Journal of Health, Medicine and Nursing www.iiste.org
ISSN 2422-8419 An International Peer-reviewed Journal DOI: 10.7176/JHMN
Vol.65, 2019

Determinants of Neonatal Mortality in Kenya: Evidence From Kenya Demographic Health Surveys, 2008 and 2014

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Abstract
Background: This paper analyses the contribution of socio demographic, neonatal, maternal and health facility related factors to the neonatal mortality in Kenya. **Methods:** Data from the Kenya demographic and health survey 2008 and 2014 was analyzed. **Results:** Logistic regression showed that in 2008, newborns with a short interval of <2 years (OR=1.938, p=0.000), very small babies, (OR 2.25, p=0.160), low birth weight (OR=6.677, p=0.000), male children (OR=1.243, p=0.028) and neonates not breastfed immediately after birth (OR=2.768, p=0.005) increased the risk of mortality. In 2014, being born in urban areas (OR=1.323, p=0.028), low birth weight (OR=2.354, p=0.008), birth interval of <2 years (OR=1.549, p=0.028, boys (OR=1.443, 0.014), mothers who did not attend ANC and those who had <3 ANC visits had (OR=4.668, p=0.000) and (OR=1.572, p=0.003) respectively as associated with neonatal mortality. **Conclusion:** This paper emphasizes on mother nutrition education, immediate initiation of breast feeding, attending 4 ANC and hospital delivery for better birth outcomes.
Key words: Determinants, Neonatal, Mortality, logistic regression, breastfeeding, birth weight
DOI: 10.7176/JHMN/65-06
Publication date: August 31st 2019

1. Background

Neonatal mortality remains a significant public health problem worldwide and accounts for 60% of the newborn deaths in the middle and lower income countries (UNICEF,2017). This is because the neonatal period is considered as the most vulnerable time for a child's survival. Globally, 18 children out of every 1000 live births. In 2017 alone,2.5 million children died in the first month of life in 2017 alone (UNICEF, 2017). Of these deaths, approximately 1,000,000 die within the first week of life. Decline in neonatal has been realized globally, but this decline is slower compared to mortality among children between 1-11 months and those 1- 4 years. The neonatal mortality rates fell by 51% from 37 deaths per 1000 live births in 1990 to the current 18 deaths per 1000 live births in 2017 a small reduction compared to the other groups.

Despite the global reduction in the neonatal mortality, disparities exist in across the regions. Neonatal mortality is highest in in sub Saharan Africa (SSA) and in South Asia (SA) each with an estimated Neonatal Mortality Rate (NMR) of 27 per 1000 live births, and children born in these two regions are nine times more likely to die in their first month of life than a child born in a high income country. More than 50% of under-five Mortality rates (U5MR) occur in the neonatal period. In Aouth Asia, the proportion of children dying in the neonatal period is higher at 60% of the total U5MR.

These statistics makes neonatal mortality an important public health concern which have been prioritized under the Sustainable Development Goals (SDGs) previously referred to as the Millennium Development Goals (MDGs). In Kenya, the neonatal mortality rate is 22 deaths per 1000 live births with the urban areas having a higher NMR of 26 per 1000 live births compared to 21 deaths per 1000 live births in the rural areas. (UNICEF, 2015)

Although Kenya has made positive progress in the overall childhood indicators over time, the country continues to train in the neonatal mortality indicators which have only marginally reduced from 33/1000 live births in 2003 (KNBS.2003) to 31/1000 live births in 2008/9 (KNBS.2009) and 22 deaths per 1000 live births in 2014 (KNBS.2014). Studies in several countries have shown that neonatal mortality results from a complex chain of biological, socio economic, demographic and health care related determinants. However common causes of neonatal mortality include birth asphyxia, pre-term birth complications, intra partum related factors, infections such as pneumonia and tetanus, low birth weight congenital malformations and neonatal sepsis (Jehan et al, 2008; Khatun et al, 2012; WHO. 2011). There exists a relationship between maternal health and neonatal survival. Poor maternal nutritional and health status has been related to poor birth outcomes and this is influenced by elements such as socio economic, demographic and biological factors. The low uptake of contraceptives by women in reproductive age, especially those from the rural areas, advances the explanation that unplanned pregnancies and increased parity which research has shown are important risk factors to neonatal survival. Consequently, the intricate relationship between the mothers' health and that of the neonate's means that measures like the essential ante natal care (ANC), access to emergency obstetric care, access to skilled attendance at birth, adequate nutrition, post-partum care, neonatal care and early initiation of breastfeeding if adequately implemented can ensure neonatal survival.

