Urban Housing And Child Nutritional and Health Status in Accra

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Abstract

The process of urbanization in Ghana has been characterized by gaps between demand for and supply of most basic needs due mainly to rapid population increase in urban centers and stagnant or worsening economic conditions that put constraints on government's ability to provide social services adequately for the population. Child care activities require housing and other facilities and amenities for provision of food and protection of children from risks of disease. The present study employed quantitative and qualitative research methods to examine the relation between housing and associated facilities and amenities and child nutritional and health outcomes in Accra. Higher prevalence rates of malnutrition and malaria and diarrhoea were found among households that lived in low standard housing facilities and depended on shared/public sources of sanitation facilities and other amenities. Their children had higher rates of stunting and underweight. Children in housing facilities that lacked good quality toilet facilities, specifically the WC were four times as likely to be wasted as children in houses that owned the facilities and amenities. The study recommends monitoring of developments in the housing industry as a component of child health and nutritional policy in Ghana.

Background

The world's urban population has been experiencing rapid increase for many decades and for the first time in history, in 2007, a little over half of the world's total population resided in urban areas. The rate of urbanization has been highest in the developing world though the rate of urbanization is still lower than that in the developing world where 75% of their population lived in urban areas in 2009. It has been estimated that almost all of the world's population growth will occur in urban areas of the less developed countries (Bremner et al. 2009).

Rapid urbanization in the less developed countries accompanied favourable economic conditions up to mid-1970s but not since then when the economies most developing countries have been stagnating or declining. Nevertheless, urban population increase has been substantial, exceeding 4%, as natural increase has contributed to urban population growth. Some estimates by the United Nations (2004) indicate that the urban population of sub-Saharan Africa (SSA) grew by 4.7% between 1980 and 2000. During the same period, the Gross Domestic Product (GDP) of the region declined annually by 0.8% (World Bank 2003). Consequently, governments in the developing world have failed to provide even basic social amenities and infrastructure, including housing facilities, for their urban populations, particularly the new urban residents (Fotso 2007), even as they did not even do so adequately prior to the onset of the economic downturn.

Meanwhile, low wages and poverty among urban residents also account for lack of access to housing and other facilities and amenities. The evidence of the inadequacies in the supply of housing facilities, for example, in the urban centres of the less developed countries is the increasing proportion of areas covered by slums (Hinrichsen 2002).

The process of urbanization in Ghana, as in many other sub-Saharan African countries, has been characterized by inadequate supply of facilities and amenities due the same reasons. Ghana experienced relatively favourable economic conditions prior to the late 1970s. Disparities between urban and rural areas and among the geographical as well as administrative regions, especially in the areas of job opportunities, availability of infrastructure and social service and standard of living, resulted in massive movements into towns (Caldwell 1969). By the late 1970s, worsening economic conditions and subsequent constraints on government budget resulted in crisis in both national and urban economies in the country but natural increase has continued to contribute to population growth in urban centres. Consequently, the economic fortunes of urban centers changed and inadequate supply of facilities and amenities began to be a common feature of the urbanization process of Ghana, even when the economy began to experience some recovery from the mid-1980s.

The population of Accra, for example, increased almost fivefold from 377,446 at the 1960 population census to 1,657,856 at the 2000 housing and population census. The housing sector in Accra has been characterized by wide gaps between demand and supply of housing units and sub-standard dwellings that lack facilities and amenities. The consequence has been charging of exorbitant rent by landlords and landladies. Some residents have sought for accommodation in overcrowded slums and squatter settlements while others have made their homes in uncompleted houses within and at the periurban areas of the city (Yeboah 2007, Badasu 2007, Yankson et al. 2005). Yankson et al.'s (2005) study has indicated that the fringe areas of Accra are being urbanized at a very fast pace and the development is not only unplanned and haphazard in nature but makes it difficult for adequate infrastructure and services to be provided to people in such places. Gaps also still exist between demand and supply of housing in accra. Urban poverty, poor urban governance and related institutuional conditions associated with land title registration also account for lack of access to adequate housing facility and poor living conditions in Accra (Yeboah 2007, Yankson et al. 2005 Songsore 1999) as elsewhere in the developing world (Hinrichsen et al. 2002).

Conceptual Background

Housing is a critical resource that is required for daily living and the performance of domestic tasks such as child care which subsequently determines child nutritional and health status. From birth through the first year of life especially, children are exposed to several health risks and nutritional problems. Immunization against the six-killer childhood diseases has been introduced

in all countries since the 1970s through the Expanded Immunization Programme (EPI) and Vitamin A and other micronutrient supplementation programmes have also been implemented and these have resulted in improvement in children's immunity against many diseases (UNICEF 1995).

Many children even in urban centres, however, still suffer from ill health and malnutrition. These may be resulting from the conditions of the dwellings of their households and the associated quality of resources such as housing facilities and amenities required for child care. The effect of the limited or lack of access to facilities and amenities that is associated with the wellbeing of children, including their nutritional and health status has not been investigated by research activities that focus on children's growth and development to any extent. This is because of the continued over-concentration on material provision, mainly food, and health services such as immunization for good child nutritional and health outcomes.

But findings of recent studies and reviews on available knowledge on growth and development of children indicate that variations in the quality of care received by infants and young children either enhances or negatively impacts on their nutritional and health status and general wellbeing. Child care is determined by many factors and may be grouped into household, community and national. Some international conditions also influence care practices (Garza 1995).

The main child care activities at the household level that require housing facility are provision of food and protection of children from risks of infection or ill health. The domestic space needed for provision of food and other types of child care for children goes with the amenities such as water and energy sources and sanitation facilities therein. In the absence of these facilities and services in the housing unit or dwelling, households rely on public sources. They sometimes pay higher tariffs for services and amenities that are not provided within the housing unit.

Furthermore, households expose themselves and their children to risks of ill health as lack of cooking space, for example, may lead to dependence on street food that may not be prepared under hygienic conditions. The consequences include incidence of diarrhoea and other food-related diseases that may result in poor nutritional status such as wasting among children.

Environmental sanitation and associated risks to diarrhoeal and respiratory infection characterize late infancy as the administration of food and water and the child's contact with the immediate environment pose risks to diseases, particularly infectious types, at this stage of children's life. According to a Population Reference Bureau and Child TRENDS's (2002) conclusions on a

study on child health, two key factors in disease prevention are safe water supply and effective means of sanitary disposal. The study found that the incidence of diarrhoea can be reduced by 22% and deaths due to diarrhea by 65% when safe water and effective means of sanitary disposal are available to households that raise young children.

The factors associated with poor nutritional and health status are inter-related. Poor health may increase the risk of poor nutrition, while malnutrition makes children more vulnerable to diseases. Kwashiorkor, for example, is precipitated by infectious diseases (Gibson 2005: 405).

The main factors responsible for stunting (low linear growth), for example, in young children have been identified as extended periods of inadequate food intake, poor dietary quality, increased morbidity or a combination of any of these conditions. Wasting which reflects a failure to gain sufficient weight relative to height or weight loss and underweight (which also arise from gaining insufficient weight relative to age or losing weight) are all related to the same factors responsible for stunting (WHO 1995, 2006).

Countries in Sub-Saharan Africa, including Ghana, have the lowest proportion of the population with access to safe drinking water and sanitation facilities, though some gains have been made in the supply of such amenities and facilities over the past few decades (PRB 2000). Environmentally-related diseases are still the major causes of death among children in Sub-Saharan Africa. High rates of malnutrition exist among children in the sub-region.

