Under-five death and uptake of health interventions for subsequent children: Evidence from high mortality settings in sub-Saharan Africa

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Abstract

Research discourse about effects of child mortality on subsequent fertility has identified behavioural replacement as a potential mechanism. Available evidence from high mortality settings of sub-Saharan Africa supports this hypothesis. Extending the argument further, an empirical question of research interest is "does experience of under-five death motivate women in high mortality settings of sub-Saharan Africa to seek preventive and curative health interventions for their subsequent children? We conducted exploratory analyses using reproductive history data from demographic and health surveys conducted in Nigeria (2018), Chad (2014-15), Burundi (2016-17), and Lesotho (2014). Outcome variables included full vaccination status, treatment of diarrhoea and symptoms of acute respiratory tract infections. Results showed that in Nigeria, death of a preceding child was not associated with treatment of diarrhea (OR_{adj}=1.13, CI: 0.76-1.69), ARI symptoms (OR_{adj} = 0.61, CI: 0.31-1.17) and full vaccination (OR_{adj} = 1.09, CI: 0.86-1.39). Similar results were obtained for Chad and Burundi. In Lesotho, death of a preceding child was associated with higher likelihood of diarrhea treatment were (OR_{adj} = 16.82, Ci: 1.69-167.57). These findings suggest that childbearing women rarely learn lessons from childhood mortality experiences to improve their childcare practices and behaviour. Several questions are still open for further exploration.

BACKGROUND

While several studies have investigated the determinants of childhood mortality at multiple levels, the consequences and response of mothers especially for subsequent births have received lesser empirical attention. In pronatal African settings, Child death can affect family stability, woman's health and psychological status, socio-economic security and reproductive behaviour (Defo, 1998). Of these potential effects, the fertility response to child loss (or mortality) is arguably the most studied. The consensus evidence from analysis of micro-level data is that death of a child is significant driver of subsequent fertility behaviour among women in sub-Saharan Africa (Defo, 1998, Ewemade et al., 2019). These often operate via shorter birth intervals aided by discontinuation of contraceptive use. This situate well within the "behavioural replacement hypothesis" which is one of the four pathways by which child mortality influence fertility (Preston, 1978). Certainly, there is a conscious desire among women to replace a lost child. Beyond this reproductive desire, does experience of child death extend to health care-seeking behaviour for children? Logically, and judging from the replacement hypothesis, it is expected that when a woman gives birth after the death of a child, she would want to take extra preventive and curative measures to ensure that the child survive. That is all things being equal, uptake of child health interventions would be higher in those who experienced death of a preceding child. Similar investigation into uptake of maternal healthcare services showed that prior experience of child death had no influence on the uptake maternal healthcare in subsequent births (Akinyemi et al., 2018). It is not clear if same would apply to child healthcare services.

Key child survival interventions include immunization, malaria prevention through use of insecticide-treated nets and treatment of common childhood illnesses such as diarrhea and symptoms of acute respiratory tract infections. Vaccination against preventable diseases is one of those interventions that have impacted positively on child survival. It is estimated that every year, about 1.5 million under-five children die from vaccine preventable diseases (McGovern and Canning, 2015). Although the effectiveness of these child survival interventions is not in doubt, their uptake is the main challenge in many sub-Saharan Africa settings. Previous studies have identified the socio-economic and cultural characteristics as the leading demand side factors affecting care-seeking behaviour and utilisation of these interventions (Tsawe et al., 2015, Mukungwa, 2015, Adinan et al., 2017, Quansah et al., 2016). Taking cue from a popular maxim that says "once beaten twice shy", the expectation is that experience of child death would serve as motivation for women to take preventive

measures against mortality for their subsequent children. If this were to be so, then phenomenon such as childhood death clustering and persistent high level of childhood mortality can be effectively reduced. Therefore, the empirical question of research interest in this paper is "does experience of under-five death motivate women in high mortality settings of sub-Saharan Africa to seek preventive and curative health interventions for their subsequent children?"

METHODS

We selected one country from each sub-region (East, West, Central and Southern) based on two criteria: (1) availability of demographic and health survey (DHS) data collected not earlier than 2014 or (2) highest level of under-five mortality in each sub-region. Based on these premises, the countries and year of DHS selected were: Nigeria (2018), Chad (2014-2015), Burundi (2016-2017) and Lesotho (2014).

