Variations in antenatal care initiation patterns among reproductive age women in sub-Saharan-Africa: event history analysis methods approach

Abstract

Despite the mounting global investment and commitment in improving maternal and neonatal survival, inequities in antenatal care attendance persist especially in sub-Saharan Africa. Though factors associated with ANC visit are well documented, there is a little evidence on variations at global level in sub-Saharan Africa. Using the most recent DHS data (2006-2018) from thirty six countries, the current study examined the variations in the antenatal care initiation patterns among 262 207 reproductive age women in sub-Saharan Africa. Descriptive analyses showed that during their last pregnancies, 10.8% of SSA female did not receive any ANC services and only 33.8% initiated ANC checkup within the first quarter of pregnancy. Multivariate modelling exercises based on discrete-time logit models showed significant variations in ANC initiation patterns according to all study covariates. Among other, the chances of ANC initiation were higher in urban area, among French-speaking countries, and among educated, primiparous and wealthier women.

Background

Despite the mounting global investment and commitment in improving maternal and neonatal survival, inequities in ANC attendance persist at several levels. Determinants of antenatal care services utilization have been extensively documented in national and sub-regional level in sub-Saharan Africa. Some studies provide strong evidence that the odds for ANC coverage is lower among women from household with poor wealth quintiles, less/non educated (Ganle, et al., 2015; Khanal, da Cruz, Mishra, Karkee, & Lee, 2015; Babalola & Fatusi, 2009; Lincetto, Mothebesoane-Anoh, Gomez, & Munjanja, 2006) , and living in rural areas (Babalola & Fatusi, 2009; Lincetto, Mothebesoane-Anoh, Gomez, & Munjanja, 2006). Some studies provide strong evidence of the link between some of pregnancy related characteristics such as birth rank and birth interval and neonatal mortality (Ghosh & Sharma, 2010; Titaley, Dibley, Agho, Roberts, & Hall, 2008). Short birth intervals are known to have negative effects on pregnancy outcomes (de Jonge, et al., 2014). Elsewhere, evidences provide the link between family/community involvement and ANC services utilization (Kanté, et al., 2015; Lincetto, Mothebesoane-Anoh, Gomez, & Munjanja, 2006; Manandhar, et al., 2004) while other pointed out the role of sociocultural factors (Ganle, et al., 2015). In Ghana, women in predominantly Islam areas, appeared to be more limited in their ability to participate in reproductive health decision-making (Ganle, et al., 2015). High coverage of ANC in addition to its benefits during pregnancy (Lincetto, Mothebesoane-Anoh, Gomez, & Munjanja, 2006), remains an important determinant for postnatal care (PNC) check-ups (Kanté, et al., 2015). Exposure to mass media especially to locally driven mass media campaign is showed to have strong impact on health services utilization (Zamawe, Banda, & Dube, 2016). Despite such results a little is known in the variations in ANC initiation patterns at global level in sub-Saharan Africa. In addition, the use of event history analysis techniques to explore the variations in first ANC initiation is uncommon in sub-Saharan Africa literature.

The present study attempts to fill these gaps by applying event history analyses models to analyse the variations in first ANC initiation among reproductive age female in sub-Saharan Africa.

Data and Methods

Data

Data were from the most recent Demographic and Health Survey (DHS) conducted in thirty-six sub-Saharan African countries. The countries and survey years were: Angola (2015-16), Burkina Faso (2010), Benin (2017-18), Burundi (2016-17), Congo Democratic Republic (2013-14), Congo (2011-12), Cote d'Ivoire (2011-12), Cameroon (2011), Ethiopia (2008), Gabon (2012), Ghana (2014), Gambia (2013), Guinea (2012), Kenya (2014), Comoros (2012), Liberia (2013), Lesotho (2014), Madagascar (2008-9), Mali (2012-13), Malawi (2015-16), Mozambique (2011), Nigeria (2013), Niger (2012), Namibia (2013), Rwanda (2014-15), Sierra Leone (2013), Senegal (2017), Sao Tome and Principle (2008), Swaziland (2006-7), Chad (2014-15), Togo (2013-14), Tanzania (2015-16), Uganda (2016), South Africa (2016), Zambia (2013-14) and Zimbabwe (2015). Using a nationally representative sample, the Measure DHS collects data on reproductive health age women (15 – 49 years) including on reproduction and ANC attendance in particular.

