ORIGINAL RESEARCH ARTICLE

Physical access to health facilities and contraceptive use in Kenya: Evidence from the 2008-2009 Kenya Demographic and Health Survey

Remare R. Ettarh and Catherine Kyobutungi

African Population and Health Research Center, APHRC Campus, Manga Close, Kitisuru Nairobi, Kenya

*For correspondence: *Email:* **rettarh@aphrc.org**   Tel: +254 (020) 400 1000

Abstract

The objective of the study was to determine the spatial variation in modern contraceptive use and unmet need for family planning across the counties of Kenya and to examine whether the spatial patterns were associated with inequalities in physical access to health facilities. Data were obtained from the 2008-2009 Kenya Demographic and Health Survey and linked to the location of health facilities in the country. Multivariate logistic regression was used to examine the influence of distance to the nearest health facility and health facility density, in addition to other covariates, on modern contraceptive use and unmet need. Overall, the prevalence of modern contraceptive use and unmet need among women aged 15-49 in Kenya was 42.1% and 19.7% respectively. Among the respondents who lived more than 5 km from the nearest health facility modern contraceptive use was significantly less likely compared to women resident 5 km or less from the nearest health facility. Women from counties with higher health facility density were 53% more likely to use modern contraceptives compared to women in counties with low health facility density. Distance and health facility density in the county were not significantly associated with unmet need. Physical access to health facilities is an important determinant of modern contraceptive use and unmet need in Kenya. Strategies should be developed in underserved counties to mitigate the challenge of distance to health facilities, such as delivering services by outreach and mobile facilities. (*Afr J Reprod Health 2012; 16[3]: 47-55*).

Résumé

L'objectif de l'étude était de déterminer la variation spatiale dans l'utilisation des contraceptifs modernes et les besoins non satisfaits de la planification familiale à travers les comtés du Kenya et d'examiner si les structures spatiales ont été associées à des inégalités dans l'accès physique aux établissements de santé. Les données ont été obtenues à partir de l'Enquête Démographique et de Sante de 2008-2009 du Kenya et liées aux endroits où se situent les établissements de santé dans le pays. La régression logistique multi variée a été utilisée pour examiner l'influence de la distance au centre médical le plus proche et la densité de l'établissement de santé, y compris des autres coaxiales, sur l'utilisation de la contraception moderne et des besoins non satisfaits. Dans l'ensemble, la prévalence de l'utilisation de la contraception moderne et des besoins non satisfaits chez les femmes âgées de 15-49 ans au Kenya était de 42,1% et 19,7% respectivement. Parmi les répondants qui habitaient à plus de 5 km de l'établissement sanitaire le plus proche, l'utilisation des contraceptifs modernes était significativement moins susceptibles par rapport aux femmes qui habitent à 5 km ou moins de l'établissement sanitaire le plus proche. Les femmes dans les comtés ayant une densité d'établissement de sante plus élevée étaient de 53% plus susceptibles d'utiliser des contraceptifs modernes par rapport aux femmes dans les comtés à faible densité d'établissement de santé. La distance et la densité établissement de santé dans le comté n'ont pas été significativement associées à des besoins non satisfaits. L'accès physique aux établissements de santé est un déterminant important de l'utilisation des contraceptifs modernes et les besoins non satisfaits au Kenya. Les stratégies devraient être élaborées dans les comtés défavorisés pour atténuer le défi de la distance aux centres de santé, tels que la prestation de services par la sensibilisation et les établissements mobiles (*Afr J Reprod Health 2012; 16[3]: 47-55*).

