RESEARCH ARTICLE

Prevalence and determinants of unmet family planning needs among women of childbearing age in The Gambia: analysis of nationally representative data [version 1; peer review: 1 approved, 1 approved with reservations]

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Abstract

Background: Family planning is imperative in the control of population growth by preventing unintended pregnancies and reducing other pregnancy-related risks. However, the effectiveness of family planning is constrained by unmet needs. This study determined the proportion and identify factors associated with unmet family planning needs among women of childbearing age in The Gambia.

Methods: We utilized cross-sectional population-based Demographic and Health Survey (DHS) data from Gambian women aged 15-49 years in 2013. The outcome measured was the total unmet/met need for FP. The sample comprised 10,233 women aged 15-49 years old. Chi-square and multivariable logistic regression analysis were used.

Results: Of the 10,233 eligible women recruited in the study, the mean age was 27.4±9.1 years while 67.5% were married. Overall, 17.6% of women reported unmet FP need, of whom 14.0% and 3.6% reported unmet birth spacing and birth limitation needs, respectively. The women's age, region, ethnicity, number of live children, number of household/family members, the optimal number of children, and husband/partners' desire for the children were found as significant determinants of unmet FP needs. Furthermore, breastfeeding has been identified as the key reason for the non-use of FP in mothers.

Conclusions: The study findings suggest a need to expand FP programs and related strategic communications especially for younger women in order to improve their contraceptive prevalence. Improving women empowerment and accessibility to FP will help to lessen the current trend towards rising unmet needs in The Gambia.

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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

contraceptives, unintended pregnancies, prevalence, breastfeeding

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Introduction

Globally, data on unmet needs for family planning (FP) has become a useful tool for the measurement and prediction of contraceptive use, and the needs of a given population. Although, awareness and access to FP services has improved in recent years, unmet need for FP remains high, particularly in low-income countries¹. At the global level, 885 million women of reproductive age in developing nations do not want to be pregnant at a particular time, while 214 million of them have an unmet need for FP methods, which accounted for 84% of all unplanned pregnancies in 2017^{2,3}. This implies that they have no desire for pregnancy and no access to any FP methods². In developing countries, there are a high proportion of persons that want to use FP commodities but are not able due to lack of access to modern and up-to-date contraceptive methods^{4,5}. Sub-Saharan Africa (SSA) contributes enormously to the proportion of this FP need among women, with more than 24% in 2015 compared to the global average (25% to 40%)^{1,6}. Inaccessibility to FP services and low awareness levels contribute to high unmet needs for FP in SSA⁷. It is estimated that there are up to 21 million births which were not planned, 26 million abortions, and 7 million miscarriages not to mention 79,000 and 1.1 million maternal and child deaths respectively, which could be prevented if unmet needs for FP are attended to by FP programs⁴. Between 2017 and 2030, there is an expected surge in the frequency of FP utilization among women in parts of SSA, including West Africa, from 20% to 29%¹. Globally, SSA accounted for 65% of FP needs for spacing, whereas other continents such as Latin America accounted for only 42%⁸.

Regarding population growth, The Gambia is considered to be among the highest in the sub-region, which can be attributed mainly to low contraceptive utilization with attended high unmet need for FP, with the fertility rate that relatively remains unchanged from 1960 to 2015⁹. The Government of the Gambia aim to reduce the maternal mortality rate from 433/100,000 in 2013 to 315/100,000 and increase the contraceptive prevalence rate from 9% in 2013 to 25% by 2021¹⁰. Despite the extensive reproductive health programmes, the unmet need for FP in The Gambia is projected at 26.5%, with 6.2% of women not using contraception since they want to cease further childbearing (limiting childbearing) and 20.3% who want to postpone the next birth at least two more years (spacing childbearing) with demand for FP satisfied with modern methods at 33.9%¹¹. Gender norms and traditional values in Gambian society could be part of the reasons for high unmet needs for FP. This translates to a high annual population growth rate of 3.3% and a maternal mortality ratio of 433 per 100,000 live births, compared to the 2016 global estimate of 385 deaths to 216 deaths per 100,000 live births^{12,13}. At the national level, the total fertility rate prior to the survey was 4.4: 5.8 in rural areas, and 3.8 in urban areas¹¹. The rural areas recorded higher age-specific fertility rates during their childbearing years. The general fertility rate for women aged 15–49 years is 140 births per 1,000, while the crude birth rate is 33 births per 1,000 population¹¹.

