

Continuum of Maternity Care in Zambia: a National Representative Survey

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Abstract

Background

Globally, over half of maternal deaths are related to pregnancy-related complications. Provision of a continuum of care during pregnancy, childbirth and the postnatal period results in reduced maternal and neonatal morbidity and mortality. Hence this study determined the prevalence of the continuum of care and its determinants among women in Zambia.

Methods

We used weighted data from the Zambian Demographic and Health Survey (ZDHS) of 2018 for 7325 women aged 15 to 49 years. Multistage stratified sampling was used to select study participants. We conducted multivariable logistic regression to explore continuum of care in Zambia. All our analyses were done using SPSS version 25.

Results

Of the 7,325 women, 38.0% (2787/7325) (95% CI: 36.9-39.1) had complete continuum of maternal healthcare (four and more antenatal care contacts, childbirth at a health facility and postnatal care). Women who had attained tertiary level of education (AOR: 1.84, 95% CI: 1.01-3.35) and whose partners had also attained tertiary level of education (AOR: 2.54, 95% CI: 1.52-4.27) were more likely to utilize the whole continuum of care compared to those who had no education. Women who initiated antenatal care (ANC) after the first trimester (AOR: 0.46, 95% CI: 0.39-0.53) were less likely to utilize the whole continuum of care compared to those who initiated in the first semester. Women with exposure to radio (AOR: 1.58, 95% CI: 1.28-1.96) were more likely to utilize the whole continuum of care compared to those who were not exposed to radio. Women residing in the Western province were less likely to utilize the entire continuum of care compared to those in the other nine provinces.

Conclusion

Level of education of the women and of their partners, early timing of ANC initiation, residing in other provinces other than the Western province, and exposure to information through radio were positively associated with utilization of the entire continuum of care. Improving literacy levels and promoting maternity services through radio may improve the level of utilization of maternity services.

Background

Globally, at least half of maternal mortalities result from pregnancy complications, and over 302,000 (90%) of these deaths occur in low and middle income countries [1], and 201,000 (66%) of the deaths take place in sub-Saharan Africa [2, 3]. Majority of these preventable maternal and perinatal deaths occur in the intrapartum and immediate postpartum period [4]. The direct maternal deaths and could be prevented by strengthening and improving access to the whole continuum of maternity care [1, 5].

Additionally, 1 in 12 children die before reaching the age of five years and most of these deaths occur in the period [6]. Neonatal mortality contributes to almost 45% of all under-5 childhood deaths worldwide [6]. Ensuring accelerated progress towards achieving sustainable development goal (SDG) 3 needs global health focus on programs and policies targeting reduction of preventable maternal, newborn and child mortality and morbidity [4].

It is estimated that if effective health measures are ensured during childbirth and in the first week of life, we could avert over 80% of maternal deaths and 66% of neonatal deaths globally [4, 7]. To ensure this, cost effective measures within the reach of low and middle income countries such as continuum of care are required [4]. Continuum of care ensures uninterrupted flow in the care at all stages hence improving maternal and child health outcomes [8]. Complete exposure to the continuum of care compared to separate healthcare ensures that utilization at each stage builds on the effect of the previous stage of healthcare access. In our study, we focused on the continuity of care over time from pregnancy through childbirth to the postpartum period. We looked at antenatal care (ANC) attendance, health facility utilization during childbirth and postnatal care (PNC).

Adequate, timely and quality antenatal care has been shown to improve birth preparedness and increase skilled birth attendance [9, 10]. Further, it enables early identification and management of pregnancy related illnesses and complications [1, 11]. Health facility utilization during childbirth increases the chances of a safe, clean environment that is well-equipped with skilled personnel, drugs, and supplies necessary for effective and timely management of childbirth complications [4]. Additionally, PNC enables timely identification of any complications that might affect maternal and neonatal health outcomes [4]. These three interventions are crucial in lowering maternal and neonatal mortality rates, thus the need to provide all of them in a continuum of care [12].

Over the last two decades, Zambia has achieved a steady reduction in the maternal mortality ratio which currently stands at 252 deaths per 100,000 live births [13]. However, this maternal mortality ratio is almost four times higher than the SDG target of 70 deaths per 100,000 live births by 2030 [14]. Most studies have focused on exploring factors associated with use of individual maternal health services, but few have explored the utilization of care as a continuum. To ensure effective continuum of care program designing and implementation, it is crucial to understand the healthcare seeking gaps along the continuum pathway and the factors associated with the gaps. Our study aimed at describing the factors influencing the continuum of care during pregnancy, at childbirth and during postpartum period among women in Zambia. The findings will inform the design of programs and strategies aimed at improving level of utilization of the continuum of care, in order to reduce the maternal and neonatal mortality.