Generally, urban children should be expected to suffer less from the conditions that cause malnutrition or anthropometric failure of any kind in young children, since they may have better material provision than their counterparts in rural or economically deprived areas, a situation described as the urban advantage (Fotso 2007). Their mothers also normally have higher levels of education, a factor which is positively related to the nutritional and health status of children (Lartey 2005, Amar Klemesu 2001). In Ghana, the results of the various GDHS show that the average anthropometric measurements and health status of urban children have been better than the national averages. Anthropometric failure rates among under-fives also decrease with an increase in maternal education (Ghana Statistical Service 1999, 2004). Some studies, like that of Amar Klemesu (2003), which focused on some aspects of child nutrition in Accra, found differentials in the rates of malnutrition among the children studied. Fotso's (2007) study which

examined the trends in child malnutrition in 15 SSA based on their Demographic and health surveys (DHS) indicates that urban rural differentials still exist but they have narrowed in some countries due primarily to increase in urban malnutrition. In others, including Ghana, the gap has widened in a few due to a sharp decline in urban malnutrition. The noted the lost of the urban advantage and the deepening poverty of the urban landscape. Housing and associated facilities and amenities was one of the variables in the composite indicators for the urban advantage.

Yet, there is a dearth of research that investigates the direct or indirect link between children's health and nutritional status on the one hand and housing facility on the other. Policies that seek to improve these conditions of children rarely identify improvement of housing facility as a means to reducing child morbidity and mortality and anthropometric failure.

The present study examined how housing indirectly through its associated facilities and amenities is related to child nutritional and health status Accra. The purpose was to demonstrate that as child care has been identified as an important determinant of child nutritional and health status, the resources that are required for performing child care tasks such as housing facility are worth considering for policy formulation to improve child and nutritional status in the country. Research is required to investigate the linkages between the two variables.

Methods

The present study is a component of a wider one that investigated the patterns of child care and their relationship with the health and nutritional status of children of Ewe migrants in the city of Accra. The wider study examined the variations of child care practices at the household level and within residential categories and socio-economic subgroups of the Ewe population in Accra. The study also included some children from the other major ethnic groups of Ghana (Akan, Ga-Dangme and Mole Dagbon), particularly in the high income residential areas.

The purpose for investigating the association of child health and nutritional status with child care among an ethnic group was necessitated by the theoretical or conceptual conclusions on the link of child care to child nutritional and health status. They indicate that socio-cultural practices, behaviours and beliefs affect how children are cared for at the household level and through them determine child health and nutritional status. Consequently, investigating child health and nutritional status should be done within socio-cultural contexts. The study therefore focused on

the Ewe migrants with the objective of examining the subject within their socio-cultural practices and behaviours regarding child care among the Ewe ethnic group. A number of practical and ethical issues in the field, however, required that children of other ethnic background be included, particularly in high income residential areas where socio-cultural factors such as beliefs were hardly associated with child care and the health and nutritional outcomes.

The children were selected from three types of residential areas: high, middle and low-income. The children studied in the high income residential areas were selected from all the major ethnic groups of Ghana resident in Accra while those selected in the low and middle income residential area were almost all of Ewe background. The purpose for selecting children from all types of residential areas was to examine the spatial variations in the conditions of care for the children and the different socio-economic status of parents and/or care givers of the children that also determine various levels of resource availability for child care. The fieldwork was carried out between September 2003 and December 2004. A number of follow-up visits were done on some areas of the study, including case studies in 2005 and 2006.

Both quantitative and qualitative research methods were employed to study a total of 172 children under five years of age from households and 38 from streets and a hospital ward. The main research instrument was a questionnaire with both open and close-ended questions. Qualitative techniques consisting mainly of in-depth interviews and ethnographic methods (narratives, life stories and observational methods) were also used to gather data for the study. Observation in the study areas was the main qualitative technique used to gather information regarding housing facility, the subject of the present study. Photographs were also taken in this regard to enhance the visual presentation of the findings.

Further information was also collected from secondary sources and from interviews with officials of some Ministries, Departments and Agencies (MDAs), including the following: Ministry of Women and Children's Affairs, Domestic Violence and Victims' Support Unit (DOVVSU) of the Ghana Police service, Department of Social Welfare, the Nutrition Unit of the Ghana Health Service (GHS) and Ghana Education Service (GES). Interviews were also conducted with proprietors/directors of day care facilities. These sources of data and information helped to understand the contexts- political, economic and social- of child health and nutritional status.

The present paper discusses the component of the study that examined the housing facilities in the study areas and the associated health and nutritional status of the children. Dwelling is used interchangeably with housing facility in line with Ghana Statistical Services House

Socio-Demographic Characteristics Of The Children

The age and sex distribution of the children are shown on Table 1. The ages of **s**ixteen of the children were not reported because their parents/care givers could not recall the date of birth of their children. They had also lost the weighing (birth and immunization) card of their children. Otherwise, their date of birth could have been read from them.

The age and sex distribution of the children show that none of the age categories was over-represented in the sample. As can be observed from Table 1, each age group, infants (< 12 months), toddlers (12- 35 months) and preschoolers (36- 59 months) formed about a third of the total number of the children. The selection of equal proportions of children by age was purposely done because the various GDHSs show that malnutrition among Ghanaian children varied by age. It was therefore appropriate to avoid over-representation of any particular age category in the present study.

Table 1 Age-Sex Distribution of the Children

	Male		**Female**		**Total**	
Age (in months	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
< 12 (infants)	38	40.0	34	35.1	72	37.5
12- 35 (toddlers)	31	32.6	26	26.8	57	29.7
36-59 (pre-schoolers)	26	27.4	37	38.1	63	32.8
All Ages	**95**	**100.0**	**97**	**100.0**	**192**	**100.0**

Source: Field Work 2003/2004

The overall sex ratio was 97.9 for the 192 children whose ages were known and reported. The male children formed just a little under half, 49.5% (95 out of 192). The proportion of boys and girls, however, varied among the age categories. While there were more boys among the infants and toddlers, girls formed a larger proportion of the preschoolers.

Socioeconomic Status (SES) of the Parents

Children's health and nutritional status are determined largely by the socio-economic status of their parents. The study therefore examined some socioeconomic characteristics of the parents of the children under study. Education and occupational characteristics were included. It is difficult to solicit information on income from interviewee. That explains the exclusion of this among the socioeconomic variables selected. The high-, middle- and low-income residential areas were selected as proxy for income status. Selection of households in the various residential areas was done randomly but purposive procedures in the selection process ensured that each of them was typical of the residential type.

Educational Status of the Mothers and Fathers of the Children

Most of the parents of the children are educated beyond the primary level. Overall, the level of education attained by the fathers is higher than that of the mothers, as can be seen in Table 2. This should be expected, because in the total national population of Ghana, level of education is higher among males than females. While 17% of the mothers have primary or no education, less than half of that percentage of the fathers (8%) had those levels of educational attainment. The proportion of the mothers with secondary and higher education was also lower; that is 42%, compared with 53% of the fathers.

The educational status of some of the mothers and fathers were not known, as can be observed on Table 2. These are children who were not co-resident with either of the parents or both of them. Consequently, one of the parents or the care givers could not provide information on the educational and other status of the mother or father.

