The Inequality of Maternal Health in Urban Sub-Saharan Africa

Monica Magadi, Eliya Zulu, and Martin Brockerhoff

Abstract

Numerous studies document the urban poor disadvantage in child health conditions in African cities. This study uses DHS data from 23 countries in sub-Saharan Africa to examine whether the urban poor experience comparable disadvantages in maternal health. The results show that although the urban poor on average receive better antenatal and delivery care than rural residents, they consistently have poorer maternal health indicators than the urban non-poor. Further analyses based on a multilevel approach reveal significant variations in urban maternal health inequalities across countries of sub-Saharan Africa. The urban poor disadvantage is more pronounced in countries with better average maternal health indicators, where the urban poor tend to be even worse off than rural residents.

SSRC Applications and Policy Working Paper A03/01

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INTRODUCTION

Urban areas of less developed countries (LDCs) are becoming the source of almost all world population growth. Whereas 58 percent of population growth occurred in urban areas of LDCs during 1975 and 2000, this figure is expected to reach 90 percent between 2000 and 2025, during which time the urban population will exceed the rural population in the less developed world. Sub-Saharan Africa represents a striking example of the shift from a predominantly rural to urban population. The region's urban population is growing at a rate of about 4.4 percent per annum, while the rural population growth rate has fallen below two percent (United Nations 2000).

Young adults are accounting for a large proportion of urban growth. Urban areas are experiencing the unprecedented increase in numbers of adolescents that has followed mortality and fertility decline in developing regions (Mensch, Bruce and Greene 1998), including in parts of Africa, and a higher volume of young people migrate from rural to urban areas than in the opposite direction to obtain jobs and schooling that are concentrated in towns and cities. As a result, the young adult urban population is not only increasing rapidly, but because of unbalanced migration, urban populations have a higher proportion of people of reproductive age than rural populations.[1] Among 20 countries of sub-Saharan Africa surveyed between 1990 and 1996, for instance, females aged 15-49 years on average represented 25.2 percent of the urban population and 20.7 percent of the rural population (Ayad at al. 1997).

Many young adults and their families in urban areas live in poverty, especially in sub-Saharan Africa. The World Bank estimates that in 1985 there were 330 million urban poor people in the less developed world (World Bank 1990). The World Health Organization (WHO) and the UN Center for Human Settlements endorsed a 1990 estimate, based on dozens of national and city studies, of 600 million urban dwellers—or 42 percent of the urban population in LDCs—living in "life and health threatening" homes or neighborhoods

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(Cairncross, Hardoy, and Satterthwaite 1990). The United Nations Population Fund concluded in 1996 that 27.7 percent of LDC urbanites were living in poverty, including 41.1 percent in sub-Saharan Africa (United Nations Population Fund 1996). Whatever the exact figure, a large proportion of the urban population in less developed countries lack the basic material resources and amenities necessary for a decent standard of living.

The health consequences of urban poverty under conditions of rapid urban growth have been well documented for children (Harpham, Lusty and Vaughn 1988; Bradley et. al. 1992; Timaeus and Lush 1995; Atkinson, Songsore and Werna 1996; Brockerhoff and Brenan 1998). A common research finding is large child health disparities between more- and less-affluent city residents. A recent study in the slums of Nairobi show similar patterns whereby the infant mortality rate for slum dwellers was 91.3, while the comparative rates for residents of other urban areas and rural parts of the country were 56.6 and 75.9, respectively (APHRC 2002). This pattern parallels the historical experience of many now-developed countries in Europe and North America during their period of most rapid urban growth, 1875-1900. In the United States in 1900, for example, for every 1,000 children born the number who died before age five was 177 in rural areas, 215 in urban areas, and 237 in New York City (Preston and Haines 1991).

Paradoxically, there has been scant comparative research on reproductive health in urban areas of developing countries, despite the rapidly increasing size and concentration of the developing world's reproductive-age population in cities. This gap in research is most glaring in the case of sub-Saharan Africa's cities, given the persistent poverty and high morbidity of the region, and that most countries have adopted structural adjustment policies that may affect city residents most adversely.[2] Indeed, while poverty is increasing across the board in most African countries, emerging evidence shows that deprivation is growing more rapidly in urban areas and major cities than in rural areas (see, for example Central Bureau of Statistics 2000).[3] As the region urbanizes quickly, documenting the types of urban areas and groups most in need of particular reproductive health services is essential to efforts to improve maternal and child health at the national level, as well as to help women achieve their reproductive preferences and thereby facilitate mortality decline. Comparing reproductive health conditions within urban areas, as well as between urban and rural areas, is required to assess whether women have benefited from most governments' commitment to universal access to safe and affordable reproductive health care services, as declared most notably at the 1994 International Conference on Population and Development.

This study uses survey data from 23 countries of sub-Saharan Africa to examine whether the presumed superiority of reproductive health care of urban women, as compared to rural counterparts, masks significant differentials in care within urban areas, and whether some urban women, in fact, have poorer reproductive health than women in rural areas. Large health disparities within cities would suggest that equal proximity to health facilities cannot be interpreted as equal access to services. Similar health conditions among rural and large groups of urban women would indicate that "urban bias" in the allocation and concentration of public and private health care resources does not necessarily translate into widespread health advantages for urban women.

This paper focuses on the urban poor, women who live in dwellings without electricity and who also do not use minimally safe drinking water and safe waste disposal facilities. This classification of urban poverty presumably encompasses those persons living in slums, squatter settlements, and peri-urban areas of cities, as well as persons living in small, remote towns where infrastructure remains poorly developed. While many indicators of reproductive health merit investigation, this study focuses on three broad categories: unwanted fertility and family planning, antenatal care, and conditions at delivery. These themes cover a course of reproduction from before conception, through pregnancy, to childbirth.

Reproductive Health Care in Sub-Saharan Africa

A review of the literature produces scanty readings on reproductive health care in urban parts of Sub-Saharan Africa. Many studies that compare availability of health services between rural and urban areas highlight the plight of rural areas, given most income-earning opportunities and the major hospitals that consume a disproportionately large component of the overall health budget are concentrated in cities and big towns (Kwast 1989). For instance, it has been estimated that in some countries about 75% of the health budget funds hospitals, most of which are located in urban areas, and 25% goes to primary health care services which serve rural residents (Biddulph 1993). However, the physical proximity to the hospitals may not give poor urban residents much leverage over their rural counterparts due to economic deprivation, among other factors.

The plight of the urban poor may be escalating in many African cities as the vast majority of them reside in informal settlements that are customarily deprived of health services by the central governments. As shown in India, slum residents may not readily

utilize health services, even when provided free of charge or brought closer to their residences, because of time constraints generated by pressure to raise money for bare survival (Sarin 1997; Mulgaonkar at al. 1994). Lack of stable and regular sources of income and the high costs of living in cities often force women into the commercial sector, doing adhoc jobs and trading during business hours that conflict with the hours of operation of major health facilities; poor women can ill afford to lose hours of pay to attend facilities under less than dire circumstances. Economic vulnerability also forces many poor urban women to indulge in risky sexual behavior such as having extramarital or multiple sexual partners in order to make ends meet (Ulin 1992, Carael and Allen 1995; Omorodion 1999; Zulu, Ezeh and Dodoo. forthcoming). Family support networks are generally weaker in cities than in villages, leaving many women fewer options to attend to young children and therefore more reluctant to obtain adequate antenatal and obstetrical care. Social heterogeneity and stratification according to ethnicity, occupation, neighborhood of residence and place of origin, and other features are typically more common in cities than in more homogeneous villages, and may lead, at best, to selective service of clients by practitioners, and at worst to poor or inadequate service as a result of covert discrimination.

The expansion of female migration from rural to urban areas and the consequent increasing proportion of women in cities raise new challenges in examining women's health in the urban setting. New migrants to urban areas tend to have worse reproductive health outcomes than those who have stayed in urban areas for a long time and those who have lived in rural areas (Brockerhoff and Biddlecom 1999). Migrants may comprise a large minority of the city's population, and many of them stay seasonally or for short durations, frequenting health facilities only in their home villages. In very large cities, the slums in which the poor live are often inaccessible to health care workers. These and many other factors combined with the cost of health services in urban areas may lead to inadequate reproductive health care for poor mothers. Thus, there are many constraints to reproductive health in urban areas that deserve recognition, factors unique to urban settings and that particularly affect the poor.