Methods

Study design and participants

The ZDHS was a nationally representative cross-sectional study conducted using validated questionnaires between 18th July 2018 and 24th January 2019 [13]. It is a periodical survey that is carried out every five years as part of the MEASURE DHS global survey and collects information on demographic, health, and nutrition indicators. The survey used stratified two-stage cluster sampling design that resulted in the random selection of a representative sample of 13,625 households [13]. The first stage involved 545 cluster (sample points) selection which consisted of enumeration areas using a sampling frame that was used during the 2010 census of population and housing (CPH) [13]. Zambia is divided into 10 provinces which are further divided into districts, constituencies, and wards [13]. Wards which are the smallest administrative units and during the 2010 CPH, these were further divided into census supervisory areas which were later divided into enumeration areas. Enumeration areas were selected with a probability proportional to their size within each sampling stratum. Systematic sampling was applied to select households in the second stage. A detailed explanation of the sampling process is available in the ZDHS 2018 report [13].

Women aged 15-49 years who were either permanent residents or visitors who had stayed in the selected households the night before the survey were eligible for interviews and a total of 13,683 women being interviewed. Four questionnaires were used in the survey and our study used data that was obtained using validated women's and household questionnaires. Our secondary analysis included women of reproductive age (15-49 years) who had given birth in the last five years preceding the survey that yielded a weighted sample of 7,325 women. Written informed consent was provided by all participants of the survey. Written permission to access the whole ZDHS database was obtained through DHS program website at this address <https://dhsprogram.com/>

Variables

Outcome variables

Complete continuum of maternal healthcare is the outcome variable, Complete continuum of care was constructed into binary variable complete coded as 1 and incomplete coded as 0. Complete continuum of maternal healthcare was considered when a woman reported having had:

1. Had at least four ANC (ANC4+) contacts during the most recent childbirth.
2. Utilized a health facility during the most recent childbirth and
3. Had at least one postnatal check-up within six weeks after childbirth [4, 15, 16].

Continuum of care was considered discontinued if the woman skipped any of the steps above [4, 17, 18]. Additionally, having four or more ANC contacts was considered as continued care during pregnancy while utilizing health facility during childbirth with four or more ANC contacts was considered as continued care during delivery.

Independent variables

Independent variables were categorized into women, partners' and household characteristics which were chosen basing on previous studies [19-21] and availability in the ZDHS data base.

Partner characteristics. This included the partner's highest level of education (no education, primary, secondary, and tertiary).

Household characteristics. Wealth index of household (categorized into quintiles: richest, richer, middle poorer and poorest), type of residence (urban and rural), and province/region that included the official 10 provinces of Zambia.

Women's characteristics. Age (15-24, 25-34, and 35-49), level of education (no education, primary, secondary, and tertiary), exposure to Newspapers/magazines, radio and TV (yes and no), preceding birth interval (less than 24 months and 24 months and above), parity (4 and less and 5 and above), age at first birth (less than 20 and 20 and above), ANC timing (first trimester and above first trimester), marital status (married and not married), age at first sex (less than 18 and 18 and above), working status (working and not working) and decision making for seeking healthcare (involved and not involved).

Statistical analysis

We used the SPSS analytic software version 25.0 complex samples package. Weighted data was used to account for the unequal probability sampling in different strata. Frequency distributions were used to describe the background characteristics of the women. Bivariable and multivariable logistic regression analyses were conducted to identify the association among various independent variables at all the three levels of continuum of care. Independent variables found significant at p-value less than 0.25 in the bivariable analysis were included in the multivariable model. Adjusted odds ratios (AOR), 95% Confidence Intervals (CI) and p-values were calculated with statistical significance level set at p-value < 0.05. Sensitivity analysis was done by analyzing continued care during pregnancy with eight ANC contacts as the outcome.

