RESEARCH ARTICLE

Determinants of inequality in health care seeking for childhood illnesses: insights from Nairobi informal settlements

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ABSTRACT

Background: An in-depth understanding of patterns of inequities in healthcare seeking among the urban residents is critical in identifying appropriate interventions strategies. The study evaluates determinants of inequality in health care seeking for childhood illnesses among informal settlement residents in Nairobi, Kenya.
Methods: Data from the second Nairobi Cross-Sectional Slum Survey (NCSS 2012) was examined. The inequality in seeking health care for childhood diarrhea as the prototype illness was assessed using concentration index (CI). The wealth index based on the household possessions and amenities was used as a measure for socioeconomic status.
Results: A total of 2 027 qualified women were included in this study. About 16.6% of children born of younger mothers aged < 20 years had diarrhea and a similar proportion of children (16.3%) was observed among mothers who were unemployed. The CI of −0.026 on health care seeking for diarrhea among children points to significant inequality among the urban poor (95% confidence interval: −0.028 to −0.023).
Conclusion: Occupation of parents, age of mothers, ethnicity, marital status and children's age were major determinants with regard to disease outcome and to a broader extent inequality in health care seeking for childhood illnesses. Enhanced bottom top community health invigoration strategies in health information awareness and services access would be instrumental.

1. Background

Child survival has remarkably improved over the last two decades due to concentrated global commitment to end preventable child death.[1,2] Under-five mortality almost reduced by half from 90 deaths per 1 000 live births in 1990 to 48 deaths in 2013.[1] Remarkably, under five mortality among the poorest has also declined.[1] These achievements are partly due to effective and affordable treatments, delivery of innovative interventions to the needy alongside political commitments.[3] Even with these accomplishments, a significantly high number of children die before their 5th birthday in low and middle income countries where most of the deaths are still caused by preventable diseases and can be treated by cost effective interventions. It is argued that the high infant mortality rate is correlated with the region's high fertility rate.[4] In 2012, a third of all under-five deaths (nealrly 2.2 million) globally were due to preventable illnesses such as pneumonia, diarrhea and malaria with Sub-Sahara Africa (SSA) shouldering the highest burden.[3]

Although Kenya is ranked 33rd globally in under five death,[5] child survival has improved recently. The under-five mortality decreased from 76 deaths per 1 000 births between 2008 and 2009 to 52 deaths per 1 000 births in 2014.[6] Like in the rest of SSA, preventable illnesses such as acute respiratory infections, Malaria, and dehydration caused by diarrhea are still major causes of child morbidity and mortality.[6,7] According to the 2014 Kenya Demographic Health Survey, six in every ten children with such symptoms were taken to a healthcare provider for treatment.[6] However, these improvements mask the inequities that exist within the country; intra-urban differences are more evident than rural–urban differences.[8,9] Child health indicators of the informal settlements in Nairobi are worse than the national average.[10] For instance, the prevalence of both fever and diarrhea was reported to be substantially higher among Nairobi slum children than in all the other

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areas.[11] Viewed together, it is apparent limited findings have focused on health seeking behaviors among informal settlement residents in Nairobi yet it is compounded by a mix of factors as the most populated city in the country with diverse health needs and constraints majorly among the low resource settings residents.[12]

