Report No. 36347-KE

Kenya

Inside Informality: Poverty, Jobs, Housing and Services in Nairobi's Slums

May 31, 2006

Water and Urban Unit 1
Africa Region

Document of the World Bank

CURRENCY EQUIVALENTS

(Approximate exchange rate during survey in February-March, 2004)

Currency Unit = Kenyan Shilling
Ksh. 1 = US$ 0.013
US$ 1 = Ksh. 75

ABBREVIATIONS AND ACRONYMS

APHRC	-	African Population and Health Research Centre
CBS	-	Central Bureau of Statistics
EA	-	Enumeration Area
GoK	-	Government of Kenya
HH	-	Household
HME	-	Household micro-enterprises
K-DHS	-	Kenya Demographics and Health Survey
Ksh	-	Kenyan Shilling
MDG	-	Millennium Development Goal
NCSS	-	Nairobi Cross-Sectional Slum Survey
NGO	-	Non-governmental organization
NTF	-	Norwegian Trust Fund
PSU	-	Primary sampling unit
USAID	United States Agency for International Development	

Note: All household data are weighted. None of the individual-level data are weighted.

Vice President	:	Gobind T. Nankani
Country Director	:	Colin Bruce
Sector Director	:	Michel Wormser
Sector Manager	:	Jaime Biderman
Task Team Leader	:	Sumila Gulyani

Table of contents

Preface and Acknowledgements

This report was prepared by a team comprised of Sumila Gulyani (Task Team Leader), Debabrata Talukdar and Cuz Potter, under the direction of Jaime Biderman (Sector Manager, AFTU1), Colin Bruce (Country Director, CD5) and Geoffrey Bergen (Country Program Coordinator, CD5).

This study builds on work started under the *Africa: Regional Urban Upgrading Initiative* (2001-2004), financed in part by a grant from the Norwegian Trust Fund (NTF-ESSD), and managed jointly by a team comprised of Catherine Farvacque-Vitkovic, Sylvie Debomy and Sumila Gulyani. It was under this initiative that the idea of a comparative study of the slums of Nairobi and Dakar was first proposed and financed. Specifically, NTF financing was used for the design and implementation of surveys of about 2000 households each in Nairobi and Dakar. Descriptive reports containing tabulations of basic results were prepared by the consultants (COWI) in 2004 and are available for both cities. In this study, we use data on the subset of 1755 slum households in Nairobi to generate a different and more analytical understanding of Nairobi's slums. A similar in-depth analysis of the data on Dakar's slums has been proposed and is awaiting approval.

This study would not have been possible without support from several of our colleagues and we would like to express our sincere gratitude to:

Catherine Farvacque-Vitkovic and Sylvie Debomy for their invaluable inputs into the design of the questionnaire and for their sustained help in co-management of the consultant contracts and coordination of field work in the two cities. This collaboration between AFTU1 and AFTU2 has not only helped ensure coordinated implementation of the study in two very different parts of the African continent but also, and more importantly, enriched the intellectual content of this work.

Makhtar Diop (previous Country Director for Kenya) for his enthusiastic support at the inception of this study, for ensuring financing for a Nairobi-specific analyses, and for supporting the idea of an additional report comparing Nairobi with Dakar.

Valerie Kozel, Judy Baker and Salman Zaheer for their advice on sampling and study design, and Joseph Gadek for helping us navigate procurement and contracts.

Judy Baker and Jesko Hentschel for serving as peer reviewers and providing extremely thoughtful and useful comments.

Kathleen Beegle, Louise Fox, Luc Christiaensen, Michael Mills, Praveen Kumar, Tova Solo, Natasha Iskander, Genevieve Connors, Ellen Basset, Kristin Little, Ian Gillson, Barjor Mehta and Matthew Glasser for taking the time to review this tome and for their constructive comments. Not all of their excellent comments could be incorporated in this version but will be in future papers.

Robert Buckley for helping us finance an additional qualitative study in the slums and Ashna Mathema for delivering it in the form of a report titled "A view from the inside."

COWI consultants for managing the field work—entailing household surveys and focus group discussions—and data coding of the results, and for delivering a professional product.

Dr. James Mutero, as COWI's team leader in Nairobi, for his hands-on leadership of the local survey teams and, subsequently, for his valuable inputs during the data analysis stage.

Staff from the Central Bureau of Statistics for partnering in crucial aspects of this study—in particular, for their assistance in construction of the sample, for managing the field-based re-listing of households in selected EAs, and for generating summary tables on key indicators for Nairobi from the 1999 census data.

Participants at the Urban Sector Brown Bag Lunch Presentation held on 28 November 2005 at the Bank in DC for a valuable discussion which has helped inform some of the analyses presented.

Nicole Volavka for volunteering and delivering a thoroughly professional copy edit of an earlier draft.

Perla San Juan for her support in innumerable ways over the course of this research project.

Executive Summary

Africa is the world's fastest urbanizing region and also its poorest continent. In countries such as Kenya and Senegal, along with urbanization, the incidence of urban poverty is also increasing. Informal or slum settlements are absorbing an increasing share of the expanding urban population and are home to the vast majority of the urban poor. Until recently, however, most poverty-oriented research has focused on rural areas. As a result, very little is known about urban poverty in general, and about slums in particular. In fact, in most countries there are no reliable estimates even on basic indicators—such as the number of people residing in these slums and the proportion of them that are poor—let alone a good understanding of the living conditions of slum dwellers, the nature of poverty that they face, and factors that may be helping slum households fight or escape poverty. Such ambiguity makes it difficult to justify, design and implement appropriate programs for the poor living in these settlements and even harder to assess the impacts of policies and programs that do get implemented.

This study attempts to fill gaps in our knowledge about slums in Nairobi and to, hopefully, also create a precedent and basis for similar studies in other African cities. Drawing on data from a unique, population-weighted, stratified random sample survey of 1755 slum households in Nairobi, this study attempts to shed light on housing and infrastructure conditions, economic opportunities, education, and poverty in Nairobi's slum settlements. Analytically, it focuses on the following questions: How poor and inadequately served are slum dwellers in Nairobi? What factors are correlated with poverty among slum households in this city?

We find that the incidence of economic poverty is very high in Nairobi's slums. About 73 percent of the slum dwellers are poor—that is, they fall below the poverty line and live on less than US$42 per adult equivalent per month, excluding rent. The high rate of economic poverty is accompanied by horrible living conditions and other forms of non-economic poverty.

Slum dwellers' access to basic services such as water, sanitation, electricity, and transportation is far worse than anticipated. For instance, only 22 percent of slum households have an electricity connection and barely 19 percent have access to a supply of piped water, in the form of either an in-house water connection or a yard tap. Such low connection rates stand in sharp contrast to the relatively good coverage data reported for Nairobi as whole. Specifically, city-level data suggest that 71-72 percent of Nairobi's households have piped water (in-house connections or yard taps) and that 52 percent have electricity connections. In other words, city-level averages mask a high level of inequality in infrastructure access; Nairobi's slums lag city-wide averages by 50 percentage points in terms of connections to piped water and by 30 percentage points in terms of electricity connections.

The housing units are mostly illegal, sub-standard in quality, and crowded. Yet the rents are high. Unlike in many other cities of the world, an extraordinary 92 percent of the slum dwellers are rent-paying tenants (rather than "squatters" who own their units). Unit owners are mostly absentee landlords who seem to be operating a highly profitable business in providing shelter to the poor. In sharp contrast to the widely-held notion that slums provide low-quality, low-cost shelter to a population that cannot afford better standards, we find that Nairobi's slums provide low-quality but high-cost shelter.

Slum dwellers have poor access to gainful employment. About 49 percent of adult slum dwellers have regular or casual jobs and 19 percent work in a household micro-enterprise, but at least 26

percent are unemployed. Unemployment rates are highest among youth (age 15-24) and women—46 percent of the youth and 49 percent of the women report that they are unemployed. This is problematic not least because the presence of an unemployed member in a household is strongly correlated with poverty.

At the household level, micro-enterprises are helping diversify the income portfolio and appear to be assisting in the struggle against poverty. About 30 percent of households report that they operate an enterprise and, encouragingly, ownership of an enterprise is negatively correlated with poverty. Strikingly, as compared to male-headed households, female-headed households are more likely to be operating an enterprise and using these to gainfully employ adults in the household. Additional research is required to better understand the mechanisms through which micro-enterprises can or do affect poverty. At the very least, the presence of these enterprises indicates that there is significant and relatively successful entrepreneurial activity in the slums; these enterprises appear to be worthy of some attention from public institutions and development agencies.

The story on education is very encouraging but deserves more attention. About 78 percent of adult slum dwellers report that they have completed primary school. Even more important, as many as 92 percent of school-age children are actually enrolled in school. These school enrollment rates are higher than the levels reported for Nairobi as a whole in the 1999 census and in the 2003 K-DHS; this seems to be a positive outcome of the introduction of free primary education in January 2003. This finding, *albeit* preliminary, brings into question some of the negative assessments regarding the effects of the free education policy on net enrollment.

Both the high rate of school enrollment among children and the relatively high primary-school-completion rate among adults are causes for optimism. Better still, and as we would hope, we find that higher education levels are positively correlated with income and negatively correlated with poverty among slum households. This is not to argue that all is well regarding education in the slums. Rather, it is to suggest that it is both important and worthwhile to continue working on education challenges in urban slums. Specifically, more work is required to enhance educational levels beyond primary schooling, reduce both the gender and welfare gap in education among slum dwellers, and address their concerns about the quality of primary school education.

Finally, a systematic comparison between poor and non-poor households reveals five types of non-monetary factors that are positively correlated with household poverty in the slums: (i) household demographics—specifically, households that are large in size and have a high proportion of women; (ii) lower education levels; (iii) lack of ownership of a micro-enterprise; (iv) unemployment in the household; and (v) lack of access to infrastructure, in particular, electricity and water supply. Given their strong correlation with poverty, these five factors can and should serve as a basis—a starting point—for the design of any poverty-alleviation efforts in the slums.

Policy and program implications

Overall, living conditions in Nairobi's slums are bleak and the incidence of poverty is high. But there is hope, not least because slum dwellers are educated, entrepreneurial, enfranchised, and seemingly able to enhance their economic welfare over time. Not only is there need for developmental action in these settlements but also the economic and social returns to well-chosen and well-designed programs are potentially very high. There is also crude evidence that previous

slum upgrading efforts, despite having been extremely modest in scale and scope, have created some benefits.

What should the government prioritize? The slum dwellers themselves identify their top four development priorities as toilets, water, health, and electricity. Their priorities resonate strongly with the technical analyses. In fact, the technical analyses and residents' priorities have a clear area of overlap—infrastructure. Investments in infrastructure—such as water, sanitation, paved paths and electricity—can help achieve improvements in several of the factors correlated with poverty as well as address some of the health concerns of slum dwellers. In addition to infrastructure, education deserves to be a high priority in the slums. Although the "free primary education" program is meeting the basic need of getting children enrolled in school, residents' concerns regarding overcrowding and quality need to be reviewed and addressed. Equally important is the need to reduce the welfare and gender gaps in secondary school completion rates.

Area-wide programs or sector-specific ones? In education, an independent sector-specific approach makes sense and can work. In terms of addressing various infrastructure deficiencies, we would argue that any serious and sustainable improvements will require a multi-sector and area-wide approach, given the base conditions in Nairobi. Also, unlike in many other cities, this is a case where housing issues need to be dealt with alongside infrastructure. In fact, if we were asked to identify just one entry point—that is, one sub-sector—into the problem of living conditions in the slums, it would be the structure of the housing market. We would argue that a key goal of any efforts in Nairobi's slums should be to break the low-quality, high-cost trap in slum housing and infrastructure, and that the only way to get there is to start discussions with both landlords and tenants.

1. Introduction

In developing countries, an estimated 870 million people were living in urban slums in 2001 (UN Millennium Project 2005). If current trends were to continue, the number of slum dwellers will grow to an estimated 1.43 billion by 2020 (UN Millennium Project 2005). World leaders and development agencies are again—after a significant hiatus—displaying their concern about the issue and slums appear to be back on the core development agenda. Indeed, at the United Nations Millennium Summit in 2000 and subsequently at the Johannesburg Earth Summit in 2002, world leaders agreed to a set of time-bound, measurable, and highly influential development targets—widely known as the Millennium Development Goals—which include a commitment to significantly improve the lives of 100 million slum dwellers by 2020 (UN 2003).

The commitment to improve the lives of slum dwellers is well-intentioned and important, but the task of achieving this goal is fraught with problems. First, there is little information and understanding of the scale and nature of urban poverty in general, and the situation in slums in particular. [1] Second, a whole generation of earlier efforts—starting in the 1970s—to upgrade urban slums has, at best, been only partially successful.[2] Third, not only is the scale of the slum problem growing rapidly in most cities of the developing world but it is also widely acknowledged to be increasingly complex—politically, institutionally, and, at times, technically—and therefore beyond the scope of simple and modest solutions. Overall, the urban slum problem appears to be a black box in terms of its nature and dynamics, is somewhat daunting in scale and scope, and often competes for policy attention and resources with the task of rural poverty alleviation.

In Sub-Saharan Africa the slum problem is particularly acute. Africa is the world's fastest urbanizing region and its poorest continent. In countries such as Kenya and Senegal, along with urbanization, the incidence of urban poverty is also increasing. Informal or slum settlements are absorbing an increasing share of the expanding urban population and are home to the vast majority of the urban poor. These settlements are generally characterized by high population densities, limited or non-existent urban services, and low-quality housing stock. Here, even more so than in other regions of the world, the scale and nature of these settlements—even basic population and demographic indicators—remain a source of much contention and debate. Such ambiguity makes it difficult to justify, design and implement appropriate programs for the poor living in these settlements and even harder to assess the impacts of policies and programs that do get implemented.

A first task in most cities, then, is to figure out what is in the black box called slums and to agree upon priorities for action in that city. How many slums dwellers does the city have? Who are they and how poor? What aspects of their current quality of life need to be improved—should the priority be jobs or education or infrastructure or reduction of violence or some combination of such efforts? What are the factors that are currently helping slum dwellers in their own quest for physical, economic and social upward mobility?

This study was designed to fill gaps in our knowledge about slums in two African cities—Nairobi and Dakar. Drawing on detailed surveys of households residing in slums—1755 and 1960 households in Nairobi and Dakar, respectively—this study aims to develop a demographic,

[1] Until recently both development programs and research efforts have been focused on rural poverty. This is just starting to change with recent studies that show that poverty is not entirely a rural phenomenon, even in a region such as Sub-Saharan Africa, and that in some countries, such as Kenya, urban poverty has been rising faster than rural poverty.
[2] See, for example, Gulyani and Basset (forthcoming) and Basset et al. (2003).

economic and infrastructure profile of slum settlements in these two cities. Analytically, it focuses on the following questions: how poor and inadequately served are slum dwellers in Nairobi and Dakar? What are the factors correlated with poverty among slum households in each city?

In this paper we present results for Nairobi. The following findings and related arguments are worth highlighting upfront.

First, the incidence of economic poverty is very high in Nairobi's slums and it is accompanied by horrible living conditions and other forms of non-economic poverty. The majority of slum dwellers fall below an expenditure-based absolute poverty line. At the same time, their access to basic services such as water, sanitation, electricity, and transportation is far worse than anticipated—the conditions raise serious public health concerns and cannot but have a negative impact on overall productivity and well-being.

Second, Nairobi's slums provide low-quality but high-cost shelter. This finding directly challenges the widely-held notion that slums provide low-quality, low-cost shelter to a population that cannot afford better standards. The conventional understanding is that, on the one hand, the quality of slum housing tends to be poor because of a combination of informality of tenure, use of low quality building materials and construction methods, and disregard of (legally-specified) minimum space/planning standards. On the other hand, these lower standards result in housing that is cheaper and thereby affordable for lower-income people. While this may be the case in the slums of some cities, it is not true in Nairobi—slum dwellers in Nairobi, most of whom are very poor, are paying a lot for their sub-standard housing.

Third, somewhat encouragingly, there is heterogeneity among Nairobi's slums dwellers, their living conditions, and their economic welfare. The people living in the slums are very poor but not universally so. Many are rural immigrants but a large proportion appears to have immigrated from other urban areas. Access to infrastructure services is very poor but a small proportion of slum households have managed to gain access to services such as electricity and private piped water connections. Education levels vary significantly both among and within households, but at least they are not universally low. Although many households have at least one unemployed adult, their economic portfolios include some combination of a regular job, casual work, and/or household micro-enterprises. Each of these micro findings is interesting in itself and is discussed in detail in the paper to provide sector-specific insights. Taken together, these micro findings suggest that the situation is not universally bleak and there are at least a few positive factors that can be built upon to foster economic and physical development in these slums.

Fourth, a systematic comparison between poor and non-poor households reveals five types of non-monetary factors that are strongly correlated with poverty in the slums: (i) household demographics (size and gender and age composition); (ii) education; (iii) ownership of a micro-enterprise; (iv) unemployment in the household; and (v) infrastructure access, in particular electricity and water supply. A slum household is more likely to be poor, the larger its household size and the more the number of women in the household. Households who own a micro-enterprise are less likely to be poor, while those with even one unemployed adult are more likely to be poor. As the education level achieved by any member of the household rises, the likelihood of being poor falls. Finally, poor households are systematically and disproportionately less likely to have access to either electricity or a private piped water connection. Given their strong correlation with poverty, these

five factors can and should serves as a basis—a starting point—for the design of any poverty-alleviation efforts in the slums.

Fifth, slum dwellers' own development priorities—a first proxy for "demand"—resonate strongly with the technical analyses. When asked to choose among competing investments, slum dwellers identified their top four development priorities as: toilets, water, health, and electricity. Their priorities, combined with the technical findings, provide a clear framework for action in the city's slums.

Sixth, although upgrading efforts in the slums have been piece-meal and modest thus far, they do appear to have created some benefits. For every 10 slum households who noted that a given sector-specific intervention had occurred in their neighborhood, nine said that it was working and that the situation was better than before. Additional analyses, using the case of the water sector, support their general comment—we find that indicators such as price, service access, and users' perceptions regarding price and quality of their water supply are all better in areas that have had a "water improvement" project as compared to those that have not. Although the degree of improvement in each water service indicator is small, it is nonetheless statistically significant and, therefore, encouraging.

The paper is structured as follows. Section two outlines the research methodology and the data. Section three estimates poverty incidence in the slums and identifies factors correlated with poverty. Sections four through nine present both descriptive data and analyses on each of the following topics: demographics, economic base, housing, previous residence of "emigrants," infrastructure, and education. Section 10 summarizes the development priorities of slum dwellers and Section 11 presents conclusions and policy implications.

2. Research methodology and the data

In February/March 2004, a household survey was administered in Nairobi's slum settlements. A total of 1755 households were surveyed in 88 Enumeration Areas (EAs). The sampling frame was constructed as follows. For census purposes, Kenya's Central Statistics Bureau (CBS) has divided Nairobi into about 4700 EAs, of which 1263 as categorized as "EA5" or "informal settlements." EA5s are characterized by poor-quality sub-standard housing and poor infrastructure.[3] The 88 EAs in our sample were selected randomly from the subset of 1263 EA5s and weighted by population. As the lists of households had not been updated for a few years, a complete re-listing was conducted in each selected EA and the sample households were selected randomly from the new lists. CBS not only collaborated in designing the sampling frame of this study, but also took responsibility for the field-based re-listing of households in the 88 EAs.

[3] CBS' methodology for creating the five categories (EA1-EA5) is presented in Annex 8; the definition for EA5 is excerpted here for ease of reference. While other categories (EA1-EA4) are largely formal planned settlements, the last category (EA5) is largely composed of informal settlements. An EA5 area "has characteristics that distinguish it clearly from the rest of the categories. The structures are largely temporary, made of mud-wall or timber-wall with cheap roofing materials, which may be iron sheets, makuti, grass or even nilon paper or cartons. The infrastructure in these areas is relatively poor as there is no proper sanitation, no clear roads for entry and even water is not connected to the dwelling structures. The following types of area fall in this category: Mkuru Kwa Njenga, Korogocho, Laini Saba, Silanga, Soweto, Kamuthii, and Mathare Valley. … It is characteristic that, close to most of the high-income areas, there are informal settlements. However, our consideration is what would be the mean in terms of the facilities among all the residents of the areas in the categories. However, where a slum is neighboring a class, which is higher, the slum within that locality will be identified and placed in its appropriate category."

Overall, this is a population-weighted stratified random sample and it is representative of the 1263 EAs categorized as "informal settlements" by CBS.[4] Further, to complement the quantitative survey, qualitative studies—community questionnaires and focus group discussions—were conducted in 10 of the survey sites.[5]

To the best of our knowledge, this is one of few large-sample, multi-sectoral, and representative surveys of slum households conducted, thus far, in the city. One other comparable dataset is APHRC's study of 4564 slum households, but it focuses almost entirely on health issues (APHRC 2002). Indeed, the existence of the APHRC study—combined with the need to keep household interviews of reasonable length and complexity—is a key reason why our study examines several development sectors other than health.

2.1 Nairobi's population and estimates regarding the number of slum dwellers

In the 1999 national census, Nairobi's population was found to be 2.139 million and slums accounted for 0.6 million people or about 30 percent of the city's population.[6] By contrast, estimates in the grey literature (e.g. consulting studies, reports by NGOs and aid agencies, etc.) are significantly higher. For instance, a study conducted in 1993 estimates that 55 percent of Nairobi's population lives in slums (Matrix Consultants/USAID 1993 cited in Adler 1995). There are at least two possible explanations for the divergence in estimates. First, it is highly likely that CBS and the other researchers use different boundaries for Nairobi—that is, several of the studies prepare estimates for the entire Nairobi metropolitan area and include slum settlements that are on the periphery of the city's administrative boundaries; using CBS' categorization means that people residing in slums on the city's periphery but outside its administrative boundaries are excluded in the estimate. Second, it is possible that the CBS has underestimated the number of EAs that are slum EAs—that is, it may have mis-categorized some of the EAs either accidentally or by using too narrow a definition.

Clearly, additional research is required to resolve this issue. Meanwhile, and for the purposes of this study, the categorization used by CBS offers a more robust (but, possibly, conservative) starting point than the approaches and estimates used in other studies. We see this number—0.6 million slum dwellers in 1999—as establishing a "floor" or minimum number of slum dwellers in the city; it is entirely possible that the actual number is higher. The sampling and results of this study, therefore, pertain to the universe of 0.6 million slum dwellers.

3. Poverty in Nairobi's slums

Recent studies in Kenya have noted that urban poverty has been increasing faster than rural poverty. In 1992, 29 percent of the people living in urban areas fell below the poverty line compared to 48 percent of those in rural areas (CBS 2000 cited in APHRC 2002). By 1997, the poverty rate in urban

[4] A similar household survey was conducted in Dakar's slums to allow for a comparative analysis with Nairobi and to establish a base for comparative studies, in the future, with other cities. The Dakar survey covered 1960 households selected randomly from a stratified random sample of 168 EAs, from a universe of 2074 EAs in the city. The results from Dakar are not presented in this paper.

[5] In addition, about 100 households were surveyed in nine EAs selected from known "sites and services" (S&S) schemes, that is, areas that were developed under donor projects between the late 1970s and mid-1980s to provide affordable housing plots with basic services for low-income residents of Nairobi. These data will allow for a separate (but rather preliminary) comparative analysis of households living in slums versus S&S schemes.

[6] Between 1989 and 1999, Nairobi's population growth rate was about 4.8 percent per annum.

areas had increased to an extraordinary 49 percent, while that in rural areas increased modestly to 53 percent (CBS 2000 cited in APHRC 2002). Urban areas now not only have a high poverty rate, but are also highly unequal—the country's first rigorous poverty mapping exercise reveals this very graphically (CBS 2003). For the case of Nairobi, the poverty mapping exercise estimated the poverty rate at 44 percent, with poverty headcount varying from below 20 percent in the richest district to over 70 percent in the poorest districts of the city (CBS 2003). These numbers are calculated by using proxy indicators (such as access to water and quality of housing) rather than actual income or expenditure data. This means, for instance, that residents of slum settlements—because they have poor quality housing and infrastructure—are almost by definition classified as poor.

To move our understanding of urban poverty a step further, this study takes a closer look at both the level and nature of poverty within slums. For this, we use both monetary and non-monetary indicators of poverty and analyze the linkages between them. In this section, we first discuss monetary indicators of poverty and explain the measure selected to disaggregate slum households into two welfare categories—"poor" and "non-poor." We then use multivariate analyses to examine which non-monetary factors are correlated with poverty in the slums.

3.1 Disaggregating "poor" and "non poor" households

For the purpose of this study, we used four different rapid assessment techniques to ascertain poverty rates in the slums. As a first measure, a household-specific poverty line was calculated for each household—to adjust for household size and age composition—and respondents were asked whether their total monthly expenditure was above or below the computed amount.[7] In addition to this "discrete" (yes/no) measure of poverty, two "continuous" measures of household welfare were also computed—per capita income per month and per capita expenditure per month. These were derived for each household from self-reported total monthly income and the total monthly expenditure that they incur in a typical month. Households were also asked to report actual spending on selected items—such as food, rent, utilities and transportation—in the previous month and these allowed for a cross-check on total expenditures reported. Finally, household assets were documented to allow for factor analyses and computation of a relative ranking of wealth.

The discrete measure—an expenditure-based poverty line—was the one selected to disaggregate the sample into poor and non-poor households. This measure was selected because it is based on and fully consistent with the Government of Kenya's (GoK) own methodology for assessing poverty in the country. Specifically, we take the 1999 poverty line as defined by the GoK and adjust it for actual inflation to calculate the poverty threshold for 2004. [8]

Using this expenditure-based poverty line—defined as an expenditure of Ksh 3,174 (US$42) per adult equivalent per month, excluding rent—about 73 percent of the slum households are "poor"

[7] For instance, a household comprised of two adults and a child of 5-14 years of age was asked whether their expenditure in the previous month was above or below Ksh 8411.

[8] For information on Government of Kenya's poverty line see World Bank (2003). We adjusted for inflation using the Consumer Price Index (CPI).

and 27 percent are "non-poor."[9] A first check of whether this categorization works is to examine basic indicators/statistics for the two groups. Indeed, as the multitude of indicators presented in Sections 4-9 will show, the two welfare groups differ in ways that are fully consistent with expectations—that is, households categorized as poor are, as a group, invariably worse off than those categorized as non-poor with respect to indicators such as income, expenditure, education, and infrastructure access.[10]

The results of the regression analyses below, combined with the descriptive statistics presented in the rest of the paper, confirm that self-reported data on three key monetary variables—per capita income, per capita expenditure and "poor" household—are internally consistent; they hold up very well under various consistency checks and relate to each other as one would expect. Reliable income data are usually hard to obtain and most other household-level analyses tend to rely on expenditure data. In our survey, however, incomes reported by households appear to be highly reliable and consistent with theory. Further, we find that income-related variables have strong explanatory power—specifically, per capita income emerges as a powerful variable for explaining differences between poor and non-poor households as well as in explaining variation in indicators such as rent. Consequently, unlike many other studies that focus on welfare analyses, we frequently use income-related variables (instead of relying entirely on expenditure-related variables) in various types of analyses presented in this paper.

3.2 Non-monetary factors influencing poverty, incomes and expenditures: Multivariate regression analyses

What non-monetary factors, when examined *simultaneously*, are significantly correlated with poverty, incomes, and expenditures? A multivariate regression was run for each of three variables related to monetary welfare—"poor," per capita income per month, and per capita expenditure per month—taken as the dependent variable. For each of the three regressions, we include the same set of non-monetary independent variables reflecting relevant household and neighborhood characteristics, which can be grouped into the three following categories:

1. Aggregate household level characteristics: The variables included here are household size, household composition in terms of age and gender, maximum education level within a household, and duration of stay or years lived in the current settlement. Also included is the following set of dummy (yes/no) variables: whether at least 1 adult (individual of age 15 years or more) in the household has regular employment, whether at least 1 adult in the household is unemployed, whether they operate a household enterprise, own a home outside Nairobi, are tenants in Nairobi (vs. owners), moved to their current settlement directly from a rural area (proxy for rural origin), whether the household has access to electricity, and whether the household has access to piped water.

[9] Adult equivalents are calculated as follows: children of age 0-4 are allocated a weight of 0.24 adult equivalents, children of age 5-14 are 0.65 adult equivalents and individuals of age 15 or more are 1.0 (or "adult").

[10] As an additional check for data consistency, we used univariate analyses to test whether the selected poverty measure is correlated to other monetary indicators as we would expect. The results show, as we would anticipate, that the likelihood of being categorized as "poor" is strongly negatively correlated, at a 1 percent significance level, with both per capita income and per capita expenditure in the household (see Annex 1). In other words, there is internal consistency between the category "poor" and the data on income and expenditure.

The household age-composition variable is constructed as the ratio of "total number of persons in a household" to "total number of adult equivalents in the household." The variable thus has a minimum value of 1 (when all persons in a household are adults) and increases as the proportion of children in a household rises. The household gender-composition variable is constructed as the proportion of adult females among the total number of adult persons in a household.

2. Household head characteristics: The variables included here are age and gender of the household head. The latter is included as a dummy variable which takes a value of 1 if the household head is male.

3. Neighborhood location and characteristics: To control for location and any other unobserved expected differences across neighborhoods, we include dummy variables for the eight divisions in which our survey households reside. In addition, a dummy variable is included to investigate the relationship of the dependent variable with neighborhood-level infrastructure improvements. This is a constructed variable/index aimed at measuring whether the slum EA in which a household resides has had a significant number of development interventions (projects or programs).[11]

Results from multivariate regression analyses

Table 1 summarizes the results of three multivariate regression analyses and shows which of the non-monetary independent variables are correlated with: (a) a household's likelihood of being poor (versus non-poor); (b) its per capita income; and (c) its per capita expenditure. The table indicates the level of statistical significance (i.e. one percent, five percent or 10 percent) for each variable, and all variables that are significant at a level of 10 percent or less are discussed below.

(a) Poor versus non-poor households

A logistic regression was conducted with the category "poor" as the dependent variable. As Table 1 shows, 12 non-monetary variables have a statistically significant correlation with poverty. The likelihood of being poor is strongly correlated with a household's size and composition. A household is more likely to fall into the category of "poor" the larger the number of people in the household and the greater the proportion of women in the household. There is no statistically significant relationship between either of the two household head characteristics—age and gender—and the likelihood of the household being poor. This suggests that the characteristics of the household head *per se* have very little systematic impact on poverty as compared to other aggregate household-level characteristics.

In terms of a household's economic base, having even one unemployed adult in the household increases the likelihood of being poor. By contrast, ownership of a household enterprise is negatively correlated with poverty. This is somewhat encouraging because, as we will see, a significant proportion of slum households do own and operate small enterprises.

In addition to household enterprises, the following three factors are negatively correlated with poverty—education, length of stay in the settlement, and ownership of a home outside of Nairobi.

