeal disease are 48% for hand-washing with soap, 36% for excreta disposal, and 17% for improved water quality[144]. Meta-analysis including 4,627 children from cluster-randomised controlled trials with an intervention period of 9–12 months identified a borderline statistically significant effect of WASH interventions on height-for-age z-score (mean difference 0.08; 95% CI 0.00 to 0.16) in < 5 y.o. children. The authors conclude that the evidence is suggestive of a small benefit of WASH interventions (specifically solar disinfection of water, provision of soap, and improvement of water quality) on length growth[145]. Given that the intervention studies reviewed were relatively short and none were of high methodological quality, the lack of evidence should not be inferred to reflect a lack of impact. Modelling indicates that hygiene interventions contribute to a reduction in stunting, either through their impact on diarrhoea prevalence and the link between diarrhoea and stunting[149] or through their impact on tropical enteropathy[150]. Both pathways could apply in urban contexts as well as rural.

There are various possible pathways linking lack of WASH to poor nutrition status. The most obvious is via exposure to factors causing ill-health. Another is via income—if a household does not have water, energy sources, and sanitation facilities in their dwelling, household members rely on public sources and in urban areas often need to pay high tariffs for services[151], which impacts on food security. Limited quantities of water mean little is available for good hygiene practices. Also, in both urban and rural contexts, time spent collecting water or suffering from water-related illnesses reduces the chance of young people getting a good education, with long-term impacts on health and socio-economic status[152].

Although strong evidence of pathways to poor nutrition status from the specifically urban context is lacking, it is plausible that continuous exposure of children to contaminated faecal matter is the most dominant mechanism. In Bangladesh the impact on nutrition status of neighbours' behaviour with respect to disposal of children's faeces was demonstrated[153]. A hand-washing intervention in Nepal was found to be ineffective with respect to nutritional outcomes[154], and the findings point to the need to address the root causes of infections, those of poverty and poor living conditions. Such evidence suggests that in the context of recurrent infections in slum environments, there is little point in focusing attention on hygiene interventions that target individual behaviours in the absence of improvements to living conditions including WASH.

Sanitation

Provision of piped sewerage has been shown to be effective in reducing diarrhoea incidence[155] but this may not be an appropriate approach for all contexts, and the choice of approach for sanitation is not clear-cut. In the densest urban centres, conventional sewerage is the only way to manage large volumes of human waste. But most of the projected urban growth is in the areas surrounding city centres and in informal settlements, and here a range of solutions is needed[156]. Sewerage systems are not affordable practical in most informal settlements given the cost and need for a piped water supply. Decentralised sanitation solutions such as pit latrines and septic tanks are more likely to be implemented when sanitation is expanded in rapidly urbanising areas, and the findings from an urban trial in Mozambique[157] will provide vital evidence in this regard. An evaluation of the sanitation component of a community development programme in Bangladesh showed that onsite sanitation solutions (dealing with excrete where deposited) can be acceptable even if such facilities are public and communal, and can lead to improvements in children's anthropometric status[153]. Such evidence indicates that on-site sanitation solutions should be the focus of urban nutrition-sensitive WASH programming, since they can be both hygienic and affordable.

Water

In urban areas, water supplies are usually provided by a utility. But services do not reach large parts of the urban population since utilities lack the funds to extend water networks into un-served areas, there are legal issues such as lack of land tenure, and physical issues related to laying pipes in crowded slums. So the urban poor often pay high prices for their water from the small-scale domestic private sector[151]. Even when piped water exists and households can afford to pay the connection fee and tariffs for it, the supply may be intermittent and unreliable,

and residents need to treat the water before drinking or obtain water from other sources such as handpumps[158]. The review identified no specific evidence of benefit to nutritional status of interventions to improve access to clean water in urban areas, only of integrated WASH programmes or of slum improvements.

Programming

It is plausible that reduction in diarrhoeal disease in urban areas, as in rural areas, can best be achieved through an approach to improving WASH which simultaneously addresses the constraints which exist at different levels. A comprehensive approach promotes improvements in key hygiene practices (hand washing, treatment and safe storage of drinking water, safe disposal of faeces, and food hygiene) while simultaneously both improving access to safe water and sanitation technologies and products, and supporting an enabling environment (improved policies, community organization, institutional strengthening, and public-private partnerships)[159]. With respect to facilitating an enabling environment, differences compared to rural settings are that in urban areas service delivery involves a large and diverse range of actors, and there is a strong theme of working with or through the private sector[33]. Where partnerships between urban poor organisations and local governments exist, much more has been achieved[37]. Externally-imposed solutions tend to lead to disappointing results due to a lack of effort to tailor them to local realities, and insufficient local ownership[33].

Efficiency savings can be made, and potentially synergistic effects on nutrition outcomes achieved by integrating WASH into nutrition and health programming, and vice versa[160]. For example WASH messages can be integrated with those of nutrition education; vouchers for point-of-use (POU) water treatment or the POU water treatment itself can be distributed at health facilities; and WASH can be integrated into community services and maternal and neonatal programmes[159]. To date, however, evidence of the effectiveness of integrating WASH promotion with nutrition is lacking from the urban context, apart from one study from Pakistan[88]. Also there exist opportunities to integrate WASH with activities supporting livelihoods such as cash transfer programmes, for instance marketing sanitation through mobile phone messaging[128] but evidence of the effectiveness of such integration is lacking.

Given the challenges of working with mobile and transient populations, and the diversity with respect to socio-economic status and culture that can occur within small geographical areas, creative approaches are needed in urban areas for such integrated activities, such as deploying mobile health teams and community based outreach workers who are familiar with population movements, and who are known and trusted by the client population[59].

Housing and fuel use

Housing and tenure

Many, though not all of the urban poor, live in slums, and tend to spend a higher proportion of total consumption on housing than the rural poor, as a result of the higher land values in cities[28]. They often live on insecure public or private land due to lack of planning for urban development and growth, and to poorly functioning land and housing markets. Households lacking property rights may be excluded from eligibility in social programmes[28]. Qualitative evidence shows how lack of secure tenure[n] impacts on food security via maintenance of investments in assets and social networks, and indicates the importance in urban areas of programmes to address land and housing security[113,161]. Lack of secure tenure is a major constraint to investing in infrastructure and services in slum areas by donors, NGOs and government agencies[28].