Table 2 Educational Characteristics of the Mothers and Fathers of the Children

Level of Education	Mothers		Fathers	
	Number	Percent	Number	Percent
None	14	6.7	7	3.7
Primary	21	10.0	10	4.8
JSS/Middle	69	32.9	47	22.4
SSS	30	14.3	27	12.9
Vocational/Technical	9	4.3	17	8.1
Polytechnic/Teacher Training	20	9.5	17	8.1
University	30	14.3	50	23.8
Do not know	17	8.1	35	16.7
Total	**210**	**100.0**	**210**	**100.0**

JSS: Junior Secondary School; SSS: Senior Secondary School

Source: Field Work 2003/2004

Occupational Characteristics of the Mothers and Fathers of the Children

The majority of the parents were in professional and technical, sales and service occupations (See Table 3.). More fathers than mothers were in the professional and technical occupations even as they have higher educational status than the mothers (Compare Tables 2 and 3). Further analysis of the data shows that most of the mothers in the sales and services categories are self-employed, while the fathers are employees of big companies. Two percent of the mothers are students who had children while going to school. The educational occupational characteristics of the parents are a reflection of that of the total national population and the associated gender differences in educational qualification.

The children and their parents were of diverse socio-demographic characteristics. The parents' educational and occupational characteristics show that most of them may not lack food and other material provisions for their children. Other factors associated with child health and nutritional

status such as the conditions of their housing facilities may however contribute positively or otherwise to the children's nutritional and health status. This is examined in the next section.

Table 3 Occupational Characteristics of the Mothers and Fathers

	Mothers		Fathers	
Type of Occupation	**Number**	**Percent**	**Number**	**Percent**
Professional & Technical	56	26.7	107	51.0
Administrative & Managerial	1	0.5	3	1.4
Clerical & Related	3	1.4	1	0.5
Sales	66	31.4	17	8.1
Service	28	13.3	33	18.9
Agriculture, Animal, Forestry	1	0.5	2	1.1
Production, Transport, Equipment	1	0.5	2	1.1
Other Labourer	9	4.3	10	5.5
Student	4	1.9	-	-
Do not know	41	19.5	35	16.7
Total	**210**	**100.0**	**210**	**100.0**

Source: Field Work 2003/2004

Housing Facility in the Study Areas

The households resided in different types of dwelling units identified at the Ghana 2000 Population and Housing Census. One-half (51.2%) of the households lived in compound houses while almost a quarter (23.8%) resided in flats/apartments (23.8%). The percentages that lived in separate and semi-detached houses were 9.3% and 5.2% respectively. The proportions that lived in separate and semi-detached houses were far smaller than those in the total national population and in all urban centres in the same housing facilities. In all urban areas, for example, 16.0% and

14.9% respectively were enumerated in separate houses and semi-detached dwelling units. The rest lived in attachments to shops, kiosks (2.9%) or uncompleted houses (7.6%). See Table 4.

The quality of housing facilities, their immediate environment and the amenities normally found in them, distinguish the housing facility or dwelling types from one another. Furthermore dwelling types differed considerably from one residential area to another. The higher the level of income of an area, the better the dwelling type. While 92.2% of all the households in low income and 82.0% in middle income residential areas resided in compound house units, the main dwelling types in high income residential areas were flat/apartment and separate houses. (See Table 4.)

Table 4 Types of Dwellings in the Residential Areas, Percent

Type of Dwelling	Low	Middle	High	Total
Separate House	-	6.0	18.3	9.3
Semi-Detached House	-	2.0	11.3	5.2
Flat/Apartment	7.8	-	52.1	23.8
Compound House	92.2	82.0	-	51.2
Attachment to Shop/Kiosk & Street	-	10.0	-	2.9
Uncompleted House	-	-	18.3	7.6
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: Field Work, 2004

In Ghana, generally, separate and semi-detached houses and flat/apartment dwelling units are found in high and middle income residential areas. Such housing facilities have good or fairly good environmental sanitation in their neighbourhood and are provided with safe drinking water and sanitation facilities. Compound houses, on the other hand, are found in low income residential areas, where some are substandard housing facilities. Environmental sanitation in low income residential areas is poor and amenities are also usually inadequate (or non-available in some cases) due to over-crowding. Lack of access to facilities and amenities is also sometimes due to the failure of land-lords/ladies to provide these facilities within the housing units. High

demand for housing facility also sometimes account for this situation. Some interviewees reported that sometimes spaces under construction for the provision of sanitation facilities are turned into sleeping spaces by land-lords/ladies for people who are desperately in need of housing. Such renters persuade them to turn sanitation facilities under construction into sleeping rooms.

Figure 1 An Uncompleted House in East Legon

Source: Field Work 2004

Some households who resided in compound and uncompleted houses were dissatisfied with the facilities as well as the poor environmental sanitation in their residential areas and were, therefore, looking for better accommodation and intended to move out. Figure 1 shows the residence of a family, an uncompleted house in East Legon. The roofing and windows suggest that a child raised there is susceptible to ill health or morbidity that are associated with poor

ventilation and leaky roof. Such a child is also exposed to mosquito bites and malaria, which remains the major cause of death among children and adults in Ghana.

However, depending on the stage of development, uncompleted houses provide some advantages for their occupants regarding child care and associated child and nutritional and health outcomes. Most uncompleted houses in the study areas have four or more bedrooms. The availability of rooms enables the occupants to have their kin or non-relatives to support them to care for their children and mothers, especially during the early postpartum period. Figure 2 is an example of such an uncompleted house. The couple residing in it has relatives living with them, providing post-natal care and support for child care. Such support was not affordable in some dwellings such as compound houses that offer to each household one bedroom, and some without space for cooking and other domestic activities.

Figure 2 A Six-Bedroom Uncompleted House in East Legon

Source: Field Work 2004

All the households who occupied kiosks were also dissatisfied with their accommodation. Some of them indicated that they could afford better accommodation, had it not been for the two- or

three-year rent advance payment demanded by landlords/ladies. They face many problems including lack of access to sanitation facilities, especially when their kiosks are far from public sources of facilities and amenities. Some of them said that they had constant fear and apprehension about the security of their abode. The situation of a couple, Mawusi and Esi who resided in a kiosk illustrates some of the circumstances of such households.

Mawusi and Esi

After paying rent advances over a number of years and faced with paying another three-year rent advance which they describe as very huge, Mawusi and Esi decided to live in a kiosk. Mawusi is a carpenter and Esi fries yam and fish to sell. They spoke to the security officers of a big organization and, through their assistance, Mawusi put up a kiosk outside the wall of the building of the organization. The kiosk looks more like a carpenter's workshop than a dwelling place so one can hardly guess that it was a housing unit. Mawusi works on one side of the front of the kiosk while Esi does her food vending business on the other. Esi's side of the kiosk also serves as a kitchen for the family. Inside the kiosk, Mawusi has put up a structure that partitions the couple's sleeping area from that of Esi's teenage niece who stays with the family. Through the cooperation of the security officers of the organization, the household (the couple, their two daughters and Esi's niece) use the toilet facilities of the organization. A very narrow space between the kiosk and the wall serves as a bathroom facility for them. They fetch water from a stand pipe located within the walls of the organization which the gardeners use to water the flower garden of the organization. Such an arrangement for access to the amenities of the organization was critical for Mawusi and Esi's household, since they were about two kilometers from the nearest public toilet facility and stand pipe in the city centre. They give some gifts to the security officers and gardeners so that the whole arrangement regarding the use of the facility and amenities of the organization could be kept secret.