The DHS is a cross-sectional household survey conducted every five years on nationally representative samples in several developing countries since the 1990s. Uniformity of sample design, survey questionnaire and variables across countries permit pooling of data and conduct of multi-country analysis.

Outcome variables included the following health and survival interventions for the index child: vaccination, treatment of diarrhoea and symptoms of acute respiratory tract infections (ARI). Definition and derivation of outcome variables followed same procedure used in previous studies (Akinyemi et al., 2016, Akinyemi et al., 2019). A child aged 12-23 months was classified as having received full vaccination if he/she had received *Bacillus Calmette–Guérin (*BCG) vaccination against tuberculosis; three doses of vaccine to prevent diphtheria, pertussis, and tetanus (DPT) ; at least three doses of oral polio vaccine (OPV); and one dose of measles vaccine (WHO, 2015). A child with diarrhea in the past two weeks was classified as having received treatment if the mother reported visiting a public or private health facility for care. A similar criterion was used for symptoms of ARI (cough at any time in the last 2 weeks, breathing faster than usual with short, rapid breaths or have difficulty breathing).

The main explanatory variable was survival status of immediate preceding child. Relevant demographic and socio-economic characteristics were controlled in multivariable analysis. Analysis was restricted to second and high order births because the main explanatory variable

will not be applicable to first births. Analysis involved the use of descriptive statistics and lagged logit models (Akinyemi et al., 2018). Each outcome was analysed separately for each country. Unadjusted and adjusted models were fitted to explore the relationship between death of preceding child and use of child healthcare services. Strength of association between variables was quantified as adjusted odds ratio (OR_{adj}) with 95% confidence interval (95% CI).

RESULTS

Background characteristics

Table 1 shows the maternal and children characteristics in the four countries selected for analysis. For Nigeria, 75% of under-five children had mothers aged 20-34 years. Only 30.1% of children had mother with secondary education; 46.2% were from women with no formal education. The commonest maternal occupation was sales/petty trading (43.4%). About 4 out of 10 children were from women in urban areas. The sex distribution of children showed that 51.9% were males while multiple births constituted 3.2%. More than half were births order 4 and above (56.5%). In terms of preceding birth interval, 38.9% had interval of at least 36 months. Distribution of background characteristics among children whose immediate preceding child died was similar to those of the entire sample with few exceptions for maternal education, place of residence, and birth interval. About 61% of those whose predecessors died had mothers with no formal education while 25% had primary education. Furthermore, three-quarter (74.5%) of these dwelt in rural areas; and about one-third (34.4%) had preceding birth interval less than 24 months.

In Chad, distribution of some variables followed a pattern similar to that of Nigeria. Such variables include maternal age, occupation, household wealth index, sex of child, birth order and birth interval. The results revealed that 65% of children's mothers had no formal education and 82.8% were from rural areas. The distribution of variables among children who lost their predecessors was similar to that of the entire sample.

Data for Burundi also share similar pattern with Nigeria in terms of maternal age, wealth index, sex of child, multiplicity of birth, preceding birth interval and birth order. Other variables showed some contrasting patterns. For instance, 46.1% of children had mothers with no formal and primary education respectively. In addition, 84.7% of under-fives belonged to mothers engaged in agriculture/manual occupation; while 92.1% live in rural

areas. The profile of children whose predecessors died followed a pattern similar to those of the entire sample for Burundi; however some exceptions are notable. A greater percentage had mothers with no formal education. Furthermore, 92.1% belonged to mothers employed in agriculture/manual labour. One-third had households in the poorest wealth quintile.

The maternal characteristics for the Lesotho data differ mostly in terms of socio-economic variables. For instance, more than half of under-five children had mothers with primary education (55.7%) while 38.8% attained secondary level. Unlike the other three countries, 60.3% had mothers who were not working while 23.5% were employed in agriculture/manual work. About three-quarter of under-five children live in rural settings. Among children whose predecessors died, 46.7% and 53.3% had mothers with primary and secondary education respectively. Many of the other variables in this group of children had similar distribution to those described for the entire sample for Lesotho.