There is a lack of research that investigates the direct or indirect link between children's health and nutritional status, and their housing situation. A good quality study in Mexico found replacement of dirt floors with cement flooring was associated with reduced parasite count and diarrhoea[162], consistent with the hypothesis that the

[n] Tenure security encompasses levels of rights that individuals and communities have to occupy, use, develop and transfer property.

improved flooring interrupts the transmission of parasitic infections. In Ghana, a cross-sectional study revealed a statistically significant association between wasting and ownership of a toilet facility[163]. One low-quality study provides cross-sectional evidence to link improved housing in rural areas with reduction in illness, including poor mental health[164], and an evaluation of a slum improvement project recorded some improvement in child nutrition status following the project, but this study lacked a control group[165]. However a systematic review of the effects of slum upgrading strategies involving physical environment and infrastructure interventions[166] provides evidence that slum upgrading may reduce the incidence of diarrhoeal diseases and water-related expenditure.

Fuel and pollution

Lack of space in housing to prepare food leads to reliance on street foods, and as was described above, these may not be hygienically prepared[24,25]. Also use of biomass fuel[o] for cooking, heating, and lighting is associated with high levels of indoor air pollution and high incidence of respiratory infections[167]. In urban areas this is a particular risk for the urban poor who often use solid fuels (biomass and coal) without proper cooking facilities and ventilation, and women and children of poor families are most affected as they spend more time in the house than men[10,168]. The effect of the indoor air pollution is added to that of outdoor air pollution from road traffic and industry which affects the central nervous system and aggravates asthmas as well as causing respiratory illness[10].

Respiratory infections in women and young children are likely to contribute to a vicious cycle of poor nutrition status and increased susceptibility to infection. In fact, there is good evidence of the negative impacts of solid fuel smoke exposure on both low birthweight and stillbirth[169], and analysis of secondary data indicates that both anaemia and stunting are linked with household use of biofuels, independent of other factors[170]. Clearly it is preferable to use a fuel type such as kerosene and liquefied petroleum gas (LPG) that has lower emissions than biomass. In many urban areas, cleaner fuels are cheaper than biomass per unit of fuel[171], but often need a larger cash outlay to buy the fuels and the stoves. For example, LPG must be bought each week or month by the bottle, but the poor usually purchase small quantities of fuel daily. Thus, making fuel available in smaller quantities would be expected to benefit the poor, as would mechanisms such as micro-credit loans or subsidies help to reduce the cost of switching between sources of fuel[171]. Interventions for adoption of improved stoves and smoke hoods can also reduce indoor air pollution[167], and so would be expected to benefit nutrition status especially of mothers and young children. However, currently no evidence exists of this effect.

5 Evidence gaps

Having described the approaches used to address undernutrition in the urban context, and evidence for their effectiveness, we now identify gaps in the evidence base.

Strengthening policy and planning

Politics and governance

In the timeframe of this review, it was not possible to comprehensively identify existing programmes, policies, and bodies which support resilient urban food security in low- and middle-income countries. Mapping of these, and documentation of relevant processes and experiences would be a valuable exercise, in order to make available evidence of effective governance from which other urban centres can learn.

The following are priority gaps in the evidence to be addressed:

[o] Renewable organic materials, such as wood, agricultural crops, or wastes.

- Apart from Belo Horizonte in Brazil, are there other cases where nutrition-specific activities take place as part of urban food security programs?
- What is the potential of existing food security initiatives as platforms from which to raise awareness of and commitment to nutrition issues?

This exercise would benefit from being undertaken in collaboration with the FAO "Food for the Cities" initiative and/or the Urban Working Group of the Global Food Security Cluster.

Knowledge and evidence

Policymakers and other stakeholders need reliable up-to-date data in order to advocate for action, to input into choice of interventions, and to guide their implementation. However urban areas have characteristics which create challenges associated with data collection which do not exist in the rural context. For example, the great diversity in health and socio-economic status which can occur within small geographical areas, the need to sample in illegal settlements, finding people who do not have fixed addresses, and the need for indicators adapted to an urban setting.

While excellent research on developing such urban-specific food security indicators is being undertaken by Concern Worldwide[172], findings from tracking the research by Concern and other relevant initiatives by the World Food Programme and Global Food Security Cluster[173] has identified that common initiatives are "occurring in silos" and findings are not being linked. It was recommended that the development, testing, and subsequent standardization of new tools to assess urban food security should be prioritised over undertaking further desk reviews of existing assessment procedures[173].

In addition, it is not clear how an urban nutrition crisis can be identified, given that the threshold of 15% Global Acute Malnutrition (GAM) was designed for a rural food crisis and does not appear to be applicable for the urban context. Globally recognised triggers for slow onset urban emergencies are needed which could be applied using existing tools such as the IPC (Integrated Phase Classification) or early warning systems such as FEWS NET[3].

The two interlinked research priorities are:

- Development and testing of a toolkit for urban vulnerability assessment, by integrating and simplifying the existing methods (World Food Programme [WFP][174], ACF International[175], and household economy approach [HEA][176]) and incorporating recent findings from primary research (including that by Concern Worldwide[172]) and a desk review (by WFP and the Global Food Security Cluster[173]).
- By applying this toolkit in varied urban contexts, develop an understanding of how to identify slow onset urban emergencies (with the ultimate goal of developing guidelines which could be applied via IPC).

Nutrition and health programming

A systematic review of nutritional interventions for preventing stunting in children (0 to 5 years) living in urban slums is currently being undertaken[177].

Nutrition-specific programming

The literature review unearthed a gap in our knowledge base regarding "what works" in urban settings. More specifically, the priority evidence gaps relate to: (a) differences in programme approaches for urban/peri-urban versus rural areas and (b) features of effective nutrition interventions in urban/peri-urban settings. The preponderance of evidence on children under the age of five also signals the need to generate robust evidence on nutrition-specific programming that explicitly addresses nutritional status outcomes of adolescents and women of reproductive age, especially outside of the context of pregnancy.

The focus within the literature on short-term measurement of programme effectiveness has resulted in a lack of conclusive evidence on sustainability of observed improvements in nutritional outcomes. The variation in the quality of published intervention studies also suggests the need to support rigorous nutrition intervention research in urban and peri-urban contexts, centring on scientifically sound methodologies (in particularly, robust sampling and creation of counterfactual evidence to support conclusions regarding attribution of nutrition "impact.").

Nutrition-sensitive health programming

Many of the shortcomings related to nutrition-specific programming also apply to nutrition-sensitive health programming. As nutrition is being increasingly embedded within reproductive, maternal, newborn, and child health (RMNCH) programmes, there is a need to: (a) test the effectiveness of integration models and (b) ensure that both integrated health programmes and multi-sectoral programmes that support health and nutrition aims document changes in key nutritional status outcomes amongst different target groups. There are underutilised sources of data specific to urban populations such as the Nairobi Urban Health and Demographic Surveillance System (NUHDSS),[178] which can be a source of real-time evidence on both nutrition-sensitive inputs and nutrition outcomes in urban populations.

Evidence on value for money/cost-effectiveness of intervention strategies is also lacking, and there is little or no conclusive evidence on prospects for sustainability of outcomes.