Results

The mean age of women was 28.5 (standard deviation (SD) 7.5) years with majority (41.2%) of them being 25–34 years. while that of the mothers was 28.80 (SD 6.83). Majority of the women resided in rural areas (61.6%), were married (75.2%), had primary education (49.1%), initiated ANC after first trimester (62.0%), had their first sexual intercourse when are less than 18 years (74.3%) and had their first pregnancy when they are below 20 years (68.1%). Of the 7,325 women, 38.0% (2787/7325) (95% CI: 36.9–39.1) had complete continuum of maternity care (four or more ANC contacts, health facility utilization during childbirth and postnatal care attendance). Further analysis showed 64.1% (4651/7262) (95% CI: 63.1–65.2) had four or more ANC contacts (continued care during pregnancy) while 57.3% (4199/7325) (95% CI: 56.2–58.5) had continued care at delivery (four or more ANC contacts and utilized a health facility for childbirth). More detailed characteristics of study participants are shown in Table 1.

Table 1
Background characteristics of women who had given birth in the last 5 years.

Characteristics	N = 7325	%
Parity		
Less than 5	5233	71.4
5 and above	2092	28.6
Residence		
Urban	2811	38.4
Rural	4513	61.6
Provinces		
Central	640	8.7
Copper belt	969	13.2
Eastern	983	13.4
Luapula	640	8.7
Lusaka	1219	16.6
Muchinga	433	5.9
Northern	615	8.4
North Western	404	5.5
Southern	946	12.9
Western	477	6.5
Exposure to Newspapers		
Yes	1217	16.6
No	6108	83.4
Working status		
Not working	3835	52.4
Working	3490	47.6
Marital status		
Not Married	1819	24.8
Married	5506	75.2

Characteristics	N = 7325	%
Education Level		
No Education	689	9.4
Primary Education	3595	49.1
Secondary Education	2726	37.2
Tertiary	316	4.3
Wealth Index		
Poorest	1676	22.9
Poorer	1527	20.8
Middle	1390	19.0
Richer	1471	20.1
Richest	1262	17.2
Age		
15–24	2605	35.6
25–34	3020	41.2
35–49	1699	23.2
ANC timing^a		
Above first trimester	4542	62.0
First trimester	2690	36.7
Exposure to Radio		
Yes	3278	44.8
No	4047	55.2
Exposure to TV		
Yes	2581	35.2
No	4744	64.8
Preceding Birth Interval^b		
24 months and above	4666	63.7
Less than 24 months	822	11.2

Characteristics	N = 7325	%
Partner's education^c		
No education	322	4.4
Primary	2011	27.5
Secondary	2530	34.5
Tertiary	444	6.1
Age at first sex		
Less than 18	5444	74.3
18 and above	1880	25.7
Healthcare seeking decision^d		
Involved	4374	59.7
Not involved	1132	15.5
Age at first birth		
Less than 20	4987	68.1
20 and above	2338	31.9
ANC attendance^e		
Less than 4	2611	35.9
4 and above	4651	64.1
Place of delivery		
Home	951	13.0
Health Facility	6373	87.0
Postnatal care		
No	2691	36.7
Yes	4633	63.2
^a Missing 93, ^b missing 1836, ^c missing 2018, ^d missing 1819, ^e missing 63		

Factors associated with complete continuum of maternity care

Results from multivariable logistic regression (Table 2) showed that province, timing of ANC initiation, exposure to radio, partners' and women's level of education were associated with complete continuum of maternity.

Table 2
Predictors of complete continuum of maternity care in Zambia

Characteristics	Complete continued care n = 2787	P- value	Crude model COR (95%CI)	P- value	Adjusted Model AOR (95% CI)
Parity		< 0.001		0.014	
5 and above	726 (26.0)		1		1
Less than 5	2061 (74.0)		1.22 (1.04– 1.44)		1.09 (0.88– 1.35)
Residence		0.003		0.082	
Rural	1656 (59.4)		1		1
Urban	1130 (40.6)		1.16 (0.98– 1.37)		1.05 (0.79– 1.40)
Provinces		< 0.001		< 0.001	
Western	109 (3.9)		1		1
Copperbelt	422 (15.1)		2.61 (1.81– 3.75)		3.12 (1.85– 5.26)
Eastern	400 (14.4)		2.32 (1.62– 3.34)		2.90 (1.78– 4.73)
Luapula	267 (9.6)		2.41 (1.59– 3.67)		2.92 (1.75– 4.86)
Lusaka	488 (17.5)		2.25 (1.56– 3.26)		2.80 (1.66– 4.72)
Muchinga	209 (7.5)		3.16 (2.09– 4.76)		4.11 (2.47– 6.82)
Northern	272 (9.8)		2.69 (1.61– 4.49)		3.64 (1.92– 6.87)
North Western	164 (5.9)		2.31 (1.62– 3.31)		3.91 (2.31– 6.62)
Southern	264 (9.5)		1.31 (0.87– 1.97)		1.49 (0.91– 2.44)
Central	191 (6.9)		1.44 (0.98– 2.12)		1.87 (1.15– 3.05)