The economic cost of living in the kiosk might be far lower than the rent Mawusi and Esi were paying elsewhere before moving in. The psychological cost- their constant fear that their deal with the security officers may be revealed to the organization- was probably very high. That might be the reason why they showed some apprehension when I contacted them for the interview with them. It took a lot of assurance about the confidentiality of the information they would provide before they were willing to grant me audience. As if they were sure that I was going to report them to the organization, they also assured me that they were going to settle in a home soon.

The variations in the quality of dwellings and the associated types and qualities of facilities, amenities and services had two major implications or effects on the health and nutritional status of the children. Firstly, the availability or otherwise of sanitation facilities and other amenities within the housing facilities and their quality depended on their tenure arrangements. Secondly, particular care giving and health behaviours of parents and/or caregivers associated with the different types of dwellings also had some direct and indirect effects on the health and nutritional status of the children. These are examined in the next two sections.

Dwelling Characteristics and Tenure Arrangement

As indicated in earlier, inadequate housing has been a major problem in Accra and other urban centres (Songsore 2003, Benneh et al. 1993, Nabila 1987). House ownership has been low in Ghana for many reasons. Difficulty and cost of acquiring land have been the main problems that account for this (Yeboah 2007, Yankson et al. 2005). Yet, tenure arrangement largely determines households' access to some social facilities and services. Tenants, especially, are not able to enjoy certain social facilities and services, as landlords fail to provide them (Songsore 2004). Some tenants, because of their poor attitude to common property, fail to take good care of some facilities or use services within their dwellings judiciously. Consequently, they create insanitary conditions for their co-tenants. The environmental behaviour of some may also not promote good health for their children. Some occupants of flats/apartments may also show poor attitude to common property around the housing facility just like those in compound houses. Occupants of separate houses who also own them may not have some of these problems. Tenure arrangement is associated with housing facility factors and behaviours that directly or indirectly affect child health and nutritional status.

In the study areas, only 5.4% of the 172 households who responded to the question on tenure arrangement indicated that they owned the houses in which they resided. Approximately half, (48.5%), and a quarter (24.0%) respectively of the households were residing in rented dwellings and public housing units (government houses and flats). The public housing units were at the University of Ghana campus, the Korle Bu Teaching Hospital and Tudu Police Barracks. About a fifth (18.6%) of all the households lived in family houses, out-houses and boys' quarters. All of

these were not paying any rent. Another 3.6% of the households were perching or living in kiosks or on the street.

Most of the rented dwellings, which were compound houses, were considered by the households to be sub-standard. These were found mainly in slums and other areas with poor environmental sanitation, such as Nima, Maamobi, New Town and Nungua.

Dwelling Characteristics and Sanitation Facilities

The dwelling characteristics and their tenure arrangement have a number of implications for the households and the children. So far as the nutritional and health status of the children is concerned, the provision of sanitation facilities was found to be the most critical. All the households who lived in public housing facilities have their own/private sanitation facilities. The same applies to almost all the households who owned their housing units. The households that were living in rented accommodation (mostly compound houses), lacked these facilities to different degrees.

Access to Toilet Facilities

Access to toilet facilities varied among the dwellings considerably. Tenure arrangement determined the type of toilet facility available to any housing facility. Moreover, better residential areas have access to better toilet facility. Only a little over one third, 36.0%, of households who resided in rented private accommodation (most of which were in compound houses) had toilet facilities within their compounds. Almost half of them, 48% (36 out of 75) use public toilet facilities, the Kumasi Ventilation Improved Project (KVIP). The others use “free range”- the bush, beach and other places. Again, while 92.5% (37 out of 40) of households residing in government-(publicly) owned housing units located in high income residential areas had a water closet (WC), only 14.7% (11 out of 75) of those in private rented housing units owned a WC.

The limited access to sanitation facilities in the study areas is a reflection of the situation in the total national population. The results of the 2000 Ghana Population and Housing Census show that approximately one out of every five persons (20.2%) does not have access to any toilet facility and almost a third (31.4%) depend on public toilet facility and a little over a quarter (26.0%) also share the pit or pan latrine. Only 8.5% use a WC. The rest use KVIP (6.9%) or other types (6.9%) in another house (GSS 2002:15). The WC and KVIP are not common in both the total national and study population because of the cost of construction and, in the case of the WC, the need for water for its operation. The large number of households sharing toilet facilities with others or depending on public facilities is also an indication that toilet facilities were not available in most households or dwellings. Generally, public toilets are not well kept. Overcrowded communities in urban areas, such as Accra, also put pressure on such facilities. Most of the public toilets hardly have water and sink for washing hands after use. Limited access to good quality toilet facilities increases children's risk of contracting diarrhoea and other infectious diseases.

Ownership of Bathroom Facility

The pattern of ownership of bathroom facility, vis-à-vis tenure arrangement, was comparable to that of toilet facilities. While the majority of government and privately owned housing units had their private bathrooms, the opposite applies to those in rented accommodation as can be seen from Table 5. Households living in rented accommodation have the highest proportion of households that share bathroom facility. Only about a fifth, 19.7%, of such households have their own bathrooms inside, compared to two-thirds, 66.7%, of those who owned their houses. Those residing in government-owned housing units have the highest proportion with private bathroom facility, over 90%.

Some households who resided in rented accommodation, sharing sanitation facilities inside their homes or in public places indicated that they wished that they could have their own private homes and private sanitation facilities instead, since they could actually afford their own homes, if access to land were easier in the city. They mentioned a number of problems that were associated with sharing toilet and bathroom facilities, stressing the poor health behaviour of

some co-tenants, whom some describe as dirty and just "capable of living in filth". A mother complained:

> We have a roster for scrubbing our bathroom. You see we are many in this house, so many people use this bathroom. When it is my turn, I clean it very well but others just refuse. There is this tenant who travels a lot. Her children are supposed to clean the bathroom but they never do it, especially when their mother is not around. When you tell them they just refuse. They wait and play some tricks until it is someone else's turn. It's not easy. It's my children whom I pity. Bathing in this filth is not hygienic at all but some people are able to live in it. It's not easy at all. (Pati, May 2004)

Table 5 Tenure Arrangement and Ownership of Bathroom Facility- Percentage of Households By Type of Bathroom Facility

	Tenure Arrangement			
Type of Facility	**Owning**	**Renting**	**Government-Owned**	**Other**
Inside and Exclusive	66.7	19.7	92.5	31.6
Separate, Shared	2.2	73.7	7.5	31.6
Open Cubicle	1.1	1.3	-	28.9
Other	-	5.3	-	7.9
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: Field Work, 2004

Sharing sanitation facilities in overcrowded communities where health behaviours of some tenants are poor can increase the risk of infectious diseases among co-tenants. Some tenants do not even have any facility within their dwellings that they can share; they depend on public ones which are not kept clean, due mainly to pressures on them and the negligence of facility overseers and users. The supervision of development of housing units by the Department of Town and Country Planning and the municipal and district assemblies to ensure that some basic facilities are provided by land-lords/ladies is very urgent.

The Nutritional and Health Status of the Children

Since the factors associated with poor nutritional and health status are inter-related poor health may increase the risk of poor nutrition, while malnutrition makes children more vulnerable to diseases. Kwashiorkor, for example, is precipitated by infectious diseases (Gibson 2005: 405).