There is a close relationship between population growth and FP. The majority of countries use FP to balance population growth with economic growth. In order to reduce the rate of unmet needs among women of childbearing age in the West African sub-region,

there is a need for a proper understanding of various covariates associated with unmet needs. Considering the limited available literature on this phenomenon, some identified determinants were majorly focusing on factors operating at individual and household levels. These have systematically taken away attention from the community factors instead of an integrated approach for better outcomes.

However, the lack of empirical research evidence is required to explain the current unprecedented population-based reproductive health challenges. This phenomenon resulted in examining the predictors of unmet need among reproductive-age women in The Gambia. To date, little attention has been paid to understanding the nexus of unmet need for FP in the Gambia, especially among low-income urban residents⁵. However, there is limited research that has explored the undercurrents of unmet needs for the FP concentrating on community-level issues and the incorporation of individuals, households, and communities in The Gambia. Therefore, the paper attempts to examine the prevalence and determinants of unmet FP needs among reproductive-age women in The Gambia.

Methods

Data source

This study utilized data from the 2013 Gambia Demographic and Health Survey (GDHS) from a population-based sample, created with the use of a stratified two-stage cluster sampling design. In the first stage, 281 clusters/Enumerated Areas (EAs) were selected in accordance with the probability proportional to the size of the EAs. In the second stage, 25 households were selected from each cluster/EA with an equal probability of systematic selection. The initial sample of 11,279 women aged 15–49 were identified from the 25 households, and 10,233 of them were eventually interviewed successfully. This yields a response rate of 91% which was considered for detailed analysis. The data used in this study were collected through interviews with women aged 15–49 years

Variable selection and measurement

Outcome variables. The outcome measured was unmet needs, which was expressed as 1 for those women who had an unmet need for FP and 0 for those who did not have an unmet need for FP. Women who did not have a need for FP were the percentage of all fertile women who were married or living in a union at the time of the interview and were considered sexually active. Although these group of women do not know if they want another child or when to have it or do not want more children at all, and/or want to delay their next child's conception for more years, they do not use any contraceptive method for prevention of pregnancy^{14–16}.

Controlled variables. Information on independent variables include socio-demographics (age, educational level, ethnicity, place of residence, religion, wealth index, etc.) and related variables (number of live children, number of household/family members, partner's desire on number of children, the optimal number of children, etc.). In terms of wealth index as a covariate in this study, this was computed by DHS based on the households data that includes ownership of certain consumer items which ranges from ownership of car or bicycle to television,

availability of clean drinking water, type of material used in building house especially the floor material, the type of and availability of sanitation facilities, and other dwelling characteristics¹². The household score for each member of the respective household was formed using the national level wealth quintiles (that is, from lowest wealth to highest wealth) after the index was computed. Each person in the population was ranked with that score, while the ranking was divided into five categories comprising of 20% each¹². However, the wealth index was further considered as low (poorest + second category), middle (middle category alone), and high (fourth + richest category) based on the specifications earlier highlighted and also cited in some previous studies^{16,17}. The data file succinctly reported both limitations of children bearing and unmet need for spacing including some other related variables. The unaddressed need to restrict child bearing and spacing was added such that the total unmet need for FP was obtained. The other related variables of the said category were summed up to form the total number of met needs category^{16–18}.

Ethical approval

This study utilized a population-based datasets that are readily available in the public domain/online. Specific variables that could be used to identify study participants were removed for confidentiality purpose. Seeking individual-level consent of the participants was not applicable, since the authors used The Gambia DHS 2013 Survey dataset which was coordinated and collected by GBoS and ICF International. Permission to use the datasets was granted by MEASURE DHS/ICF International. The DHS project received the requisite ethical approvals from the related Research Ethics Committee in The Gambia, West Africa, prior to the survey.

