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## The triad of poverty, environment and child health in Nairobi informal settlements

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### Abstract

Twenty four focus group discussions and 62 in depth interviews were conducted in four informal settlements in Nairobi in 2002 to explore the community members' expression and understanding of the linkages between urban poor environments and childhood illnesses. Community members identified respiratory tract infections, diarrhea, malaria, skin problems and malnutrition as the five leading illnesses among children aged under-5 years. The mothers linked these illnesses to lack of adequate and clean water, unsafe waste disposal systems, lack of adequate and nutritious food and air pollution. The ability of the mothers to make these linkages, which are quoted verbatim in the paper, shows that their children's illnesses could mainly be due to the impoverished status and environments rather than their mothers' lack of biomedical conceptualization of disease processes. The opportunity for child survival programs exists as illustrated by the communities' conceptual understanding of the linkages between the environment and child health outcomes. The challenge for any child survival program is therefore to build on it.

Key Words: childhood illnesses, environment, community perceptions, urban poor, Kenya

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## **Introduction**

Urban growth in Africa continues to be fuelled by rural-urban migration. Unlike in developed countries where urbanization was accompanied by economic boom, the reverse has been the case for Africa. Between 1970 and 1995, Africa's urban population grew by 4.7% per year, while its GDP dropped by 0.7% (World Bank, 2000). Indeed most of Africa's urbanization has occurred amidst economic liberalization, structural adjustment programs, abolition of subsidies, retrenchment and cost-recovery plans that were necessitated by poor economic performance (Jakhanwal, 2001). It has been predicted that assuring conditions in which the urban poor can be healthy, and especially those living in the informal settlements, is going to present a major challenge for decades to come (Caldwell & Caldwell, 2002:65). Informal settlements as used in this paper refer to residential areas that have been constructed illegally and where housing is not in compliance with current planning and building regulations (United Nations, 1996). This term will be used interchangeably with slum communities.

Urbanization has historically been presumed to lead to mortality reduction due to economic prosperity and increased access to modern medical care. However this has not been the case for most developing countries (Dobson, 1992) where evidence suggests that quality of life in some urban areas is even worse than in rural areas mainly due to high levels of poverty in pockets of the urban population (Brockhoff & Brennan, 1998; Zulu, Dodoo & Ezeh, 2002). Evidence from Demographic and Health Surveys indicates that the urban poor in sub-Saharan Africa have less access to health services, and consequently exhibit higher mortality rates than residents from other population sub-groups including rural residents (APHRC, 2002). Caldwell & Caldwell (2002) found disproportionately higher mortality rates in the poorer households in Dhaka informal settlements affirming the World Bank's position that children born into poor families have a higher chance of dying before their first and fifth birthday than those born into better-off families (World Bank, 2002).

The contribution of environmental factors to human morbidity and mortality is well acknowledged. Whether from a research or a programmatic perspective, it is clear that people living in unhygienic environments as indicated by poor drainage systems, inadequate or non-existent sanitation, and piles of uncollected refuse, suffer higher levels of morbidity and mortality. Because of their illegal status, residents of informal settlements do not receive government services such as water, drains, sewerage and rubbish collection; (Caldwell & Caldwell, 2002). It is estimated that 40% of world deaths can be attributed to various environmental factors (Pimentel et al, 1998; Clarke, 1993). Most of these deaths occur mainly among the poor that live in developing countries (World Bank, 2003). Poor sanitary conditions contribute to approximately 4 million deaths, mostly among infants and young children, every year. Access to water correlates strongly with the survival of children under-five-years (Gleick, 1993). Malnutrition, also a major cause of child morbidity and mortality, can be related to environmental degradation (Pimentel & Pimentel, 1996; Pimentel et al, 1998).

By their very nature, informal settlements are replete with poor environmental factors that predispose their inhabitants to poor health outcomes. These settlements are usually illegal or quasi-legal and built in marginal areas in contravention of current planning and building regulations (United Nations, 1996). They do not receive the usual services such as supply of potable water, waste-water drainage, refuse collection and sewerage services from the urban governments. Yet in many developing countries a large proportion of the population migrating to the urban centres continues to settle in these areas. It is therefore important to clarify whether the residents and new comers understand the health risks posed by the living environments in the informal settlements.