bold = Significant at p-value < 0.05

Characteristics	Complete continued care n = 2787	P- value	Crude model COR (95%CI)	P- value	Adjusted Model AOR (95% CI)
Exposure to Newspapers		< 0.001		0.001	
No	2237 (80.3)		1		1
Yes	550 (19.7)		1.43 (1.15– 1.77)		1.10 (0.86– 1.41)
Working status		0.041		0.128	
Not working	1416 (50.8)		1		1
Working	1370 (49.2)		1.10 (0.97– 1.26)		0.89 (0.74– 1.08)
Marital status		0.006		0.022	
Not Married	643 (23.1)		1		-
Married	2143 (76.9)		1.17 (1.02– 1.33)		-
Education Level		< 0.001		< 0.001	
No Education	198 (7.1)		1		1
Primary Education	1316 (47.2)		1.43 (1.14– 1.79)		1.27 (0.99– 1.63)
Secondary Education	1091 (39.1)		1.65 (1.33– 2.05)		1.17 (0.86– 1.59)
Tertiary	182 (6.5)		3.34 (2.32– 4.82)		1.84 (1.01– 3.35)
Wealth Index		< 0.001		0.052	
Poorest	611 (21.9)		1		1
Poorer	550 (19.7)		0.98 (0.83– 1.16)		0.89 (0.71– 1.11)
Middle	515 (18.5)		1.03 (0.84– 1.25)		0.92 (0.71– 1.19)
Richer	547 (19.6)		1.03 (0.81– 1.31)		0.95 (0.63– 1.43)

bold = Significant at p-value < 0.05

Characteristics	Complete continued care n = 2787	P- value	Crude model COR (95%CI)	P- value	Adjusted Model AOR (95% CI)
Richest	563 (20.2)		1.40 (1.09– 1.81)		0.80 (0.49– 1.31)
Age		0.721		0.777	
35–49	644 (23.1)		1		
25–34	1165 (41.8)		1.03 (0.88– 1.20)		
15–24	978 (35.1)		0.98 (0.85– 1.14)		
ANC timing		< 0.001		< 0.001	
First trimester	1353 (48.6)		1		1
Above first trimester	1429 (51.4)		0.45 (0.40– 0.51)		0.46 (0.39– 0.53)
Exposure to Radio		< 0.001		< 0.001	
No	1347 (48.3)		1		1
Yes	1440 (51.7)		1.57 (1.38– 1.79)		1.58 (1.28– 1.96)
Exposure to TV		< 0.001		0.002	
No	1705 (61.2)		1		1
Yes	1082 (38.8)		1.29 (1.10– 1.51)		0.92 (0.73– 1.16)
Preceding Birth Interval		0.001		0.006	
Less than 24 months	263 (12.9)		1		1
24 months and above	1778 (87.1)		1.31 (1.08– 1.59)		1.23 (0.99– 1.52)
Partner's education	148	< 0.001		< 0.001	
No education	93 (4.5)		1		1

bold = Significant at p-value < 0.05

Characteristics	Complete continued care n = 2787	P- value	Crude model COR (95%CI)	P- value	Adjusted Model AOR (95% CI)
Primary	719 (34.5)		1.37 (0.95– 1.96)		1.31 (0.88– 1.95)
Secondary	1012 (48.6)		1.64 (1.17– 2.29)		1.38 (0.94– 2.02)
Tertiary	258 (12.4)		3.42 (2.32– 5.03)		2.54 (1.52– 4.27)
Age at first sex		< 0.001		0.001	
18 and above	794 (28.5)		1		1
Less than 18	1993 (71.5)		0.79 (0.69– 0.91)		1.16 (0.93– 1.43)
Healthcare seeking decision^d		< 0.001		0.006	
Not involved	385 (18.0)		1		1
Involved	1758 (82.0)		1.30 (1.08– 1.58)		1.24 (0.99– 1.56)
Age at first birth		< 0.001		0.001	
20 and above	978 (35.1)		1		1
Less than 20	1808 (64.9)		0.79 (0.69– 0.90)		0.99 (0.80– 1.24)
bold = Significant at p-value < 0.05					

Details about factors associated with four or more ANC4 contacts (continued care during pregnancy) and four or more ANC contacts and health facility utilization at childbirth (continued care at childbirth) are shown in **supplementary files 1 and 2**.

