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# Antenatal Care Practices Among Hard-to-Reach Fishing Communities on Lake Victoria: A Community-Based Cross-Sectional Survey

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## Abstract

**Background:** Uganda has one of the highest maternal deaths in sub-Saharan Africa, with a mortality ratio of 336 per 100 000 live births. Early regular antenatal care (ANC) helps prevent adverse outcomes, including deaths, through prevention, identification, treatment, and/or referral of at-risk women. We explored ANC practices and associated factors among women from hard-to-reach Lake Victoria islands fishing communities in Kalangala district, Uganda. **Methods:** A cross-sectional survey among 486 consenting women aged 15 to 49 years, who were pregnant or had a birth or abortion in the past 6 months was conducted in 6 island fishing communities of Kalangala district, Uganda, during January to May 2018. ODK software interviewer-administered questionnaires were used to collect data on sociodemographics and ANC practices. Regression modeling using STATA version 15 was used to determine factors associated with ANC visits. **Results:** Women's median (range) age was 26 (15-45) years, 63% (304/486) had up to primary level education, 45% (219/486) were housewives (stay home mums), 87% (423/486) were married. ANC visits ranged from 0 to 10, with over three-fifths of women having their first visit late after 3 months of being pregnant (63%, 198/316). Women without a history of pregnancy loss (adjusted odds ratio [AOR] = 1.8, 95% CI 1.1-3.0), those not staying with their partners (AOR = 2.5, 95% CI 1.1-6.0), and those whose partners were working in fishing-related activities (AOR = 1.8, 95% CI 1.0-3.0) were likely to have started care late. Women from communities with a public health facility and those with partners working in none fishing-related activities had the highest predicted number of visits. **Conclusion:** Antenatal practices among these communities are characterized by late start of care. Community-led early ANC awareness interventions are needed. Targeted health policies need to consider public ANC facilities for each island for improved antenatal outcomes and maternal health.

## Keywords

antenatal, care, practices, fishing, community, women, Uganda

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## Background

Almost 1000 women die daily throughout the world from complications of pregnancy and child birth.[1] Complications of pregnancy and childbirth are still the major causes of death and disability among women aged 15 to 49 years in the developing world.[1] Although reports indicate a reduction in deaths, they are still unacceptably high in sub-Saharan Africa where over 60% are due to preventable causes.[1,2] Deaths may be due to direct complications of being pregnant, in labor and the period after termination of pregnancy, or from preexisting conditions worsened by physiologic effects of the above.[3-5]

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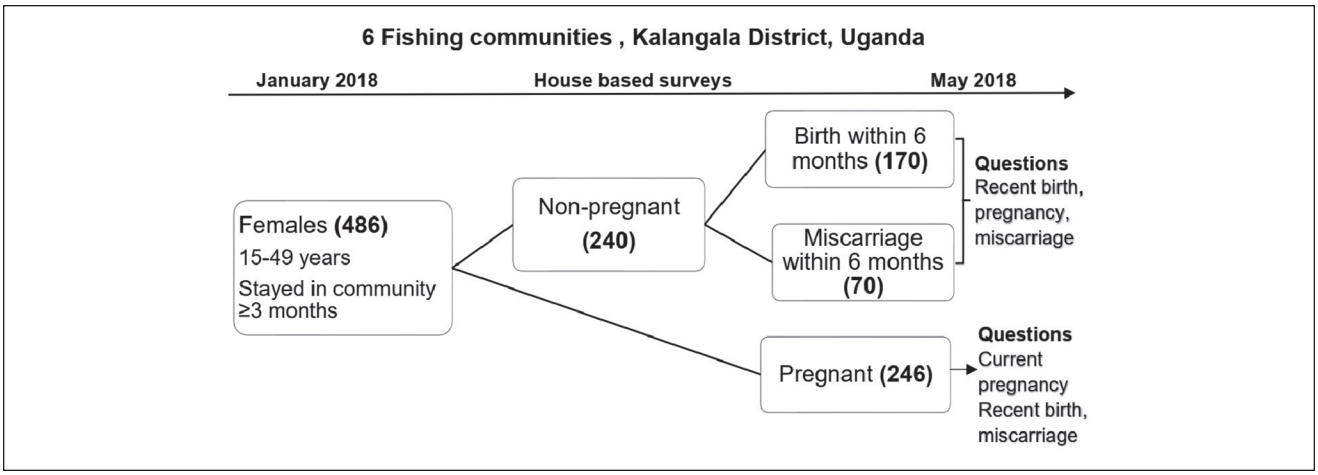