The main goal of this study was to determine the trends and determinants of neonatal mortality using the KDHS data of 2008 and 2014. The findings from this study would be useful for policy processes in both health and nutrition, designing and scaling interventions that will support reduction of neonatal mortality in Kenya.

Objectives of the study

i. To determine the neonatal mortality in households in Kenya under KDHS of 2008 and 2014.
ii. To determine the factors associated with neonatal mortality in households in Kenya under KDHS of 2008 and 2014.

Literature review and theoretical framework

Social-economic characteristics related to neonatal mortality.

The socio economic determines of neonatal mortality in this study have been defined through the levels of education, income and place of residence. Their measurement was used to assess proximate as expressed by Mosely and Chen (1984). These determinants help explain the underlying reasons though the theoretical framework to the causes of neonatal morality in Kenya.

Maternal characteristics related to neonatal mortality.

Maternal characteristics included age of the mother, age at first birth of the mother, highest level of education, preceding birth interval, Maternal BMI and breastfeeding practices. BMI was used to measure the mothers' nutritional status. The BMI cut offs were computed based on the WHO standards and were defined as <18.5= underweight, 18.5-24.9 =normal and >25.0 as overweight.

Neonatal characteristics.

Neonatal characteristics included neonatal birth weight, birth size, sex of the child and birth order of the child and the preceding birth interval.

Health facility characteristics.

Health characteristics included use of antenatal clinic services and place of delivery. For uptake of ANC services, the cut of was based on the recommended minimum of 4 antenatal visits into two categories <4 ANC visits and >4 ANC visits. Place of delivery was categorized as health facility and home delivery.

Conceptual framework

The proposed conceptual framework for this study described the scope as derived from the analytical framework of Mosley and Chen (1984) on child survival. This framework for child survival is widely used in studies that have assessed determinants of neonatal mortality in several countries. The variables in the conceptual framework are grouped into socioeconomic characteristics (3 variables), neonatal characteristics (3 variables), health system characteristics (2variables) and maternal characteristics (4 variables).

This framework has been adjusted to capture the relationships of the variables under study and how they interact with the outcome variable. The selected variables are those that have been considered under the KDHS survey analysis.