[11] See Annex 8 for details regarding the construction of this variable.

First, a household's likelihood of being poor falls as the maximum education attained by any member of the household rises. This is also an encouraging finding and suggests, as we would hope but can never assume, that investment in education is paying off for slum households. Second, as a household's length of stay in the settlement increases, its likelihood of being poor falls. One could speculate on the reasons. On the one hand, this may be an indication that many of the poor households leave the slums after struggling for a few years. On the other hand, it may well be that over time households tend to do better—perhaps with time they manage to deepen their social and economic networks and/or learn to better navigate the city's complex economy. Third, households that own a home outside of Nairobi are less likely to be poor, but land ownership outside the city does not have any correlation with poverty. This finding suggests that certain (but not all) types of external assets and linkages may be helping slum households stay out of poverty.

Poor households are less likely to have access to infrastructure services—in particular, electricity and piped water (either an in-house connection or a yard tap). As we will see subsequently, access to infrastructure in the slums is highly inadequate in general. But poor households are systematically less likely to have access and this is especially true in the case of electricity and water connections.

With respect to the location or division in which households reside, we find that those residing in Dagoretti are less likely to be poor as compared to those residing in the Central division (with the latter taken as the "base"). Finally, we also find that households residing in an EA with a higher number of development (infrastructure/social) interventions are more likely to be poor. Specifically, we constructed a variable to measure (*albeit* roughly) the number of development interventions or improvement efforts in an EA and found it to be positively correlated with poverty. The finding that households residing in "medium intervention" areas are poorer than those in "low intervention" slum areas appears to suggest that the interveners intended to and succeeded in targeting aid to the poorest areas within the slums.

(b) Per capita income

Per capita income is computed by dividing reported monthly household income by the total number of members in the household. Unlike the computed poverty line, this variable is not adjusted to reflect adult equivalency. The regression results show that nine non-monetary variables have a statistically significant correlation with the per capita incomes of slum households (Table 1).

Per capita income falls as household size increases, as proportion of children increases (relative to adults), and as the proportion of women among adults increases. Also, the presence of an unemployed adult in the household has a strong negative impact on per capita income.

On the other hand, as the maximum education level in the household rises, per capita incomes also rise. There is also a positive correlation between per capita income and ownership of a home outside Nairobi. Further, as per capita incomes rise, so does access to electricity and piped water.

Finally, two locations or divisions in which households reside—Westlands and Dagoretti—show statistically different effects compared to the "base" division (Central). While the households residing in Westlands are found to have systematically lower per capita income as compared to those residing in the Central division, the opposite holds true for those households residing in Dagoretti.

(c) Per capita expenditure

Per capita expenditure is computed by dividing total basic expenditure in a typical month by the total number of members in the household; it is not adjusted to reflect adult equivalency. The regression results show that eight variables have a statistically significant correlation with the per capita expenditures of slum households (Table 1). As one would expect, results for the "per capita expenditure" regression analysis are very similar in nature to those for per capita income—that is, most of the same non-monetary variables emerge as statistically significant correlates of both per capita income and per capita expenditure. This offers additional confirmation and assurance that data reported by households on their income and expenditure are consistent with each other.

Among slum households, per capita expenditure falls as household size increases, as the proportion of children increases (relative to adults) and as the proportion of women increases. The presence of an unemployed adult in the household has a strong negative impact on per capita expenditure.

There is a positive relationship between a household's per capita expenditure and the following variables: years lived in the current settlement, access to electricity, and access to piped water. In terms of location, two divisions—Dagoretti and Kibera—show a statistically different effect compared to the "base" division (Central). The households residing in both these divisions are found to have systematically higher per capita expenditures as compared to those residing in the Central division.

Table 1: Summary of multivariate regression analyses

	Per capita household income					Poor (w.r.t expenditure per adult equiv)					Per capita household expenditure				
	Coef.	Std Error	T-stat	P-value		Coef.	Std Error	T-stat	P-value		Coef.	Std Error	T-stat	P-value	
Constant	6620	610	10.9	0	***	2.41	0.8	3	0.003	***	5000	470	10.7	0	***
Number of household members	-570	40	-13.5	0	***	0.94	0.13	7.1	0	***	-350	30	-13.5	0	***
Household age composition	-2160	280	-7.8	0	***	-1.78	0.57	-3.1	0.003	***	-1460	150	-9.9	0	***
Proportion of women among adults in HH	-1450	220	-6.4	0	***	0.66	0.34	1.9	0.058	*	-620	150	-4.1	0	***
Max level of education in household	430	80	5.4	0	***	-0.41	0.11	-3.9	0	***	90	60	1.4	0.159	
At least one individual regularly employed	160	130	1.3	0.216		-0.19	0.14	-1.4	0.171		10	80	0.1	0.898	
At least one individual unemployed	-730	90	-8	0	***	0.61	0.18	3.4	0.001	***	-380	80	-4.9	0	***
Have operated enterprise in last 2 weeks	170	150	1.1	0.264		-0.36	0.18	-2	0.054	*	0	70	0	0.964	
Age of household head	10	10	1.1	0.289		-0.01	0.01	-0.7	0.507		-10	10	-1	0.301	
Female head of household	140	130	1.1	0.288		-0.08	0.29	-0.3	0.787		60	80	0.8	0.43	
Years resided in current settlement	10	10	0.9	0.388		-0.03	0.01	-3	0.003	***	20	10	2.9	0.004	***
Medium intervention settlement	-190	130	-1.5	0.149		0.51	0.26	2	0.055	*	-10	90	-0.1	0.929	
Rent home	-140	240	-0.6	0.571		0.3	0.31	1	0.333		-10	140	-0.1	0.962	
Own home outside Nairobi	230	130	1.7	0.094		-0.55	0.17	-3.2	0.002	***	120	90	1.4	0.155	
Previous residence in rural area	-30	110	-0.3	0.751		0.17	0.12	1.4	0.176		-100	60	-1.6	0.119	
Have electricity	550	160	3.5	0.001	***	-1.06	0.21	-5	0	***	430	130	3.4	0.001	***
Have piped water (in-house or yard tap)	340	150	2.3	0.022	**	-0.41	0.22	-1.9	0.068	*	260	110	2.3	0.022	**
Division															
1. Central (base for analyses)	-	-	-	-		-	-	-	-		-	-	-	-	
2. Makadara	200	200	1	0.329		-0.07	0.26	-0.3	0.783		-10	130	-0.1	0.924	
3. Kasarani	340	230	1.5	0.144		-0.36	0.38	-1	0.341		50	120	0.4	0.664	
4. Embakasi	-270	210	-1.3	0.213		-0.15	0.3	-0.5	0.622		190	140	1.4	0.167	
5. Pumwani	-240	170	-1.4	0.174		0.23	0.42	0.6	0.583		-170	150	-1.2	0.248	
6. Westlands	-630	300	-2.1	0.04	**	0.05	0.46	0.1	0.914		-150	190	-0.8	0.424	
7. Dagoretti	340	170	2	0.052	*	-0.75	0.29	-2.6	0.011		510	120	4.4	0	***
8. Kibera	270	180	1.5	0.146		-0.36	0.26	-1.4	0.177		280	130	2.2	0.032	**
	N=1378	R^2=0.470	F(23,65)=68.54			N=1723	F(23,65)=9.12				N=1722	R^2=0.369	F(23,65)=41.5		

Note: Statistical significance indicated by asterisks. ***=1%, **=5%, *=10%.

4. Who lives in Nairobi's slums? Demographics, household types and composition

In the slums, the average household is comprised of three members and is male-headed. This general statement, while true, masks a significant amount of variation in household types and composition. In this section we examine population demographics and characteristics of slum households, with a special emphasis on characteristics or variables that distinguish the poor from non-poor households. We also examine differences between male-headed and female-headed households.

For the purposes of this paper, "adults" are defined as individuals of age 15 years or more. Those in the age group 5-14 years are referred to as "school-age children" and those who are less than 5 years of age are referred to as "young children." These three categories are also used to calculate "adult-equivalents" where children of age 0-4 are allocated a weight of 0.24 adult equivalents, children of age 5-14 are 0.65 adult equivalents and individuals of age 15 or more are 1.0 (or "adult"); this weighting is often used by the Government of Kenya in its poverty assessments.

4.1 The population pyramid: Gender and age profiles of slum dwellers

In the slum population, *there are more males than females, the ratio being 55:45* (Table 2, Figure 1, and Annex 2). Although a greater proportion of young children are female (51 percent), a greater proportion of both school-age children and adults are male (51 percent and 58 percent, respectively).

There are more adults than children, their ratio being 66:34. Further, as the population pyramid in Figure 1 clearly shows, adults in the age group 20-34—that is, young working-age individuals—comprise a large proportion of the slum population. When compared to population pyramids for the country as a whole and its urban and rural areas, presented in Annex 2, *slums have disproportionately few children*.

These data are consistent with the prevailing notion that young men come to the city to look for jobs, leaving their families behind in rural areas. It is also widely acknowledged that these young men send remittances back to their families. As we will see, the data do support this notion, but also point to a fair amount of diversity among household types and in remittance patterns.

4.2 Household size and composition

In Nairobi's slums, the average household size is 3.0, with the poor households reporting an average of 3.4 members compared to 1.9 for non-poor households (Table 2). By comparison, mean household size is 3.2 for Nairobi city as a whole and 3.4 for urban Kenya (Census 1999). As noted earlier, *household size is a key factor influencing incomes, expenditures and poverty in the slums.* With increasing household size, slum households' per capita income and expenditure fall, and the likelihood of being poor increases significantly.

The relatively small household size in the slums is attributable, in part, to the *high proportion of single-person households*—they account for almost a third (32 percent) of all slum households. By comparison, 23 percent of urban households in Kenya and 22 percent of Nairobi households have one household member (K-DHS 2003, Table 2.2).

A second factor that appears to be contributing to the small household size is the *emergence of split residences*—that is, members of one family often need to live in separate units, either in the same

settlement or in other parts of the city, due to space and housing constraints. This issue, identified through qualitative research, suggests that the small household size in Nairobi's slums does not necessarily imply that families are having few children. Nor should the average household size of 3.0 be construed to mean that the typical slum household is comprised of a couple with one child.

Proportion of children. Multivariate regression analyses show that *as the proportion of children increases relative to adults, per capita income and expenditure in the household fall.* Given that the poverty threshold is established in terms of adult equivalents, however, a household with more children (i.e. fewer adult equivalents) is less likely to be categorized as poor in comparison, for instance, to another household of the same size with more adults (and the same total household income or expenditure).

Ratio of women in the household. In poor households, a greater proportion of adults are women (Table 2). Multivariate analyses confirm that *as the proportion of women among adults increases in a slum household, per capita income and expenditure fall significantly and its likelihood of being poor increases* (Table 1). The strong influence of gender on incomes, expenditures and poverty in our results, suggests that female slum dwellers are economically worse off than their male counterparts; this preliminary finding is examined in more detail in the next sub-section.

Head of household. Household heads are on average 35 years old and the majority of them are men. Female-headed households account for 18 percent of all households, but they account for a higher proportion of poor households (19 percent) than non-poor households (14 percent). Multivariate analyses show, however, that *neither the age nor gender of the household head is, in itself, a strong determinant of a household's income, expenditure and likelihood of being poor.* Rather it is the age and gender composition of the household taken as a whole that influences incomes, expenditures and poverty.

4.3 Female-headed households: Coping with the gender handicap?

At first glance, we seem to have somewhat conflicting results regarding the effect of gender on household welfare. On the one hand, multivariate analyses show that as the proportion of women among adults increases in a slum household, its likelihood of being poor increases. On the other hand, the same analyses also show that female-headed households are not systematically more likely to be poor.

To better understand why this is the case, we first examined education levels and employment access by gender. These analyses, presented in other sections of this paper, show that women are, indeed, operating with a gender handicap. *Female slum dwellers are more likely to be unemployed, have a lower level of education, and are less likely to have a wage-paying job.*

We then compared female-headed and male-headed households (Annex 3). The results show that the two groups differ significantly on virtually every count—21 of the variables examined show a statistically significant difference (at a ten percent level or less). These descriptive statistics show, interestingly enough, that *although female-headed households have several characteristics that are positively correlated with poverty, they also have several characteristics that work in the opposite direction* (i.e. are negatively correlated with poverty). Key insights from Annex 3 are discussed below.

Relative to male-headed households, female-headed households have, on average, lower per capita incomes and expenditures. Further, a higher proportion of them are poor—78 percent of female-headed households and 71 percent among male-headed households are poor. They also less likely to

be sending remittances—50 percent of female-headed households say they send remittances compared to 76 percent of male-headed households. There is a key difference in household composition—female-headed households have a significantly higher proportion of adult women (65 percent) relative to male-headed households (18 percent).

In terms of education, female-headed households are clearly worse off. While 90 percent of male-headed households have at least one member with primary education or higher, only 77 percent of female-households fall in that category. There is a similar gap with respect to secondary education—43 percent of male-headed households compared to 30 percent of female-headed households report having a member who has completed secondary education or more.

In terms of employment, female-headed households are significantly less likely to have a member with a wage-paying (regular or casual) job. On the other hand, a greater proportion of female-headed households operate household micro-enterprises and they are less likely to have a member who is unemployed. About 43 percent of female-headed families have started micro-enterprises that seem to have gainfully employed adults in their household and lowered the proportion of households with unemployed members. Given that poverty is positively correlated with unemployment and negatively correlated with household micro-enterprises, these female-headed households appear to have devised a good solution for offsetting their handicap in gaining access to jobs.

Female-headed households tend to be less mobile and have been staying in their current house and settlement for about 3-4 years longer than male-headed households. Female-headed households have, on average, been in their current settlement for 12 years and their current house for seven years. By comparison, male-headed households have lived in their settlement for eight years and their current house for four years. Given that duration of stay has a negative correlation with poverty, this is another factor that may be helping weaken the likelihood of poverty for female-headed households.

Compared to male-headed households, female-headed households have a higher rate of home ownership within the slums but a significantly lower rate of home-ownership outside Nairobi; it is worth restating that it is the latter that is negatively correlated with poverty. About 13 percent of female-headed households own their current home in the slums, compared to 7 percent of male-headed households. On the other hand, only 23 percent of female-headed households own a home outside Nairobi compared to 60 percent of male-headed households.

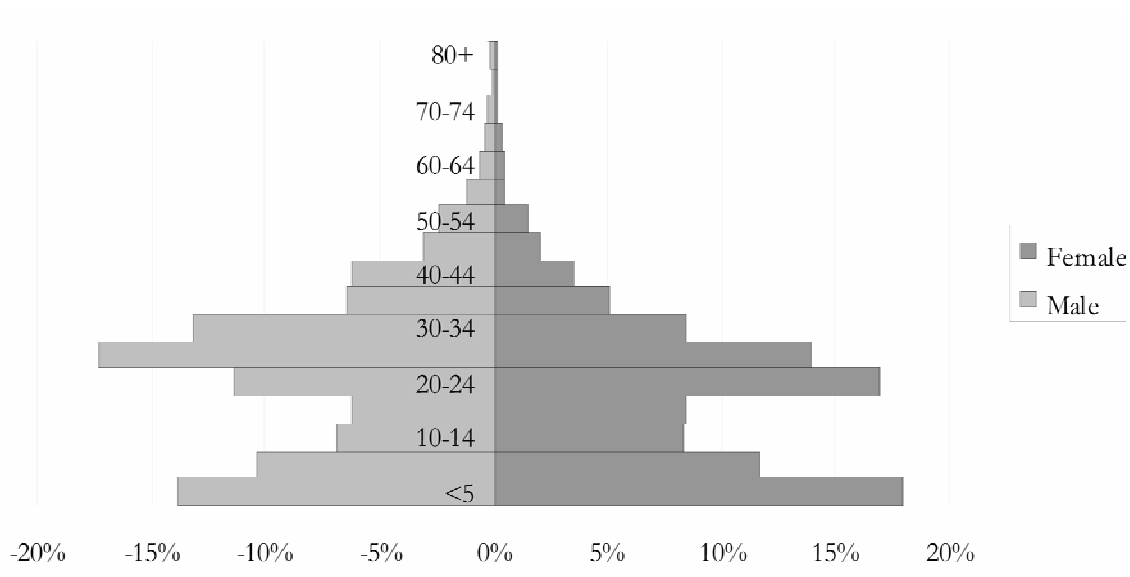
In terms of access to infrastructure and other services, *female-headed households are more likely to have an electricity connection but less likely to have a cell phone and a bank account.* Among female-headed households, 26 percent have electricity, 13 percent have a cell phone, and 23 percent have a bank account. Among male-headed households, 21 percent have electricity, 21 percent have a cell phone, and 32 percent have a bank account.

Overall, female-headed households appear to have devised coping strategies that are helping them offset some of the liabilities associated with poor access to jobs and education. They are not better-off than male-headed households, but at least they are not systematically worse off. Additional research is required to ascertain whether women in male-headed households are economically worse off than men in their household, and better or worse-off than women residing in female-headed households.

Table 2: Demographics, household size and composition

	All		Poor		Non-poor	
	N	Percent of total	N	Percent of total	N	Percent of total
Households (N)	1755		1282		473	
Household size (N)	2.97		3.38		1.88	
Single-person households (N, %)	560	31.9%	261	20.4%	299	63.2%
Female-headed households (N)	310	17.7%	244	19.0%	66	14.0%
Mean age of household head (yrs)	34.8		34.8		34.6	
Median age of household head (yrs)	32.0		32.0		32.0	
Age profile	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**
Age 0-4	825	15.7%	717	16.5%	108	11.9%
Age 5-14 (school age children)	976	18.6%	877	20.2%	99	10.9%
Age 15+ ("adults")	3455	65.7%	2751	63.3%	704	77.3%
Total no. of individuals	5256	100.0%	4345	100.0%	911	100.0%
Gender profile, male: female	**Ratio (N)**	**Ratio (%)**	**Ratio (N)**	**Ratio (%)**	**Ratio (N)**	**Ratio (%)**
Age 0-4	401: 424	49: 51	352: 365	49: 51	49:59	45: 56
Age 5-14 (school age children)	501: 475	51: 49	453: 424	48: 52	48: 51	48.5:51.5
Age 15+ ("adults")	1997: 1458	58: 42	1515: 1236	55: 45	482: 222	68.5: 31.5
All individuals	2899: 2357	55: 45	2320: 2025	53: 47	579: 332	64: 36

Figure 1: Population pyramid in Nairobi's slums



Note: See Annex 2 for population pyramids for rural and urban Kenya.

5. Economic base: Incomes, jobs and micro-enterprises in the slums

What are the income levels of poor and non-poor slum dwellers? What are their key expenditures? In what kinds of economic activities are they involved? What are the differences, if any, in the income portfolios of poor versus non-poor households and those that are headed by women? This section takes a closer look at such questions. Before presenting detailed data, we highlight four findings that are particularly striking.

First, the non-poor have significantly higher incomes than the poor but absolute expenditures on basics such as rent and electricity are similar across the two groups. The poor, consequently, seem to be coping by cutting back on expenditures over which they have more discretion—that is, food, water and "luxuries" such as transportation. They also seem to opting to forgo high-expense utilities such as electricity—relative to the non-poor, a significantly smaller proportion of the poor have electricity connections.

Second, although the majority (68 percent) of slum dwellers is economically active, the unemployment rate is high and stands at 26 percent. At the household level, almost all (97 percent) have at least one income-generating activity, but as many as 46 percent report that there is an unemployed person in the household. As we would expect, relative to the non-poor, poor households are far more likely to have an unemployed person in the household.

Third, and rather surprisingly, female-headed households report far lower unemployment rates than both male-headed households and poor households—29 percent of female-headed households, compared to 45 percent of those headed by males and 51 percent of the poor, report an unemployed adult in the household. A possible explanation may be that 43 percent of female-headed households are operating household enterprises that seem to be effectively employing some of the labor in the household.

Fourth, as many as 30 percent of the households operate an enterprise and they are systematically less likely to be poor. These enterprises appear to be providing an effective alternative to wage-employment (which is not easy to come by, at least for slum dwellers). And they also appear to be a key factor keeping female-headed households, who are operating with several handicaps, from being systematically poor.

5.1 Household incomes and expenditures

For the slum population as a whole, the average monthly per capita income of a slum household is Ksh 3705 (US$ 49) and the median income is Ksh 3000 (US$ 40)—that is, *half of the households in slums earn less than US$ 40 per capita per month.* Income levels among poor and non-poor households differ significantly. In fact, average per capita income among non-poor households is more than double that for poor households, Ksh 6023 and Ksh 2776 (US$ 80 and US$ 37) for the two groups, respectively (Table 3 and Figure 2). Median monthly per capita income among the non-poor is also more than twice as high—Ksh 5500 and Ksh 2444 (US$ 70 and US$ 33), for the non-poor and poor respectively.

When asked how much they spend on basics in a typical month ("to live"), households reported an average expenditure of Ksh 2500 (US$ 33), with the poor spending about Ksh 1900 (US$ 25) and the non-poor reporting an average expenditure of Ksh 4100 (US$ 55) per month. Households were

subsequently asked to report actual expenditures in two categories known to entail significant outlays—rent and food—and also on four key infrastructure services, that is, water, transport, electricity and garbage collection. These figures are reported in Table 3 and their shares in household income and expenditure are reported in Table 4. Density plots of key expenditures of poor and non-poor households are presented in Annex 4.

Compared to expenditures by poor households, the non-poor spend about twice as much on food, three times more on transport, and 1.5 times more on water per person per day. Yet, each of these expenditures accounts for a greater share of incomes of the poor relative to the non-poor. As a percent of monthly household income, food accounts for 43 percent for the poor and 37 percent for the non-poor. Transport expenditures account, on average, for seven percent of the income for the poor and 10 percent for the non-poor. For water, poor households spend three percent of their income while the non-poor spend two percent.

Apart from food, rent is one of the largest expenditures for slum households. As would be expected, *non-poor households spend more on rent—but, surprisingly, only about 20 percent more—than the poor* (Table 3 and Figure 3). Average monthly rent is Ksh 913 (US$ 12) for the non-poor and Ksh 753 (US$ 10) for the poor. Further, the median rent for non-poor households (Ksh 750 per month or US$ 10) is only 50 Ksh greater than that for poor households. *Share of rent in total income is remarkably similar for the two groups* as well—rent constitutes 11 and 12 percent of household income for non-poor and poor households, respectively. Rents are analyzed and discussed in more detail in the Housing Section.

The poor and non-poor spend similar absolute amounts on two infrastructure services—electricity and garbage collection—but these expenditures account for a larger proportion of the incomes of the poor. For the 10 percent of slum households who pay private providers for refuse collection, the expenditure is about Ksh 50 (US$ 1) per month and it does not vary much by household or by location. It accounts for 0.6 percent of income for the non-poor and 0.8 percent for the poor. Monthly electricity payments average Ksh 286 (US$ 4) for the 22 percent of households who have access; these expenses account for about 3 percent of incomes for the non-poor and 4 percent for the poor.

Figure 2: Cumulative plot of per capita household income[12]

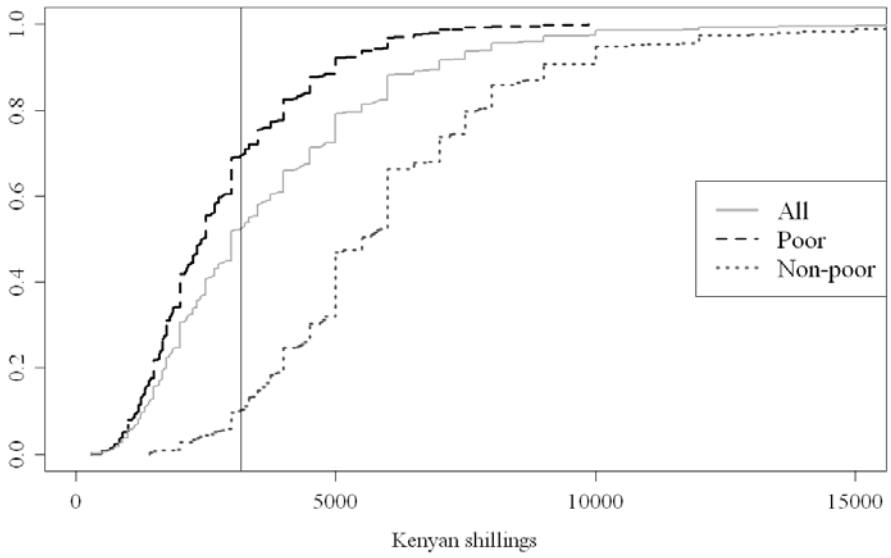
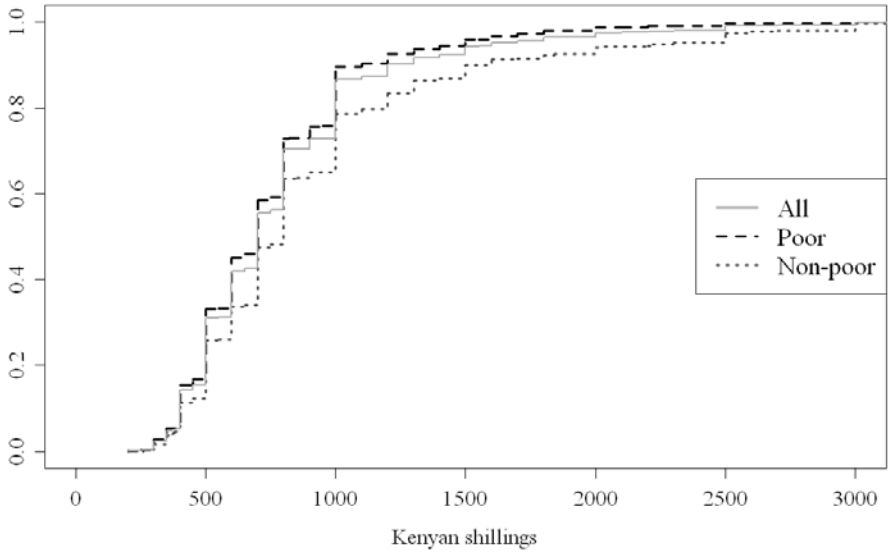


Figure 3: Cumulative plot of typical monthly rent



[12] Sample households are categorized as "poor" or "non-poor" based on a "0,1" classification using an expenditure-based (not income-based) poverty threshold.

TABLE 3: Incomes and Expenditures

	All HH			Poor HH			Non-poor HH		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
Per capita income in Ksh/month **	1400	3,705	3,000	1011	2,776	2,444	389	6,023	5,500
Per capita expenditure on basics in a typical month (Ksh) **	1754	2,493	2,000	1281	1,874	1,750	473	4,121	4,000
Per capita spending on food per day (Ksh) ***	1755	43.00	40.00	1282	34.31	31.00	473	66.04	60.00
Per capita spending on transportation per day (Ksh) ***	1754	9.68	4.00	1281	5.98	0.00	473	19.44	15.00
Per capita daily expenditure on water (Ksh) ***	1754	2.95	2.40	1281	2.57	2.00	473	3.95	3.00
Rent per month (Ksh) **	1601	797	700	1173	753	700	428	913	750
Household monthly spending on refuse collection (Ksh)	161	51	40	117	51	40	44	51	40
Household spending per month on electricity (Ksh) **	362	286	250	218	295	275	144	274	200

Note: (i) Statistical significance of difference between poor and non-poor indicated by asterisks. ***=1%; **=5%, *=10%.
(ii) The relevant exchange rate is US$1=Ksh75

TABLE 4: Share of major expenditures in total monthly income and expenses

	All			Poor			Non-poor		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
As percent of basic HH expenditure in a typical month									
Rent	1601	17.0%	14.6%	1173	17.0%	15.0%	428	16.9%	13.9%
Food	1754	58.8%	52.9%	1281	60.3%	54.5%	473	54.8%	48.0%
Transport	1753	11.4%	6.7%	1280	9.7%	0.0%	473	15.8%	13.3%
Water	1753	4.4%	3.6%	1280	4.8%	4.0%	473	3.4%	2.6%
Electricity	362	4.7%	4.0%	218	5.4%	4.2%	144	3.7%	3.1%
Refuse Collection	161	1.0%	0.8%	117	1.0%	0.8%	44	1.0%	0.6%
As percent of monthly HH income									
Rent	1282	11.7%	10.0%	927	11.9%	10.6%	355	11.3%	10.0%
Food	1400	41.2%	37.5%	1011	43.1%	40.0%	389	36.5%	35.0%
Transport	1399	7.7%	4.3%	1010	6.6%	0.0%	389	10.3%	10.0%
Water	1400	3.1%	2.6%	1011	3.4%	3.0%	389	2.3%	1.8%
Electricity	253	3.5%	2.9%	151	4.0%	3.3%	102	2.7%	2.5%
Refuse Collection	129	0.7%	0.6%	94	0.8%	0.6%	35	0.6%	0.4%

5.2 Individuals in the labor force

Given that many Kenyans become economically active at a young age, we first examine the primary activity of all adult slum dwellers, that is, individuals of age 15 years or more (Table 5). Then, to allow for a comparison with available census data for Nairobi's population, we also tabulate the "primary activity" pursued by individuals of age five years or more (Table 6). It is important to note that the two analyses (and, thereby, Tables 5 and 6) are not directly comparable because some of the categories used in the two are constructed somewhat differently. The results are summarized below.

Table 5: Employment (individuals 15 years of age or more)

	All		Poor		Non-poor		Males		Females	
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
1. Unemployed	910	26%	805	29%	105	15%	198	10%	712	49%
2. Regular employee	835	24%	591	21%	244	35%	670	34%	165	11%
3. Casual employee	854	25%	682	25%	172	24%	686	34%	168	12%
4. Own business/ own account worker	666	19%	515	19%	151	21%	339	17%	327	22%
5. Student/apprentice	154	4%	130	5%	24	3%	87	4%	67	5%
6. Pensioner/investor/ sick/handicapped	20	0.60%	14	0.50%	6	0.90%	8	0.50%	12	0.80%
7. Other/don't know	16	0.50%	14	0.50%	2	0.30%	9	0.50%	7	0.50%
Total	3455	100%	2751	100%	704	100%	1997	100%	1458	100%

Note: For data disaggregated by age group, see Annex 7.

The majority (68 percent) of adult slum dwellers are economically active, but as many as 26 percent report that they are unemployed and seeking work (Table 5). The remaining five percent are mostly students or apprentices and there is a small residual category (one percent of total) that includes pensioners, homemakers and investors as well as the sick and handicapped.

Almost half (49 percent) of all adult slum dwellers are wage employees (Table 5). Of these, almost exactly half have regular jobs, while the other half are casual employees. About 19 percent of all adults are self-employed either in small enterprises that they own or as independent workers such as electricians or plumbers.