The sample of this study comprised last pregnancies completed within the 5 years preceding the surveys by women aged 15 – 49 years. After pooling the datasets for the most recent surveys in the thirty-six countries, there was 262,207 women who gave birth within the 5 years preceding the surveys.

The outcome of this study was a time variable, measured for each pregnancy (pregnant woman) subject at risk (of first ANC initiation). It equals to either the duration of observation (if the event does not occur, i.e no ANC, until the time of the delivery) or the duration before event (if it occurs). The time is measured in month.

Independent variables were selected based on the literature review. There were: Respondent's age (15-24 years, 25-29 years, 30-34 years, 35-39 years, 40-49 years), respondent's highest education (no education, primary, secondary or more), respondent`s occupation (not working, white collar, sales/services, agriculture, manual/domestic), religion (Anglican, Catholic, Muslim, Other), household wealth index (poorest, poorer, middle, richer, richest), place of residence (urban, rural), level of acculturation / modern (lower, average, high), health facility's accessibility (big problem, not a problem), desire for pregnancy (wanted then, wanted later, wanted no more) birth order number (first, rank 2 – 4, rank 5 or more), ever had terminated pregnancy (no, yes, first pregnancy), partner's education (no education, primary, secondary or above, don`t know), household head (male, female), Sub region (Eastern Africa, Middle Africa, Southern Africa, Western Africa), Language (English-speaking, French-speaking, Portuguese-speaking).

Methods

Two types of methods relating to event history analysis were employed. These were Kaplan-Meier survivor curves and survival functions (at descriptive level) and discrete – time logit models (at multivariate level). The Kaplan Meier curves were performed to explore the comparative survival curves of first ANC initiation patterns according each covariate. Discrete – time logit models were performed to examine the crude and net of effects of each covariate on the dependent variable. Differences were tested for significance at a 1% level. Analyses were completed using the STATA 13.0 (www.stata.com) software.

Preliminary results

Key results including descriptive (frequencies, Kaplan Meier survivor curves, hazard functions) and output from discrete-time logit models are presented below.

Table 1: Study population by selected characteristics (most recent)

Variable	Frequency	Percentage
Respondent's age		
15-24 years	79,689	30.4
25-29 years	67,177	25.6
30-34 years	52,925	20.2
35-39 years	37,121	14.2
40-49 years	25,295	9.7
Respondent's highest education		
No education	98,717	37.7
Primary	91,459	34.9
Secondary or more	72,021	27.5
Respondent`s occupation		
not working	78,393	31.0
white collar	9,427	3.7
sales/services	57,734	22.8
agriculture	81,692	32.3
manual/domestic	25,764	10.2
Religion		
Anglican	82,343	33.8
Catholic	60,906	25.0
Muslim	36,003	14.8
Other	64,633	26.5
Household wealth index		
Poorest	56,159	21.4
Poorer	55,184	21.1
Middle	52,496	20.0
Richer	51,144	19.5
Richest	47,225	18.0
Marital status		
Married	181,585	69.3
Consensual union	41,318	15.8