Statistical analysis

Socio-demographic and related factors of the study sample were presented as percentages. Distributions between women who reported unmet needs and those who reported non-unmet needs for FP were compared using Student's *t*-test for continuous variables and Pearson's Chi-squared test for categorical variables. The results of bivariate analysis between the categorical outcome variable (unmet need for FP and no unmet need) and background-independent variables (selected socio-demographic and related factors) were cross-checked for $p < 0.20$ in order to be included for further analysis in the logistic regression model. The collinearity testing approach has the correlation analysis to detect interdependence between variables. A cut-off of 0.7 was used to examine the multicollinearity known to cause major concerns¹⁹. No variable from the correlation matrix was removed in the model due to a lack of multicollinearity. A logistic regression model was used to identify the associated factors with unmet FP needs, in which adjusted odds ratios (ORs) and their 95% confidence intervals (CIs) were computed. At the level of the analysis, variables with *p* values of < 0.05 were considered statistically significant. Data analysis was performed using IBM SPSS version 25.

Results

Socio-demographic characteristics of women of reproductive-age in The Gambia

A total of 10,233 women of reproductive age were involved in the study and Table 1 shows their socio-demographic characteristics. The participant mean age was 27.4 years (standard deviation ± 9.1). Almost half of the participants were within 15–24 years age group, which constituted 44.6% of the sample. More than half of the participants were from rural areas. Moreover, 2,366 (33.2%) of women were Mandinka by ethnicity and 5,079 (49.6%) were illiterate. Of the study participants, 6,905 (67.5%) were currently married, while 852 (8.3%) were reported to be pregnant at the time of the study. In total, 4,474 (43.8%) were currently working, 4,913 (48.0%) had household members aged between 1–10 years and 6,089 (59.5%) had 0–2 children living in a household.

Prevalence and reasons for the unmet need for FP among Gambian women

Table 2 presents the prevalence and reasons for the unmet FP need among participants. Overall, the prevalence of unmet need for FP was 1,800 (17.6%) while the unmet need for spacing and limiting of the number of births was 1,432 (14.0%) and 368 (3.6%), respectively. Therefore, the total unmet need was found to be 8,412 (82.4%). The main reasons for lack of FP use among Gambian women were breastfeeding ($n=1,240$, 37.1%), respondent opposed to FP ($n=747$, 22.4%), partner opposed to FP ($n=372$, 11.1%), fatalistic outlook ($n=344$, 10.3%), postpartum amenorrhoea ($n=321$, 9.6%), and afraid of side effects/health issues ($n=273$, 8.2%).

Factors influencing the unmet FP need among Gambian women

Table 3 shows a cross-tabulation with frequencies and percentages of each variable. The results shows that all background variables (age of women, place of residence, region, ethnicity, religion, educational level, wealth index, women current work status, number of live children, number of household/family members, ideal/optimal number of children and husband/partner desire for children) were significantly different among those with unmet FP need and those with no unmet need at $p < 0.05$. The study shows that 7.2% of women aged 25–34 years had the highest proportion of unmet FP needs while those aged 15–24 years had the lowest unmet need for FP across all the age categories. Rural areas have a higher proportion of overall unmet FP need which accounted for 11.3%, while the communities of Brikama and Kerewan have a higher overall unmet FP need when compared to other regions in The Gambia.

Those of Mandinka ethnicity had the highest total unmet FP needs (5.7%) followed by Fula at 4.6%). Adeherents to Islam recorded the highest unmet FP needs at 17.2%. In terms of the educational background of the participants, women who never been to school or lower educational levels have the highest level (11.2%) of overall unmet FP needs. The percentage decreased as the degree

Table 1. Women's socio-demographic characteristics, GDHS 2013.

Variables	Frequency (n)	Percent (%)
Age of women		
15–24	4564	44.6
25–34	3235	31.6
35+	2434	23.8
Mean (SD): 27.4 (±9.1)		
Place of residence		
Urban	4498	44.0
Rural	5735	56.0
Region		
Brikama	1833	17.9
Kanifing	1506	14.7
Kerewan	1448	14.2
Basse	1269	12.4
Banjul	1073	10.5
Mansakonko	1041	10.2
Kuntaur	1039	10.2
Janjanbureh	1024	10.0
Ethnicity		
Mandinka	3366	33.2
Fula	2470	24.3
Wolof	1387	13.7
Jola	851	8.4
Serahuleh	744	7.3
Non-Gambian	479	4.7
Serere	388	3.8
Manjago	143	1.4
Bambara	123	1.2
Other	105	1.0
Creole	88	0.9
Religion		
Islam	9916	97.0
Christianity	302	3.0