The welfare gap in employment. *Among poor slum dwellers the unemployment rate is almost twice as high as that among non-poor slum dwellers*—29 percent of slum dwellers belonging to poor households are unemployed compared to 15 percent of those from non-poor households. Poor households also have fewer adults employed in a regular job (21 percent) compared to the non-poor (35 percent).

The gender gap in employment. *In terms of access to jobs, women are dramatically worse off than men* and the gap between them is significantly larger than that between poor and non-poor households. Women are almost five times more likely to be unemployed than men—*the unemployment rate among women is an extraordinary 49 percent compared to 10 percent among men.* Women are also three times less likely to have any kind of wage employment—while 67 percent of men have either a regular or casual job only 23 percent of women do. Perhaps as a consequence of inadequate access to jobs, *women are more likely to*

be working in household micro-enterprises; 22 percent of women, as compared to 16 percent of men, work in such enterprises.

Unemployed youth. *Slum dwellers in the age-cohort of 15-24 years report an unemployment rate of 46 percent which is more than twice as high as the rate in any other age groups* (Annex 7). Youth from poor households are more likely to be unemployed than those from non-poor households. Specifically, 49 percent of young people (age 15-24) in poor households report that they are unemployed, relative to 34 percent of those in non-poor households. Unemployment among youth has often been offered as a key explanation behind high incidence of crime and violence in slum settlements in different parts of the world. Our findings regarding youth unemployment, combined with our data on crime presented subsequently, suggest that this issue does need to be further explored in the context of Nairobi's slums.

Child labor? For the vast majority of children of age 5-14 years, the primary activity is "going to school" and not some form of child labor (Annex 7). This is not to suggest that there is no child labor—many of these children could well be in school and also working to help support the family. Nevertheless, the fact that their primary activity entails going to school rather than going to work is encouraging.

Comparing Nairobi and its slums. In comparing primary activities of slum dwellers with those of all of Nairobi's residents, two striking differences emerge (Table 6). *First, the proportion of individuals unemployed and seeking work is nine percentage points higher in the slums compared to Nairobi* as a whole. *Second, there is an 11 percentage point difference between the city and its slums in the proportion* of those falling into the category of "student/retired/incapacitated/homemaker"—that is, people *who are mostly engaged in non-income generating activities and are also not seeking work*. In other words, a significantly smaller proportion of people in slums report themselves unwilling or unable (technically or physically) to be involved in an income-generating activity than for Nairobi city as a whole.

Table 6: Primary activity (individuals of age five years or more)

	Nairobi's slums: Our 2004 survey		Nairobi: 1999 Census	
Primary activity	N	%	N	%
1. Unemployed (seeking work/not working)	910	21%	214302	12%
2. Employee (wage work/on leave)	1695	38%	693793	39%
3. Own busi/agri hold/own account worker	666	15%	255396	14%
4. Stu/retired/incapicitated/home maker	1071	24%	587107	33%
5. Other n.e.c	96	2%	37674	2%
Total	4438	100%	1788272	100%

5.3 Employment in the household

Almost all households (97 percent of total) had at least one member reporting an income generating activity—either wage employment (regular or casual) or income from a household enterprise or other self-employment. At the same time, 42 percent of households reported that at least one member was unemployed.

A far greater proportion of the poor (51 percent) have unemployed members in the household compared to the non-poor (20 percent) (Table 7). The types of jobs in the household income portfolios of the two groups differ as well. Among poor households, a greater proportion have casual jobs relative to regular jobs; the situation is reverse among non-poor households.

Female-headed households report a lower unemployment rate than male-headed households, and a significantly higher proportion operate household enterprises (Table 7). About 45 percent of male-headed households report an unemployed member in the household and 28 percent say they operate an enterprise. Among female-headed households, these proportions are almost exactly reversed—29 percent have unemployed members and 43 percent have enterprises. This indicates that *it is by operating enterprises, more so than male-headed households, that female-headed households are keeping their unemployment rate significantly lower.*

Multivariate analyses show that the *presence of an unemployed adult is strongly correlated with poverty*. At the same time, having one regular job in the household has no statistically significant influence on a household's per capita income, expenditure and poverty level. These data and analyses suggest that *having one regular job or one employed person in the household is usually not sufficient to keep the household out of poverty*. In other words, to pull household-level expenditures above the poverty line, either the income associated with these jobs need to increase, or more members of the household need to have incomes, or both.

Table 7: Employment at household level

	All	Poor	Non-poor	Male-head	Female-head	
% of HHs with at least one working in own HME	30.4	31.4	27.8	27.8	42.9	**

% with at least one unemployed	42.3	50.8	19.8	*	44.7	29.4	**
% with at least one casual job	40.9	43.7	33.4	*	42.4	34.3	**
% with at least one regular job	41.2	39.6	45.4	***	44.1	26.6	**
% Other, don't know, missing etc	9.4	10.7	6.1	**	7.7	17.6	**

Note: Significance of difference indicated by asterisks. ***=1%, **=5%, *=10%.

5.4 Household micro-enterprises (HMEs)

In the slums, *30 percent of the households operated an income-generating enterprise over the previous two weeks*. Of the sample of 1755 households, 544 reported operating at least one enterprise and 75 households reported two or more enterprises.[13] Among them they have a total of 632 enterprises that employ about 900 people (or 26 percent of the adults). Table 8 below gives the distribution of the categories and types of the primary enterprises operated by each of the 544 households.

As noted earlier, *in Nairobi's slums, ownership of an HME is negatively correlated with the likelihood of being poor*. Although it could well be that only the non-poor operate enterprises, some of the evidence suggests that this cannot be the only reason behind such a correlation. For instance, the fact that as many as 43 percent of female-headed households operate enterprises, combined with the fact that they are *a priori* more likely to be poor given their lower levels of education and poor access to jobs, suggests that *these enterprises may actually be helping households stave off poverty*.

This is an encouraging finding for Nairobi—not only because we now know that regular jobs are not sufficient to keep Nairobi's slum households out of poverty, but also because we found no such negative correlation between HME ownership and poverty in a parallel study of Dakar's slums (World Bank, 2004). Additional analyses show that, in Nairobi's slums, HME ownership is associated with a higher total income at the *household-level* even though it has no statistically significant relationship with *per capita* income.[14] Given its potentially important role in ameliorating poverty in the slums, this section takes a more careful look at the type and nature of HMEs that are operating in Nairobi's slums.[15]

As Table 8 shows, the HMEs fall into six broad categories: (i) retailing and food services including trading/hawking/kiosks and food preparation and sales (64 percent); (ii) small manufacturing/production, construction, and repair of goods (22.2 percent); (iii) general services such as hairdressers, laundry, transport, medicine, photo studios, etc. (8.1 percent); (iv) entertainment services, including bars, brewing and pool tables (2.4 percent); (v) farming and livestock (0.9 percent); and (vi) other (2.4 percent).

Retailing, including food-related sales and services, is by far the most important economic activity pursued by HMEs in Nairobi's slums and *accounts for 64 percent of all enterprises*. Many of these retailers are small hawkers but some own kiosks or other semi-formal establishments. After retailing, the next largest category is *small manufacturing, construction, and repair of goods, accounting for just over a fifth (22*

[13] The percentages of households in the sample who had at least one HME and who had two or more HMEs are 30.1 percent and 4.1 percent respectively. We did not find any statistically significant difference (at the 5 percent level) with respect to these two percentage values between poor versus non-poor households.

[14] We conducted univariate and multivariate regression analyses with total household income as the dependent variable and HME ownership as an independent variable. HME ownership was positively correlated with household income (at a statistical significance level of 1 percent). Further, length of operation of HMEs is positively correlated with HH income. The results are not shown in the paper. (Table 1 presents regression results for per capita income).

[15] For additional data and analyses on HMEs, see Annex 5.

percent) of HMEs. Other service providers, such as salons and launderers, account for eight percent of HMEs. Finally, farmers/rearers of livestock and "other" enterprise owners account for two and one percent of HMEs, respectively.

Three retailing sub-categories are particularly prominent in the overall distribution—"fruit and vegetables" account for 18 percent of all HMEs, processed food and food services account for 14 percent, and "clothes and shoes" account for an additional 12 percent of the total. It is worth noting that *at least 32 percent of HMEs are food-related*—they focus entirely on retailing raw or processed food, food preparation (cooking) and/or food-related services (e.g. butchering). Further, as the discussion below suggests, these food-related HMEs *appear to be "starter" businesses*, often operating only locally and at a subsistence level—when compared to other types of HMEs, they have fewer employees, have been in operation for a shorter period, have poor access to water and electricity, and few sell outside the settlement.

The average HME has been in business 4.1 years and employs 1.6 persons (including the owner). There are several notable deviations from these aggregate indicators. First, HMEs that cook or process food have been in business roughly one year less than the average HME. Second, HMEs providing non-food-oriented services—such as hairdressers and clothing washers—have been in business on average about two years longer than the average HME. Third, as compared to the average HME, retail businesses employ fewer people (1.4 persons), while bars and entertainment establishments hire more people (2.2 persons).

Almost half of the HMEs sell outside their immediate settlement. Among small manufacturers and producers, the majority (62 percent) sell outside their settlement. By comparison, fewer of those involved in food and services do so.

Access to electricity and piped water among slum HMEs is extremely limited, but certain types of enterprises have better access than others. Just over one-quarter of HMEs have access to electricity (28 percent), which exceeds the rate at which households are connected (22 percent). Additionally, two categories of HMEs, "manufacturing, construction and repair" and "bars and entertainment" report better access (32 percent and 54 percent, respectively), while only one-fifth of food-related enterprises report that they have access to electricity.

The pattern is somewhat different for access to piped water (including yard taps). While the HME rate of access (20 percent) is roughly the same as the overall household rate of 19 percent, only one in ten food-service providers has access, while manufacturers, non-food services, and bars maintain rates of 24, 25, and 31 percent, respectively.

Table 8: Types of "Primary" Household Micro-enterprises (HMEs)

Category and type of enterprise	N	%
Retail general and food (incl. Small trade/hawking/kiosks)	**348**	**64.0%**
Selling fruits and vegetables	96	17.6%
Food preparation, sale and processing	77	14.2%
Selling clothes and shoes	64	11.8%
Kiosk selling various items	41	7.5%
Water kiosk	3	0.6%
Small retailers/Hawkers: cereals, HH supplies, HH fuels, & misc.	67	12.3%
Small manufacturing/production, construction & repair of goods	**121**	**22.2%**

Sewing and textile	55	10.1%
Shoe making/repair	18	3.3%
Furniture making	14	2.6%
TV/video/electronics/cell phones (sales and repair)	10	1.8%
Metal welding/fabrication	4	0.7%
Bldg contractor/plumber/electrician/painter	7	1.3%
Automotive repair	13	2.4%
Services (hairdresser, laundry, transport, medical, photo etc)	**44**	**8.1%**
Hairdresser	22	4.0%
Services-dry cleaning, washing ironing, carpet cleaning	4	0.7%
Medical clinic	1	0.2%
Transportation: boda-boda (motorcycle taxis), cargo carts etc.	9	1.7%
Photography	3	0.6%
Medicine-traditional	5	0.9%
Services-bars, entertainment, and brewing	**13**	**2.4%**
Brewing	9	1.7%
Bar/entertainment (pool tables)	4	0.7%
Farming and livestock	**5**	**0.9%**
Other	**13**	**2.4%**
Total main HMEs	**544**	**100.0%**

5.5 Banking and credit

About 31 percent of slum households have bank accounts (Table 9). As would be expected, a higher proportion of non-poor households (43 percent) have bank accounts compared to the poor (26 percent). The likelihood of having a bank account increases as incomes rise, and this tendency holds not just for the sample as a whole but also within the sub-groups of poor and non-poor households.

Among slum households, only 17 percent had a loan at the time of the survey (Table 9). Of these, the majority (62 percent) had borrowed money from relatives or friends, though this proportion was higher for the poor (66 percent) than for the non-poor (53 percent). NGOs, savings groups and/or credit cooperatives were the next most important source (21 percent), but the non-poor were more likely than the poor to have obtained loans from them. Specifically, 29 percent of non-poor borrowers obtained loans from NGOs and savings groups, as compared to 17 percent of the poor. Banks accounted for eight percent of all loans, and informal lenders, infamous for charging very high interest rates, accounted for an even smaller proportion (3 percent). Finally, as compared to male-headed households, female-headed households are significantly less likely to have either a bank account or a loan (see Annex 5).

Table 9: Banking and credit

	All		**Poor**		**Non-Poor**	
	N	Percent	N	Percent	N	Percent
No. of households	1755		1282		473	
Households with bank accounts***	494	30.7%	305	26.4%	189	42.0%
HHs with a loan*	297	17.4%	205	16.3%	92	20.3%
Primary source of loan**						
Relatives or friends	183	62.2%	134	66.4%	49	53.4%
NGOs or savings group or credit coop	61	20.9%	34	16.9%	27	29.2%

Bank	25	7.9%	16	6.9%	9	10.0%
Informal lender	7	2.5%	4	2.0%	3	3.7%
Other	21	6.6%	17	7.9%	4	3.7%

Note: Stat significance of difference between poor and non-poor indicated by asterisks. ***=1%, **=5%, *=10%.

6. Housing, tenure and rents

Slums in Nairobi—and in most other parts of the developing world—have some combination of the following four characteristics: (i) informality or illegality of land tenure; (ii) housing units built, at least at inception, with poor quality construction materials and methods; (iii) settlement layouts and units that are usually in violation of legally-specified minimum space standards and various other planning regulations (e.g. regulations specifying plot and unit sizes, floor area ratios, building setbacks, public open spaces, space for facilities such as schools and community centers, etc.); and (iv) physical infrastructure and services—such as water supply, electricity, drainage, sanitation, and street lighting—that are highly inadequate.

The literature on slums portrays them as a housing solution devised for the poor and, largely, by the poor themselves. It also suggests that slum settlements have emerged—and are continuing to grow—because both governments and formal land and housing markets have been failing to deliver affordable housing for low-income residents of cities in the developing world. It argues that artificially high planning and building standards (e.g. minimum plot sizes that are too large and regulations specifying use of permanent building materials) are often one of the key reasons why formal sector products are expensive and unaffordable to a large proportion of the population. By contrast, slums deliver housing that is affordable. In the slums, units are very small, densities are high, and impermanent building materials are used liberally. These, in combination with the informality of land tenure, keep housing prices low and affordable. In other words, the literature argues that slums provide shelter that is low-quality but also low-cost.

Nairobi's slums challenge the above ideas and, thereby, the very core of our current understanding of slum settlements, how they emerge and develop, and how they can be improved. To understand how and why they constitute a challenge to conventional wisdom, it is worth examining the type of stylized narrative of slum development that emerges from existing literature.

A stylized narrative of slum development emerging from existing literature

The literature on slum settlements suggests a storyline that runs as follows. Poor people come into the city and, due to lack of affordable alternatives, squat on vacant land that legally belongs to someone else. Means of access to such land varies across cities and includes independent squatting, participation in organized "land invasions," and purchase of land in "illegal subdivisions" created by (rogue) developers who acquire and subdivide land in violation of existing land development regulations.

Squatters build their own housing in accordance with their affordability. They often start with a small, impermanent and poor-quality structure such as a shack. As their incomes improve and/or they gain a foothold in the city, they are able to invest in their house—they upgrade to better building materials and slowly add rooms and even floors. At times, some of the additional rooms

are sub-let and start to generate rental incomes that further help stabilize household income and/or finance additional housing upgrades. Over time, housing in the slum improves and consolidates.[16]

Infrastructure consolidation in the slums is usually harder than housing consolidation and the outcome varies more widely across settlements. At inception, there is little or no infrastructure—no piped water supply, electricity connections, drainage, sewerage, streetlights, or paved roads. For the longest time public utilities refuse to step in and provide service because that would mean legitimizing these illegal settlements. Overtime, infrastructure does improve somewhat through some combination of actions by individuals, non-governmental organizations, community associations, private infrastructure service providers and, at times, the government. Unlike the housing consolidation process that is fueled entirely by individual investments, the infrastructure upgrading process requires significant external funding and support, both because it is far more expensive and because its "public" nature reduces incentives for household-level investments. Although some settlements have done better than others, basic physical infrastructure continues to be highly inadequate in the vast majority of slum settlements in the developing world, and it raises concerns regarding public health, productivity and equity/welfare.

Key findings: Are Nairobi's slums atypical?

Nairobi's slums differ from the above stylized narrative in the following ways. First, rather than squatter-owners who invest to upgrade their housing, the vast majority of Nairobi's slum dwellers are tenants.[17] The majority of landlords are "absentee" in that they live outside the settlement and often use intermediaries to collect rent. In other words, this is a case of housing for the poor but not by the poor.

Second, there appear to be few incentives for either residents or absentee landlords to invest in improving housing and community-level infrastructure in these settlements. The tenants are mobile—the data show that they move both their residences and settlements fairly frequently. This, combined with lack of ownership, means that they have almost no incentive to invest. As non-residents themselves, the landlords do not suffer personally from the poor housing and infrastructure conditions and this eliminates at least one of their incentives for investment. Arguably, competitive pressure should make the landlords invest, but it appears that there are severe barriers to entry that have reduced any such pressures. As a result, these slums have not been improving and/or consolidating significantly, and living conditions are far worse than in slums of other cities such as Dakar.[18]

---

[16] The rate of housing investment and consolidation depends on incomes and various other factors, but is strongly influenced by perception of security of tenure. Slum households are more likely to invest, conventional wisdom suggests, if they believe that their housing investment will be secure and not subject to demolition or arbitrary "taking" by the government.

[17] Several previous studies have noted that tenancy rates are high (e.g. Amis 1984, Mwangi 1997).

[18] Infrastructure indicators in Dakar's slums are significantly superior to those in Nairobi's slums (World Bank 2004). In many cities and towns (for e.g. Rio de Janeiro in Brazil, Delhi in India, and Pereira and Santa Marta in Colombia) the slums have consolidated overtime—both housing and urban services have improved. For instance, a longitudinal study of the two Colombian towns (regional capitals)—Pereira and Santa Marta—shows that self-help settlements are consolidating steadily over time; the paper focuses on the linkages between housing consolidation and home-based income generation (Gough and Kellett 2001).

Third, the level of rents is high despite poor quality—that is, Nairobi's slums provide low-quality high-cost shelter for low-income families. Rents account for a significant proportion of income and previous studies suggest that rental payments may be squeezing other basic expenditures, including those on food. (A question for future exploration, then, is whether the high costs have eliminated a key "advantage" of the slums.)

Fourth, there is a highly developed rental market and, despite the informality of tenure, rental values behave in a manner similar to those in formal real estate markets. Even within the seemingly homogenous slum rental market there is variation in prices among slums and within slums; this, in turn, indicates that there is variation in size and quality of units available. Multivariate analysis reveals that rents vary with a unit's location, size, construction quality and infrastructure access.

This section first examines existing housing conditions and tenure status. It then explores the nature of the housing market by examining the level of rents and factors that are correlated with rental values in the slums.

6.1 Tenure, length of stay and tenure security

In Nairobi's slums, 92 percent of the households are rent-paying tenants. Of the remaining eight percent, six percent claim they own both their house and the land, while two percent say they own the structure but not the land. [19] Within the small group of resident home owners (8 percent of total), 60 percent rent out at least one room—that is, 4.8 percent of slum households are "resident landlords." The vast majority of structure owners are, hence, "absentee landlords."

The home-ownership rate in the slums is ten percentage points lower than that for the city as a whole and about 63 percentage points lower than the national average. Specifically, among the households residing in Nairobi, 18 percent own the units in which they live and 82 percent are tenants (Census 1999). At the national level, the situation is the reverse—71 percent own the houses in which they reside and only 29 percent of households are renters. National-level home-ownership indicators are driven largely by the high rates of home-ownership and owner-occupancy in rural areas. Although rural households tend to own their homes, the quality of the structures is poor (Census 1999).

Nairobi's slum dwellers move residences more often than their neighborhood/settlement. Slum dwellers have lived in their current residences for an average of five years, and in their current settlement for about nine years. The poor move homes somewhat less frequently than the non-poor—they have lived in their current home for an average of 5.1 years compared to 4.4 years for the non-poor and the difference is statistically significant (at 10 percent level). There is, however, no statistically significant difference between the poor and non-poor in the mean length of stay in their current settlement.

Multivariate analyses show that length of stay in a settlement is positively correlated with household welfare—as the number of years lived in the settlement increase, per capita income also increases and the likelihood of being poor falls. Further, households who report that they moved to their current settlement directly from a rural (as opposed to urban) area are more likely to be poor. On the other hand, ownership of a home outside of Nairobi is negatively correlated with poverty.

[19] See Annex 6 for additional information on slum dwellers who say they own their house/land.

Half of the slum households feel they have secure tenure. About nine percent say they have been evicted at least once. There is no statistically significant difference among the poor and non-poor either in the proportion who feel they have secure tenure or those who have actually experienced eviction.

Tenancy contracts in slums are based almost entirely on verbal agreements. Only 3.6 percent of the renters say they have a formal written tenancy agreement, while 96 percent have a verbal agreement with their landlords. About 0.5 percent claim to have no agreement; it is unclear whether they are squatters.

6.2 Housing size and quality—crowding and construction materials

As we would expect, *crowding*, as measured by persons per room, *is far worse in the slums than in Nairobi city or in the country as a whole* (Table 10). There are 2.6 persons per room in Nairobi's slum settlements as compared to 1.7 for Nairobi city as a whole and 1.55 for Kenya. Within the slums, poor households are significantly worse off with 3.0 persons per room compared to 1.6 persons per room in non-poor households.

Table 10: Dwelling unit density

	Census	Our survey		
	Nairobi	All	Poor	Non-poor
Avg rooms/HH	1.64	1.2	1.2	1.2
Avg persons/room	1.76	2.6	3.0	1.6
Avg HH size	3.24	3.0	3.4	1.9
N (no. households)		1755	1282	473

NB. At national level, 1.55 person/room.

In the slums, *the vast majority of dwelling units are built with poor quality and impermanent construction materials* with the most common being corrugated-iron roofs (98 percent of total), cement floors (68 percent), and tin or corrugated-iron walls (45 percent).

Permanence of the building material used for external walls emerges as a good indicator of both housing quality and the welfare level of households.[20] About 19 percent of non-poor households, as compared to nine percent of the poor, live in units built with permanent wall materials—that is, walls built with stone, brick or block—and the difference is statistically significant. There is *no* significant difference, however, in the roofing and flooring materials used by the two groups.

Overall, only 12 percent of the housing units in Nairobi's slums have permanent external walls. This indicator compares unfavorably not only with the Nairobi average of 56 percent but also with the national average of 26 percent (Census 1999). It is not surprising that this housing quality indicator is significantly worse in slums than for Nairobi as a whole. It is striking, however, that it is significantly worse than the national average as well, given that housing quality in rural areas is known to be very poor.

6.3 Rental values in the slums

Rents are significant. The average monthly rent paid by slum households is Ksh 790 (US$11) and the median rent is Ksh 700 (US$9) (Table 3). Non-poor households spend more on rent than the poor

[20] In multivariate analyses (not presented in the paper), "external wall material" emerged as the one housing quality indicator that has a statistically significant correlation with "poor" households.

but, on average, only about 20 percent more. The average monthly rent is Ksh 913 (US$ 12) for the non-poor as compared to Ksh 753 (US$ 10) for the poor. The median rent for non-poor households is Ksh 750 (US$10) and Ksh 700 (US$9) for the poor.

Among the major expenditure categories, rent appears to be second only to food and accounts for an average of 12 percent of monthly household income (Table 4). Disaggregated by welfare, the proportion of income allocated to rent is similar across the two groups—rent accounts for 12 percent and 11 percent of income for the poor and non-poor, respectively.

Finally, as we would expect, *rents vary by location*. Table 11 below shows that rents are, on average, highest in the Westlands and Dagoretti and lowest in Kibera and Kasarani.

Table 11: Rents in different areas (divisions) of Nairobi

	N	Mean	Median	Min	Max	SD
Dagoretti	295	1090	900	300	3230	570
Westlands	57	1080	1000	400	3000	590
Pumwani	111	890	700	300	3000	590
Central	189	860	700	260	2600	400
Makadara	170	780	750	400	2000	200
Embakasi	167	670	600	200	3200	330
Kasarani	182	640	500	250	2000	320
Kibera	450	620	500	300	2000	260
TOTAL	1621	790	700	200	3230	440

6.4 What drives rental values in Nairobi's slums?

Rents vary significantly not only between slums located in different parts of the city but also within given slum settlements. To try and understand the variables that drive rents in slums, we conducted a multivariate regression analysis with "monthly rent," paid by tenant households, as the dependent variable.[21] The independent variables used in this hedonic analysis can be grouped into the following two categories:

1. Rented house characteristics, infrastructure access and tenure: The variables included here are number of rooms in the house, house quality as assessed by the enumerator, number of households sharing a toilet, and six dummy (yes/no) variables. Three of the dummy variables reflect house construction quality: whether walls are made of permanent materials (stone/brick/block), whether roofs are concrete, and whether floors are made of permanent materials (tiles/cement/wood). Another two dummy variables reflect infrastructure access: whether the house has access to electricity and to piped water. A final dummy variable reflects whether the household feels it has security of tenure.

[21] The functional form of the regression model used is linear. It was estimated using maximum-likelihood estimation method that allowed for the fact that data was collected through stratified random sampling with slum EAs (EA5) as the primary sampling units (PSUs) and sampling weights assigned to each household based on its inverse probability of selection.

2. Neighborhood characteristics and infrastructure: To investigate the relationship of neighborhood-level infrastructure and its rental market, the following dummy variables were included: whether the slum EA containing the rented home has seen a significant number of infrastructure/social interventions,[22] whether the EA has a public school, and whether the tenant of the rented home perceives the neighborhood to be safe. We also included two other neighborhood-specific infrastructure variables: whether the settlement has drainage and whether the internal roads are paved. Finally, to control for the crucial "location factor" and any other unobserved/undocumented expected differences across neighborhoods that are like to influence rental markets, we include dummy variables for the eight divisions in which our survey households reside.

The regression results are presented in Table 12. *The "informality" notwithstanding*, rents in Nairobi's slums appear to behave just as in any formal real estate rental market—*rents depend on or vary with a unit's size, location, construction quality, and access to infrastructure.* The results indicate that there is some variation in the type and quality of units available for rent. This is surprising because, at first glance, it is hard to imagine significant variation in "quality" within slums—most slum settlements appear to have appalling infrastructure and ramshackle, usually impermanent, housing. In the discussion below we examine those variables that are correlated to rental value at a significance level of 10 percent or less.

With respect to rented house characteristics, we find that rent is strongly and positively related to unit size measured in terms of number of rooms. Also, as one would expect, rents are directly related to housing quality—more specifically, rents are higher for housing constructed with permanent building materials. Units that have permanent external walls—that is, those constructed with stone, brick or block—command higher rents than units with walls of wood, mud or tin. Similarly, units with cement or wooden floors have higher rents than those with mud floors. By contrast, roofing material appears to have no significant impact on rental values; one possible explanation may lie in the fact that there is little variation in roofing material (98 percent of the roofs are of corrugated iron or tin). Further, house-specific infrastructure access is another key determinant of rent. Dwelling units with an electricity connection and those with access to either a private or yard connection for water command higher rents than units without these amenities. However, sharing of toilet facilities with a large number of people does not seem to have any significant bearing on rent.[23] Finally, the results show no systematic relationship between rent paid by a household and its perception of tenure security.

In terms of explicitly controlled neighborhood characteristics, we find that *rents are higher in settlements with a public school facility than those without.* However, we do not find any significant relationship between aggregate intervention at the EA level and rent of households located there. This seems to suggest that the current (relatively low) level of intervention/upgrading at the EA level has very little systematic impact on rents compared to that of characteristics specific to the rented house. Similarly, existence of drainage facilities and paved internal roads in the settlement does not appear to affect rents systematically. This could again be due to lack of variation in the level of such infrastructure among settlements, or due to multicollinearity with other variables.

[22] The construction of this variable is described in Section 8.5 and in Annex 8.

[23] It could well be that there is insufficient variation in toilet access among households; multicollinearity with other variables is another possible reason.

Further, the residents' perception regarding the relative safety of their settlement (in terms of crime) is not correlated in any significant way to the rents that they pay. This result is somewhat more surprising, given the wide-spread perception of crime and insecurity in the slums. Some possible reasons for this result are that: residents' perception on this issue is not a good proxy for measuring the impact of crime; there is little variation in crime levels—or at least residents' perception of incidence of crime—among settlements; or, indeed, that this variable is not a key driver of rents in Nairobi's slums. We return to the issue of crime shortly.

With respect to location and/or other unobserved neighborhood characteristics, we find that *the "division" in which a slum is located directly influences rent at the unit level.* Relative to the rents in the Central division (base/comparator case), rents are similar in Divisions 2, 5 and 6 (Makadara, Pumwani and Westlands). However, rents are systematically higher in Division 7 (Dagoretti) and systematically lower in Divisions 3, 4 and 8 (Kasarani, Embakasi and Kibera). These results indicate that even after controlling for key observable characteristics of the house and the neighborhood, *location and/or other "unobserved" neighborhood-level characteristics impose either a "premium" or a "discount" in the home rental markets across slums in the eight divisions.*

6.5 Crime: Unsafe in their own neighborhood

As many as 63 percent of slum households report that they do not feel safe inside their settlement. And 27 percent report that their household, or at least one person in it, actually *experienced a criminal incident over the previous 12 months* (Table 13). Although perception of safety does not vary either by welfare level or by gender of the respondent, the actual incidence of crime does. Specifically, a higher proportion (31 percent) of male respondents report that they were victims of crime in the previous year, as compared to women (23 percent) and the difference is statistically significant.

Among those who were victims, *the majority report that the incident occurred inside their own settlement.* The average number of incidents experienced by a victimized household in the previous year was 1.67, with an average of 1.2 occurring inside the settlement and 0.46 outside the settlement. *The poor were more likely than the non-poor to have been victimized in their own settlement.* Specifically, with respect to the mean number of incidents of crime suffered by a household inside the settlement over the previous year, the poor reported 1.27 as compared to 1.03 for the non-poor; this difference is statistically significant.

Table 12: Regression for monthly rent

	Coef.	Std. Err.	T-stat	P-value	
Constant	180	100	1.72	0.088	*
Feels tenure is secure	0	30	-0.07	0.944	
Years in settlement	0	0	-0.23	0.817	
Number of rooms for household	300	60	4.87	0.000	***
Permanent walls	280	80	3.32	0.001	***
Concrete roof	110	110	1.03	0.305	
Permanent floor	110	30	4.13	0.000	***
Has electricity	240	30	6.97	0.000	***
Has piped water	90	40	2.40	0.019	**
Number of households sharing toilet	0	0	-1.00	0.322	
Assessor's estimate of building quality	90	30	2.66	0.009	***
Settlement has been improved	-60	70	-0.96	0.342	
Internal roads paved	-50	60	-0.84	0.403	
Drainage exists	-10	20	-0.60	0.550	
Street lights exist	-10	80	-0.09	0.925	
Public school present in neighborhood	80	30	2.61	0.011	**
Considers area safe	-10	20	-0.58	0.561	
Division					
Central (base for analyses)	-	-	-	-	
Makadara	70	50	1.47	0.145	
Kasarani	-160	80	-2.06	0.042	**
Embakasi	-130	70	-1.80	0.076	*
Pumwani	60	90	0.69	0.490	
Westlands	230	180	1.28	0.203	
Dagoretti	100	50	1.91	0.060	*
Kibera	-120	40	-2.60	0.011	**
	N=1282	R^2=0.519	F(25,63)=29.98		

Note: Significance of difference between poor and non-poor indicated by asterisks. ***=1%, **=5%, *=10%.

