Author's response to reviews

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Beneficial Newborn Care Practices in Rural Eastern Uganda: a Cross-sectional Study

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Abstract

Background: Beneficial newborn care practices can improve newborn survival. However, little is known about the factors that affect utilization of these practices by mothers.

Methods: This was a cross-sectional study conducted among 1,616 mothers who had delivered in the past year in two districts (Luuka & Buyende) in Eastern Uganda. Data collection took place between September and November 2011. Data were collected on socio-demographic and economic characteristics (i.e. household possessions, fuel material used for lighting and cooking, and animals owned), health facility attendance, skilled delivery attendance, number of children ever born, distance to health facility and early newborn care knowledge and practices. Descriptive statistics were computed to determine the proportion of mothers who used beneficial newborn care practices (optimal thermal care; good feeding practices; weighing and immunizing the baby immediately after birth; and good chord care) during the neonatal period and conducted multivariable logistic regression to assess the predictors of use of all beneficial newborn care practices. Analysis was done using STATA statistical software, version 12.1.

Results: Of the 1,616 mothers enrolled, 773 (38.4%) were aged 25-34; 1,472 (91.1%) were married; 326 (20.2%) had secondary or more education; while 1,357 (84%) were laborers or peasants. Uptake of any beneficial newborn care practices was 13.2% overall; lower in Luuka (11%, n=797) than in Buyende (15.3%, n= 819). Immunization (80.7% in Luuka; 82.5% in Buyende) and weighing the baby after birth (68% Luuka; 58.9% Buyende) were the most prevalent newborn care practices reported by mothers. At the multivariable analysis, number of ANC attendances (3-4 vs. 1-2: OR= 1.40, 95%CI= 1.04, 1.89), skilled delivery vs. unskilled delivery: OR=2.69, 95%CI=1.99, 3.64), husband's education status (Primary vs. no education: OR=0.66, 95%CI=0.48,0.89), and socio-economic status (middle vs. low: OR=1.48, 95%CI=1.05,2.08) were significant predictors of utilization of any beneficial newborn care practices among mothers.

Conclusion: Utilization of beneficial newborn care practices was low and associated with ANC and skilled delivery attendance. These findings suggest a need for interventions to improve ANC

and skilled delivery attendance as well as a need for improved utilization among those that attend ANC and/or deliver under skilled attendance

Key words: Newborn care practices; Eastern Uganda; Maternal characteristics; social economic status

BACKGROUND

It is estimated that about 4 million neonatal deaths occur every year, contributing 38% of the estimated 10.5 million deaths that among under-five children worldwide. The precursors of these neonatal deaths have been traced back to lack of practice of beneficial newborn care beneficial practices [1, 2]. According to WHO, Save The Children and UNICEF[3-5], beneficial newborn care practices are described as interventions such as immunization of baby (with birth dose of oral polio and Hepatitis B vaccines) after birth [6]; assessment for birth weight; gestational age; congenital defects and signs of newborn illness [3]; practice of good cord care such as antiseptics use for umbilical care [7]; skin to skin care and maintaining warmth[8, 9]; as well as early and exclusive breastfeeding [10-12]. Studies have shown that beneficial newborn care practices at population level can save many newborn lives. In addition, these beneficial newborn care interventions are simple, cost effective and acceptable: many of which can be effectively provided by a single skilled birth attendant caring for the mother and the newborn and sometimes by the mother herself if taught [12-15].

In Uganda, studies have demonstrated low levels of newborn care knowledge among certain cadres of health workers-particularly midwives: a gap in the promotion of beneficial newborn care practices among newborn mothers and care givers[16]. In addition, disparities in equitable access to health care are likely to hinder promotion of beneficial newborn care practices among mothers and care givers since 52% of deliveries do not take place in health facilities[17]. This creates a gap in delivery of these interventions at health system level in addition to the existing social inequity to healthcare access among the rural poor [1, 12, 18, 19]. The government of Uganda has undertaken several steps to help improve equitable access to healthcare, including a

minimum package of health services for all levels of healthcare, abolishing user fees, and ensuring health facility within reach (within 5km) of the majority of households [3]. Furthermore, use of community health workers such as VHT's has been another effort the ministry of health has put in place to create demand for services in communities and promote beneficial newborn care practices among care givers and newborn mothers, especially in the early newborn period. Furthermore, in abide to improve access to care; it has undertaken a decentralization process and creation of new districts: Luuka and Buyende being among these districts.