Keywords: Family planning, contraceptives, health facility accessibility, Kenya

Introduction

Kenya has an estimated population of 39.4 million and with an annual growth rate of 2.8%, the population is projected to exceed 50 million by 2025[1]. The trend in fertility that showed a sharp decline from 1978 to 1997 has leveled off in the last decade[2]. The 2008-2009 Kenya Demographic

and Health Survey (KDHS) reports a total fertility rate (TFR) of 4.6 lifetime births per woman and a prevalence of 46% in the use of any contraceptive method among currently married women[3]. These results did not meet the 2010 targets of 2.5 for TFR and 62% for contraceptive prevalence set by the Kenya National Population Policy for Sustainable Development[4]. The recent plateaus in TFR and contraceptive use in Kenya have been attributed to reduced availability of modern contraceptive methods, diversion of resources to HIV/AIDS, and inadequate support for family planning programs[5].

Family planning services in Kenya are offered by the Ministries of Medical Services and Public Health and Sanitation, non-governmental organizations (NGOs), and the private sector. Studies indicate that health facilities in Kenya that are designated to offer family planning services are not equitably distributed throughout the country[6]. The consequences of these inequalities in service provision with regards to uptake of contraceptive methods are unclear but may underlie some of the regional differences observed in the country.

Utilization of family planning methods is determined by factors at the individual, household, and community level, but the geographic pattern of contraceptive use may be associated with influences at the sub-administrative or county level such as the availability and accessibility of health services in these areas[7-9]. The 2008-2009 KDHS shows high prevalence of total unmet need for family planning across the population, ranging from 16% in North Eastern to 31% in Nyanza[3]. The reasons for these regional variations in Kenya are not evident but are important for addressing the barriers to access to contraceptive services. The aim of this study was to examine the relationship between physical accessibility of health facilities and the spatial variation in use of modern contraceptives and unmet need across Kenya.

Methods

The data for this study were obtained from the 2008-2009 Kenya Demographic and Health Survey[3]. The KDHS is a nationally representative survey that collects population data on a range of health and demographic indicators, including fertility, family planning and maternal mortality. Individual and household data were analyzed for a sub-sample of 4,494 fecund women from a total of 8,850 women aged 15 to 49 years who participated in the survey. All the households were located in the 400 clusters which represented primary sampling units of approximately 20 to 30 households. Details of the sampling design and data collection procedures are available in the main survey report[3].

Dependent variables

The dependent variables in the study included the following:

1. ***Modern contraceptive use:*** *This was a measure of whether a fecund woman was using a modern method of contraception (oral pill, intrauterine device, condom, female or male sterilization, implant, or injectable) at the time of the survey. This measure was based on a recode of the KDHS variable that asked about the method of contraception currently being used. A woman using any of the modern methods was coded as 1 or 0 if otherwise.*

2. ***Unmet need:*** *This was a measure of whether a woman who wanted to avoid becoming pregnant was not using any modern method of contraception and provided in the KDHS dataset. The unmet need group also included were all fecund women, who either did not want any more children or who wished to postpone the birth of their next child for at least two more years but were not using any method of contraception. The unmet need group also included all pregnant women whose pregnancies were unwanted or mistimed or who unintentionally became pregnant because they were not using contraception. This variable was provided in the KDHS data*set.

Independent variables

Based on a review of the literature for relevant risk factors, the independent variables selected for the analysis included age, educational attainment, household wealth, urban-rural residence, parity and exposure to family planning messages[8-10]. Physical access to

health facilities was measured by two variables: the distance from the cluster coordinates to the nearest registered health facility and the density of health facilities in each county. The distances between the households and the health facilities were determined with ArcGIS 9.2 (ESRI International, Redlands, California)[11] using the method employed by Ettarh *et al.*[12]. Briefly, buffers of 5 km were created around the location of all health facilities in order to identify households within that distance. The households were categorized based on whether they were located within or outside the buffers. The Kenya Health Sector Policy aims at improving accessibility of all health services by ensuring that all households are within a 5 km range of a health facility[13].

Health facility density was expressed as the ratio of the number of health facilities per 10,000 population in each county. The density of health facilities was categorized based on the mean county ratio (5.8 per 10,000 population) for all the 47 counties in the country, where those with equal or higher than the mean ratio reflect a higher health facility density and those with less than the mean ratio have a lower health facility density. Each woman was assigned the health facility density category for her county of residence. Data on county population and health facilities were obtained from the Kenya Open Data Project[14].