Table 13: Crime

	By poverty status							By sex of respondent				
	All		**Poor**		**Non-poor**			**Male**		**Female**		
	N=1755	Percent	N=1282	Percent	N=473	Percent		N=903	Percent	N=852	Percent	
Feel safe inside settlement	647	36.5%	483	37.7%	164	33.2%		3.34	36.4%	3.13	36.5%	
Victim of crime in last year	477	27.3%	333	26.1%	144	30.5%		277	30.8%	200	23.4%	***
If a victim of crime (N=477),	Mean	SE	Mean	SE	Mean	SE		Mean	SE	Mean	SE	
Number of incidents	1.67	0.06	1.71	0.08	1.56	0.07		1.64	0.06	1.71	0.10	
Number of incidents inside settlement	1.2	0.07	1.27	0.08	1.03	0.08	**	1.18	0.07	1.22	0.11	
Number of incidents outside settlement	0.46	0.04	0.44	0.05	0.53	0.07		0.46	0.04	0.47	0.07	

Note: Significance of difference between poor and non-poor or male and female respondents indicated by asterisks. ***=1%; **=5%, *=10%.

6.6 Stuck in a high-cost low-quality trap?

Previous studies suggest that the business of being a slum landlord in Nairobi is highly profitable. In his detailed study of landlordism in Nairobi's slums, Amis (1984) estimates that:

> "[In the case of] a 10-room structure, the annual capital return was 131 percent. Thus after only nine months the landlord's income is pure profit, since the maintenance and running costs are more or less non-existent."

Amis also cites a previous study by Temple (1973) that finds the rate of return on such rental housing to be 171 percent.[24] Clearly these studies are dated and there is a need for additional research on the current profitability and risks of being a slumlord in Nairobi.

Nevertheless, these early studies, combined with some of our data from interviews and surveys, support the view that there are severe barriers to entry in the housing market in the slums. These barriers to entry appear to have kept base rental values high despite the poor quality, and they seem to have reduced competitive pressures that may have encouraged landlords to invest some of their profits in improving the quality of units and their access to services such as water and electricity.

Overall, it seems that Nairobi's slums are stuck in a high-cost, low-quality trap. The tenants are paying a lot for very poor quality housing and infrastructure. And, unlike in cities such as Dakar and Rio de Janeiro, housing quality and services in Nairobi's slums have not improved and consolidated steadily over time. Why? The plausible explanations include the following facts: (i) in Kenya urbanization has been occurring in the context of weak economic growth; (ii) absentee landlords control 95 percent of the housing stock in slums and they have invested very little, privately, in upgrading the housing; (iii) there has been no systematic and/or large-scale infrastructure upgrading programs financed or supported by government—that is, there has been no systematic public investment in slums; and (iv) until recently, slum dwellers have had very little "voice" because democratic elections have only just started in Kenya. Based on such an understanding, we would argue that a key goal of public policy interventions aimed at improving the slums should be to help the residents break out of this high-cost, low-quality trap. And to be effective, any such efforts will need to involve the landlords in the design and, perhaps, even during implementation.

7. (Rural) Emigrants?: Previous residence, remittances and real estate assets outside

Of Nairobi's 2.04 million residents, only 31 percent were born in Nairobi (Census 1999). Within slum settlements, the proportion of Nairobi natives is assumed to be significantly lower. Further, it is commonly assumed that the vast majority of Nairobi's slum dwellers are relatively recent migrants from rural areas with strong rural ties. They are often perceived as temporary or short-term migrants who return frequently to rural areas and have little commitment to staying on in the city. To gain an insight into this issue and, especially, to understand "turnover" in slum settlements, this section takes a closer look at the following factors: the location from which the slum dwellers came (i.e. previous residence), where they send remittances, and whether and where they hold property.

7.1 Previous residence

[24] Amis cites the following paper: "Redevelopment of Kibera" Draft, 1973, by N. Temple.

Slum dwellers were asked where they lived before moving into their current settlement. Just over half of the slum households report that they were living in another urban location before they moved to their current settlement, indicating that they have significant urban experience. Specifically, 43 percent moved in from other slum and non-slum settlements in Nairobi itself, one percent were born in their current settlement, and seven percent moved in from another urban location in Kenya. An additional one percent emigrated from another country. The remaining 48 percent emigrated to their current settlements directly from a rural area.

7.2 Ownership of real estate assets outside of Nairobi

In sharp contrast to their low land- and home-ownership rates within the city, an extraordinary 60 percent of the slums dwellers say they own land outside of Nairobi and 55 percent own a house outside the city. Land-ownership rates are almost equally high among the poor and non-poor. Home-ownership rates are, however, higher among the non-poor—61 percent of the non-poor own homes outside Nairobi compared to 52 percent of the poor (this difference is statistically significant at the five percent level). Multivariate analyses show that *ownership of a home outside Nairobi is positively correlated with per capita income and strongly negatively correlated with the likelihood of being poor* (Table 1). There is no such evidence for land ownership.

7.3 Remittances

Over the previous year, about 71 percent of the households sent remittances, in cash or kind, to relatives or friends. However, only about 18 percent reported having received such support or remittances from their extended family.

Disaggregated differently, about 11 percent of households both received and sent remittances, 61 percent sent remittances but did not receive any, and seven percent received remittances but did not send any. The remaining 22 percent neither sent nor received remittances.

Geography of remittances. Contrary to popular belief, *a greater proportion (55 percent) of primary remittances is intra-urban rather than urban-to-rural (44 percent).* The transferring households were distributed as follows: 44 percent sent money/gifts primarily to rural areas, 31 percent within Nairobi itself, and 24 percent to other urban areas in the country. For remittance-receiving slum dwellers, very few of the transfers originate in rural areas. Within the 18 percent (311 households) who received transfers over the previous year, 80 percent said these transfers were from residents in Nairobi, 11 percent from other urban areas and only 7 percent from rural areas. Overall, both Nairobi-to-other urban and Nairobi-to-rural transfer are very common, and as a group *Nairobi's slum households are, by far, "net remitters"—that is, Nairobi's slum dwellers are using their urban incomes to support families and friends both inside and outside the city.*

Remittances by poor and non-poor households**.** Remittance patterns among poor and non-poor households differ. As one would expect, a greater proportion of non-poor households (83 percent) sent remittances compared to the poor (67 percent). It is striking, however, that such a large proportion of poor households can and do send remittance despite their own state of deprivation. Finally, the geography of remittances differs as well—the proportion of poor households remitting to rural areas is 29 percent as compared to 39 percent for non-poor households. All of these differences among poor and non-poor households are statistically significant (at 5 percent level or less).

7.4 Registered voters and participation in last election—enhancing "voice"

In many countries, slum dwellers' right to vote has helped them and their allies in pressuring local and national governments to reduce the risk of demolitions, improve delivery of basic services and/or undertake land regularization programs in these settlements. To assess whether such bottom-up pressures are likely to help slum dwellers in Nairobi, in this survey they were asked both whether they were registered to vote and whether they had voted in the presidential election in 2002. Before we examine the results, it is worth noting that the first democratic presidential election in Kenya took place in 1994, and the first regime change occurred in 2002 (with President Moi stepping down after decades of rule). It is also important to note that, unlike in many other countries where voting registration is tied to place of residence, Kenyans can vote in any district in the country.

The survey reveals that the majority (69 percent) of survey respondents are enfranchised and that they do exercise their right to vote—82 percent of those registered say that they voted in the 2002 presidential election (Table 14). Overall, the net participation rate—that is, those who were registered and voted—was 56 percent.

Analyses reveal, however, that there is a welfare gap in the net participation rate (Table 14). Only 53 percent of the poor voted in the 2002 election as compared to 64 percent of the non-poor. The gender gap is even larger—46 percent of the women voted as compared to 66 percent of the men. Women from poor households had the lowest participation rate, with only 44 percent voting in the 2002 election. [25]

Most of the welfare and gender gap is attributable to differences in registration rates, rather than to differences in turnout once they are registered. Although 69 percent of survey respondents are registered voters, registration rates are higher among the non-poor (78 percent) than the poor (65 percent). There is a 20 percentage point gap between men and women—80 percent of men are registered as compared to 60 percent of women.

Once registered, slum dwellers do turn out to vote in elections and there is no difference in turnout rates between the poor and non-poor (82 percent in both groups). Turnout rates among men and women are also similar (83 percent and 80 percent, respectively). Further disaggregation of the data reveal, however, that there is a significant difference in turnout rates between women from poor and non-poor households. Specifically, 89 percent of registered women from non-poor households voted in the election as compared to 78 percent of women from poor households.

In sum, slum dwellers are enfranchised and participate in elections. As democratic processes in the country deepen, slum dwellers are likely to have more "voice" and can, thereby, hope to extract better performance and greater responsiveness from their local and national government. Efforts to increase voter registration among the poor slum dwellers and among women can help make voter participation more representative.

[25] Tables presenting data further disaggregated by gender within the two welfare groups have not been included in this paper.

Table 14: Registered voters and participation in 2002 election

	All		Poor		Non-poor		Male		Female	
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Registered to vote (a) ***	1755	69.0%	1282	65.5%	473	78.3%	903	57.4%	852	79.5%
Registered voting in 2002 (b)	1207	81.7%	835	81.8%	372	81.7%	719	82.8%	488	80.2%
Net participation rate (a*b)		56.4%		53.5%		64.0%		47.5%		63.7%

Note: ***Indicates statistical significance at 1% level for difference between Poor and Non-poor as well as Male and Female.

Table 15: Water infrastructure and services: Primary sources, per capita use levels, and unit costs

	All HHs			Poor HHs			Non-Poor HHs		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
USE: PER CAPITA									
Per capita water consumption in liters per day among slum households***	1750	23.4	20	1277	21	20	473	29.8	20
Per capita water consumption in liters per day for those using kiosk as primary source***	1142	23.6	20	847	21	20	295	30.4	20
UNIT COST-USD/m^3									
Unit water cost in USD/m^3 for all slum households **	1750	1.73	1.33	1277	1.69	1.33	473	1.82	2
Unit water cost in USD/m^3 can for those using kiosk as primary source***	1142	1.77	1.33	847	1.71	1.33	295	1.93	2
Primary sources of water* **									
Private piped	67	3.8		47	3.7		18	3.9	
Yard tap	267	15.2		185	14.4		82	17.3	
Kiosk	1127	64.2		838	65.4		289	61	
Vendors	33	1.9		26	2		8	1.7	
Neighbors	23	1.3		21	1.6		2	0.4	
Ground water or other natural source	88	5		49	3.8		38	8.1	
Other	2	0.1		1	0.1		0	0	
Sub-total	1606	91.5		1167	91		437	92.4	
Missing	149	8.5		115	9		36	7.6	
Total	1755	100		1282	100		473	100	

Note: Significance of difference between poor and non-poor indicated by asterisks: ***= 1% level, **=5%

Table 16: Energy infrastructure and services: Electricity, other household fuels, and street lighting

	All		Poor		Non-Poor	
	N	Percent	N	Percent	N	Percent
Connections to electricity	1755		1282		473	
Households connected **		21.80%		18.30%		31.30%
HHs aware of informal connections		44.30%		50.10%		44.30%
Method or recipient of electricity payment *	383		235		163	
Included in rent		30.2%		24.2%		39.6%
Pay to landlord (separately from rent)		23.6%		23.1%		24.3%
Pay neighbor		23.2%		28.8%		14.4%
Pay to utility company		18.7%		18.1%		19.5%
Other		3.7%		0.4%		0.0%
Buy prepaid card		0.5%		0.5%		0.5%
Primary source of home lighting **	1755		1282		473	
Electricity		22.00%		19.10%		29.60%
Kerosene		77.10%		80.00%		69.50%
Solar/other		0.90%		0.90%		0.90%
Primary cooking fuel **	1755		1282		473	
Electricity		0.50%		0.60%		0.40%
Kerosene		90.10%		90.00%		90.30%
Charcoal		5.80%		6.40%		4.30%
Firewood		0.80%		1.00%		0.20%
Gas/solar		1.10%		0.80%		2.20%
Street lighting	1755		1282		473	
HH who say there is street lighting		15.70%		15.2%		15.3%
Of those with street lighting, lights work:	276		201		75	
rarely or not at all		35.50%		32.80%		42.70%
some of the time		29.70%		30.90%		26.70%
most of the time		34.80%		36.30%		30.70%

Note: Significance of difference between poor and non-poor indicated by asterisks: **=5%, *=10%.

Table 17: Sanitation infrastructure and services: Toilets, Sewerage, Drainage and Garbage

	All		Poor		Non-Poor	
	N	Percent	N	Percent	N	Percent
Toilet Facilities—Type:	1755		1282		473	
No facility/flying toilets		6%		6%		6%
Individual toilet (VIP/ordinary pit/WC)		25%		24%		26%
Shared/public toilet		68%		68%		67%
Mean number of **households** sharing a toilet facility	1615	19.1	1180	19.4	435	18.5
Mean number of **people** sharing a toilet facility*	1613	71.3	1181	73.8	432	64.7
Toilet maintenance provided by:*	1755		1282		473	
Landlord		28%		27%		32%
Own household		4%		4%		4%
Group of households		48%		48%		48%
HHs aware of toilet improvements in their settlement	1755	28%	1282	27%	473	31%
Excreta disposal system (incl. sewerage)*	1755		1282		473	
Formal NCC connection to public sewer		12%		11%		14%
Informal connection to public sewer		17%		18%		14%
Septic tank/soak pit		1%		0%		2%
Pit latrine		64%		64%		63%
HHs aware of improvement in disposal facilities in settlement	1755	7%	1282	6%	473	7%
Grey water disposal system (incl. drainage)	1755		1282		473	
Pour into the drain		71%		71%		70%
Pour into the road or pavement		19%		19%		17%
Pour into pit latrine		1%		1%		1%
HHs who say drains exists in their settlements	1755	77%	1282	77%	473	77%
HHs with a drain outside their house	1755	58%	1282	56%	473	61%
HHs whose drain works properly most of the time	1755	25%	1282	25%	473	26%
Garbage/solid waste disposal system	1755		1282		473	
Dumping in own neighborhood		78%		79%		76%
Burning/burying in own compound		10%		10%		9%
Organized private collection system		11%		10%		13%
City collection system		1%		1%		1%
HHs who say garbage services exist in their settlement	1755	26%	1282	26%	473	28%
HHs who pay for their refuse collection	1755	9%	1282	9%	473	9%

Note: Significance of difference between poor and non-poor indicated by asterisks: **=5%, *=10%.

8. Infrastructure access and service delivery

There is almost universal agreement—between policy makers, academics, city residents, development agencies, and other experts—that the slums of Nairobi are poorly served. At the same time, aggregate data on infrastructure access from the National Census of 1999 indicate that the city's residents (and, by extension, the city's slum dwellers) are far better off than those in other parts of the country, especially when compared to those residing in rural areas. As a result, national poverty alleviation programs and budgetary allocations tend to focus on rural areas and on other urban centers with worse aggregate indicators; in this process, Nairobi's slums tend to miss out.

This raises the following questions. What is the infrastructure status of the slums? How do service indicators in the slums compare to those in other areas in the city and to national-level indicators? To answer such questions, and contribute to a more nuanced understanding of the situation, we take a closer look at four key infrastructure sectors: (i) water supply; (ii) energy; (iii) sanitation and drainage; and (iv) transportation.

We find, first, that infrastructure access in Nairobi's slums is unacceptably low—it is far worse than city-wide averages would suggest and it is often worse than the averages for urban Kenya. It is also significantly worse than the situation in, for instance, Dakar's slums.

Second, we find that some of the proxy infrastructure indicators being used in national level statistics and/or census data do not measure "access" correctly and at times seriously understate the level of problems on the ground. For the water sector, for example, access to water kiosks is reported as access to "piped water"—a category that includes yard taps and private in-house water connections, and is considered to be the highest level of service possible in many contexts. However, people have to walk to these kiosks, they have to pay very high prices to buy water by the jerrycan and, as a result, they tend to use very little water from this source (e.g. Gulyani et al. 2005). In other words, water kiosks provide a service level that is far inferior to yard taps and private in-house water connections but are counted in the same category as the latter two; thereby, households relying on kiosks are often, and inappropriately, excluded from programs aimed at reaching the under-served.

The findings presented in this section lead to a strong conclusion: there is no justifiable basis for excluding slum dwellers (relative to, say, rural residents) from either poverty-oriented infrastructure programs (e.g. the water and health MDGs) or from any significant sector-specific infrastructure development programs in the country. We speculate that this is likely to be true for slums in many other cities of the developing world—this is a hypothesis that should be tested in future empirical research.

8.1 Water supply in the slums

(a) Primary water sources

Only four percent of the households have private piped connections and use them as their primary water source (Table 15). About 15 percent use yard taps as their primary source and *the vast majority—64 percent—rely on kiosks*. That is, they buy water by the bucket or, to be specific, 20-liter "jerrycans." About five percent rely on ground or other natural sources, two percent on vendors, and one percent on neighbors. Information regarding the primary source used by the remaining nine percent of the households is not available (i.e. missing).

By comparison, studies reporting data for Nairobi as a whole place the proportion with access to piped water (i.e. private in-house connections or yard taps) at 71-72 percent (Collignon and Vezina 2000, Gulyani et al. 2005). In other words, *there is a gap of over 50 percentage points between the percent of connected households in the slums as compared to the city as a whole.*

(b) Per capita use

Water use in Nairobi's slums averages about 23 liters per capita per day (lcd) (Table 15). Poor households use an average of 21 lcd compared to 30 lcd by the non-poor and the difference is statistically significant. Median water use is 20 lcd for poor and non-poor households alike. That is, exactly half the households residing in slums (both poor and non-poor) use less than 20 lcd of water.

Water use in Nairobi's slums is low in both absolute and relative terms. In fact, it is about half the level recorded for urban areas in Kenya by recent studies. Two of these studies of urban water use in Kenya report average water use of 40-45 lcd and also argue that these use levels are rather low compared to both previous use levels in Kenya and to current use levels in other developing countries (see Thompson et al. 2000, Gulyani et al. 2005). By comparison, then, Nairobi's slum dwellers are seriously under-served.

(c) Unit cost of water

Slum households pay full-cost-recovery-level prices or more for their water. They pay, on average, Ksh130/m^3 (US\$1.73/m^3) for their water and the median cost is KSh100/m^3 (US\$1.33/m^3). While there is no statistically significant difference in the average unit costs borne by poor and non-poor households, the median costs for the non-poor are higher than for the poor (US\$2.00/m^3 and US\$1.33/m^3, respectively).

Water prices appear to have come down since November 2000, when there was a water shortage in the city. Specifically, using data from household surveys conducted in November 2000 in Nairobi, Mombassa and Kakamega, Gulyani et al. (2005) report an average unit cost of US\$3.50/m^3 (adjusted for shortage at US\$2.90/m^3) and a median cost of US\$2.10/m^3. As one would hope, price levels in Nairobi do appear to have to have adjusted downwards after the shortage was over.

Nevertheless, current water prices in Nairobi are still untenably high—untenable not only because income levels are low in the slums (and in the country as a whole) but also because experts estimate that an efficiently managed Nairobi water utility can cover full costs at tariffs that are significantly lower than the prevailing market price of USD1.73/m^3 (see Gulyani et al. 2005).

8.2 Electricity, other fuels, and street lighting

Only one in five homes in Nairobi's slums (22 percent) is connected to electricity (Table 16). Connections rates are significantly higher among non-poor households (31 percent) compared to the poor (18 percent). Simply being connected does not, however, imply continuous availability. Almost one-quarter (23 percent) of connected households report that electricity is available less than 12 hours a day.

Of those connected, the vast majority (96 percent) say they pay their bills regularly. Compared to the non-poor, poor households are somewhat less likely to pay regularly—95 percent of the poor and 98 percent of the non-poor households claim they pay their electricity charges regularly. About 54 percent say their pay their landlord for electricity, either as part of their rent or in addition to it. Another 23 percent pay their neighbor, about 19 percent pay directly to the utility, and the remaining four percent report other payment arrangements.

Some of the 22 percent who have access to electricity get it through an illegal connection. About 44 percent of the households report that they are aware of illegal connections in their neighborhood. In slums in many other countries, by contrast, a far greater proportion of households tend to have access to electricity and it is often through illegal connections.

Primary lighting fuels. Within slums, all of the 22 percent who have electricity connections do use electricity as their primary lighting fuel—indicating that this is their preferred lighting fuel and that they are willing and able to pay for it. Among the 78 percent who are *unconnected*, almost all *rely on kerosene as their primary lighting fuel.* The exception is those households—comprising one percent of the total—who rely on solar or other fuels, including batteries.

Use of electricity as a lighting fuel—a good indicator of the relative "access, availability and affordability" of electricity—is far lower in Nairobi's slums compared to the city as a whole and to the average for urban Kenya, but still significantly higher than in rural Kenya. The proportion of households using electricity as their main lighting fuel is as follows: 22 percent of households in Nairobi's slums, 52 percent of households in Nairobi as a whole, and 40 percent of all urban households in Kenya. The national average is 13.5 percent which reflects a shockingly low usage rate in rural areas—only 3.8 percent of rural households in Kenya use electricity as their main lighting fuel. Overall, there is an urgent need to improve electricity access in both slum settlements and in rural Kenya.

Primary cooking fuels. In addition to being the primary lighting source for slum dwellers, *kerosene also serves as the primary cooking fuel.* About 90 percent of slum households rely on kerosene for cooking, and the proportion is similar among poor and non-poor households. The next most important fuel is charcoal, and it is used by 6.4 percent of the poor and 4.3 percent of the non-poor. Gas and solar power are used for cooking by 0.8 percent of the poor and 2.2 percent of the non-poor. Only one percent of households use firewood as their cooking fuel—though this is more prevalent among poor households—and just 0.5 percent of households use electricity for cooking.

Street lighting. *Only 15 percent of households report street lights on their streets.* This is consistent for poor and non-poor households. Of those who reported street lights, one-third said that the lights worked most of the time, one-third reported that they worked some of the time, and one-third claimed that the lights worked rarely or not at all.

8.3 Sanitation and drainage

Access to various types of sanitation infrastructure and services is highly inadequate in the slums. In fact, sanitation indicators are significantly worse than the already poor indicators for water and electricity. The main indicators for sanitation and drainage are summarized in Table 17 and are discussed below.

(a) Access to toilets. Only about one-quarter of the slum households have access to a private toilet facility. The majority (68 percent) of slum dwellers rely on shared toilet facilities. An additional 6 percent are even worse off—they have no access to toilets and have to use open areas and/or "flying toilets" (i.e. plastic bags that are tied up and then flung away). This distribution is almost identical for poor and non-poor households. The fact that levels of access and types of facilities are similar among poor and non-poor appears to suggest that inadequate access to toilets in the slums is not solely a cost or affordability issue; the low levels of access appear to be resulting from other constraints such as lack of space and/or the very low proportion of resident owners as compared to renters in the slum population.

On average, 19 households—or 71 people—depend on one shared toilet. The number of households sharing a facility is similar among poor and non-poor households. Given the larger size of poor households, however, they have a larger number of people relying on one toilet—among poor households 74 people share one toilet compared to 65 people per toilet among the non-poor (this difference is statistically significant at the 10 percent level).

Many of the shared toilets are public facilities, often financed by NGOs and operated by community groups. There are, however, also some facilities that are privately owned and operated on a pay-per-use basis. Among households that rely on shared facilities, 95 percent report that they able to reach these facilities on foot within five minutes, while the rest say that the facilities are located at a greater walking distance.

Maintenance. Of those who have access to a facility, more than half (54 percent) report that their toilet facilities are maintained by a group of households, 34 percent report that landlords provide maintenance, four percent say they maintain their toilet themselves, and the remaining seven percent report other arrangements for maintenance.

(b) Excreta disposal and sewerage. As noted, six percent of the households have no access to a toilet facility and cannot, therefore, follow any safe disposal practices. Among the rest, *nearly two-thirds of households (64 percent) dispose off excreta through pit latrines which have to be emptied* on a regular basis (but are often not). A small proportion of households (1 percent) report the use of septic tanks or soak pits. About 29 percent utilize the public sewer system—12 percent have formal connections and 17 percent are connected informally to public sewers.

Although roughly the same proportions of poor and non-poor households are connected to the public sewer system, a greater proportion of poor households have an informal connection as compared to the non-poor. Among poor households, 11 percent have formal sewer connections while 18 percent have informal connections. Among non-poor households, 14 percent have formal connections and an additional 14 percent are informally connected.

(c) Grey water disposal and drainage. Most households (71 percent) dispose of "grey water", which includes bath water, dish water and the like, by pouring it into a drain. Almost one-fifth of

households (19 percent), however, simply dump their grey water onto the road or pavement, while the remaining 10 percent find some other means of disposal.

About three-quarters of the households (77 percent) report that there are some drainage channels in their settlement. At the household level, however, *only half of all households (58 percent) report a drain outside their home, and only one-quarter (25 percent) report that the drains work properly most of the time.* In other words, slum settlements appear to have some primary drainage facilities but secondary and tertiary drains are less common. Further, even when they do exist, drains do not function on a regular or reliable basis.

(d) Solid waste disposal services barely exist. *Less than one in a hundred households (0.9 percent) is served by a publicly-provided garbage collection system.* As a result, most households (78 percent) dispose of solid waste by dumping it in their own neighborhood. Another 10 percent burn or bury their waste in their own compound. Only about 10 percent employ an organized private collection system and, of these, the majority (78 percent) pay for the service. There is no statistically significant difference in disposal patterns among poor and non-poor households.

Although only about 11 percent of the households use some sort of public or private collection system, 26 percent of the households report that such services exist in their settlements. If garbage collection services exist, why are participation rates by households low? One reason may be that households are unwilling or unable to pay for garbage collection. Given the large negative externalities of current solid waste disposal practices, this is an area that requires further inquiry (and probably needs to be accorded priority in future interventions).

8.4 Modes of transportation

Among adult slum dwellers, 64 percent walk to work and 31 percent use microbuses to commute (Table 18). A far greater proportion of the poor (69 percent), as compared to the non-poor (50 percent), walk to work. This 19 percentage point difference in modal share has been captured by microbuses—that is, about 27 percent of poor workers use microbuses to commute to work as compared to 45 percent of non-poor workers.

The difference in transportation modes used by the poor and non-poor is even more evident among school-age children. Ninety-three percent of poor children walk as their main mode of transportation, as compared to 77 percent of non-poor children. A significantly larger proportion of non-poor children (16.2 percent) use a microbus as their main mode of transportation, as compared to the children from poor households (1.6 percent).

The difference in the transportation modes used by the poor and non-poor is clearly reflected in daily per capita household expenditure on transportation. The median daily expenditure among the non-poor is Ksh 15 and the average expenditure is Ksh 19.4. By comparison, *at least half of the poor households do not spend any money on transportation*—as a group, their median expenditure is zero and average daily expenditure is Ksh 6 (less than one-third the average spending by the non-poor). Many of the poor appear to be forgoing transportation expenditures entirely, given their low incomes and high fixed expenses on items such as housing.

Table 18: Transportation

	All		Poor		Non-poor	
	N	Value	N	Value	N	Value
Adults with occupation walking to work (%)	2516	64.1	1927	68.5	589	49.9
Adults with occupation taking microbus to work (%)	2516	31.2	1927	27	589	44.5
Adults using other means to get to work (%)	2516	4.7	1927	4.5	589	5.6
School-age children who walk	892	91.4	816	93	76	76.8
School-age children who use microbuses	892	3.1	816	1.6	76	16.2
Mean HH daily per capita spending on transportation (Ksh)	1754	9.7	1281	6	473	19.4
Median HH daily per capita spending on transportation (Ksh)	1754	4	1281	0	473	15

8.5 Infrastructure upgrading efforts thus far and results

Unlike in many other cities of the developing world, slums in Nairobi have not benefited from any large-scale or systematic public programs designed to upgrade infrastructure and services in the slums. However, there have been some pilot projects and piece-meal efforts by different types of government agencies, international development organizations, and non-government organizations. To ascertain the extent—and, if possible, effectiveness—of such efforts, the household questionnaire included a module on the resident's perception regarding the upgrading efforts. Specifically, households were asked whether they were aware of an effort to improve the physical infrastructure and/or services in thirteen possible sectors and, if so, whether these improvements had actually helped improve the situation. The sectors included in the inquiry are: water supply, toilets, toilet exhauster services, garbage collection services, health clinics, public schools, private schools, internal roads, access roads, electricity, land regularization programs, street lights, and drainage facilities.

Based on these household responses, all enumeration areas have been classified into "low" or "medium" intervention areas. Before describing the method used for this ex-post classification, it is important to note this is just one of several possible ways to examine interventions at the neighborhood level. The approach used is as follows. If 50 percent or more respondents in a given EA reported that they were aware of an intervention in a given sector, an "intervention" was defined to have actually occurred in that area. The number of sectors that had experienced interventions were then totaled to obtain a measure of the extent of interventions in the area. Based on this approach, we found that the total number of interventions ranges from zero to eight. Following a natural break in the data, those areas with fewer than three interventions were considered "low-intervention areas", and those with three to eight were designated "medium-intervention areas" (Annex 8, Table 8.1). No EA in our sample had more than eight interventions.

As Annex 8 shows, about one-quarter of all households were unaware of any interventions, while roughly one-half were aware of one or two interventions. Altogether, four out of five households reside in low-intervention areas. Only a small proportion of the EAs have had more than three interventions—for instance, seven percent of EAs have had three interventions, two percent have had six interventions, and only one percent of the EAs have had eight interventions.

The variable "medium intervention" was then included as a dummy variable in a series of regression analyses. The results, mentioned in earlier sections, show that households residing in medium-intervention areas are more likely to be poor than those in other slum areas; this appears to suggest that the interveners intended to and succeeded in targeting aid to the poorest areas within the slums (Table 1). We also find that rents in medium intervention areas are not systematically different (higher) than those in low intervention areas (Table 12)—a plausible reason for this may be that the number and/or nature of interventions may not have been sufficient to create a substantial-enough improvement in the infrastructure and services in medium-intervention areas as compared to those categorized as low-intervention areas.