DATA AND METHODS

Measuring Urban Poverty with Demographic Surveys

Montgomery at al. (2000) note that in the absence of reliable data on income and consumption to measure living standards in health-related surveys, researchers typically rely

on one of three sets of indicators: (1) access to potable water and the nature of toilet facilities, (2) quality of housing materials, or (3) ownership of selected consumer durables. Like income and consumption, which do not necessarily represent all of the material resources available to a household, each of these three proxy measures of living standards is inadequate to distinguish the urban poor from the non-poor in low-income countries. For instance, with respect to building materials of the dwelling, a cement floor may represent the preference of a well-to-do household that values a solid foundation, whereas for others it reflects illegal or non-tenured housing on sidewalks, streets, or in parks (Perlman 1986). Ownership of consumer durables is partly a function of taste and choice, and may be independent of wealth or income. A poorer household, for instance, may expend the bulk of its income on a radio, motorbike, and other goods yet live in squalor; a wealthier household may eschew these same non-perishable goods for other purchases (for example, travel). Furthermore, consumer durables often do not work, nor are they always purchased by the current users or owners.

Household linkage to electricity and use of safe drinking water and sanitation—a "basic amenities" definition for urban areas—is perhaps the least flawed indicator to gauge urban poverty, since electricity and the ready availability of potable water and clean fecal waste disposal facilities can be considered as universally-desired and needed services in urban areas; wealth and income are the main constraints on the demand for these items. While start-up costs of implementing these major services are typically high in cities, the marginal costs of extending the services throughout a compact community are usually low (Hardoy and Satterthwaite 1989). Therefore, wealthier and poorer urban households can usually be distinguished based on whether major infrastructure is in place in their neighborhoods or is used. Nonetheless, an absence of any single amenity cannot be taken to represent poverty. For instance, many deprived households illegally "tap into" electrical power sources from distant origins, while others use fresh water sources (e.g., collected rainwater) rather than local standpipes and boreholes for drinking, or open public space rather than safe septic tanks or cesspools for urination and excretion (for instance, because local facilities are too scarce). To overcome such practices that would undermine a basic amenities classification of urban poverty, a strict definition of the urban poor can be applied, for instance as persons whose dwellings lack (or who do not avail themselves of) a set of basic infrastructure items.

In a study meant to compare sexual outcomes between slum and non-slum residents of Nairobi City based on Demographic and Health Survey (DHS) data, Zulu, Dodoo and Ezeh (2002) use the simultaneous absence of electricity, water (pumped into the residence),

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and sanitation (flush toilets) as a proxy indicator of slum residence. The authors argue that while there are some slum dwellers who have one or two of these amenities, and there are also some non-slum dwellers who lack one or two of the three amenities, it is inconceivable to think of a non-slum location in the city where all three are simultaneously absent. Thus, although the measure does not capture a clean dichotomy of slum versus non-slum contexts, it is at least able to identify the core of slum settlements where none of the three amenities is available. The authenticity of using the simultaneous absence of these amenities as an indicator of slum residence is validated by the closeness of the results (for slum areas) in the Zulu et al. paper and those obtained from a representative sample of the city's slum settlements (APHRC 2002).

Data

Data analyzed in this paper are from DHS conducted in 23 countries of sub-Saharan Africa during the 1990s. The DHS apply probability-based sampling separately to urban and rural strata, to provide valid samples of the urban and rural populations at the national level. Typically, the urban sample is large enough (at least 1000 female respondents) to produce acceptably low sampling errors and high reliability of estimates. In cases where the urban sample is a small proportion of the national sample (as in many DHS conducted in Africa) urban areas are over-sampled. In such cases, the analyses in this study apply individual weights to each survey respondent to produce a representative urban sample.

In this study, we define the "urban poor" as those women of reproductive age who do not have electricity in their dwellings *and* also do not use drinking water that is piped into their home or from a public tap, *nor* use a private or shared flush toilet. The non-existence or nonuse of all three amenities in this classification arguably produces a conservative estimate of the urban poor, although it represents those urbanites living in the most extreme conditions of deprivation. A multi-item definition is necessary so as to not over-represent as poor those persons living in small urban areas where one of the amenities (for instance, electricity) is much more likely to be absent than in big cities. Analysis of pooled data from Mali, Niger, and Senegal reveals a Pearson correlation coefficient of 0.893 (p<.01) between an urban woman living in a dwelling without any basic amenities and living in an urban cluster (or community) where most households lack all basic amenities. Therefore, in describing the urban poor in Africa, one can extrapolate from the individual to community level with a high degree of confidence.

The indicators of maternal health analyzed, namely: unplanned fertility; antenatal care; and delivery care relate to births to women in the 3, 4 or 5 years immediately preceding the surveys. Unplanned fertility is classified into three categories: mistimed (wanted later), unwanted (wanted no more) and wanted fertility (wanted then). Antenatal care is assessed based on both the timing and the frequency of visits during pregnancy, while delivery care indicators include delivery attendant, place of delivery, and delivery of tetanus vaccinations to the women.

Methods of Analysis

The analysis proceeded as follows. First, descriptive statistics are presented for three groups of women—the urban poor, other urbanites, and rural residents—to determine whether substantial differentials exist between the urban poor and others according to well-established, minimally acceptable levels of maternal health care, as declared at international conferences since the 1970s. Since cultural practices of maternal health vary greatly across African settings, our main interest is in intra-national differentials rather than cross-national comparisons. Median values from the 23 countries arguably represent approximate conditions in the region.

The descriptive analysis is followed by multivariate analyses that examine the effect of residence (urban poor, other urban, and rural) on maternal health outcomes, while controlling for the effects of other important covariates: parity, age, education level, religion and region/province of residence. The three outcome variables here have binary responses (with only two broad categories), and hence, the multivariate analyses are based on binomial logistic regression models to examine the variations in the odds of unplanned fertility, inadequate antenatal care, and non-professional delivery care between pairs of the three residential categories (urban poor, other urban, and rural residents).

Further analyses have examined the variations in urban maternal health inequalities across different countries in sub-Saharan Africa using multilevel logistic regression models. The analysis, based on two-level models that treat the country effect as random and allows the effect of residence to vary across countries, seeks to determine the magnitude and pattern of variations in the urban maternal health inequalities across countries. This will help determine to what extent the observed maternal health inequalities are generalizable across countries of sub-Saharan Africa. The general form of the random coefficients multilevel logistic model used in the analysis may be expressed as:

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$$Logit\ \textbf{\textit{p}}_{ij} = X'_{ij}\,\textbf{\textit{b}} + Y'_{ij}\,u_j$$

Where:

π_{ij} - is the probability of a given outcome for a particular birth, i, in country, j ;

X'_{ij} - is the vector of covariates which may be defined at birth, or country level;

β - is the associated vector of fixed parameters;

Y'_{ij}- is a vector of covariates (usually a subset of X'_{ij}) the effects of which vary randomly at country level; and

u_j - is the vector of country level random effects.

The multilevel regression analyses were carried out using the *MLwiN* statistical package (Institute of Education, 2000). The estimates are based on second-order predictive quasi likelihood (PQL) procedure.

RESULTS

Descriptive Analysis

Extent of Urban Poverty

The percentage of urban women interviewed in the 23 countries who are classified as poor ranges from under 10 percent in six countries—Ghana, Côte d'Ivoire, Comoros, Namibia, Senegal and Zimbabwe—to 72 percent in Tchad (Table 1). Despite this variation, the validity of a basic amenities definition of urban poverty is indicated by the consistent levels observed in adjacent or nearby countries. For instance, levels are between 9 and 16 percent in Ghana, Nigeria and Togo; 14 percent in Kenya and 18 percent in Tanzania. Further support for this classification of urban poverty comes from a Pearson correlation coefficient of -.566 (p<.01) between levels of urban poverty and Gross National Product per capita in the survey year.[4]

[Table 1 about here]

Extreme differences in urban poverty levels between countries may be attributable to their urban structures and histories.[5] For example, almost half of the urban population of Senegal resides in greater Dakar, which benefited as the longtime center of French colonial West Africa, and which continues to draw a disproportionate share of direct foreign investment in the Sahel region.[6] The urban population of Uganda, on the other hand, consists

of localities of 100 or more residents, the lowest threshold in the developing world; most urbanites in Uganda live in scattered large villages or small towns.[7]

Fertility, Unwanted Fertility and Unmet Need for Family Planning

Ensuring that women have the freedom to decide whether and when to have children is one of the major goals of family planning and reproductive health programs. However, studies show that a large proportion of births in the developing countries result from unplanned pregnancies. Such pregnancies have been linked to a variety of negative health consequences, such as unsafe induced abortions and poor antenatal care (Joyce and Groomsman 1987; Dixon-Mueller 1989; Magadi, Madise and Rodrigues 2000). The determinants of unplanned fertility are complex, not easily reduced to factors such as lack of contraception or education. Even though use of family planning is expected to reduce the incidence of unplanned pregnancies, it has been suggested that as actual fertility declines, wanted fertility may decline even faster, so that the proportion of births that are unplanned may actually grow even when fertility control is becoming more prevalent (Tsui, Wasserheit and Haaga 1997). Analysis of DHS data by Westoff and Bankole (1995) shows that much of the unmet need for contraception, especially in sub-Saharan Africa, is motivated by the desire to delay first pregnancies or to space pregnancies, rather than to stop childbearing.