Sensitivity analysis

Continued care during pregnancy (Eight or more ANC contacts)

Only 91 (1.2%, 95% CI: 1.0-1.5) women had attended at least eight ANC contacts. In the multivariable analysis, only three factors were associated with eight or more ANC contacts which included; age, residence, and initiation of ANC timing. Younger women aged 15–24 years were 243% (AOR: 3.43 95% CI:

1.46–8.05) more likely to have eight or more ANC contacts compared to their older counterparts aged 35–49 years. Women in urban areas were 245% more likely (AOR: 3.45, 95% CI: 1.48–8.04) to have eight or more ANC contacts compared to women in rural areas. Women who initiated ANC contacts after the first trimester were 92% less likely (AOR: 0.08, 95% CI: 0.03–0.18) to have eight or more ANC contacts compared to women who initiated ANC in the first trimester.

Discussion

Of the 7,325 women, 38.0% (2787/7325) (95% CI: 36.9-39.1) had continuum of maternity care. The level of continued care reduced at every stage of care from 64.1% during pregnancy to 57.3% at child birth and 38% complete continuum of care during postpartum period. The largest dropout occurred between delivery and the postnatal period. This finding of complete continuum of care is lower than findings from Cambodia, Nepal and Egypt studies [12, 16, 22] and higher than findings from studies conducted in Pakistan, Tanzania, Ethiopia and Ghana [4, 6, 17, 23].

We found that province, timing of ANC initiation, exposure to radio, and the level of education of women and their partners, were associated with complete continuum of maternity care. Although preceding birth interval was not associated with complete continuum of care, it was found to be significantly associated with continued care during pregnancy and at childbirth.

Women who initiated ANC after the first trimester were less likely to have complete continuum of care compared to those who initiated ANC in the first trimester. This was observed at all stages of accessing care (continued care during pregnancy and at childbirth). Initiating ANC early enables women to have more ANC contacts thus ability to complete the first continuum which is the first step in ensuring complete continuum of care [24, 25]. The increased likelihood of more ANC contacts associated with early ANC initiation leads to adequate health education sessions regarding the benefits of skilled birth attendance, postnatal care and creates rapport between the health workers and the women [24-26]. This further increases the likelihood of the utilization of the subsequent components of maternity continuum of care. ANC timing has been shown to be associated with complete continuum of care in previous studies [17, 24, 25, 27].

Province was a significant factor at every level of care. However, the association became stronger at the complete continuum of care level. Women belonging to the Western province were less likely to have complete continuum of care compared to the women in the other nine provinces. Variations in the complete continuum of care utilization was large with Lusaka province accounting for the highest percent of women at 17.5% with complete continuum of care, Copper belt second at 15.1%, Eastern third at 14.4% and Western province with the lowest percentage at 3.9%. High use provinces are located around the capital city, Lusaka and these are more socioeconomically developed with better access to both public and private health facilities. Western province women had the least likelihood of complete continuum of care. Western province is characterized by difficult geographical and climatic conditions which has greatly affected agricultural production hence affecting household income [28]. Secondly, over

80% of the population is considered to be poor of which 70% of these are women [28]. These poverty levels can affect access to care hence delayed ANC initiation, access to good quality education and affordability of mass media channels such as radios which factors have been shown to be associated with complete continuum of care. Region of residence has been shown to be associated with continuum of care in previous studies in Ghana and Cambodia [12, 18].