Poor access to newborn health is high in Uganda, but few studies have assessed it with respect to practice of beneficial newborn care practices [1, 20]. In addition, there is paucity of data regarding factors associated with practice of beneficial newborn care practices among the newly created districts of Uganda. We assessed and compared prevailing beneficial newborn care practices among the districts of Buyende and Luuka and assessed factors associated with practice of beneficial newborn care practices in these districts. Our study findings will inform policy on implementation and rollout of the newborn care aspect of the child survival strategy in the light of new Uganda eastern districts.

METHODS

Study design, population & setting

This was a cross-sectional household baseline study conducted among 1,616 mothers who had given birth in the last one year to inform implementation of the Maternal Newborn Study

(MANEST) in two rural new districts (Buyende and Luuka) of eastern Uganda. The study population was restricted to mothers who had live babies; we excluded those who had stillbirths or whose babies died prior to interview to minimize the social consequences associated with asking mothers about babies that died immediately after birth.

Luuka and Buyende are relatively new districts that were created by an Act of Parliament and became functional on 1 July 2010. Luuka is bordered by Buyende district in the north, Kaliro district to the northeast, Iganga district to the southeast, Mayuge district to the south, Jinja district to the southwest and Kamuli district to the northwest. On the other hand, Buyende is bordered by Amolatar District to the northwest, Kaberamaido District to the north, Serere District to the northeast, Kaliro District to the east, Luuka District to the southeast, Kamuli District to the south and Kayunga District to the west. Buyende and Luuka districts are both part of Busoga region which contributes 10% of the population of Uganda. Over 80% of the population are peasants and leave on less than US$1 a day. The crude birth rate in Buyende and Luuka districts averages that of the country 42 live births per 1,000, population.[1, 21].

Data collection procedures

Data were collected on maternal socio-demographic factors (age ,level of education, occupation, husband's education status, marital status, distance from health facility (where women delivered), skilled delivery, delivery mode, ANC attendance, number of ANC visits, trimester at first ANC and parity. Women were also asked about their awareness about Early Newborn Care (ENC) including type of instrument used to cut the cord, type of material used to tie the chord, when the newborn was first dried and wrapped, length of time (hours/days) before breastfeeding

was initiated and whether the baby was exclusively breastfed during the first month of life. We also collected data on materials used for walls, roofs and floor; lighting sources and fuel material, ownership of land, farm animals (chicken, goats, cows, pigs, sheep),household materials (bed, table, television, radio, mobile phone, refrigerator) and other material such as ownership of car, bicycle, boat, motorcycle. These materials were used to compute a composite variable for socio-economic status as described below. Quality assurance was done through daily assessment of filled questionnaires and in cases of error or incompleteness of data, corrective measures were implemented immediately. Data collection took place from September to November 2011.

Measures

Beneficial newborn care practices were grouped into five categories: (i) Optimal thermal care (defined as baby put skin-to-skin at birth or wrapped at birth and bathed after 24 hours or more), (ii) Good chord care (defined as use of clean cutting instrument to cut the cord, plus clean thread to tie and no substance added to the chord), (iii) Good feeding practices (defined as initiating breastfeeding within the first one hour after birth and giving the baby no food supplements at all in the first month of life), (iv) Weighing the baby immediately after birth, and (v) immunization (if the baby was given oral polio vaccine (OPV) and/or BCG after birth). These newborn care practices are affordable and acceptable [15] and evidence of use shows significant reduction of neonatal mortality [22, 23]. These newborn care practices were further combined into an index of beneficial newborn care practices, which was dichotomized as ("Yes=1", if the mother practiced all the beneficial newborn care practices and "No=0", if the mother practiced neither or just a

few): this was considered the outcome of interest and was used as a proxy for increased survival if the mother reported all newborn care practices.

