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Trends and Determinants of Neonatal Mortality in Uganda: Further Analysis of the Demographic and Health Surveys

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Additional information about the 2016 UDHS or other UDHS surveys may be obtained from the Directorate of Population and Social Statistics, Uganda Bureau of Statistics, Colville Street, P.O. Box 7186, Kampala, Uganda; telephone +256-414-706000; email: ubos@ubos.org; internet: www.ubos.org.

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ABSTRACT

The study examined demographic and socioeconomic factors associated with neonatal deaths in Uganda. Uganda's neonatal mortality has stagnated at 27 deaths per 1,000 live births over the past decade, risks missing the UN Sustainable Development Goal for reducing neonatal deaths. Studying consistent factors over time that are associated with neonatal mortality could inform policy to reduce it. We used data from the Uganda Demographic and Health Surveys conducted in 2001, 2006, 2011, and 2016. Due to the rare nature of the outcome variable (neonatal deaths), we used a complementary log-log model and controlled for complex survey design in analyses.

Our study found that over the past decade children who were not put on breast milk immediately after birth and children of mothers with multiple risk factors for childbearing (too young, too old, too soon, too many) were associated with higher odds of neonatal deaths. We conclude that consistent significant factors associated with increased neonatal mortality include delayed breastfeeding after birth and multiple maternal risk factors. There is a need to sensitize mothers about the importance of breastfeeding newborns immediately after birth. Interventions to reduce the number of teenage pregnancies and promotion of contraceptive use to help avoid higher-risk childbearing are critical to reducing the prevalence of neonatal mortality in Uganda.

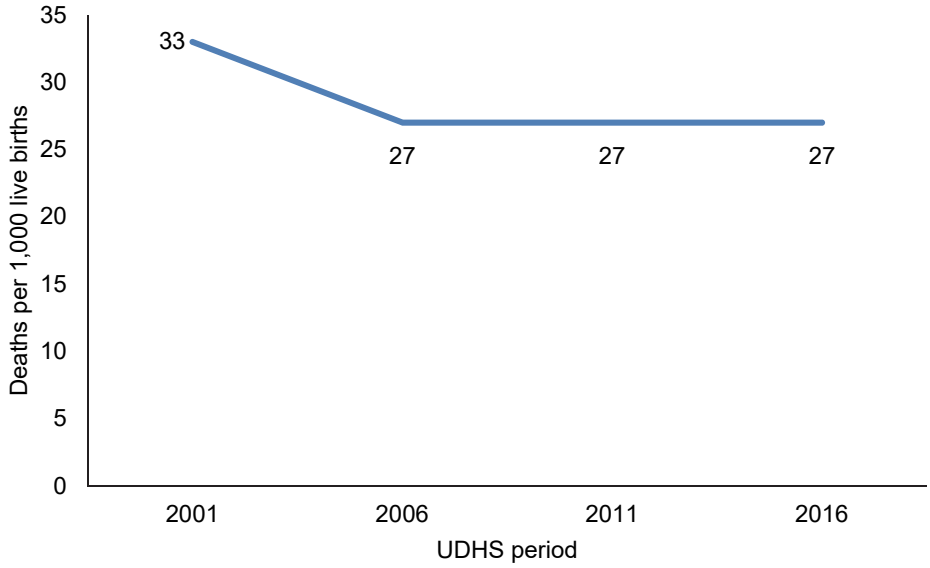
Key words: Neonatal mortality, Uganda, children under age 5, trends

1 INTRODUCTION

Globally, 8.2 million children under age 5 die each year, and more than 40% of these are neonatal deaths, occurring before 30 days of life. In sub-Saharan Africa alone, 1.2 million newborns die every year (Kananura, Tetui, Waiswa, and Kiwanuka 2016), and the area has the highest risk of neonatal deaths among the 186 countries studied in 2013 (Oza, Cousens, and Lawn 2014). In Uganda, 1 child in every 16 does not survive to the fifth birthday, and neonatal deaths account for 42% of under-5 deaths (UBOS and ICF 2018). The Millennium Development Goal on improving under-5 survival, where neonatal mortality is a high proportion of all under-5 deaths, was not achieved (UNDP 2015). Neonatal mortality has stagnated over the last decade, and risks missing the current targets in Uganda for the UN Sustainable Development Goal for reducing neonatal mortality.