Death of preceding child and uptake of child healthcare services

Uptake of the three healthcare services is summarised in Figures 1-4. In Nigeria (Fig. 1), uptake of medical treatment for diarrhea (61.9% vs 65.0%) and ARI symptoms (67.2% vs 57.0%) as well as full vaccination (31.0% vs 25.7%) was slightly higher among children whose predecessors were alive. The pattern was the same in Burundi but it was reversed in Chad (Fig. 2) and Lesotho (Fig 4.) though with varying magnitudes.

Results of logit models to explore the independent association between death of preceding child and uptake of child healthcare services are presented in Tables 2-4. In Nigeria, both the unadjusted (OR = 1.15, CI: 0.78-1.68) and adjusted model (OR_{adj}=1.13, CI: 0.76-1.69) revealed that death of preceding child was not associated with treatment of diarrhea symptoms (Table 2). Similarly, in Chad and Burundi, there was no association between the two variables. However, for Lesotho, the odds of diarrhea treatment were higher when the preceding child did not survive (OR_{adj} = 16.82, Ci: 1.69-167.57).

Table 3 showed that death of a preceding child was not associated with uptake of treatment for ARI symptoms in Nigeria (OR_{adj} = 0.61, CI: 0.31-1.17), Chad (OR_{adj} = 1.47, CI: 0.62-3.51) and Burundi (OR_{adj} = 0.95, CI: 0.40 – 2.23). Models were not fitted for Lesotho due to sample size limitations.

Models for full vaccination revealed similar findings (Table 4). Whether a preceding child survived or not had no relationship with childhood vaccination in Nigeria (OR_{adj} = 1.09, CI:

0.86-1.39), Chad (OR_{adj} = 1.28, CI: 0.90-1.83), Burundi (OR_{adj} = 0.74, CI: 0.45-1.21) and Lesotho (OR_{adj} = 1.02, CI: 0.41-2.51).

DISCUSSION AND CONCLUSION

In this study, birth history data from Nigeria, Chad, Burundi and Lesotho were analysed to investigate whether death of an immediate preceding child motivate better uptake of child healthcare services for the next child. Selected services were medical treatment of diarrhea and ARI symptoms as well as full vaccination.

Our findings showed that death of preceding child was not associated with any of the child healthcare services in Nigeria, Chad and Burundi. These results are similar to those found in a similar study which also revealed that death of a preceding child did not motivate for better utilisation of maternal healthcare services in Nigeria (Akinyemi et al., 2018). The main intention in these studies was to explore whether childbearing women learn any lessons from childhood mortality experiences in order to improve their childcare practices and behaviour. Though not conclusive, the available evidence suggests that this is rarely so.

In Lesotho, the likelihood of diarrhea treatment was higher in children whose predecessors were not alive. Although the present data is not sufficient to explain why this is so; this departure from the pattern in other three countries suggests that such heterogeneity may be present in several other countries. The information on diahhrea/diahhrea treatment available to mothers may have been responsible. Similarly, a lot of health system related factors could have plaid some roles. These factors were not included in analyses and therefore, very little could be said about them.

There are many unanswered questions in this discourse. For example, what do childbearing women think about the causes of childhood deaths? Do they see any linkage between use or non-use of child healthcare services and wellbeing/survival of their children? How best do they think child survival could be promoted? Even though the effectiveness of maternal and child health interventions are empirically proven, how much of these information is available to women especially those without formal education and living in rural areas? This is one area where health awareness and advocacy programmes may need some tinkling. There is a need for strategies to increase demand for these effective child health services among those that are most vulnerable and at risk of experiencing childhood deaths.

Three countries are too few to draw definite conclusions about relationship between death of a child and uptake of healthcare services for subsequent infants/children. Therefore, a logical next step is to extend this exploration to more countries. Secondly, stronger objective evidence could have been possible if there was data on use of healthcare services for all children. Then, it would have been possible to deeply investigate the health-seeking behaviour for all children born to the same mother. These can be explored with data from health and demographic surveillance systems if relevant variables are available. Lastly, it is also important to situate the findings within the overall system designed for promoting child health and survival in different countries.