The main factors responsible for stunting (low linear growth), for example, in young children have been identified as extended periods of inadequate food intake, poor dietary quality, increased morbidity or a combination of any of these conditions. Wasting which reflects a failure to gain sufficient weight relative to height or weight loss and underweight (which also arise from gaining insufficient weight relative to age or losing weight) are all related to the same factors responsible for stunting (WHO 1995, 2006).

Nutritional Status of the Children

The main child nutritional indicators examined were anthropometric measurements. The proportion of the children classified as malnourished, according to the three nutritional indicators, is shown in Table 6. Almost a third of the children were stunted and underweight and a tenth were wasted. As can be observed from Table 8.1, the percentages of the children with anthropometric failures are over one-and-half times the averages for under-fives in the total urban population of Ghana in 2003 (Ghana Statistical Services et al. 2004). The percentages wasted (10.2%) and underweight (31.4) were also almost one-and-half times those for the same age group in the total national population at the same survey.

The differences in percentages stunted were not large, as can be seen from Table 6. This is due to a generally higher prevalence of stunting than wasting among children in Sub-Saharan African countries, including Ghana, and other low-income countries (Gibson 2005: 254, 256). Stunting does not, therefore, vary much among different categories of the population.

There has been generally lower anthropometric failure among urban children in Ghana (Ghana Statistical Service 1999, 2004, 2009) resulting mainly from better material provision for them compared to rural children or children in economically deprived areas who may experience periods of inadequate food intake, poor dietary quality, increased morbidity or a combination of any of these conditions more frequently or permanently. It is also due to higher maternal

education in urban areas that are positively related to better nutritional and health status of children (Lartey 2005, Amar Klemesu 2001). The results of the various GDHS show that anthropometric failure rates among under-fives decrease with increase in maternal education and were lower in urban areas than rural areas and the national averages (Ghana Statistical Service 1999, 2004, 2009). The children in the present study are more stunted, wasted and underweight than the average urban child and even the average Ghanaian child, as indicated by the results of the 2003 GDHS.

Table 6 Percentage of Malnourished Children According to Three Anthropometric Indices: Height-for-Age, Weight-for-Height and Weight-for-Age of the Children Compared With National Averages

Population Characteristics	Height-for-Age (Stunted) Percentage below – 2SD	Weight-for-Height (Wasted) Percentage below - 2SD	Weight-for-Age (Underweight) Percentage below - 2SD
Children Under Study	32.7	10.2	31.4
Urban Average*	20.5	6.6	15.4
National Average*	29.9	7.1	22.1

Source: Field Work 2003- 2004, *- Taken from the 2003 GDHS

It can be concluded that the average anthropometric failure rates for the total urban and total national population conceal vast differences that may exist among various subgroups in the population. Some studies have attempted to investigate the differentials in anthropometric failure among some subgroups of the population. Amar Klemesu's (2003) study, which focused on some aspects of child nutrition in Accra, found differentials in the rates of malnutrition among the children studied in the city. A research by Adjei et al. (2006) on nutritional and health status

of children under five years in four districts of Ghana also found out that stunting among the children ranged from 23.8% to as high as 59.8%.

The higher anthropometric failure rates among the Ewe children than the average for the total urban children population can be attributed also increasing rate of poverty and morbidity in Ghana's urban areas, including Accra. The incidence of poverty and its effects on child nutritional and health status may be higher in some subgroups of the urban population, probably some sections of the one under study. Consequently, their anthropometric failure rates may be higher than the averages recorded for the total urban population.

The Health Status of the Children

High rates of morbidity were recorded among all the children and the most reported diseases were environmentally-related, malaria and diarrhoea. These diseases could indirectly affect their nutritional status through wasting that is associated with ill health.

The percentages of the children that suffered from malaria and diarrhoea during the month preceding the household survey were 29.3% and 21.0% respectively. These rates were higher than those recorded in the total urban population for malaria (22.4%) and diarrhoea (13.6%) at the 2003 GDHS. The total national population also recorded lower rates for malaria (21.3%) and diarrhoea (15.2%) at the same survey. Refer to Table 7.

Table 7 also shows that prevalence of malaria was highest among children who were living in compound houses and other types of dwellings (kiosks, uncompleted houses, street, etc.) that are found in slums and other areas of the city where environmental sanitation and drainage are poor. These lower standard of housing facilities also lack safe drinking water inside the dwellings and have waste disposal methods that are ineffective and account for choked drainage and breeding of mosquitoes and higher risk of diarrhoea. The pattern of prevalence diarrhoea is however different, with little disparities among different qualities of housing or dwelling types. The equally high prevalence rate of diarrhoea in separate households that are found in high income residential areas with good supply of safe drinking water and sanitation facilities can be attributed to other factors such as early introduction to baby formula and bottle-feeding which increase children's risk to diarrhoeal infection. The analysis of the data on exclusive breastfeeding showed that 67.9% the children whose mothers had university education and were

in high income residential were introduced to baby formula from birth or before they were six months old compared to 42.9% among their counterparts whose mothers had no education and were residing in low income residential areas.

Table 7 Percentage of Children with Malaria and Diarrhoea in the Month Preceding the Household Survey by Dwelling Types and Method of Waste Disposal

Background Characteristics	Percentage of Children with Malaria	Percentage of Children with Diarrhoea
Type of Dwelling		
Separate	25.0	25.0
Semi-Detached/Apartment	22.9	11.1
Compound	34.2	20.0
Other	40.9	14.3
Method of Waste Disposal		
Collected (Public/Private)	25.0	25.0
Public Dump	32.8	25.8
Other	40.0	7.9
Total	**29.3**	**21.0**
Urban Average*	**22.4**	**13.6**
National Average*	**21.3**	**15.2**

Source: Field Work 2003/2004, * from 2003 GDHS. ** includes the <6 also

It must be noted, however, that the malaria prevalence rates for the total urban and national population were based on prevalent rates for the two-week period preceding the 2003 GDHS. The information on malaria at this national survey was on fever, the major manifestation of malaria. For these reasons, the prevalence of the disease in the study population may not be comparable with those from the 2003 GDHS, since the latter covered a shorter period of time and could have been higher if a one-month period were considered. But it was indicated further in the results of the 2003 GDHS that higher prevalence rates of malaria were recorded for the urban population, probably due to higher rates of reporting of the illness among the more educated urban population than in the rural population (Ghana Statistical Service 2004: 160, 203).

Indeed, worsening environmental sanitation in Ghana's urban centres, especially the city of Accra, as well as poor health behaviour of residents (The Legon Observer 2009, Yankson et al. 2005) account for the higher incidence of environmentally-related health conditions among the children. Ineffective waste management coupled with poor drainage systems in most residential areas in Accra has been responsible for breeding of mosquitoes and high incidence of malaria, especially during the rainy season when choked gutters and flooded surfaces are favourable for the breeding of mosquitoes.