The fertility levels presented in Table 2 vary considerably across the three residential sub-categories as well as between countries. Fertility levels for the urban poor range from 3.5 (Zimbabwe) to 5.6 (Namibia), while for rural areas they range from 4.9 (Zimbabwe) to 7.6 (Niger). These variations reflect broader differences on reproductive contexts in which the urban poor operate across the countries. Fertility of the urban poor in sub-Saharan Africa more closely resembles the fertility of rural women than of more affluent urban residents. As shown in Table 2, the median total fertility rate (TFR) of the urban poor in the three years preceding the surveys was 5.72 births, a level 0.61 lower than in rural areas (6.33) and 1.57 higher than among other urbanites (4.15). In all countries except Cote d'Ivoire, Namibia, Cameroon and Mozambique, the urban poor have higher fertility than rural residents. The TFR was higher among the urban poor than other urban residents in 20 of 22 countries, the exceptions being Niger and Tchad. The most extreme difference is in Namibia, and also in Madagascar, where fertility among the relatively large population of urban poor was nearly twice as high as among other urban residents. Almost all countries with a difference of one child or less (between the urban poor and non-poor) have relatively high fertility levels in

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general, with the exception of Zimbabwe, where the urban poor have about half a child more than other urbanites. The median wanted fertility rate from the data we have analyzed was 1.2 births higher among the urban poor (4.8) than among other urbanites (3.6).[8] These differentials support the observation of Mamdami at al. (1993) that the urban poor generally desire more children than other urban residents despite the relatively high costs of child-rearing in cities, costs that poorer households presumably are less equipped to sustain.

[Table 2 about here]

High wanted fertility of the urban poor in Africa, however, obscures their high levels of unwanted births. The next two panels of Table 2 show that a considerable proportion of all births (30, 33, and 26 percent among the urban poor, other urbanites, and rural residents, respectively) in sub-Saharan Africa are either unplanned or unwanted. The median proportion of mistimed births among the urban poor (23.4 percent) was higher than the proportion for rural areas (19.7 percent), but slightly lower than that for other urbanites (25 percent). The patterns seem rather inconsistent as some countries with more or less similar reproductive conditions exhibit not only different levels of variations, but also in different directions. For instance, the neighboring Malawi and Tanzania have the biggest difference in the levels of mistimed fertility between the urban poor and rural residents, but the differences are in opposite directions. The big proportion of mistimed births in rural areas in Malawi may be a reflection of intense emphasis of child-spacing in the country's traditional reproductive regime (Zulu 1998; Zulu and Kalipeni, forthcoming). In general, births are about as likely to be unwanted among the urban poor (6.4 percent) as among rural residents (6.5 percent) but more likely to be unwanted among other urban residents (8.5 percent) in this sample of African countries.

Intra-urban differentials in unwanted fertility correspond closely with differences in the unmet need for family planning. The median level of unmet need is 19 percent among the urban poor (and 20 percent among rural women), as compared to 16 percent among other urban residents. In 18 of the 22 countries, unmet need is higher among the urban poor than other urbanites, and levels nearly twice as high among the urban poor are observed in countries with relatively high as well as low fertility (for instance, Namibia and Zimbabwe). One can interpret from these statistics that the relatively high unwanted (and total) fertility of the urban poor in sub-Saharan African could be lowered by programs that more effectively meet couples' need for contraception. Data available from 12 countries (not shown) on family planning outreach services (defined as having been visited recently by a family planning worker) offer modest evidence that service provision is inferior in poor urban areas.

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In 8 of the 12 countries, the urban poor were less likely to have been visited by a family planning worker in the past year than were other urbanites; only in Zimbabwe, where both urban and rural fertility rates are low, have the urban poor been serviced with particular vigor.

Prenatal Care

Poor antenatal care is a risk factor for adverse pregnancy outcomes for both the mother and the baby, including maternal mortality, perinatal mortality, premature delivery, pre-eclampsia and anemia, in many settings of the developing world (Anandalakshmy et al. 1993; Fawcus et al. 1996; Magadi, Diamond and Madise 2001). Initiation (timing), frequency, and overall quality of antenatal care are important for timely identification and mitigation of potential pregnancy complications. To ensure that potential pregnancy problems are identified in good time, it is important that antenatal care is started early in pregnancy and continue at regular intervals throughout the pregnancy. It should be noted, however, that the number of antenatal visits may not have much impact on maternal health and the outcome of the pregnancy if the health personnel are not well trained and equipped to timely and effectively screen and manage potential risk factors both to the mother and fetus, and provide education and counseling on how to deal with various issues outside the clinic (Rooney 1992). Unfortunately, these management and quality of care aspects are not reflected in the information on the timing and frequency of antenatal care.

Table 3 shows that few women in sub-Saharan Africa receive prenatal care in the first trimester from a health service provider, particularly in East, Central, and Southern Africa. Among the urban poor, for instance, less than 10 percent of the women in Malawi, Rwanda, Kenya and Zambia initiate prenatal care in the first trimester, compared to between 40 and 50 percent of their counterparts in Mali, Senegal, Comoros, Burkina Faso, and Tchad). Nonetheless, large disparities exist between urban groups and rural women in most countries. While urban populations presumably have far greater physical proximity to antenatal care (and greater resources to use it) median averages are close for women in poor urban areas and rural areas, with 25 and 23 percent of recent births of both groups receiving early care. In eleven of the 23 countries, fewer urban poor women initiate antenatal care in the first trimester than rural women. Early use of prenatal care is significantly higher among other urbanites, at 33 percent. This general pattern of differentials is most pronounced in

Madagascar, but it is typical of coastal West African countries including Benin, Senegal, Ghana, Cameroon, Mali, Togo, and Côte d'Ivoire.

[Table 3 about here]

Less early antenatal care in East, Central, and Southern Africa apparently reflects a common practice in those areas of postponing visits until later in pregnancy rather than not having them, while West African women tend to have fewer overall visits, despite starting earlier. Most of the countries in East, Central and Southern Africa which have the lowest proportion of women attending antenatal care in the first trimester are among the best performers when we look at proportion of women making four or more antenatal visits during pregnancy. The urban non-poor are more likely to make frequent antenatal care visits, with 70 percent of women having made four or more antenatal visits, compared to the poor urbanites (50 percent) and rural residents (44 percent). Indeed, only on the small island of Comoros are the urban poor (84 percent) more likely than the non-poor (62 percent) to have attended four or more antenatal care visits. In 21 of the 23 countries, rural residents make less antenatal visits than urban residents.

The 1990 World Summit for Children established a goal of universal tetanus toxoid immunization by the year 2000. Tetanus vaccinations are used to protect the mother and the child from infections during and immediately after delivery. The results (Table 4) show huge variations in the coverage of tetanus immunization across countries with the southern African countries of Zimbabwe, Mozambique and Namibia exhibiting the lowest levels (below 40%), while Tanzania and Senegal have universal coverage (Table 4). On average, poor women in urban Africa in the 1990s were much more likely than rural women to have received injections, at 54 and 42 percent, respectively, but less likely than other urban women, at 58 percent. Intra-urban differences in tetanus immunization are not large in the majority of the countries, but they are systematic across the region, with the poor being disadvantaged in 14 of the 20 countries with data on this indicator. In Tchad, while universal tetanus immunization is achieved among the urban non-poor, less than 40% of the urban poor and rural residents received the immunizations.

[Table 4 about here]

Conditions at Delivery

Appropriate delivery care is important for the health of both the mother and the newborn, especially in cases where childbirth complications develop. It is important that mothers

deliver their babies in a hygienic setting and in the presence of a qualified attendant and equipment/supplies in order to reduce the risk of infections and be in a position to effectively manage any complications that may arise. Delivery care in most parts of sub-Saharan Africa is far from adequate as a large proportion of deliveries occur at home, and without a qualified attendant (see for example Magadi, Diamond and Rodrigues, 2001).

Table 5 presents data for the nature of delivery care that African women accessed in the 1990s. Although distance to a health facility may not differ greatly among urban population groups in Africa, the use of health facilities for giving birth does differ. For the urban poor, the percentage of births delivered in health facilities varies from less than half in Tchad, Madagascar, Kenya and Nigeria, to over 80 percent in Togo and Burkina Faso. The urban poor are more likely than their non-poor urbanites to deliver outside health facilities in all countries, except the Comoros. While only about a third of rural births are delivered in health facilities, close to two-thirds of children of the urban poor and four fifths of births of the non-poor urbanites are delivered at such facilities. The urban poor are advantaged compared to their rural counterparts in all the 23 countries, though the differentials are more pronounced in Western Africa than they are in Eastern and Southern Africa. The biggest difference between the two groups is observed in Niger where only 63.5 percent of births among the urban poor are delivered in health facilities, compared to only 8.5 percent among rural residents. Use of health facilities for delivery generally differs less between the two urban groups in Western Africa than in Eastern and Southern Africa.