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Table 1: Background characteristics and death of preceding child in Four Sub-Sahara African Countries

	Nigeria (2018)		Chad (2014-15)		Burundi (2016-17)		Lesotho (2014)	
Maternal variables	**All children (n=25093)**	**Death of preceding child (n=3012)**	**All children(n= 14465)**	**Death of preceding child (n =1827)**	**All children (n =10492)**	**Death of preceding child (n=827)**	**All children (n=1777)**	**Death of preceding child (n=182)**
Age of mother (years)								
< 20	4.4	7	8.9	12.3	0.8	0.8	1.6	9.9
20-34	74.7	73.3	75.3	70.9	75.8	72	78.8	81
>=35	20.9	19.7	15.8	16.8	23.4	27.2	19.6	9.2
Maternal education								
No formal education	46.2	60.7	65.4	56.9	46	52.5	0.9	0
Primary	15.5	12.5	25	31.7	46.1	41.1	55.7	46.7
Secondary	30.1	20.6	9	11.5	7.4	6.4	38.8	53.3
Higher	8.2	6.3	0.5	0	0.5	0	4.6	0
Occupation								
Not working	26.6	30.3	42.8	34.9	6	1.89	60.3	61.2
Professional/ Services	10.7	9.3	0.7	0	5.2	4.5	8.4	10.8
Sales	43.4	45.9	37.4	48.8	4.1	1.6	7.7	7
Agric/Manual	19.1	14.2	19.1	16.3	84.7	92.1	23.5	21
Household wealth index								
Poorest	23.2	31.5	19.7	20.7	21.3	30.7	27.7	19.6
Poorer	22.2	30.1	23.9	24.9	21.7	27.3	20.9	17.2
Middle	20	17.9	21.3	21.3	22.4	19.6	19	34
Richer	18.3	11.8	20.3	19.1	19.2	15.3	15.9	20.3
Richest	16.3	8.8	14.8	14.1	15.4	7.2	16.6	8.9
Type of residence								
Urban	38.4	25.5	17.2	16.9	7.9	3.6	26.4	19.8
Rural	61.6	74.5	82.8	83.1	92.1	96.4	73.6	80.2
Child variables								
Sex								
Male	51.9	54.4	51	52.3	50.1	49.9	48.6	42.6
Female	48.1	45.6	49	47.7	49.9	57.1	51.4	57.4
Multiple birth								
No	96.8	97.1	96.9	96.6	97.9	94.9	97.7	95.7

Yes	3.2	2.9	3.2	3.4	2.1	5.1	2.4	4.3
Birth order								
2	24.1	20.8	17.4	16	21.9	23.3	39.9	28.3
3	19.4	16.7	16.1	17.2	20.1	16.3	29.4	36
>=4	56.5	62.5	66.4	66.8	57.5	60.4	30.7	35.7
Preceding birth interval								
< 24 months	20.5	34.4	23.5	28	15.2	47.7	7.2	26.6
24-36 months	40.6	35.8	39.5	39.8	41.5	29.5	30.7	28.8
>=36 months	38.9	29.8	36.9	31.8	43.2	21.9	62.2	44.6
Age of child (months)								
0 - 11	20.1	20.3	20.6	20.1	20.5	19.8	21.5	18.2
12 - 23	19.9	20.8	17.7	19.1	21.4	18.8	20.9	20.5
24 - 35	19	17.8	19	18.3	18.7	17.5	21.4	26.4
>=36	41	41.1	42.8	42.6	39.5	43.9	36.2	34.8

