What does Access to Maternal Care Mean Among the Urban Poor? Factors Associated with Use of Appropriate Maternal Health Services in the Slum Settlements of Nairobi, Kenya

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Abstract *Objectives* The study seeks to improve understanding of maternity health seeking behaviors in resource-deprived urban settings. The objective of this paper is to identify the factors which influence the choice of place of delivery among the urban poor, with a distinction between sub-standard and "appropriate" health facilities. *Methods* The data are from a maternal health project carried out in two slums of Nairobi, Kenya. A total of 1,927 women were interviewed, and 25 health facilities where they delivered, were assessed. Facilities were classified as either "inappropriate" or "appropriate". Place of delivery is the dependent variable. Ordered logit models were used to quantify the effects of covariates on the choice of place of delivery, defined as a three-category ordinal variable. *Results* Although 70% of women reported that they delivered in a health facility, only 48% delivered in a facility with skilled attendant. Besides education and wealth, the main predictors of place of delivery included being advised during antenatal care to deliver at a health facility, pregnancy "wantedness", and parity. The influence of health promotion (i.e., being advised during antenatal care visits) was significantly higher among the poorest women. *Conclusion* Interventions to improve the health of urban poor women should include improvements in the provision of, and access to, quality obstetric health services. Women should be encouraged to attend antenatal care where they can be given advice on delivery care and other pregnancy-related issues. Target groups should include poorest, less educated and higher parity women.

Keywords Maternal health · Urban poor · Health facility delivery · Kenya

Introduction

Despite the various international efforts that have been initiated to improve maternal health, more than 500,000 women worldwide die each year as a result of complications arising from pregnancy and childbirth [1, 2]. Most maternal deaths occur during labor, delivery, or the immediate postpartum period, with hemorrhage, sepsis, eclampsia, obstructed labor and complications from unsafe abortion being the main direct causes. Indirect causes include malaria, HIV and AIDS, and anemia [2]. Many women also suffer long-term obstetric sequela such as fistula [3, 4]. Almost all these deaths occur in the developing countries, with sub-Saharan Africa accounting for almost 47% of the toll [5]. Many of these deaths could be averted if women had access to appropriate maternal health care, including antenatal and delivery care [2, 6].

Are There Any Signs of Progress Towards Reducing Maternal Mortality?

In 1987, the 'Safe Motherhood Initiative' was launched with the aim of reducing maternal deaths by 50% in one decade [7]. After 10 years of implementation, a review noted that little progress had been made, but recognized that with political commitment, maternal morbidity and mortality could be reduced with existing knowledge and technology, particularly attendance of all deliveries by a

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skilled health professional [4, 8]. Despite the lack of reliable trend data for countries with high maternal mortality, recent investigators believe that progress in achieving improvements in maternal health has been very slow in the developing world, and in some instances, has reversed [9, 10]. In recognition of maternal health as one of the priority development challenges that need to be addressed, the international community endorsed the reduction of maternal mortality ratio by three-quarters between 1990 and 2015, as one of the eight Millennium Development Goals (MDGs) [11]. This commitment arose not only from the overwhelming evidence of the huge burden of maternal deaths, but also from the far reaching ramifications on child survival, the family and community at large [12].

The Kenya Context: Why Should We Pay Attention to Urban Resource-deprived Settings?

Kenya's capital city typifies the current urban population boom and associated urban health and poverty problems. Its population increased from about 120,000 in 1980 to about 3 million in 2000, with over 60% of the population living in slums which cover only 5% of city's residential land area [13]. It is estimated that while absolute poverty increased from 48% to 53% in rural areas of Kenya between 1992 and 1997, it almost doubled from 27% to 50% over the same period in Nairobi city [14]. Key dimensions of poverty include inadequate access of urban dwellers to appropriate health care services, with Nairobi slums being served mainly by private-owned, sub-standard, unlicensed and informal health facilities [15]. Young people in these informal settlements face challenges such as high levels of unemployment, crime and substance abuse, poor schooling facilities, and early sexual debut resulting in unplanned childbearing which accounts for a substantial proportion of births in Kenya [16].