As Figure 1 shows, Uganda's neonatal mortality ratio declined from 33 deaths per 1,000 live births in 2001 to 27 deaths per 1,000 live births in 2006, but no change in the ratio occurred between 2006 and 2016. Therefore, identifying factors associated with neonatal mortality could help policymakers to improve early childhood survival.

Figure 1 Trend in Uganda's neonatal mortality, 2001 to 2016



Source: Uganda Demographic and Health Surveys (https://www.statcompiler.com/en/)

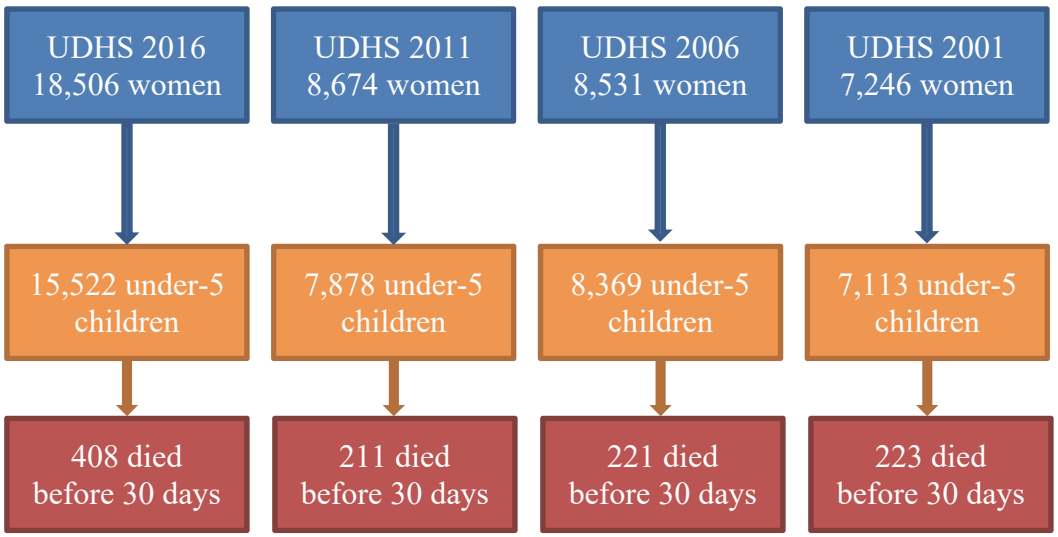
As cited in Kananura et al. (2016), the major causes of Uganda's neonatal deaths include sepsis/pneumonia, tetanus, diarrhea, prematurity, and birth asphyxia (Liu et al. 2012). Other studies show that poor access and utilization of health services during pregnancy and childbirth, especially the high number of deliveries that take place without skilled birth attendants, are also associated with neonatal deaths. Risk factors including mothers too young (below age 18), too old (age 35 and older), with short birth intervals, and with too many children have also been associated with high rates of neonatal mortality (GSS et al. 2004). However, there is limited literature on the demographic and socioeconomic factors that have consistently over time been shown to be associated with neonatal deaths in Uganda. The objectives of this paper were to explore demographic and socioeconomic factors that have consistently over time been associated with neonatal mortality.

2 METHODS

2.1 Data Used

The study used a series of data from the Uganda Demographic and Health Surveys (UDHS) for 2001, 2006, 2011, and 2016. Across these surveys, similar sampling designs were applied, using a two-stage cluster sampling to generate a nationally representative sample of households. In the first stage, clusters were selected from sampling frames using the most recent available census. In the second stage, households were selected from each cluster. In each of the surveys there was stratification of urban and rural areas for the different sampled clusters. This study used data from women age 15-49 interviewed in the UDHS about their children born within the 5 years prior to the survey. Figure 2 shows the selection process for the number of children considered in our analysis.

Figure 2 Selection of the number of children who died before age 1 month



2.2 Measurement of Variables and Statistical Methods

The statistical analyses focused only on children under age 1 month born to mothers age 15-49 in the 5 years prior to the different surveys. The analysis took into consideration the complex survey design, and weights were applied to ensure representativeness and to correct for nonresponse.