To generate socio-economic status (SES), variables considered were floor material, roof material, wall material, fuel used for cooking, source of light and household possessions (i.e. radio, type of bed, table refrigerator, television set, sound cassette player, and telephone). These variables were screened for relevance, and reliability testing using Cornbrash's alpha (which was found to be 0.628) and acceptable[22]. The final list of variables included type of floor material, type of roof material, wall material, fuel used for cooking, and source of light. Principal Component Analysis (PCA) was performed and the first principal component was scored and used to generate an asset index that was used to group all households into wealth quartiles. i.e., <25%=Lowest, 25-50%=Low, 50-75%=Middle and>75%= High socio-economic Status) [23]. The 'lowest' and 'low' wealth quartiles were combined to generate low socio-economic status, while medium and high, were left as they were, i.e., medium and high socio-economic status respectively.

Parity of mother (defined as the number of children the mother has had) was grouped as follows <2, 2-4 and >4, while trimester was categorized according to weeks of gestation as follows: trimester 1<13 weeks, trimester 2=14-26 weeks and trimester 3=27-40 weeks [1]. The distribution of age was checked for normality and found to be skewed (to the right), then we categorized age into ≤24 years, 25-34 years and ≥35 years.

Statistical analyses

We computed descriptive statistics to determine the proportion of mothers utilizing beneficial newborn care practices separately for each district and conducted bivariate analyses to assess the association between beneficial newborn care practice and mother's socio-demographic and other characteristics. We fitted a logistic regression with mother's characteristics that were significant by district: only socio-economic status, husband's education and distance to health facility were significantly associated with beneficial newborn care practices. We then used the stepwise forward selection method, with probability of inclusion (*pe)* at 0.05 and exclusion (*pr)* at 0.1 to select maternal characteristics that were statistically significant predictors of utilization of beneficial newborn care practices among mothers and included districts as a covariate. These results were presented as the final model. Data were entered using Fox Pro and cleaned. STATA version 12.1 was used for analysis.

Ethical considerations

The study was approved by Makerere University School of public health institutional Review Board. Informed consent was sought from study participants after reading to them and adequately explaining to them the aim of the study. Participants were informed of their right to withdraw from the study at any stage of the interview.

RESULTS

A total of 1,616 mothers were enrolled into this study. Of these, 797(49.3) were enrolled from Luuka while 819 (50.7) were enrolled from Buyende (Table 1). Of the 1,616 mothers enrolled, 773(38.4 %) were aged 25-34; 326 (20.2%) had secondary education or more, middle socio-

economic status 691(42.8%); were married 1,472 (91.1 %); while 1,357 (84%) were laborers or peasants. Forty one per cent (658) of the mothers were of parity 2-4; 1,583(98%) reported antenatal care attendance; 1,221(75.6%) attended ANC for 3-4 times while 891(55.1%) had their first ANC visit in trimester 2. Skilled delivery was reported among 1,183(73.2%) of mothers and 114(8.9%) had assisted delivery. Distance to place of delivery was not known among majority of mothers 1,154 (71.4%).

Table 2 shows the distribution of selected newborn care practices in Luuka and Buyende districts. Overall, uptake of all beneficial newborn care practices was 13.2% (213); lower in Luuka (11%, 88) than in Buyende (15.3%, 125). Immunization (80.7 % in Luuka; 82.5% in Buyende) and weighing the baby after birth (68% Luuka; 58.9% Buyende) were the most prevalent newborn care practices reported among mothers. The proportion of mothers reporting good cord care practices was lower in both Luuka (42.3%) and Buyende (40.1%) as was the proportion of mothers reporting optimal thermal care (42.3% Luuka; 40.2% Buyende). Good feeding practice was equally reported among few mothers (48%) in Luuka and slightly more than half of mothers (51.2%) in Buyende.