Variables	Frequency (n)	Percent (%)
Highest level of educational		
No education	5079	49.6
Primary	1438	14.1
Secondary	3268	31.9
Higher	448	4.4
Wealth index		
Low	4395	42.9
Middle	1991	19.5
High	3847	37.6
Currently pregnant		
No or unsure	9381	91.7
Yes	852	8.3
Current marital status		
Never in union	2866	28.0
Married	6905	67.5
Separate	462	4.5
Women work status		
No	5732	56.2
Yes	4474	43.8
Number of living children		
0 – 2	6089	59.5
3+	4144	40.5
Mean (SD): 2.4 (±2.5)		
Number of household members		
1 – 10	4913	48.0
11 – 20	3612	35.3
21+	1708	16.7
Mean (SD): 13.8 (±10.7)		

of schooling rose. The prevalence of total unmet FP need was high for both participants who are currently working (8.9%) and reported an ideal number of children more than 5 by 10.9% with low wealth index at 8.5%. Women with more than 3 living children had 11.7% prevalence rate of total unmet FP need while those with 0–2 living children had a rate of 6.0%. The

Table 2. Prevalence and reasons for unmet need for family planning among fertile women, GDHS 2013.

Variables	Frequency (n)	Percent (%)
Unmet need (n=10212)		
Never had sex	2442	23.9
Unmet need for spacing	1432	14.0
Unmet need for limiting	368	3.6
Using for spacing	502	4.9
Using for limiting	182	1.8
Spacing failure	17	0.2
Limiting failure	1	0.0
No unmet need	3611	35.4
Not married and no sex in the last 30 days	497	4.9
Infecund, menopausal	1160	11.4
Total unmet need		
unmet need (spacing and/or limiting)	1800	17.6
No unmet need	8412	82.4
Reason for not using FP*		
Breastfeeding	1240	37.1
Respondent opposed	747	22.4
Husband/partner opposed	372	11.1
Fatalistic	344	10.3
Postpartum amenorrheic	321	9.6
Afraid of side effects/health issues	273	8.2
Not having sex	271	8.1
Infrequent sex	241	7.2
Religious prohibition	199	6.0
Knows no method	171	5.1
Not married	159	4.8
Knows no source	110	3.3
Menopausal/hysterectomy	96	2.9
Subfecund/infecund	49	1.5
Lack of access/too far	35	1.0
Interferes with the body's processes	33	1.0
Others opposed	9	0.3
Inconvenient to use	9	0.3
Costs too much	8	0.2
No method available	7	0.2
Preferred method not available	1	0.0

*Multiple responses

Table 3. Factors associated with unmet family planning needs among Gambian women.

Socio-demographic factors	Total unmet need for FP		Chi-square test	p-value
	Yes n (%)	No n (%)		
Age of women				
15–24	453 (4.4)	4107 (40.1)	340.538	<0.001*
25–34	739 (7.2)	2492 (24.4)		
35+	608 (5.9)	1813 (17.7)		
Place of residence				
Urban	647 (6.3)	3843 (37.6)	57.099	<0.001*
Rural	1153 (11.3)	4569 (44.7)		
Region				
Banjul	145 (1.4)	926 (9.1)	77.634	<0.001*
Kanifing	220 (2.2)	1282 (12.6)		
Brikama	310 (3.0)	1517 (14.9)		
Mansakonko	158 (1.5)	880 (8.6)		
Kerewan	299 (2.9)	1149 (11.3)		
Kuntaur	188 (1.8)	850 (8.3)		
Janjanbureh	259 (2.5)	762 (7.5)		
Basse	221 (2.2)	1046 (10.2)		
Ethnicity				
Mandinka	577 (5.7)	2784 (27.5)	22.617	0.012*
Wolof	277 (2.7)	1107 (10.9)		
Jola	137 (1.4)	711 (7.0)		
Fula	470 (4.6)	1997 (19.7)		
Serere	54 (0.5)	334 (3.3)		
Serahuleh	127 (1.3)	613 (6.1)		
Creole/Aku	7 (0.1)	81 (0.8)		
Manjago	22 (0.2)	121 (1.2)		
Bambara	19 (0.2)	104 (1.0)		
Other	14 (0.1)	90 (0.9)		
Non-Gambian	79 (0.8)	398 (3.9)		
Religion				
Islam	1757 (17.2)	8139 (79.8)	4.013	0.045*
Christianity	40 (0.4)	261 (2.6)		
Highest educational level				
No education	1140 (11.2)	3922 (38.4)	212.816	<0.001*
Primary	268 (2.6)	1169 (11.4)		
Secondary	350 (3.4)	2915 (28.5)		
Higher	42 (0.4)	406 (4.0)		