The outcome variable of interest was survival status of the child before age 1 month, which is a binary variable (dead or alive). The independent variables in the study included: place of residence; ethnicity; marital status of the mother; sex of the child; household wealth index; mother's religion; mother's education; mother's occupation; father's education; father's occupation; access to safe water for drinking; breastfeeding; access to information; women's empowerment; vaccination (tetanus); ever had fever; place of delivery; and risk factors for childbearing. A women's empowerment index was derived from survey responses on participation in decision-making on household purchases, visits to family relatives, and access

to health care. The index was categorized into three parts: 0 for low empowerment (no participation in decision-making); 1 for weak empowerment (participation in one or two types of decisions); and 2 for high empowerment (participation in all three types of decisions). We used four regions (Central, East, North, and West) to harmonize among the four surveys, since there have been variations in the number of regions across the survey period. Mother's age at the time of survey, birth order, and preceding birth interval were used to compute maternal risk factors associated with newborn mortality. The risk factors were considered as mother's age too young (under age 18) or too old (over age 34), birth interval too soon (birth intervals less than 2 years), or with too many births (more than four children). A composite variable showing children born to mothers with multiple risks for childbearing was computed from these risk factors and was used at the bivariate level and in the regression model.

Cross-tabulation of the outcome variable with the independent variables was carried out. At the multivariable level, an association between selected variables of interest and the outcome variable (survival status of children under age 1 month) was estimated using a complementary log-log model. This model was used because the outcome—neonatal death—is rare (Calabrese and Osmetti 2013). Results were accepted at the 95% confidence level. We tested for multicollinearity among the independent variables and excluded from the model the variables birth order and parity, which exhibited high correlation. One major limitation of the analysis is that medical factors associated with neonatal death were not considered, as they were not available in the dataset and were not a focus of the study.

3 RESULTS

Table 1 shows the association between the percentage of children who died before age 1 month and selected child and maternal background characteristics, among children born in the 5 years prior to the UDHS surveys, from 2001 to 2016. At the bivariate level, the only factor found to be significantly and consistently associated with higher neonatal mortality in each of the four surveys was mother not receiving a tetanus injection. Other factors that were significantly associated with higher levels of neonatal deaths in some of the surveys, particularly the 2016 UDHS, included: male children, children born to younger mothers (age 15-19) or older mothers (age 45-49), children of mothers who had fewer than four visits for antenatal care (ANC), and children not put on breast milk immediately.

Children born to mothers who received recommended doses of tetanus injection were significantly associated with a lower percentage of neonatal deaths, ranging from 1.6% to 2.4% over the survey period 2001 to 2016 compared with 3.5% to 4.4% among those whose mothers who did not receive any doses of the tetanus vaccine. Male children were significantly associated with higher neonatal mortality compared with females. Children whose mothers had less than four ANC visits were significantly associated with higher neonatal mortality compared with those who had the recommended four or more visits (WHO 2016). Children who were breastfed immediately after birth registered lower neonatal mortality, ranging from 1.1% to 2.2% over the survey period 2001 to 2016 compared with 2.9% to 3.7% among those who were not immediately breastfed. Children born to mothers with multiple risk factors were significantly associated with higher neonatal mortality compared to those with no risk factor.

Table 1 Percentage of children who died before age 1 month by selected child and maternal background characteristics, UDHS 2001 to 2016