Through this paper we give the inhabitants a voice, to articulate their understanding of their own environment and how it affects them (World Bank, 2003). We use a qualitative approach to assess women's perceptions on the link between environment and their children's health in Nairobi informal settlements. We examine two main questions posed to the residents: "What are the most common health problems of your own children or those children you know about personally?" and "What do you think causes these diseases?"

### **The study context**

The urban population in Kenya grew from 3.8 million in 1989 to 9.9 million in 1999, constituting 34% total population. For instance, Nairobi's population was only 120,000 in 1948 (Muwonge, 1980) and by 1999 it was estimated at 2.3 million (Republic of Kenya (ROK), 2001). Women form about 49% of the urban population. These population increases have been accompanied by a rapid rise in the level of poverty from 29% in 1992 to 52% in 1997 (ROK and United Nations Development Program (UNDP), 2001). It is now estimated that 60% of Nairobi residents are poor and live in congested informal settlements that occupy only 5% of the residential land area (Matrix Development Consultants, 1993). These settlements tend to be marginal, located in marshy areas, near railway lines and next to dumping sites. These urban poor experience high unemployment levels leading to income poverty that further limits their access to health, education and opportunities for skills development. The urban poor therefore constitute the majority of the approximately 32% of Nairobi's population that is economically inactive (ROK, 2002).

The informal settlements of Nairobi are similar to others elsewhere in the developing countries in terms of the prevailing environmental conditions and the nature of services they receive. Nairobi city produces 1000 tons of solid wastes daily, but refuse collection services is limited, especially in the informal settlements, and in the end only 20% of this solid waste is collected and taken to designated dumpsites. A study conducted in Nairobi informal settlements (APHRC, 2002) found that only about 24% of all households have access to piped water, in form of public water taps or water piped into residence, versus 92% in non-slum areas of Nairobi as a whole. Consequently, most of the residents of informal settlements (75%) purchase water for domestic use (Wasao & Bauni, 2001).

The epidemiological profile of the informal settlements reflects their poor living conditions. In terms of child health the African Population and Health Research Centre (APHRC 2002) established the rate of diarrhea (31%) of children under three years of age in the informal settlements was more than double that of Nairobi as a whole (13%), and was considerably higher than the rates for other urban and rural areas. This was despite higher educational attainment - about 73% of all the respondents have completed primary school or gone to secondary school, compared to only 46% for rural residents and 68% for residents of other urban areas. Measles coverage was found to be lower in the informal settlements compared to Nairobi and other urban areas. In addition, the infant mortality rate (IMR) was higher in Nairobi's informal settlements (91/1000) compared to 39/1000 in the non-slum parts of Nairobi and 76/1000 in rural Kenya (APHRC, 2002).

### **Study sites**

This paper is based on two sets of data collected in 2002 from four informal settlements in Nairobi City, namely Kawangware, Korogocho, Viwandani and Njiru. This was a collaborative project between APHRC, Program for Appropriate Technology (PATH)-Kenya, Population Council, JHPIEGO Corporation and CARE-Kenya. The four sites were selected for this study mainly because they were covered by the APHRC's demographic surveillance system, which would potentially provide a monitoring and evaluation function for any intervention programs that would be implemented by the Center and its partners.

Kawangware is located in the western part of Nairobi. It is inhabited by 86,000 people (ROK, 2001), who mostly provide domestic and support services to the neighboring suburbs. Viwandani, which has a population of 56,000 is located in the industrial area of Nairobi. Most of the inhabitants therefore work as casual laborers in the surrounding industries. Korogocho, located in the east, is one of the oldest informal settlements in Nairobi having been in existence for more than 50 years. It is home to over 44,000 people. Njiru is the smallest settlement involved in the study with an estimated population of 18,000 people. Generally, children under-five-years account for 15% of the population in the settlements, while women aged 15-49 account for 26% with minor variations between the settlements.

## **Methods**

### **Data collection**

Focus group discussions (FGDs) were conducted with various categories of community members while in-depth interviews (IDIs) were conducted with women who had children aged under-five-years. Data was collected by a group of 16 interviewers, who were given special training on qualitative fieldwork techniques. The FGD and IDI guides were originally developed in English then translated into Kiswahili the national language of Kenya, which is understood and spoken by most people.