Some conditions associated with urban housing, even in high income residential areas, also account for the relatively high prevalence of malaria among these urban children. During observations on environmental cleanliness and interviews on protection against malarial attack, a mother of one of the children, a nurse who resided in a government apartment building in a high income residential area pointed out that the cultivation of plantain and other food crops that collect water between their leaves also makes mosquitoes breed around houses. Such condition, she said, makes children and adults susceptible to malarial attack. Figure 4 shows the immediate environment of the government apartment building. Pointing to plantain crops that were growing very close to the apartment building (as shown in Figure 4), she lamented:

> Look at all these plantain crops around our apartment. Do you see them? There's a lot of water on the sucker, among the leaves. You can imagine the number of mosquitoes there. So, when you go outside to dry your clothes so many mosquitoes bite you. Why should we use mosquito nets when the mosquitoes that bite us are outside? The mosquitoes bite us during the day, not

in the night. We have trap doors to our apartments and mosquito nets on the windows to prevent mosquitoes from entering our apartment. (Mawuli, June 2004).

Figure 4 A Three-storey Apartment Building in a High Income residential Area with Plantain and other Food Crops Growing Around it

Source: Field Work, June 2004

Mawuli's observation probably explains why some other Ghanaians may not be using the mosquito bed nets but trapped doors as protection against malaria. The assertion that mosquitoes bite people a lot more during the daytime than on their beds at night may not be an exaggeration. Other interviewees also complained about how mosquitoes bite their children at day care facilities during their siesta period. In May 2006, the University Primary and Junior Secondary School was sprayed to destroy the numerous mosquitoes that have infested the school and bite children during school hours. There is, however, a need to educate the population about the different species of mosquitoes and the need for protection against the anopheles, the vector of the malaria parasite, which bites people after 8 pm.

Explaining the Link Between Housing Facility and the Nutritional Status of the Children

Until child care was recognized as an analytical category in the assessment of the nutritional status of children, food security and morbidity were the main factors that were identified as affecting child malnutrition and poor health. The positive effect of maternal education on child health and nutritional status has also been emphasized. In the present study, the percentages of households that lacked food security and good quality food (for the provision of balanced diet) throughout the year were 10.6% and 7.5% respectively. However, the percentages of the children who had anthropometric failure were far higher, for example, 10.2% and 32.7% respectively of the children were wasted and stunted. It should then be expected that some other factors contributed to the children's nutritional status, apart from household food security or dietary quality.

Housing facility is an important care resource that affects child health and nutritional status by working through its associated conditions, including sanitation facilities and amenities such as bathing and toilet facilities and method of waste disposal. Some observable child care and health behaviours of households such as preparation/provision of food are determined by housing facility or dwelling types and they also affect children's health and nutritional status, apart from food security and dietary behaviours of their households. All these are examined in the succeeding sections.

Dwelling Types and Nutritional Status of the Children

The prevalence rates of malnutrition among children from the different types of dwelling can be observed from Table 7. As can be seen from Table 7, the proportions of children with anthropometric failures are far higher in compound houses than in separate houses and apartments/flats. The disparities in the percentages that are stunted are the least. They are comparable to the small differentials in prevalence of stunting observed in the total national and total urban populations also.

As indicated earlier, the rate of stunting among children in Ghana as in other developing countries is generally high, irrespective of their background. The differences in the prevalence rate of wasting, a condition that is associated with ill health, is the highest among the children.

Table 7 Percentage of Malnourished Children According to Three Anthropometric Indices: Height-for-Age (Stunting), Weight-for-Height (Wasting) and Weight-for-Age (Underweight) by Residential and Dwelling Characteristics

Background	Height-for-Age (Stunted)	Weight-for-Height (Wasted)	Weight-for-Age (Underweight)
	Percentage below -2SD	Percentage below -2S	Percentage below –2S
Residential Type			
Low Income	36.2	13.3	40.0
Middle Income	38.4	9.9	29.3
High Income	31.1	8.7	29.4
Dwelling Type			
Compound House	38.2	17.3	26.9
Separate House/ Apartment/Flat	31.8	8.6	20.0
Bathing Facility			
Bathroom Shared	34.2	17.1	24.0
Owned Bathroom Inside	25.4	10.0	18.0
Toilet Facility			
Shared or No Toilet Facility	36.0	18.6	20.8
WC Owned By Household	26.8	9.5	14.8
Waste Disposal			
Public Dump & Other	36.6	19.0	20.0
Collected (Public/Private)	26.2	7.0	18.6

Source: Field Work 2003- 2004

Children living in compound houses that are found in low income residential areas with higher morbidity rates were twice as likely to be wasted as those in separate houses and apartment/flat that are located in high income residential areas which reported relatively lower morbidity rates.

Sanitation Facilities, Waste Disposal Methods and Nutritional Status of the Children

The influence of access to and quality of sanitation facilities on the nutritional status of the children can also be observed from Table 7. Higher anthropometric failure rates are associated with poorer environmental sanitation with respect to the means of waste disposal and sanitation facilities. The risk of stunting is markedly lower for children in households with better sanitation facilities. The percentages of children who are wasted and underweight are far higher in households that share sanitation facilities and depend on public dumps or other forms of waste disposal methods (indiscriminate, burning, burying, etc.) compared to those whose households own sanitation facilities and have their waste collected from their homes. The difference in the percentage underweight is small with respect to waste disposal methods.

The percentages of children who are wasted and underweight are also far higher in households that share sanitation facilities and depend on public dumps or other forms of waste disposal methods (indiscriminate, burning, burying, etc.) compared to those whose households own sanitation facilities and have their waste collected from their homes. The difference in the percentage underweight is small with respect to waste disposal methods.

Housing Facility and Provision of Food for Children

The provision of food for the children was mainly from home or street vendors, depending on availability of cooking space in the housing facility. Dependence of households on street food was found in middle and low income residential areas where all the households who did not have kitchen or cooking space resided. This child care behaviour associated with low and middle income housing facilities increases children's risk of suffering from food-borne diseases. Figures 5a and 5b are examples of food sold by food vendors in the city that may be given to children too. They are sold under unhygienic conditions and dust from the street blow over them.

Observations in the field found many street vendors preparing food under unhygienic conditions including uncovered drains as can be seen from Figure 5a and 5b.

During a number of follow-up visits to case studies in low and middle income residential areas, it was found out that some infants were fed with street food, particularly *koko* (local name for porridge made from corn or millet), even from their fifth month. Children were also fed with other types of food bought from food vendors as they are introduced to solid food. Some households in these areas and in uncompleted buildings in high income residential areas indicated that they depend daily on food vendors for lack of kitchen or cooking space. The housing facility and the associated health and care behaviours resulted in different levels of risk of ill health and consequent nutritional status among the children.

Figure 5a A Food Vendor on a Pedestrian Pavement Near an Open Drain is Pealing Yam to Fry. More of the Tubers of Yam and Cartoons of Fish Which Will be Fried Later Are on the Ground.

Source: Field Work, August 2004

Figure 5b Food Vendors Selling Plantain Chips and Dough-nuts, Almost Completely Exposed, on Busy Streets.

Source: Field Work, August 2004

Relative Risk of Malnutrition Associated with Sanitation Conditions of Housing Facilities

The relative risks of malnutrition associated with the housing facilities with respect to residential and dwelling types, environmental sanitation, and sanitation facilities were also examined. Odd Ratios were estimated for the associations of these housing facility conditions on the one hand and nutritional indicators on the other hand.

The association between weight-for-height and ownership of toilet facility by household was the strongest and was statistically significant when Odd Ratios were estimated. Children in households who did not own any toilet facility were four times as likely to be wasted as those in households with WC. This difference in wasting distribution was statistically significant at 95% confidence level (OR= 4.43; 95% CI, 1.13- 17.38; p= 0.03).