**Figure 1.** Study recruitment flowchart.

Uganda has one of the highest number of maternal deaths in sub-Sharan Africa, with a maternal mortality ratio (MMR) of 336 per 100 000 live births.[6] Most deaths occur in resource limited hard-to-reach rural settings where access to health and other social services is still a challenge.[7]

Skilled antenatal care (ANC) is key in prevention of maternal morbidity and mortality.[8,9] ANC is a process of regular check-ups conducted by a skilled birth attendant (midwife, nurse, or doctor) on a pregnant woman involving; prevention, detection, and treatment of health problems and counselling on; healthy pregnancy timing, breast-feeding, maternal nutrition, pregnancy danger signs, birth complications preparedness and promotion of a healthy lifestyle for the benefit of the pregnant mother, unborn baby, family, and community.[10,11] ANC helps early prevention and treatment of maternal conditions like anemia, malaria, HIV/AIDS, hypertension, in addition to preparing women for any child birth complications, encouraging them to have a skilled birth attendant and to seek postnatal care.[8,9,12,13]

ANC attendance is still inadequate in Uganda, with variations between urban and rural hard-to-reach settings,[6,14,15] compared with current recommendations.[16,17] Fishing communities (FCs) on Lake Victoria are among the hard-to-reach resource-limited settings in Uganda, with perchance limited access to social services, including ANC services. A FC is a social-economic group of people living in an area, who make most of their livelihood directly or indirectly from fishing activities. Members consist of fishermen, boat owners, those engaged in fish processing, boat makers, local fishing gear makers or repairers, those dealing in fishing equipment, managers of fishing boats and local businesses, including restaurants, bars, brothels, as well as fishmongers or traders.[18]

There is a paucity of information on antenatal care among FCs, though presumed inadequate due to presence of factors related to poor care. Studies indicate that majority of people spend less than 5 years in these communities,[19,20] which has been linked to retention in research and care.[20,21] Short duration of stay affects planning and access to services, including ANC. Low literacy levels in these communities[20,21] have been previously linked to poor ANC attendance in other settings.[6,14,15,22] FCs remoteness is a deterrent to skilled birth attendants and makes it logistically challenging to deliver the much-needed ANC supplies to rural health facilities.

FCs being remote hard to reach settings, with members being mobile, reproductive age women in these communities may be having challenges accessing ANC, with poor maternal health and mortality.

We explored the level of ANC attendance and associated factors to better understand ANC practices among women from 6 hard-to-reach island FCs in Kalangala district, Uganda.

## Methods

### *Study Design*

This was a cross-sectional survey to understand ANC practices among women in 6 hard-to-reach Kalangala district, Uganda islands. The islands were selected based on their remoteness, with the nearest being 2 hours motorized boat ride from the mainland and having a population of at least 1000 people.

The survey involved 486 consenting women, interviewed during January to May 2018 (see Figure 1).

### *Inclusion and Exclusion Criteria*

Women aged 15 to 49 years at survey time, who were pregnant or had a pregnancy outcome (live birth, still birth or abortion) in the past 6 months were included. Women

younger than 15 or older than 49 years, those who have never been pregnant, or had a pregnancy outcome over 6 months ago were excluded.

### Recruitment for the Survey

Nine resident survey research assistants (study team) were selected based on previous research experience working in FCs. They were trained on Human Subjects Protection and all study procedures prior to commencement of the survey.

Study community sensitization meetings, including who is expected to participate and eligibility criteria were held across all sites. Research assistants moved from household to household locating potential participants. Village local council leaders, community health workers (CHWs), locally known as Village Health Teams (VHTs) also provided guidance on which households had potential participants, which would then be approached by the study team. If a potential participant was not available at the time of the survey, the study team would schedule another appointment to meet her. Potential participants were given detailed information about the study through an information sheet read to them in the language they best understand between English and Luganda. This would be conducted in the presence of a guardian if the woman was a minor and or an impartial witness if she was illiterate in the language of the consent. Women who understood the study information and were willing to take part, signed the informed consent document, a copy of which was given to them.