[Table 5 about here]

Delivery assistance from a health professional (nurse, doctor or trained TBA) shows a similar pattern of differentials as place of delivery. We did not separate those who attended care from physicians and those who got care from nurses because physicians are often seen when there are complications that midwives and nurses, who ordinarily handle deliveries, cannot deal with. As such, differences in attendance by physicians reflect both the extent of pregnancy/delivery complications and choice of delivery attendant by some clients. In countries like Cote d'Ivoire and Madagascar, less than five percent of the urban poor received professional assistance, while in Zimbabwe, Namibia, Malawi and Burkina Faso over 70 percent of all deliveries were attended to by professional assistance. Cote d'Ivoire and Madagascar (alongside Niger) exhibit the lowest (less than 12%) utilization of professional delivery care for all the three residential categories. In general, Southern African countries exhibit higher levels of professional care utilization than West African countries.

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Greater use of professional assistance during delivery among the urban non-poor compared to the urban poor is observed in all countries, except Cote d'Ivoire. Huge differences of close to or over 20 percentage points are noted in Southern Africa (Mozambique, Zambia, Zimbabwe, and Malawi), as well as in Kenya and Nigeria. The urban poor are more likely to receive professional care than rural residents in all countries, except Madagascar, the Comoros, Niger and Cote d'Ivoire, indicating that in some countries on the continent, there is need to pay more attention to the reproductive health needs of the urban poor.

In sum, there is considerable intra-urban inequality in maternal health care in sub-Saharan Africa. The urban poor are disadvantaged compared to the urban non-poor according almost all indicators of maternal health considered. Although the urban poor disadvantage is more pronounced in some countries more than others, they are at least modestly deprived in virtually all countries.

Multivariate Analysis

The associations between residence and reproductive health outcomes observed in the descriptive analysis may be spurious due to the effects of other important socio-economic and demographic factors that are associated with residence. For instance, urban residents are likely to comprise a higher proportion of women who are younger, with fewer children and more educated. In addition, factors such as religious affiliation and region of residence may also have independent effects on reproductive health outcomes. The results of the multivariate analysis presented in this section control for the effects of these factors.

Unplanned fertility

Results from the multivariate analysis presented in Table 6 show that rural women are less likely to report mistimed fertility as compared to the urban poor. In virtually all countries (seven) where there is a significant association between residence and unplanned versus wanted fertility ($p<0.05$), the urban poor are more likely to have mistimed or unwanted births than their rural counterparts. In comparison with the urban non-poor, the urban poor are more likely to have mistimed fertility in all the three countries where there is a significant difference between the two residential categories. For unwanted fertility, evidence of

significantly higher rates among the urban non-poor compared to the urban poor are observed in Zambia and Mozambique (in Southern Africa), while the relationship is reversed in Burkina Faso (in West Africa). For the analysis of combined mistimed and unwanted fertility, the results are similar; the urban poor are more disadvantaged than urban non-poor in all the countries with significant residential residence/deprivation effects, while positive effects are noted in four and negative ones in two of the six countries where significant results are noted for intra-urban variations. These relationships control for the effects of the other covariates such as birth-order, which have very strong associations with unplanned fertility. As would be expected, increasing birth order is consistently associated with high probability of unplanned fertility, especially unwanted births (results not shown).

[Table6 about here]

Prenatal Care

Table 7 shows limited and inconsistent differences in the timing of antenatal care between the urban poor and rural women, as the urban poor are more likely to initiate early prenatal care than rural residents in Zambia, but less likely to do so in Madagascar and Tchad. The urban non-poor are more likely than the urban poor to initiate antenatal care in the first trimester. All countries (7 out of the 23) showing significant differences ($p<0.05$) in timing of antenatal care between the urban poor and urban non-poor conform to this general pattern.

[Table 7 about here]

The urban poor are also generally less likely to receive adequate antenatal care, based on frequency of visits, as compared to the urban non-poor. However, compared to rural residents, the urban poor are better off. In all countries showing significant relationships, the urban poor are less likely than the urban non-poor, but more likely than rural women to receive adequate antenatal care (make at least four visits during pregnancy).

Delivery Care

Of all the maternal health indicators examined in this paper, delivery care shows the greatest consistency with respect to residential disparities (see Table 8). In almost all the countries, the urban poor have significantly lower risks of non-professional deliveries than rural residents. The only exceptions are Madagascar and Zimbabwe (though only significant for delivery attendant in Madagascar) where professional delivery care is higher among rural

residents than among the urban poor. As would be expected, professional delivery care is generally significantly higher among the urban non-poor than the urban poor. In Zimbabwe, for instance, the urban non-poor are 6.2 times more likely to have professional delivery care than the urban poor.

[Table 8 about here]

The urban poor advantage in delivery care, over rural residence, may be attributed mainly to physical inaccessibility of health services and cultural beliefs surrounding delivery in many rural settings of sub-Saharan Africa. Unlike the antenatal care services which are usually available in smaller health centers, facilities providing delivery care are usually distant for many rural residents. On the other hand, the urban poor versus non-poor disparity is most probably due to cost implications, since professional delivery care services are likely to be unaffordable to the urban poor.

Variations in Maternal Health Inequalities Between Countries

This section examines variations in maternal health inequalities between countries of sub-Saharan Africa, using merged data set for 23 countries of sub-Saharan Africa. The variations between countries are examined after taking into account the effect of the main factors known to influence maternal health in the region: mothers educational attainment, age and parity at the time of birth of index child. This analysis seeks to establish the extent to which the observed maternal health inequalities are generalizable across countries of sub-Saharan Africa.

Unplanned fertility

The individual and country level parameter estimates for mistimed, unwanted and overall unplanned fertility are presented in Table 9. The results for the socio-demographic factors are consistent with existing literature, showing higher risks of unplanned fertility among teenagers, higher order births, and the more educated women, compared to their older, nulliparous or uneducated counterparts.

[Table 9 about here]

Averaging across countries, there is no significant difference between urban poor and urban non-poor in terms of mistimed or overall unplanned fertility, but unwanted fertility is significantly higher among the urban non-poor. The urban poor have, on average, higher

unwanted or overall unplanned fertility than rural residents. Despite these general patterns, the country level variances indicate that the levels of unplanned fertility vary significantly between countries and the residential inequalities also vary significantly across countries. Figure 1 shows the variations in mistimed, unwanted and overall unplanned fertility for urban poor, urban non-poor and rural residents, for countries with varying risks/ levels of unplanned fertility. Since the countries risk factors have a standard normal distribution, the values are varied from -2 to +2, representing countries with the lowest and highest risks respectively. *(Figure 1 about here)*

The graphs show that the urban poor have relatively higher mistimed or overall unplanned fertility than the urban non-poor or rural residents for countries with low levels/risks of unplanned fertility. However, for countries with relatively high risks/levels of unplanned fertility, the urban poor are notably less likely to have a mistimed or overall unplanned fertility compared to the urban non-poor or rural residents. For unwanted fertility, the urban poor are not different from rural residents across countries. However, the urban non-poor in countries with higher than average risks of unwanted fertility exhibit significantly higher levels of unplanned fertility than their urban poor or rural counterparts.

Antenatal Care

The results for antenatal care presented in Table 10 confirm the general pattern that antenatal care for the urban poor is significantly worse off than for the urban non-poor, albeit better than rural residents. The urban poor in sub-Saharan Africa are on average 1.4 times more likely to initiate antenatal care late in pregnancy (during 2nd or 3rd trimester) or make an inadequate number of antenatal visits (three or less) during pregnancy. In general, the results further confirm findings from earlier studies showing overall significantly poorer antenatal care among teenage mothers, less educated women and higher order births, compared to their counterparts who are older, more educated or lower order births. The results further show that urban inequalities in antenatal care vary significantly between countries. *[Table 10 about here]*

We further explore, in Figure 2, the implications of county risk factors on the probability of poor antenatal care for urban poor, urban non-poor and rural women. The results suggest that the urban inequalities in antenatal care are greatest for countries with relatively low risks of poor antenatal care, and almost non-existent for countries with very

high probabilities of poor antenatal care. For countries with very low probabilities of poor antenatal care, the urban poor are worse off, even in comparison to the rural residents.

[Figure 2 about here]

Delivery Care

Table 11 gives the individual and country level parameter estimates of non-professional delivery care in sub-Saharan Africa. In general, the probability of non-professional delivery care declines with increasing maternal education and age, but increases with increasing parity. On average, the urban poor are more likely to have non-professional delivery care than the urban non-poor, but less likely compared to the rural residents. The country level variances show that there is a significant variation in delivery care across countries of sub-Saharan Africa, and that residential inequalities in delivery vary significantly across countries.