A prior study suggested that few families with sick children seek care in facilities mainly because of lack of funds and perception that the child illness' is not serious enough to warrant it.[10] Other studies have documented lack of finances and perception on seriousness of illness to be some of the main factors influencing care seeking behavior for childhood illnesses but very little has been done with regard to determinants of health seeking behavior and inequality among children in urban slums which constitutes about 60% of the urban population.[10,13,14] In an examination of determinants of immunization inequality and influence of socio-demographic, economic and disease-related factors in health care seeking in urban Nairobi's informal settlements pointed to inequalities largely explained by the mother's level of education and socioeconomic status.[10,13] Further dimensions ranging from marital status to satisfaction and perception of quality health care services, birth order, ethnic group, maternal employment status and residence have been underpinned in various settings.[9,15–17] Thus, it is amenable to assert that efforts to mitigate inequality in health care seeking with a particular focus on those in limited resources settings stand to benefit from related contextual insights. Such knowledge is important in identifying appropriate interventions strategies, sustaining progress if any, and accelerating efforts in reducing preventable childhood deaths. The insights would also provide an important leverage for cues to possible intervention avenues in tune with sub theme two on sustainable development goal three that focuses on ensuring healthy lives and promoting well-being for all at all ages. Therefore, to realize milestones towards remarkable reduction in under five mortality particularly among the poor and the excluded requires identifying determinants of the existing and prevailing disparities. In this regard, this study aimed at providing evidence of existing dynamics on determinants of inequality in health care seeking for childhood illnesses among informal settlement residents in Nairobi, Kenya.

2. Methods

2.1. Study setting and data source

The study was conducted across all informal settlements in Nairobi, Kenya and utilized data from the Nairobi Cross-sectional Slum Survey (NCSS) conducted in 2012.[12,18] Diarrhea has been documented to be the most frequent cause for care seeking among children in the study setting and was therefore considered as the prototype childhood illness to assess inequality in health care seeking for childhood illnesses.[10] The sample for the NCSS 2012 covering all informal settlements in the city as aforementioned was designed to allow estimation of key indicators with a margin of error of 2–5 points (95% level of confidence).[12,18] The following indicators were considered in the sample size calculation: under-five mortality rate, percentage of under-five children who had diarrhea in the 2 weeks preceding the survey, percentage of children aged 12–< 24 months who had been vaccinated against measles, and percentage of children aged 12–< 24 months who had been fully immunized. The sampling formula reported was applied to calculate the number of children required to estimate each indicator.[12]

Households were selected using cluster random sampling method while data on the socio-demographic characteristics of the households and women was collected as earlier reported and described in detail.[12] In addition, a questionnaire with a section on occurrence of diarrhea and health seeking behavior for children born under the age of five years preceding the survey questionnaire was administered to all mothers who had children under the age of five and the total number of mothers who fall in this group and inform the basis of this study were 2 027

women.[12] Overall, the women's questionnaire had several modules including socio-demographic characteristics, migration history, reproduction, contraception, pregnancy, ante-natal and postnatal care, child immunization and child health, marriage, fertility preferences, husband's background and the woman's work/livelihood activities, HIV/AIDS and other sexually transmitted infections, general health issues and maternal mortality. The questionnaire also included modules on household characteristics, household poverty and wellbeing including food security, transfers and remittances.[12]

The study procedures and questionnaire were administered to each participant by professional and trained field workers following the protocol approved by the Kenya Medical Research Institute Ethical Review Board. Interviews were conducted in private rooms to protect the confidentiality of responses and enhance the comfort of respondents. All identifier variables that could be used to identify the individuals or households which participated in the survey were anonymized in the final shared datasets.

2.2. Statistical analysis

Wealth index can be used in estimating socioeconomic status, whereas concentration index (CI) has the capability of providing the measure of inequality and the contributing factors; hence, the latter was utilized in this study.[19] Based on various assets and amenities,[12] we used the principal component analysis to extract a set of summary indices (principal components) as earlier detailed to express the socioeconomic status of those households.[13,19] To decompose socioeconomic inequality in care seeking across wealth index, CI was computed using a regression based approach to identify determinants of health care seeking inequality.[13,19,20] The CI is computed as;

$$CI = 2 \, cov \, (Y_i, R_i) / \mu$$

Where Y_i is the health variable whose inequality is being measured; μ is its mean; R_i is the ith individual's fractional rank in the socioeconomic distribution (e.g. the person's rank in the income distribution); and $cov(\ldots, \ldots)$ is the covariance. Where the data are weighted, a weighted covariance was computed, and a weighted fractional rank generated. The standard errors and corresponding confidence intervals of the estimates were determined using bootstrap approach to assess significance of the inequality. The 95% confidence interval not including zero indicates significant inequality at 5% significance level. The inequality in seeking health care for childhood diarrhea was also assessed using the CI.