Face to face interviews within participants' homes, workplaces, or any other chosen convenient location of choice, where confidentiality would be maintained were conducted by research assistants. Interviews involved responding to a pretested semistructured questionnaire designed in Open Data Kit (ODK) software,[23] on computer tablets. The questionnaire collected data on sociodemographic characteristics, factors related to pregnancy and child birth; household head names, study community, duration of community stay, age, date of birth, tribe, highest education, partner's highest education, religious affiliation, main occupation, partner's main occupation, marital status, whether they were staying with their partners, if the partner had other spouses, who makes health decisions for the participant, age at first pregnancy, total pregnancies, history of miscarriage, date of last miscarriage, total child births, and date of last child birth. The tool also had questions on current pregnancy; if the woman was currently pregnant, months of current pregnancy, current or previous willingness to have skilled antenatal care, ANC attendance, reasons for nonattendance, number of visits attended, cadre of health worker seen at ANC, facility where ANC was received for the current or most recent pregnancy. Women were asked if they received the following components of ANC at least once: blood pressure measurement, provision of a blood sample, provision of a urine sample, tetanus vaccination, intermittent Preventive treatment with sulphadoxine/pyrimethamine (IPTp) including number of times of IPTp, deworming treatment, iron, and folate supplements. The questionnaire also had questions on the most recent birth; time since last childbirth, place of childbirth, cadre of person who assisted the childbirth, whom would they have preferred to assist them, place of birth, and how long ago was their last HIV test.

### Statistical Methods

This analysis aimed at answering the following questions:

1. What is the level of ANC attendance?
2. What factors are associated with the number of ANC visits attended by women?
3. What factors are associated with late (after 3 months of pregnancy) start of ANC?

### Study Variables

Dependent variable was number of ANC visits (provided by nurses, midwives or doctors) attended by women who were pregnant or had a previous childbirth. Late start of ANC was the other dependent categorical variable. Independent variables included study community with or without public (government) health facility, time spent in the community, women's age, education, marital status, staying together with partner, partner's education, partner occupation, receipt of all ANC components at least once, and history of pregnancy loss.

Frequency tables were used to summarize the independent variables. Categorization of independent variables was based on their logical relationship with the outcome variable (number of ANC visits) at bivariable analysis. Bivariable chi-square tests were used to assess the associations between independent and dependent variables at 95% significance level.

To understand factors associated with the number of ANC visits attended at multivariable analysis, 3 count models were fitted: negative binomial regression (NBREG), zero inflated Poisson (ZIP), and zero inflated negative binomial (ZINB). This was because the outcome, number of ANC visits had a significant proportion of zero counts with the mean being different from the variance. Of the 3 models—NBREG, ZIP, and ZINB—the best suited model was selected based on having the lowest Akaike's information criterion (AIC) and Bayesian information criterion (BIC) values. Factors associated with late start of ANC were assessed using logistic regression modelling. Selection of predictor variables included in the models was based on previous literature, biological plausibility, or statistical significance ($P \leq 0.2$) at bivariable analysis. We

**Table 1.** Characteristics of Study Participants.

| Characteristics | Frequency | Percentage | Lowest | Median | Highest |
|---|---|---|---|---|---|
| Age (years) | | | 15 | 26 | 45 |
| Age at first pregnancy (years) | | | 13 | 17 | 30 |
| Total births | | | 0 | 3 | 11 |
| Antenatal care times | | | 0 | 2 | 10 |
| | Frequency | Percentage | 95% CI | | |
| Age group (years) | | | | | |
| 15-24 | 193 | 39.7 | 0.4-0.4 | | |
| 25-49 | 293 | 60.3 | 0.6-0.7 | | |
| Age at first pregnancy (years) | | | | | |
| 13-19 | 402 | 82.7 | 0.8-0.9 | | |
| 20-49 | 84 | 17.3 | 0.1-0.2 | | |
| Marital status | | | | | |
| Married | 423 | 87.0 | 0.8-0.9 | | |
| Not married | 63 | 13.0 | 0.1-0.2 | | |
| Highest education | | | | | |
| Post primary | 150 | 30.9 | 0.3-0.4 | | |
| Primary | 304 | 62.5 | 0.6-0.7 | | |
| None | 32 | 6.6 | 0.1-0.1 | | |
| Occupation group | | | | | |
| Housewife | 219 | 45.1 | 0.4-0.5 | | |
| Fishing related | 35 | 7.2 | 0.1-0.1 | | |
| Others | 232 | 47.7 | 0.4-0.5 | | |
| Community public health facility | | | | | |
| Absent | 76 | 15.6 | 0.1-0.2 | | |
| Present | 410 | 84.4 | 0.8-0.9 | | |
| Health decisions maker | | | | | |
| Respondent | 158 | 32.5 | 0.3-0.4 | | |
| Partner | 98 | 20.2 | 0.2-0.2 | | |
| Respondent and partner | 209 | 43.0 | 0.4-0.5 | | |
| Others | 21 | 4.3 | 0.0-0.1 | | |
| First antenatal care visit timing | | | | | |
| Within 3 months of pregnancy | 118 | 37.3 | 0.3-0.4 | | |
| After 3 months of pregnancy | 198 | 62.7 | 0.6-0.7 | | |