Statistical and spatial analyses

The analyses included descriptive, logistic and spatial visualization methods. Descriptive analysis was done to show the prevalence of modern contraceptive use and unmet need by individual and household socio-demographic characteristics. All the selected variables were statistically significant (p<0.25) in the bivariate analysis and included in the multivariate regression models. Separate logistic regression models were fitted for the two outcome variables and the results were expressed as odds ratios. Spatial visualization of the levels of modern contraceptive use, unmet need and households located more than 5 km from the nearest health facility in each county was done using intensity maps. All analyses were done with weighted data.

Results

Table 1 shows the prevalence of modern contraceptive use and unmet need by selected background characteristics. The overall prevalence of modern contraceptive use and unmet need among women aged 15-49 in Kenya was 42.1% and 19.7% respectively. Higher levels of modern contraceptive use were seen among older women aged 30 years or older, compared to younger women. Modern contraceptive use was also more prevalent among women who had higher levels of education, belonged to households in higher wealth quintiles, resided in urban areas, had higher parity, and who had been exposed to family planning messages. There was more prevalent use of modern contraceptives among women who resided 5 km or less from the nearest health facility compared to women living farther than 5 km from a health facility, and among those resident in areas where health facility density equaled or exceeded the county average of 5.8 per 10, 000 population.

The prevalence of unmet need was lower among women with higher education, from households with greater wealth, residing in urban areas, and exposed to family planning messages. Higher levels of unmet need were seen among women with higher parity, who lived more than 5 km from the nearest health facility, and who lived in areas where health facility density was less than the county average.

The adjusted odds ratios for modern contraceptive use and unmet need for contraceptives in Kenya are shown in Table 2. Women aged 20-39 years were significantly more likely to use modern contraceptives compared with younger women. Education, higher levels of household wealth and exposure to family planning messaging were also significantly associated with higher contraceptive use. There was significantly higher likelihood of contraceptive use among

Table 1: Proportion of women using modern contraceptive methods and women with unmet need for family planning by background characteristics

	Contraceptive Use (Row %)	χ^2	Unmet need (Row %)	χ^2	Total	(Col %)
	42.1		19.7		4494	
Age in years		175.9[#]		29.5[#]		
15-19	19.6		14.6		473	10.5
20-29	39.2		19.7		1851	41.2
30-39	50.2		19.1		1367	30.4
40-49	43.9		26.2		803	17.9
Education		67.3[#]		131.2[#]		
No education	13.0		41.2		269	6.0
Primary	42.9		22.7		2465	54.8
Secondary	44.9		12.3		1337	29.8
Higher	49.9		9.5		423	9.4
Household wealth		111.7[#]		132.1[#]		
Poorest	21.1		37.5		544	12.1
Poor	37.7		24.5		746	16.6
Middle	46.9		19.3		834	18.6
Rich	47.4		14.2		962	21.4
Richest	44.9		15.2		1408	31.3
Place of residence		3.6[#]		19.5[#]		
Urban	43.6		15.8		1330	29.6
Rural	40.1		22.6		3164	70.4
Parity		233.0[#]		132.7[#]		
0	18.5		8.5		726	16.2
1-2	44.1		16.2		1612	35.9
3-4	51.8		22.9		1132	25.2
> 4	42.9		32.1		1024	22.8
Exposure to FP messages		66.4[#]		53.2[#]		
No	28.3		29.7		966	21.5
Yes	45.6		17.0		3527	78.5
Distance to health facility		17.2[#]		15.7[#]		
More than 5km	29.5		29.0		635	14.1
5km or less	44.0		18.1		3855	85.9
Health facility density		63.3[#]		43.6[#]		
Less than county average	37.0		23.3		3091	68.8
Equal to or more than county average	48.8		14.8		1403	31.2

FP=Family planning; [#]P<0.25

Table 2: Multivariate analysis of factors associated with contraceptive use and unmet need