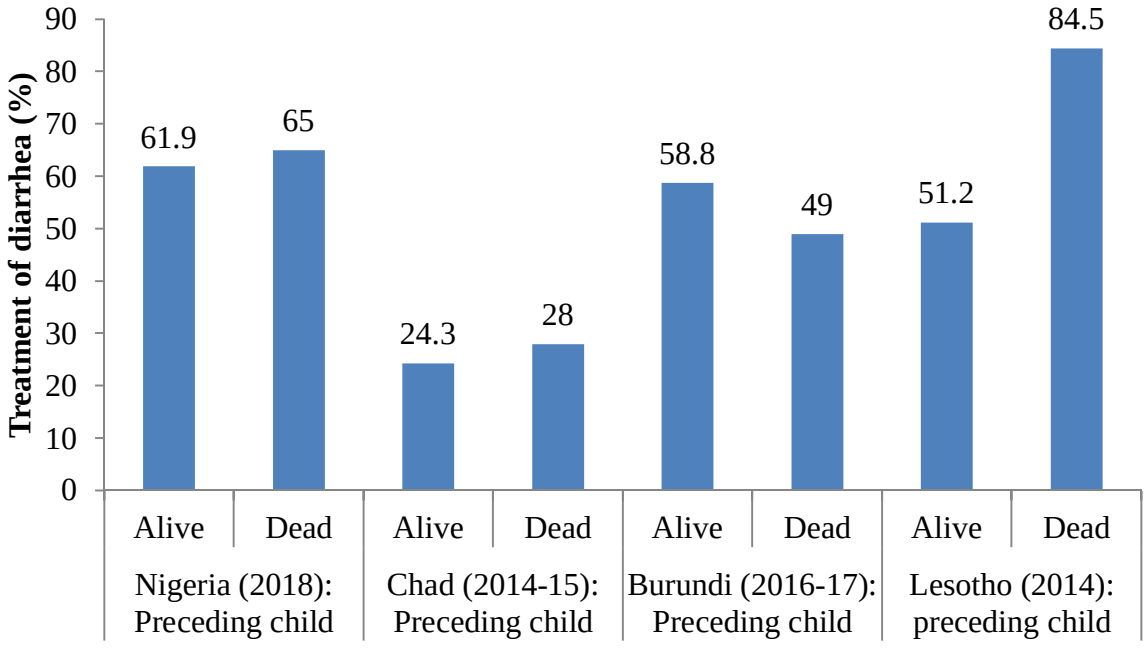

Fig. 1: Diarrhea treatment according to survival status of preceding child in four African countries

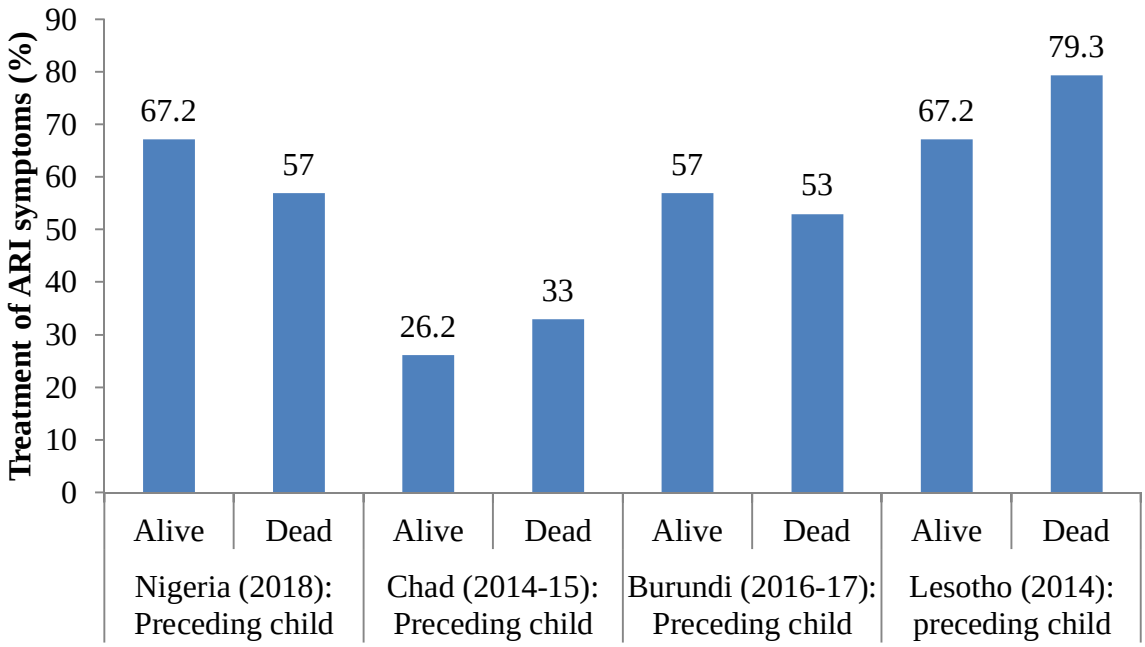

Fig. 2: Treatment of ARI symptoms according to survival status of preceding child in four African countries