Nutrition-sensitive agriculture-related programming

Despite plausible causal pathways to link urban agriculture with nutritional benefit, definitive evidence is lacking in this regard. Evidence exists from the urban context that nutrition-specific interventions are effective; weak evidence exists from the urban context that agriculture-related nutrition-sensitive ones do too, and weak evidence from context-neutral studies indicate the potentially synergistic effect of integrating programmes to support urban agriculture and nutrition-specific interventions. Thus well designed studies over a time-scale that is sufficient to demonstrate a measurable impact, are needed to explore the effectiveness of integrated agriculture and nutrition-specific programmes in urban contexts.

Equity and resilience

The primary gaps in our knowledge base relate to equity dynamics—in particular, to the interplay between gender, poverty, and undernutrition in urban areas. Future social protection efforts focused on urban populations (e.g., impending rollout of Ethiopia's Urban Productive Safety Nets Programme) are opportunities to formalise the role that social protection/safety net efforts play in advancing nutrition goals in urban populations. Bolstering how nutritional status outcomes (as well as proximate determinants such as household food security and dietary practices) are monitored under the auspices of those initiatives can inform efforts to address root causes (e.g., poverty) of undernutrition in urban areas. Ensuring that the aforementioned evidence is gender disaggregated will also be important in shedding light on gender-related inequities and shortfalls in nutrition indicators.

In addition, evidence is needed relating to alternative approaches to address livelihood security. For example, promising findings from a cross-sectional study relating to the nutritional impact for urban women of micro-credit participation[135] could be tested with a study design that can better assess causation i.e., a prospective cohort study, or a randomised controlled trial (the latter may be difficult since participants assigned to receive no services could approach another lending organisation for a loan). A factorial design is recommended to see if the success of integrating microcredit and community health interventions in modifying health behaviours in the rural context[179] could be replicated in the urban context. Data should be collected on child nutrition and education as

well as data relating to the female clients, to examine whether women invest the additional resources obtained via microcredit participation in their children.

There is a large evidence gap in relation to the household food economy and the related vulnerability of poor urban residents. Specifically -

- There is an evidence gap in relation to the role of urban agriculture in the household economy. Improved understanding is needed of the relative importance of pathways by which home production of food benefits urban household nutrition—is improved dietary diversity more important than increased cash for purchase of other foods, or increased time for child care?
- The role of markets in urban areas is poorly understood. It seems that while a surprisingly high proportion of households use agriculture as a source of food, only a small proportion use this as a source of income, and it is not clear if this is due to the small scale of production which does not leave spare for sale, or that urban markets do not work well as a means of transferring the produce to the commercial consumer. Increased understanding of the role of informal markets, and the sources of food sold within them is especially needed.
- The effect of the ascendancy of supermarkets in urban areas on the livelihoods of the urban poor is poorly understood. Those who work as food vendors or transporters may be affected.
- Street foods account for a high proportion of urban residents' diets and this proportion increases when food prices increase. For those involved in the preparation and sale of street foods, they are a major source of income. Given the growing importance of street foods to urban food systems, it is important to understand where the food sold by street vendors comes from, how this affects the livelihoods of others (for example those gaining income from agriculture) and how these associations vary with the size of the urban centre.

The physical environment

- There is only weak evidence for the causal links between improved WASH and nutrition outcomes despite the existence of plausible causal mechanisms. Rigorous design of WASH programme evaluations which incorporate nutrition outcome indicators would enable these links to be explored.
- Evidence is also needed relating to the impact of integrated WASH, health and nutrition interventions on undernutrition.

References

1. United Nations Department of Economic and Social Affairs (UN ESA). (2014) *World Urbanization Prospects: The 2014 Revision.* New York: Population Division, UN ESA. ST/ESA/SER.A/366.
2. Potts D. (2012) Challenging the myths of urban dynamics in sub-Saharan Africa: The evidence from Nigeria. *World Development.*40(7):1382-1393.
3. Mohiddin L, Phelps L, Walters T. (2012) *Urban malnutrition: a review of food security and nutrition among the urban poor.* London: Nutrition Works. International Public Nutrition Resource Group.
4. Popay J, Roberts H, Sowden A, et al. (2006) *Guidance on the conduct of narrative synthesis in systematic reviews.* Lancaster: Institute for Health Research, Lancaster University. A product from the ESRC methods programme.
5. Department for International Development (DfID). (2014) *Assessing the strength of evidence.* London: DfID. How to Note.
6. Ramalingam B, Knox Clarke P. (2012) *Meeting the urban challenge: Adapting humanitarian efforts to an urban world.* London: Active Learning Network for Accountability and Performance (ALNAP) and Overseas Development Institute (ODI).
7. United Nations Department of Economic and Social Affairs (UN ESA). (2005) Notes accompanying Table 6: Urban and total population by sex: 1996-2005. *Demographic Yearbook*. New York: UN ESA.
8. Muggah R. (2012) *Researching the urban dilemma: Urbanization, poverty and violence.* Ottawa: International Development Research Centre.
9. United Nations Human Settlements Programme (UN-Habitat). (2013) *State of the World's Cities 2012/2013 - Prosperity of Cities.* New York: UN-Habitat.
10. Sverdlik A. (2011) Ill-health and poverty: a literature review on health in informal settlements. *Environment and Urbanization.*23(1):123-155.