	Contraceptive use		Unmet need	
	OR	[95% CI]	OR	[95% CI]
Age in years (Ref: 15-19)				
20-29	1.40*	1.09, 1.80	0.99	0.71, 1.37
30-39	1.58**	1.20, 2.09	0.62*	0.42, 0.91
40-49	1.10	0.81, 1.48	0.84	0.55, 1.26
Education (Ref: No education)				
Primary	3.66**	2.83, 4.74	0.72*	0.56, 0.94
Secondary	4.66**	3.53, 6.18	0.46**	0.34, 0.64
Higher	5.98**	4.34, 8.27	0.41**	0.27, 0.63
Household wealth (Ref: Poorest)				
Poorer	1.70**	1.37, 2.14	0.75*	0.57, 0.99
Middle	2.29**	1.85, 2.86	0.62**	0.48, 0.82
Richer	2.57**	2.06, 3.21	0.49**	0.37, 0.66
Richest	2.49**	1.91, 3.27	0.72*	0.51, 0.99
Place of residence (Ref: Urban)				
Rural	1.15	0.97, 1.37	0.87	0.67, 1.13
Parity (Ref: 0)				
1-2	3.40**	2.74, 4.22	2.15**	1.57, 2.96
3-4	5.27**	4.14, 6.74	3.52**	2.47, 5.03
> 4	5.00**	3.80, 6.59	4.87**	3.28, 7.24
Exposure to FP messages (Ref: No)				
Yes	1.47**	1.28, 1.71	0.74**	0.61, 0.90
Distance to health facility (Ref: More than 5km)				
5km or less	1.26**	1.09, 1.48	0.90	0.73, 1.10
Health facility density (Ref: Less than mean)				
Equal to or more than mean	1.53**	1.36, 1.75	0.83	0.69, 1.01

*P<0.05; **P<0.01. OR=odds ratio; CI=Confidence interval; FP=Family planning

respondents resident 5 km or less from the nearest health facility and among those resident in counties with equal or higher than the average health facility density. Unmet need for contraceptives was significantly less likely among women aged 30-39, among women with higher levels of education and among those in households with greater wealth. Women of higher parity were significantly more likely to have unmet need.

Neither the distance to the nearest health facility nor the county health facility density was significantly associated with the likelihood of unmet need.

Figure 1A shows the prevalence of modern contraceptive use in the counties in Kenya. Modern contraceptive use varied substantially across the country. The counties in the north had low levels of contraceptive use whereas the counties in the central region had the highest levels of contraceptive use. Figure 1B shows the levels of unmet need for contraceptives across counties in the country. The counties in the central region had the lowest levels of unmet need in the