The present study further identifies ownership of sanitation facility, and the quality thereof, as an important factor associated with the nutritional status of children among the migrants.It corroborates the PRB and Child TRENDS' (2002) findings. The effects measured by the odd ratios, show that they affect children's nutritional and health status more than any other residential/dwelling condition or resource. Refer to Table A1- A22 in the Appendix.

Table 8 Relative Risk of Malnutrition Associated with Sanitation Conditions of Housing Facilities: **Percentage of Background Characteristics by Child's Nutritional Status Indicators**

	Child's nutritional status indicators					
	Height for age z-score		Weight For Height z-score		Weight For Age z-score	
Background						
Residential area	Odds ratio	p-value	Odds ratio	p-value	Odds ratio	p-value
Low income (RC)						
High income	0.797	0.608	0.555	0.297	1.027	0.959
Type of dwelling						
Apartment/separate houses (RC)						
Compound houses	0.754	0.489	2.227	0.221	1.057	0.908
Main source of energy						
Gas or electricity (RC)						
Charcoal	0.857	0.725	2.870	0.126	0.478	0.122
Bathing facility						
Owned bathroom inside quarters (RC)						
Bathroom shared	1.179	0.676	1.857	0.270	1.439	0.426
Toilet facility						
WC owned by household (RC)						
No toilet facility	2.727	0.070	4.433	0.033	0.500	0.414

Source: Field Work 2003/2004

The findings of the quantitative and qualitative analysis, including a number of case studies selected for the study indicate that poor housing facility and associated environmental sanitation with high prevalence rate of environment-related diseases, particularly malaria and diarrhoea as well as poor child care behaviours such feeding infants with street food that is prepared and sold under unhygienic conditions in low and middle income residential areas and dwellings combine to affect the nutritional and health status of the children. The effect of these factors in the lives of Grace and Peace, some of the case studies selected in a residential area with the low and middle income households are typical examples:

Grace and Peace

Grace and Peace, a set of twins, and their parents lived in a one-room housing unit in a residential area with low and middle income households. They have no amenities and facilities available in their dwelling. They buy water from a vendor; paying more than they should if they were provided with water inside their home. They use the bush as their toilet facility. They do not have a kitchen so their cooking space is the open space in front of their room, a corridor. The doors of the several tenants open to the corridor. It is badly lit so some tenants cook rather prepare their meals in an open space at one side of the compound house when the weather allows. The tenants use charcoal so smoke sometimes from the charcoal pot enters the bedrooms. Enyonam, the mother of grace and Peace had post-natal care provided by her mother for only two months. Her mother could have stayed a little longer but her husband decided that she should leave, since he could no more share their room with his mother in-law. A friend of Enyonam in the neighbourhood gave her a helping hand during the day, but Enyonam actually needed help at night and early morning even more, because somebody is needed to stay with Grace and Peace as she goes to the bush, the toilet facility, and also some distance away to buy water. Getting a house help to do domestic chores and even stay with the children so that Enyonam could resume work as a seamstress was also not a possibility since the single room could not be shared by the couple with a house help either. Her husband, a sales assistant, leaves home very early to avoid vehicular traffic congestion, but gets back late as he decided after the birth of the twins to do part-time work, driving a taxi cab after work, to earn more income for the family. could not avoid the evening traffic congestion. Enyonam explained that she was overwhelmed by their circumstances and as a result could not lactate. Grace and Peace were introduced to a baby formula at two weeks. They could not buy enough of the baby formula for the babies so Enyonam decided to dilute the formula for them. She introduced them to *koko* (a local name for porridge made from corn dough) during their second month due to financial constraints. Meanwhile, the bottle feeding increased the risk of Grace and Peace to diarrhoea, as did the street food

> they were fed with for convenience sake. They had many episodes of severe diarrhoea, and were sometimes admitted to the hospital for treatment. Their health deteriorated between their sixth and twelve month, as they were introduced to solid food, often bought from the street. Grace and Peace were stunted and underweight before their first birthday.

Conditions of the housing facility and associated lack of access to sanitation facilities and amenities contributed in several ways to Enyonam's poor health and caring behaviours which consequently resulted in Grace and Peace's poor nutritional and health status. The conditions that were responsible for Grace and Peace's poor nutritional and health conditions are a complex set but the conditions associated with their housing facility stand out, though likely to be "invisible" to policy-makers. There were many other children in the study areas that had similar nutritional and health outcomes that are related to poor housing facility. Their situation also show that the conditions that produce poor nutritional status are diverse among socioeconomic subgroups of the population such that parental socioeconomic status, household food security and dietary behaviour alone may not sufficiently explain them, especially in urban settings as the present study shows. Therefore, the "one-policy-fits-all" approach needs a review so as to adopt appropriate interventions suitable for different subgroups of the population. Moreover, public policy and interventions to improve child health and nutritional status needs to consider improvement in the housing sector too.

Conclusion

Several factors may equally contribute to the disparities in health and nutritional status that were observed among the children in the different housing facilities but the contribution of housing facility to differences in health and nutritional status were also observed, particularly that of toilet facility. It is getting to a decade since research (PRB and Child TRENDS 2002) provided evidence that access to sanitation and safe water supply can reduce child morbidity and mortality. The present study also present similar evidence, even in an urban setting where the provision of such basic needs have been taken for granted. Slums may attract such attention but even middle income residential areas should not be neglected since some their housing facilities do promote child health and nutritional status but may not be visible to policy makers.

The present study, based on its findings, recommends that the scope of policies that aim at promoting child health and nutritional status of children in Ghana should be widened to include such areas as monitoring developments in the housing sector to ensure that appropriate facilities and amenities are provided in housing facilities for households and for optimal child care behaviours and practices to be achieved so that good child health and nutritional outcomes can be realized as well as the achievement of the MDGs.

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APPENDIX

Table A1 Associations between child's nutritional status indicator (height-for-age z-score) and residential area

Height-for-age z-score	Residential area		Total	Odds Ratio Estimates		
	Low income	*High income*		*OR**	*95% CI*	*p-value*
z-score > 2.00	30	31	**61**	0.797	.335-1.897	0.608
z-score < 2.00	17	14	**31**			
Total	**47**	**45**	**92**			

Table A2. Associations between child's nutritional status indicator (weight-for-height z-score) and residential area

Weight-for-height z-score	Residential area		Total	Odds Ratio Estimates		
	Low income	*High income*		*OR**	*95% CI*	*p-value*
z-score > 2.00	37	40	77	.555	.184-1.678	0.297
z-score < 2.00	10	6	16			
Total	47	46	93			

Table A3 Associations between child's nutritional status indicator (weight-for-age z-score) and residential area

Weight-for-age z-score	Residential area		Total	Odds Ratio Estimates		
	Low income	*High income*		*OR**	*95% CI*	*p-value*
z-score > 2.00	38	37	75	1.027	.367-2.874	.959
z-score < 2.00	9	9	18			

Total	47	46	93			

Table A4 Associations between child's nutritional status indicator (height-for-age z-score) and residential area

Height-for-age z-score	**Residential area**		**Total**	**Odds Ratio Estimates**		
	Medium	*High income*		*OR**	*95% CI*	*p-value*
z-score > 2.00	39	31	70	.927	.402-2.139	.859
z-score < 2.00	19	14	33			
Total	58	45	103			