assessed for collinearity and removed variables that did not improve the models or were highly correlated with other variables in the models, with the final predictors in the models having the lowest *P* values, model AIC and BIC values. Adjusted coefficients, *P* values, and 95% confidence intervals (CIs) were used to report associations. All analyses were done using STATA version 15.[24] Tables were created using asdoc, a STATA program written by Shah.[25]

## Results

### *Participants Characteristics*

Women had a median age of 26 years, ranging from 15 to 45 years. Majority had never gone beyond primary level education (69.1%, 336/486) and were working as housewives (stay home mums) (45.1%, 219/486). Most women had spent between 1 and 5 years in these FCs (52.1%, 253/486), were staying in communities with a government (public) health facility (84.4%, 410/486) (see Table 1).

### *ANC Visits Attendance*

Number of ANC visits attended ranged from 0 to 10, with a median of 2. The number of ANC visits had a higher proportion of zeros (35%, 170/486), none attendance. Over three-fifths of women had the first ANC visit late after 3 months of being pregnant (63%, 198/316), with almost a third of those who had a childbirth during the past 6 months never completing 4 ANC visits (30%, 51/170). A higher proportion of women whose partners had attained postprimary education attended ANC compared with those

**Table 2.** Characteristics of Study Participants by Antenatal Care (ANC) Visits.

| | | ANC visits | | | | |
|---|---|---|---|---|---|---|
| Characteristic | Total | 0, n (%) | 1-10, n (%) | *P* | Mean | *P* |
| Age group (years) | | | | .92 | | .45 |
| 25-49 | 293 | 102 (34.8) | 191 (65.2) | | 2.3 | |
| 15-24 | 193 | 68 (35.2) | 125 (64.8) | | 2.1 | |
| Highest education | | | | .99 | | .75 |
| Post primary | 150 | 52 (34.7) | 98 (65.3) | | 2.3 | |
| Primary | 304 | 107 (35.2) | 197 (64.8) | | 2.1 | |
| None | 32 | 11 (34.4) | 21 (65.6) | | 2.1 | |
| Partner education | | | | <.05 | | .06 |
| Post primary | 187 | 53 (28.3) | 134 (71.7) | | 2.5 | |
| Primary | 103 | 37 (35.9) | 66 (64.1) | | 2.2 | |
| Other | 133 | 56 (41.1) | 77 (57.9) | | 1.9 | |
| Partner occupation | | | | .39 | | <.05 |
| Fishing related | 299 | 107 (35.8) | 192 (64.2) | | 2.0 | |
| Non-fishing related | 124 | 39 (31.4) | 85 (68.6) | | 2.7 | |
| Community public health facility | | | | .05 | | <.05 |
| Absent | 76 | 34 (44.7) | 42 (55.3) | | 1.6 | |
| Present | 410 | 136 (33.2) | 274 (66.8) | | 2.3 | |
| Receipt of all ANC components | | | | <.05 | | <.05 |
| Yes | 58 | 0 (0.0) | 58 (100.0) | | 4.2 | |
| No | 428 | 170 (39.7) | 258 (60.3) | | 1.9 | |
| Pregnancy loss history | | | | <.05 | | <.05 |
| Yes | 200 | 86 (43.0) | 114 (57.0) | | 1.8 | |
| No | 286 | 84 (29.4) | 202 (70.6) | | 2.4 | |
| Time spent in community | | | | .7 | | <.05 |
| 3-11 months | 112 | 43 (38.4) | 69 (61.6) | | 1.7 | |
| 1-5 years | 253 | 86 (34.0) | 167 (66.0) | | 2.3 | |
| >5 years | 121 | 41 (33.9) | 80 (66.1) | | 2.5 | |

whose partners had primary or other forms of education as well as women staying in communities with a public health facility (see Table 2).