Widow/Divorce/Separated	19,781	7.5
Single	19,523	7.5
Place of residence		
Urban	84,730	32.3
Rural	177,477	67.7
Level of acculturation		
Lower	161,723	61.9
Average	38,634	14.8
High	60,785	23.3
Health facility's accessibility		
Big problem	88,971	38.3
Not a problem	143,452	61.7
Desire for pregnancy		
Wanted then	184,399	72.5
Wanted later	52,810	20.8
Wanted no more	17,064	6.7
Birth order number		
First	55,379	21.1
Rank 2 - 4	124,000	47.3
Rank 5 or more	82,829	31.6
Ever had terminated pregnancy		
No	169,988.55	66.3
Yes	31,180.75	12.2
first pregnancy	55,378.58	21.6
Partner's education		
No education	78,236	29.8
Primary	66,083	25.2
Secondary or above	77,028	29.4
Don`t know	40,861	15.6
Household head		
Male	197,247	77.3
Female	57,845	22.7
Sub region		
Eastern Africa	100,688	38.4
Middle Africa	49,274	18.79
Southern Africa	11,583	4.42
Western Africa	100,663	38.39
Language		
English-speaking	128,060	48.8
French-speaking	116,392	44.4
Portuguese-speaking	17,755	6.8
ANC initiation time		

1st month	8,346	3.2
2nd month	19,200	7.3
Third month	61,008	23.3
Fourth month	54,151	20.7
Fifth month	42,667	16.3
Sixth month	30,549	11.7
Seventh month	12,499	4.8
Eighth month	3,371	1.3
Ninth month	2,157	0.8
No ANC	28,258	10.8
Total	**262,207**	**100,0**

Figure 1: Kaplan-Meier survival estimates of ANC initiation by household wealth index