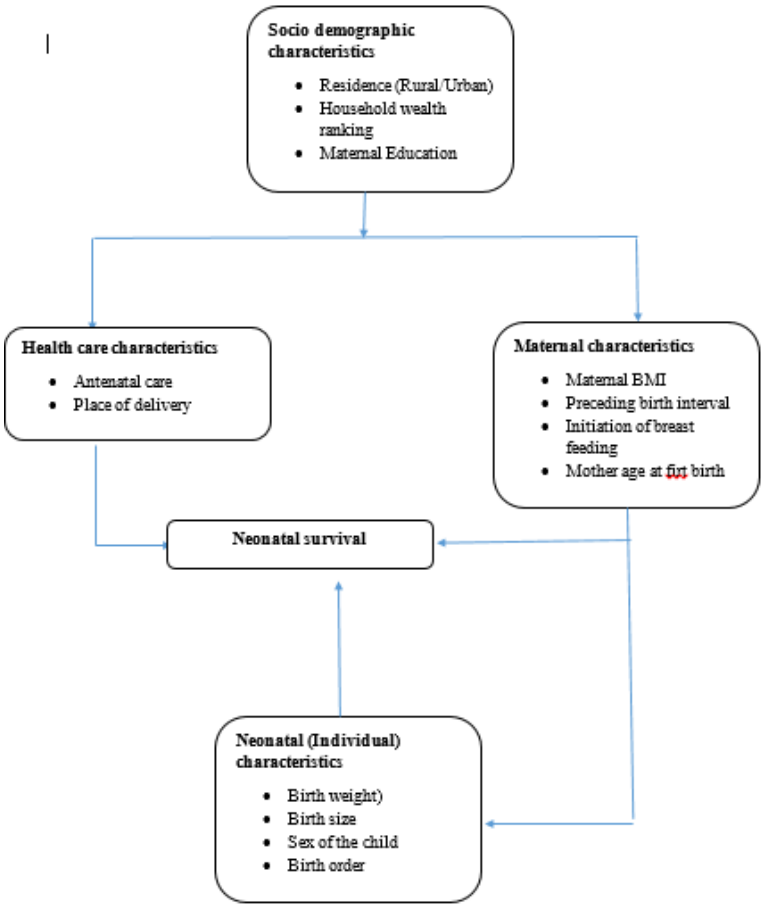

Figure 1: Conceptual framework developed for the study of determinants of neonatal mortality in Kenya.

2. Methodology.

The analysis used data from the KDHS of 2008/09 and KDHS 2014 survey data. The data is available to the public for use upon submission of request to utilize the data for analysis. Permission to use the data was obtained from ORC Macro International, the agency responsible for all the DHS data globally. The DHS uses a multi stage sampling methodology which samples households in selected clusters. Households are then systematically selected from the clustered and residents are eligible for to participate in the survey. In total 8,444 eligible women were administered with the interview, translating to a 93.6% response rate in 2008. In 2014, 14,741 eligible women were interviewed which was a 96.2% response rate. Analysis included all live births in the last five years preceding the 2008 survey who totaled to 5852. In 2014, the total live births were 19,565. The total neonatal deaths in the 2008 KDHS was 183 where as in 2014, the neonatal deaths were 427.

Data was analyzed with SPSS statistical software version 20.0 Analysis was done at descriptive, univariate and multivariate levels. Bivariate analysis was used to check for association between neonatal, health facility and maternal characteristics on the neonatal deaths. Binary logistic regression was used to determine odds ratio for the association between social, biological neonatal and healthcare factors to neonatal mortality. The analysis was done using complex sample analysis to adjust for the cluster sampling design used in the KDHS.

The main outcome variable was neonatal deaths expressed in a binary form (0 dead and 1 alive). Neonatal mortality is defined as death before 28 days. Independent variables include demographic characteristics such as place of residence, wealth status, maternal characteristics such as maternal education, maternal age at first birth, maternal age, birth order, preceding birth interval, maternal BMI, commencement of breast feeding, neonatal characteristics such as size of the child, sex and birth weight of the child and health service characteristics including ANC visits and place of delivery. All statistical testing was done at 95% confidence interval.

3. Results

In the analysis of the background characteristics, we looked at the residence, wealth status, mothers level of education. A total of 25,417- live births within the 5 years preceding the 2008/09 and 2014 analysis were included in the analysis. The background characteristics are presented in table 1 (below)

The neonatal mortality in 2008/9 as 22 per 1000. There was a total of 5852 live births included in the study

and 183 neonates died within the first 28 days Neonates born to mothers residing in the rural areas had a slightly lower NMR compared to their counterparts in the urban areas (NMR: 31vs 32) the poorest households had the highest NMR compared to the middle class households (NMR: 41 vs 37). Neonates whose mothers had no education had the highest NMR compared to those with primary education (NMR: 41 vs 27). Male neonates had higher NMR compared to females (NMR: 36 vs 25) respectively. Neonates whose mothers perceived them as small had a higher NMR of 89 compared to an average size child whose NMR was 24.

In 2014 DHS analysis the NMR in urban areas as higher compared to neonates born in the rural areas (NMR 25 vs 20). The 2014 KDHS however showed that poor households had lower NMR compared to the rich households (NMR: 20 vs 23). Neonates whose mothers had no education had the low NMR compare to mothers with higher levels of education (NMR: 20 vs 23).