### ***Focus Group Discussions***

Six FGDs were carried out in each of the four study communities to obtain information on community perspectives and views regarding the most critical health problems and needs confronting the communities and possible solutions to the problems, among other issues. The recruitment of study participants involved the fieldworkers going around the communities door-to-door looking for people with the specified characteristics for the FGDs. The FGD participants were recruited a day before the discussion by the field teams. The participants in the FGDs in each site were categorized as follows: (i) women under 20 years of age; (ii) women aged 20-34; (iii) women aged 35+; (iv) men aged 20-34; (v) men aged 35+, and (vi) community leaders – mixed group. The FGDs lasted between one and one-half hours and they were mainly conducted in Kiswahili.

### ***In-depth Interviews***

In order to get detailed information about child health, we sought to conduct IDIs with 15 women drawn from each of the study communities. The women were identified from the pilot demographic surveillance system database which the APHRC had been carrying out since August 2000. Interviewers were given identification information for women whose under-five-year children had been sick in the previous three months in order to collect more details on the conditions and the mothers' views regarding the causes, the course of action taken and health care options considered. In some cases, like Korogocho, where the number of cases from the database were not enough, the interviewers recruited additional respondents for in-depth interviews during the course of the recruitment of the FGD participants. The IDIs lasted on average 40 minutes and were conducted in either Kiswahili or English depending on the language the respondent felt comfortable with.

### **Data storage and analysis**

All the FGDs and IDIs were tape recorded. The interviewers also took notes during the interviews that were submitted to the office together with the tapes derived from both the FGDs and IDIs. The tapes were transcribed by a group of four researchers who were stationed in the office as the data collection progressed and they therefore had opportunity to check with the interviewers for clarification. The data were then typed and analyzed thematically by the authors who read all the FGD and IDI transcripts. In this case, the focus was on community perceptions on common problems, important health problems of under-five-year children and the perceived causes. Selected quotes have been used in this paper to render a voice to the respondents.

## Results

### Socio-demographic characteristics of IDI participants

Almost half the mothers involved in the IDIs were aged between 20 and 24 years. Forty three of the 62 mothers were married, 16 single, 1 divorced while marital status was not provided for 2 mothers. Out of the 62 mothers, 27 reported they were housewives, 13 were engaged in casual lab our (mainly washing clothes for people or child minding), 20 were involved in petty businesses (3 of whom were selling illicit alcoholic brews) while occupation was not provided for 2 mothers.

Major Problems identified by the community members through FGDs

**Table 1 presents a matrix of the five most important problems as identified by participants from the different groups and from each of the study communities.**

**Table 1: Five most important problems in Nairobi informal settlements**

Study site	Women 20 less	Women 20-34	Men 20-34	Women 35+	Men 35+	Community Leaders	Top five priorities
Kawangwari	Bad roads Water Drainage Toilets Garbage	Water Toilets Garbage Healthcare HIV/AIDS	Toilets Water Garbage Healthcare HIV/AIDS	Water Garbage Toilets Healthcare HIV/AIDS	Water Garbage Toilets Healthcare HIV/AIDS	Bad roads Water Drainage Toilets Garbage	<b>Water Toilets Garbage Healthcare HIV/AIDS</b>
Korogocho	Healthcare Water Toilets Garbage HIV/AIDS	Toilets Insecurity Healthcare Water Garbage	Water Toilets Garbage Drainage Healthcare	Unemployment HIV/AIDS Water Toilets Garbage	Insecurity HIV/AIDS Water Toilets Garbage	Healthcare Water Toilets Garbage HIV/AIDS	<b>Water Toilets Healthcare Garbage Insecurity</b>
Njiru	Water Healthcare Toilets HIV/AIDS Pneumonia	Education Toilets Healthcare Water Garbage	Water Healthcare Unemployment Toilets Garbage	Toilets Garbage Healthcare Water HIV/AIDS	Housing Poverty Healthcare Water Toilets	Water Healthcare Toilets HIV/AIDS Pneumonia	<b>Water Toilets Healthcare Garbage HIV/AIDS</b>
Viwandani	Toilets Water Garbage Healthcare HIV/AIDS	Unemployment Drainage Water Toilets Garbage	Toilets Healthcare Water Garbage HIV/AIDS	Healthcare Water Toilets Garbage HIV/AIDS	Healthcare Education Toilets HIV/AIDS ----- -	Toilets Water Garbage Healthcare HIV/AIDS	<b>Toilets Water Healthcare Garbage HIV/AIDS</b>