Figure 1: Maps showing the levels of contraceptive use, unmet need and physical access to health facilities among counties in Kenya
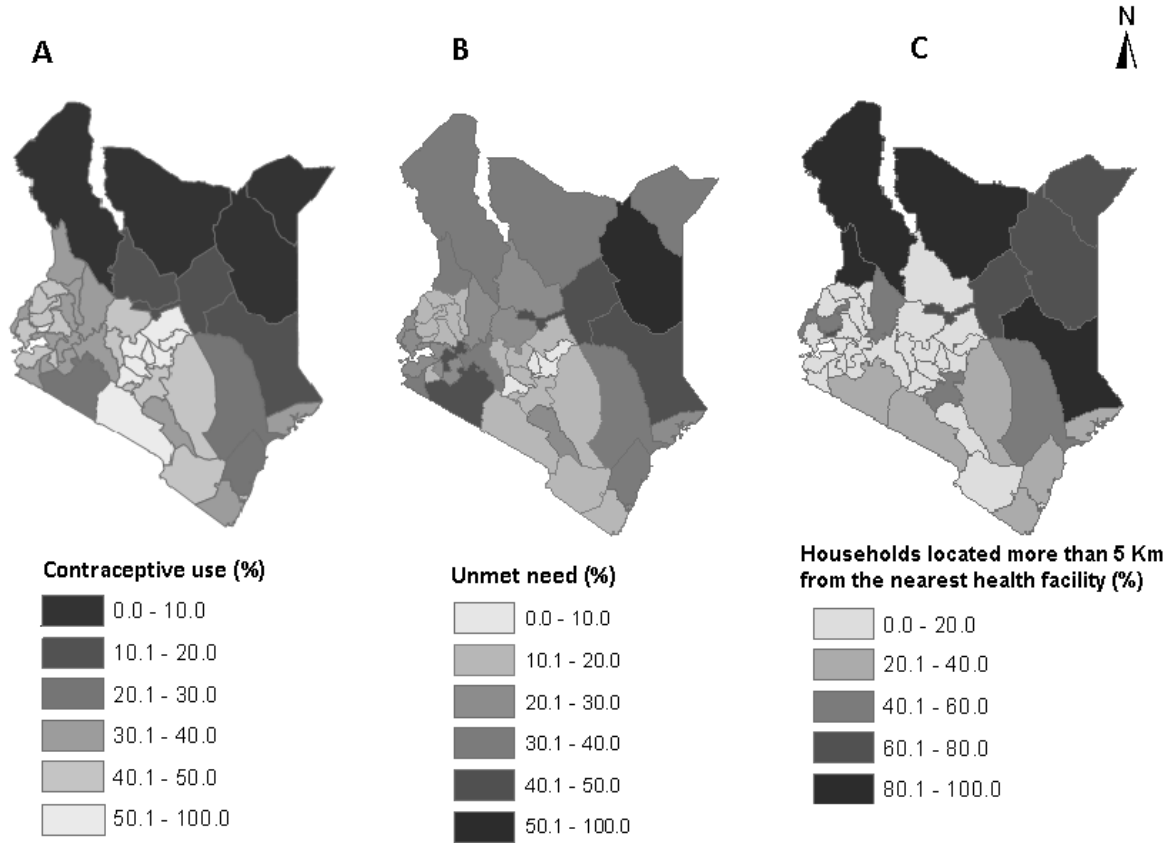
country, whereas most of the counties in the northern and eastern parts of the country had higher levels of unmet need. Figure 1C shows the proportion of households located more than 5 km from the nearest health facility in the counties in Kenya. The highest proportions of underserved households were found in counties in the northern and eastern regions of the country.

Discussion

This paper examines the influence of physical access to health facilities on the modern contraceptives use and unmet need in Kenya, while controlling for other important individual and household determinants. The prevalence of modern contraceptive use and unmet need among fecund women aged 15-49 across Kenya were

42.1% and 19.7% respectively. The statistically significant higher likelihood of modern contraceptive use associated with higher levels of education as seen in this study is consistent with findings of other studies in sub-Saharan Africa which have reported higher prevalence of contraceptive use among women with higher educational attainment[15,16]. The lower likelihood of unmet need among women with higher levels of education indicates that higher educational attainment positively influences the ability of women to overcome the barriers to accessing family planning services. Exposure to family planning messages was associated with higher likelihood of use of contraceptives and this is consistent with reports regarding the high levels of non-use of contraceptives due to lack of knowledge[17]. Further strengthening of social

mobilization and mass messaging for family planning in underserved counties would likely increase use and reduce unmet need. Although the concept of unmet need has been assumed to equal the latent demand for family planning, there is the alternative view that only some fraction of the estimated unmet need represents this demand which can be converted into contraceptive use[18].

The observed association of household wealth with modern contraceptive use and unmet need has been reported from previous studies, with greater likelihood of contraceptive use and lower probability of unmet need found among women in wealthier households compared to those in poorer households[19][20]. Studies show that the gap in contraceptive use between the poor and the non-poor has persisted despite improvements in general socioeconomic status globally and greater provision of family planning services[19]. These inequities are often related to factors which affect access to health services, such as economic conditions, socio-cultural factors and physical access, which often affect the poor disproportionately[20].