Table 1: Distribution of household, maternal, health sector and neonatal related characteristics, KDHS 2008/09 and 2014

		KDHS 2008-09			KDHS 2014		
		Neonatal deaths N=183	**Total live births N=5852**	**NMR**	**Neonatal deaths N=427**	**Total live births N=19565**	**NMR**
Residence	Urban	35	1074	32.5	176	7024	25
	Rural	148	4777	31	251	12540	20
Wealth status	Poorest	60	1445	41	95	4658	20
	Poor	30	1190	25	80	3987	20
	Middle	40	1085	37	80	3525	22
	Rich	15	1038	14	82	3453	23
	Richest	38	1095	34	91	3942	23
Mothers education	No education	31	763	41	51	2308	22
	Primary	101	3713	27	241	10979	21
	Secondary	37	1105	33	82	4633	17
	higher	14	271		53	1645	32
Age at first birth							
	Below 19 years	88	3601	24	200	10873	18
	20-29 years	87	2209	39	216	8407	25
	30-39 years	6	43		11	275	40
Birth Order	First child	42	1309	32	129	5104	25
	2nd or 3rd child	71	2225	31	145	7669	19
	4th and above	70	2318	30	153	6791	22
Birth spacing (preceding birth interval)	<2 years	53	1024	52	72	2570	28
	>2 years	87	3507	24	209	11818	17
BMI	Underweight	11	730	16.4	22	1082	20
	Normal weight	125	3875	32	125	5412	23
	Overweight	46	1178	39	64	2780	23
Time for commencing breastfeeding after birth	Immediately	13	2255 2160	5.76	26	3980	6
	Between 1 hour and 24 hours	19	10981193	24.8	10	2283	4
	After 24 hours	0	522		6	512	11
Child characteristics							
Size of the child	Very large	7	302	23	9	305	29
	Larger than average	51	1555	32	56	2085	26
	Average	73	3006	24	71	5429	13
	Smaller than average	25	748	33	40	1088	36
	Very small	17	189	89	18	309	58

		KDHS 2008-09			KDHS 2014		
		Neonatal deaths N=183	Total live births N=5852	NMR	Neonatal deaths N=427	Total live births N=19565	NMR
Sex of the child	Male	110	3027	36	231	9937	23
	Female	71	2825	25	196	9626	20
Birth weight							
	Underweight	17	153		22	466	47
	Normal weight	36	1773		34	3211	10
	Above average weight	17	803		36	2469	26
	Not weighed	207	3098		111	3181	
Health service characteristics							
Place of delivery	Facility	86	3346	36	148	7308	20
	Home	92	2493	25	255	11969	21
Number of ANC visits	No ANC visits	6	366	16	30	615	48.7
	1-3 ANC visits	23	1730	13	88	5505	15.9
	>4 ANC visits	60	1872	32	89	8322	10.6

Bivariate analysis

Cross tabulations were undertaken to establish if there existed associations between the dependent variable (neonatal morality) and the other independent variables. The chi square analysis showed some significant associations between the neonatal mortality variable and other independent variables. For the 2008 KDHS analysis, these variables included mother's education (2=8.112, p=0.044), age of the mother at first birth (^{2} =27.309, p=0.000), birth spacing (2=12.687, p=0.000), mothers BMI (2=7.383, p=0.025), initiation of breast feeding (2=14.235, p=0.001) size of the child (^{2}=28.067, p=0.000), birthweight of the child (2=48.388, p=0.000), sex of the child (2= 6.066, p=0.014), place of delivery (2=6.064, p=0.014) and the number of ANC visits by the mother (2=15.096, p=0.001). Analysis for the 2014 KDHS findings, after the chi square analysis, there was an established association between neonatal mortality and place of residence (2=5.355, p= 0.021), mothers' education (2=12.027, p=0.007) age at first birth (2=16.120, p=0.000), birth order (2=6.055, p=0.048), preceding birth interval (2=11.765, p=0.001), size of the infant (2=55. 007.p=0.000), birth weight (2=64.827, p=0.000 and the number of antenatal visits (2=60.486, p=0.000). Table 2: Chi square analysis of characteristics associated with neonatal mortality, KDHS 2008 and 2014.