Table 3 shows bivariate analysis of maternal characteristics and beneficial newborn care practices. At the bivariate analysis, mother's education ($p<0.015$), husband's education status ($p<0.001$), mother's employment status ($p<0.040$), number of ANC visits ($p<0.002$), skilled delivery ($p<0.001$), distance to health facility where mother delivered from ($p<0.004$), socio-economic status ($p<0.001$) and district of residence ($p<0.012$) were significantly associated with reporting all beneficial newborn care practices.

Table 4 shows adjusted and unadjusted Odds Ratios and 95% confidence intervals (CI) of reported beneficial newborn care practice among the study participants. Multivariable analysis results show that higher ANC attendances (3-4 vs. 1-2: OR= 1.40, 95%CI= 1.04, 1.89); skilled delivery (OR=2.69, 95%CI=1.99, 3.64); husband's education status (Primary vs. No education: OR=0.66, 95%CI=0.487, 0.89); socio-economic status (middle vs. low: OR=1.48, 95%CI=1.05,2.08); and distance to health facility (Do not know vs. ≤ 5km: OR=0.62,95%CI=0.43,0.89) were significant predictors of utilization of all beneficial newborn care practices among mothers.

DISCUSSION

Our study of the beneficial newborn care practices among mothers in Luuka and Buyende districts found that only 13% of mothers in both districts utilized beneficial newborn care practices. The low utilization of beneficial newborn care practices may be related to poor quality of services especially at ANC [24-27] and deep-rooted cultural practices and rituals for newborns [1, 28, 29]. These findings suggest a need for improved sensitization of mothers about the benefits of beneficial newborn care practices at ANC and the need for interventions that address deep-rooted cultural practices and rituals that still inhibit use of newborn care practices[30, 31].

We found that use of beneficial newborn practices was associated with skilled delivery and number of ANC attendances, with those attending ANC for 3-4 times more likely to report all beneficial newborn care practices than those who attended once or twice. These findings suggest

that attending ANC for three or four times coupled with increased use of skilled delivery can improve uptake of beneficial newborn care practices [3, 32]. However, these findings should be interpreted in light of the fact that despite nearly three-quarters of mothers delivering under skilled attendance and three-quarters of mothers attending ANC services for 3-4 times, only a small proportion of mothers reported utilizing beneficial newborn care practices.

Harmful newborn care practices such as bathing the baby immediately after birth [33], delayed initiation of breastfeeding [34] and putting powder, salty water or lizard droppings on the umbilical cord [1] continue to be practiced even among women who have attended ANC and/or delivered under skilled attendance. Prior studies in rural Uganda have found that delayed bathing of the baby and putting nothing on the umbilical cord are not acceptable practices among mothers and health care providers [15, 35]. In India, Shah & Dwivedi [33] found that uptake of beneficial newborn care practices is largely hampered by cultural practices, including one known as "*Chatti Puja*" – that restricts wrapping of the baby in clothes or exposing them to sunlight until the seventh day after birth [33]. In Afghanistan, Newbrander et al.[34] found that initiation of breastfeeding may be delayed until up to three days after birth – or until a woman has had her first bath after delivery [34]. These findings suggest a need for innovative interventions (e.g. use of mentor-mothers) to address barriers that inhibit use of beneficial newborn practices among mothers, including those that address the deep-rooted cultural practices and norms that still prevent women from utilizing newborn care practices.

We found that mothers of middle socio-economic status were more likely to practice beneficial newborn care practices compared to those of low socio-economic status. This is in contrast with

an earlier study in the same region that reported no significant difference in the utilization of newborn care practices by women [1]. Women of higher socio-economic status may be more likely to practice beneficial newborn cares practices because: i) they can easily access health interventions at fixed health facilities which tend to be inequitably distributed, ii) they are able to access skilled delivery and iii) they can make four or more ANC visits compared to women of low socio-economic status [36, 37]. Furthermore, women of low socio-economic status may hold deep cultural beliefs and practices-these practices may not be beneficial to newborns [38, 39]. These findings suggest a need for targeting women of low socio-economic class with correct information on the importance of beneficial newborn care practices in influencing a baby's growth and survival through outreaches or intensified use of community health workers.