[Table 11 about here]

The variation in delivery care for the urban poor, urban non-poor and the rural residents in countries with different risk factors are presented in Figure 3. The urban inequalities in delivery care are greater in countries with lower than average levels of non-professional care, than those with above average levels, with the greatest inequality being observed in countries about 0.5-1 standard deviation below the mean level of professional care. On the other hand, the rural disadvantage is most pronounced for countries with average levels of professional delivery care.

(Figure 3 about here)

DISCUSSIONS AND CONCLUSIONS

This paper has examined maternal health status in sub-Saharan Africa, differentiated by three groups: the urban non-poor, the urban poor, and rural women. Along most indicators of maternal health care there is a continuum from rural through urban poor to urban non-poor, although the urban poor closely resemble rural women in many respects even after controlling for personal characteristics such as educational attainment that typically confer better health care to urban women.

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The analysis of maternal health care suggests that poverty is possibly an impediment to receiving adequate maternal health care among urban residents of sub-Saharan Africa. The urban poor are more likely to initiate antenatal care late in pregnancy, make less frequent visits during pregnancy, and receive non-professional delivery care, compared to the urban non-poor. These results corroborate findings from previous studies which have demonstrated a link between low socio-economic status and underutilization of maternal health services (McKinlay and McKinlay 1972; Magadi 1999). Although there is an indication that the urban poor are on average more likely to receive professional delivery care and make more frequent visits than rural residents, there is no significant evidence that they initiate antenatal care earlier, despite closer physical proximity to health services in urban areas.

It is important to point out that the observed general patterns of residential disparities in maternal health observed in this paper are not uniform across countries of sub-Saharan Africa. Country level analyses reveal significant variations in the urban maternal health inequalities across countries. The urban poor disadvantage with respect to antenatal and delivery care (relative to the urban non-poor) is more pronounced in countries with better maternal health indicators. In fact, the urban poor tend to have worse indicators than even the rural residents in countries with the best maternal health indicators. This suggests that insofar as there have been improvements in maternal health care in some countries of sub-Saharan Africa, the urban poor have least benefited from such improvements.

It is universally acknowledged that the urban poor represent a rapidly growing segment of the developing world's population, and that young adults are the fastest growing segment of the urban poor. As in the United States, the concentration of poverty and young adults in cities is inevitable because most of the developing world's population will soon live in urban areas. Continuation of trends that impact negatively on the urban poor—macro-economic reforms, shortages of affordable and safe housing, exclusion from municipal governance, decline of national economies, AIDS affliction—may increase and intensify urban poverty, and possibly widen inequality between the poor, a moderately sized middle class, and a few affluent persons employed in government and foreign-controlled businesses. Urbanization trends will certainly elevate the need for basic services in cities.

To date, health programs in Africa have focused their efforts in rural areas where most population resides and where it is assumed that disease is most rampant and essential health services are most lacking. This paper identifies a need to channel more reproductive health services to the growing number of poor women in urban Africa, though neglect of rural health problems is not warranted. Among the reproductive health priorities of the urban

poor is control of unplanned fertility, perhaps through satisfaction of their relatively high unmet need for family planning.

As the urban poor grow in number, failure to address the inequality of reproductive health care in urban Africa could lead to an urban health crisis for a major proportion of women and children. A historical precedent for this—high mortality in cities of the U.S. and Europe in the 19th century prior to the formation of a sizeable middle class population—makes this a likely scenario for Africa. Regrettably, Africa's current economic crisis and political instability in parts of the region dampen the prospects for economic growth that is sufficient to benefit the middle class and the poor.

Further research needs to identify whether the urban poor in Africa reside mainly in small cities and towns—where the majority of urbanites live in most countries—or in the growing slums and peri-urban areas of large cities. In Kenya, where a large majority of urban dwellers live in the capital city Nairobi, it is estimated that between 55% and 70% of the city's residents live in slum settlements (Matrix Development Consultants 1993). This pattern—of the urban poor comprising about one-half of the biggest city residents—may be atypical of the region. Moreover, reproductive health care in poor areas of big and small urban settlements needs to be compared. This information is vital for the targeting of reproductive health programs during a period of low resources for and expenditures on health services in the region. Unfortunately, the urban sample sizes of DHS surveys conducted in Africa are too small to disaggregate the urban population beyond what is done in this paper while providing reliable estimation. Field research in large and small urban areas of Africa is necessary to address the reproductive health care needs of particular segments of the urban poor.

NOTES

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Table 1: Distribution of urban population by level of deprivation, Sub-Saharan Africa

Country	%Poor	N (Urban)
Benin (1996)	36.4	1819
Burkina Faso (1998)	18.9	1651
Cameroon (1998)	13.5	2709
C.A.R. (1994/95)	50.1	2474
Comoros (1996)	8.5	903
Cote d'Ivoire (1994)	9.3	3852
Ghana (1998/99)	5.2	1585
Kenya (1998)	13.6	1466
Madagascar (1997)	33.3	2376
Malawi (1992)	18.2	1316
Mali (1995/96)	43.8	3509
Mozambique (1997)	22.8	2514
Namibia (1992)	7.8	1891
Niger (1998)	25.5	2363
Nigeria (1990)	11.2	3530
Rwanda (1992)	27.3	1158
Senegal (1997)	7.8	3055
Tanzania (1996)	18.5	2088
Tchad (1996/97)	71.9	3013
Togo (1998)	16.3	3034
Uganda (1995)	34.8	2439
Zambia (1996)	15.6	3001
Zimbabwe (1994)	8.9	1745
Median	18.2	2376

Table 2: Fertility, Unplanned Fertility and Unmet Need for Family Planning

Country, Survey Year	Births in 3 Years Preceding Survey								
	Total fertility Rates			Proportion of births that are mistimed			Proportion of births that are unwanted		
	Urban Poor	Other Urban	Rural	Urban Poor	Other Urban	Rural	Urban Poor	Other Urban	Rural
Benin, 1996	6.10	4.18	6.67	23.35	25.66	19.72	5.84	9.86	6.51
Burkina Faso, 1998	5.04	3.71	6.90	19.76	23.23	28.45	26.35	22.57	12.50
C.A.R., 1994	5.05	4.51	5.23	15.46	16.03	7.09	1.21	1.72	0.79
Cameroon, 1998	5.73	3.58	5.38	27.55	21.57	19.58	5.10	7.43	6.53
Comoros, 1996	4.60	3.65	5.02	19.43	17.86	25.82	26.86	29.55	25.38
Cote d'Ivoire, 1994	6.17	4.17	5.99	17.97	27.16	10.91	7.47	11.94	3.90
Ghana, 1998	4.06	2.81	5.26	18.33	24.26	16.97	2.40	6.71	2.73
Kenya, 1998	4.39	2.93	5.16	46.46	37.68	38.66	8.08	6.16	11.56
Madagascar, 1997	5.98	3.29	6.66	29.13	22.71	19.73	5.51	3.67	3.13
Malawi, 1992	-	-	-	21.28	29.55	37.14	6.38	8.30	8.97
Mali, 1995/96	6.12	4.85	7.30	24.03	30.63	16.37	3.22	3.63	4.08
Mozambique, 1999	5.71	4.23	5.33	27.50	21.95	29.62	11.25	7.59	8.66
Namibia, 1992	6.55	3.85	6.30	11.98	29.33	18.92	4.46	8.17	5.10
Niger, 1997/98	5.47	5.71	7.61	36.99	32.79	29.55	4.79	11.50	4.83
Nigeria, 1990	5.91	4.91	6.33	10.66	12.19	9.90	4.06	3.45	2.49
Rwanda, 1992	5.31	4.17	6.33	25.81	25.04	21.97	11.83	19.46	9.26
Senegal, 1997	6.03	4.13	6.74	38.46	43.21	42.28	11.54	13.17	14.86
Tanzania, 1996	5.00	3.87	6.34	21.53	21.33	9.06	2.43	1.92	0.72
Tchad, 1998	5.84	5.91	6.52	26.89	34.38	21.01	8.52	10.46	8.18
Togo, 1998	3.78	3.12	6.32	15.29	21.17	17.72	10.00	12.61	10.18
Uganda, 1995	5.88	4.50	7.17	14.11	9.39	14.69	11.20	11.33	11.48
Zambia, 1996/97	5.92	4.98	6.86	36.07	37.74	27.21	7.76	9.70	5.52
Zimbabwe, 1994	3.53	3.04	4.85	34.85	27.40	30.75	5.05	9.18	5.87
Median	5.72	4.15	6.33	23.35	25.04	19.73	6.38	8.30	6.53

NOTES: Urban Poor defined as women ages 15-49 whose dwellings lack electricity and who do not use safe drinking water and flush toilets (see text). Individual sample weights are applied in countries where urban areas were over-or under-sampled. "Visitors" to urban areas exc luded.