Source: FGDs conducted in four slums of Nairobi (2002)

FGD priority problems have been derived from the sequence in which the participants mentioned them. The sequence of the responses is taken to indicate the gravity of the problem as perceived by the participants. As illustrated in the matrix, all the groups identified similar problems with little variations, implying similarity of experiences across the informal settlements. There is general agreement between men and women regarding the most important issues in which they had problems and as shown in the last column, water, toilets, healthcare,

garbage and HIV/AIDS emerged as critical problems facing the community members. Although the participants considered poverty as the main factor in their choice of residence, the discussions were skewed towards their day-to-day difficulties. This was captured in the following quotes:

*The dirt we have here is because we are poor but if we were able, we would not be suffering like this, we would do something about it.*

*The problem here is that it is in a slum, meaning that people here are very poor.*

These sentiments illustrate the frustrations the people have with their settlements that sometimes lead to serious consequences such as illnesses, which is the main focus of this paper.

### **Views on major childhood illnesses**

Through the IDIs mothers identified the five most common childhood illnesses (Table 2).

**Table 2: Five most common illnesses among children of Nairobi informal settlements**

<b>Health problems</b>	<b>No.</b>
Respiratory infections (pneumonia, coughing, colds and flu)	54
Diarrhea (including vomiting and stomach problems)	54
Malaria	38
Malnutrition (including kwashiorkor and Marasmus)	15
Skin problems (including scabies and ringworms)	10

Source: In-depth interviews with mothers of young children (2002)

Other health problems identified included AIDS, typhoid, worm infestation and unspecified fevers. The IDI participants noted that their entire environment was unsafe for raising children. As captured in one interview, the respondent observed the following:

*Interviewer (I): Okay in your own view what do you think contributes to the health problems of young children?*

*Respondent (R): It is because many people live here..... Also this place is not clean enough, so some diseases you get them because of poor environment..... Like toilets they have been built close together. Some people get the problem of diarrhea.*

*I: And about your child, what causes the health problems he suffers from such as diarrhea?*

*R: Some things you cannot understand. My child just falls sick, maybe when he is eating his food drops down and he will just pick it and eat it like that. And you see there you cannot even know which germs he has eaten that will cause diarrhea.*

In making reference to the perennial lack of food in the community a respondent stated that:

*There is also lack of food, when any disease comes it finds that the children are not strong because what they eat does not give them enough energy.*

Another said that the biggest problem in the community was lack of food but not lack of understanding regarding how to feed their children:

*They keep saying that we should give a balanced diet to our children but if you do not have food that is a problem. Like when you go to the clinic they will say that your child does not eat well.....I went to Kenyatta (the national referral hospital) and I was told that my child was not sick, she lacked food....I was told the important foods to give my children like milk, at least milk everyday, others like green grams, beans, rice and others that I don't have because they are expensive and without money you cannot be helped as such.*

The participants also noted that the poor state of their shelters contributed to their children's ill-health as stated by one respondent:

*Like common colds it is the way the weather keeps on changing. These iron sheet houses are a problem because they make the child to get colds since there are no beddings. And the cold stays in the child and*

*you know we are in these houses because of poverty. We are unable (financially); otherwise we would not be staying here.*

Malaria was also discussed by the FGD participants as prevalent in the community:

*Because the incomes of people here are low and activities like prevention of malaria needs nets and many parents cannot afford. What bring these mosquitoes are still waters here, boreholes and when these mosquitoes attack people they go to children and adults due to poor prevention.*

Given the notion that ill-health among the children was common, the IDI respondents were asked how often their children got sick. As shown in Table 3, most of the mothers indicated that ill-health was frequent among children in these environments.