Keeping months of pregnancy constant, the predicted number of ANC times was lowest among women living in a community without a public health facility, whose partners were working in fishing related occupations. Women with the same months of pregnancy, staying in communities with a public health facility, whose partners were working in none fishing related occupations had the highest predicted number of ANC visits (see Supplementary Table S1). The predicted number of ANC visits by months of pregnancy was 0 from 1 to 4 months of pregnancy, 1 at 5 to 6 months of pregnancy, and only 3 at 8 and 9 months of pregnancy (see Supplementary Table S2).

Women were likely to have started ANC late after the first 3 months of pregnancy if they had partners working in fishing-related activities (odds ratio [OR] = 1.8, $P < .05$, 95% CI 1.0-3.1), had attained only up to primary level education (OR = 2.6, $P = .05$, 95% CI 1.0-7.0), were not living together with their partners (OR = 2.5, $P < .05$, 95% CI 1.1-6.0), and reported no previous history of a pregnancy loss (OR = 1.8, $P < .05$, 95% CI 1.1-3.0) (see Table 3).

## *Factors Associated With the Number of ANC Visits Attended*

Negative binomial regression (NBREG) model was chosen over the ZIP and ZINB models as a comparison of the three models using AIC and BIC, NBREG model had the least AIC and BIC values (AIC = 1062.0, BIC = 1101.0) relative to the others (see Table 4).

Women whose partners worked in fishing-related activities were 0.8 (exponentiated coefficient) times as less likely to have attended more ANC visits than those whose partners were in non-fishing-related work, both having stayed in the same community, with the same months of pregnancy. Women who were staying in a community with a public (government) health facility were 1.5 (exponentiated coefficient) times as likely to have attended more ANC visits than those who stayed in a community without a public

**Table 3.** Factors Associated With Late Antenatal Care (ANC) Attendance.

| Characteristic | ANC attendance | | | Crude odds ratio (95% CI) | Adjusted odds ratio (95% CI)[a] |
|---|---|---|---|---|---|
| | Total | Early | Late | | |
| Age group (years) | | | | | |
| 25-49 | 191 | 70 (36.7) | 121 (63.3) | 1 | |
| 15-24 | 125 | 48 (38.4) | 77 (61.6) | 0.93 (0.6-1.5) | |
| Highest education | | | | | |
| None | 21 | 11 (52.4) | 10 (47.6) | 1 | 1 |
| Primary | 197 | 66 (33.5) | 131 (66.5) | 2.2 (0.9-5.4) | **2.6 (1.0-7.0)** |
| Post primary | 98 | 41 (41.8) | 57 (58.2) | 1.5 (0.6-3.9) | 1.9 (0.7-5.4) |
| Partner education | | | | | |
| Other | 77 | 29 (37.7) | 48 (62.3) | 1 | |
| Primary | 66 | 21 (31.8) | 45 (68.2) | 1.3 (0.7-2.6) | |
| Post Primary | 134 | 51 (38.1) | 83 (61.9) | 1.0 (0.6-1.8) | |
| Partner occupation | | | | | |
| Non-fishing related | 85 | 37 (43.5) | 48 (56.5) | 1 | 1 |
| Fishing related | 192 | 64 (33.3) | 128 (66.7) | 1.5 (0.9-2.6) | **1.8 (1.0-3.1)** |
| Staying with partner | | | | | |
| Yes | 242 | 93 (38.4) | 149 (61.6) | 1 | 1 |
| No | 35 | 8 (22.9) | 27 (77.1) | 0.9 (0.5-1.8) | **2.5 (1.1-6.0)** |
| Community public health facility | | | | | |
| Absent | 42 | 15 (35.7) | 27 (64.3) | 1 | |
| Present | 274 | 103 (37.6) | 171 (62.4) | 0.9 (0.5-1.8) | |
| Receipt of all ANC components | | | | | |
| No | 258 | 94 (36.4) | 164 (63.6) | 1 | |
| Yes | 58 | 24 (41.4) | 34 (58.6) | 0.8 (0.5-1.5) | |
| Pregnancy loss history | | | | | |
| Yes | 114 | 53 (46.5) | 61 (53.5) | 1 | 1 |
| No | 202 | 65 (32.2) | 137 (67.8) | 1.8 (1.1-2.9) | **1.8 (1.1-3.0)** |

[a]Adjusting for the potential predisposing factors in final model. Boldfaced values indicate statistically significant variables in final model.

health facility, if they had the same months of pregnancy and their partners had the same occupation.