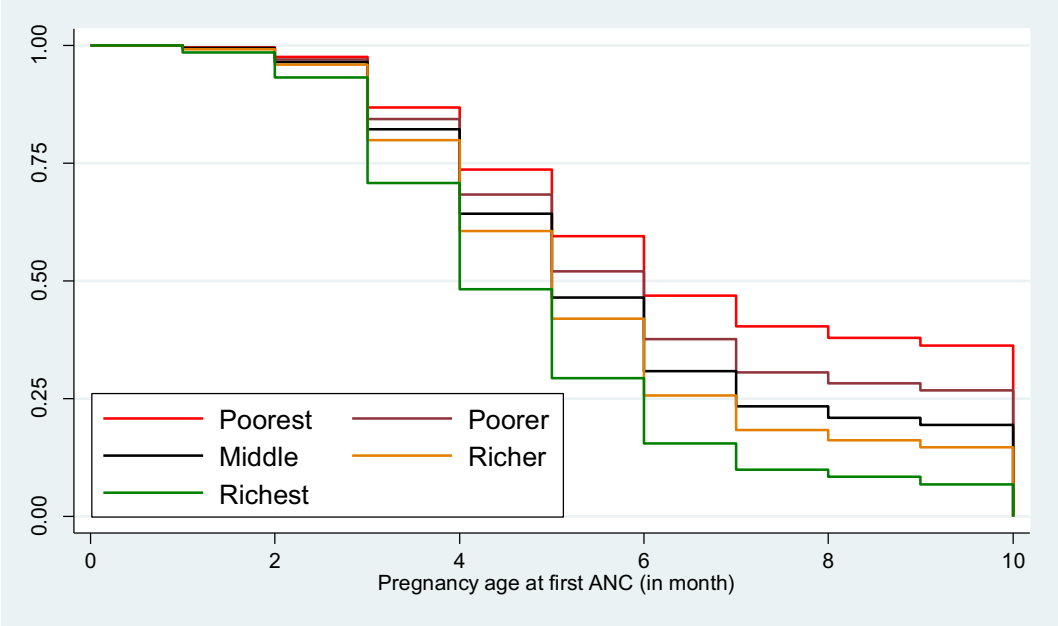

Figure 2: Kaplan-Meier survival estimates for ANC initiation by SSA sub-region

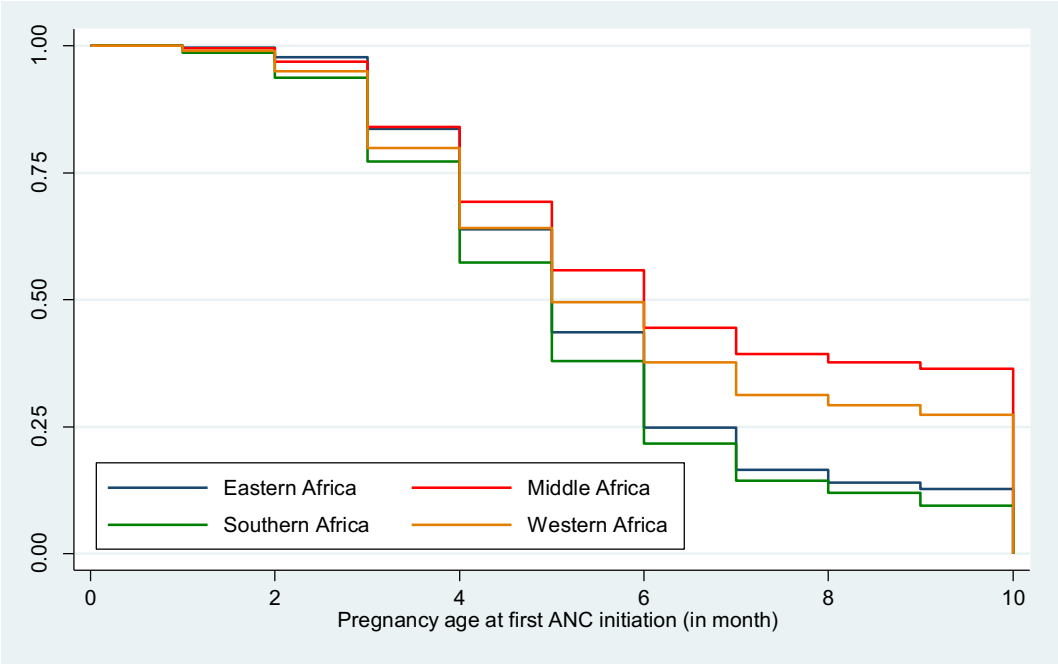

Table 2: Discrete – time Logit Models for antenatal care initiation in SSA (most recent DHS data from 36 countries)

Respondent's age	**Crude effects**	**Net effects**
15-24 years	1.0	1.0
25-29 years	1.01(1-1.02)ns	1.05(1.04-1.07)***
30-34 years	1.00(0.99-1.01)ns	1.10(1.08-1.12)***
35-39 years	0.97(0.95-0.98)***	1.14(1.11-1.16)***
40-49 years	0.87(0.86-0.89)***	1.10(1.08-1.13)***
Respondent's highest education		
No education	1.0	1.0
Primary	1.47(1.46-1.49)***	1.24(1.22-1.26)***
Secondary or more	1.82(1.8-1.84)***	1.30(1.28-1.32)***
Respondent`s occupation		
not working	1.0	1.0
white collar	1.74(1.7-1.79)***	1.13(1.09-1.16)***
sales/services	1.18(1.17-1.2)***	1.02(1.01-1.04)***
agriculture	1.10(1.08-1.11)***	1.16(1.14-1.17)***
manual/domestic	1.25(1.23-1.27)***	1.10(1.08-1.12)***
Respondent's religious membership		
Anglican	1.0	1.0
Catholic	1.00(0.98-1.01)***	0.92(0.9-0.93)***
Muslim	0.51(0.5-0.52)***	0.61(0.59-0.62)***