Our study has got several limitations. For instance, there is a likelihood women interviewed for our study did not remember all the beneficial newborn care practices that they practiced when they gave birth to their babies – given that we interviewed mothers who delivered in the past 12 months. It is likely that mothers who delivered exactly 12 months from the time of interview might be less likely to recall all the newborn care practices that they used compared to those who had delivered in a month or so to the time of interview. However, since we did not collect data on the duration between delivery and time of interview, we are unable to assess the extent to which recall bias varied over time. Nevertheless, since women tend to remember what happens to their babies [40, 41], it is unlikely that recall bias affected the results reported in a substantial way.

It is also important to note that the proportions of beneficial newborn care practices reported in this paper are based on self-reports of what women did when they gave birth to their babies.

Since we could not verify individual newborn care practices, there is a possibility that some practices may not have been practiced as reported. However, given that almost similar proportions of use of newborn care practices were reported in two separate districts, it is very likely that women's reports of beneficial newborn care practices might reflect the actual use of these practices in the communities. Finally, it is important to note that the study was conducted in newly created districts (created in 2010); so, the low proportions of use of beneficial newborn care practices may have been as a result of inadequate access to health care facilities. Since there are no studies conducted in the other relatively older districts to offer a comparison, we recommend that similar studies be conducted in other relatively older districts taking note of the availability and access to health services in the districts and the extent to which they influence utilization of beneficial newborn care practices.

Despite these limitations, our findings are crucial in the implementation of interventions aimed at improving child growth and survival. The Ministry of Health recommends that pregnant women attend ANC up to four times, and that all mothers deliver under the hands of skilled attendants. At the moment, only 57% of mothers deliver at the hands of skilled attendants, and ANC attendance declines substantially from 95% at the first visit to 48% at the 4th visit [21]. Our findings suggest a need for heightened promotion of antenatal care attendance up to the 4th visit and increased skilled delivery attendance in order to increase the proportion of mothers who can and are able to utilize beneficial newborn care practices for the benefit of their babies' growth and survival.

CONCLUSION

Our study shows that utilization of beneficial newborn care practices was sub-optimal. The independent factors associated with use of beneficial newborn care practices were skilled delivery attendance and attending ANC up to 3-4 visits. These findings suggest a need for increased promotion of ANC and skilled delivery attendance as well as the need to improve utilization of newborn care practices among those that attend ANC and/or deliver under skilled attendance.

List of abbreviations

ANC	Antenatal care
DSS	Demography Surveillance Site
ENC	Early Newborn Care
LIC	Low income countries
MANEST	Maternal Newborn Study
OPV	Oral polio Vaccine
PCA	Principle component analysis
SES	Social economic status
UNICEF	United Nations International Children's Emergency Fund
VHT	Village Health team
WHO	World Health Organization

Competing interests

The authors declare that they have no competing interest

Authors' contributions

OMO drafted the manuscript and analyzed the data. PW conceived the study, designed the study, developed data collection tools, and supervised field work. JKBM and RW provided guidance in drafting, analysis and reviewing the manuscript. All authors approved the final manuscript

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Table 1 **Population Characteristics Stratified by District of Residence**			
	District		
Characteristics	**Luuka N=797 (%)**	**Buyende N=819 (%)**	**Total N=1,616 (%)**
Age group			
≤ 24	296 (37.1)	271 (33.1)	708 (35.2)
25-34	309 (38.8)	313 (38.2)	773 (38.4)
≥ 35	157 (19.7)	166 (20.3)	404 (20.1)
Don't Know	35 (4.4)	69 (8.4)	126 (6.3)
Marital status			
Married	752 (91.8)	752 (91.8)	1472 (91.4)
Education			
No education	64 (8.0)	130 (15.9)	194 (12.0)
Primary	534 (67.0)	562 (68.6)	1096 (67.8)
Secondary	199 (25.0)	127 (15.5)	326 (20.2)
Occupation			
Salaried or Business	61 (7.0)	52 (6.3)	113 (7.0)
Laborers or peasants	652 (81.8)	705 (86.1)	1357 (84.0)
Housewife or Others	84 (10.5)	62 (7.6)	146 (9.0)
Husband's education status			
No education	135 (16.9)	157 (19.2)	292 (18.1)
Primary	358 (44.9)	424 (57.8)	281 (48.4)
Secondary	304 (38.2)	238 (29.0)	542 (33.5)
Attended ANC			
Yes	782 (98.1)	801 (97.8)	1583 (98.0)
Number of ANC attendances*			
1-2	27 (3.4)	35 (4.3)	62 (3.8)
3-4	596 (73.5)	635 (77.5)	1221(75.6)