11. Paciorek CJ, Stevens GA, Finucane MM, Ezzati M. (2013) Children's height and weight in rural and urban populations in low-income and middle-income countries: a systematic analysis of population-representative data. *The Lancet Global Health.*1(5):e300-e309.
12. Fox K, Heaton TB. (2012) Child nutritional status by rural/urban residence: A cross-national analysis. *The Journal of Rural Health.*28(4):380-391.
13. Bhutta ZA, Das JK, Rizvi A, et al. (2013) Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *The Lancet.*382(9890):452-477.
14. Hall A, Blankson B, Shoham J. (2011) *The impact and effectiveness of emergency nutrition and nutrition-related interventions: a review of published evidence 2004-2010.* Oxford: Emergency Nutrition Network.
15. Duffield A, Reid G, Walker D, Shoham J. (2004) *Review of the published literature for the impact and costeffectiveness of six nutrition related emergency interventions.* Oxford: Emergency Nutrition Network.
16. Webb P, Boyd E, de Pee S, Lenters L, Bloem M, Schultink W. (2014) Nutrition in emergencies: Do we know what works? *Food Policy.*49:33-40.
17. FANTA-2. (2008) *Emergencies in urban settings: A technical review of food-based program options.* Washington, DC: Food and Nutrition Technical Assistance II Project (FANTA-2), Academy for Educational Development. USAID Office of Food for Peace Occasional Paper 6.
18. Ruel MT, Garrett JL, Hawkes C, Cohen MJ. (2010) The food, fuel, and financial crises affect the urban and rural poor disproportionately: a review of the evidence. *the Journal of Nutrition.*140(1):170S-176S.
19. Ruel MT. (2000) Urbanization in Latin America: constraints and opportunities for child feeding and care. *Food & Nutrition Bulletin.*21(1):12-24.
20. Frayne B, Pendleton W, Crush J, et al. (2010) *The State of Urban Food Insecurity in Southern Africa.* Kingston and Cape Town: Queen's University and AFSUN. Urban Food Security Series No. 2.
21. Cohen MJ, Garrett JL. (2010) The food price crisis and urban food (in) security. *Environment and Urbanization.*22(2):467-482.
22. Tacoli C. (2015) *Reframing the debate on urbanisation, rural transformation and food security.* London: The International Institute for Environment and Development (IIED). Food and Agriculture Briefing.
23. Satterthwaite D. (2006) *Outside the Large Cities: the demographic importance of small urban centres and large villages in Africa, Asia and Latin America.* London: International Institute for Environment and Development.
24. Kimani-Murage E, Schofield L, Wekesah F, et al. (2014) Vulnerability to food insecurity in urban slums: experiences from Nairobi, Kenya. *Journal of Urban Health.*91(6):1098-1113.
25. Draper A. (1996) *Street foods in developing countries: The potential for micronutrient fortification.* London, UK: London School of Hygiene and Tropical Medicine. Report for USAID.
26. Tacoli C, Bukhari B, Fisher S. (2013) *Urban poverty, food security and climate change.* London: International Institute for Environment and Development. Human Settlements Working Paper No.37.
27. Ruel MT, Garrett JL. (2004) Features of urban food and nutrition security and considerations for successful urban programming. *Journal of Agricultural and Development Economics.*1(2):242-271.
28. Baker J. (2008) *Urban poverty: A global overview.* Washington DC: World Bank.
29. Martin-Prével Y, Traissac P, Massamba J-P, Adoua-Oyila G, Coudert K, Trèche S. (2000) Deterioration in the nutritional status of young children and their mothers in Brazzaville, Congo, following the 1994 devaluation of the CFA franc. *Bulletin of the World Health Organization.*78(1):108-118.
30. Marin CM, Segura JL, Bern C, et al. (1996) Seasonal change in nutritional status among young children in an urban shanty town in Peru. *Trans R Soc Trop Med Hyg.*90(4):442-445.
31. Choudhary N, Parthasarathy D. (2009) Is migration status a determinant of urban nutrition insecurity? Empirical evidence from Mumbai city, India. *Journal of biosocial science.*41(05):583-605.
32. Gillespie S, Haddad L, Mannar V, Menon P, Nisbett N. (2013) The politics of reducing malnutrition: building commitment and accelerating progress. *The Lancet.*382(9891):552-569.
33. Jones H, Clench B, Harris D. (2014) *The governance of urban service delivery in developing countries: Literature review.* London: Overseas Development Institute.
34. Haddad L, Nisbett M, Barnett I, Valli E. (2014) *Maharashtra's child stunting declines: What is driving them? Findings of a multidisciplinary analysis.* Brighton, UK: Institute of Development Studies.
35. Rokx C. (2006) *Governance and malnutrition - Exploring the contribution of "good governance" to malnutrition reduction in developing countries.* University of Maastricht. Ph.D. thesis.
36. Kjellstrom T, Mercado S, Sattherthwaite D, Mccgranahan G, Friel S, Havemann K. (2007) *Our cities, our health, our future: Acting on social determinants for health equity in urban settings.* Kobe, Japan World Health Organization, Kobe Centre. Report to the WHO Commission on Social Determinants of Health from the Knowledge Network on Urban Settings.
37. Satterthwaite D, Mitlin D, Patel S. (2011) *Engaging with the urban poor and their organizations for poverty reduction and urban governance.* New York: United Nations Development Programme (UNDP).
38. World Health Organization (WHO). (2008) *Healthy Urbanization Learning Circle (HULC).* Centre for Health Development, WHO.