While a distinction between low- and medium-intervention areas is useful, it is more important to understand whether a particular sectoral intervention worked and what kinds of positive effects it may have created. As a first step, we examined households' perceptions regarding each sector-specific intervention. *The vast majority of slum dwellers who noted that there was an intervention also said that it was working and had helped improve the situation* (Annex 8). In other words, various interventions have, at the very least, improved residents' perception of the quality of those services in their settlement.

Impacts of sector-specific interventions: Case of the water sector

Given the richness of information on water supply in our dataset, we next examined the effects of improvements in the water sector. Based on household responses two groups were created—those who had reported a "water intervention in their neighborhood" and those who had reported "no intervention." Basic water supply indicators, gathered in a different module of the survey, were compared across the two groups. The results, summarized in Table 19, reveal the following.

First, although the level of per capita water use does not differ significantly across the two groups, the average unit cost of water is 13 percent lower in intervention areas compared to those without an intervention—US$1.55/$m^3$ and US$1.79/$m^3$, respectively. Second, relative to areas without intervention, areas with an intervention have a higher proportion of households using piped water (private connections and yard taps) as a primary source and a lower proportion of those relying on

kiosks. Given that kiosks are a more expensive source and entail more effort and time in water collection, the increased use of piped water can be considered an improvement in the level of service; this shift is probably also a key factor behind the reduction in the average unit cost of water in areas with intervention. It is worth noting, however, that the upgrading or intervention efforts appear to have been modest—for example, the proportion of people with access to yard taps increased only six percentage points while the proportion of those relying on kiosks fell about five percentage points.

Third, households in areas that have experienced interventions in the water sector perceive their prices to be lower on average than households in non-intervention areas. Fourth, they also perceive their water quality to be higher, as compared to households residing in areas without intervention.

In summary, *water sector interventions, albeit modest in scale and scope, do seem to have worked*—they appear to have helped lower unit water costs, increase the proportion of households with access to a higher level of piped water service (private connections and yard taps), and improved residents' perceptions of both water quality and price. The results suggest that interventions in the water sector have had a positive impact on the lives of slum dwellers. This is a very encouraging finding.

Table 19: Impact of interventions in the water sector

	No intervention		Intervention	
	N	Mean	N	Mean
Per capita water use-lcd	1267	23.4	458	23.3
Unit water cost-US$/m^3***	1246	1.79	448	1.55
	N	Percent	N	Percent
Perception of water price**				
"High"	847	67.3%	238	52.4%
"Fair"	377	30.0%	188	41.9%
"Low"	32	2.7%	24	5.7%
Total	1256	100%	450	100%
Perception of water quality**				
"Good"	760	59.7%	340	73.9%
"Fair"	384	31.0%	91	20.4%
"Poor"	128	9.3%	27	5.7%
Total	1272	100%	458	100%
Primary water source*				
No primary water source	125	9.5%	42	8.8%
Private piped	48	3.5%	19	5.0%
Yard tap	156	13.5%	83	20.1%
Kiosk	822	64.4%	286	60.2%
Vendors	23	1.7%	9	1.9%
Neighbors	11	1.0%	4	0.9%
Other	76	5.8%	11	2.5%
Don't know or no answer	11	0.7%	4	0.8%
Total	1272	100.0%	458	100.0%

Note: Significance of difference indicated by asterisks. ***=1%, **=5%, *=10%.

9. Education

In January 2003 the Government of Kenya introduced free primary education as a step towards improving literacy levels in the country. The government now has plans to actively expand public primary schools in slum areas (Lauglo 2004). There are several studies underway to measure the impacts of the free education program and the preliminary results are not all positive.

To contribute to the ongoing policy discussions and program designs in the education sector, this section focuses on the following questions: What was the status of education in the slums one year after the introduction of free primary education? What are some of the issues that deserve priority in the proposed slum education program?

Before we discuss our results, it is worth examining one of the emerging critiques of the free primary education policy. Based on a study of private schools in three of Nairobi's slums, Tooley (2004) concludes:

> "… the findings on these [private] schools suggests that free primary education (FPE) may not have had the desired impact of increasing educational enrolment. Instead it may have led to a *decrease* in the *numbers* of students enrolled in primary schools, and a *decrease* in *quality* in government schools, at least as perceived by parents." (Tooley, 2004, pp. 4) [Emphasis in original].

Tooley contends that estimates regarding the dramatic increases in public school enrollment may be misleading; rather than representing new enrollments they may well be transfers from private non-formal (or unregistered) educational institutions to public schools. In addition, the exodus of students from private schools has hurt their viability and forced some to close. Not all of the students displaced by closure of private schools have, however, been able to find slots in public schools. Consequently, net enrollment may have fallen (rather than increased) in Nairobi's slums as a result of the introduction of free primary education.

Our findings directly challenge the argument that introduction of free primary education may have hurt enrollments—in fact, our data provide preliminary evidence that the free primary education policy is working for households in Nairobi's slums. First, primary school enrollments rates are high and they appear to have improved after the introduction of free education in 2003. Second, contrary to widespread expectations, we find no difference in primary school enrollments rates between girls and boys and between children from poor and non-poor households. In addition, as noted earlier, rents are systematically higher in settlements with a public school facility (Table 12); this correlation suggests (but does not prove) that access to a public school is valued by households. It is crucial to test these findings through additional research to conclusively settle the debate regarding enrollments.

Beyond the enrollment discussion, we find that the majority of slum dwellers have completed primary school, but women and poor households lag in educational attainment. More encouragingly, we also find that education levels are negatively correlated to poverty. Overall, our findings highlight the need for additional efforts focusing on education in Nairobi's slums.

In the following section, we examine school enrollment rates and educational achievement by age cohort, welfare category, and gender. We also compare education statistics in the slums with those from the Kenya Demographics and Health Survey (K-DHS) of 2003.

9.1 Enrollment rates among children (5-14 years of age)

The *enrollment rate among school-age children (5-14 years) living in slums is 92 percent* and there is no significant difference either between boys and girls or between poor and non-poor households (Table 20). By comparison, the 1999 census recorded the enrollment rate for this age group at 80 percent for Nairobi as whole. The explanation may lie in the fact that the census data pre-date the government's policy of providing free primary education—that is, the enrollment rate may have risen dramatically (both in Nairobi and the slums) after the new policy came into effect. This issue is explored further in Section 9.4 below.

Of the eight percent of school-age children who are not currently enrolled in school, about half have dropped out of school, and the other half have never been to school. There is no statistically significant difference in enrollment and drop-out rates either among males and females or among the poor and non-poor in this age group (5-14 years).[26]

Although the school enrollment rate is high, qualitative data suggest that parents are concerned about quality of education. In interviews, parents said that the classes were currently too crowded to offer their children a decent education.

9.2 Educational attainment (age 15 years or more)

Among adult slum dwellers, at least 96 percent have had some schooling and 77 percent of slum dwellers have completed at least primary school. Beyond primary school, however, educational attainment tapers off rapidly. Only 28 percent have completed secondary school or more.

The poor lag behind the non-poor in education and the gap is wide by secondary school level (Table 20). Among adult members of the household, the proportion who have had no schooling is twice as high in poor households as compared to the non-poor—specifically, 5.0 percent of poor adults as compared to 2.4 percent of the non-poor have received no education (and can be considered illiterate). The gap between the two groups widens to eight percentage points by the time primary school is completed—76 percent of the poor compared to 84 percent of the non-poor have completed primary school. By the time secondary school is completed, the gap between the poor and non-poor widens even further (to 14 percentage points); only 25 percent of the poor have completed secondary-level training as compared to 39 percent of the non-poor.

Figure 4 presents a more disaggregated snapshot of the welfare gap in education. It plots educational achievement for six age cohorts (5-14, 15-24, 25-34, 35-44, 45-54, and over 55 years of age), further disaggregated by welfare category. *First,* it clearly shows that *in each age category the poor have lower educational attainment than the non-poor. Second*, *educational attainment initially rises with age, maximizes at 25-34, and then declines*—that is, it is highest among those in the 25-34 age cohort and falls rapidly which each older age category. Thus, slum dwellers over the age of 55 years have the

[26] In a different study Lloyd et al. (2000) find that, in rural areas, girls are more likely to drop out during the last two years of primary school (standards 7 and 8) as compared to boys. In Nairobi's slums, for the age group 5-14 (taken as a whole), we do not find any such evidence.

highest proportion of people without any formal education and the lowest proportion of those who have completed at least primary education. The second finding is somewhat encouraging in that it suggests that educational levels have been improving over time and that young slum dwellers are more likely to be more educated now than they were a few decades ago.

There is a serious gender gap in education. Among adults, women lag behind men in educational attainment at all levels—relative to men, a greater proportion of women have no schooling and significantly lower proportions have completed primary and secondary school. Compared to men, the proportion of women without schooling is three times higher—7.2 percent of women and 2.5 percent of the men have had no formal education. While 82 percent of men have completed primary school, only 71 percent of the women have done so. And 34 percent of men have completed secondary school as compared to 20 percent of the women.

9.3 Educational attainment at the household level and its impact on poverty

To analyze the impact of education on household welfare, we created a variable for the maximum level of education achieved by any member of the household (rather than just examining the education of the household head or primary income earner).

The descriptive statistics summarized in Table 20 reveal the following. In *about 87 percent of the households, at least one member has completed primary education or more.* The remaining 13 percent have members who have not completed primary school or have received no formal education at all. The proportion of households in which at least one member has completed primary education is similar among the poor and non-poor.

About 40 percent of the households had at least one member who had completed secondary school. As compared to the poor, a greater proportion of non-poor households have at least one member with a secondary school completion certificate—38 percent and 44 percent of the poor and non-poor, respectively.

As reported earlier, multivariate analyses show that as the maximum level of education attained in the household rises, its likelihood of being poor falls and its per capita income rises (Table 1). This is an encouraging finding because it indicates that there are returns to education even within the population of slum dwellers and that this is so despite the seemingly tight (and increasingly informal) labor market in the city.

9.4 Comparison with education statistics reported in the K-DHS 2003

The 2003 K-DHS, conducted between May and August 2003, reports educational attainment among individuals of age six years or more. The K-DHS data were collected soon after the introduction of free primary education and it is highly likely that they do not capture the full effect of this policy on indicators such as school enrollment. Nevertheless, they provide some sort of a baseline against which to compare education levels in the slums (Table 21).

Our data show that middle- and higher-education statistics for slum dwellers are significantly worse than the averages reported for Nairobi in the K-DHS report. About 22 percent of slum residents have completed secondary education as compared to 42 percent of Nairobi's residents. Less than three percent of slum dwellers have post-secondary training or degrees as compared to over 16 percent of all Nairobi residents. At the primary school level, however, the gap is smaller. About 63

percent of the slum dwellers have completed primary education and/or some secondary education, as compared to 69 percent of all Nairobi residents.

The surprise is in the proportion reporting no schooling. We find that only about 5 percent of slum dwellers of age six years or more have not received any formal education; this is better than the numbers reported in the 2003 K-DHS data which finds the "no schooling" proportion to be nine percent in Nairobi. This is surprising because we would expect at least the average for Nairobi as whole to be better than that for the slums. There are at least two possible explanations and they are not mutually exclusive. First, it is possible that the introduction of free primary education has indeed increased enrollment rates and that the number for Nairobi is now also higher than that reported in the 2003 K-DHS. Second, it may be that the K-DHS sample for Nairobi (comprised of 2352 individuals) is not fully representative; by comparison our sample for the slums alone covers 4416 individuals.

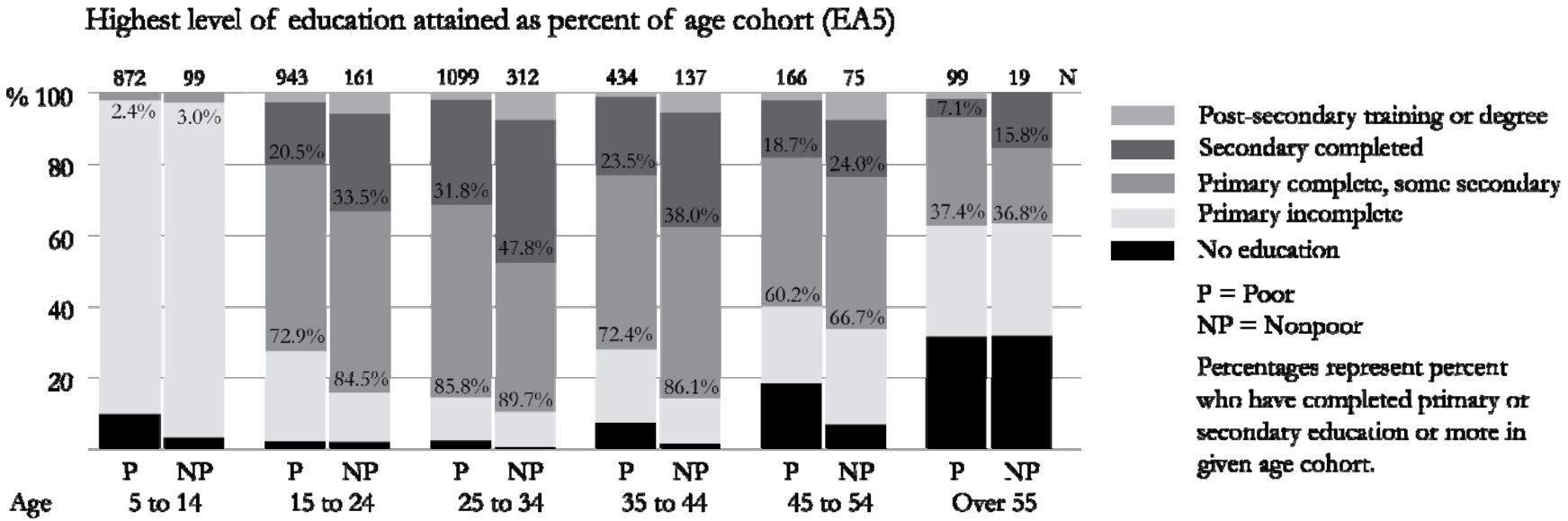
Overall, *the school enrollment rate in the slums is high and appears to have improved after the introduction of free primary education in 2003*. This contention can, in part, be easily tested by CBS—at the very least they can use census data to generate enrollment rates in slum areas in 1999 and compare these to the levels reported in this study. As mentioned earlier, our finding—although preliminary—directly challenges contentions by analysts such as Tooley (2004) who argue that enrollment rates may have fallen (rather than risen) in Nairobi's slums due to the introduction of free primary education.[27]

[27] Tooley's (2004) study is based on a survey of private schools and not a survey of households. Further, as the author himself admits, his argument regarding enrollments is based on estimates and these are subject to several biases. For these reasons, we would argue that his study cannot and should not be used to make claims regarding overall enrollments rates in the slums, nor to speculate more broadly on the advantages and disadvantages of public schools in the slums. Tooley's study can, at best, provide qualitative insights and raise issues that are of concerns to operators and clients of private schools covered under his study.

Table 20: Education by welfare group and gender

	All		Poor		Non-poor		Males		Females	
	N	%	N	%	N	%	N	%	N	%
School enrollment among school-age children (5-14 yrs) (N=971)	895	92.2%	803	91.8%	92	92.9%	459	92.2%	436	92.2%
Adults in school (15 yrs of age or more) (N=3452)	128	3.7%	107	3.9%	20	2.8%	72	3.6%	56	3.8%
Highest level of education achieved (individuals 15 yrs or more, excluding missing data)										
None	155	4.5%	138	5.0%	17	2.4%	50	2.5%	105	7.2%
Primary incomplete	622	18.0%	526	19.1%	96	13.6%	304	15.2%	318	21.8%
Primary complete/secondary incomplete	1717	49.7%	1402	51.0%	315	44.7%	970	48.6%	747	51.3%
Secondary completed	845	24.5%	618	22.5%	227	32.2%	596	29.9%	249	17.1%
Post secondary training/degree or more	113	3.3%	64	2.3%	49	7.0%	75	3.8%	38	2.6%
Total	3452	100.0%	2748	100.0%	704	100.0%	1995	100.0%	1457	100.0%
Summary statistics:										
Primary complete or higher	2675	77.5%	2084	75.8%	591	83.9%	1641	82.3%	1034	71.0%
Secondary complete or higher	958	27.8%	682	24.8%	276	39.2%	671	33.6%	287	19.7%
Highest level of education achieved in the household										
None	27	1.5%	21	1.6%	6	1.3%		1.1%		3.1%
Primary incomplete	196	11.2%	143	11.2%	53	11.2%		9.2%		20.5%
Primary complete/secondary incomplete	833	47.5%	628	49.0%	205	43.3%		47.1%		46.4%
Secondary completed	604	34.4%	434	33.9%	170	35.9%		37.3%		24.4%
Post secondary training/degree or more	95	5.4%	56	4.4%	39	8.2%		5.3%		5.7%
Total	1755	100.0%	1282	100.0%	473	100.0%		100.0%		100.1%

Figure 4: Highest level of education attainted by age cohort and welfare category



Note: Compiled from Annex 7. In each column: (i) the larger number (percentage) represents the proportion of each age cohort who have completed at least primary education; and (ii) the smaller number (percentage) represents the proportion of each age cohort who have completed at least secondary education.

Table 21: Highest level of education achieved by individuals 6 years or more in Nairobi and its slums

	Nairobi's Slums: 2004					K-DHS 2003: Nairobi			K-DHS 2003:National	
	Total (N=4416)	**Poor** (N=3613)	**NonPoor** (N=803)	**Males** (N=2489)	**Females** (N=1927)	**Total** (N=2352)	**Males** (N=1212)	**Females** (N=1157)	**Urban** (N=6113)	**Kenya** (N=30074)
None	4.5%	4.9%	2.4%	3.1%	6.3%	8.7%	7.3%	10.0%	11.8%	19.5%
Primary incomplete	32.7%	35.0%	22.9%	28.8%	37.8%	22.2%	21.2%	22.9%	29.5%	45.7%
Primary complete or secondary incomplete	40.5%	40.5%	40.0%	40.3%	40.5%	27.5%	25.4%	29.3%	28.5%	21.7%
Secondary completed	19.6%	17.6%	28.6%	24.6%	13.2%	25.6%	28.9%	21.8%	18.5%	8.8%
Post secondary training or degree	2.6%	1.8%	6.2%	3.1%	2.0%	16.0%	16.4%	15.4%	11.6%	4.3%
Summary statistics										
Primary or more	62.7%	59.9%	74.7%	68.0%	55.8%	69.1%	70.7%	66.5%	58.6%	34.8%
Some education	95.4%	94.8%	97.6%	96.8%	93.6%	91.3%	91.9%	89.4%	88.1%	80.5%

10. Development priorities

Given that their current access to various basic services is highly inadequate and the government's budget constraints are unlikely to allow for simultaneous improvements in all, we asked slum households to report their development priorities—specifically, towards which services they would like to see resources directed. Households were asked to rank nine services, including health and education, in order of priority. Table 22 presents the results in the form of frequency distributions for the entire sample and by household welfare level.

Slum households ranked the following as their top development priorities: (i) toilets and disposal of excreta (24 percent); (ii) water supply (19 percent); (iii) health clinics and services (13 percent); and (iv) electricity (12 percent). The rank order was similar among poor and non-poor households, with one exception—internal access roads emerged as the third most important service for non-poor households, ahead of health services and electricity.

Notably, education was ranked as a first priority by only five percent of the households—six percent of poor households and three percent of the non-poor. This may indicate relative satisfaction with the government's policy of free universal education, or may reflect a pragmatic conclusion that additional government resources should be directed to other sectors.

These priority rankings are useful in that they clearly signal what the residents would like to see improved in the short-term—physical infrastructure and access to health services. This can be used as a starting point for the design of slum improvement/upgrading programs being proposed by government, NGOs, and international aid agencies. The analysis on correlates of poverty presented in Section 3.2 and infrastructure access indicators presented in Section 8 provide support for the emphasis on infrastructure—well-designed investments in physical infrastructure (especially, toilets, water and electricity) can help improve the living conditions for all slum dwellers, help close the gap in access between the poor and non-poor, improve health, and support household enterprises. At the same time, Sections 3.2 and 9 together also suggest that a continued focus on education may be necessary to assist slum dwellers in their struggle against poverty over the longer term.

Table 22: Development Priorities as Stated by Households

	% of All HH (N =1755)		% of Poor (N = 1282)		% of Non-Poor (N = 473)	
	First Priority	Second Priority	First Priority	Second Priority	First Priority	Second Priority
Toilets and disposal of excreta	23.8	17.0	24.1	17.9	23.0	14.8
Water supply system	18.9	14.8	19.2	14.8	18.0	14.7
Health clinics and services	13.4	13.7	14.1	13.9	11.7	13.1
Electricity at home	12.3	10.1	13.3	10.3	9.7	9.6
Internal access road and roads within	9.4	10.1	7.1	9.8	15.4	10.8
Garbage collection and disposal	8.3	13.8	8.2	13.7	8.5	14.1
Schools and education	5.3	6.6	6.1	7.4	3.1	4.7
Storm water drainage system	4.5	7.4	4.1	6.6	5.7	9.5
Other	2.2	2.5	2.1	2.5	2.4	2.6
Street lighting for security	2.0	4.0	1.7	3.2	3.7	6.2

Note: The difference in stated "first priority" between the poor and non-poor is significant at 5 percent level.

11. Conclusions and policy implications

This study brings quite a bit of bad news, but there are also some positive findings. In this section we summarize some of the main findings, highlight the factors that are correlated with poverty, and outline some of the policy implications.

Who lives in these slums? The average slum household has three members and has resided in its current settlement for about nine years. About 48 percent of households report that they lived in a rural area before moving to their current settlement and, to our surprise, 51 percent said they moved in from another urban location. These slum dwellers are enfranchised—69 percent are registered voters and 82 percent of these say they voted in the presidential election of 2002.

Poverty incidence, measured in terms of expenditure, in the slums is high. About 73 percent of the slum dwellers are poor—that is, they live on less than US$42 per adult equivalent per month, excluding rent. Although their incomes are lower than those of the non-poor, the poor incur similar absolute expenditures on basics such as rent and electricity, because the market does not offer cheaper alternatives. To cope, the poor are cutting back on expenditures over which they have more discretion—that is, food, water and "luxuries" such as transportation—and going without high-expense utilities such as electricity. Finally, non-monetary poverty is high as well and it is particularly evident in the poor access to higher education, jobs, infrastructure and decent housing.

Infrastructure

There is an appalling lack of infrastructure. First, coverage of slum households by the public electric utility is low (22 percent connected) and most slum dwellers rely on kerosene for both lighting and cooking. Second, the water supply situation is dismal—four percent have in-house connections, 15 percent rely on yard taps and 68 percent rely on water kiosks. Kiosk users buy water by the jerrycan and pay a high average unit price; as a result, water use levels are low (23 lcd). Third, the sanitation situation—toilets, sewers and garbage removal services—raises serious public health concerns. About 68 percent rely on shared toilets with a high loading factor (average of 71 people per toilet). About 70 percent have neither a formal or informal connection to a sewer and rely on pit latrines that have to be emptied (but rarely are). About 88 percent of slum households either dump their garbage in their neighborhood or burn/bury it in their own compound. And only 0.9 percent is served by a public garbage collection system. Fourth, the majority of the poor cannot afford to pay for transportation and at least 50 percent spend nothing on it; in poor households, therefore, 93 percent of the children and 69 percent of the adults walk to school and work, respectively.

Further analyses show that, in the slums, public electric and water utilities can and do connect some non-poor households but they are not reaching many of the poor—as compared to the non-poor, poor households are systematically less likely to have access to piped water and electricity, even after controlling simultaneously for many other factors. Both the low connection rates and the gap between poor and non-poor households are indefensible. Public utilities should be categorically required to develop and implement plans for improving service delivery in the slums; at the same time, they need to be given both resources and incentives to improve their performance in this area. There is substantial international (and some national) experience to suggest how these improvements can be implemented.

Housing

The vast majority (92 percent) of slum households do not own their homes. They are tenants and they are crammed—2.6 persons per room—in poor quality housing structures built with impermanent materials. Rents in the slums are significant, despite the informal status of these settlements, the poor quality of the housing and inadequate infrastructure. Slum households pay an average rent of about US$11 per month. Further, rents vary within and across slum settlements and they appear to be driven by many of the factors that influence rental values in "formal" real estate markets—specifically, rents vary with location, house quality and infrastructure access.

Economic base

The economic base in slums is weak. In terms of employment at the individual level, about 49 percent of adult slum dwellers have regular or casual jobs. However, at least 26 percent are unemployed; the presence of an unemployed member in a household is strongly correlated with poverty. About 19 percent of adults work in a household enterprise.

At the household level, slum dwellers try to build an income portfolio rather than rely on one income stream, and household enterprises appear to be helping. About 30 percent of the households report that they operate at least one enterprise. The average enterprise has been in operation for about four years and employs 1.6 people. The encouraging news is that ownership of a household enterprise is negatively correlated with poverty. In other words, households with enterprises are more likely to be non-poor. It could well be that only the non-poor have the resources (financial and/or entrepreneurial) to operate such enterprises, but our findings suggest that this in not the full story—these enterprises appear to be helping households stay out of poverty. Additional research and analysis should be conducted to ascertain whether and how household enterprises can have a poverty-alleviating effect in the slums and the kinds of public policy/investment/infrastructure support that can engender or reinforce such a potentially positive outcome. At the very least, the presence of these enterprises indicates that there is significant and relatively successful entrepreneurial activity in the slums and that they appear to be worthy of some attention from public institutions and development agencies.

Education

The story on education is encouraging, but additional attention is required. Nairobi's slum dwellers are trying to ensure that their children have basic education. More than nine out of 10 (92 percent) school-age children are enrolled in school. These rates are higher than the levels reported for Nairobi as a whole in the 1999 census and in the 2003 K-DHS; this seems to be a positive outcome of the introduction of free primary education in January 2003. This finding, *albeit* preliminary, challenges arguments by analysts who suggest that the policy of free primary education may not have led to a net increase in enrollment rates. These analysts suggest that the new policy may have just led to the transfer of students from (unregistered) private schools to public schools and indeed to an overall decline, given capacity constraints in public facilities. While plausible and interesting, these arguments are not supported by data from slum households.

This is not to argue that all is well regarding education in the slums nor that the introduction of free education has been problem-free. Slum dwellers emphasize, for instance, that they are concerned about quality of education—they believe that, with the introduction of free education, public schools are currently too crowded to offer decent education to their children. This means that more work is required to ensure that the policy of free primary education can go beyond simply increasingly

enrollment rates and create tangible and sustained benefits, in learning and educational attainment outcomes, for the students in the medium-term.

Among adults, 95 percent have received some education and 78 percent have completed primary school. Beyond this level educational attainment tapers off and at the secondary school level both the gender gap and welfare gap start to widen. Specifically, secondary school completion rates are higher for men than for women and among non-poor households as compared to the poor.

Overall, the high rate of school enrollment among children and the relatively high primary-school-completion rate among adults are causes for optimism. Better still, and as we would hope, we find that higher education levels are positively correlated with income and negatively correlated with poverty among slum households. These findings lend support for development/adoption of policies and programs that will aim to further enhance educational levels among slum dwellers, reduce both the gender and welfare gap in education among them, and address their concerns about the quality of primary school education.

Other factors affecting economic welfare: time and gender

Slum dwellers' economic welfare appears to improve with time—there is a negative correlation between poverty and the number of years that a household has lived in a given slum settlement. This could potentially be due to factors such as deepening of local social networks, increasing urban experience and/or improving ability to navigate the city's complex local economy and labor markets. Additional research—qualitative analyses and longitudinal studies—is required to better understand whether, how and why economic conditions improve over time; such research can also help identify whether and how some of these "slow gains" or time-related processes of upward economic mobility can be accelerated.

Households' economic welfare is adversely affected by increasing household size, number of children and proportion of women in the household. Of these, the gender variable has the more obvious and immediate policy implications. In the slums, household size is already small and, as the narrow base of the population pyramid graphically reveals, the proportion of children is far lower than in the Kenyan population as a whole. Thus, efforts to further reduce household size or proportion of children to help reduce poverty would, arguably, not make much sense. By contrast, the finding that households with more women are more likely to be poor is a cause for concern and an area for intervention. Analyses show that women work with a handicap—their access to both education and jobs is significantly lower than that for men and this, in turn, restricts their options for upward mobility. The policy implications include, for instance, that special efforts may be required to ensure that women are participating in and benefiting from current and planned policies and programs (in education, employment, HMEs, infrastructure, credit etc). There may also be a need for additional/special programs to provide direct or targeted support to women to enhance their economic welfare.

Policy and program implications

Overall, living conditions in Nairobi's slums are bleak and poverty incidence is high. But there is hope, not least because slum dwellers are educated, entrepreneurial, enfranchised, and seemingly able to enhance their economic welfare over time. Not only is there is need for developmental

action in these settlements but also the economic and social returns to well-chosen and well-designed programs are potentially very high.

What is the record of prior slum-oriented development programs? There is crude evidence that previous upgrading efforts, despite having been extremely modest in scale and scope, have created some benefits. Of those slum dwellers who noted that there has been an effort to improve a particular service in their neighborhood, the vast majority noted that the service was working and that the situation was better than before. Additional analyses, using the case of the water sector, support this perception of slum dwellers. In comparing slums where a water supply intervention had occurred to those with "no intervention," the former had lower prices, a greater proportion of households with access to in-house or yard connections and a smaller proportion relying on kiosks. In addition, households in areas "with intervention" perceived their water quality to be higher and their prices to be lower than those residing in areas without an intervention. The degree of improvement in each water indicator is small but significant and encouraging.

What should the government prioritize? Technical analyses suggest that the following hold the most potential for achieving the specific goal of poverty alleviation in Nairobi's slums: actions that improve infrastructure access, help increase education levels, facilitate further development of household enterprises, reduce unemployment, and reduce the gender handicap borne by women. Meanwhile, the slum dwellers' themselves identify their top four development priorities as toilets, water, health and electricity.

The technical analyses and residents' priorities have a clear area of overlap—infrastructure. In fact, investments in infrastructure—such as water, sanitation, paved paths and electricity—can help achieve improvements in several of the factors correlated with poverty as well as address some of the health concerns of slum dwellers. First, infrastructure improvements can create household-level benefits that include improved living conditions, lower incidence of illness, and lower expenses on basic services, especially water. Second, infrastructure investments can provide a shot in the arm for local business development. That is, infrastructure improvements can facilitate the development and competitiveness of household micro-enterprises that are already playing a crucial economic role; these HMEs can, in turn, help lower unemployment in the slums.

In addition to infrastructure, education deserves to be a high priority in the slums. Although the "free primary education" program is meeting the basic need of getting children enrolled in school, resident's concerns regarding overcrowding and quality need to be reviewed and addressed. Equally important is the need to reduce the welfare and gender gaps in secondary school completion rates. This is crucial as a medium- and long-term investment for assisting the poor and the women in their efforts to fight poverty and improve their economic welfare.