Table 3: Timing and frequency of antenatal Care

| Country, Survey Year | (Births in last 3, 4, 5 Years) | | | | | |
| | Timing of Antenatal Care (Started in First Trimester) | | | Frequency of Antenatal Care (Four or More Visits) | | |
	Urban Poor	Other Urban	Rural	Urban Poor	Other Urban	Rural
Benin, 1996	22.94	47.78	24.42	50.28	74.21	49.31
Burkina Faso, 1998	46.09	54.74	30.84	32.23	33.57	22.03
Cameroon, 1998	33.33	51.93	37.17	47.96	74.89	48.37
C.A.R., 1994	30.20	38.38	30.46	48.54	59.89	30.07
Cote d'Ivoire, 1994	22.59	32.66	22.10	30.37	41.69	22.57
Comoros, 1996	45.83	50.68	37.60	84.00	62.13	50.59
Ghana, 1998	32.88	51.56	40.39	67.53	83.19	57.00
Kenya, 1998	7.45	20.63	13.02	63.92	67.31	60.66
Madagascar, 1997	25.94	51.67	19.39	46.30	79.39	37.48
Malawi, 1992	6.21	10.79	9.28	70.12	72.40	62.11
Mali, 1995/96	40.28	56.54	32.73	40.88	56.37	17.60
Mozambique, 1999	21.59	27.26	22.72	49.66	75.67	37.38
Namibia, 1992	35.80	32.56	27.83	50.00	69.86	54.40
Niger, 1997/98	39.34	47.97	27.96	27.37	36.88	7.31
Nigeria, 1990	25.00	21.66	22.32	70.92	83.72	40.09
Rwanda, 1992	6.29	13.71	3.22	13.71	24.10	11.40
Senegal, 1997	44.74	64.89	48.53	14.81	27.08	13.11
Tanzania, 1996	10.59	13.12	11.10	70.73	82.29	70.70
Tchad, 1998	49.75	57.00	34.32	33.23	45.56	9.25
Togo, 1998	19.25	31.44	14.92	59.28	66.08	42.26
Uganda, 1995	17.67	13.84	14.81	63.78	71.98	44.18
Zambia, 1996/97	8.45	9.60	12.47	75.09	82.65	66.09
Zimbabwe, 1994	25.00	29.27	25.70	82.61	82.11	73.40
Median	25.00	32.66	22.72	50.00	69.86	44.18

Table 4: Prenatal care: Tetatus Immunization

Country, Survey Year	Tetanus Injections (2 or more for First Births)		
	Urban Poor	Other Urban	Rural
Benin, 1996	53.42	67.35	58.04
Burkina Faso, 1998	56.67	58.16	28.42
Cameroon, 1998	54.17	60.75	52.01
C.A.R., 1994	52.76	62.33	45.35
Cote d'Ivoire, 1994	59.65	66.02	55.30
Comoros, 1996	40.00	39.62	41.26
Ghana, 1998	64.29	57.14	52.99
Kenya, 1998	60.87	63.41	61.00
Madagascar, 1997	41.73	52.94	40.20
Malawi, 1992	79.31	81.36	78.52
Mali, 1995/96	49.31	51.28	25.27
Mozambique, 1999	29.38	52.17	23.27
Namibia, 1992	37.50	38.94	34.12
Niger, 1997/98	44.64	57.45	16.82
Nigeria, 1990	58.54	64.83	31.05
Rwanda, 1992	77.78	68.18	66.92
Senegal, 1997	100.00*	50.00	42.86
Tanzania, 1996	100.00*	66.67	50.00
Tchad, 1998	37.50	100.00*	31.58
Togo, 1998	---	---	---
Uganda, 1995	---	50.00	40.00
Zambia, 1996/97	---	25.00	53.85
Zimbabwe, 1994	33.33	25.71	36.67
Median	53.80	57.81	42.06

*All observations fall within two or more tetanus injections for first births.
---There are no observations for two or more tetanus injections for first births.

Table 5: Delivery Care: Place of delivery and professional care at delivery

Country, Survey Year	(Births in last 3, 4, 5 Years)					
	Delivered at Health Facility			Received Professional Assistance		
	Urban Poor	Other Urban	Rural	Urban Poor	Other Urban	Rural
Benin, 1996	63.13	93.03	54.90	45.40	54.81	34.31
Burkina Faso, 1998	83.46	94.70	26.97	74.02	83.41	19.76
Cameroon, 1998	69.70	86.59	44.44	61.62	79.71	42.15
C.A.R., 1994	74.56	82.38	28.56	43.42	63.21	13.12
Cote d'Ivoire, 1994	57.41	77.27	28.98	2.58	1.96	1.38
Comoros, 1996	73.08	68.72	34.67	25.93	43.62	28.38
Ghana, 1998	60.76	78.96	30.60	37.50	43.32	12.96
Kenya, 1998	43.43	70.85	34.86	47.47	73.22	36.51
Madagascar, 1997	34.85	53.07	31.69	4.46	10.39	11.95
Malawi, 1992	72.46	90.76	54.18	73.17	93.54	65.42
Mali, 1995/96	60.54	64.48	18.66	55.66	59.26	19.97
Mozambique, 1999	53.49	84.50	34.44	48.42	80.08	29.81
Namibia, 1992	73.12	88.27	58.10	72.04	84.21	58.70
Niger, 1997/98	63.54	73.06	8.51	0.00	0.23	0.14
Nigeria, 1990	46.28	71.77	23.56	40.61	61.54	20.52
Rwanda, 1992	56.65	73.38	24.15	60.12	75.09	28.12
Senegal, 1997	67.43	78.21	33.58	58.45	76.59	28.20
Tanzania, 1996	72.19	80.40	40.27	69.23	78.23	36.83
Tchad, 1998	30.43	44.85	4.35	31.43	43.32	5.15
Togo, 1998	81.12	84.46	37.30	45.23	56.81	12.10
Uganda, 1995	65.74	80.66	30.68	59.84	76.53	28.74
Zambia, 1996/97	54.11	79.49	26.42	54.45	79.52	25.95
Zimbabwe, 1994	72.34	93.33	61.18	70.21	92.93	60.40
Median	63.54	79.49	31.69	48.42	63.21	28.12

Table 6: Unplanned Fertility: Odds Ratios for the Rural Residents and Urban Non-Poor Versus Urban Poor

Country (Year)	Mistimed (wanted later)		Unwanted (no more)		Total Unplanned (mistimed or unwanted)	
	Rural Residents	Urban Non-Poor	Rural Residents	Urban Non-Poor	Rural Residents	Urban Non-Poor
Benin (1996)	1.15	1.46	0.78	1.64	1.04	1.57*
Burkina Faso (1998)	0.84	0.68	0.30*	0.33*	0.72	0.61*
Cameroon (1998)	0.59*	0.54*	1.47	1.97	0.69	0.68
C.A.R. (1994/95)	0.73*	1.35	0.81	1.32	0.73*	1.41*
Comoros (1996)	1.00	1.04	1.69	1.65	1.23	1.26
Cote d'Ivoire (1994)	0.74	0.95	0.81	1.58	0.82	1.10
Ghana (1998/99)	1.19	0.69	0.58	0.58	0.97	0.60
Kenya (1998)	0.67	0.69	0.94	1.32	0.64*	0.74
Madagascar (1997)	0.99	0.74	1.15	0.99	1.08	0.81
Malawi (1992)	1.37	1.06	0.37**	0.90	0.72*	0.94
Mali (1995/96)	0.87	1.12	1.03	1.48	0.89	1.17
Mozambique (1997)	0.74*	1.20	0.87	2.55**	0.73**	1.43**
Namibia (1992)	0.62	0.77	0.98	0.83	0.66	0.73
Niger (1998)	0.46**	0.97	0.38	0.72	0.44**	0.93
Nigeria (1990)	0.94	1.24	0.80	1.30	0.89	1.26
Rwanda (1992)	1.30	0.87	0.85	1.34	1.07	1.16
Senegal (1997)	0.73*	0.99	0.66	1.10	0.71*	1.05
Tanzania (1996)	0.87	1.12	0.94	1.51	0.88	1.33
Tchad (1996/97)	0.66**	0.97	0.75	1.48	0.65**	1.00
Togo (1998)	0.83	0.54**	0.85	1.76	0.81	0.64*
Uganda (1995)	0.87	1.25	0.75	1.18	0.81*	1.27*
Zambia (1996)	0.73*	0.74*	0.86	2.56**	0.72*	0.98
Zimbabwe (1994)	1.94	1.54	0.75	1.33	1.68	1.58

*-$p<0.05$, **-$p<0.01$

Table 7: Inadequate Antenatal Care: Odds Ratios for Rural Residents and Urban Non-Poor versus Urban Poor