**Table 3: How often children get sick in Nairobi informal settlements?**

Frequency	No.
Very often (every 3 days, weekly, 2 to 3 times a month, always)	30
Often (every 2 to 3 months)	9
Not often (every 5 to 6 months)	8
Rarely (every 2 years)	2

Source: In-depth interviews with mothers of young children (2002)

Some of the mothers reported that their children fell sick on a weekly basis. Frequency of illness has implications on the child's health and overall development.

### **Linkages between the environment and child health**

In the next four sub-sections we look at the environmental problems cited through the FGDs (water, toilets and garbage/poor drainage) and air pollution in view of what mothers felt were the main linkages with child health.

#### ***Water***

The community members highlighted three main concerns with water: access, cost and quality. They complained about the limited access to water points, which are often located far from the houses of some members. There were also some landlords who rationed water such that it was only available on specific days of the week and at specific times. This is a limitation especially for people who have children and require high amounts of water. However, for those who have access they decried the high cost of buying water in the informal settlements where households spend between 2/= and 5/= for twenty liters. These costs could accumulate to Kenya Shillings 900 per month (equivalent to US\$ 15) which is higher than what households with piped water spend. This eventually is costly especially relative to the slum residents' low income levels. The communities cited various coping strategies such as the use of sewerage water, skipping bathing and washing, using borehole and rainwater, and drawing water from broken pipes. The respondents considered the water they use as dangerous to their health due to contamination. It was also reported that the plastic pipes used by the water vendors often burst and the water becomes contaminated with filth. The use of rainwater is also unhealthy as noted by a young mother during the IDIs:

*There are no toilets, people excrete in paper bags and when it rains it mixes with this water and so when you collect rainwater it is mixed with the stool that people throw anywhere even on the rooftops.*

The mothers apparently understand the relationship between water and diseases such as typhoid, cholera and skin conditions especially among children. In one area it was reported that toilets were located next to water pipes. When the pipes burst the sewage contaminates the water during repair. The people end up drinking that water which is essentially a mixture of feces and urine: "You may end up getting sick if you drink such water" were a respondent's concluding remarks on this issue.

#### ***Toilets***

Toilets were identified as problematic at three main levels: availability, access, and maintenance. Most of the residents do not have access to toilets mainly because the number of toilets is inadequate to cater for them all.

Where there are toilets, the owners keep them under lock and key and only the residents of that particular plot or structure are allowed use. The situation is so bad such that the residents have resorted to several coping strategies. They use polythene bags, tins and old newspapers that are later trashed. They defecate on the roadsides, open trenches, open fields, riverside, incomplete/demolished houses and bushes. Some residents have taken advantage of the desperate situation and charge for toilet use at costs ranging from 1 - 3/= for short-call and 3-10/= for long-call. This cumulatively is expensive especially in view of the low and yet uncertain incomes of the residents. Children are often allowed to defecate anywhere; while some residents reduce the waste (drain) in the filled up toilets using buckets mainly because the city council does not evacuate the toilets in the settlements. A young mother observed that:

*Some children will excrete outside but now when your children go out to play they will touch feces and play with them and fall sick and have diarrhea.*

Another mother responded that children while playing in dirt put their hands in their mouths leading to diarrhea. She added that:

*The toilets are near the doors and they are full of dirt. The dirt comes out and flows into the house especially the maggots and this is a problem.*

Diarrhea was closely linked to lack of toilets especially by mothers who identified this condition as important among their children. They said that they could not lock their children in the houses even though they understood the dangers of them playing outside. Few mothers reported that diarrhea in young children was caused by teething but generally lack of toilets was directly associated with diarrhea.