3. Results

The distribution summary of occurrence of diarrhea and health care seeking are reported by background characteristics (Table 1). Overall, the prevalence of diarrhea among children during the two-weeks preceding the survey, by selected background characteristics was 20.2%. Considering the children age, diarrhea was most prevalent among children aged 12–< 24 months, followed by those aged 6–< 12 months. The lowest prevalence was observed among the youngest infants and all of those infants had been taken to a health facility. On the other hand, while diarrhea was less prevalent among children aged 24 months and above, children in this age category were also the least likely to be taken to a health facility. There was no variation in the prevalence by the sex of the child and neither was there any consistent variation in prevalence of diarrhea by birth order. Maternal age seemed to be associated with the prevalence of diarrhea among children and determining whether the sick child was taken to a health facility. Maternal level of education was related to diarrhea prevalence, children born to mothers with tertiary level of education had lower prevalence of diarrhea than all the other children. The prevalence of diarrhea was higher among children of mothers that engage in informal income-generating activities (IGA) (17.1%) and lower (11.0%) among mothers with formal form of IGA.

Table 1
Summary distribution of occurrence of diarrhea and health care seeking by child and family characteristics.

Characteristics	Number of children (*n*)	Occurence rate of diarrhea (%)	*P*	Seeking care's rate (%)	*P*
Age of the child[a]					
< 6 months	194	8.2		100.0	
6–< 12 months	191	22.0		82.4	
12–< 24 months	382	26.7	< 0.001	86.2	0.262
24–35 months	1 208	12.3		57.7	
Age of the mother					
< 20 years	398	16.6		71.8	
20–< 25 years	858	16.0	0.682	74.2	0.178
≥ 25 years	771	14.8		70.7	
Mothers' education					
Primary	377	18.8		80.0	
Secondary	726	15.0	0.166	71.4	0.305
Tertiary	924	14.8		69.9	
Mothers' employment statas					
Unemployed	1 145	16.3		50.3	
Employed	882	14.7	0.328	50.0	0.963
Main IGA of mothers*					
Business	434	15.0		52.9	
Informal	420	17.1		77.4	
Formal	155	11.0	0.472	72.7	0.277
Other	14	14.3		64.8	
No IGA	1 001	16.0		78.0	
Marital status					
Not married	342	12.3		79.2	
Married	1 685	16.3	0.061	71.1	0.331
Husbands' occupation					
Business	329	14.0		63.2	
Informal	967	17.7		70.6	
Formal	430	11.4	0.004	73.3	0.364
Unemployed	24	16.7		100.0	
Missing	80	26.3		75.0	
Never married	197	13.2		91.7	
Children ever born					
One	647	15.9		76.4	
Two	696	14.5	0.761	75.5	0.543
Three	388	16.2		66.7	
≥ Four	296	16.9		61.9	
Covered by health insurance*					
Yes	276	15.2		56.0	
No	1 686	15.2	0.989	75.2	0.199

IGA: income-generating activity. [a] Those were the numbers with diarrhea out of the total eligible children per the age of children indicated; * The remainder did not provide information on cover for one reason or the other.

The proportion of children who had diarrhea was higher among mothers with primary level of education (18.8%) and there was no much difference between secondary and tertiary level of education (15.0% versus 14.8%). Majority of diarrhea cases (16.3%) were among married women but with absentee husbands (26.3%). Mothers with the forth born and/or with a child aged above 12–< 24 months were the most affected. There was insignificant proportionate difference in the occurrence of diarrhea among children of mothers who had and those who did not have an insurance cover. However, more mothers with insurance cover (59.5%) did seek care for their children. Similar observation was made in the occurrence of diarrhea among children for mothers aged less than 20 years, had tertiary education, with formal employment and mothers who were not married. The association with Husband's employment status was not clear with fewer women with unemployed husbands.