Country (Year)	Late Initiation (not 1st trimester)		Inadequate Visits (less than 4 visits)	
	Rural Residents	Urban Non-Poor	Rural Residents	Urban Non-poor
Benin (1996)	0.93	0.50**	1.21	0.78
Burkina Faso (1998)	1.22	0.89	1.45	1.24
Cameroon (1998)	0.85	0.60	1.25	0.50**
C.A.R. (1994/95)	0.86	0.88	1.95**	0.70*
Comoros (1996)	1.38	0.85	5.45**	2.57
Cote d'Ivoire (1994)	0.99	0.66*	1.58**	0.78
Ghana (1998/99)	0.75	0.53*	1.83*	0.57
Kenya (1998)	0.48	0.35*	1.12	1.12
Madagascar (1997)	1.42**	0.44**	1.27*	0.35**
Malawi (1992)	0.61	0.57	1.35	0.99
Mali (1995/96)	0.99	0.65**	2.81**	0.50**
Mozambique (1997)	1.03	0.97	1.75**	0.49**
Namibia (1992)	1.36	1.27	1.06	0.57*
Niger (1998)	1.37	0.77	3.98**	0.73*
Nigeria (1990)	1.23	1.25	3.28**	0.66*
Rwanda (1992)	1.17	0.54	1.05	0.52*
Senegal (1997)	0.81	0.52**	0.79	0.45**
Tanzania (1996)	0.92	1.12	0.93	0.82
Tchad (1996/97)	1.43**	0.87	3.63**	0.69**
Togo (1998)	0.98	0.66	1.44*	0.95
Uganda (1995)	1.08	1.31	1.69**	0.83
Zambia (1996)	0.63*	1.04	1.43*	0.76
Zimbabwe (1994)	0.92	0.86	1.44	0.91

*-p<0.05, **-p<0.01

Table 8: Professional Delivery Care: Odds Ratios for Rural Residents and Urban Non-Poor versus Urban Poor

Country (Year)	Professional (medical) Attendant		Health Facility Deliveries	
	Rural Residents	Urban Non-Poor	Rural Residents	Urban Non-Poor
Benin (1996)	0.50**	0.72	0.46**	2.38**
Burkina Faso (1998)	0.11**	1.53	0.12**	2.56**
Cameroon (1998)	0.20**	0.86	0.18**	1.35
C.A.R. (1994/95)	0.24**	1.44*	0.16**	1.19
Comoros (1996)	0.97	2.05	0.15**	0.79
Cote d'Ivoire (1994)	0.60	0.56	0.33**	2.19**
Ghana (1998/99)	0.27**	0.75	0.25**	1.48
Kenya (1998)	0.51**	2.32**	0.56*	2.39**
Madagascar (1997)	4.29**	1.50	1.14	1.15
Malawi (1992)	0.78	4.44**	0.45**	2.79**
Mali (1995/96)	0.17**	1.30*	0.11**	2.14**
Mozambique (1997)	0.48**	2.25**	0.48**	2.69**
Namibia (1992)	0.45**	1.36	0.42**	1.63
Niger (1998)	--	--	0.05**	1.30
Nigeria (1990)	0.49**	1.82**	0.47**	2.41**
Rwanda (1992)	0.42**	1.73*	0.40**	1.84**
Senegal (1997)	0.30**	1.56**	0.30**	1.20
Tanzania (1996)	0.30**	1.31	0.29**	1.26
Tchad (1996/97)	0.14**	1.67**	0.14**	1.85**
Togo (1998)	0.17**	0.99	0.20**	0.78
Uganda (1995)	0.34**	1.53**	0.28**	1.42*
Zambia (1996)	0.32**	2.06**	0.33**	2.13**
Zimbabwe (1994)	1.36	6.23**	1.23	5.49**

, *-p<0.05, **-p<0.01

Table 9: Individual and country level parameter estimates of mistimed, unwanted and overall unplanned fertility in sub-Saharan Africa

Parameters	Mistimed fertility		Unwanted fertility		Unplanned fertility	
	Estimate	Std Error	Estimate	Std Error	Estimate	Std Error
Fixed Effects						
Constant	-1.42	0.120	-3.68	0.201	-1.19	0.122
Residence (urban poor)[1]						
- urban non-poor	0.01	0.077	0.40*	0.104	0.13	0.078
- rural	-0.15	0.086	-0.17*	0.060	-0.17*	0.082
Education level (none)[1]						
- primary	0.44*	0.023	0.42*	0.037	0.49*	0.021
- secondary	0.71*	0.031	0.47*	0.054	0.73*	0.030
Age (15-19)[1]						
- 20-24	-0.44*	0.029	-0.35*	0.068	-0.50*	0.028
- 25-29	-0.78*	0.036	-0.40*	0.078	-0.85*	0.034
- 30-34	-1.10*	0.043	-0.06	0.083	-1.03*	0.040
- 35+	-1.48*	0.049	0.70*	0.085	-0.85*	0.043
Birth order (1st birth)[1]						
- 2-3	0.50*	0.029	-0.05	0.064	0.46*	0.027
- 4-5	0.85*	0.037	0.59*	0.075	0.92*	0.035
- 6 +	1.12*	0.043	1.54*	0.080	1.51*	0.040
Country level variances						
Constant	0.27*	0.091	0.75*	0.229	0.29*	0.095
Urban non-poor	0.09*	0.038	0.14*	0.052	0.10*	0.039
Rural	0.13*	0.049	0.00	0.000	0.12*	0.045

[1] - reference category

* - significant at 5% level

Table 10: Individual and country level parameter estimates of inadequate antenatal care (late initiation or too few visits) in sub-Saharan Africa

Parameters	No visit in 1st trimester		Less than four visits	
	Estimate	Std Error	Estimate	Std Error
Fixed Effects				
Constant	1.59	0.157	0.58	0.170
Residence (urban poor)[1]				
- urban non-poor	-0.36*	0.087	-0.35*	0.064
- rural	0.31*	0.121	0.43*	0.108
Education level (none)[1]				
- primary	-0.40*	0.025	-0.58*	0.020
- secondary	-0.82*	0.032	-1.13*	0.030
Age (15-19)[1]				
- 20-24	-0.22*	0.031	-0.21*	0.028
- 25-29	-0.37*	0.037	-0.36*	0.033
- 30-34	-0.50*	0.044	-0.45*	0.039
- 35+	-0.48*	0.050	-0.38*	0.043
Birth order (1st birth)[1]				
- 2-3	0.17*	0.029	0.13*	0.026
- 4-5	0.45*	0.037	0.25*	0.033
- 6+	0.62*	0.044	0.36*	0.038
Country level variances				
Constant	0.49*	0.159	0.60*	0.189
Urban non-poor	0.12*	0.049	0.06*	0.026
Rural	0.28*	0.097	0.22*	0.077

[1] - reference category
* - significant at 5% level

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Table 11: Individual and country level parameter estimates of non-professional delivery care (home delivery or non-medical assistance) in sub-Saharan Africa

Parameters	Home delivery		Non-medical assistance	
	Estimate	Std Error	Estimate	Std Error
Fixed Effects				
Constant	-0.19	0.163	0.85	0.375
Residence (urban poor)[1]				
- urban non-poor	-0.60*	0.102	-0.43*	0.105
- rural	1.26*	0.153	0.94*	0.180
Education level (none)[1]				
- primary	-0.88*	0.021	-0.80*	0.025
- secondary	-1.77*	0.033	-1.52*	0.037
Age (15-19)[1]				
- 20-24	-0.25*	0.029	-0.22*	0.031
- 25-29	-0.48*	0.034	-0.40*	0.037
- 30-34	-0.63*	0.040	-0.55*	0.044
- 35+	-0.68*	0.045	-0.58*	0.049
Birth order (1st birth)[1]				
- 2-3	0.62*	0.027	0.52*	0.029
- 4-5	0.91*	0.034	0.76*	0.038
- 6+	1.02*	0.040	0.88*	0.044
Country level variances				
Constant	0.54*	0.172	3.02*	0.924
Urban non-poor	0.19*	0.069	0.19*	0.072
Rural	0.48*	0.153	0.65*	0.211
Rural/ constant	-0.26*	0.131	-0.84*	0.365