Table A5. Associations between child's nutritional status indicator (weight-for-height z-score) and residential area

Weight-for-height z-score	**Residential area**		**Total**	**Odds Ratio Estimates**		
	Medium	*High income*		*OR**	*95% CI*	*p-value*
z-score > 2.00	50	40	90	.937	.301-2.923	.911
z-score < 2.00	8	6	14			
Total	58	46	104			

Table A6 Associations between child's nutritional status indicator (weight-for-age z-score) and residential area

Weight-for-age z-score	**Residential area**	**Total**	**Odds Ratio Estimates**

	Medium	*High income*		*OR**	*95% CI*	*p-value*
z-score > 2.00	45	37	82	.912	.347-2.400	.852
z-score < 2.00	12	9	21			
Total	57	46	103			

Table A7. Associations between child's nutritional status indicator (height-for-age z-score) and residential area

Height-for-age z-score	**Residential area**		**Total**	**Odds Ratio Estimates**		
	Low	*Medium*		*OR**	*95% CI*	*p-value*
z-score > 2.00	30	39	69	0.860	0.383-1.931	0.714
z-score < 2.00	17	19	36			
Total	47	58	105			

Table A8 Associations between child's nutritional status indicator (weight-for-height z-score) and residential area

Weight-for-height z-score	**Residential area**		**Total**	**Odds Ratio Estimates**		
	Low	*Medium*		*OR**	*95% CI*	*p-value*
z-score > 2.00	37	50	87	.592	.213-1.645	.315
z-score < 2.00	10	8	18			
Total	47	58	105			

Table A9 Associations between child's nutritional status indicator (weight-for-height z-score) and residential area

Weight-for-height z-score	Residential area		Total	Odds Ratio Estimates		
	Low	*Medium*		*OR**	*95% CI*	*p-value*
z-score > 2.00	38	45	83	1.126	.428-2.959	.810
z-score < 2.00	9	12	21			
Total	47	57	104			

Table A10 Associations between child's nutritional status indicator (height-for-age z-score) and type of dwelling

Height-for-age z-score	Type of dwelling		Total	Odds Ratio Estimates		
	Apartment/ separate houses	*Compound houses*		*OR**	*95% CI*	*p-value*
z-score > 2.00	21	75	96	.754	.339-1.677	.489
z-score < 2.00	13	35	48			
Total	34	110	144			

Table A11 Associations between child's nutritional status indicator (weight-for-height z-score) and type of dwelling

Weight-for-height z-score	Type of dwelling		Total	Odds Ratio Estimates		
	Apartment/ separate houses	*Compound houses*		*OR**	*95% CI*	*p-value*
z-score > 2.00	32	91	123	2.227	.618-8.031	.221
z-score < 2.00	3	19	22			
Total	35	110	145			

Table A12 Associations between child's nutritional status indicator (weight-for-age z-score) and type of dwelling

Weight-for-age z-score	Type of dwelling		Total	Odd Ratio Estimates		
	Apartment/ separate houses	*Compound houses*		*OR**	*95% CI*	*p-value*
z-score > 2.00	28	87	115	1.057	.410-2.727	.908
z-score < 2.00	7	23	30			
Total	35	110	145			

Table A 13. Associations between child's nutritional status indicator (height-for-age z-score) and number of sleeping rooms in the house

Weight-for-age z-score	Sleeping rooms in the house		Total	Odds Ratio Estimates		
	One room	*Two or more rooms*		*OR**	*95% CI*	*p-value*
z-score > 2.00	33	62	95	1.217	.571-2.593	.612
z-score < 2.00	14	32	46			
Total	47	94	141			

Table A14 Associations between child's nutritional status indicator (weight-for-height z-score) and number of sleeping rooms in the house

Weight-for-height z-score	Sleeping rooms in the house		Total	Odds Ratio Estimates		
	One room	*Two or more rooms*		*OR**	*95% CI*	*p-value*
z-score > 2.00	37	84	121	.485	.189-1.240	.131
z-score < 2.00	10	11	21			
Total	47	95	142			

Table A15 Associations between child's nutritional status indicator (weight-for-age z-score) and number of sleeping rooms in the house

Weight-for-age z-score	Sleeping rooms in the house	Total	Odds Ratio Estimates

	One room	*Two or more rooms*		*OR**	*95% CI*	*p-value*
z-score > 2.00	38	76	114	1.056	.436-2.554	.905
z-score < 2.00	9	19	28			
Total	47	95	142			

Table A16 Associations between child's nutritional status indicator (height-for-age z-score) and bathing facility in the house

Height-for-age z-score	**Bathing facility**		**Total**	**Odds Ratio Estimates**		
	Owned bathroom inside quarters	*Bathroom shared*		*OR**	*95% CI*	*p-value*
z-score > 2.00	34	50	84	1.179	.545-2.547	.676
z-score < 2.00	15	26	41			
Total	49	76	125			

Table A17 Associations between child's nutritional status indicator (weight-for-height z-score) and bathing facility in the house

Weight-for-age z-score	Bathing facility		Total	Odds Ratio Estimates		
	Owned bathroom inside quarters	*Bathroom shared*		*OR**	*95% CI*	*p-value*
z-score > 2.00	45	63	108	1.857	.618-5.579	.270
z-score < 2.00	5	13	18			
Total	50	76	126			

Table A18 Associations between child's nutritional status indicator (weight-for-height z-score) and bathing facility in the house

Weight-for-age z-score	Bathing facility		Total	Odds Ratio Estimates		
	Owned bathroom inside quarters	*Bathroom shared*		*OR**	*95% CI*	*p-value*
z-score > 2.00	41	57	98	1.439	.588-3.521	.426
z-score < 2.00	9	18	27			
Total	50	75	125			

Table A19 Associations between child's nutritional status indicator (height-for-age z-score) and ownership of toilet facility by the household

Height-for-age z-score	Toilet facility		Total	Odds Ratio Estimates		
	WC owned by	*No toilet*		*OR**	*95% CI*	*p-value*

	household	*facility*				
z-score > 2.00	30	11	41	2.727	.922-8.066	.070
z-score < 2.00	11	11	22			
Total	41	22	63			

Table A20 Associations between child's nutritional status indicator (weight-for-height z-score) and ownership of toilet facility by the household

Weight-for-height z-score	**Toilet facility**		**Total**	**Odds Ratio Estimates**		
	WC owned by household	*No toilet facility*		*OR**	*95% CI*	*p-value*
z-score > 2.00	38	15	53	**4.433**	**1.131-17.379**	**.033**
z-score < 2.00	4	7	11			
Total	42	22	64			

SAMPLE INTERPRETATION:

An Odds Ratio (OR) of 4.4 in the above table is suggestive that children of households who did not owe any toilet facility were fourfold likely to have wasted children compared to households with WC. This differences in wasting distribution was statistically significant at 95% confidence level (OR = 4.43; 95%CI 1.13-17.38; p = 0.03)

Table A21 Associations between child's nutritional status indicator (weight-for-age z-score) and ownership of toilet facility by the household

Weight-for-age z-score	**Toilet facility**		**Total**	**Odds Ratio Estimates**		
	WC owned by household	*No toilet facility*		*OR**	*95% CI*	*p-value*
z-score > 2.00	35	20	55	.500	.095-2.642	.414

z-score < 2.00	7	2	9
Total	42	22	64