Variables	KDHS 2008 χ^2	P values	KDHS 2014 χ^2	P values
Demographic characteristics				
Residence	0.073	0.788	5.355	0.021*
Wealth status	17.694	0.001*	2.026	0.731
Mothers characteristics				
Mothers education	8.112	0.044s	12.027	0.007**
Age at first birth	27.309	0.000*	16.120	0.000*
Birth Order	0.146	0.929	6.055	0.048*
Birth spacing (preceding birth interval)	12.687	0 .000	11.765	0.001*
BMI	7.383	0.025*	0.330	0.848
Initiation of breastfeeding	14.235	0.000*	3.848	0.146
Child characteristics				
Size of the child	28.067	0.000*	55.007	0.000*
Sex of the child	6.033	0.014*	1.909	0.167
Birth weight	48.388	0.000*	64.827	0.000
Health service characteristics				
Place of delivery	6.064	0.014*	0.248	0.618
Number of ANC visits	15.096	0.001*	60.486	0.000*

Logistic regression analysis for neonatal mortality

To establish the determinants of neonatal mortality, the study used logistic regression by use of a simple univariate

cox hazards regression` using the formula below:

$$logit(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_kX_k$$

The binary logistic regression model shows the independent (adjusted) effects of the socio demographic characteristic on neonatal mortality. The results showed in the table 3 below show that infants born from the urban areas had higher odds of dying compared to those born in the rural areas (OR 1.323 p 0.028) in the2014 KDHS. The 2008 results did no show significant relationship. Children born of poor households showed a high risk of dying within the first month of life however, these findings were not statistically significant. The same trend was observed in 2014.

Maternal characteristics.

The model then analyzed the effects of maternal characteristics on the risk of neonatal deaths. The findings for both the 2008 and 2014 KDHS showed that infants born od mothers with low BMI had a lower risk of dying compare ho those with BMI above 25. These finds were inconsistent with existing literature on maternal BMI and the risk of neonatal mortality, where neonates born of mothers with low BMI had an increased risk of dying in the first month of life.

In regard to the preceding birth intervals, neonates born less than 2 years from the preceding birth had a higher odd of dying (OR =1.938, P=0.000) compared to those born within an interval of above 2 years. This was according to the KDHS 2008 study findings. The 2014 analysis showed a similar trend, with children within 2 years of the previous having 1.5-times likelihood of dying compared to those born with more than 2 years' birth interval. These associations showed statistical significance for both study periods.

Neonatal characteristics

The model that was considered in the analysis of child characteristics in relation to the risk of neonatal morality. In this model, the child related characteristics i.e. size of the child, birth weight of the child, sex of the child and the birth order of the child were all fit into the logistic regression model. The findings showed that first born (children of the first order) had the highest risk of dying compared to 4th order and above. This was true in both the analyses of 2008 and 2014, however, these findings did not show statistical significance (OR=1.775, p=0.447 and OR=1.412, p=0.08) respectively. Children who were considered very small by their mothers at the time of birth were 2 times more likely to die compare to larger children. The 2008 findings showed that (OR=2.015, p=0.160) and the 2014 findings were OR=1.523, p=0.347). These findings were however not statistically significant. It was however noteworthy that children who were reported to be of average size at the time of birth in the 2014 KDHS study had the lowest risk of neonatal mortality with OR 0.446, p=0.031. Male neonates are more likely (OR 1.423, p=0.028) to die than female neonates in the first month of life. This was the case in the KDHS 2008 analysis. The scenario was similar in 2014 KDHS study with an OR 1.443, p=0.014). These associations were found to be statistically significant. Children who were not weighed birth and those born with low birth weight had the higher odds of dying compared to those of normal birth weight. In the 2008 KDHS study findings, LBW children were 6 times more likely to die in the neonatal period compared to normal weight children (OR=6.677, p=0.000). In 2014, LBW children were 2 times more likely to die (OR=2.354, p=0.008). these associations were found to be statistically significant.

Health care characteristics.

The analysis of the DHS findings showed that children born at the health facilities were at higher odds of dying within the neonatal period. However, these associations were not found to be statistically significant. In the analysis of the KDHS 2014 neonates of mothers who had not attended any ANC visits had a higher risk of death (OR=4.668, p=0.000) compared to mothers who attended more than 4 ANC visits. Similarly, mothers who attended between 0-3 ANC visits had 1.5 times more likely to lose their babes in the neonatal period compare to those who attended more than 4 ANC visits (OR= 1.572, p=0.003).