The *CI*s of wealth and the possible determinants of diarrhea and health seeking behavior and their percentage contribution to inequality in seeking health care for diarrhea are presented in Table 2. The *CI*s for both dependent and determinants provide insights on seeking care for diarrhea inequality. The *CI* value for seeking care for diarrhea among children was −0.026 indicating the significant inequality among the urban poor (95% confidence interval: −0.028 to −0.023). The results indicate that health care seeking for childhood diarrhea is less among children from the poorest families. Among the determinants considered, it was evident that birth order, mother's level of education, marital status, husband's occupations, mother's age, ethnicity and child age were

potential determinants of inequality. A high proportion of young mothers and mothers with lower level of education were found in the poorest families. Similar observations were made for unmarried mothers and those married to husbands involved in business or informal work. Ethnicity also varied by socioeconomic status, with a high proportion of mothers from the Luhya and Kamba ethnic communities belonging to the poorest families. There were differences in seeking care for diarrhea by ethnicity and mother's religion. Mothers with a high birth order and those with young children were from poorest families. Mother's whose husbands had informal occupation contributed significantly to overall inequality by 22.3%. The other important contributors were birth order (21.8%) and mothers whose husbands occupation was business (10.8%). The degree of health inequality in terms of health care seeking for childhood illness was not significantly influenced by mother's involvement in any IGA.

4. Discussion

In the presented findings, it was evident, high proportions of occurrence of diarrhea as prototype childhood illness was observed among[10]: (1) children of mothers who were either aged less than 20 years; (2) were unemployed; (3) had informal form of income generating activities; (4) had only primary level of education as the highest education status attained; (5) mothers who were of Luhya or Luo origin in terms of ethnicity; or (6) among women who were married. Dimensions ranging from marital status to satisfaction and perception of quality health

Table 2

Concentration indices and contributions of determinants to health care seeking.

Impact factor	Concentration index	95% confidence interval	Percentage contribution (%)	95% confidence interval
Sought care for diarrhea	−0.026	−0.028 to −0.023	–	–
Age of the mother				
< 20 years	−0.128	−0.132 to −0.123	−10.5	−29.4 to 8.5
20−< 25 years	0.023	0.020 to 0.026	−9.8	−29.8 to 10.2
≥ 25 years	Ref.	Ref.	Ref.	Ref.
Mother's education				
Primary	−0.029	−0.033 to −0.024	6.8	−7.6 to 21.3
Secondary	−0.017	−0.020 to −0.013	8.4	−7.8 to 24.6
Tertiary	Ref.	Ref.	Ref.	Ref.
Mother involved in IGA				
Home	0.073	0.069 to 0.078	−6.9	−21.9 to 8.1
Away	0.044	0.040 to 0.049	12.6	−12.1 to 37.2
No IGA	Ref.	Ref.	Ref.	Ref.
Marital status				
Not married	−0.430	−0.438 to −0.422	−21.4	−71.9 to 29.1
Married	Ref.	Ref.	Ref.	Ref.
Husband occupation				
Business	−0.020	−0.026 to −0.014	10.8	−10.4 to 32.0
Informal	−0.036	−0.038 to −0.034	22.3	−21.0 to 65.7
Formal	0.153	0.148 to 0.158	−11.0	−28.9 to 6.9
Other	Ref.	Ref.	Ref.	Ref.
Ethnicity				
Luo	0.098	0.094 to 0.103	−6.1	−15.9 to 3.8
Luhya	−0.083	−0.086 to −0.079	−28.7	−87.0 to 29.6
Kikuyu	0.101	0.095 to 0.107	1.1	−1.8 to 3.9
Kamba	−0.097	−0.102 to −0.092	7.6	−6.9 to 22.2
Other	Ref.	Ref.	Ref.	Ref.
Children ever born				
One	0.038	0.035 to 0.042	−17.8	−49.5 to 14.0
Two	−0.020	−0.023 to −0.017	21.8	−34.9 to 62.6
≥ Three	Ref.	Ref.	Ref.	Ref.
Covered by health insurance				
Yes	0.381	0.376 to 0.386	54.0	−55.6 to 163.5
Not	Ref.	Ref.	Ref.	Ref.
Children's age				
0−< 12 months	−0.117	−0.122 to −0.112	−6.6	−19.8 to 6.6
12−< 24 months	0.035	0.031 to 0.039	7.2	−9.0 to 23.3
24−35 months	Ref.	Ref.	Ref.	Ref.