The consequences of growing urban poverty on health are now emerging, with evidence of increasing intra-urban health disparities between the poor and the non-poor [17–19]. Other studies have shown that the rural/urban ill-health and mortality gaps have narrowed in recent years, mainly as a result of stalling and even an upturn in urban trends [20, 21]. These widening intra-urban and narrowing urban-rural health inequities suggest that the urban bias in the allocation and concentration of health-care resources does not translate into health advantages for all urban dwellers. A study conducted in the Nairobi informal settlements showed that slum residents had worse health outcomes than even their rural counterparts [22]. For example, only 48% of slum children were fully vaccinated, compared with 63% in Nairobi as a whole and 56% in rural Kenya, as reported in the 2003 Demographic and Health Survey (DHS), and only 52% of deliveries among slum women took place in a health facility, against 78% in Nairobi as a whole. These figures suggest huge disparities between the Nairobi poor and non-poor in health service utilization.

Paradoxically, our understanding of the problems urban poor women in sub-Saharan Africa encounter when seeking care remains limited. Specifically, not much is known about the challenges and barriers that childbearing poses for women in urban slums. From the demand side for obstetric care services, access and utilization of services can be influenced by personal, family, community factors and perceived benefits from the health care system, which ultimately influence obstetric outcomes. On the supply side, it has been shown that slums are predominantly served by privately owned and unlicensed health facilities with limited skilled staff and equipment, whereas most of the formal health facilities are located outside of the slums [15]. Although the Kenya Services Provision Assessment study of 2004 provided insights into the situation of obstetric services access, it failed to show the situation in the slums. The study, however, showed that Nairobi province had the lowest comprehensive emergency obstetric care facility coverage per 500,000 inhabitants in the country [23].

Against this backdrop, this study aims to improve understanding of women's health seeking behaviors in resource poor settings. Specifically, the goal is to identify the factors which influence the choice of place of delivery among the urban poor in Nairobi, Kenya, with a distinction between sub-standard and "*appropriate*" health facilities.

Data and Methods

Study Setting

The study was conducted in two Nairobi informal settlements (Viwandani and Korogocho) where the African Population and Health Research Center (APHRC) conducts demographic surveillance of about 60,000 inhabitants, referred to as the Nairobi Urban Health and Demographic Surveillance System (NUHDSS). The two communities exhibit structural differences in terms of population density and socioeconomic status, among others that provide opportunity for comparisons between communities facing similar poverty and health challenges, but operating under different livelihood settings.

Data

The data used in this study were from a maternal health project carried out by APHRC in Korogocho and Viwandani in 2006. The data were collected through household interviews and health facility survey. From the NUHDSS all women who had a pregnancy outcome in 2004–2005 were

selected and interviewed. A total of 1,927 interviews were successfully conducted. The questionnaire covered various topics including background characteristics, reproductive history, perceived access and quality of care, antenatal care, delivery care, obstetric complications, antenatal, delivery and postnatal expenditure, postnatal care, and household characteristics. All health facilities in Nairobi where a majority of women in the household survey delivered were audited with the goal of assessing the adequacy to provide obstetric care to the study population. The health facility audit covered the number, training and competency of obstetric staff; the services offered; the physical infra-structure; and the availability, adequacy and functional status of equipment and other essentials for safe delivery. The referral and communication system was also assessed. The study was approved by the Ethical Committee of the Kenya Medical Research Institute, and informed consent was sought before interviewing each respondent.

Study Variables

The outcome variable used in this paper is the place of delivery. From the health facility survey, health facilities were classified into two categories. The first category herein referred to as "*appropriate*", comprised health facilities run/owned by government, large NGOs, religious and missionary groups that provide at least the basic essential obstetric care. They are larger; some are hospi-tals—two of which serve as referral facilities—and are located in the outskirts of the slums. They are able to offer most of the signal functions of basic emergency obstetric care, as defined by the following six procedures: adminis-tration of parenteral antibiotics; administration of parenteral oxytocic drugs; administration of parenteral anticonvulsants (for pre-eclampsia); manual removal of retained products of conception; manual removal of a retained placenta; and assisted vaginal delivery (vacuum extraction). The second category, herein referred to as "*inappropriate*", comprised the substandard health clinics that do not provide the basic essential obstetric care ser-vices. They were mainly privately-owned and unlicensed clinics located within the two slum communities. The dependent variable was thus defined as follows:

$Y =$

$$\begin{cases} 0 \text{ if respondent did not deliver at a health facility} \\ 1 \text{ if respondent delivered at an inappropriate health facility} \\ 2 \text{ if respondent delivered at an appropriate health facility} \end{cases}$$

For the purpose of this study, the predictors were grouped into three broad categories that cover the individual (woman), household and community levels. Individual- and household-level socioeconomic covariates

include education, working status, ethnicity, and household wealth. Principal component analysis (PCA) [24] was used to generate household wealth tertiles from household possessions, namely, presence of electricity, material of the dwelling floor, source of drinking water, type of toilet facility and type of cooking fuel. The second category is comprised of bio-demographic and health-related variables, namely, parity; pregnancy wantedness; and antenatal care visit. Of special interest to this study is the assessment of the effect of health promotion, captured in the data by whether the respondent was advised during antenatal care to deliver at a health facility. Health promotion activities directed to the less privileged populations with the goal of reducing inequalities in access and use of health services have been shown to be effective yet the potential of health education as a tool for political action and behavior change has been lost in contemporary health education [25, 26]. We will also test whether the health promotion effect varies by respondent's education or household wealth. This will help ensure better targeting of population groups for promotion campaigns if the health advice variable emerges strongly associated with use of appropriate health facilities.

Finally, a community-level variable, the slum residence was included, since the two slum areas have important socioeconomic and demographic differences. Other potential covariates that were not included in the analysis included husband/partner's education, and women's age at birth. The former was strongly correlated with women's education and with household wealth, while the latter was correlated with women's parity.

Methods of Analysis

To quantify the effects of the identified covariates on the choice of place of delivery, multivariate ordered logistic regressions were fitted in the context of the partial pro-portional odds model. This model was chosen since the dependent variable is a three-category ordinal outcome. Using multinomial regression would mean that the infor-mation conveyed by the ordered nature of the outcome variable is discarded. In addition, not treating the variable as ordered, may lead to loss of efficiency [27]. The partial proportional odds model is a special case of the generalized ordered logit model that is less restrictive than the pro-portional odds model. Though proportional odds models are suited for the analysis of ordinal response variables, a critical assumption is that of *parallel slopes*. This assumption was assessed in preliminary analyses, using the Brant test. The test showed that overall, there was a vio-lation of the parallel regression assumption ($\chi^2 = 212.99$, P-value < 0.001) on a number of covariates. Details on the statistical theory behind the partial proportional odds

model can be found in several sources [25, 28]. The STATA command gologit2 [29] was used to fit the partial proportional odds model.
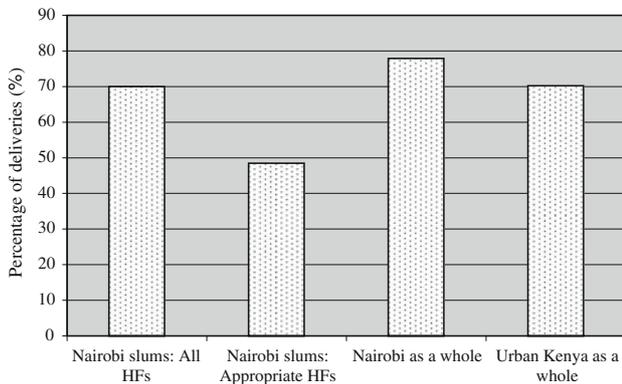
Results

Sample Characteristics

Figure 1 compares the percentage of health facility deliveries in the study population (Nairobi slums) with that of Nairobi as a whole and urban Kenya based on the 2003 Kenya DHS. While it may be estimated that nearly 70% of slum dwellers deliver at health facilities, a figure which is not far from that of Nairobi as a whole (about 78%), only about 48% deliver in facilities with at least minimum standards. These results indicate that it may be misleading if the two categories of facilities examined in this study are not treated separately. Background characteristics of the 1,927 women interviewed are presented in Table 1.