Area-wide programs or sector-specific ones? This question clearly has more than one answer and we take the following position on this issue. In education, an independent sector-specific approach makes sense and can work. For various infrastructure sectors, independent interventions are possible and they can create limited benefits; this is evident from the (small) gains seen from prior efforts in the water sector. We would argue, however, that any serious and sustainable improvement in infrastructure requires a multi-sector and area-wide approach, given the base conditions in Nairobi. Also, unlike in many other cities, this is a case where housing issues need to be dealt with alongside infrastructure. This is because the absentee landlords own and control not just the housing units but also many of the yard taps, water kiosks, in-house connections for electricity and

water, and many of the toilet facilities (including "public" pay-per-use toilets). Any serious intervention needs to include discussions with landlords, and once some agreement has been reached it can and should be used to achieve gains, simultaneously, in housing and various infrastructure sectors. In fact, if we were asked to identify just one entry point—that is, one sub-sector—into the problem of living conditions in the slums, it would be the structure of the housing market. We would argue that a key goal of any efforts in Nairobi's slums should be to break the low-quality, high-cost trap in slum housing and infrastructure, and that the only way to get there is to start discussions with both landlords and tenants.

References

Alder, Graham. 1995. Tackling Poverty in Nairobi's Informal Settlements: Developing an Institutional Strategy. *Environment and Urbanization* 7 (2), 85-107.

Amis, Philip. 1984. Squatter or Tenants: The Commercialization of Unauthorized Housing in Nairobi. *World Development* 12 (1), 87-96.

APHRC (African Population and Health Research Center). 2002. Population and Health Dynamics is Nairobi's Informal Settlements: Report of the Nairobi Cross-sectional Slum Survey (NCSS) 2000. Nairobi: African Population and Health Research Center.

Basset, Ellen, Sumila Gulyani, Catherine Farvacque-Vitkovic and Sylvie Debomy. 2003. Informal Settlement Upgrading in Sub-Saharan Africa: Retrospective and Lessons Learned, Working Paper, Africa Urban and Water, AFTPI, The World Bank.

CBS (Central Bureau of Statistics). 2003. *Geographic Dimensions of Well-Being in Kenya: Where are the poor?* From Districts to Location. Volume 1. Central Bureau of Statistics, Ministry of Planning and National Development. Nairobi: Regal Press Kenya.

"Census 1999": The 1999 Population and Housing Census: The Popular Report, CBS, August 2002.

Gough, Katherine V. and Peter Kellet. 2001. Housing Consolidation and Home-Based Income Generation: Evidence from Self-Help Settlements in Two Columbian Cities. *Cities* 18 (4), 235-247.

Gulyani, Sumila and Ellen M. Basset. Forthcoming (2007). Retrieving the Baby from the Bathwater: Slum Upgrading in Sub-Saharan Africa, *Environment and Planning C*.

Gulyani, Sumila, Debabrata Talukdar, R. Mukami Kariuki. 2005. Universal (Non)service?: Water Markets, Household Demand and the Poor in Urban Kenya, *Urban Studies*, vol. 42, no. 8, July.

"K-DHS 2003" (Kenya Demographic and Health Survey 2003), CBS, Ministry of Health (MoH), and ORC Macro, July 2004.

Lauglo, Jon. 2004. Basic Education in Areas Targeted for EFA in Kenya:ASAL Districts and Urban Informal Settlements, Report for the World Bank, Washington DC, Working Draft.

Lloyd, Cynthia B., Barbara S. Mensch, Wesley H. Clark. 2000. The Effects of Primary School Quality on School Dropout among Kenyan Girls and Boys, *Comparative Education Review*, Vol. 44, No. 2, May.

Mwangi, Isaac Karanja. 1997. The Nature of Rental Housing in Kenya. *Environment & Urbanization*, Vol. 9, No. 2: 141-159, October.

Thompson, J., Porras, I. T., Wood, E., Tumwine, J. K., Mujwahuzi, M. R., Katui-Katua, M. & Johnstone, N. 2000. Waiting at the Tap: Changes in Urban Water Use in East Africa Over Three Decades. *Environment & Urbanization*, Vol. 12, No. 2: 37-52, October.

Tooley, James. 2004. Private Schools Serving Low Income Families. A Case Study from Kenya, University of Newcastle Upon Tyne, May 10. Research Report submitted to GoK and the World Bank.

World Bank. 2003. Kenya: A Policy Agenda to Restore Growth, Report No. 25840-KE, AFCOS (Country Dept 2), The World Bank, Washington, DC.

World Bank. 2004. Upgrading of Low-Income Settlements in Sub-Saharan Africa. Consultants' Report, TF No. 024943, Africa Urban and Water Units, The World Bank, Washington, DC.

ANNEX 1: Univariate regression analyses

Incomes, expenditures and the likelihood of being poor: Univariate regression analyses

We ran two univariate regressions to examine the relationship between households categorized as "poor" (dependent variable) and the incomes and expenditures that they had reported. To be specific, the two independent variables used were "per capita income per month" and "per capita expenditure per month."

The results show, as we would anticipate, that the likelihood of being categorized as "poor" is strongly negatively correlated, at a 1 percent significance level, with both per capita income and per capita expenditure in the household (Table 1.1).

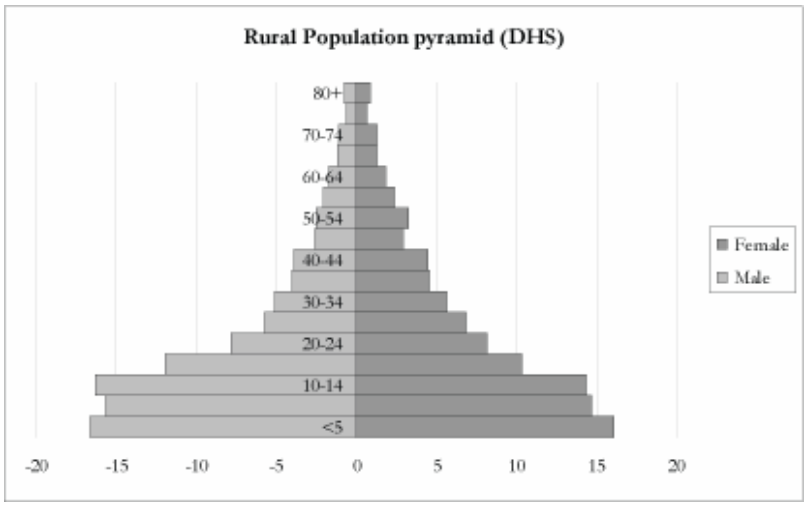
In a third regression, we examined the relationship between per capita expenditure (dependent variable) and per capita income (independent variable) (Table 1.1). The results show, again as we would expect, that expenditures are strongly significantly correlated with incomes and that incomes alone helps explain about 36 percent of the variation in household expenditures.

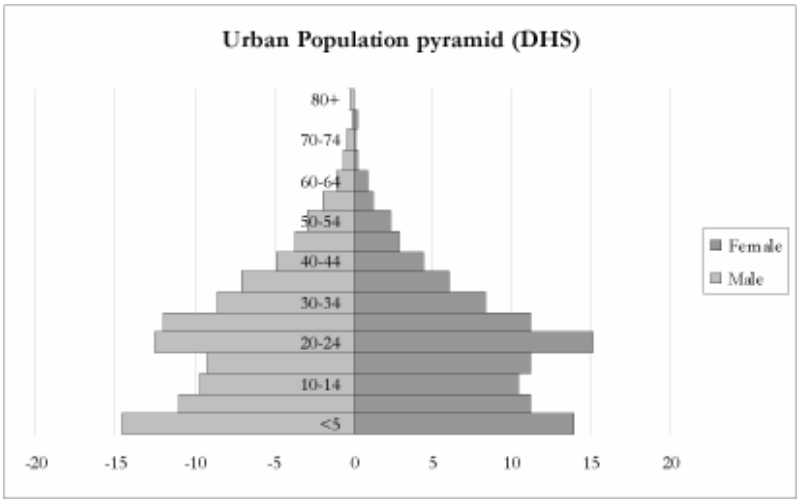
Table 1.1: Summary of univariate logistic regression analyses

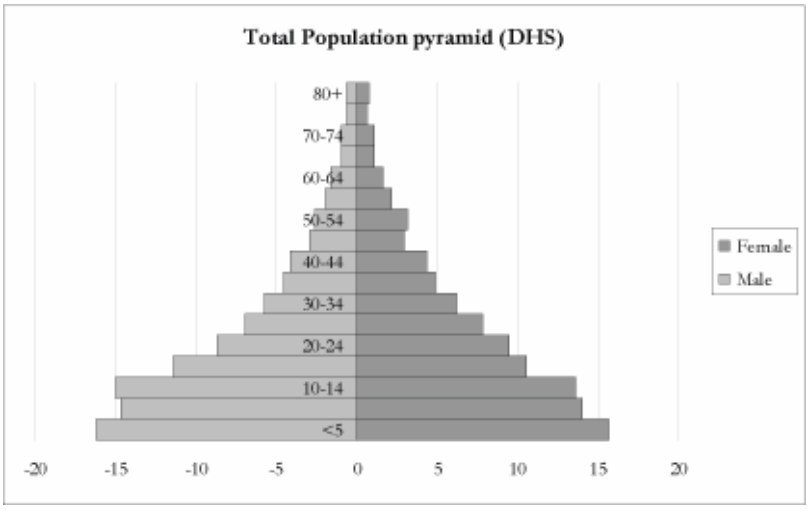
		Std. Error	t-statistic	p-value	R^2 and F
Dependent variable: Poor (N=1400)					
(i) Independent variable: Per capita household income per month					
Constant	4.274	0.233	18.31	0.000	
Per capita household income per month	-0.001	0.0001	-16.73	0.000	F(1,87)=279.80
(ii) Independent variable: Per capita household expenditure per month (N=1754)					
Constant	5.399	0.74	7.30	0.000	
Per capita household expenditure per month	-0.002	0.0003	-6.18	0.000	F(1,87)=38.13
Dependent variable: Per capita household expenditure per month (N=1754)					
Independent variable: Per capita household income per month					
Constant	660	70	10.1	0.000	R^2=0.360
Per capita household income per month	0	0	24.3	0.000	F(1,87)=387.15

Note: Income and expenditure are in Kenyan shillings.

ANNEX 2: Population pyramids in Kenya (Rural, Urban, and National)







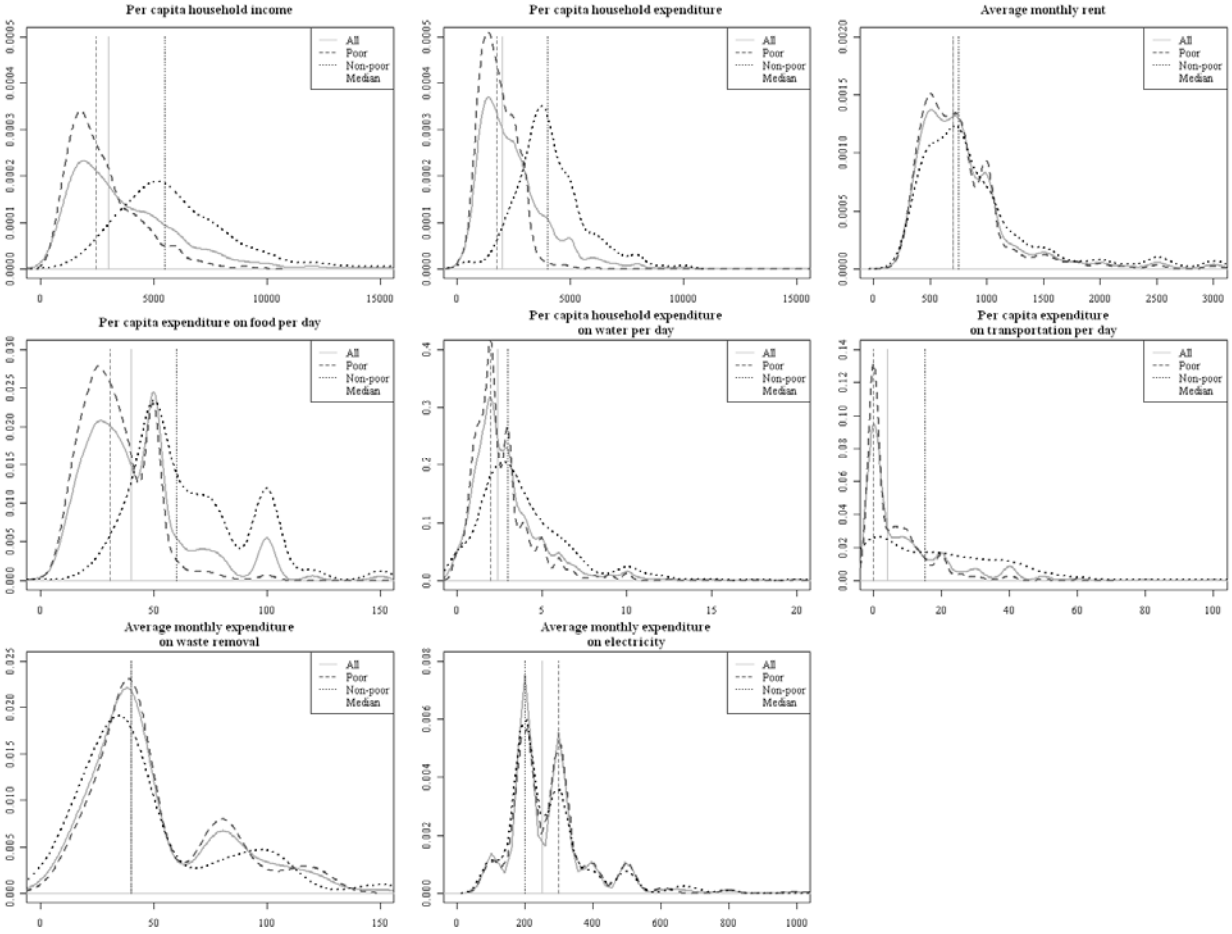
ANNEX 3: Male-headed and female-headed households

Table 3.1: Male-headed and female-headed households

Indicator	All HH	Male-headed	Female-headed	Stat diff. between them
No of Households (N)	1776	1454	309	
Avg age of HH head	34.7	34.1	37.7	***
Avg HH size	3	2.9	3.1	
% female-headed	17.3	na	na	
Avg. % of adult women within household	26.5	18.3	64.8	***
% poor	72.5	71.2	77.7	**
Per capita income in Ksh/month	3705	3821	3120	***
Per capita expenditure in a "typical" month (Ksh)	2493	2549	2239	***
Per capita expenditure in the last month without rent (Ksh)	2790	2800	2751	
Per capita expenditure in the last month with rent (Ksh)	3152	3157	3140	
% who rent (vs. own)	91.9	92.9	87	**
Avg monthly Rent in Ksh	797	796	807	
Avg yrs in settlement	8.8	8.1	11.8	***
Avg yrs in current house	4.9	4.4	7.2	***
% whose previous residence was in a rural area	47.8	47.5	47.7	
% who sent remittances last year	71.4	76.1	50	***
% who received remittances last year	17.7	16.4	23.1	***
% who own land outside	60	66.9	26.5	***
% who own house outside	54.5	60.1	23	***
% with cell phone	19.7	20.9	13.3	***
% with bank account	30.7	32.1	23.3	***
% with electricity connection	21.6	20.7	25.6	*
% with piped water as primary	18.8	18.5	20.6	
% with yard tap as primary	21.7	21.8	21.1	
Employment at HH level				
% with at least one working in own HME	30.4	27.8	42.9	***
% with at least one unemployed	42.3	44.7	29.4	***
% with at least one casual job	40.9	42.4	34.3	**
% with at least one regular job	41.2	44.1	26.6	***
% Other, don't know, missing etc	9.4	7.7	17.6	***
Maximum education level achieved in HH				***
1)% HHs with no education	1.5	1.1	3.1	
2) % HHs with some primary	11.2	9.2	20.5	
3) % HHs with primary completed	28.3	28.9	26.3	
4) % HHs with some secondary	18.5	18.2	20.1	
5) % HHs with secondary completed	35.1	37.3	24.4	
6) % HHs with post secondary training	4.6	4.5	5.4	
7) % HHs with degree or more	0.6	0.8	0.3	
Sub-total	100%	100%	100%	

Note: Significance of difference indicated by asterisks. ***=1%, **=5%, *=10%.

ANNEX 4: Income and expenditures in Nairobi's slums (density plots)



ANNEX 5: Household micro-enterprises, banking and credit

Table 5.1: Multivariate logistical regression for households with HMEs

	Coef.	Std Error	T-stat	P-value	
Constant	-1.42	0.49	-2.91	0.005	***
Poor	-0.14	0.16	-0.85	0.399	
Number of household members	0.38	0.06	6.10	0.000	***
Proportion of children in HH	0.98	0.39	2.51	0.014	***
Proportion of women among adults in HH	1.61	0.34	4.69	0.000	***
Max level of education in household	0.09	0.10	0.91	0.364	
At least one individual regularly employed	-1.83	0.16	-11.81	0.000	***
At least one individual unemployed	-1.82	0.15	-12.15	0.000	***
Age of household head	0.00	0.01	0.49	0.627	
Female head of household	-0.65	0.26	-2.53	0.013	**
Years resided in current settlement	0.01	0.01	1.14	0.257	
Medium intervention settlement	-0.48	0.15	-3.15	0.002	***
Rent home	0.15	0.23	0.66	0.509	
Own home outside Nairobi	0.29	0.14	1.99	0.050	**
Previous residence in rural area	0.18	0.12	1.50	0.137	
Have electricity	0.56	0.18	3.04	0.003	***
Have piped water (in-house or yard tap)	-0.17	0.19	-0.89	0.378	
Division					
1. Central (base for analyses)	-	-	-	-	
2. Makadara	-0.07	0.20	-0.34	0.735	
3. Kasarani	0.57	0.22	2.61	0.011	***
4. Embakasi	-0.29	0.26	-1.11	0.270	
5. Pumwani	0.60	0.17	3.54	0.001	***
6. Westlands	0.50	0.15	3.35	0.001	***
7. Dagoretti	-0.01	0.19	-0.07	0.942	
8. Kibera	0.16	0.20	0.80	0.425	

Note: Statistical significance indicated by asterisks: ***=1%, **=5%, *=10%.

Table 5.2: Comparing households with and without HMEs and by gender of HH head

	N	No HME	Have HME	Stat sig.	Male-head & HME (N=404)	Female head & HME (N=126)	Stat sig.
Avg age of HH head	1723	34.3	35.7	**	35	38.2	***
Avg HH size	1755	2.7	3.6	***	3.6	3.7	
Avg. percent of adult women within household	1755	25%	29%	***	21%	57%	***
Percent poor	1755	71.5%	74.7%		72.3%	81.4%	*
Avg. per capita income in Ksh/month	1400	3840	3370	***	3520	2870	***
Avg. per capita expenditure in typical month (Ksh)	1754	2600	2250	***	2320	2030	**
Percent who rent (vs. own)	1755	92.7%	89.9%	**	90.0%	89.0%	
Avg monthly Rent in Ksh	1601	790	820		820	830	
Avg yrs in settlement	1755	8.1	10.4	***	9.7	12.7	**
Avg yrs in current house	1755	4.5	5.9	***	5.4	7.3	*
Percent whose previous residence was rural	1755	46.1%	51.9%	**	52.2%	50.9%	
Percent who remit	1755	73.4%	66.9%	**	74.9%	42.2%	***
Percent who own land outside	1755	60.1%	59.7%		69.4%	28.2%	***
Percent who own house outside	1755	54.4%	54.9%		63.9%	26.1%	***
Percent with cell phone	1755	18.3%	23.0%	**	25.9%	13.3%	***
Percent with Bank account	1755	27.4%	38.4%	***	40.9%	29.2%	**
Percent with electricity connection	1755	19.0%	72.3%	***	26.5%	31.9%	
Percent with piped water as primary	1755	18.9%	18.2%		18.5%	19.5%	
Percent with yard tap as primary	1755	21.5%	22.3%		22.4%	22.4%	
Employment at HH level							
Percent with at least one unemployed	1755	46.4%	32.9%	***	34.8%	25.9%	*
Percent with at least one casual job	1755	49.9%	19.9%	***	21.5%	14.2%	*
Percent with at least one regular job	1755	50.1%	20.4%	***	24.4%	8.1%	***
Percent other, don't know, missing etc	1755	8.5%	11.6%	**	9.2%	19.9%	***
HH Educational Profile- Maximum level of education among adult members within HH	1755						***
1) Percent with no education		1.5%	1.5%		0.6%	3.4%	
2) Percent with some primary		10.9%	11.8%		8.5%	23.0%	
3) Percent with primary completed		29.1%	26.5%		28.0%	22.9%	
4) Percent with some secondary		18.3%	18.9%		19.0%	19.4%	
5) Percent with secondary completed		35.2%	35.0%		37.7%	24.8%	
6) Percent with post secondary training		4.2%	5.5%		5.3%	6.6%	
7) Degree or more		0.7%	0.8%		1.0%	0.0%	
8) Missing, don't know, etc		0.0%	0.0%		0.0%	0.0%	
Sub-total		100.0%	100.0%		100.0%	100.0%	
Years HME in operation			4.1		4.1	4	
Number of employees in last 14 days			1.6		1.6	1.5	
Place of operation							**
Percent home, inside the residence	1755		27.0%		27.9%	24.8%	
Percent home, outside the residence			14.1%		13.0%	18.4%	
Percent not home, but in settlement			23.5%		21.1%	31.3%	
Percent outside settlement			26.0%		28.1%	18.7%	
Percent both inside and outside settlement			9.0%		9.8%	6.9%	
Place where products are mainly sold							**
Percent inside settlement			51.8%		48.1%	64.7%	
Percent outside settlement			32.0%		34.5%	22.2%	
Percent both inside and outside			16.2%		17.4%	13.1%	

Note: Stat significance of the difference indicated by asterisks: ***=1%, **=5%, *=10%. NA: Not applicable.

Table 5.3: Data on HMEs by sector

	1) Retail-trading/ hawking/ kiosks	2) Small manufacturing/ production, construction & repair of goods	3) Services-food	4) Services (incl.hairdresser, laundry, transport, medicine, photo)	5) Services-bars, entertainment, brewing, khat	6) Farming, dairy, livestock	7) Other
Percent of all HMEs (N=534)	50.2	21.5	14.7	8.0	2.3	0.9	2.3
Percent within male-headed households	49.7	23.2	13.6	7.6	2.1	1.2	2.6
Percent within female-headed households	52.0	14.8	18.9	9.5	3.3	0.0	1.6
Percent within sector operated by poor households*	73.9	74.9	87.4	67.4	64.7	56.5	51.8
Mean per capita income (Ksh)**	3320	3360	2700	3780	4740	4980	5760
Std. Error	140	280	300	600	820	1600	1800
Mean per capita expenditure (Ksh)	2220	2270	1960	2390	2620	3370	3130
Std. Error	80	130	200	210	290	1120	430
Percent within sector operated by tenants (Ksh)***	91.9	89.1	88.9	88.9	88.1	0	100
Rent per month (Ksh)	820	820	780	810	950	Na	880
Std. Error	40	50	60	60	110	Na	240
Percent operated by households that remit	65.9	70.3	69.1	62.8	73.2	63.3	51.9
Percent operated by households with electricity	26	31.9	21.3	29.9	52.4	16.7	35.6
Percent operated by households with piped water	18.8	22.9	8.8	25.3	33.4	16.7	9.0
Percent operated by households with yard tap	21.8	27.1	16.1	24.0	33.4	30.1	9.0

Note: Statistical significance of the difference indicated by asterisks:***=1%, **=5%, *=10%. "NA" indicates "not applicable".

Table 5.4: Multivariate regressions analyses: Households with bank account and loans

(N=1391)	HHs with a Bank account					HHs with a loan				
Variable	Coeff.	SE	t-stat	p-value	Sig.	Coeff.	SE	t-stat	p-value	Sig.
Constant	-3.77	0.38	-9.84	0.000	***	-0.31	0.51	-0.61	0.545	
Per capita income	0.00	0.00	3.92	0.000	***	0.00	0.00	-4.21	0.000	***
Poor HH	-0.36	0.21	-1.72	0.089	*	-0.82	0.18	-4.51	0.000	***
Regular job in HH	0.97	0.11	8.69	0.000	***	0.36	0.19	1.89	0.062	*
Operate HME	0.94	0.18	5.31	0.000	***	0.15	0.18	0.85	0.399	
Maximum education in HH	0.53	0.06	8.29	0.000	***	0.06	0.06	0.87	0.388	
Female HH head	-0.20	0.19	-1.05	0.296		-0.30	0.24	-1.22	0.226	

Note: Levels of statistical significance: ***=1%, **=5%, *=10%.

Table 5.5: Banking and credit

	All		Poor		Non-Poor			Male head		Female head		
	N	Percent	N	Percent	N	Percent	Sig.	N	Percent	N	Percent	Sig.
No. of households	1755		1282		473			1438		304		
Households with bank accounts	494	30.7%	305	26.4%	189	42.0%	***	451	32.2%	73	23.3%	***
HHs with a loan	297	17.4%	205	16.3%	92	20.3%	*	250	18.1%	43	13.6%	*
Primary source of loan							**					
Relatives or friends	183	62.2%	134	66.4%	49	53.4%		153	61.8%	28	65.6%	
NGOs or savings group or credit coop	61	20.9%	34	16.9%	27	29.2%		51	20.9%	8	18.1%	
Bank	25	7.9%	16	6.9%	9	10.0%		22	8.0%	3	7.9%	
Informal lender	7	2.5%	4	2.0%	3	3.7%		6	2.7%	1	1.5%	
Other	21	6.6%	17	7.9%	4	3.7%		18	6.6%	3	6.9%	

Note: Statistical significance of difference between poor and non-poor indicated by asterisks: ***=1%, **=5%, *=10%.

ANNEX 6: Housing and previous residence

Table 6.1: Profile of slum dwellers who own their house

	All		Poor		Non-poor	
	N	Percent	N	Percent	N	Percent
Feel tenure is secure	150	62.2%	105	62.3%	45	61.8%
Believe it is easy to sell or buy property in neighborhood	150	33.7%	105	38.2%	45	23.3%
Aware of a property sale in immediate vicinity in last twelve months*	150	33.9%	105	38.0%	45	24.1%
Mean expected value of property if sold (Ksh)**	150	398391	105	239203	45	723977
Type of ownership document	150		105		45	
-None		36.6%		37.2%		35.0%
-Temporary occupation license		19.2%		22.7%		11.0%
-Freehold title		11.2%		8.1%		18.6%
-Certificate of title (long-term lease from Nairobi City Council/Govt)		7.8%		7.8%		7.6%
-Share certificate		4.9%		4.2%		6.6%
-Letter from the chief (provincial administration)		4.8%		6.2%		1.5%
-Other		15.5%		13.7%		19.7%
Rent out rooms (i.e. are landlords)	150	60.0%	105	57.5%	45	65.9%
Mean number of rent-paying tenants	150	5.9		4.6		8.4

Note: Statistical significance of the difference indicated by asterisks: ***=1%, **=5%, *=10%.