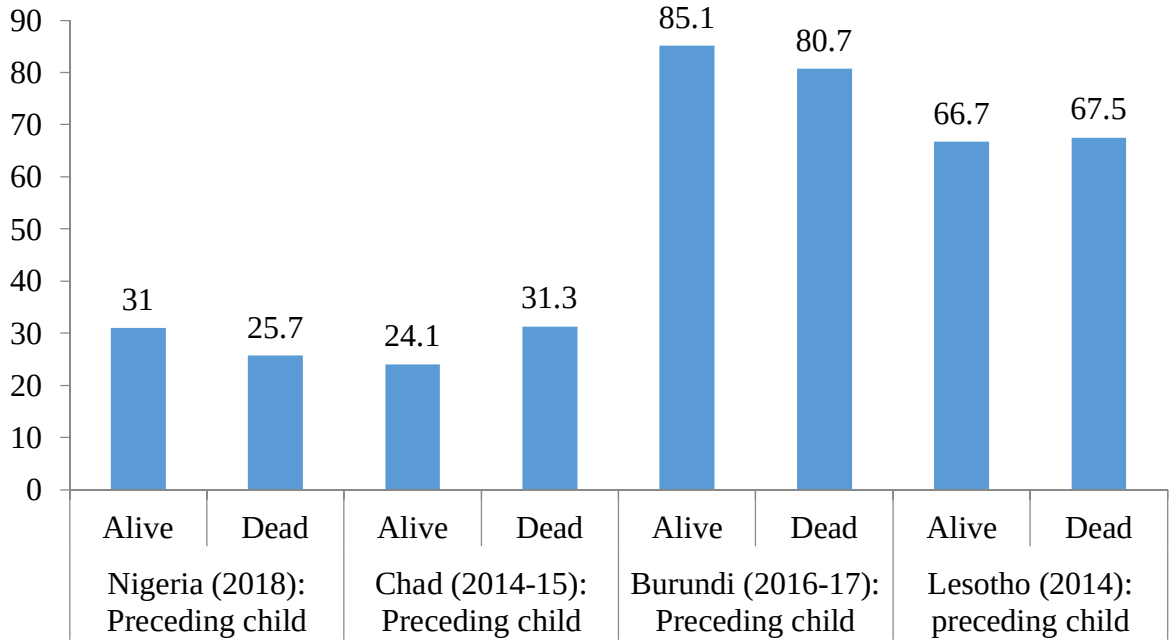

Fig. 2: Full vaccination according to survival status of preceding child in four African countries

Table 2: Association between death of preceding child and uptake of treatment for diarrhea in Four Sub-Sahara African Countries

	Nigeria (2018)	Chad (2014-15)	Burundi (2016-17)	Lesotho (2014)
Variables	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Unadjusted model				
Death of preceding child	1.15 (0.78-1.68)	1.24(0.68 - 2.28)	0.68(0.39 -1.19)	5.19(0.93-29.02)
Adjusted model				
Death of preceding child	1.13 (0.76-1.69)	1.18(0.26 - 1.33)	0.62(0.34 -1.15)	16.82(1.69 -167.57)
Age of mother (years)				
< 20				
20-34	1.18(0.58 -2.40)	0.59(0.26 - 1.33)	0.11(0.01 -0.97)	
>=35	0.95(0.42 - 2.15)	0.50(0.19- 1.34)	0.10(0.01 -0.97)	2.42(0.26 - 22.55)
Maternal education				
No formal education	1.35(0.89 - 2.07)	1.57(0.96 -2.57)	1.41(1.00 - 1.97)	
Primary	1.01(0.65 - 1.57)	2.86(1.42 -5.73)	0.90(0.38 - 2.11)	2.27(0.50 - 10.38)
Secondary	0.76(0.32 - 1.83)			
Higher				
Occupation				
Not working				
Professional/Services	0.91 (0.47 - 1.76)	1.95(0.11 - 33.35)	1.61(0.48 -5.41)	2.35(0.34 -16.11)
Sales	1.39(0.97 -1.99)	0.99(0.61 -1.59)	2.90(0.83 -10.120	
Agric/Manual	0.95 (0.63 -1.44)	1.23(0.69 - 2.19)	2.14(1.02 - 4.51)	0.86(0.20 - 3.64)
Household wealth index				
Poorest				
Poorer	1.26(086 - 1.84)	1.52(0.77-3.02)	1.09(0.68 -1.74)	0.35(0.07 -1.84)
Middle	1.14(0.72 - 1.80)	1.84(0.96 - 3.51)	1.11(0.69 - 1.80)	0.26(0.04 - 1.72)
Richer	1.39(0.79 - 2.45)	1.94 (0.99 - 3.79)	1.24(0.75 - 2.05)	0.11(0.02 - 0.61)
Richest	2.99(1.44 - 6.22)	4.34(1.60 - 11.82)	0.95(0.47 - 1.90)	1.72(0.06-47.44)
Type of residence				
Urban				
Rural	0.90(0.60 - 1.35)	1.83(0.77 -4.37)	0.97(0.47 - 1.99)	0.33(0.05 - 2.16)
Child variables				
Sex				
Male	1.01(0.75 - 1.35)	1.20(0.80 - 1.80)	1.21(0.88-1.66)	1.09(0.29 - 4.09)
Female				
Multiple birth				
No				
Yes	3.50(1.08 - 11.36)	0.83(0.30 -2.34)	1.61(0.47 -1.03)	0.09(0.00 - 7.86)
Birth order				
2				
3	1.31(0.80 - 2.14)	1.59(0.75 -3.37)	0.67(0.40 -1.12)	0.18(0.03 - 1.17)
>=4	1.52(0.97 -2.38)	2.45(1.20 - 4.97)	0.66(0.42 -1.03)	0.27(0.03 - 2.34)
Preceding birth interval				
< 24 months				
24-36 months	0.69 (0.45 - 1.04)	1.03(0.60 -1.74)	0.98(0.58 - 1.67)	0.61(0.14-2.61)
>=36 months	0.77 (0.50 - 1.21)	0.91(0.54 -1.53)	0.76(0.54 - 1.08)	