39. Nisbett N, Gillespie S, Haddad L, Harris J. (2014) Why worry about the politics of childhood undernutrition? *World Development.*64:420-433.
40. Acosta AM, Fanzo J. (2012) *Fighting maternal and child malnutrition: analysing the political and institutional determinants of delivering a national multisectoral response in six countries: A synthesis paper.* Brighton, UK: Institute of Development Studies.
41. Haddad L, Acosta AM, Fanzo J. (2012) *Accelerating reductions in undernutrition, what can nutrition governance tell us?* University of Sussex, Brighton: Institute of Development Studies. In Focus, Policy briefing, Issue 22.
42. Pridmore P. (2011) *Identifying and tackling the social determinants of child malnutrition in urban informal settlements and slums: a cross national review of the evidence for action.* London: NICK Project Research Partnership, Institute of Education, University of London. Pathways to Better Nutrition Series 1.
43. Food and Agriculture Organization (FAO). (2011) *Food, agriculture and cities - The challenges of food and nutrition security, agriculture and ecosystem management in an urbanizing world.* Rome: FAO. FAO Food for the Cities multi-disciplinary initiative position paper.
44. Garrett J, Kadiyala S, Kohli N. (2014) *Working multisectorally to improve nutrition: Global lessons and current status in India.* New Delhi: International Food Policy Research Institute. Partnerships and Opportunities to Strengthen and Harmonize Actions for Nutrition in India (POSHAN) Policy Note #1.
45. Government of Kenya. (2012) *Kenya Urban Nutrition Strategy 2012 -2017, draft.* Nairobi: Ministry of Public Health and Sanitation.
46. Palo L. (2013) *Urban Nutrition Strategy, Delhi.* Presentation on behalf of Save the Children and the Coalition for Sustainable Food Security in India. Consultation on drafting the Delhi State Urban Policy, September 26,2013.
47. Ministry of Women and Child Development (MWCD). (2013) *Multi-sectoral programme to address maternal and child malnutrition in selected 200 high-burden districts - An overview.* New Delhi: MWCD.
48. Food and Agriculture Organization (FAO). (2015) *Food for the Cities Programme - Building sustainable and resilient city region food systems.* Rome: FAO.
49. Rocha C, Lessa I. (2009) Urban governance for food security: The alternative food system in Belo Horizonte, Brazil. *International Planning Studies.*14(4):389-400.
50. Justice J, Gopinath R, Raichowdhury S, Verma R, Kantner A. (2012) *USAID/India Health of the Urban Poor Project Mid-Term Evaluation Report.* Delhi: USAID.
51. de Zeeuw H, Drechsel P. (2015) *Cities and agriculture: Developing resilient urban food systems.* London: Routledge
52. Pelletier DL, Frongillo EA, Gervais S, et al. (2012) Nutrition agenda setting, policy formulation and implementation: lessons from the Mainstreaming Nutrition Initiative. *Health Policy and Planning.*27(1):19-31.
53. Ved R, Menon P. (2012) *Analyzing intersectoral convergence to improve child undernutrition in India.* Washington DC: International Food and Policy Research Institute (IFPRI). IFPRI Discussion Paper 01208.
54. Buchan J, Couper ID, Tangcharoensathien V, et al. (2013) Early implementation of WHO recommendations for the retention of health workers in remote and rural areas. *Bulletin of the World Health Organization.*91(11):834-840.
55. Pridmore P, McCowan T, Carr-Hill R, et al. (2014) *Nutritional improvement for children in urban Chile and Kenya: Full research report.* London: Economic and Social Research Council.
56. Pridmore P, Carr-Hill R, Amuyunzu-Nyamongo M, Lang'o D, McCowan T, Charnes G. (2015) Tackling the Urban Health Divide Though Enabling Intersectoral Action on Malnutrition in Chile and Kenya. *Journal of Urban Health.*92(2):313-321.
57. Tuffrey V. (2015) *Nutrition surveillance systems: their use and value.* London: Save the Children and Transform Nutrition. Unpublished report for SC UK.
58. Kameli Y, Ndiaye B, Castan F, Fortin S, Tapsoba S, Martin-Prevel Y. (2012) Food security and Nutrition Surveillance in Urban Areas for Improved Decision Making, A case-study in Ouagadougou and Bobo-Dioulasso, Burkina Faso. International Scientific Symposium on Food and Nutrition Security Information : From valid measurement to effective decision making; 2012; Rome.
59. USAID Environmental Health Project. (2004) *Improving the Health of the Urban Poor: Learning from USAID Experience.* Washington DC: United States Agency for International Development (USAID). Strategic Report 12.
60. Creti P. (2010) *Review of existing approaches, methods and tools used by humanitarian agencies to measure livelihoods, food insecurity and vulnerability in urban contexts.* WFP / OXFAM.
61. Brixton Health. Sampling in Urban Settings.
62. MacAuslan I, Farhat M. (2013) *Review of urban food security targeting methodology and emergency triggers Final Report.* Oxford, UK: Oxford Policy Management.
63. Oxfam GB CW, CARE International. (2009) *The Nairobi Informal Settlements: An emerging food security emergency within extreme chronic poverty – a compilation and synthesis of key food security, livelihood, nutrition and public health data.* Oxford, UK: Oxfam GB, Concern Worldwide, and CARE International in Kenya.
64. Herrador Z, Sordo L, Gadisa E, et al. (2014) Cross-sectional study of malnutrition and associated factors among school aged children in rural and urban settings of Fogera and Libo Kemkem districts, Ethiopia. *PLoS ONE.*9(9):e105880.
65. Amugsi DA, Mittelmark MB, Lartey A. (2013) An analysis of socio-demographic patterns in child malnutrition trends using Ghana demographic and health survey data in the period 1993–2008. *BMC Public Health.*13(1):960.

66. Woldt M, Moy GG, Egan R. (2015) *Improving household food hygiene in a development context.* Washington DC: Food and Nutrition Technical Assistance III Project. Technical Note.
67. Usfar AA, Iswarawanti DN, Davelyna D, Dillon D. (2010) Food and personal hygiene perceptions and practices among caregivers whose children have diarrhea: a qualitative study of urban mothers in Tangerang, Indonesia. *Journal of nutrition education and behavior.*42(1):33-40.
68. Iroegbu CU, Ene-Obong HN, Uwaegbute AC, Amazigo UV. (2000) Bacteriological quality of weaning food and drinking water given to children of market women in Nigeria: implications for control of diarrhoea. *Journal of Health, Population and Nutrition.*18(3):157-162.
69. Naik R, Smith R. (2015) *Impacts of family planning on nutrition.* Washington DC: Futures Group, Health Policy Project.
70. Ijumba P, Doherty T, Jackson D, Tomlinson M, Sanders D, Persson LÅ. (2014) Social circumstances that drive early introduction of formula milk: an exploratory qualitative study in a peri-urban South African community. *Maternal & child nutrition.*10(1):102-111.
71. Ahmed AU. (2004) *Impact of feeding children in school: Evidence from Bangladesh.* Washington, DC: International Food Policy Research Institute.
72. Shrimpton R, Rokx C. (2012) *The Double Burden of Malnutrition: A Review of Global Evidence. .* Washington, DC: World Bank.
73. Mohiddin L, Phelps L, Walters T. (2012) Urban malnutrition: a review of food security and nutrition among the urban poor. *London: Nutrition Works. International Public Nutrition Resource Group.*19-35.
74. McIntyre L, Rondeau K, Kirkpatrick S, Hatfield J, Islam KS, Huda SN. (2011) Food provisioning experiences of ultra poor female heads of household living in Bangladesh. *Social Science & Medicine.*72(6):969-976.
75. Levay AV, Mumtaz Z, Rashid SF, Willows N. (2013) Influence of gender roles and rising food prices on poor, pregnant women's eating and food provisioning practices in Dhaka, Bangladesh. *Reproductive health.*10(1):53.
76. Saleem AF, Mahmud S, Baig-Ansari N, Zaidi AK. (2014) Impact of maternal education about complementary feeding on their infants' nutritional outcomes in low-and middle-income households: A community-based randomized interventional study in Karachi, Pakistan. *Journal of Health, Population, and Nutrition.*32(4):623.
77. Akter SM, Roy SK, Thakur SK, et al. (2012) Effects of third trimester counseling on pregnancy weight gain, birthweight, and breastfeeding among urban poor women in Bangladesh. *Food & Nutrition Bulletin.*33(3):194-201.
78. Bolam A, Manandhar DS, Shrestha P, Ellis M, de L Costello AM. (1998) The effects of postnatal health education for mothers on infant care and family planning practices in Nepal: a randomised controlled trial. *British Medical Journal.*316(7134):805-811.
79. Deshmukh PR, Garg BS, Bharambe MS. (2008) Effectiveness of weekly supplementation of iron to control anaemia among adolescent girls of Nashik, Maharashtra, India. *Journal of Health, Population and Nutrition.*26(1):74-78.
80. Ainsworth M, Ambel A. (2010) *What can we learn from nutrition impact evaluations?: Lessons from a review of interventions to reduce child malnutrition in developing countries.* Washington DC: Independent Evaluation Group, International Bank for Reconstruction and Development.
81. Jahan K, Roy SK, Mihrshahi S, et al. (2014) Short-term nutrition education reduces low birthweight and improves pregnancy outcomes among urban poor women in Bangladesh. *Food & Nutrition Bulletin.*35(4):414-421.
82. Pahwa S, Kumar GT, Toteja GS. (2010) Performance of a Community-based Health and Nutrition-education Intervention in the Management of Diarrhoea in a Slum of Delhi, India. *Journal of Health, Population and Nutrition.*28(6):553-559.
83. Gartner A, Maire B, Kameli Y, Traissac P, Delpeuch F. (2006) Process evaluation of the Senegal-Community Nutrition Project: an adequacy assessment of a large scale urban project. *Tropical Medicine & International Health.*11(6):955-966.
84. Berger S, de Pee S, Bloem M, Halati S, Semba R. (2008) Malnutrition and morbidity among children not reached by the national vitamin A capsule programme in urban slum areas of Indonesia. *Public Health.*122(4):371-378.
85. Semba RD, Moench-Pfanner R, Sun K, et al. (2011) Consumption of micronutrient-fortified milk and noodles is associated with lower risk of stunting in preschool-aged children in Indonesia. *Food & Nutrition Bulletin.*32(4):347-353.
86. De-Regil LM, Suchdev PS, Vist GE, Walleser S, Peña-Rosas JP. (2013) Home fortification of foods with multiple micronutrient powders for health and nutrition in children under two years of age (Review). *Evidence-Based Child Health: A Cochrane Review Journal.*8(1):112-201.
87. Lanerolle P, Atukorala S, de Silva G, Samarasinghe S, Dharmawardena L. (2000) Evaluation of nutrition education for improving iron status in combination with daily iron supplementation. *Food & Nutrition Bulletin.*21(3):259-269.
88. Saleem AF, Mahmud S, Baig-Ansari N, Zaidi AKM. (2014) Impact of Maternal Education about Complementary Feeding on Their Infants' Nutritional Outcomes in Low- and Middle-income Households: A Community-based Randomized Interventional Study in Karachi, Pakistan. *Journal of Health, Population and Nutrition.*32(4):623-633.
89. Puett C, Salpéteur C, Lacroix E, Houngbé F, Aït-Aïssa M, Israël A-D. (2013) Protecting child health and nutrition status with ready-to-use food in addition to food assistance in urban Chad: a cost-effectiveness analysis. *Cost Effectiveness and Resource Allocation.*11(1):27.