The association of higher parity with greater likelihood of modern contraceptive use and unmet need in Kenya is consistent with other reports that suggest that contraception is more likely to be adopted by high-parity women who want to cease childbearing[10]. The relationship has been described in other countries and is also linked to the desire for limiting and/or spacing by women[21][22]. The higher likelihood of unmet need shown among women with higher parity suggests that family planning services in Kenya may be inaccessible or inadequate to address the specific needs of this group of women.

The spatial distribution of county-level prevalence of modern contraceptive use and unmet need highlights the extent of disparity between counties across Kenya. The low levels of contraceptive use and high unmet need in the northern and eastern regions suggest that unknown factors in these regions may partly underlie the spatial patterns observed. Some areas of the country may not have been adequately covered with messaging about family planning or may still adhere to traditional views regarding fertility[23]. This pattern of contraceptive use in Kenya has

been previously reported and attributed to the better socioeconomic conditions in the southern regions as a result of greater rainfall and agricultural production[8]. The high prevalence of contraceptive use and low unmet need in the central region are likely related to the characteristics of this part of the country. The central region, which includes Nairobi, is the most urbanized and densely populated in the country. Accessibility of health facilities is higher in this region and family planning programmes are most often implemented in these area[3].

From the results of the multivariate analysis, the distance to the nearest health facility and the density of health facilities in the county influenced the use of modern contraceptives but were not associated with unmet need for family planning. Women resident 5 km or less to the nearest health facility were 26% more likely to use modern contraceptives than those resident at distances more than 5 km. Access to health services is considered a fundamental right and ensuring adequate physical access for all citizens of a country remains a key responsibility of government[24]. Previous studies have shown that the choice of treatment provider is influenced by distance, with the number using health facilities reducing as the distance to be travelled increases[12][25][26]. The access to health facilities, measured as the proportion of households within 5 km from the nearest health facility and the health facility density, was very low in counties in the northern region. The reasons for this inequality in health service provision in this part of the country may be related to the population distribution in the northern counties where settlements are typically smaller in size and spaced farther apart, making the cost of health service provision higher[27].

This study has a number of limitations. Firstly, the cross-sectional and retrospective nature of the data limits the conclusions that can be drawn from the analysis. Secondly, the absence of data with which to estimate actual travel times only allowed the use of proxy measures such as the Euclidean distance to the nearest health facility. However, there is evidence that the latter correlates strongly with travel time[28]. Another limitation is the relatively small numbers on which the county proportions are calculated. A more representative

sampling by county is needed to provide better estimates of these outcomes at this level. Finally, the density of health facilities in each county is a generalized variable that may mask intra-county disparities in the availability of health facilities. The study however provides important evidence that adds clarity to the situation at county level regarding contraceptive use and unmet need, and could provide the basis for more in-depth studies at this sub-national level.

The findings of this study are important for use by stakeholders involved in family planning in Kenya. Policy-makers and service providers should target counties with low contraceptive use and high unmet need by addressing service provision barriers to family planning uptake, such as poor physical access to health facilities, through appropriate policies and programs. Strategies could focus on counties with greater need for services, with an emphasis on measures to mitigate the challenge of distance such as delivering family planning services by outreach and mobile facilities.

Contribution of Authors

RRE conceived and designed the study and was responsible for the statistical and spatial analyses of the data. CK contributed substantially in the conceptualization and design of the study. All authors approved of the manuscript.