-: not available; Ref.: reference; IGA: income-generating activity.

care services, birth order, ethnic group, maternal employment status and residence have been underpinned in diverse findings with regard to determinants of inequality in care seeking among the under five children.[9,14–16] Mother's level of education being secondary and/or tertiary had no meaningful indication to trends of diarrhea observed among their children.

Prevailing evidence from comparative findings indicate that maternal age and education have an integral basis for maternal and child health.[21,22] Education has been demonstrated to have a positive effect on health either directly through increased knowledge about danger signs and disease patterns or indirectly through a deeper understanding of health system structures and a higher ability to adapt to change.[22,23] Although the study did not focus on utilization of traditional herbal medicine, the care seeking pattern observed would be a reflection of studies across urban and rural setting of Kenya that also mirror the cultural perspective and practice in the context of this study setting showing that most people combine a mix of conventional healthcare services, self-care/prescription as well as traditional herbal medicine practitioners (THMPs) modes of treatment.[24–27] Furthermore, women in disadvantaged settings and low socioeconomic cadre are known to have delayed approach in seeking healthcare services for common childhood illness like cough and diarrhea for their children and complications affecting them during pregnancy or combine a mix of complementary and healthcare services only to focus on professional care from healthcare providers when symptoms persist and/or intensify.[24,26,28] Most pregnant women and women with under five children are also known to prefer readily accessible and less costly self-care/prescription as well as THMPs modes of treatment due to cost associated implications that

is they are more likely to be cheap, easily accessible, more trusted because they were referred to by family and friends or beliefs around efficacy.[24,26,27]

Though there was no disparity in the occurrence of diarrhea among children of mothers who had and those who did not have insurance cover (Table 1), there were variations in care seeking for diarrhea by ethnicity and mother's religion. In our study setting population structure related factors such as religion and ethnicity seem to influence health seeking behavior more than the capacity to access public health services through health cover as an economic predictor to having or not having capacity to reach health services.[12,13,16] Equally, having no consistent variations observed in prevalence of diarrhea by birth order but rather by age attest to the concern that more mothers would be giving less personalized attention to the children as they become more experienced with motherhood or as the child progressively attains higher age status.[9,15,16]

Children from poor households are 1.9 times more likely to die before the age of five as compared to those from rich households.[29] Children of uneducated parents are 2.8 times more likely to die compared to those of mothers with at least a secondary level of education.[29] In relating prior reporting to the CI results, it is worth noting that health care seeking for childhood diarrhea is less among children from the poorest families with birth order, mother's level of education, marital status, husband's occupations, mother's age, ethnicity and child age as potential determinants of inequality. Also, the inequality dynamics tend to reflect prevailing epidemiological highlights, where all 16 countries with the highest under-five mortality rate (above 100 deaths per 1 000 live births) are in SSA, i.e., one in every 12 children born die

before the age of five.[3,4] The risk factors interlinked to child mortality in SSA are well documented and range from maternal age, family size, gender of the child, household environment and accessibility to health services.[30–33]