Other	0.84(0.83-0.85)***	0.82(0.81-0.83)***
Household wealth index		
Poorest	1.0	1.0
Poorer	1.20(1.19-1.22)***	1.10(1.08-1.12)***
Middle	1.37(1.35-1.39)***	1.17(1.16-1.19)***
Richer	1.51(1.49-1.53)***	1.18(1.16-1.2)***
Richest	1.90(1.87-1.93)***	1.22(1.19-1.24)***
Place of residence		
Urban	1.0	1.0
Rural	0.69(0.69-0.7)***	0.88(0.86-0.89)***
Level of acculturation		
Lower		
Average	1.41(1.39-1.42)***	1.12(1.1-1.13)***
High	1.60(1.58-1.61)***	1.17(1.15-1.19)***
Accessibility		
Big problem	1.0	1.0
No problem	1.28(1.27-1.3)***	1.09(1.08-1.1)***
Desire for pregnancy		
Wanted then	1.0	1.0
Wanted later	1.15(1.13-1.16)***	0.99(0.98-1)ns
Wanted no more	1.03(1.01-1.05)***	0.93(0.91-0.95)***
Birth order number		
First	1.0	1.0
Rank 2 - 4	0.9(0.89-0.91)***	0.92(0.91-0.94)***
Rank 5 or more	0.73(0.72-0.74)***	0.82(0.8-0.84)***
Household head		
Male	1.0	1.0
Female	1.11(1.1-1.12)***	1.04(1.03-1.06)***
Partner's education		
No education	1.0	1.0
Primary	1.43(1.41-1.45)***	1.15(1.13-1.16)***
Secondary or above	1.71(1.69-1.73)***	1.17(1.15-1.19)***
Don`t know	1.47(1.45-1.49)***	1.11(1.09-1.14)***
Sub region		
Eastern Africa	1.0	1.0
Middle Africa	0.74(0.73-0.75)***	0.77(0.75-0.78)***
Southern Africa	1.17(1.15-1.2)***	1.11(1.08-1.14)***
Western Africa	0.90(0.89-0.91)***	1.04(1.02-1.05)***
Language		
English-speaking	1.0	1.0
French-speaking	0.94(0.94-0.95)***	1.17(1.15-1.18)***
Portuguese-speaking	0.87(0.86-0.89)***	0.99(0.97-1.01)ns

Ever had terminated pregnancy		
No	1.0	1.0
Yes	1.18(1.16-1.19)***	
No, first pregnancy	1.24(1.23-1.25)***	

Table 3: Sample seize by country

Country code	Country name	Year of interview	n (weighted)
AO7	Angola	2015-16	8,495
BF6	Burkina Faso	2010	10,487
BJ7	Benin	2017-18	9,031
BU7	Burundi	2016-17	8,941
CD6	Congo Democratic Republic	2013-14	11,063
CG6	Congo	2011-12	5,882
CI6	Cote d'Ivoire	2011-12	5,237
CM6	Cameroon	2011	7,621
ET7	Ethiopia	2008	7,590
GA6	Gabon	2012	3,702
GH6	Ghana	2014	4,142
GM6	Gambia	2013	5,305
GN6	Guinea	2012	4,995
KE6	Kenya	2014	14,440
KM6	Comoros	2012	2,064
LB6	Liberia	2013	4,769
LS6	Lesotho	2014	2,575
MD5	Madagascar	2008-9	8,662
ML6	Mali	2012-13	6,773
MW7	Malawi	2015-16	13,515
MZ6	Mozambique	2011	7,874
NG6	Nigeria	2013	20,467
NI6	Niger	2012	8,002
NM6	Namibia	2013	3,838
RW6	Rwanda	2014-15	6,060
SL6	Sierra Leone	2013	8,647
SN7	Senegal	2017	7,949
ST5	Sao Tome and Principle	2008	1,386
SZ5	Swaziland	2006-7	2,134
TD6	Chad	2014-15	11,125
TG6	Togo	2013-14	4,858
TZ7	Tanzania	2015-16	7,079

Country code	Country name	Year of interview	n (weighted)
UG7	Uganda	2016	10,152
ZA7	South Africa	2016	3,036
ZM6	Zambia	2013-14	9,322
ZW7	Zimbabwe	2015	4,988
	Total		**262,207**

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