Exposure to radio was positively associated with continued care during pregnancy and complete continued of care. Women who were exposed to radio were more likely to have more ANC contacts and complete continuum of care. The influence of media on access to maternal healthcare services could be attributed to the role media houses play in reducing knowledge gaps by sensitizing women on the benefits of healthcare seeking and utilization which leads to positive attitudes, challenges negative social norms and improves health seeking behavior [29, 30]. As a result, media exposed women have been shown to be associated with increased ANC contacts in our analysis and in previous studies [30, 31] which increases their likelihood to have adequate health education sessions and most likely to have health facility utilization during childbirth and postnatal care hence complete continuum of care [32]. Furthermore, people who are exposed to media are more likely to be educated, have discussions with others which interpersonal interactions contribute greatly in challenging negative norms that might affect health seeking and hence lead to positive health seeking behavioral change [32, 33]. Exposure to media has been shown in previous studies to have a positive association with continuum of care [4, 31].

Women and those with partners who had attained at least a tertiary level of education were more likely to have complete continuum of care compared to their uneducated counterparts. Higher levels of education have been shown to be associated with better maternal health literacy, more receptive to new health related information, increased awareness of available health resources, better decision-making abilities and more financial resources which factors increase their likelihood of accessing maternal healthcare services [24, 34]. With improved maternal health literacy, women become more informed about maternal health care issues which enables them to make positive health care decisions [35]. In most parts of sub-Saharan Africa including Zambia, the patriarchal system is practiced, hence men have a crucial role in the decision-making process, household resource control and allocation which affects women's access to healthcare [18]. Education has been shown to help challenge negative norms and lead to better healthcare decision making hence educated men are more likely to support their women to have continuum of care [18]. Therefore, the government of Zambia needs to intensify education to post-secondary level and also improve or start maternal health programs targeting the less educated women and their partners. Education has been shown in previous studies to be associated with continuum of care [4, 18, 24].

Strengths And Limitations

This is the foremost nationwide analysis that explores continuum of maternity care services. Therefore, it can be used as a yardstick and motivation for further studies on related subject matter in order to ensure effective maternal healthcare program implementation. Secondly, we used the most current nationally

representative data hence the findings are generalizable to women in Zambia. However, use of cross-sectional data only enables associations to be established but not causal relationships. Sixty-three (0.9%) of the 7325 women could not recall the number of ANC contacts they had and these were categorized among those who discontinued care which might have slightly reduced the percentage of women who had complete continuum of care. Lastly, the possibility of recall bias due to self-reported answers.

Conclusion

This study demonstrated only two out of five women were able to utilize the entire continuum of maternity care services. Level of education of the women and that of their partners (tertiary), early timing of ANC initiation, residing in other provinces other than the Western province, and exposure to radio were positively associated with completion of maternity continuum of care. Thus, we recommend the different stakeholders engaged in maternal health care to focus on women whose levels of education and that of their partners are below tertiary especially those residing in the Western province to ensure utilization of the entire continuum of maternity care. Utilization of mass media especially radio to sensitize the population on the benefits of continuum of care should be encouraged with great attention given for early initiation of ANC, increasing the number of ANC contacts, health facility and skilled birth attendance during childbirth and postnatal care.

Abbreviations

AOR Adjusted Odds Ratio

CI Confidence Interval

COR Crude Odds Ratio

DHS Demographic Health Survey

ZDHS Zambia Demographic Health Survey

OR Odds Ratio

SD Standard Deviation

WHO World Health Organization

SPSS Statistical Package for Social Science

ANC Antenatal care

PNC Post-natal care

Declarations

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Availability of data and materials

The data set used is openly available upon permission from MEASURE DHS website (URL: <https://www.dhsprogram.com/data/available-datasets.cfm>).

Authors' contributions

QS Conceived the idea, drafted the manuscript, performed analysis and interpreted the results. MWM, LMM, EO and DM participated in the design of the study and helped in results interpretation and writing. All authors read and approved the final manuscript.

Ethics approval and consent to participate

High international ethical standards are ensured for MEASURE DHS surveys as ethical approval from the country is obtained from a national ethical review board and local authorities before implementing the survey and well-informed verbal consent is sought from the respondents prior to data collection [36, 37]. For the 2018 ZDHS, ethical approval was obtained from the Inner City Fund (ICF) and the Zambia Tropical Diseases Research Centre (TDRC), institutional review boards (IRBs) [38]. All methods of data collection were performed in accordance with the relevant guidelines and regulations. This data set was obtained from the MEASURE DHS website (URL: <https://www.dhsprogram.com/data/available-datasets.cfm>) after getting their permission and no formal ethical clearance was obtained since we conducted secondary analysis of publicly available data.

Consent for publication

Not applicable.

Competing interests

All authors declare that they have no competing interests.

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