90. Huybregts L, Houngbe F, Salpeteur C, et al. (2012) The effect of adding ready-to-use supplementary food to a general food distribution on child nutritional status and morbidity: a cluster-randomized controlled trial. *PLoS medicine.*9(9):e1001313.
91. Branca F, Piwoz E, Schultink W, Sullivan LM. (2015) Nutrition and health in women, children, and adolescent girls. *BMJ.*351(Suppl1):27-31.
92. Kotecha P, Patel SV, Baxi R, et al. (2013) Dietary pattern of schoolgoing adolescents in urban Baroda, India. *Journal of Health, Population, and Nutrition.*31(4):490.
93. Nago ES, Lachat CK, Huybregts L, Roberfroid D, Dossa RA, Kolsteren PW. (2010) Food, energy and macronutrient contribution of out-of-home foods in school-going adolescents in Cotonou, Benin. *British Journal of Nutrition.*103(02):281-288.
94. Ginsburg C, Griffiths PL, Richter LM, Norris SA. (2013) Residential mobility, socioeconomic context and body mass index in a cohort of urban South African adolescents. *Health & Place.*19:99-107.
95. Feeley A, Musenge E, Pettifor JM, Norris SA. (2012) Changes in dietary habits and eating practices in adolescents living in urban South Africa: The birth to twenty cohort. *Nutrition.*28(7):e1-e6.
96. Austrian K, Muthengi E, Riley T, et al. (2015) *Adolescent girls initiative Kenya - Baseline report.* Nairobi: Population Council.
97. Khanum S, Ashworth A, Huttly S. (1998) Growth, morbidity, and mortality of children in Dhaka after treatment for severe malnutrition: a prospective study. *The American journal of clinical nutrition.*67(5):940-945.
98. International Food and Policy Research Institute (IFPRI). (2015) *Global Nutrition Report 2015: Actions and accountability to advance nutrition and sustainable development.* Washington DC: IFPRI.
99. MEASURE Evaluation. (2012) *Improving access to family planning can promote food security in a changing climate.* Chapel Hill, NC: MEASURE Evaluation, Carolina Population Center, University of North Carolina. Study Summary.
100. Rahman M. (2015) Is unwanted birth associated with child malnutrition in Bangladesh? *International Perspectives on Sexual and Reproductive Health.*41(2):80-88.
101. Smith E, Smith R. (2015) *Impacts of family planning on food security.* Washington, DC: Futures Group, Health Policy Project.
102. Borwankar R, Amieva S. (2015) *Desk review of programs integrating family planning with food security and nutrition.* Washington DC: Food and Nutrition Technical Assistance III Project.
103. World Health Organization (WHO). (1999) *Improving Child Health - IMCI: The Integrated Approach.* Geneva: WHO.
104. Burnham G. (1997) *Evaluation of integrated management of childhood illness (IMCI) performance in urban health centers. .* Lusaka. Prepared for United States Agency for International Development (USAID). BASICS Technical Directive: 019 ZA 01 024.
105. Jibo A, Iliyasu Z, Abubakar I, Umar L, Hassan A. (2014) Community-integrated management of childhood Illnesses (C-IMCI) and key household practices in Kano, Northwest Nigeria. *Sub-Saharan African Journal of Medicine.*1(2):70.
106. Huicho L, Dávila M, Campos M, Drasbek C, Bryce J, Victora CG. (2005) Scaling up integrated management of childhood illness to the national level: achievements and challenges in Peru. *Health policy and planning.*20(1):14-24.
107. Khatun M, Stenlund H, Hörnell A. (2004) BRAC initiative towards promoting gender and social equity in health: a longitudinal study of child growth in Matlab, Bangladesh. *Public Health Nutrition.*7(08):1071-1079.
108. Keino S, Plasqui G, Ettyang G, van den Borne B. (2014) Determinants of stunting and overweight among young children and adolescents in sub-Saharan Africa. *Food & Nutrition Bulletin.*35(2):167-178.
109. Masset E, Haddad L, Cornelius A, Isaza-Castro J. (2012) Effectiveness of agricultural interventions that aim to improve nutritional status of children: systematic review. *BMJ.*344:d8222.
110. Berti PR, Krasevec J, FitzGerald S. (2004) A review of the effectiveness of agriculture interventions in improving nutrition outcomes. *Public health nutrition.*7(5):599-609.
111. Korth M, Stewart R, Langer L, et al. (2014) What are the impacts of urban agriculture programs on food security in low and middle-income countries: a systematic review. *Environmental Evidence.*3(1):21.
112. Zezza A, Tasciotti L. (2010) Urban agriculture, poverty, and food security: Empirical evidence from a sample of developing countries. *Food Policy.*35(4):265-273.
113. World Bank. (2013) *Urban agriculture: Findings from Four City Case Studies.* Washington, DC: Urban Development & Resilience Unit, World Bank. Urban development series knowledge papers, No.18.
114. Mboganie-Mwangi A, Foeken D. (1996) Urban agriculture, food security and nutrition in low income areas in Nairobi. *African Urban Quarterly.*11(2/3):170-179.
115. Maxwell D, Levin C, Csete J. (1998) Does urban agriculture help prevent malnutrition? Evidence from Kampala. *Food policy.*23(5):411-424.
116. Yeudall F, Sebastian R, Cole DC, Ibrahim S, Lubowa A, Kikafunda J. (2007) Food and nutritional security of children of urban farmers in Kampala, Uganda. *Food & Nutrition Bulletin.*28(Supplement 2):237S-246S.
117. Sebastian R, Lubowa A, Yeudall F, Cole DC, Ibrahim S. (2008) The association between household food security and urban farming in Kampala. In: Cole D, Lee-Smith D, Nasinyama G, eds. *Healthy city harvests: Generating evidence to guide policy on urban agriculture*. Lima, Peru: International Potato Center (CIP) and Makerere University Press:69-88.