Rapid urbanization has resulted in a majority of residents in African cities to live in overcrowded slum like areas.[14] Such settings are often characterized by unhygienic environmental conditions which worsen the health outcomes of various residents whose livelihoods and health status are poor.[14,34] Such unhealthy living conditions have resulted in higher child malnutrition, morbidity and mortality in slums and slum like areas than in more privileged urban settlements or even rural areas.[14,34,35] Evidence shows that the urban advantage that urban areas had over the rural areas on economic, health and social indicators have either been reversed or no longer exists. This shift raises new challenges in the efforts to improving basic health care for the rapidly growing number of urban poor and especially for children.[36] In tandem with the observation, in all the informal settlement covered in the presented findings, health care seeking for childhood diarrhea is less among children from the poorest families. Among the determinants considered, it was evident that birth order, mother's level of education, marital status, husband's occupations, mother's age, ethnicity and child age were potential determinants of inequality. Young mothers or mothers with lower level of education were more in poorest families. Similar observation was made for unmarried mothers and those married to husbands involved in business or informal work.

This study holds a limitation of the fact that recall bias may not have been completely eliminated in the sense that, health seeking behavior was evaluated cross-sectionally by asking what might have happened in the past. Though, such bias may not have been substantial considering the study design and implementation considerations on good practice in the conduct and reporting of survey results.[37] We also note, family income may have different pathways of impact for both disease incidence and health care seeking however, our study is not designed to explore these pathways. Furthermore, it would be argued that, there would be a bias based on time lapse between presented reporting on determinants of inequality in health care seeking for childhood illnesses at this point in time while utilizing NCSS 2012. Despite the view, it is important to note, the findings hold the key to enabling orienting research focus towards new research directions and questions thus moving public health research forward.[38,39]

5. Conclusion

Occupation of parents, age of mothers, ethnicity, marital status and children aged below five years were major determinants with regard to disease outcome and to a broader extent, inequality in health care seeking for childhood illnesses. More interesting is the existence of disparity in health seeking and childhood illness among the urban poor. In the context of global health and action driven policies, disproportionately disadvantaged communities need to be empowered to obtain and access basic healthcare services with emphasis at primary healthcare levels. Much prominence should be on enhanced bottom top community health invigoration strategies in health information awareness and services access. Therefore, alongside increased campaign strategies to improve full immunization uptake among the under five in Kenya, the study findings point to the need of incorporating awareness on childhood diarrhea and other associated illnesses of critical concern and the recommended treatments that can be used to manage them. Information, education and communications materials and other forms of media awareness should be well packaged to better cover all women in child-bearing age range while considering their varied socioeconomic status, literacy levels and cultural barriers especially for those in the underprivileged urban settings as partly pointed out in the findings presented.

CRediT author statement

Nicholas Ngomi: Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing. **Christopher Khayeka-Wandabwa:** Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing. **Thaddaeus Egondi:** Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing. **Pamela A. Marinda:** Validation, Formal analysis, Writing – original draft, Writing – review & editing. **Tilahun Nigatu Haregu:** Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing.

Ethics approval and consent to participate

The survey received ethical approval from the Kenya Medical Research Institute's Ethics Review Committee. The ethics committee approval number KEMRI/RES/7/3/1. Each participant selected for inclusion within that household gave written informed consent (signature or thumbprint); for children under the age of 18 years a parent or guardian gave written consent (the Kenyan constitution considers married persons and those aged 18 years and above to be adults in their own right) and children aged over 12 years were additionally asked to give written assent. Responding to this survey was voluntary.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