Table 6.2: Previous Residence

	All		Poor		Non-poor	
	No.	%	No.	%	No.	%
Other informal settlement	515	29.3%	371	29.0%	144	30.1%
Other non-slum settlement in Nairobi	241	13.9%	176	14.1%	65	13.6%
Other town in Kenya	114	6.5%	77	6.0%	37	7.9%
Rural area Kenya	840	47.8%	628	48.8%	212	45.3%
Other country	27	1.4%	22	1.6%	5	0.8%
Since birth	18	1.0%	8	0.6%	10	2.2%
TOTAL	1755	100.0%	1282	100.0%	473	100.0%

ANNEX 7: Highest level of education attained and primary activity, by age and welfare

Table 7.1: Highest level of education attained by age and welfare group

	5 to 14		15 to 24		25 to 34		35 to 44		45 to 54		55+		TOTAL 15+	
	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N
						All								
None	8.9%	86	2.0%	22	1.8%	25	5.8%	33	14.5%	35	31.4%	37	4.4%	152
Primary incomplete	88.7%	861	23.5%	259	11.6%	163	18.6%	106	23.2%	56	31.4%	37	18.0%	621
Primary complete, some secondary	2.5%	24	52.2%	576	51.4%	725	48.7%	278	41.9%	101	28.8%	34	49.8%	1714
Secondary completed	0.0%	0	18.9%	209	31.8%	449	24.5%	140	16.2%	39	6.8%	8	24.5%	845
Post-secondary training or degree	0.0%	0	3.4%	38	3.5%	49	2.5%	14	4.1%	10	1.7%	2	3.3%	113
TOTAL	100.0%	971	100.0%	1104	100.0%	1411	100.0%	571	100.0%	241	100.0%	118	100.0%	3445
						Poor								
None	9.5%	83	2.0%	19	2.2%	24	7.1%	31	18.1%	30	31.3%	31	4.9%	135
Primary incomplete	88.1%	768	25.1%	237	12.0%	132	20.5%	89	21.7%	36	31.3%	31	19.2%	525
Primary complete, some secondary	2.4%	21	52.4%	494	54.0%	594	48.8%	212	41.6%	69	30.3%	30	51.0%	1399
Secondary completed	0.0%	0	17.5%	165	29.6%	325	22.1%	96	16.3%	27	5.1%	5	22.5%	618
Post-secondary training or degree	0.0%	0	3.0%	28	2.2%	24	1.4%	6	2.4%	4	2.0%	2	2.3%	64
TOTAL	100.0%	872	100.0%	943	100.0%	1099	100.0%	434	100.0%	166	100.0%	99	100.0%	2741
						Non-poor								
None	3.0%	3	1.9%	3	0.3%	1	1.5%	2	6.7%	5	31.6%	6	2.4%	17
Primary incomplete	93.9%	93	13.7%	22	9.9%	31	12.4%	17	26.7%	20	31.6%	6	13.6%	96
Primary complete, some secondary	3.0%	3	50.9%	82	42.0%	131	48.2%	66	42.7%	32	21.1%	4	44.7%	315
Secondary completed	0.0%	0	27.3%	44	39.7%	124	32.1%	44	16.0%	12	15.8%	3	32.2%	227
Post-secondary training or degree	0.0%	0	6.2%	10	8.0%	25	5.8%	8	8.0%	6	0.0%	0	7.0%	49
TOTAL	100.0%	99	100.0%	161	100.0%	312	100.0%	137	100.0%	75	100.0%	19	100.0%	704

Table 7.2: Primary activity by age and welfare group

Primary activity	5 to 14		15 to 24		25 to 34		35 to 44		45 to 54		55 over		Total 5+		Total 15+	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
All																
Unemployed	25	2.6	513	46.4	287	20.3	70	12.3	21	8.6	16	13.5	932	21.1	907	26.3
Employer	7	0.7	1	0.1	4	0.3	1	0.2	0	0	0	0	13	0.3	6	0.2
Regular employee, skilled	1	0.1	36	3.3	140	9.9	66	11.6	44	18	9	7.6	296	6.7	295	8.6
Regular employee, unskilled	1	0.1	67	6.1	275	19.5	119	20.8	59	24.2	20	16.8	541	12.2	540	15.6
Casual employee, skilled	0	0	43	3.9	100	7.1	51	8.9	15	6.2	6	5	215	4.9	215	6.2
Casual employee, unskilled	0	0	177	16	293	20.8	112	19.6	35	14.3	22	18.5	639	14.5	639	18.5
Own account worker	1	0.1	111	10	294	20.8	150	26.3	62	25.4	31	26.1	649	14.7	648	18.8
Unpaid family worker	1	0.1	8	0.7	3	0.2	0	0	0	0	0	0	12	0.3	11	0.3
Student/apprentice	922	95	145	13.1	10	0.7	0	0	0	0	0	0	1077	24.4	155	4.5
Pensioner/investor	0	0	1	0.1	1	0.1	1	0.2	4	1.6	12	10.1	19	0.4	19	0.6
Other/sick/disabled/don't know	13	1.3	4	0.4	5	0.4	1	0.2	4	1.6	3	2.5	30	0.7	17	0.5
Poor																
Unemployed	23	2.6	458	48.5	250	22.7	64	14.8	18	10.7	12	12	825	22.8	802	29.2
Employer	7	0.8	1	0.1	4	0.4	1	0.2	0	0	0	0	13	0.4	6	0.2
Regular employee, skilled	1	0.1	23	2.4	93	8.5	46	10.6	26	15.4	7	7	196	5.4	195	7.1
Regular employee, unskilled	0	0	52	5.5	201	18.3	84	19.4	42	24.9	17	17	396	10.9	396	14.4
Casual employee, skilled	0	0	31	3.3	73	6.6	34	7.8	8	4.7	6	6	152	4.2	152	5.5
Casual employee, unskilled	0	0	153	16.2	237	21.6	92	21.2	30	17.8	18	18	530	14.6	530	19.3
Own account worker	1	0.1	90	9.5	229	20.8	112	25.8	40	23.7	27	27	499	13.8	498	18.1
Unpaid family worker	1	0.1	7	0.7	3	0.3	0	0	0	0	0	0	11	0.3	10	0.4
Student/apprentice	826	94.7	125	13.2	6	0.6	0	0	0	0	0	0	957	26.4	131	4.8
Pensioner/investor	0	0	1	0.1	0	0	0	0	3	1.8	10	10	14	0.4	14	0.5
Other/sick/disabled/don't know	13	1.5	4	0.4	4	0.4	1	0.2	2	1.2	3	3	27	0.8	14	0.5
Non-poor																
Unemployed	2	2	55	34.2	37	11.9	6	4.4	3	4	4	21.1	107	13.3	105	14.9
Employer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Regular employee, skilled	0	0	13	8.1	47	15.1	20	14.6	18	24	2	10.5	100	12.5	100	14.2
Regular employee, unskilled	1	1	15	9.3	74	23.7	35	25.6	17	22.7	3	15.8	145	18.1	144	20.5
Casual employee, skilled	0	0	12	7.5	27	8.7	17	12.4	7	9.3	0	0	63	7.9	63	9
Casual employee, unskilled	0	0	24	14.9	56	18	20	14.6	5	6.7	4	21.1	109	13.6	109	15.5
Own account worker	0	0	21	13	65	20.8	38	27.7	22	29.3	4	21.1	150	18.7	150	21.3
Unpaid family worker	0	0	1	0.6	0	0	0	0	0	0	0	0	1	0.1	1	0.1
Student/apprentice	96	97	20	12.4	4	1.3	0	0	0	0	0	0	120	14.9	24	3.4
Pensioner/investor	0	0	0	0	1	0.3	1	0.7	1	1.3	2	10.5	5	0.6	5	0.7
Other/sick/disabled/don't know	0	0	0	0	1	0.3	0	0	2	2.7	0	0	3	0.4	3	0.4

ANNEX 8: Background note on methodology

Household Sampling-Weight Based Analyses

- We have adopted the following survey analysis parameters: (1) Strata: Slum households vs. non-slum households. (2) PSU (Primary Sampling Unit): Each individual EA. Technically, this choice of PSU allows for "clustering" of household observations within each EA under the assumption that household characteristics/behaviors will be more correlated within EAs than across EAs. (3) Sampling (Probability) Weights: The inverse probability of selection of households given in the data set through the variable "WEIGHT". We have 1755 slum households representing a slum population of 209,111 households from 88 slum EAs (from a possible 1263 slum EAs) across 8 geographic divisions. So, *sampling-weight based analyses of these 1755 households produce estimates reflective of a population of 209,111 slum households covering a total of 0.64 million slum dwellers.*

- For a majority of the analyses, we use household welfare sub-population of "poor" and "non-poor". As noted in the main text, "poor" refers to households whose expenditure are below the poverty line and "non-poor" refers to households whose expenditure are above or equal (3 cases) the poverty line (Source: Q7 of the survey (Annex 10)). The variable created is POOR (1=poor and 0=non-poor). Of the 1755 slum households with sampling weights, 1282 are thus classified as "poor" and 473 as "non-poor".

- This is "sampling without replacement" which would normally require "finite population correction". However, since the 88 EAs in the sample is a small proportion (less than 10%) of the total number of EAs (1263), such a correction is not that critical and is not used in the analyses in this paper.

Ex-post classification of EAs into "Low Intervention" and "Medium Intervention" areas

- Despite a serious effort to do so, lack of available data made it difficult to achieve an acceptable *ex-ante* classification of the slum EAs in the sample into groups based on the level of past improvement and/or upgrading interventions for infrastructure services. We have used the following approach as one reasonable method for an *ex-post* classification of slum EAs into groups based on the level of past improvement and/or upgrading interventions for infrastructure services. It should be underscored that this is just one possible way of conducting such a classification.

- Classification approach used: (1) Based on Q91 in the survey, 13 possible types of interventions are considered: water supply; toilets; toilet exhauster services; garbage collection services; health clinics; public schools; private schools; internal roads; access roads; electricity; land regularization initiatives; street lights; and drainage facilities. (2) Then, based on response to the Q91.A2 , an improvement intervention is defined to have occurred in a given slum EA for a given sector if 50% or more of the sample households from that slum EA said that such an improvement intervention occurred in that sector in the past. (3) Using the term "intervention" as defined in the previous step, the total number of sector improvement interventions is computed for each of the 88 slum EAs. Note that this total number, by nature of construction, is an integer with a

value range of 0 to 13. Thus, a value of "3" for a given EA indicates that in 3 out of the possible 13 interventions, 50% or more of the sample households from that EA said improvement interventions had occurred in the past. (4) Finally, EAs with a total number of sectoral interventions of 2 or less, as computed in the previous step, are classified as "low intervention" EAs, while those with values of 3-8 are classified as "medium intervention" EAs. (There were no EAs with greater than 8 interventions). The distribution of such total intervention values across all 88 slum EAs and the respective 1755 sample households are shown in Table 8.1 below. As Table 8.1 shows, this approach of ex-post classification produces 70 slum EAs as "low intervention" EAs with 1402 sample households and 18 slum EAs as "medium intervention" EAs with 353 sample households.

Table 8.1: Ex-post classification of EAs based on number of improvement interventions

Total number of sector improvement interventions	% of the slum EAs	% of the sample slum households	"Ex-post" classification of the slum EAs
0	26.1%	25.9%	"**Low-Intervention**" slum EAs (70 EAs with 1402 sample households)
1	29.6%	30.4%	
2	23.9%	23.6%	
Subtotal	79.6%	79.9%	
3	6.8%	6.8%	"**Medium-Intervention**" slum EAs (18 EAs with 353 sample households)
4	5.7%	5.4%	
5	4.6%	4.6%	
6	2.3%	2.3%	
7	0.0%	0.0%	
8	1.1%	1.1%	
Subtotal	20.5%	20.1%	
TOTAL (N)	88	1755	

Table 8.2: Households reporting a given intervention and their perception of its impact

(N=1755)	All			Low intervention		Medium intervention	
Type of infrastructure or service	Intervention occurred(a)	Situation is now "better" (b)	(b/a)	Intervention occurred (a)	Situation is "better" (b)	Intervention occurred (a)	Situation is "better" (b)
Access roads to settlement *	40.1%	36.4%	90.8%	39.6%	36.4%	43.9%	36.3%
Health services ***	33.4%	32.2%	96.4%	28.2%	26.7%	53.2%	52.5%
Private schools **	30.8%	29.5%	95.8%	28.1%	26.8%	41.0%	39.7%
Toilet facilities ***	28.4%	26.7%	94.0%	24.6%	23.3%	41.3%	39.1%
Water supply ***	25.8%	24.7%	95.7%	29.9%	21.4%	40.3%	37.0%
Public schools ***	24.9%	19.2%	77.1%	17.4%	14.8%	52.3%	35.2%
Drainage facilities ***	21.5%	18.0%	83.7%	15.6%	12.4%	41.9%	38.5%
Internal roads in settlement **	15.0%	12.5%	83.3%	11.1%	9.9%	24.1%	22.1%
Home electricity ***	10.5%	9.1%	86.7%	7.0%	6.3%	22.1%	19.4%
Garbage disposal services **	9.9%	9.6%	97.0%	7.7%	7.4%	17.6%	17.6%
Street lighting ***	3.9%	2.7%	69.2%	1.2%	0.9%	11.2%	9.5%

Note: Statistical significance of difference between low and medium intervention areas in proportion who say the situation is "better": ***=1%, **=5%, *=10%.
(a) Refers to the proportion of households who said that a given intervention had occurred in their neighborhood. (b) Refers to the proportion who said that the situation is now "better" (rather than the "same" as or "worse") than the situation prior to the intervention.

ANNEX 9: Note on definition of slums used by CBS, Kenya

CENTRAL BUREAU OF STATISTICS, KENYA
STRATIFICATION OF THE MAJOR URBAN IN NASSEP IV
(Document received at World Bank March 15, 2006)

1. Why Should the Major Urban be stratified?

There are various reasons why stratification is applied in sampling applications. These are mainly to:

1. Reduce variances of sample estimates
2. Employ different methods and procedures within the strata
3. Use the strata as domains of estimation and
4. Facilitation of administrative convenience.

For the case of the major urban in Kenya, it is necessary to sub-stratify because of the first reason, i.e. reduction of variances, due to extensive diversity apparent in the urban population. This has the effect of raising the sampling errors and hence reducing the reliability of the estimates. With sub-strata of the population, sample allocation is made to each sub-stratum and then sample elements are drawn independently to represent the population from the sub-strata. This results in great gain in the estimates of the population parameters.

It is considered that most of the major urban can be clearly segmented into five distinct categories. These categories would then be allocated their own clusters to facilitate sample selection from the major urban areas with a view to increasing the precision of the estimates based on the sample.

For the purpose of the sub-stratification, the major urban will be stratified into the following five main distinct categories:[28]

1. Upper
2. Lower upper
3. Middle
4. Lower Middle and
5. Lower.

Each of the categories will have particular characteristics, which will be used to classify the EAs that will comprise them. It is appreciated that a clear-cut and watertight criterion for classifying the areas out-rightly on the ground does not exist. However, using information related to the location of the residential areas, the infrastructure around the areas and the perceived incomes of the residents, it is possible to clearly categorize the areas into the five distinct categories. It is important to state at the outset that some of the categories above do not necessarily exist in the entire major urban and in any case does not have to exist in all major urban areas. It follows, therefore, that sub-strata shall be created where the description for each category applies appropriately. In this case we can have one or two of the major urban areas having all the above categories while others may have four or three.

[28] In CBS' data, these five categories are coded as EA1, EA2, EA3, EA4 and EA5, respectively.

The ultimate aim is to develop these structures so that we reduce the potential high variances that would negatively affect our estimates.

Since there is bound to be some arbitrariness in the assignment of the five categories to the areas of the major urban in respect to diversity, it is necessary that a standard be conceived for each of the five categories. The standards will then serve as models for reference for all the towns to be sub-stratified. It is observed that Nairobi possesses all the five categories mentioned above and it would be logical to base the models for sub-stratification on the areas in Nairobi. This is also considered convenient since it will enable all the members of the teams that will participate in the exercise to visit all these areas and form an impression of the attributes that constitute them.

We shall now look at each category in the following sections and provide examples of the residential areas that constitute them. These will, as mentioned above, form reference categories for the rest of the urban for classification.

2. Upper Sub-stratum

This category will embrace the most affluent segment of the population in the major urban. It will comprise areas with homes occupying own compounds and generally having well maintained roads around them. In most cases, the homes will be having large compounds and one observable feature will be that many of them are manned by security either hired by the owners of the homes or provided by employers. The fences are well cared for and even sometimes reinforced with electrical protection. Alarm systems are evident on some of the houses and in some cases you have to drive along a drive to enter the homes. In certain cases these homes may have swimming pools, tennis court and even basketball play ground.

Examples of these are provided below. These will serve as models of the areas that will constitute this category of residential areas in Nairobi and other major urban.

1. Runda
2. Muthaiga
3. Lavington
4. Kitisuru
5. Loresho
6. Spring Valley
7. Westlands (Residential)
8. Karen
9. Kileleshwa
10. Highridge
11. Hurlingham
12. Rossyln Lone Tree
13. Hardy
14. Kyuna
15. Bomas
16. Muthangari

3. Lower Upper Sub-stratum

It is found necessary to create this category to differentiate from the former because these areas will have slightly different facilities around them. Even though they will be accommodating equally wealthy members of the population, the compounds will be generally smaller and will be lacking some of the facilities evident in the first category.

1. South B
2. South C
3. Southlands
4. Langata
5. Donholm
6. Fedha
7. Ngumo
8. Adams Arcade
9. Woodly

4. Middle Sub-stratum

The middle class will cover areas where there are no large compounds and luxurious amenities as observed in the first two categories. Generally, this category will have most of the population located in the East-lands of Nairobi. They will have relatively higher density of population in comparison to the first two and in most cases it will be observed that the structures have not maintained the design that was developed when they were built.

1. Buruburu
2. South Kariobangi
3. Pioneer
4. Outering Road Estate
5. Zimmerman
6. Umoja 1
7. Ngara
8. Koma Rock
9. Huruma Flats
10. Ushirika Estate
11. Juja Road
12. Eastleigh
13. Pangani
14. Park Road
15. Kariokor Flats
16. Kahawa West (Old)
17. Kimathi Estate
18. Harambee

5. Lower Middle Sub-stratum

This category is largely composed of the areas that may be termed as the 'old Nairobi'. Most of them were built during pre-independence days and can be seen to have aged, generally. Most of the facilities are now won out due to age. Most of the members of the young elite population do not prefer to live there, due to their diminished face. However, there are also quite a number of estates

that were built after independence that fall in this category. Most of the houses in these areas have provision for one sleeping room, otherwise bed-sitters are not an uncommon feature. The following are some of the estates that comprise this category.

1. Huruma
2. Kariobangi
3. Muthurwa
4. Dandora
5. Mathare North
6. Kayole
7. Kaloleni
8. Shauri Moyo
9. Ziwani
10. Staree
11. Ofafa (Kunguni, Maringo)
12. Jericho
13. Jerusalem
14. Hamza
15. Mbotela
16. Kithurai

6. Lower Sub-stratum

It should be noted that the categories listed earlier were largely formal planned settlements. There is the last category, which is largely composed of the informal settlements. This is also largely located in the East-lands of Nairobi for the case of the city. It has characteristics that distinguish it clearly from the rest of the categories. The structures are largely temporary, made of mud-wall or timber-wall with cheap roofing materials, which may be iron sheets, makuti, grass or even nilon paper or cartons. The infrastructure in these areas is relatively poor as there is no proper sanitation, no clear roads for entry and even water is not connected to the dwelling structures. The areas listed below fall in this category.

1. Mkuru Kwa Njenga
2. Korogocho
3. Laini Saba
4. Silanga
5. Soweto
6. Kamuthii
7. Mathare Valley

It is important to note that even though the categories above have been indicated to have some particular types of infrastructure associated with them, it does not imply that other kinds of dwelling facilities do not fall within their environs. It is characteristic that, close to most of the high-income areas, there are informal settlements. However, our consideration is what would be the mean in terms of the facilities among all the residents of the areas in the categories. However, where a slum is neighboring a class, which is higher, the slum within that locality will be identified and placed in its appropriate category.

7. The Implementation of the Exercise

For the exercise to be effective and hence produce as meaningful results as possible, it is important that the teams that will undertake the exercise should have an orientation to the exercise in Nairobi for a period of three days. This will put into perspective the attributes that will enable the creation of the categories above. Thus in the three days, each of the above categories will be visited and adequate understanding developed through discussions and feedback from the participating teams. On completion of the exercise it will be possible to reproduce the same classification in the other towns where they exist with as little variation as possible.

This exercise is, however, challenging and will require personnel with the ability to make valid judgement. The teams should, therefore, comprise officers from a cross-section of the CBS to provide varied experience. It is therefore proposed that officers should be drawn from the following divisions:

1. NASSEP
2. Population and Social Research
3. Industry and Labour,
4. Agriculture and
5. Macro and
6. Data Processing and Research.

It is expected that these teams will be able to determine and assign the most appropriate categories to the areas of the six major urban.

The exercise should be handled by three teams of at least six people with each team at least having one officer from each of the six divisions. Hence a minimum of 18 people will be required to perform the exercise.

ANNEX 10: Household questionnaire – Nairobi

Enumerators' id number: **Date:**

Time:

Below is a list of variables needed for identifying a household.

Location.....

Sub-location .....

EA name..... ……..

EA code…. .....

Structure number.....

Household number .....

Name of household head .....

Enumerator visits	1	2
Result		

Result codes:

1. *Completed*
2. *No (competent) household member at home*
3. *Entire household absent for extended period*
4. *Postponed*
5. *Refused*
6. *Dwelling vacant or address not a dwelling*
7. *Dwelling destroyed*
8. *Dwelling not found*
9. *Other (specify)*

Introduction

Hello/Good morning/Afternoon! My name is …… I am working on a study of informal settlements in Nairobi. As you might be aware (the community facilitator will have visited the study site to inform people) the Government of Kenya has given permission to interview people in this settlement and your household is one of those selected for interview. It would be most helpful if you could kindly help us fill out this questionnaire.

We are gathering information on the types and state of facilities in this settlement and how these affect your daily life activities. I would like to know whether you are the head of household, the spouse or another member of the household.

ENUMERATOR, PLEASE MAKE SURE YOU ARE TALKING TO HOUSEHOLD HEAD, SPOUSE OF THE HEAD OR SOME OTHER INFORMED ADULT MEMBER OF THE HOUSEHOLD.

Module 1: Demographics and household composition

The questions in this module seek to provide information on the household size and composition as well as educational level. Furthermore, the questions seek to provide knowledge about migration patterns and duration of stay in the structure. These questions are important for the estimation of wealth effects.

Some of the questions have been formulated as in the DHS questionnaire. Again, in order to keep the questionnaire as short as possible other questions in this module do not follow the DHS questionnaire.

Q1. How many persons are there in your household (i.e. persons who usually live here with you and share this house/room and share income)?

	Adults	Children 5 -14 years	Children under 5 years
Number of Household			

[ENUMERATOR: BASED ON THE NUMBER OF HOUSEHOLD MEMBERS PLEASE REFER TO THE CONVERSION TABLES IN THE BACK AND INSERT THE POVERTY LINE BELOW]

Q1A. Poverty line for household: _____ KSh/month

Q2. How many rooms does your household occupy?

_____Number of rooms

[ENUMERATOR: CODE 6666 IF HOUSEHOLD SHARES ROOM WITH PERSON(S) FROM OTHER HOUSEHOLDS]

Q3. Please help us fill this table about your household members

[ENUMERATOR: OTHER CODES: NOT APPLICABLE (NA) 7777, NO RESPONSE 8888, DON'T KNOW 9999]

No	**a** **NAME** [FOR MEMBERS OTHER THAN HH RECORD ONLY FIRST NAME]	**b** **Relation to household head** [i.e. Spouse, son, daughter or other adult]	**c** **What is the sex of [NAME]?** Male.....01 Female…02	**d** **How old is [NAME]?** [RECORD IN COMPLETED YEARS]	**e** **What is the school attendance status of [NAME]?** At school.....01 Left school..02 Never went to school….03	**f** **What is the highest educational level completed by [NAME]?** None…….…….....01 Primary incomplete…...02 Primary completed……03 Secondary incomplete...04 Secondary completed....05 Post secondary training.06 Degree and above..……07	**g** **What has been [NAME] main activity during the last 7 days?** Unemployed……01 Employer……....02 Regular employee (skilled)….03 Regular employee (unskilled).04 Casual employee (skilled)…...05 casual employee (unskilled)…06 Own account worker……...07 Unpaid family worker……..…08 Student/apprentice……..….09 Pensioner/investor……..….10 Sick/handicapped……..…..11 Other, [SPECIFY BELOW]…12	**h** **Is [NAME] main occupation inside or outside settlement?** Inside…...01 Outside…02 Both……03	**i** **What was [NAME] ´s main mode of travel [FOR ACTIVITY MENTIONED IN COL g]** Walk….....01 Bicycle…….....02 Own vehicle……03 Microbus/Matatu……04 Shared Taxi……..……05 Taxi …….....06 Bus regular……..07 Other, [SPECIFY BELOW].....08
Adult 1.) (respondent)									
Adult 2.)									
Adult 3.)									
Adult 4.)									
Adult 5.)									
Adult 6.)									
Adult 7.)									
Adult 10.)									

Q3 CONTINUED: **[ENUMERATOR: OTHER CODES: NOT APPLICABLE (NA) 7777, NO RESPONSE 8888, DON'T KNOW 9999]**

No	a	b	c	d	e	f	G	h	i	j
	NAME [FOR MEMBERS OTHER THAN HH RECORD ONLY FIRST NAME]	**Relation to househol d head** [i.e. Spouse, son, daughter or other adult]	**What is the sex of [NAME]?** Male........01 Female…02	**How old is [NAME]?** [RECORD IN COMPLE TED YEARS]	**What is the school attendance status of [NAME]?** At school.....01 Left school..02 Never went to school….03	**What is the highest educational level completed by [NAME]?** None…….…...01 Primary incomplete ….………02 Primary completed…..….... ..03 Secondary incomplete……… .....04Secondary completed………. .05 Post secondary training.………06 Degree and above…....……07	**What has been [NAME] main activity during the last 7 days?** Unemployed…………………01 Employer…………………......02 Regular employee (skilled)….03 Regular employee (unskilled).04 Casual employee (skilled)…...05 casual employee (unskilled)…06 Own account worker………...07 Unpaid family worker……..…08 Student/apprentice………..….09 Pensioner/investor………..….10 Sick/handicapped…………..…..11 Other, [SPECIFY BELOW]..12	**Is [NAME] main occupation inside or outside settlement?** Inside…...01 Outside…02 Both……03	**What was [NAME] ´s main mode of travel [FOR ACTIVITY MENTIONED IN COL g]** Walk…...................01 Bicycle…….............02 Own vehicle………03 Microbus/Matatu… 04 Shared Taxi……..…05 Taxi ……………....06 Bus regular………..07 Other, [SPECIFY BELOW]…………08	**Has [NAME] been immunized against BCG (tuberculosis)** Yes……..…..01 No……..……02
THEN FILL OUT THE TABLE FOR ALL CHILDREN AGED 5 - 14 YEARS (REFER TO THE NUMBER REPORTED IN Q1 TO ENSURE CONSISTENCY)										
5-14 years 1.)										
5-14 years 2.)										
5-14 years 3.)										
5-14 years 4.)										
5-14 years 5.)										
5-14 years 6.)										
5-14 years 7.)										
5-14 years 8.)										
5-14 years 9.)										
5-14 years 10)										
5-14 years 11)										

Q3. CONTINUED

No	a **NAME** [RECORD ONLY FIRST NAME]	b **Relation to household head**	c **What is the sex of [NAME]?** Male……..01 Female.....02	d **How old is [NAME]?** [IF UNDER 1 YEAR RECORD "00"]	j **Has [NAME] been immunized against BCG (tuberculosis)** Yes……01 No…….02
FILL OUT THE TABLE FOR CHILDREN UNDER 5 YEARS OF AGE					
0-4 years 1.)					
0-4 years 2.)					
0-4 years 3.)					
0-4 years 4.)					
0-4 years 5.)					
0-4 years 6.)					
0-4 years 7.)					
0-4 years 8.)					

Q4. How long have you been occupying this same house/structure?

[ENUMERATOR: IF LESS THAN 1 YEAR RECORD 1 YEAR] _____years

Q5. How long has this household lived in this settlement?

[ENUMERATOR: IF LESS THAN 1 YEAR RECORD 1 YEAR] _____years

Q6. Where did the household live before coming to this settlement?

1. Other informal settlement in Nairobi 1
2. Other non-slum settlement in Nairobi 2
3. Other city in Kenya 3
4. Rural area in Kenya 4
5. Other country 5

Module 2: Economic Profile

The questions seek to identify the poverty/income status of the households. Questions on assets are included in order to allow for estimation of wealth distribution without recourse to expenditure and income data.

Q7. Was your total household expenditure last month - NOT including rent - above_____ KSh/month?

[ENUMERATOR: REFER TO THE POVERTY LINE INSERTED IN Q1A]

1. Yes	1
2. No	2

Q8. Over the past one week (7days), how much did your household spend on food, on average per day?

_____(in KSh) per day

Q9. Over the past one week (7days), how much did your household spend on transport, on average per day?

_____(in KSh) per day

[ENUMERATOR: CODE 7777 FOR THOSE WHO GET FREE TRANSPORT]

Q10. If you pay rent, how much do you pay per month (less charges for utilities – water etc.)?

_____ (in KSh) per month

[ENUMERATOR; CODE 7777 FOR THOSE WHO DO NOT PAY RENT]

Q11. Over the past one week (7days), how much did your household spend on 'other expenses'?-(not food, transport and rent), on average per day

_____(in KSh) per day

Q12. How much money does your household currently spend per month, on average, to live?

_____ (in KSh) per month

Q13. What was the total household income in KSh last month (including all sources as well as money received from family)?

1. Less than 2,000	7. 20,001-25,000	1	7
2. 2,001-4,000	8. 25,001-30,000	2	8
3. 4,001-6,000	9. 30,001-40,000	3	9
4. 6,001-12,000	10. 40,001-50,000	4	10
5. 12,001-15,000	11. Above 50,000	5	11
6. 15,001-20,000	12. Don't know/refuse to answer	6	12

Q13.A Actual amount _____(in KSh)

[**ENUMERATOR: CODE 8888 IF NOT GIVEN RESPONSE ON ACTUAL AMOUNT]**

Q14. Does any member of this household have a bank account?

1.	Yes	1
2.	No	2

Q15. Does any member of this household currently have a loan(s)? [CIRCLE ALL THAT APPLY]?

1.	No loan	4.	Loan from relative or friend	1 4
2.	Loan from a bank	5.	Loan from an informa1 lender (shylock)	2 5
3.	Loan from NGO or savings & credit group/coop.	6.	Other, specify	3 6

_____ specify

Q16. Over the last 12 months, did you SEND gifts or money to support persons in your extended family or friends (i.e. any people who do not usually live with you)?

1.	Yes	1
2.	No **GO TO Q18**	2

Q17. Where do these people reside? [CIRCLE ALL THAT APPLY]

1.	Within Nairobi	4.	Abroad	1 4
2.	Other urban centres	5.	Other, specify	2 5
3.	Rural Kenya			3

_____specify

Q18. Over the last 12 months, did you RECEIVE gifts or money from your extended family or friends (i.e. any people who do not usually live with you)?

1.	Yes	1
2.	No **GO TO Q20**	2

Q19. From where did you receive these gifts or money? [CIRCLE ALL THAT APPLY]

1.	Within Nairobi	4.	Abroad	1 4
2.	Other urban centres	5.	Other, specify	2 5
3.	Rural Kenya			3

_____specify

Q20. Does your household own any of the following assets?
[ENUMERATOR: RESPONDENT MAY CHOOSE AS MANY AS APPLICABLE]

Asset type and code	**Yes or No**
1. Table	
2. Chair	
3. Sofa	
4. Bed	
5. Cupboards	
6. Stove (kerosene or gas)	
7. Wheelbarrow	
8. Radio	
9. Water storage jerrycans	
10. Water storage tank (at least 100 litres/ 20	
11. Sewing machine	
12. Hens/ducks	
13. Livestock (cows, goats, sheep)	
14. Bicycle	
15. Telephone (with service)	
16. Telephone (disconnected)	
17. Cell/Mobile phone (with service)	
18. Fan	
19. Refrigerator	
20. Television (working most of the time)	
21. Video	
22. Private car	
23. House in Nairobi	
24. House outside Nairobi	
25. Land in Nairobi	
26. Land outside Nairobi	
27. Shares at the stock exchange	

Module 3: Infrastructure services

The questions seek to provide detailed information on access to infrastructure services and the quality of these services, including problems with maintenance. Some questions address the issue of how services and their maintenance are organised (e.g. how people pay). Furthermore, the questions seek to identify priorities for improvement. Additional questions on whether the improvements work are included in module 7

Q21. Suppose the government or local authority (Nairobi City Council) had enough money to help your neighborhood with only **two** services (with the other services having to wait until money were available). I will read you the following list and you tell me which **two, in order of priority,** would be at the top of your priority list for improvement:

1. **Electricity** at home
2. **Water** supply system
3. **Toilets** and disposal of excreta
4. **Garbage** collection and disposal
5. **Schools** and education
6. Internal **access road and roads** within neighbourhood
7. Storm water **drainage** system
8. **Street lighting** for security
9. **Health clinics** and services
10. Other (specify) _____

_____first priority

_____second priority

Water Supply

Q22. How many jerry cans of water does your household on average consume per day for all purposes from all sources?

_____ jerry cans per day [1 jerry can = 20 liters]

[ENUMERATOR: IF DON´T KNOW USE CODE 9999]

Q23. Please help us fill this table about your water supply?

[ENUMERATOR: MUST FILL COLUMN a FULLY BY MARKING (x) ALL THAT APPLY]		[ENUMERATOR: FILL FOR THE TWO MOST IMPORTANT SOURCES ONLY]				Comments
Which sources?	**a** Which source of water do you use? (Mark X)	**b** Which is your primary source and which is second most important? Primary source...1 Next most important source……..2	**c** What amount of water do you use from source 1 (and, then, from source 2? (no. of jerrycans **per day**) [Code 7777 if used only once a month or less frequently] Don't know …..9999	**d** What amount do you pay per unit? Pay nothing ...0 KSh/jerrycan or per other unit (please specify unit)	**e** What is the total amount that you spend on water from this source per day? Pay nothing …….0 KSh on average	**f**
1) Private connection to piped water in house					Ksh _____ per bill Ksh ____ per month	
2) Yard tap (shared connection)						
3) Water kiosk				KSh/jerrycan		
4) Water Vendors (specify) _____ (tanker, handcart, other)						
5) Neighbours						
6) Ground water & other natural sources outside the house (e.g. wells, lake, river, spring)						
7) Other, specify _____						

Q24. For those **without** house connections, over the last one week(7 days), what was the total amount that you spent **PER DAY** on water from all sources?