Neonates who were not immediately initiated to breastfeeding in 2009 KDHS were more likely to die (OR 3.142 CI (1.536-6.428), p=0.001 compared to neonates immediately initiated to breastmilk. A similar trend is also observed in 2014 with OR=2.496 CI 1.038-6.002 p=0.041.

Table 3: Logistic regression analysis of the determinants of neonatal mortality (adjusted Odds ratio) KDHS 2008_09 and 2014.

		KDHS 2008_09			KDHS 2014		
		OR	**95% CI**	**P value**	**OR**	**95% CI**	**P value**
Residence	Urban	1.126	0.615-2.061	0.700	1.323	1.031-1.699	0.028
	Rural (ref)						
Wealth status	Richest (ref)						
	Poorest	1.802	0.915-3.547	0.088	1.218	0.810-1.832	0.343
	Poor	1.083	0.538-2.179	0.824	1.227	0.833-1.808	0.300
	Middle	1.521	0.784-2.951	0.215	1.363	0.944-1.968	0.099
	Rich	0.576	0.286-1.160	0.122	1.285	0.926-1.782	0.134
Mothers education	Higher (ref)						
	No education	0.826	0.385-1.73		0.870	0.545-1.387	0.558
	Primary	0.680	0.348-1.328		0.834	0.585-1.189	0.315
	Secondary	0.801	0.409-1.569		0.592	0.410-0.854	0.005
Age at first birth	30-39 years (ref)						
	Below 19 years	0.159	0.062-0.405	0.000*	0.458	0.241-0.869	0.017
	20-29 years	0.257	0.103-0.638	0.003	0.648	0.347-1.212	0.174
Maternal characteristics							
BMI	Overweight(ref)						
	Underweight	0.435	0.215-0.881	0.021	0.922	0.469-1.813	0.814
	Normal weight	0.736	0.497-1.090	0.126	1.012	0.697-1.468	0.951
Birth spacing (preceding birth interval)	>2 years(ref)						
	<2 years	1.938	1.358-2.768	0.000	1.549	1.047-2.292	0.028
Neonatal characteristics							
Birth Order	First child	1.775	0.775-1.782	0.447	1.412	0.962-2.073	0.08
	2nd or 3rd child	1.104	0.773-1.576	0.586	1.188	0.844-1.63	0.323
	4th and above (ref)						
Size of the child	Very large (Ref)						
	Larger than average	1.344	0.600-3.012	0.472	0.941	0.452-1.958	0.870
	Average	0.965	0.434-2.146	0.931	0.446	0.215-0.929	0.031
	Smaller than average	1.027	0.424-2.487	0.952	1.116	0.507-2.452	0.786
	Very small	2.015	0.757-5.362	0.160	1.523	0.634-3.660	0.347
Sex of the child	Female (ref)						
	Male	1.423	1.038-1.950	0.028	1.443	1.077-1.943	0.014
Birth weight	Above normal birth weight(ref)						
	Not weighed at birth	1.933	1.184-3.158	0.008	2.584	1.716-3.891	0.000
	Low birth weight	6.677	3.200-13.936	0.000	2.354	1.255-4.415	0.008
	Normal birth weight	1.374	0.777-2.431	0.275	0.799	0.485-1.314	0.377

		KDHS 2008_09			KDHS 2014		
		OR	**95% CI**	**P value**	**OR**	**95% CI**	**P value**
Health care characteristics							
Place of delivery	Facility(ref)						
	Home	0.843	0.542-1.311	0.448	0.782	0.572-1.068	0.122
Number of ANC visits	>4 ANC visits						
	No ANC visits	0.523	0.215-1.272	0.153	4.668	2.899-7.516	0.000
	0-3 ANC visit	0.432	0.263-0.709	0.432	1.572	1.164-2.125	0.003
Initiation of breastfeeding	Immediately(ref)						
	Between 1 hour and 24 hours	2.768	1.353-5.662	0.005	0.629	0.299-1.323	0.222
	After 24 hours		0		1.899	0.796-4.533	0.148

Discussion

Overall the aim of the study was to identify risk factors associated with neonatal mortality in Kenya comparing data from KDHS 2008 and KDHS 2014 using a nationally representative sample. This analysis showed that several factors were significantly associated with neonatal mortality after adjusting for confounding variables.