>4	158 (19.8)	132 (16.1)	290 (17.9)
Don't Know	26 (3.3)	17 (2.1)	43(2.7)
Trimester at first ANC attendance*			
Trimester 1	292 (36.6)	273 (33.3)	565 (34.9)
Trimester 2	439 (55.1)	452 (55.2)	891 (55.1)
Trimester 3	49 (6.2)	73 (8.9)	122 (7.6)
Don't Know	17 (2.1)	21 (2.5)	38 (2.4)
Parity			
1	125 (15.7)	107 (13.1)	232 (14.4)
2-4	315 (39.5)	343 (41.9)	658 (40.7)
>4	357 (44.8)	369 (45.0)	726 (44.9)
Skilled delivery			
Yes	605 (75.9)	578 (70.6)	1183 (73.2)
Delivery mode			
Normal delivery	774 (97.1)	795 (97.1)	1569 (97.1)
Distance to health facility where mother delivered from			
<5km	113 (14.2)	117 (14.3)	230 (14.2)
>5km	101 (12.7)	131 (16.0)	232 (14.4)
Don't know	583 (73.1)	571 (69.7)	1154 (71.4)
Socio-economic status			
Low	180 (22.6)	300 (36.6)	480 (29.7)
Middle	346 (43.4)	345 (42.1)	691 (42.8)
High	271 (34.0)	174 (21.2)	445 (27.5)
*Proportions expressed out of those who reported attending ANC for at least once			

Table 2 **Newborn care practices among mothers resident in Luuka and Buyende districts**			
Newborn care practices	**District**		
	Luka (N=797)	**Buyende (N=819)**	**Total (N=1,616)**
	N (%)	**N (%)**	**N (%)**
All beneficial newborn care practice (Yes)	88 (11.0)	125 (15.3)	213 (13.2)
Good cord care practice (Yes)	666 (42.3)	778 (40.1)	1444 (41.2)
Baby weighed after birth (Yes)	542 (68.0)	490 (59.8)	1032 (63.9)
Optimal thermal care (Yes)	321 (42.3)	316 (40.2)	637 (41.2)
Immunization of newborn (Yes)	643 (80.7)	676 (82.5)	1319 (81.6)
Good feeding practice (Yes)	376 (48.0)	414 (51.2)	790 (49.7)

Table 3 **Unadjusted Odds Ratios, 95%CI of reported beneficial newborn care practices of mother's in Luuka and Buyende**				
Maternal Characteristics (N=1616)		**Beneficial Newborn Care (n=213)**		
	N (%)	**n (%)**	**OR (95% CI)**	**P-value**
Age group				
≤ 24	708 (35.2)	68 (31.9)	1.00	
25-34	773 (38.4)	88 (41.3)	0.827 (0.59;1.16)	0.272
≥ 35	404 (20.1)	47 (22.1)	0.80 (0.54;1.19)	0.275
Don't Know	126 (6.3)	10 (4.7)	1.28 (0.64;2.58)	0.488
Marital status				
Married	1472 (91.4)	199 (93.4)	0.69 (0.39;1.22)	0.201
Education				
No education	194 (12.0)	33(15.5)	1.00	
Primary	1096 (67.8)	151 (70.9)	1.28 (0.85;1.94)	0.236
Secondary +	326 (20.2)	29 (13.6)	2.10 (1.23;3.58)	0.007
Employment status				
Salaried or business	113 (7.0)	7 (3.3)	1.00	
Laborer or peasant farmer	1357 (84.0)	188 (88.3)	0.41 (0.19;0.90)	0.025
House wife or others	146 (9.0)	18 (8.5)	0.47 (0.19;1.18)	0.104
Husband's education status				
No education	292 (18.1)	33 (15.5)	1.00	
Primary	281 (48.4)	128 (60.1)	0.65 (0.43;2.74)	0.040
Secondary +	542 (33.5)	52 (24.1)	1.20 (0.76;1.91)	0.437
Attended ANC				
Yes	1583 (98.0)	206 (96.6)	1.80 (0.77;4.20)	0.174
Number of ANC visits				
1-2	62 (3.8)	61 (28.6)	1.00	
3-4	1221(75.6)	112 (52.6)	1.94 (1.38;2.74)	0.001
>4	290 (17.9)	34 (16.0)	1.89 (1.18;2.98)	0.006
Don't Know	43(2.7)	6 (2.8)	1.55 (0.63;3.84)	0.345