	2016		2011		2006		2001	
Variable	**p-value/ percentage**	**n**	**p-value/ percentage**	**n**	**p-value/ percentage**	**n**	**p-value/ percentage**	**n**
Type of place of residence	**0.936**		**0.537**		**0.471**		**0.038**	
Urban	2.7	3,233	2.4	1,147	2.2	953	2.1	821
Rural	2.6	12,038	2.7	6,928	2.7	7,470	3.4	6,850
Region	**0.056**		**0.822**		**0.315**		**0.036**	
Central	3.2	4,106	2.9	2,129	2.8	1,942	3.0	2,173
Eastern	2.2	4,297	2.4	2,281	2.0	2,222	2.4	2,305
Northern	2.8	3,038	2.8	1,510	3.1	1,937	4.6	1,316
Western	2.3	3,829	2.6	2,155	2.7	2,323	3.7	1,878
Religion	**0.172**		**0.254**		**0.293**		**0.945**	
Catholic	2.7	5,904	3.0	3,350	2.7	3,716	3.4	3,159
Anglican	2.8	4,712	2.1	2,373	2.3	2,889	3.1	3,008
Moslem	3.0	2,199	2.3	1,055	2.3	936	3.2	1,009
Others	1.9	2,456	3.1	1,298	3.7	881	3.3	496
Sex of child	**0.012**		**0.029**		**0.000**		**0.116**	
Male	3.0	7,695	3.1	4,050	3.3	4,180	3.6	3,814
Female	2.3	7,576	2.2	4,026	1.9	4,243	2.9	3,858
Mother's age	**0.001**		**0.049**		**0.100**		**0.215**	
15-19	4.5	971	2.9	469	3.8	439	3.6	518
20-24	2.5	4,216	3.6	2,023	2.8	2,208	3.5	2,237
25-29	2.1	3,968	2.0	2,365	3.0	2,241	2.2	2,116
30-34	2.4	3,025	1.6	1,455	2.1	1,758	3.5	1,389
35-39	2.6	1,932	3.2	1,128	1.8	1,087	4.4	901
40-44	3.2	920	3.2	495	1.9	531	3.4	388
45-49	6.5	238	2.6	141	5.1	159	3.5	123

Continued...

Table 1—*Continued*

Variable	2016 p-value/ percentage	2016 n	2011 p-value/ percentage	2011 n	2006 p-value/ percentage	2006 n	2001 p-value/ percentage	2001 n
Marital status	**0.951**		**0.529**		**0.916**		**0.341**	
Never married	3.0	657	1.5	219	3.0	266	1.2	211
Married/living together	2.6	12,863	2.7	7,004	2.6	7,233	3.2	6,746
Widow/divorced	2.5	286	3.9	225	2.0	282	3.1	190
Not living together	2.8	1,464	2.2	620	2.7	642	4.3	525
Mothers highest educational level	**0.488**		**0.533**		**0.464**		**0.091**	
No education	3.2	1,680	1.9	1,161	3.1	1,910	3.0	1,891
Primary	2.6	9,391	2.7	5,161	2.5	5,358	3.6	4,922
Secondary	2.7	3,243	3.0	1,475	2.1	957	2.2	735
Higher	1.9	958	3.2	279	2.9	198	0.5	123
Wealth quintile	**0.140**		**0.316**		**0.646**		**0.937**	
Poorest	2.5	3,442	1.9	1,812	2.9	1,893	3.2	1,604
Poorer	2.3	3,203	3.1	1,727	2.7	1,900	3.5	990
Middle	2.5	2,950	2.4	1,616	2.1	1,676	3.2	1,237
Richer	3.5	2,735	3.3	1,425	2.8	1,604	2.8	1,497
Richest	2.4	2,940	2.7	1,496	2.5	1,351	3.5	2,344
Women's empowerment	**0.606**		**0.132**		**0.808**		**0.614**	
Low	2.8	3,874	2.4	2,322	2.5	2,681	2.8	1,939
Middle	2.4	4,073	3.3	2,580	2.5	2,483	3.4	3,443
Empowered	2.6	7,324	2.3	3,174	2.8	3,259	3.4	2,289
Number of antenatal visits	**0.000**		**0.955**		**0.644**		**0.203**	
Less than four	2.6	4,072	1.8	2,602	1.5	2,658	2.2	2,603
Four or more	1.5	6,080	1.8	2,366	1.7	2,377	1.6	1,881
Place of delivery	**0.469**		**0.237**		**0.525**		**0.515**	
Public	2.5	8,748	3.0	3,554	2.9	2,455	2.7	1,704
Private	2.8	2,455	1.9	1,078	2.2	1,008	3.3	1,103
No facility	2.9	4,068	2.5	3,433	2.5	4,886	3.3	4,816
Women's occupation	**0.502**		**0.292**		**0.370**		**0.749**	
Not working	2.4	2,642	3.0	1,668	1.8	624	3.4	1,243
Agriculture/self employed	2.5	6,944	2.3	4,227	2.8	6,057	3.1	5,331
Other occupations	2.8	5,685	3.1	2,180	2.5	1,742	3.6	1,098
Access to information	**0.576**		**0.585**		**0.441**		**0.118**	
No access to information	2.8	3,596	2.9	1,292	3.0	1,609	3.7	3,390
With access to information	2.6	11,674	2.6	6,783	2.5	6,814	2.9	4,282
When child put to breast	**0.000**		**0.002**		**0.108**		**0.002**	
Not immediately	3.7	6,470	3.4	3,955	2.9	5,215	3.5	6,937
Immediately after birth	1.8	8,801	1.9	4,121	2.2	3,208	1.1	734
Tetanus injections before birth	**0.000**		**0.000**		**0.000**		**0.000**	
No tetanus injection	3.7	6,550	3.5	4,028	3.7	4,561	4.4	4,550
Under dose 1-2	1.9	6,322	1.9	2,885	1.3	2,826	1.2	2,376
Recommended dose 3+	1.6	2,398	1.7	1,162	1.6	1,036	2.4	746
Distance to health facility	**0.346**		**0.462**		**0.071**		**0.041**	
Big problem	2.5	6,254	2.5	3,697	2.9	5,026	3.8	3,593
No problem/small problem	2.7	9,016	2.8	4,369	2.2	3,394	2.7	4,067
Maternal risk (too young/ too old/too many/too soon)	**0.002**		**0.074**		**0.354**		**0.060**	
No multiple risk	2.4	12,078	2.4	6,156	2.5	6,371	3.0	5,922
Had multiple risk	3.5	3,192	3.3	1,919	3.0	2,052	4.1	1,750