Multivariate Analysis: Main Effects

Multivariate results in Table 2 show that as expected, respondents' own education was associated with place of delivery, controlling for all other identified covariates. Compared with their counterparts with primary education, the odds of women with secondary/higher education to deliver at appropriate health facilities were more than 61% higher ($P < 0.01$). While women with primary education tended to deliver more frequently at health facilities, compared to those with no education ($P < 0.10$), there was no difference with regard to delivering at appropriate health facilities. Women who were employed at the time of the survey had a higher likelihood of delivering at a health facility, compared with those who were not working ($P < 0.05$); however, there was no difference in the likelihood to deliver at appropriate health facility. With regards

Table 1 Characteristics of women from the slums of Nairobi, Kenya who delivered in 2004–2005

Variables	%	N
Panel 1: individual- and household-level socioeconomic variables[a]		
Education		
None	8.6	166
Primary	66.0	1,272
Secondary or higher	25.4	489
Working status		
Not working	63.4	1,222
Currently working	36.6	705
Ethnicity		
Kikuyu	25.9	499
Kamba	18.9	365
Luhya	14.8	285
Luo	22.4	431
Others	18.0	347
Panel 2: individual biodemographic and health-related covariates		
Parity		
1	25.0	481
2–3	45.8	883
4+	29.2	563
Wanted index pregnancy then		
No	30.6	590
Yes	69.4	1,337
Antenatal care visits		
0–1	12.0	231
2–3	36.0	694
4+	52.0	1,002
Advised to deliver with a health professional		
No	23.2	448
Yes	76.8	1,479
Panel 3: Community-level variables (Slum residence)		
Korogocho	57.0	1,098
Viwandani	43.0	829
N		1,927

[a] Also include household wealth tertiles (not shown)

to ethnicity, the odds of the Kamba, Luhya, and Luo women to use health facilities in general and the "appropriate" ones in particular, reduced by 63%, 77%, and 83%, respectively, as compared to their Kikuyu counterparts ($P < 0.01$). The positive and graded effect of household wealth, whereby the likelihood to use health facility for delivery steadily increases as household wealth status increases, was apparent in our results. Respondents from the least poor households were 2.1 times more likely to deliver at a health facility ($P < 0.01$), and about 45% more likely to deliver at appropriate health facilities, compared with their counterparts from the poorest households ($P < 0.01$).

Fig. 1 Health facility deliveries in Kenya. Source: Figures for Nairobi and urban Kenya are from 2003 KDHS

Table 2 Odds ratios of unconstrained partial proportional ordered logistic regression models on the determinants of health facility delivery in the slums of Nairobi, Kenya

	All types of HF[a] vs. not HF		Appropriate HF vs. (inappropriate HF or not HF)	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
Panel 1: Individual- and household-level socioeconomic variables				
Education (Ref: Primary)				
None	0.687*	[0.448; 1.053]	1.056	[0.700; 1.594]
Secondary or higher	1.611***	[1.287; 2.016]		Same
Working status (Ref: Not working)				
Currently working	1.309**	[1.050; 1.631]	1.061	[0.861; 1.306]
Ethnicity (Ref: Kikuyu)				
Kamba	0.367***	[0.274; 0.491]		Same[b]
Luhya	0.230***	[0.169; 0.314]		Same
Luo	0.174***	[0.130; 0.232]		Same
Others	0.804	[0.556; 1.163]	0.603***	[0.432; 0.841]
Household wealth (Ref: Poorest)				
Middle	1.259**	[1.004; 1.580]	1.446***	Same
Least poor	2.113***	[1.626; 2.747]		[1.134; 1.844]
Panel 2: individual biodemographic and health-related covariates				
Parity (Ref: 1)				
2–3	0.533***	[0.423; 0.671]	0.486***	Same
4+	0.357***	[0.268; 0.475]		[0.368; 0.642]
Wanted index pregnancy then (Ref: No)				
Yes	1.222*	[0.995; 1.501]		Same
Antenatal care visits (Ref: 2–3)				
0–1	0.545***	[0.392; 0.757]	0.716*	[0.512; 1.002]
4+	1.159	[0.946; 1.421]		Same
Advised to deliver with a health professional (Ref: No)				
Yes	1.466***	[1.181; 1.820]		Same
Panel 3: community-level variables (Ref: Korogocho)				
Slum residence				
Viwandani	0.517***	[0.402; 0.667]	0.183***	[0.143; 0.235]