Trimester at first ANC visit				
Trimester 1	565 (34.9)	59 (27.7)	1.00	
Trimester 2	891 (55.1)	126 (59.2)	0.71 (0.51;0.98)	0.040
Trimester 3	122 (7.6)	21 (9.9)	0.56 (0.33;0.96)	0.036
Don't Know	38 (2.4)	7 (3.2)	0.52 (0.22;1.22)	0.134
Parity				
1	232 (14.4)	24 (11.3)	1.00	
2-4	658 (40.7)	89 (41.8)	0.74 (0.46;1.19)	0.212
>4	726 (44.9)	100(47.0)	0.72 (0.45;1.16)	0.177
Delivery mode				
Normal delivery	1569 (97.2)	210 (98.6)	0.44 (0.14;1.43)	0.174
Skilled Delivery				
Yes	1183 (73.2)	109 (51.2)	3.12 (2.32;4.19)	0.001
Distance to health facility where mother delivered from				
≤ 5 km	230 (14.2)	24 (11.3)	1.00	
> 5 km	232 (14.4)	18 (8.5)	1.39 (0.73;2.63)	0.319
Don't know	1154 (71.4)	171 (80.2)	0.67 (0.93;1.05)	0.083
Socio-economic status				
Low	480 (29.7)	86 (40.4)	1.00	
Middle	691 (42.8)	81 (38.0)	1.64 (1.18;2.28)	0.003
High	445 (27.5)	46 (21.6)	1.89 (1.29;2.78)	0.001
District				
Buyende	819 (50.7)	125 (58.7)	0.69 (0.52;0.92)	0.012

Table 4 **Crude and Adjusted Odds ratios, 95% CI of beneficial newborn care practices, adjusting maternal characteristics that had significant chi-square values in bivariate analysis**				
Maternal Characteristics (N=1616)	**Crude OR (95% CI)**	**p-value**	**Adjusted OR (95% CI)**	**p-value**
Number of ANC attendances				
1-2	1.00			
3-4	1.94 (1.38;2.74)	0.001	1.40 (1.04;1.89)	0.028
> 4	1.89 (1.18;2.98)	0.006		
Don't Know	1.55 (0.63;3.84)	0.345		
Skilled Delivery				
No	1.00		1.00	
Yes	3.12 (2.32;4.19)	0.001	2.69 (1.99;3.64)	0.001
Husbands education status				
No education	1.00			
Primary	0.65 (0.43;0.98)	0.040	0.66 (0.49;0.89)	0.007
Secondary +	1.20 (0.76;1.91)	0.437		
Social economic status				
Low	1.00			
Middle	1.64 (1.18;2.28)	0.003	1.48 (1.05;2.08)	0.024
High	1.89 (1.29;2.78)	0.001	1.47 (0.99;2.03))	0.060
Distance to health facility where mother delivered from				
≤ 5 km	1.00			
> 5 km	1.39 (0.73;2.63)	0.319		
Don't know	0.67 (0.43;1.05)	0.083	0.62 (0.43;0.89)	0.010
District				
Luuka	1.00			
Buyende	0.69(0.52;0.92)	0.012	0.76 (0.56;1.03)	0.072