## Discussion

Majority of women started attending ANC late after 3 months of pregnancy, with the predicted ANC visits by month of pregnancy being lower than current national recommendations of at least 1 ANC visit at 0 to 20, 20 to 28, 28 to 36, and over 36 weeks.[17]

Women in communities with a public health facility were likely to have attended more visits than those in communities without a public health facility.

Late start with fewer predicted visits by month of pregnancy may be due to propinquity of ANC services, as having no public health facility in the community was associated with fewer predicted visits attended. It is challenging and expensive for women staying in islands FCs to access the unavailable ANC services on another island or mainland. Public health facilities were level II and III, all equipped with ANC services, including skilled attendants to minimize maritime challenges of seeking care outside the community. This adds to other settings work indicating an association between ANC attendance and health facility proximity.[15,22,26-30] Others did not find any association between ANC attendance and nearness to a health facility.[31] Presence or closeness to a health facility per se may not help improve ANC practices without skilled attendants and equipment for quality services. The fewer predicted number of visits by months of pregnancy might have been due to lack of knowledge and awareness of the benefits of early ANC. Awareness of benefits of early ANC was not assessed, though over three-fifths of study participants had not studied beyond primary level education. Lower education levels have been linked to poor ANC utilization in other parts of Uganda.[6,14,15]

Women who had attained post-primary level education were less likely to have started ANC late after the first 3 months of pregnancy, as was the case with majority of other settings.[6,14,15,22,32,33] Women with higher education may easily comprehend ANC-related awareness information including understanding of challenges associated with late start of ANC. Negative sociocultural practices that don't favor

**Table 4.** ANC Visits Predictors Using NBREG, ZIPREG, and ZINBREG Models.[a]

| Variable | NBREG | ZIPREG | ZINBREG |
|---|---|---|---|
| Partner occupation | | | |
| Fishing related | −0.2** | −0.2** | −0.2** |
| | (0.1) | (0.1) | (0.1) |
| Community public health facility | | | |
| Present | 0.4** | 0.4** | 0.4** |
| | (0.1) | (0.1) | (0.1) |
| Months of pregnancy | | | |
| 4 | 1.0** | 1.0** | 1.0** |
| | (0.3) | (0.3) | (0.3) |
| 5 | 1.4*** | 1.4*** | 1.4*** |
| | (0.3) | (0.3) | (0.3) |
| 6 | 1.8*** | 1.8*** | 1.8*** |
| | (0.3) | (0.3) | (0.3) |
| 7 | 2.3*** | 2.3*** | 2.3*** |
| | (0.3) | (0.3) | (0.3) |
| 8-9 | 2.6*** | 2.6*** | 2.6*** |
| | (0.3) | (0.3) | (0.3) |
| Birth up to 6 months | 3.0*** | 3.0*** | 3.0*** |
| | (0.2) | (0.2) | (0.2) |
| Constant | −1.7*** | −1.7*** | −1.7*** |
| | (0.3) | (0.3) | (0.3) |
| Ln (α) | −17.1 | | −17.9 |
| | (376.1) | | (197.1) |
| Zero inflation | | | |
| Partner education | | | |
| Post-primary | | −32.7 | −123.1 |
| | | (6695.6) | (0.0) |
| Age group (years) | | | |
| 15-24 | | −27.8 | −123.0 |
| | | (1642.0) | (0.0) |
| Total births | | 0.1 | −0.5 |
| | | (2.2) | (0.9) |
| Religion | | | |
| Catholic | | 5.9 | −0.1 |
| | | (42343.4) | (13.0) |
| Protestant | | −11.5 | 4.7 |
| | | (42354.6) | (18.0) |
| Muslim | | −40.5 | −122.3 |
| | | (42462.5) | (0.0) |
| Community with public health facility | | | |
| Present | | −46.8 | −13.1 |
| | | (1539.6) | (17.6) |
| Pregnancy loss history | | | |
| No | | −17.1 | −119.4 |
| | | (666.3) | (0.0) |
| Constant | | 24.2 | 7.6 |
| | | (42360.8) | (0.0) |
| Observations | 368 | 368 | 368 |
| Pseudo $R^2$ | 0.3 | 0.0 | 0.0 |
| AIC | 1062.0 | 1071.1 | 1062.3 |
| BIC | 1101.0 | 1141.5 | 1117.1 |

Abbreviations: ANC, antenatal care; NBREG negative binomial regression; ZIPREG, zero inflated Poisson regression; ZINBREG, zero inflated negative binomial regression.