The analysis shows a decline in the neonatal mortality rates from 31 deaths per 100,000 to 23 deaths per 100,000 between 2008 and 2014. The decline in the neonatal mortality rates is an indicator towards the combined interventions by different sectors, including health and social awareness programs to support child survival. The analysis of the KDHS survey data showed that male children had a significantly higher risk of dying during the neonatal period compared to female neonates. This finding is consistent with other study findings which have had similar outcomes (Ezeh *et al*, 2014) who analyzed the determinants of neonatal mortality with evidence from the Nigeria demographic health survey under taken in 2008.

The findings also showed that mothers who perceived their neonates to be very small had a greater risk of dying in the first month compared to those who perceived their neonates as large. These findings are consistent with other similar studies in India and Asia have shown the same findings, it is important to note that the rationale for the perceived size of the child is subjective. However, birth size was an important proxy for birth weight considering than more than 50% of the neonates were not weighed at birth. Other studies have also shown correlation between birth size and actual birth weight. Low birth weight children had the greatest risk of dying within the first month of life. Neonates of mothers who had not attended any ante natal clinics were 4 times more likely to die in the first month of life compared to those whose mother attended ANC clinics. These findings are consistent to studies that have shown the protective role of ANC against neonatal mortality. In the meta-analysis of data across regions, Doku & Neupane (2017), findings showed that ANC attendance was protective against neonatal mortality.

Early initiation of breast feeding was a significant determinant of neonatal survival. Neonates who were initiated to breastfeeding after one hour had their risk of death increase compared to initiate to breastfeeding breastfed immediately. These findings were similar to other studies and reviews that showed that early initiation to breastfeeding was associated with increased risk of neonatal mortality (Khan *et al*, 2015). There was a significant association between birth weight and neonatal deaths. Children with low birth weight in 2008 were 6 times more likely to die in the first month of life compared to normal weight children. This was also the case in the 2014 study. Infants of mother with less than 2 years spacing had a higher risk of dying compared to those born with more than 2 years spacing.

The findings in this study show that there are association between various demographic, maternal, neonatal and health related characteristics with neonatal mortality.

The strengths and weaknesses of this study need to be considered. This study is nationally representative and a multi stage cluster sampling. Additionally, recall errors arising from the dates of birth and death given by the women. One of the weaknesses of this study is that only surviving women were interviewed, therefore missing on other neonatal deaths that may have also occurred as a result of the death of the mothers. Other factors such as gestational age that are known to affect the neonatal survival were not assessed in this study.

Conclusions

Analysis on the determinants of neonatal mortality show that sex of the child (being male), birth weight of the child, preceding birth interval living in urban areas and initiation of breast feeding were important determinants of neonatal mortality. In the 2008 KDHS, birth weight, birth spacing being male and initiation of breastfeeding one hour after birth. In the 2014 analysis, the most significant determinants of neonatal mortality include being born in the urban areas, children born with low both weight, children born less than 2 years after the previous birth and children whose mothers did not attend any ANC clinics and those who attended less than 4 clinic sessions.

Based on these findings, further social advocacy on the adoption of the recommended minimum of 4 ANC visits during pregnancy is imperative for expectant mother to enhance opportunities for care during pregnancy, improve nutrition support through supplementation of Iron and folic acid, nutrition education for dietary diversity and awareness creation on any danger signs during pregnancy. In addition, further sensitization on the need adopt appropriate family planning options by women should be scaled, so that they are able to make better decisions on when to have children after healing. This will go hand in hand in demystifying the misconceptions that are preventing uptake of contraceptive options among the women. At the community level, operationalization of the community level strategies especially through the community health front line workers to incentivize mothers to deliver their babies in health facilities especially in key in ensuring there is an increase in the number of expectant women delivering their babies under the supervision of a skilled health care provider.

Finally, there should be further strengthening of baby friendly hospital initiatives (BFHI) and complimenting it with the baby friendly community initiative (BFCI) will ensure that more women are initiating their infants on breast milk immediately after birth and continue to breastfeed exclusively for 6 months, to increase the survival of the neonates since breastfeeding exclusively and on demand has been identified among the high impact nutrition interventions that have improved neonatal outcomes.

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