_____per day (in KSh)

Q25. For those **with** house connections, how much do you pay per month for water from **ALL** sources?

_____per month (in KSh)

[ENUMERATOR: ESTIMATE AMOUNT PER MONTH BY DIVIDING AMOUNT PER BILL BY 3]

Q26. How would you characterize the total amount you have to pay for water from all sources?

1. High	3. Low	1	3
2. Fair		2	

Q27. How long does it usually take you to walk from your house to your **primary water** source (ONE WAY)?

1. 1 minute or less	4. More than 10 minutes-up to 20 minutes	1	4
2. More than 1 minute-up to 5 minutes	5. More than 20 minutes	2	5

3. More than 5 minutes-up to 10 minutes	6. Not sure	3	6

[ENUMERATOR: FOR HOUSE CONNECTION CODE 7777, IF DON´T KNOW USE CODE 9999]
_____

Q28. How would you characterize the quality of water from your primary source?

1. Poor	3. Good	1	3
2. Fair		2	

SANITATION

Now I would like to ask you some questions about sanitation in your household.

Excreta Disposal

Q29. What types of toilet systems does this household usually use?

1. No facility/flying toilets **GO TO Q38**	5. Public/shared Latrine	1	5
2. Individual ordinary Pit Latrine	6. Public/shared VIP Latrine	2	6
3. Individual VIP Latrine	7. Other, specify	3	7
4. Flush Toilet/WC		4	
	_____specify		

Q30. How long does it take you to walk from your house to the toilet (if toilet facility not in house)?

[ENUMERATOR: CODE 7777 IF TOILET IS IN THE HOUSE OR COMPOUND]
_____minutes to walk

Q31. How many households/people share the toilet?
[ENUMERATOR: CODE 01 if HOUSEHOLD DOES NOT SHARE]

_____households

_____people

Q32. Who maintains the toilet and/or pays for it?

1. Landlord	3. Group of households	1	3
2. My household	4. Other, specify	2	4
	_____specify		

Q33. Your toilet is connected to which of the following disposal systems (i.e. where does the excreta/ sewage go)?

1. NCC connection to Public sewer **GO TO Q38**	4. Pit latrine	1	4
2. Informal connection to public sewer **GO TO Q38**	5. Other, Specify **GO TO Q38**	2	5
3. Septic tank/or soak pit **GO TO Q36**		3	

_____specify (e.g. to water drain, to river etc.)

[ENUMERATOR: IF DON´T KNOW USE CODE 9999] _____ **GO TO Q38**

Q34. What do you do when the pit is full?

1. Usually have it emptied	3. Let it overflow	1	3
2. Dig a new pit **GO TO Q38**	4. Other**,** specify	2	4

_____specify

[ENUMERATOR: IF DON´T KNOW USE CODE 9999] _____ **GO TO Q38**

Q35. Which methods are used for emptying?

1. City Council/local authority exhauster services	3. Private exhauster services.	1	3
2. Manual methods	4. Other, specify	2	4

_____specify

GO TO Q38

Q36. How is the septic tank/soak pit emptied?

1. By truck	3. By overflow	1	3
2. Manually	4. Other, specify	2	4

_____specify

Q37. How often is the septic tank/soak pit emptied?

every _____month(s)

[ENUMERATOR: IF DON´T KNOW USE CODE 9999]

"Grey Water" (i.e. used kitchen or bath water)

Q38. How do you dispose of grey water?

1. Pour it into the drain	3. Pour it into a pit latrine	1	3
2. Pour it onto the road or pavement	4. Other, specify	2	4

_____specify

Solid Waste

Q39. What is the most commonly used mode of disposing refuse from this household?

1. Dumping in your neighbourhood **GO TO Q43**	4. City collection system	1	4
2. Burning in your compound **GO TO Q43**	5. Organised private collection system	2	5
3. Burying in your compound **GO TO Q43**	6. Other, specify	3	6

_____specify

Q40. How many <u>times per month</u> is your solid waste collected?

1. Once a month	3. There is no regular pattern	1	3
2. More than once a month	4. Other, specify	2	4

_____specify

Q41. Do you pay for refuse collection?

1. Yes	1
2. No **GO TO Q43**	2

Q42. How much do you pay for refuse collection per month?

_____(in KSh) per month

Electricity

Q43. Is your dwelling unit connected to electricity?

1. Yes	1
2. No **GO TO Q48**	2

Q44. How many hours per day do you get electricity?

_____hours/day

Q45. Do you pay for electricity regularly?

1. Yes	1
2. No **GO TO Q48**	2

Q46. How or to whom do you pay?

1. Pay to utility company	4. Included in rent	1	4
2. Buy prepaid card	5. Pay neighbour	2	5
3. Pay to landlord (separately from rent)	6. Other, specify	3	6

_____specify

Q47. How much do you pay on average for electricity per month?

_____(in KSh) average amount/month

Q48. Are informal connections to electricity common in this neighbourhood?

1. None as far as I know	3. There are many	1	3
2. There are a few		2	

[ENUMERATOR: IF DON´T KNOW USE CODE 9999] _____

Other Issues

Q49. What is your primary cooking fuel?

1. Electricity	5. Charcoal	1	5
2. Paraffin/Kerosene	6. Solar	2	6
3. Gas	7. Do not cook	3	7
4. Firewood	8. Other, specify	4	8

_____specify

Q50. What is primary source of lighting?

1. Electricity	4. Solar	1	4
2. Kerosene (Pressure lamp, lantern, tin lamp)	5. Other, specify	2	5
3. Firewood		3	

_____specify

Internal Roads

Q51. The access road to your house is?

1. Not paved/earth road	3. Gravel/murram	1	3
2. Slightly improved but rough road	4. Tarmacked	2	4

Q52. Is it usable in the rainy season?

1. Yes, most of the time	1
2. Yes, some of the time	2
3. Rarely or not at all	3

Drains

Q53. Is there a drain outside your house?

1. Yes	1
2. No **GO TO Q55**	2

Q54. Does the drain work properly?

1. Yes, most of the time	1
2. Yes, some of the time	2
3. Rarely or not at all	3

Street lighting

Q55. Do you have street lights/lamp posts in your street?

1. Yes	1
2. No **GO TO Q58**	2

Q56. Do the street lights in your street work?

1. Yes, most of the time **GO TO Q58**	1
2. Some of the time	2
3. Rarely or not at all	3

[ENUMERATOR: IF DON´T KNOW USE CODE 9999] _____ **GO TO Q58**

Q57. What is the <u>main reason</u> for why the street lights don't always work?

1. No bulbs or bulbs not changed	3. Street lights vandalized	1	3
2. No electricity	4. Other, specify	2	4

_____specify

[ENUMERATOR: IF DON´T KNOW USE CODE 9999] _____

Module 4A: Health

The questions in this module seek to identify the need for health care. Health is seen as one of the most important indicators of adequate infrastructure and questions therefore address the respondents own health situation. Questions on access to health care and access to schooling will be treated in the community questionnaire as will questions on perceived safety in the neighbourhood.

Health

Q58. During the past 2 weeks has anyone in your household suffered from an illness or injury?

1. Yes	1
2. No **GO TO Q60**	2

Q59. What was the illness, injury or condition? (CIRCLE ALL THAT APPLY)

1. Fever	6. Cold/flu/throat infection	1	6
2. Malaria	7. Stomach-ache	2	7
3. Typhoid	8. Cough	3	8
4. Cholera	9. Injury/cuts	4	9
5. Diarrhoea	10. Other, specify	5	10

_____specify

Module 4B: Civil participation, crime/violence etc

Q60. Are you a registered voter?

1. Yes	1
2. No **GO TO Q62**	2

Q61. Did you vote in the last Presidential election in December 2002?

1. Yes	1
2. No	2

Q62. Has your household or any member of the household been a victim of a crime such as burglary, theft, or personal assault in the last 12 month?

1. Yes	1
2. No **GO TO Q65**	2

Q63. How many such incidents has your household suffered over the last 12 months?

_____number

Q64. How many of these incidents occurred inside the settlement versus outside the settlement?

_____number (inside settlement)

_____number (outside settlement)

Q65. Do you feel safe in your settlement?

1. Yes	1
2. No	2

Module 5: Security of land and tenure

This module seeks to obtain information on the perception of tenants and owners on security of tenure in reference to the various forms of property rights that they possess. Moreover, the module will provide insights into the extent to which upgrading leads to increases in rent and displacement of the poorer residents, as reported in the literature. Length of tenure/stay is covered in Module 1.

Land tenure

Q66. Do you own this property?

1. Own both land and structure	1
2. Own the structure but not the land **GO TO Q68**	2
3. Tenant **GO TO Q71**	3

Q67. What type of ownership document do you have?

1. None	6. Freehold title	1	6
2. Temporary occupation license	7. Other, specify	2	7
3. Share certificate		3	
4. Certificate of title (long-term lease from Nairobi City council/Government)		4	
5. Letter from the chief (provincial administration)		5	

_____specify

Q68. Do you rent out rooms in your house?

1. Yes	1
2. No **GO TO Q70**	2

Q69. How many rent paying tenants (households) do you have?

_____Number of paying tenants

Q70. If you were to sell your property (land and/or structure), how much do you think you could sell it for?

_____amount (in KSh)

GO TO Q75

Q71. What type of tenancy agreement do you have with the owner of the structure?

1. Written formal agreement	3	No agreement (squatter) **GO TO Q75**	1	3
2. Verbal agreement			2	

Q72. What is your total rent per month (less water and other utilities)?

_____amount/month (in KSh)

Q73. Has the rent been increased/reduced within the last year?

1. Increased	3. No change **GO TO Q75**	1	3
2. Reduced **GO TO Q75**		2	

[ENUMERATOR: IF DON'T KNOW USE CODE 9999] _____

Q74. Why was the rent increased?

1. For no reason at all	4. Landlord increased it, no improvement	1	4
2. A result of improvements to the neighbourhood	5. Landlord increases rent periodically	2	5
3. Landlord increased it due to improvements	6. Other, specify	3	6

_____specify

All Respondents

Q75. Do you feel you have secure tenure (to land, structure or dwelling unit)?

1. Yes	1
2. No	2

Q76. Have you ever been evicted from your land, structure or dwelling unit in Nairobi?

1. Yes	1
2. No **GO TO Q79**	2

Q77. When was the most recent eviction?

_____(year)

Q78. By whom were you evicted?

1. Nairobi city council/Government	3. Other, specify	1	3
2. Company or individual that holds the head title to the land		2	

_____specify

Q79. Is it easy to buy and sell property in your immediate neighbourhood/ community?

1. Yes	1
2. No	2

[ENUMERATOR: IF DON'T KNOW USE CODE 9999] _____

Q80. Within the last 12 months has anyone in your immediate neighbourhood/community sold their property?

1. Yes	1
2. No	2

[ENUMERATOR: IF DON'T KNOW USE CODE 9999] _____

Module 6: Household Enterprises

The questions seek to identify the extent and type of economic activity within the settlement. This mainly includes employment of household members and others as well as information about types of enterprise and where the products are sold (inside or outside settlement). Questions partly follow LSMS, short version.

Q81. Over the past 14 days, has anyone in your household operated any income-generating enterprise which produces goods or services or has anyone in your household owned a shop or operated a trading business?

1.	Yes	1
2.	No **GO TO MODULE 7**	2

Q82. What type of enterprise does your household have? [CHECK ALL THAT APPLY]

1.	Sewing and textile	8.	Hairdresser	1 8
2.	Food	9.	Bar/entertainment	2 9
3.	Kiosk selling various items	10.	TV/video	3 10
4.	Water kiosk	11.	Selling vegetables	4 11
5.	Furniture making	12.	Selling clothes	5 12
6.	Metal welding/fabrication	13.	Brewing	6 13
7.	Shoe making/repair	14.	Other, specify	7 14

_____specify

Q82.A Of those circled, which is the **MAIN** enterprise?

_____

Q83. For how long has the **MAIN** enterprise been in operation?

[ENUMERATOR: IF LESS THAN 1 YEAR RECORD 1 YEAR]

_____years

Q84. Where do you operate the **MAIN** enterprise?

1.	Home, inside the residence	4.	Outside settlement 1 4
2.	Home, outside the residence	5.	Both inside and outside settlement 2 5
3.	Not home, but in settlement		3

Q85. Do you or the members of this household own all of this enterprise?

1. Yes	1
2. No	2

Q86. How many household members including yourself have worked in this enterprise during the last 14 days?

_____number of household members

Q87. During the last 14 days how many people did this enterprise employ who are not members of this household?

_____number of non-household members

Q88. Where are the products from the business mainly sold?

1. Inside settlement	1
2. Outside settlement	2
3. Both inside and half outside	3

Q89. Is the enterprise located next to a motorable road?

1. Yes	1
2. No	2

Q90. Please rank the following features in terms of importance for your business "(1 is the most important, 2 the second most import, 3 the third most important and 4 the least important)"

[ENUMERATOR: PLEASE RANK ALL 4 FEATURES]

Feature	Rank
to credit	
to road	
to electricity	
to water	

Module 7: Project beneficiary Assessment

This module links closely with the first series of questions in Module 3 (Infrastructure Services). The purpose is to obtain information on whether the settlement has been upgraded, whether the residents are aware of this, and what impact the upgrade has had. Despite problems with retrospective questions these questions also allow for some form of assessment of how the upgrading programmes have worked.

Q91. Please help us fill this table about interventions and the perceived effect of these interventions?[ENUMERATOR: COLUMN A TO BE COMPLETED FOR ALL INTERVENTIONS] [CODES: Not Applicable (NA) 7777; No response: 8888; Don't know: 9999]

Type of intervention	A Insert **YES (1)** or **NO (2)** to indicate if respondent knows/believes type of service/ facility exists and if improvement/ upgrading have occurred. A1 Does the service/ facility exist?	A2 Has any improvement /upgrading occurred at all to this service/ facility during your stay in this settlement?	B Is the service/ facility working now? Yes……...1 No……2 Sometimes...3 [IF 1 GO TO D]	C [IF **NO** IN **B**] Why is service /facility not working? Never worked……1 No maintenance ……..2 Destroyed or improper usage……..3 Other specify below……..4	D [IF **YES** IN A2] As compared to the situation before the service/ facility improvement how is the situation today? Better……..…1 Worse……2 Same as before…..……3	E When it was/is working, did/ do you use this facility/ service? Yes…..…1 No……2	F [IF **YES** IN **E**] What is your **MAIN** reason for using this service? It is affordable…… …….1 Quality is good……....2 There is no alternative…...3 It is an improvement...4 Other specify below……..5	G [IF **NO** IN **E**] Why don't you use this service? It is too expensive..1 Quality is bad…..…..2 Do not have access…...3 Other specify below...4	H Did you contribute to the capital/ building costs (**upfront**)? Yes, in cash/ kind….1 No……2	I Do you pay for service on a regular basis or for its maintenance ?? Yes….1 No…..2	J Comments
1. Water supply, waterpoints/ connections in settlement											
2.Toilets in the settlement (no. or quality)											
3.Toilet exhauster services or sewerage											
4.Garbage receptacles and/or collection service											
5. Health clinic or service											
6. Public School building or service											

Type of intervention	A Insert **YES (1)** or **NO (2)** to indicate if respondent knows/believes type of service/ facility exists and if improvement/ upgrading have occurred.		B Is the service/ facility working now? Yes……...1 No……2 Sometimes...3 [IF 1 GO TO D]	C [IF **NO** IN **B**] Why is service /facility not working? Never worked……1 No maintenance ……..2 Destroyed or improper usage……..3 Other specify below……..4	D [IF **YES** IN A2] As compared to the situation before the service/ facility improvement how is the situation today? Better……..…1 Worse……2 Same as before…..……3	E When it was/is working, did/ do you use this facility/ service? Yes…..…1 No……2	F [IF **YES** IN **E**] What is your **MAIN** reason for using this service? It is affordable…… …….1 Quality is good……....2 There is no alternative…...3 It is an improvement...4 Other specify below……..5	G [IF **NO** IN **E**] Why don't you use this service? It is too expensive..1 Quality is bad…..…..2 Do not have access…...3 Other specify below...4	H Did you contribute to the capital/ building costs (**upfront**)? Yes, in cash/ kind….1 No……2	I Do you pay for service on a regular basis or for its maintenance ?? Yes….1 No…..2	J Comments
	A1 Does the service/ facility exist?	A2 Has any improvement /upgrading occurred at all to this service/ facility during your stay in this settlement?									
7. Private School building or service											
8.Internal roads: quality or number											
9. Access road to settlement: improvement etc.											
10.Electricity connections/supply											
11.Land regularization initiatives											
12.Street lights											
13.Drainage											
14. Other, specify: _____											

Q92. Which one of these improvement/upgrading interventions do you think has had the most positive impact on your household?

_____

[ENUMERATOR: INSERT NUMBER OF INTERVENTION FROM PREVIOUS TABLE]

[IF NO CHANGE HAS OCCURED **GO TO Q94**]

Q93. How has the most important intervention impacted your household

[ENUMERATOR: CIRCLE THE **TWO** MOST IMPORTANT IMPACTS]

1.	Saved time or energy	1
2.	Reduced cost of service	2
3.	Reduced illness/sick days	3
4.	Improved prospects of earning an income or running a business	4
5.	Availability of service	5
6.	Other, specify	6

_____specify

Housing structure

Q94. What materials have been used for construction of the house?

Type of material	a External walls	b Roof	C Floor
	Stone……..……1 Brick/block……..…..2 Mud/wood…….....3 Mud/cement……..….4 Wood only…….....5 Corrugated iron sheet....6 Tin…….....7 Other……..….8	Corrugated iron.....1 Clay tiles…….....2 Concrete……...3 Asbestos sheet…....4 Makuti (thatch)…....5 Grass……....6 Tin.…….…..……7 Other……...….8	Earth/clay…….....1 Tiled floor…….....2 Cement……..……3 Wood.……..…....4 Other……..……5

[ENUMERATOR: THE FOLLOWING SHOULD BE FILLED IN AFTER THE INTERVIEW]

Q95. How would you rate the overall quality of the interview in terms of willingness to answer correctly and willingly?

1. Poor	3. Good	1	3
2. Fair		2	

Q96. Please assess how the condition of this dwelling compares to others in the EA

1. Worse than average	3. Better than average	1	3
2. Average		2	

Time : ☐☐ ☐☐

Signature, Enumerator.....

Signature, Supervisor (field work) .....

Data Entry Information:

ID nr. data entry clerk.....

ID nr. Supervisor (data entry).....

Signature, data entry clerk.....

Signature, Supervisor (data entry).....

Conversion table for household poverty limit KSh/month

Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households
1	0	0	3,174	1	5	0	13,490	2	0	0	6,348	2	5	0	16,664	3	0	0	9,522	3	5	0	19,838
1	0	1	3,936	1	5	1	14,251	2	0	1	7,110	2	5	1	17,425	3	0	1	10,284	3	5	1	20,599
1	0	2	4,698	1	5	2	15,013	2	0	2	7,872	2	5	2	18,187	3	0	2	11,046	3	5	2	21,361
1	0	3	5,459	1	5	3	15,775	2	0	3	8,633	2	5	3	18,949	3	0	3	11,807	3	5	3	22,123
1	0	4	6,221	1	5	4	16,537	2	0	4	9,395	2	5	4	19,711	3	0	4	12,569	3	5	4	22,885
1	0	5	6,983	1	5	5	17,298	2	0	5	10,157	2	5	5	20,472	3	0	5	13,331	3	5	5	23,646
1	0	6	7,745	1	5	6	18,060	2	0	6	10,919	2	5	6	21,234	3	0	6	14,093	3	5	6	24,408
1	0	7	8,506	1	5	7	18,822	2	0	7	11,680	2	5	7	21,996	3	0	7	14,854	3	5	7	25,170
1	1	0	5,237	1	6	0	15,553	2	1	0	8,411	2	6	0	18,727	3	1	0	11,585	3	6	0	21,901
1	1	1	5,999	1	6	1	16,314	2	1	1	9,173	2	6	1	19,488	3	1	1	12,347	3	6	1	22,662
1	1	2	6,761	1	6	2	17,076	2	1	2	9,935	2	6	2	20,250	3	1	2	13,109	3	6	2	23,424
1	1	3	7,522	1	6	3	17,838	2	1	3	10,696	2	6	3	21,012	3	1	3	13,870	3	6	3	24,186
1	1	4	8,284	1	6	4	18,600	2	1	4	11,458	2	6	4	21,774	3	1	4	14,632	3	6	4	24,948
1	1	5	9,046	1	6	5	19,361	2	1	5	12,220	2	6	5	22,535	3	1	5	15,394	3	6	5	25,709
1	1	6	9,808	1	6	6	20,123	2	1	6	12,982	2	6	6	23,297	3	1	6	16,156	3	6	6	26,471
1	1	7	10,569	1	6	7	20,885	2	1	7	13,743	2	6	7	24,059	3	1	7	16,917	3	6	7	27,233
1	2	0	7,300	1	7	0	17,616	2	2	0	10,474	2	7	0	20,790	3	2	0	13,648	3	7	0	23,964
1	2	1	8,062	1	7	1	18,377	2	2	1	11,236	2	7	1	21,551	3	2	1	14,410	3	7	1	24,725
1	2	2	8,824	1	7	2	19,139	2	2	2	11,998	2	7	2	22,313	3	2	2	15,172	3	7	2	25,487
1	2	3	9,585	1	7	3	19,901	2	2	3	12,759	2	7	3	23,075	3	2	3	15,933	3	7	3	26,249
1	2	4	10,347	1	7	4	20,663	2	2	4	13,521	2	7	4	23,837	3	2	4	16,695	3	7	4	27,011
1	2	5	11,109	1	7	5	21,425	2	2	5	14,283	2	7	5	24,599	3	2	5	17,457	3	7	5	27,773
1	2	6	11,871	1	7	6	22,186	2	2	6	15,045	2	7	6	25,360	3	2	6	18,219	3	7	6	28,534
1	2	7	12,633	1	7	7	22,948	2	2	7	15,807	2	7	7	26,122	3	2	7	18,981	3	7	7	29,296
1	3	0	9,363	1	8	0	19,679	2	3	0	12,537	2	8	0	22,853	3	3	0	15,711	3	8	0	26,027
1	3	1	10,125	1	8	1	20,441	2	3	1	13,299	2	8	1	23,615	3	3	1	16,473	3	8	1	26,789
1	3	2	10,887	1	8	2	21,202	2	3	2	14,061	2	8	2	24,376	3	3	2	17,235	3	8	2	27,550
1	3	3	11,649	1	8	3	21,964	2	3	3	14,823	2	8	3	25,138	3	3	3	17,997	3	8	3	28,312
1	3	4	12,410	1	8	4	22,726	2	3	4	15,584	2	8	4	25,900	3	3	4	18,758	3	8	4	29,074
1	3	5	13,172	1	8	5	23,488	2	3	5	16,346	2	8	5	26,662	3	3	5	19,520	3	8	5	29,836
1	3	6	13,934	1	8	6	24,249	2	3	6	17,108	2	8	6	27,423	3	3	6	20,282	3	8	6	30,597
1	3	7	14,696	1	8	7	25,011	2	3	7	17,870	2	8	7	28,185	3	3	7	21,044	3	8	7	31,359
1	4	0	11,426	1	9	0	21,742	2	4	0	14,600	2	9	0	24,916	3	4	0	17,774	3	9	0	28,090
1	4	1	12,188	1	9	1	22,504	2	4	1	15,362	2	9	1	25,678	3	4	1	18,536	3	9	1	28,852
1	4	2	12,950	1	9	2	23,265	2	4	2	16,124	2	9	2	26,439	3	4	2	19,298	3	9	2	29,613
1	4	3	13,712	1	9	3	24,027	2	4	3	16,886	2	9	3	27,201	3	4	3	20,060	3	9	3	30,375
1	4	4	14,473	1	9	4	24,789	2	4	4	17,647	2	9	4	27,963	3	4	4	20,821	3	9	4	31,137
1	4	5	15,235	1	9	5	25,551	2	4	5	18,409	2	9	5	28,725	3	4	5	21,583	3	9	5	31,899
1	4	6	15,997	1	9	6	26,312	2	4	6	19,171	2	9	6	29,486	3	4	6	22,345	3	9	6	32,660
1	4	7	16,759	1	9	7	27,074	2	4	7	19,933	2	9	7	30,248	3	4	7	23,107	3	9	7	33,422

Conversion table for household poverty limit (Continued) KSh/month

Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households	Adults	5-14 years	0-4 years	Poverty line for households
4	0	0	12,696	4	5	0	23,012	5	0	0	15,870	5	5	0	26,186	6	0	0	19,044	6	5	0	29,360
4	0	1	13,458	4	5	1	23,773	5	0	1	16,632	5	5	1	26,947	6	0	1	19,806	6	5	1	30,121
4	0	2	14,220	4	5	2	24,535	5	0	2	17,394	5	5	2	27,709	6	0	2	20,568	6	5	2	30,883
4	0	3	14,981	4	5	3	25,297	5	0	3	18,155	5	5	3	28,471	6	0	3	21,329	6	5	3	31,645
4	0	4	15,743	4	5	4	26,059	5	0	4	18,917	5	5	4	29,233	6	0	4	22,091	6	5	4	32,407
4	0	5	16,505	4	5	5	26,820	5	0	5	19,679	5	5	5	29,994	6	0	5	22,853	6	5	5	33,168
4	0	6	17,267	4	5	6	27,582	5	0	6	20,441	5	5	6	30,756	6	0	6	23,615	6	5	6	33,930
4	0	7	18,028	4	5	7	28,344	5	0	7	21,202	5	5	7	31,518	6	0	7	24,376	6	5	7	34,692
4	1	0	14,759	4	6	0	25,075	5	1	0	17,933	5	6	0	28,249	6	1	0	21,107	6	6	0	31,423
4	1	1	15,521	4	6	1	25,836	5	1	1	18,695	5	6	1	29,010	6	1	1	21,869	6	6	1	32,184
4	1	2	16,283	4	6	2	26,598	5	1	2	19,457	5	6	2	29,772	6	1	2	22,631	6	6	2	32,946
4	1	3	17,044	4	6	3	27,360	5	1	3	20,218	5	6	3	30,534	6	1	3	23,392	6	6	3	33,708
4	1	4	17,806	4	6	4	28,122	5	1	4	20,980	5	6	4	31,296	6	1	4	24,154	6	6	4	34,470
4	1	5	18,568	4	6	5	28,883	5	1	5	21,742	5	6	5	32,057	6	1	5	24,916	6	6	5	35,231
4	1	6	19,330	4	6	6	29,645	5	1	6	22,504	5	6	6	32,819	6	1	6	25,678	6	6	6	35,993
4	1	7	20,091	4	6	7	30,407	5	1	7	23,265	5	6	7	33,581	6	1	7	26,439	6	6	7	36,755
4	2	0	16,822	4	7	0	27,138	5	2	0	19,996	5	7	0	30,312	6	2	0	23,170	6	7	0	33,486
4	2	1	17,584	4	7	1	27,899	5	2	1	20,758	5	7	1	31,073	6	2	1	23,932	6	7	1	34,247
4	2	2	18,346	4	7	2	28,661	5	2	2	21,520	5	7	2	31,835	6	2	2	24,694	6	7	2	35,009
4	2	3	19,107	4	7	3	29,423	5	2	3	22,281	5	7	3	32,597	6	2	3	25,455	6	7	3	35,771
4	2	4	19,869	4	7	4	30,185	5	2	4	23,043	5	7	4	33,359	6	2	4	26,217	6	7	4	36,533
4	2	5	20,631	4	7	5	30,947	5	2	5	23,805	5	7	5	34,121	6	2	5	26,979	6	7	5	37,295
4	2	6	21,393	4	7	6	31,708	5	2	6	24,567	5	7	6	34,882	6	2	6	27,741	6	7	6	38,056
4	2	7	22,155	4	7	7	32,470	5	2	7	25,329	5	7	7	35,644	6	2	7	28,503	6	7	7	38,818
4	3	0	18,885	4	8	0	29,201	5	3	0	22,059	5	8	0	32,375	6	3	0	25,233	6	8	0	35,549
4	3	1	19,647	4	8	1	29,963	5	3	1	22,821	5	8	1	33,137	6	3	1	25,995	6	8	1	36,311
4	3	2	20,409	4	8	2	30,724	5	3	2	23,583	5	8	2	33,898	6	3	2	26,757	6	8	2	37,072
4	3	3	21,171	4	8	3	31,486	5	3	3	24,345	5	8	3	34,660	6	3	3	27,519	6	8	3	37,834
4	3	4	21,932	4	8	4	32,248	5	3	4	25,106	5	8	4	35,422	6	3	4	28,280	6	8	4	38,596
4	3	5	22,694	4	8	5	33,010	5	3	5	25,868	5	8	5	36,184	6	3	5	29,042	6	8	5	39,358
4	3	6	23,456	4	8	6	33,771	5	3	6	26,630	5	8	6	36,945	6	3	6	29,804	6	8	6	40,119
4	3	7	24,218	4	8	7	34,533	5	3	7	27,392	5	8	7	37,707	6	3	7	30,566	6	8	7	40,881
4	4	0	20,948	4	9	0	31,264	5	4	0	24,122	5	9	0	34,438	6	4	0	27,296	6	9	0	37,612
4	4	1	21,710	4	9	1	32,026	5	4	1	24,884	5	9	1	35,200	6	4	1	28,058	6	9	1	38,374
4	4	2	22,472	4	9	2	32,787	5	4	2	25,646	5	9	2	35,961	6	4	2	28,820	6	9	2	39,135
4	4	3	23,234	4	9	3	33,549	5	4	3	26,408	5	9	3	36,723	6	4	3	29,582	6	9	3	39,897
4	4	4	23,995	4	9	4	34,311	5	4	4	27,169	5	9	4	37,485	6	4	4	30,343	6	9	4	40,659
4	4	5	24,757	4	9	5	35,073	5	4	5	27,931	5	9	5	38,247	6	4	5	31,105	6	9	5	41,421
4	4	6	25,519	4	9	6	35,834	5	4	6	28,693	5	9	6	39,008	6	4	6	31,867	6	9	6	42,182
4	4	7	26,281	4	9	7	36,596	5	4	7	29,455	5	9	7	39,770	6	4	7	32,629	6	9	7	42,944