1. United Nations International Children's Emergency Fund. Progress for children (No. 11): beyond averages: learning from the MDGs. https://www.unicef.org/media/50866/file/Progress_for_Children_No._11-ENG.pdf. Accessed January 10, 2022.
2. United Nations. Mellinium Development Goals Report 2014. https://www.un.org/en/desa/millennium-development-goals-report-2014. Accessed January 10, 2022.
3. United Nations International Children's Emergency Fund. Levels and trends in child mortality 2013. https://data.unicef.org/resources/levels-trends-child-mortality-report-2013/. Accessed January 10, 2022.
4. United Nations International Children's Emergency Fund. Committing to child survival: a promise renewed 2015. https://data.unicef.org/resources/committing-to-child-survival-a-promise-renewed-2015/. Accessed January 10, 2022.
5. United Nations International Children's Emergency Fund. The state of the world's childreden 2015. https://data.unicef.org/resources/state-worlds-children-2015/. Accessed January 10, 2022.

6. United Nations Office for the Coordination of Humanitarian Affairs. Kenya demographic and health survey: key indicators 2014. https://reliefweb.int/report/kenya/kenya-demographic-and-health-survey-key-indicators-2014. Accessed October 10, 2021.

7. Kenya National Bureau of statistics, Ministry of Health, National AIDS Control Council, Kenya Medical Research Institute. *Kenya Demographic and Health Survey 2014*. Nairobi: Kenya National Bureau of Statistics; 2015.

8. Fotso JC. Child health inequities in developing countries: differences across urban and rural areas. *Int J Equity Health*. 2006;5:9.

9. Kassile T, Lokina R, Mujinja P, Mmbando BP. Determinants of delay in care seeking among children under five with fever in Dodoma region, central Tanzania: a cross–sectional study. *Malar J*. 2014;13:348.

10. Taffa N, Chepngeno G. Determinants of health care seeking for childhood illnesses in Nairobi slums. *Trop Med Int Health*. 2005;10(3):240-245.

11. Magadi MA, Zulu EM, Brockerhoff M. The inequality of maternal health care in urban sub-Saharan Africa in the 1990s. *Popul Stud (Camb)*. 2003;57(3):347-366.

12. African Population and Health Research Center. Population and health dynamics in Nairobi's informal settlements: report of the Nairobi cross-sectional slums survey (NCSS) 2012. https://aphrc.org/publication/population-and-health-dynamics-in-nairobis-informal-settlements-report-of-the-nairobi-cross-sectional-slums-survey-ncss-2012-3/. Accessed October 10, 2021.

13. Egondi T, Oyolola M, Mutua MK, Elung'ata P. Determinants of immunization inequality among urban poor children: evidence from Nairobi's informal settlements. *Int J Equity Health*. 2015;14:24.

14. Mahabir R, Crooks A, Croitoru A, Agouris P. The study of slums as social and physical constructs: challenges and emerging research opportunities. *Region Stud Region Sci*. 2016;3(1):737-757.

15. Hu Y, Wang Y, Chen Y, Li Q. Determinants of inequality in the up-to-date fully immunization coverage among children aged 24–35 months: evidence from Zhejiang province, East China. *Hum Vaccin Immunother*. 2017;13(8):1902-1907.

16. Wambui WM, Kimani S, Odhiambo E. Determinants of health seeking behavior among caregivers of infants admitted with acute childhood illnesses at Kenyatta National Hospital, Nairobi, Kenya. *Int J Pediatr*. 2018;2018:5190287.

17. Sultana M, Sarker AR, Sheikh N, et al. Prevalence, determinants and health care-seeking behavior of childhood acute respiratory tract infections in Bangladesh. *PLoS One*. 2019;14(1):e0210433.

18. African Population and Health Research Center. *Population and Health Dynamics in Nairobi's informal settlements: Report of the Nairobi cross-Sectional Slums Survey (NCSS) 2000*. Nairobi: African Population and Health Research Center; 2002.

19. Houweling TA, Kunst AE, Mackenbach JP. Measuring health inequality among children in developing countries: does the choice of the indicator of economic status matter? *Int J Equity Health*. 2003;2(1):8.

20. Wagstaff A, van Doorslaer E, Watanabe N. On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in Vietnam. *J Econ*. 2003;112(1):207-223.