Table 3: Association between death of preceding child and uptake of treatment for ARI symptoms in Four Sub-Sahara African Countries

	Nigeria (2018)	Chad (2014-15)	Burundi (2016-17)
Variables	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Unadjusted model			
Death of preceding child	0.65 (0.34-1.21)	1.39(0.61 -3.14)	0.85(0.39 -1.83)
Adjusted model			
Death of preceding child	0.61 (0.31-1.17)	1.47(0.62 -3.51)	0.95(0.40 -2.23)
Age of mother (years)			
< 20			
20-34	1.14(0.41 -3.16)	1.09(0.33 - 3.59)	1.06(0.19 - 5.90)
>=35	1.13(0.35 - 3.64)	0.64(0.13 - 3.08)	1.40(0.23 - 8.69)
Maternal education			
No formal education	1.67(0.85 - 3.28)	1.67(0.80 - 3.45)	1.23(0.77 - 1.94)
Primary	1.02(0.50 - 2.09)	1.68(0.55 - 5.11)	1.57(0.43 -5.75)
Secondary	1.14(0.20 - 6.56)		
Higher			
Occupation			
Not working			
Professional/Services	1.47(0.57 - 3.81)		0.47(0.08 - 2.84)
Sales	1.72(0.93 -3.18)	1.17(0.55 - 2.44)	0.39(0.06 - 2.34)
Agric/Manual	0.88(0.46 - 1.69)	0.58(0.20 - 1.65)	1.15(0.36 -3.66)
Household wealth index			
Poorest			
Poorer	1.24(0.65 - 2.36)	3.00(0.99 - 9.02)	0.77(0.41 - 1.43)
Middle	1.46(0.73 - 2.92)	0.79(0.26 - 2.44)	1.17(0.62 - 2.21)
Richer	2.38(0.93 - 6.11)	1.23(0.36 - 4.18)	1.50(0.77 - 2.92)
Richest	10.67(1.87 -60.76)	3.33(0.73 -15.10)	3.11(1.14 - 8.51)
Type of residence			
Urban			
Rural	1.28(0.65 - 2.51)	0.68(0.19 - 2.37)	2.58(0.96 -6.93)
Child variables			
Sex			
Male	0.97(0.60 - 1.56)	0.94(0.50 - 1.78)	1.72(1.12 - 2.65)
Female			
Multiple birth			
No			
Yes	3.39(0.74 - 15.60)	0.66(0.16 -2.68)	1.85(0.54 -6.34)
Birth order			
2			
3	0.52(0.24 -1.10)	0.67(0.23 -1.94)	1.32(0.68 -2.59)
>=4	0.72(0.38 - 1.36)	0.92(0.38 - 2.25)	0.81(0.44 -1.49)
Preceding birth interval			
< 24 months			
24-36 months	1.13(0.58 - 2.17)	1.93(0.83 -4.47)	1.09(0.53 -2.24)
>=36 months	1.16(0.59 - 2.31)	1.30(0.63 -2.69)	1.55(0.75 - 3.19)