Table 2 presents results from a complementary log-log model to establish factors associated with neonatal mortality. Our results did not show consistent factors associated with neonatal deaths over all four of the surveys. However, in the three most recent surveys, from 2006 to 2016, children who were put on breast milk were significantly associated with reduced odds of neonatal deaths. Results also show that in the two

most recent surveys, 2011 and 2016, children whose mothers had multiple risk factors were associated with increased odds of neonatal deaths.

Children who were not put on breast milk immediately after birth were significantly associated with higher odds of neonatal mortality, ranging from 2.1 times higher in 2006 to 3.3 times higher in 2016 compared with children who were breastfed immediately. In the 2011 and 2016 surveys, children whose mothers had multiple risk factors had about twice the odds of dying in the first month compared with those whose mothers had no risk factors. Children whose mothers attended fewer than the four recommended ANC visits were significantly associated with lower odds (0.6) of neonatal deaths, but only in the most recent survey, as shown in Table 2.

Table 2 Results from complementary log-log regression of socioeconomic factors associated with neonatal mortality, UDHS 2001 to 2016

	Year			
Variable	2016	2011	2006	2001
Type of place of residence (Ref: Urban)	0.9	1.3	1.7	1.1
Rural	(0.6 - 1.5)	(0.6 - 2.9)	(0.8 - 3.5)	(0.5 - 2.4)
Region (Ref: Central)				
Eastern	0.6	0.8	1.0	0.7
	(0.4 - 1.1)	(0.4 - 1.5)	(0.4 - 2.6)	(0.3 - 1.6)
Northern	0.9	0.5	1.7	1.0
	(0.5 - 1.5)	(0.2 - 1.1)	(0.8 - 3.8)	(0.4 - 2.5)
Western	0.9	0.7	0.8	0.9
	(0.5 - 1.5)	(0.3 - 1.6)	(0.4 - 1.8)	(0.4 - 2.3)
Religion (Ref: Catholic)				
Anglican	1.1	0.7	1.1	0.8
	(0.8 - 1.6)	(0.4 - 1.2)	(0.6 - 2.0)	(0.5 - 1.4)
Moslem	1.2	0.7	0.8	0.8
	(0.7 - 1.9)	(0.3 - 1.4)	(0.3 - 2.1)	(0.4 - 1.8)
Others	0.5*	0.9	1.4	1.0
	(0.3 - 0.9)	(0.5 - 1.6)	(0.6 - 3.2)	(0.4 - 2.6)
Sex of child (Ref: Female)				
Male	1.3	1.0	2.1**	1.5
	(1.0 - 1.8)	(0.7 - 1.6)	(1.2 - 3.5)	(0.9 - 2.5)
Marital status (Ref: Single)				
Married/living together	0.9	0.8	1.1	1.3
	(0.4 - 1.9)	(0.2 - 2.9)	(0.3 - 4.6)	(0.3 - 4.7)
Widow/divorced	0.9	1.2	0.2	1.7
	(0.3 - 2.8)	(0.2 - 6.1)	(0.0 - 2.4)	(0.3 - 9.5)
Not living together	0.7	0.7	1.4	1.6
	(0.3 - 1.6)	(0.2 - 3.1)	(0.4 - 4.6)	(0.4 - 7.2)
Highest educational level (Ref: None)				
Primary	0.9	0.9	1.4	1.2
	(0.6 - 1.5)	(0.5 - 1.9)	(0.7 - 2.8)	(0.6 - 2.3)
Secondary	0.9	0.9	0.5	0.9
	(0.5 - 1.8)	(0.4 - 2.1)	(0.1 - 2.1)	(0.3 - 2.3)
Higher	0.7	1.6	0.9	0.1*
	(0.3 - 1.9)	(0.4 - 7.2)	(0.1 - 6.3)	(0.0 - 0.6)
Wealth quintile (Ref: Poorest)				
Poorer	1.0	2.3*	0.9	0.6
	(0.6 - 1.5)	(1.0 - 5.2)	(0.4 - 2.1)	(0.2 - 1.6)
Middle	1.1	2.0	1.0	0.6
	(0.6 - 1.9)	(0.8 - 4.9)	(0.4 - 2.3)	(0.3 - 1.3)
Richer	1.3	2.2	1.5	0.8
	(0.8 - 2.4)	(0.9 - 5.3)	(0.7 - 3.3)	(0.3 - 1.8)
Richest	0.8	2.5	1.5	0.7
	(0.3 - 1.7)	(0.9 - 7.1)	(0.5 - 4.9)	(0.3 - 1.5)