21. Marinda P, Chibwe N, Tambo E, Lulanga S, Khayeka-Wandabwa C. Challenges and opportunities of optimal breastfeeding in the context of HIV option B+ guidelines. *BMC Public Health*. 2017;17(1):541.

22. Caldwell JC. Education as a factor in mortality decline an examination of Nigerian data. *Popul Stud (Camb)*. 1979;33(3):395-413.

23. Kaljee LM, Anh DD, Minh TT, Tho LH, Batmunkh N, Kilgore PE. Rural and urban Vietnamese mothers utilization of healthcare resources for children under 6 years with pneumonia and associated symptoms. *J Behav Med*. 2011;34(4):254-267.

24. Lambert J, Leonard K, Mungai G, et al. *The Contribution of Traditional Herbal Medicine Practitioners to Kenyan health Care delivery: Results from Community Health-Seeking Behavior Vignettes and a Traditional Herbal Medicine Practitioner Survey*. Washington, D.C.: the World Bank; 2011.

25. Abubakar A, Van Baar A, Fischer R, Bomu G, Gona JK, Newton CR. Socio-cultural determinants of health-seeking behaviour on the Kenyan coast: a qualitative study. *PLoS One*. 2013;8(11):e71998.

26. Mothupi MC. Use of herbal medicine during pregnancy among women with access to public healthcare in Nairobi, Kenya: a cross-sectional survey. *BMC Complement Altern Med*. 2014;14:432.

27. Kisiangani J, Baliddawa J, Marinda P, et al. Determinants of breast cancer early detection for cues to expanded control and care: the lived experiences among women from Western Kenya. *BMC Womens Health*. 2018;18(1):81.

28. Gichobi D, Wanzala P, Mutai J, Kamweya A. Factors associated with disease outcome in children at Kenyatta National Hospital (KNH). *J Public Health Epidem*. 2010;2(9):262-266.

29. United Nations International Children's Emergency Fund. The state of the world's children 2016: a fair chance for every child. https://www.unicef.org/reports/state-worlds-children-2016. Accessed October 10, 2021.

30. Macassa G, Hallqvist J, Lynch J. Inequalities in child mortality in sub-Saharan Africa: a social epidemiologic framework. *Afr J Health Sci*. 2011;18(1–2):14-26.

31. Rustein SO. Factors associated with trends in infant and child mortality in developing countries during the 1990s. *Bull World Health Organ*. 2000;78(10):1256-1270.

32. Blane D, Smith GD, Hart C. Some social and physical correlates of intergenerational social mobility: evidence from the West of Scotland Collaborative Study. *Sociology*. 1999;33(1):169-183.

33. Hart CL, Smith GD. Relation between number of siblings and adult mortality and stroke risk: 25 year follow up of men in the Collaborative study. *J Epid Commun Health*. 2003;57(5):385-391.

34. Matthews Z, Channon A, Neal S, Osrin D, Madise N, Stones W. Examining the "urban advantage" in maternal health care in developing countries. *PLoS Med*. 2010;7(9):e1000327.

35. Zulu EM, Dodoo FNA, Chika-Ezee A. Sexual risk-taking in the slums of Nairobi, Kenya 1993–8. *Popul Stud (Camb)*. 2002;56(3):311-323.

36. Bocquier P, Madise NJ, Zulu EM. Is there an urban advantage in child survival in sub-Saharan Africa? Evidence from 18 countries in the 1990s. *Demography*. 2011;48(2):531-558.

37. Kelley K, Clark B, Brown V, Sitzia J. Good practice in the conduct and reporting of survey research. *Int J Qual Health Care*. 2003;15(3):261-266.

38. Griffin RE. When are old data new data? *Geo Res J*. 2015;6:92-97.

39. Fecher B, Friesike S, Hebing M. What drives academic data sharing? *PLoS One*. 2015;10(2):e0118053.