118. Jensen P. (2013) *The urban gardens program for HIV-affected women and children: A review and look to the future.* Washington, DC: Food and Nutrition Technical Assistance III Project (FANTA).
119. Armar-Klemesu M, Maxwell D. (2000) Accra: Urban agriculture as an asset strategy, supplementing income and diets. In: Bakker N, Dubbeling M, Gundel S, Sabel-Koschella U, de Zeeuw H, eds. *Growing cities, growing food: Urban agriculture on the policy agenda. A reader on urban agriculture*. Germany: GTZ/DSE:183-208.
120. Lee-Smith D, Prain G. (2006) Urban agriculture and health. In: Hawkes C, Ruel M, eds. *Understanding the links between agriculture and health.* Vol 2020 Focus No. 13. Washington DC: International Food Policy Research Institute (IFPRI).
121. Karanja N, Yeudall F, Mbugua S, et al. (2010) Strengthening capacity for sustainable livelihoods and food security through urban agriculture among HIV and AIDS affected households in Nakuru, Kenya. *International Journal of Agricultural Sustainability.*8(1):40-53.
122. Wills J, Chinemana F, Rudolph M. (2010) Growing or connecting? An urban food garden in Johannesburg. *Health Promotion International.*25(1):33-41.
123. Fotso JC. (2006) Child health inequities in developing countries: differences across urban and rural areas. *International Journal for Equity in Health.*5(9):1-10.
124. Alemu A, Tsegaye W, Golassa L, Abebe G. (2011) Urban malaria and associated risk factors in Jimma town, south-west Ethiopia. *Malaria Journal.*10(173):24.
125. Omumbo J, Guerra C, Hay S, Snow R. (2005) The influence of urbanisation on measures of Plasmodium falciparum infection prevalence in East Africa. *Acta tropica.*93(1):11-21.
126. Kamath L, Vijayabaskar M. (2014) Middle-Class and Slum-Based Collective Action in Bangalore Contestations and Convergences in a Time of Market Reforms. *Journal of South Asian Development.*9(2):147-171.
127. Mathur OP. (2013) *Urban Poverty in Asia.* New Delhi: National Institute of Urban Affairs. A Study prepared for the Asian Development Bank, Manila.
128. MacAuslan I, Phelps L. Oxfam GB Emergency Food Security and Livelihoods Urban Programme Evaluation: Final Report. (2012). Oxford, UK: Oxford Policy Management.
129. Smith L, Ramakrishnan U, Ndiaye A, Haddad L, Martorell R. (2003) *The importance of women's status for child nutrition in developing countries.* Washington DC: IFPRI. Research Report 131.
130. Wamani H, Åstrøm AN, Peterson S, Tumwine JK, Tylleskär T. (2007) Boys are more stunted than girls in sub-Saharan Africa: a meta-analysis of 16 demographic and health surveys. *BMC pediatrics.*7(1):17.
131. Federal Democratic Republic of Ethiopia MoA. *Productive Safety Net Programme 4, Design Document.*
132. Aston T, Jones N. (2012) *Social protection and child nutrition, Kenya - Greater coordination and better targeting needed.* London: Save the Children. Briefing prepared by the Overseas Development Institute (ODI).
133. Attanasio O, Gómez LC, Heredia P, Vera-Hernandez M. (2005) *The short-term impact of a conditional cash subsidy on child health and nutrition in Colombia.* London: Institute of Fiscal Studies. Report summary: Familias 03.
134. Alderman H. (2013) *Nutrition-sensitive social protection programs: How can they help accelerate progress in improving maternal and child nutrition? Presentation on Dec 4, 2013.* Washington DC: World Bank.
135. Hamad R, Fernald LC. (2012) Microcredit participation and nutrition outcomes among women in Peru. *Journal of epidemiology and community health.*66(6):e1-e1.
136. Tacoli C. (2012) *Urbanization, gender and urban poverty: paid work and unpaid carework in the city.* London: International Institute for Environment and Development, and United Nations Population Fund. Urbanization and emerging population issues Working Paper 7.
137. Ruel MT, de la Brière B, Hallman K, Quisumbing A, Coj N. (2002) *Does Subsidized Childcare Help Poor Working Women in Urban Areas?: Evaluation of a Government-sponsored Program in Guatemala City.* Washington DC: International Food Policy Research Institute.
138. Young MEe. (2007) *Early child development from measurement to action, a priority for growth and equity.* Washington D.C.: World Bank.
139. United Nations Human Settlements Programme (UN Habitat). (2012) *Gender Issue Guide: Urban Planning and Design.* Nairobi: UN Habitat.
140. UNICEF and World Health Organization (WHO). (2015) *Progress on Sanitation and Drinking Water - 2015 Update and MDG Assessment.* Geneva: UNICEF and WHO.
141. Montgomery MR. (2009) *Urban poverty and health in developing countries.* Population Reference Bureau Washington, DC.
142. Lusambili A. (2011) *'It is our Dirty Little Secret': An Ethnographic Study of the Flying Toilets in Kibera Slums, Nairobi.* Brighton: STEPS Centre (Social, Technological and Environmental Pathways to Sustainability), University of Sussex.
143. Alirol E, Getaz L, Stoll B, Chappuis F, Loutan L. (2011) Urbanisation and infectious diseases in a globalised world. *The Lancet infectious diseases.*11(2):131-141.
144. Cairncross S, Hunt C, Boisson S, et al. (2010) Water, sanitation and hygiene for the prevention of diarrhoea. *International journal of Epidemiology.*39(suppl 1):i193-i205.
145. Dangour AD, Watson L, Cumming O, et al. (2013) Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children. *Cochrane Database of Systematic Reviews.*8:CD009382.