Acknowledgements

References

1. UNFPA. Kenya Country Profile, 2010.
2. Ezeh AC, Mberu BU, Emina JO. Stall in fertility decline in Eastern African countries: regional analysis of patterns, determinants and implications. *Philos Trans R Soc Lond B Biol Sci* 2009;364(1532):2991-3007.
3. Kenya National Bureau of Statistics (KNBS), ICF Macro. *Kenya Demographic and Health Survey 2008-09*: Calverton, Maryland: KNBS and ICF Macro, 2009.
4. National Council for Population and Development. Sessional Paper No. 1 of 2000 on National Population Policy for Sustainable Development: Ministry of Planning and National Development, Kenya, 2000.
5. USAID. Integrating Population, Health, and Environment in Kenya. *Making the Link*. Washington, DC: Population Reference Bureau, 2007.
6. National Coordinating Agency for Population and Development. Research Agenda on Population and Development in Kenya. Nairobi: NCAPD, 2006.
7. Burgard S. Factors associated with contraceptive use in late- and post-apartheid South Africa. *Stud Fam Plann* 2004;35(2):91-104.
8. Stephenson R, Baschieri A, Clements S, Hennink M, Madise N. Contextual influences on modern contraceptive use in sub-Saharan Africa. *Am J Public Health* 2007;97(7):1233-40.
9. Stephenson R, Beke A, Tshibangu D. Contextual influences on contraceptive use in the Eastern Cape, South Africa. *Health Place* 2008;14(4):841-52.
10. Njogu W. Trends and determinants of contraceptive use in Kenya. *Demography* 1991;28(1):83-99.
11. ESRI. ArcGIS Release 9.2. Redlands, CA: ESRI, 2006.
12. Ettarh R, Galiwango E, Rutebemberwa E, Pariyo G, Peterson S. Spatial analysis of determinants of choice of treatment provider for fever in under-five children in Iganga, Uganda. *Health & Place* 2011;17(1):320-326.
13. Ministry of Health. Health Policy Framework 1994 - 2010. Nairobi: Ministry of Health, Government of Kenya, 1997.
14. Kenya Open Data Project. Kenya Open Data, 2011.
15. Cleland JG, Van Ginneken JK. Maternal education and child survival in developing countries: the search for pathways of influence. *Soc Sci Med* 1988;27(12):1357-68.
16. Shapiro D, Tambashe BO. The impact of women's employment and education on contraceptive use and abortion in Kinshasa, Zaire. *Stud Fam Plann* 1994;25(2):96-110.
17. Bongaarts J, Bruce J. The Causes of Unmet Need for Contraception and the Social Content of Services. *Studies in Family Planning* 1995;26(2):57-75.
18. Casterline JB, Sinding SW. Unmet Need for Family Planning in Developing Countries and Implications for Population Policy. *Population and Development Review* 2000;26(4):691-723.
19. Gakidou E, Vayena E. Use of modern contraception by the poor is falling behind. *PLoS Med* 2007;4(2):e31.
20. Shaikh BT, Hatcher J. Health seeking behaviour and health service utilization in Pakistan: challenging the policy makers. *Journal of Public Health* 2005;27(1):49-54.

21. Bradley S, Schwandt H, Khan S. *Levels, Trends, and Reasons for Contraceptive Discontinuation.* Calverton, MD: ICF Macro, 2009.
22. Khan S, Mishra V, Arnold F, Abderrahim N. *Contraceptive Trends in Developing Countries.* Calverton, MD: ORC Macro, 2007.
23. Wortham RA. Spatial differences in fertility decline in Kenya: evidence from recent fertility surveys. *The Social Science Journal* 2002;39(2):265-276.
24. Outka G. Social Justice and Equal Access to Health Care. *The Journal of Religious Ethics* 1974;2(1):11-32.
25. Noor AM, Zurovac D, Hay SI, Ochola SA, Snow RW. Defining equity in physical access to clinical services using geographical information systems as part of malaria planning and monitoring in Kenya. *Trop Med Int Health* 2003;8(10):917-26.
26. NoorAli R, Luby S, Hossein Rahbar M. Does use of a government service depend on distance from the health facility? *Health Policy and Planning* 1999;14(2):191-197.
27. Central Bureau of Statistics, Ministry of Finance and Planning. Kenya 1999 Population and Housing Census: The Population Report. Nairobi: Government Printer, 2002.
28. Phibbs CS, Luft HS. Correlation of travel time on roads versus straight line distance. *Med Care Res Rev* 1995;52(4):532-42.