* $P < 0.10$; ** $P < 0.05$; *** $P < 0.01$

[a] Health facility

[b] Estimates for appropriate HF vs. (inappropriate or not HF) are the same as for all types of HF vs. not HF

The likelihood of delivering at a health facility in general and in the well-equipped facilities in particular, significantly decreases as parity increases ($P < 0.01$). As expected, pregnancies that were wanted then were more likely to be delivered at appropriate health facilities, compared with those that were either mistimed or unwanted ($P < 0.10$). The number of antenatal visits was associated with place of delivery: women who attended 2–3 antenatal care visits were more likely to have health facility delivery in general ($P < 0.01$), or at "appropriate" facility ($P < 0.01$), compared with their counterparts who made at most one visit. Respondents who made four antenatal visits or more (the recommended number) tended to use a health

facility for delivery more frequently than those who made only 2–3 visits, but the difference did not reach statistical significance at the level of 0.10. Importantly, respondents who were advised during antenatal care to deliver at a health facility were 47% more likely to use health facilities in general and the well-equipped ones in particular, compared with those who were not advised ($P < 0.01$).

Noticeably, there subsisted huge differentials in health facility deliveries by slum residence, with Korogocho women about twice more likely to deliver at health facility in general ($P < 0.01$), and more than five times more likely to do so in an appropriate facility ($P < 0.01$), compared to women living in Viwandani.

Fig. 2 Interactions between education and household wealth and health advice in influencing the choice of place of delivery in the slums of Nairobi, Kenya: All types of HF[a] vs. not HF.
[a] Health facility. Note: Estimates for appropriate HF vs (inappropriate or not HF) were all the same as for all types of HF vs not HF
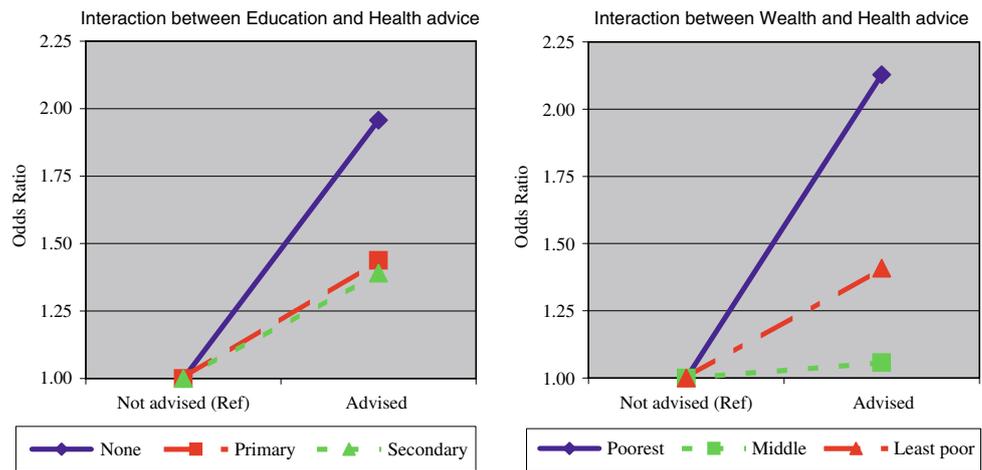
Multivariate Analysis: Interaction Effects

Results of these interactions are shown in Fig. 2. The parallel line assumption being met for all interaction terms (not shown), Fig. 2 only displays the odds ratios of using "appropriate" health facilities. As can be seen, the effect of being advised to deliver at health facility varies greatly by education. Among women with no education, those who were advised were about twice more likely to deliver at a health facility, compared with those who did not receive the advice ($P < 0.05$). The effect is smaller and statistically non-significant among women with primary education (odds ratio of 1.44) and among respondents with secondary education or higher (odds ratio of 1.39). The pattern of interaction between health advice and household wealth is also apparent. Being advised during antenatal care to deliver at a health facility has a huge and statistically significant effect on place of delivery among the poorest (odds ratio of 2.1); a moderate and significant effect among the least poor (odds ratio of 1.4); and almost no effect in the middle wealth category.