Table 4: Association between death of preceding child and full vaccination in Four Sub-Sahara African Countries

	Nigeria (2018)	Chad (2014-15)	Burundi (2016-17)	Lesotho (2014)
Variables	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Unadjusted model				
Death of preceding child	0.77(0.61 - 0.96)	1.44(1.01 -2.05)*	0.73(0.46 - 1.17)	1.04(0.45 -2.38)
Adjusted model				
Death of preceding child	1.09(0.86 - 1.39)	1.28(0.90 -1.83)	0.74(0.45 - 1.21)	1.02(0.41 -2.51)
Age of mother (years)				
< 20				
20-34	2.62(1.59 - 4.33)	1.10(0.68 -1.77)	1.53(0.42 -5.53)	3.96(0.26 - 60.35)
>=35	2.89(1.68 - 4.99)	1.02(0.56 - 1.83)		7.10(0.40 -125.63)
Maternal education				
No formal education	2.15(1.58 - 4.33)	1.62(1.20 - 2.19)	1.55(1.18 -2.04)	11.38(1.33 -97.20)
Primary	2.50 (1.99 - 3.15)	2.97(1.95 - 4.51)	1.81(0.92 - 3.55)	10.54(1.15 -96.24)
Secondary	3.36(2.35 - 4.81)	1.39(0.32 - 6.06)	6.77(0.72 -63.17)	19.96(1.20 -330.71)
Higher				
Occupation				
Not working				
Professional/Services	1.67(1.28 -2.18)	2.56(0.67 -9.81)	1.18(0.55 - 2.51)	2.93(0.63 - 13.64)
Sales	1.30(1.06 - 1.59)	2.09(1.58 - 2.76)	2.79(1.07 - 7.28)	0.81(0.29 - 2.26)
Agric/Manual	1.18(0.93 - 1.49)	0.83(0.58 - 1.17)	1.41(0.81 -2.45)	0.87(0.46 - 1.64)
Household wealth index				
Poorest				
Poorer	1.21(0.95 - 1.56)	1.19(0.81 -1.74)	1.71(1.16 -2.52)	1.61(0.81 - 3.20)
Middle	1.32(1.01 - 1.73)	1.12(0.76 - 1.66)	1.39(0.96 - 2.02)	4.41(1.94 - 10.03)
Richer	1.88(1.40 - 2.53)	1.05(0.71 - 1.57)	1.49(1.01 - 2.20)	2.36(0.94 -5.89)
Richest	2.87(2.06 -4.00)	1.77 (1.03 - 3.06)	1.30(0.75 - 2.25)	1.00(0.29 - 3.43)
Type of residence				
Urban				
Rural	0.86(0.72 -1.03)	1.33(0.84 - 2.10)	1.84(1.02 - 3.31)	0.65(0.28 - 1.52)
Child variables				
Sex				
Male	1.02(0.88 -1.19)	0.87(0.69 -1.11)	0.91(0.70 - 1.18)	1.15(0.68 - 1.94)
Female				
Multiple birth				
No				
Yes	1.60(1.08 - 2.39)	1.61(0.78 - 3.28)	0.76(0.33 -1.74)	0.78(0.10 - 5.84)
Birth order				
2				
3	0.92(0.72 - 1.18)	1.32(0.87 - 2.04)	1.66(1.11-2.50)	1.42(0.73 -2.75)
>=4	0.97(0.78 - 1.21)	1.46(0.99 -2.15)	1.34(0.93 -1.91)	1.03(0.50 -2.10)
Preceding birth interval				
< 24 months				
24-36 months	0.83(0.66 -1.03)	0.88(0.64 -1.20)	2.78(0.27 -27.79)	1.12(0.41 -3.12)
>=36 months	0.85(0.72 -1.02)	0.94(0.71 - 1.23)	2.13(0.21 -21.50)	1.16(0.44 - 3.04)