Continued...

Table 2—*Continued*

Variable	Year			
	2016	2011	2006	2001
Empowerment (Ref: Not empowered)				
Limited empowerment	0.8	1.7	0.6	0.9
	(0.5 - 1.6)	(0.8 - 3.8)	(0.3 - 1.3)	(0.5 - 1.8)
Empowered	1.0	1.8	0.8	0.9
	(0.5 - 1.7)	(0.8 - 4.0)	(0.4 - 1.7)	(0.4 - 1.7)
Attend recommended ANC visits (Ref: <=3 visits)				
4 or more ANC visits	0.6**	1.1	1.2	0.8
	(0.4 - 0.9)	(0.7 - 1.8)	(0.7 - 2.0)	(0.5 - 1.3)
Place of delivery (Ref: Home/not health facility)				
Public	1.1	0.8	1.2	1.4
	(0.8 - 1.7)	(0.5 - 1.3)	(0.7 - 2.2)	(0.7 - 2.6)
Private	1.6	0.4*	0.9	0.8
	(0.9 - 2.6)	(0.2 - 1.0)	(0.4 - 1.9)	(0.4 - 1.9)
Woman's occupation (Ref: Not employed)				
Agriculture/self-employed	1.2	0.6	0.6	0.7
	(0.7 - 1.9)	(0.3 - 1.1)	(0.2 - 1.9)	(0.3 - 1.2)
Other occupations	1.2	0.8	1.0	1.2
	(0.7 - 2.0)	(0.5 - 1.3)	(0.3 - 3.1)	(0.6 - 2.7)
Access to information (Ref: No access)	0.7	0.6	0.7	0.7
Access	(0.5 - 1.0)	(0.3 - 1.3)	(0.4 - 1.4)	(0.4 - 1.2)
When child first breastfed (Ref: Immediately)				
Not immediate	3.3***	3.5***	2.1*	2.0
	(2.3 - 4.6)	(2.2 - 5.7)	(1.1 - 3.7)	(0.9 - 4.4)
Mother received TT Injections before birth? (Ref: No tetanus injection)				
Received under dose	1.5	0.9	1.6	1.2
	(0.9 - 2.4)	(0.4 - 2.0)	(0.7 - 3.3)	(0.6 - 2.1)
Received recommended dose	1.1	1.1	0.9	0.5
	(0.7 - 1.7)	(0.6 - 2.0)	(0.4 - 2.0)	(0.3 - 1.0)
Distance to medical facility a problem? (Ref: Big problem)				
Not a problem	0.8	0.8	1.5	1.2
	(0.6 - 1.2)	(0.5 - 1.4)	(0.9 - 2.4)	(0.8 - 2.0)
Multiple risk (Ref: No risk)	2.0***	1.9*	1.1	1.5
Risk	(1.5 - 2.7)	(1.1 - 3.2)	(0.6 - 1.9)	(0.9 - 2.4)