Discussion

This paper has examined the factors which influence the choice of place of delivery among women in the informal settlements in Nairobi, Kenya. Its novelty is to use a unique dataset that links women's reported health seeking behavior to the health facility where care was sought; and to define and use a health facility delivery variable that distinguishes the small, informal and often unlicensed clinics, from appropriate health facilities for delivery. A number of key findings emerge from this study.

The covariates in the analysis included four socioeconomic variables defined at the individual (education and

working status) and household (wealth and husband/partner's education) levels. Our results on the effects of women's education and household wealth conform to expectation and lend support to the vast amount of studies that have consistently shown that these two socioeconomic covariates affect women's health [17, 30, 31]. The influence of household wealth was significant after including all control variables, suggesting the importance of the economic dimension of poverty on health, even in resource-deprived settings.

As expected, pregnancy *wantedness* is significantly associated with the choice of place of delivery. To a large extent, unplanned childbearing is an indicator of non-use of family planning services by women in need of them [17]. While the effects of parity (or birth order) and antenatal care visits have been abundantly reported in other maternal health studies [17, 30, 31], of special significance in this study is the strong and statistically significant effect of whether a woman was advised to deliver at a health facility. This finding is in line with a recent study in India which showed that educational activities promoting the benefits of maternal care services are important factors for their use [32]. Our results further indicate that this effect of *health promotion* is very strong among the poorest women, strong among the least poor, and weak in the middle wealth category. This pattern of association which is also observed for the education categories deserves further investigation. It suggests that to be the most effective, health promotion should target mainly the poorest and non-educated women.

Residential differences in the use of obstetric services are strikingly large, with Korogocho women significantly more likely to use obstetric services. Other studies in the same communities have shown considerable advantage of Viwandani residence in terms of child health [33]. These contextual effects above and beyond the composition of the populations deserve further investigation.

Conclusion and Policy Implications

Though numerous studies have examined maternity care utilization, little effort has been made to assess the appropriateness of these facilities and their capability to deliver women and handle or refer complications when they occur. The descriptive results highlight the need to accurately measure the proportion of health facility deliveries, since current consensus is that all pregnancies are at a risk of developing complications [34]. For example in this survey, about 70% of deliveries were reported to have occurred in health facilities, however only 48% took place in appropriate health facilities in terms of staffing, equipment and drugs.

The findings of this study urgently call on the local authorities to improve the quality of health services available to the growing urban poor populations. Even though slums may be considered illegal, they are home to a rapidly growing proportion of urban dwellers. Most of the facilities in the slums are not registered; they are not supervised and regulated in anyway; they lack trained staff, equipment and life saving drugs; and as a result, cannot handle obstetric complications or do not have functioning referral procedures and systems. It has been shown that maternal mortality cannot be substantially reduced in the absence of access to emergency obstetric care [35]. There is a need to set minimum standards for all providers and frequently check their compliance with these standards.

Our results suggest the need to set up and strengthen maternal health promotion campaigns geared towards the marginalized population groups. Women should be educated to attend antenatal care services, and during the visits, they should be provided advice on delivery and postnatal care, recognition of complications, and other pregnancy-related issues. Women of high parity are also less likely to deliver in health facilities, probably assuming that they are seniors at the exercise. All these perceptions and misconceptions can be corrected through continued and focused health promotion during antenatal visits and through the mass media. Target groups should include poorest, lower-educated and higher parity women.

This work also shows that unwanted pregnancies tend to be delivered outside of health facilities. There is urgent need to limit the occurrence of unwanted pregnancies especially among young girls as they are big contributors to abortions in general, and unsafe abortions in particular. This may be achieved by providing effective contraceptive technologies to girls at risk of unwanted pregnancies.

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