146. Esrey SA. (1996) Water, waste, and well-being: a multicountry study. *American Journal of Epidemiology.*143(6):608-623.
147. Smith LC, Haddad L. (2015) Reducing child undernutrition: Past drivers and priorities for the post-MDG era. *World Development.*68:180-204.
148. Spears D. (2013) *How much international variation in child height can sanitation explain?* Washington DC: World Bank Sustainable Development Network, Water and Sanitation Program. World Bank policy research working paper 6351.
149. Bhutta ZA, Ahmed T, Black RE, et al. (2008) What works? Interventions for maternal and child undernutrition and survival. *The Lancet.*371(9610):417-440.
150. Humphrey JH. (2009) Child undernutrition, tropical enteropathy, toilets, and handwashing. *The Lancet.*374(9694):1032-1035.
151. Mason N. (2009) *Access for the poor and excluded - Tariffs and subsidies for urban water supply.* WaterAid. Discussion Paper.
152. WaterAid and SHARE. (2013) *Under-nutrition and water, sanitation and hygiene.* London, UK: WaterAid and the Sanitation and Hygiene Applied Research for Equity (SHARE) consortium. Briefing Paper.
153. Buttenheim AM. (2008) The sanitation environment in urban slums: implications for child health. *Population and Environment.*30(1-2):26-47.
154. Langford R, Lunn P, Panter-Brick C. (2011) Hand-washing, subclinical infections, and growth: A longitudinal evaluation of an intervention in Nepali slums. *American Journal of Human Biology.*23(5):621-629.
155. Norman G, Pedley S, Takkouche B. (2010) Effects of sewerage on diarrhoea and enteric infections: a systematic review and meta-analysis. *The Lancet Infectious Diseases.*10(8):536-544.
156. Cairns-Smith S, Hill H, Nazarenko E. (2014) *Urban sanitation, why a portfolio of solutions is needed.* Boston Consulting Group.
157. Brown J, Cumming O, Bartram J, et al. (2015) A controlled, before-and-after trial of an urban sanitation intervention to reduce enteric infections in children: research protocol for the Maputo Sanitation (MapSan) study, Mozambique. *BMJ open.*5(6):e008215.
158. Mahmud I, Mbuya N. (2016) *Water, Sanitation, Hygiene, and Nutrition in Bangladesh: Can Building Toilets Affect Children's Growth?* Washington DC: World Bank.
159. WASHplus Project. (2013) *Integrating water, sanitation, and hygiene into nutrition programming* Washington DC: United States Agency for International Development.
160. UNICEF. (2015) *The impact of poor sanitation on nutrition.* New York: UNICEF. Policy Brief.
161. Mahadevia D. (2011) *Tenure security and urban social protection in India.* Brighton, UK: Institute of Development Studies. Centre for Social Protection Research Report, No. 5.
162. Cattaneo MD, Galiani S, Gertler PJ, Martinez S, Titiunik R. (2009) Housing, health, and happiness. *American Economic Journal: Economic Policy.*1(1):75-105.
163. Badasu DM. (2011) Urban housing and child nutritional and health status in Accra. Sixth African Population Conference, 5 - 9 December 2011; 2011; Ouagadougou, Burkina Faso.
164. Wolff CG, Schroeder DG, Young MW. (2001) Effect of improved housing on illness in children under 5 years old in northern Malawi: cross sectional study. *BMJ.*322(7296):1209-1212.
165. Abelson P. (1996) Evaluation of slum improvements: Case study in Visakhapatnam, India. *Cities.*13(2):97-108.
166. Turley R, Saith R, Bhan N, Rehfuess E, Carter B. (2013) Slum upgrading strategies involving physical environment and infrastructure interventions and their effects on health and socio-economic outcomes. *Cochrane Database of Systematic Reviews.*1:CD010067.
167. Fullerton DG, Bruce N, Gordon SB. (2008) Indoor air pollution from biomass fuel smoke is a major health concern in the developing world. *Transactions of the Royal Society of Tropical Medicine and Hygiene.*102(9):843-851.
168. Voigtländer S, Breckenkamp J, Razum O. (2008) Urbanization in developing countries: Trends, health consequences and challenges. *Journal of Health and Development.*4(1-4):135-163.
169. World Health Organization (WHO). (2007) *Indoor air pollution from solid fuels and risk of low birth weight and stillbirth: report from a symposium held at the Annual Conference of the International Society for Environmental Epidemiology (ISEE), September 2005, Johannesburg.* Geneva: WHO.
170. Mishra V, Retherford RD. (2007) Does biofuel smoke contribute to anaemia and stunting in early childhood? *International Journal of Epidemiology.*36(1):117-129.
171. Practical Action. (2015) *Reducing exposure to indoor air pollution.* Rugby, UK: Practical Action. http://practicalaction.org/smoke_report_3 Accessed 30 October 2015.
172. Chaudhuri J, Erasmus W, Appleford G. (2015) *Urban early warning? Concern Worldwide's research on indicators for urban crises: Implications for policy and practice in Kenya.* Nairobi, Kenya: Concern Worldwide.
173. Nyemah J. (2015) *Tracking the development of urban food security assessment tools: 2010 to 2015.* Rome: World Food Programme (WFP). Joint proposal from WFP and Global Food Security Cluster (gFSC).
174. Collins G. (2008) *Technical guidance sheet - Urban food security & nutrition assessments.* Rome: World Food Programme. Strengthening Emergency Needs Assessment Capacity (SENAC).
175. Levron E. (2010) *Identification of vulnerable people in urban environments.* Palaiseau, France: ACF International.

176. Evidence for Development. (2015) *The individual household method (IHM).* Sevenoaks, UK: Evidence for Development. http://www.efd.org/our-work/methods/the-individual-household-method-ihm/ Accessed 30th October 2015.
177. Goudet SM, Griffiths PL, Bogin BA, Madise NJ. (2015) Nutritional interventions for preventing stunting in children (0 to 5 years) living in urban slums (Protocol). *The Cochrane Library.*
178. Beguy D, Elung'ata P, Mberu B, et al. (2015) Health & Demographic Surveillance System Profile: The Nairobi Urban Health and Demographic Surveillance System (NUHDSS). *International Journal of Epidemiology.*44(2):462-471.
179. Flax VL, Negerie M, Ibrahim AU, Leatherman S, Daza EJ, Bentley ME. (2014) Integrating group counseling, cell phone messaging, and participant-generated songs and dramas into a microcredit program increases Nigerian women's adherence to international breastfeeding recommendations. *The Journal of nutrition.*144(7):1120-1124.