*** p<0.001, ** p<0.01, * p<0.05

4 DISCUSSION

We conducted an analysis of the trends and socioeconomic determinants of neonatal mortality in Uganda, using data from the Uganda Demographic and Health Surveys conducted in 2001, 2006, 2011, and 2016. The results did not show factors that could consistently explain neonatal mortality over the entire survey periods. However, there were two key socioeconomic factors that were shown to be associated with increased neonatal mortality in the more recent surveys, namely children not breastfed immediately and children born to mothers with multiple risk factors for childbearing. Also, children whose mothers did not attend the recommended number of ANC visits were significantly associated with increased neonatal deaths only in the most recent DHS survey of 2016.

Children not put on breast milk immediately after birth have been found to be associated with high odds of neonatal deaths elsewhere. Studies by Smith et al. (2017) and Phukan, Ranjan, and Dwivedi (2018) show a positive association between breastfeeding within 1 hour after birth and reduced prevalence of neonatal deaths that closely relates with our findings. Breastfeeding mothers are also more likely to contribute to the Kangaroo method by creating a close bond between the child and mother (WHO 2015). The Kangaroo method also has other benefits in reducing neonatal mortality; a mother is more likely to detect an illness in the child and therefore more likely to act faster to seek treatment compared with a non-breastfeeding mother. Breast milk immediately after birth is also rich in antibodies and essential nutrients. There are also risks of exposure to unhygienic modes of feeding and subsequently a likelihood of suffering from diseases like diarrhoea when infants are not exclusively breastfeed. The trends in the results on children breastfeeding immediately after birth are likely to be further explained by the increasing availability and use of fortified foods compared with earlier years.

Children whose mothers had multiple risk factors were associated with increased odds of neonatal deaths. Multiple risk factors were considered to be two or more of the following; too young, too old, too many children, and birth intervals too short. Bivariate results equally showed that mothers age 15-19 (too young) and those age 45-49 (too old) were associated with higher levels of neonatal deaths compared with those age 20-44. Other studies have found that children born to mothers with risk factors are associated with increased neonatal deaths (GSS et al. 2004). Children born to mothers who are too young (under age 18) do not have a fully developed body for reproduction. Young mothers are more likely to have children born prematurely or with low birth weight (Neal et al. 2018; Chen et al. 2008), and these children are prone to neonatal death. Such young mothers might also have problems of not being well versed on how to care for children, since they are still children themselves. Other studies have shown that young mothers have such problems as lack of a stable partner and paid job (Ribeiro et al. 2014). Uganda's teenage pregnancy prevalence stalled at 25% over the last decade, which could partly explain why risk factors have been significant over the last two recent surveys.

Older mothers (age 35+) have higher risks of hypertension during pregnancy (Ribeiro et al. 2014), which is more likely to cause neonatal and maternal deaths. It is possible that older women tend to think that they are well versed with pregnancy, as indicated by their low rates of ANC attendance (Rurangirwa et al. 2017), and could be complacent and thus ignore some of the key aspects of proper care for their infants.

In the 2016 survey, children whose mothers had fewer than the recommended number of ANC visits were associated with higher odds of neonatal deaths compared with those who had at least four attendances. Other studies have associated low ANC attendance with high neonatal mortality (Arunda et al. 2017; Ibrahim et al. 2012). ANC attendance of the recommended number and intervals increases chances of detecting pregnancy-related complications early enough, and appropriate advice can be given to the expectant mother.

4.1 Conclusions and Recommendations

Neonatal mortality in Uganda has stagnated over the last three UDHS surveys. The factors that were identified to be associated with neonatal deaths over time were children not put on breast milk immediately after birth, and children of mothers with multiple risk factors. Attendance at the recommended number of ANC visits was also found to be important. Actions targeted toward promotion of breastfeeding within 1 hour after birth and sensitization of young and older women to take precautionary measures during birth are critical. There is also a need to encourage expectant women to go for at least four ANC visits.

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