[1] - reference category
* - significant at 5% level

Figure 1: Estimated probabilities of unplanned fertility for urban poor, urban non-poor and rural women at varying country risk factors.
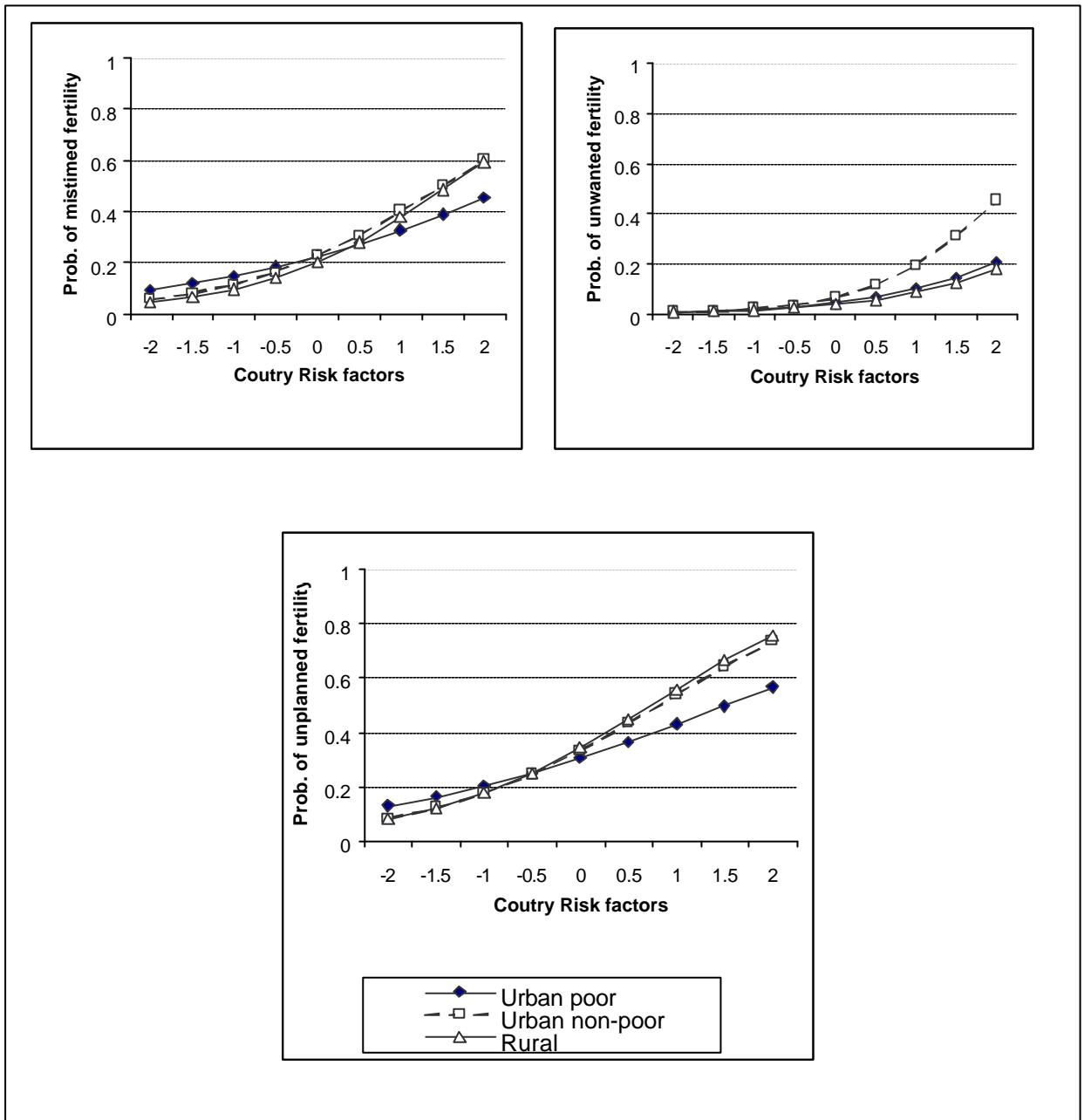
Figure 2: Estimated probabilities of poor antenatal care for urban poor, urban non-poor and rural women at varying country risk factors.
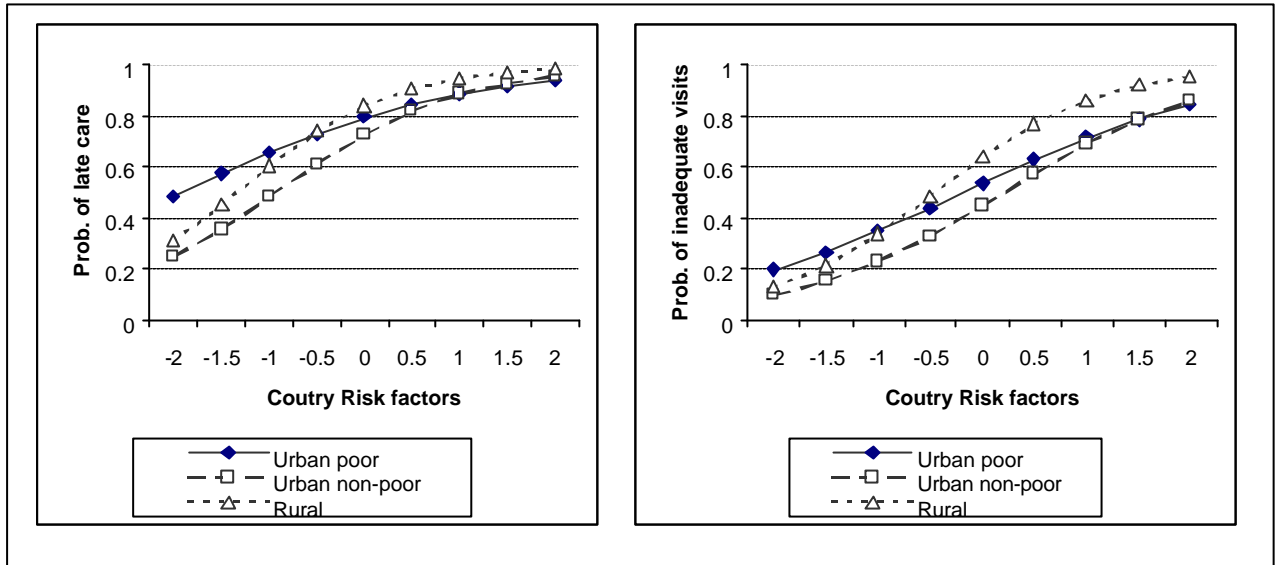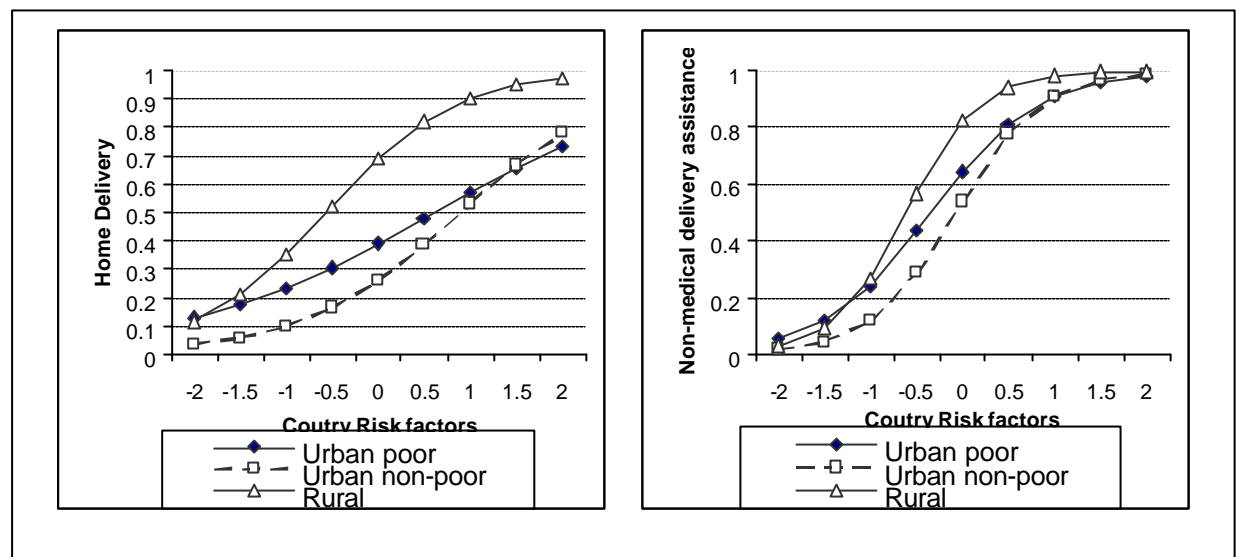
Figure 3: Estimated probabilities of non-professional delivery care for urban poor, urban non-poor and rural women at varying country risk factors.

and 1997, while in urban areas it increased from 29 to 49 per cent. In the city of Nairobi, the respective percentage almost doubled from 26 to 50 per cent (Central Bureau of Statistics 2000).

[4] GNP figures are taken from issues of The World Bank's World Development Report.

[5] Note that the DHS data for Benin and Togo do not have categories for flush toilets, which means that poverty is defined by presence/absence or running tap water and electricity. The proportion of urban residents with flush toilets was also considerably low (less than 10%) in the following countries: Burkina Faso, Central African Republic, Comoros, Mali, Niger, Tchad, and Tanzania.

[6] The widely shared advantages of Senegal's urban population are exhibited by the largest difference with rural child mortality of any country in Africa.

[7] This definition was changed in 1999 to localities with at least 5,000 residents.

[8] The wanted fertility rate (WFR) is calculated like the TFR, but is based only on births that occur before a woman has reached her desired family size. The unwanted fertility rate is the difference between the TFR and UFR.