### ***Garbage and poor drainage***

The study participants observed that garbage is an eyesore in their communities and is a source of diseases. The accumulation of garbage is basically a consequence of lack of dumping sites in the communities and the inability of the city council to collect the garbage for appropriate dumping. An associated problem to garbage disposal is poor drainage. The uncollected garbage often accumulates and blocks any drainage that might exist in the communities. The poor drainage also makes the informal settlements muddy and impassable during the rainy seasons. This leads to several consequences including increase in breeding sites for mosquitoes, filth, foul smell and diseases such as diarrhea. The common occurrence of malaria in the community was associated with stagnant water that provides ground for mosquito breeding:

*R: We do not have a place to dump rubbish waste. People throw the rubbish on the road and children sometimes pick food from this rubbish. The stagnant water breeds mosquitoes.*

*I: There is stagnant water here?*

*R: There is no drainage system.....*

A mother of seven children associated children's illness to the presence of garbage and a poor sewerage system:

*R: I can say that diseases are caused by our dirty environment; we live in a dirty place. Like, I live next to a trench of dirty water. Even some people visited my neighbor and asked her to move because the dirty trench was not good for the health of her children. Otherwise you will be taking your child to hospital every day..*

*I: So what causes the problems?*

*R: Garbage and sewage. They flow behind the houses.*

Another mother said that because she lived next to a drain sometimes when her children stayed the whole day without food they would pick anything edible, which explained their frequent diarrhea. Another young mother of 3 children who had moved to Nairobi a year prior to the interview reported that her children had become prone to illness during her stay in the settlement because of the dirty environment.

### **Pollution**

Although pollution did not emerge as one of the top five problems in the community during FGDs, the mothers recognized that informal settlements tend to be found around industrial activities. This may have been influenced by the fact that one of the study sites is located in industrial area and even those who live in other sites tend to work in or around the industrial area. Pollution is therefore a problem many have to deal with daily. Mothers of young children linked this environmental hazard to their children's ill health. One of them noted that:

*Bad air especially from the fields sometimes smells so bad. I think that causes some of these diseases, such as coughs and chest problems.*

Another one who identified eye problems as common among children explained that:

*When we are inside we usually think it is because of smoke that comes from the industries, because long time ago we never used to have this problem. We are not sure of the chemicals they use nowadays. The problem has become serious.....When you go to the hospital you are told that it is an allergy and you wonder why we have allergies.*

The congested houses characterized by poor ventilation were also associated with ill-health among children. As noted by one respondent:

*Also air, you can see that the houses are congested. The houses are close together so there is no fresh air. Even if you see these houses we are living in, the toilets are just there so there can't be fresh air. Out there sewerage ways are passing here and there.*

These results show that children in the informal settlements are frequently ill from diseases that are a result of the environment in which they live. Although the mothers understand the linkages between illness and the poor environment, their poverty status may hinder them from taking appropriate and effective remedial actions.

### **Discussion and Conclusions**

The role of the environment in ill-health is well-acknowledged. What has however received inadequate attention is whether people who live in such environments and who experience these ill-effects are able to make the relevant biomedical connections. During the FGDs with the community members they identified what was wrong with their environment and not just the inconvenience caused to them as individuals but also the consequences on their health and wellbeing. This study went further to explore in detail what mothers considered to be the most common childhood health problems and their possible causes – which according to them were community centered. Diseases related to the unsanitary living environments, lack of water and inadequate nutrition form the majority of those cited by the mothers. Illnesses such as diarrhea and vomiting, malaria, pneumonia, skin problems (scabies, ringworms) and common colds/coughs were frequently cited as important among children. What has emerged from this study is that mothers have concrete ideas about what causes childhood illnesses and can relate this to specific conditions: stagnant water leads to mosquito breeding which is responsible for malaria; diarrhea is a result of children playing and eating dirty food; while the type of housing, cold and the 'bad air' cause pneumonia and the frequent coughs and colds. This is an important finding given empirical evidence that has often depicted mothers as ignorant, not knowing what causes illnesses or believing in forces other than biomedical as being responsible for childhood illnesses. Only few mothers in our study sites alluded to teething as causing diarrhea which has also been reported elsewhere. Although teething may not be the direct cause of diarrhea, the fact is that young children may be tempted to rub their painful gums when teething thereby introducing pathogens in their mouths. Thus, living in a dirty environment is invariably responsible for the diarrhea among the teething children. It is also important to note that clinical research needs to be done to establish the current status of malaria especially in marginal areas in Nairobi and its environs because for long the city has been considered to be malaria free.

The results attest to the complexities of illness etiology in urban poor areas which are further complicated by the increased density of people (Pimentel et al, 1998), which the mothers make reference to when they note that "our areas are crowded and there is no fresh air". The crowding of people in marginal urban areas, the movement of

populations into new environments, the increased use of chemicals that pollute soils, water and air and growing malnutrition all contribute to the increase in diseases among children (Pimentel et al, 1998).