[a]Standard errors are in parentheses.

*$P < .05$, **$P < .01$, ***$P < .001$.

ANC may be less among women with higher education. Education may also be associated with easy access to paying employment, financial freedom, and better health services which increase likelihood of early and adequate ANC attendance.

Women who were not staying with their spouses were likely to have started ANC late, as majority ANC facilities encourage women to be accompanied by their spouses during ANC or else, they are not attended to promptly, which may discourage women from seeking ANC early. Some FCs' members are mobile, leaving their families, including spouses on the mainland to earn a living in these communities. Women staying away from their spouses might have come to earn a living, receiving little or no financial support from their distant partners. It might have been financially challenging for such women to easily create time for early ANC as they were engaged in activities to financially support themselves. Lack of support from spouses has been previously linked to the late start and inadequate ANC attendance in some communities.[30,34-36]

Women whose spouses had fishing related occupations were likely to have started ANC late after the first three months (trimester) of pregnancy. These communities being islands, with most male occupations being fishing and related activities, those working in fishing-related activities may have had less time to support their women start ANC early. During the morning, a time usually for ANC, men are busy sorting their fishing nets and resting from overnight's fishing. By late afternoon, when the men are slightly free, the time for ANC is over. Additionally, spouses working in fishing and related activities may have had easy access to a daily cash income, which they recklessly spent on social engagements than supporting their partners who often lack resources to facilitate early start of ANC.[37] Women with spouses doing non-fishing-related work were likely to have started ANC early, as non-fishing-related activities may be less engaging, with less frequent absences from home. Partner's occupation has been associated with ANC attendance in other communities.[26]

Women without prior history of pregnancy loss were likely to have started ANC late relative to those with history of pregnancy loss. They might have become complacent, thinking that it will always be the same, there is no need to start ANC early, yet their counterparts wanted to avoid a repeat loss. Findings add to the literature in other settings where having experienced a miscarriage was associated with early attendance of ANC.[22,38]

A limitation of the study was the lack of comparison of self-reports to medical records including ANC cards as care attendance occurred from diverse locations. We did not ascertain the proportion of women who had complicated pregnancies. This could be another limitation as

women with complicated pregnancies might have attended more ANC, leading to overreporting of ANC visits. Since the study recruited women with pregnancy experiences, those who died from complications of pregnancy were automatically excluded as there were no verbal ANC autopsies conducted.

## Conclusions

ANC practices among these rural island Lake Victoria FCs in Uganda are characterized by fewer than expected visits by months of pregnancy compared with national guidelines,[17] with majority of visits starting late after the first 3 months of pregnancy.

Community-led early ANC awareness interventions are needed to improve care especially among the less educated and those with spouses in fishing related activities. Health policies for FCs need to consider public ANC facilities for each island for improved antenatal outcomes and maternal health.

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### Author Contributions

AS, a PhD student, conceived the study, secured funding, training and coordination of field team, data management, cleaning, data analysis, interpretation of data and drafting of the manuscript. JN, GM, NN, JN, PN, and HLK participated in data collection, data quality control, data management, modification, reviewing and approval of the manuscript. KP participated in the review, modification and approval of manuscript. KM participated in the review, modification and approval of manuscript. BB participated in conception of the idea, reviewing study progress, drafting, review and approval of manuscript. NK participated in conception of the idea, design of the study, reviewing study progress, drafting, review and approval of manuscript. OD participated in conception of the idea, design of the study, finalization of study protocol, reviewing study progress, data analysis, interpretation of data, drafting, reviewing and approval of the manuscript. All authors substantially modified and approved the final manuscript prior to submission.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### Ethical Approval

The study was approved by Uganda Virus Research Institute Research Ethics Committee (Federal Wide Assurance [FWA] number 00001354) and the Uganda National Council of Science and Technology (FWA number 00001293).

### Informed Consent

Women aged 18 years and older were enrolled after providing written informed consent. Women adolescents aged 15 to 17 years were enrolled after documented emancipated minor consent if they were emancipated minors or assent, with documented consent from their parents or guardians.

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### Supplemental Material

Supplemental material for this article is available online.

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