Historically, pockets of poverty appear to have matched pockets of disease in many urban environments (Landers, 1990; Dobson, 1992) and the same trend is being re-enacted not only in Nairobi but also in major urban centers in the developing world. This is an unfortunate situation given the advances in medical knowledge and techniques; and the apparent high levels of awareness among the lay people of what has been largely considered a bio-medical concept of disease causation.

Despite their high levels of understanding of the appropriate diet for children, the general poverty in the study areas hampers mothers' ability to provide food for their children. The consequences of lack of food are far reaching given that malnourished children tend to be seriously affected by parasitic infections which also reduce nutrient availability. The presence of intestinal parasites frequently diminishes appetite and food intake thereby exacerbating the malnutrition status (World Bank, 2002). While cause-specific mortality may be difficult to accurately ascertain, many childhood deaths in developing countries can be attributed to five main causes, or a combination of them: acute respiratory infections, diarrhea, measles, malaria and malnutrition (UNICEF, 2000), which corroborates the mothers' perceptions on most common illnesses in the slum communities. A child in sub-Saharan Africa will on average have about 3-4 episodes of diarrhea, 4-8 episodes of acute respiratory infections annually among many other health problems (Bern et al, 1992; Sikolia et al, 2002). Discussants in the current study reflected upon this reality whereby children in the slums suffer from the effect of one illness after the other during the year. The long term implications on child growth and development and overall immunity against the infection-malnutrition interaction dynamics are well established (Rice et al, 2000; Caballero, 2002). Having children who are ill frequently impacts on the people in various ways. The parents spend money and time on treatment and care, money that they often do not have. For mothers who do casual work it may involve the suspension of labor to care for the sick child, which is costly given the temporary nature of such engagements. Diverting family resources to provide care to a sick child may have implications on the provision of other basic necessities such as food. This becomes a vicious cycle of poverty-illness-poverty.

Advocacy aimed at behavior change continues to dominate healthcare delivery to improve child health and yet there is evidence that reducing inequalities in income distribution and the empowerment of the deprived are effective in reducing childhood morbidity and mortality (Spencer 2000). A similar view is expressed by Werner & Sanders (1997) who argue against the notion that ill-health of people living in poor countries is largely due to ignorance and overpopulation. Our study participants have shown clearly that they understand the linkages between the environment and child health and this provides a springboard for interventions aimed at addressing child health. It makes it easier because the concepts of hygiene are already well understood. However, for any changes in morbidity and mortality to be realized, there is need to address the mushrooming informal settlements which are an indication of the inability of the government to provide housing for the urban residents; and in the least to provide services in these settlements. The Kenya Government is committed to attaining the Millennium Development Goals (United Nations, 2001) and to reduce child mortality as per its own development agenda (e.g. National Poverty Eradication Plan 2000 – 2015, Poverty Reduction Strategy paper 2002 and National Development Plan 2000-2008) but for any of these to be achieved the fate of the urban poor has to be addressed. The upgrading of informal settlements, which is part and parcel of these commitments, is an important beginning because this would impact on morbidity and mortality as evidenced in other countries with low per capita gross national product. Spencer (2000) reports that state investment in social services and apparent equitable income distribution in Sri Lanka, Costa Rica, China and Kerala State in India markedly led to the decline in infant and child mortality over the last 3-4 decades (see also Werner and Sanders 1997; Dobson, 1992).

The problems reported by the residents of the informal settlements are not simple and cannot therefore be resolved by the communities, the government or donor agencies independently. Any interventions aimed at addressing them would require concerted efforts with all parties contributing to the process in order to ensure success and sustainability. There is need to develop effective partnerships with the study populations because of the complex nature of problems as noted by Diderichsen, Evans & Whitehead (2001) "we have to look both

upstream into the mechanisms of society and downstream into the mechanisms of human biology and clinical issues of how people cope with disease and disability if we were to alleviate suffering”, especially among the urban poor. The opportunity to build on the residents’ conceptual understanding and willingness to participate is evident; the challenge is therefore to provide a platform for action.

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