Socio-demographic factors	Total unmet need for FP		Chi-square test	p-value
	Yes n (%)	No n (%)		
Wealth index				
Low	871 (8.5)	3514 (34.4)	48.283	<0.001*
Middle	381 (3.7)	1605 (15.7)		
High	548 (5.4)	3293 (32.2)		
Currently pregnant				
No or unsure	1659 (16.2)	7701 (75.4)	0.743	0.389
Yes	141 (1.4)	711 (7.0)		
Women current work status				
No	891 (8.7)	4832 (47.4)	38.636	<0.001*
Yes	906 (8.9)	3557 (34.9)		
Number of living children				
0 – 2	610 (6.0)	5472 (53.6)	597.737	<0.001*
3+	1190 (11.7)	2940 (28.8)		
Number of household/family members				
0–10	777 (7.6)	4128 (40.4)	24.6	<0.001*
11–20	669 (6.6)	2934 (28.7)		
21+	354 (3.5)	1350 (13.2)		
Ideal/optimal number of children				
0 – 5	687 (6.7)	3944 (38.6)	45.478	<0.001*
>5	1113 (10.9)	4468 (43.8)		
Husband's desire for children				
Both want same	277 (4.1)	986 (14.4)	13.277	0.004*
Husband wants more	771 (11.3)	2137 (31.3)		
Husband wants fewer	20 (0.3)	61 (0.9)		
Don't know	700 (10.3)	1873 (27.4)		
Husband/partner's education level				
No education	1127 (15.4)	3460 (47.2)	1.993	0.737
Primary	93 (1.3)	276 (3.8)		
Secondary	373 (5.1)	1235 (16.9)		
Higher	116 (1.6)	378 (5.2)		
Don't know	60 (0.8)	207 (2.8)		

* Statistically significant at 0.05 level

proportion of total unmet FP need was highest among husbands/partners who desired to have more children (11.3%) and lowest for those who want fewer children.

Predictors of unmet need for FP among reproductive-age women in The Gambia

The model is shown in Table 4 where seven variables have p-value <0.05 at least in one of the specific categories in each predictor

variable. However, place of residence, religion, women's level of education, wealth index, and women's current work status were not significant predictors of unmet need for FP. Women in the age group 15–24 were 22.5% less likely to have unmet FP needs as compared to those at age 35 and above. However, women aged 25–34 were 6.1% less likely to have unmet FP needs than women aged 35 and over. Compared to women in Basse region, there is less likelihood of having unmet FP needs for those in Banjul

Table 4. Determinants of unmet family planning need among Gambian women.

Variables	B (Regression coefficient)	Odds Ratio	95% C.I. for OR		p-value
			Lower	Upper	
Age of women					0.031
15–24	-0.254	0.775	0.639	0.941	0.010*
25–34	-0.063	0.939	0.820	1.075	0.364
35+ (Ref)					1
Residence					
Urban	0.170	1.186	0.966	1.456	0.103
Rural (Ref)					1
Region					0.000
Banjul	-0.593	0.552	0.398	0.766	0.000***
Kanifing	-0.595	0.552	0.410	0.742	0.000***
Brikama	-0.356	0.701	0.551	0.890	0.004**
Mansakonko	-0.001	0.999	0.773	1.292	0.995
Kerewan	-0.375	0.687	0.547	0.863	0.001**
Kuntaur	-0.059	0.943	0.739	1.203	0.634
Janjanbureh	-0.671	0.511	0.406	0.643	0.000***
Basse (Ref)					1
Ethnicity					0.333
Mandinka	-0.391	0.676	0.511	0.895	0.006**
Wolof	-0.416	0.660	0.489	0.890	0.006**
Jola	-0.344	0.709	0.508	0.989	0.043*
Fula	-0.378	0.685	0.516	0.911	0.009*
Serere	-0.250	0.779	0.517	1.174	0.233
Serahuleh	-0.302	0.739	0.525	1.042	0.084
Creole/Aku	0.196	1.217	0.390	3.796	0.735
Manjago	-0.628	0.534	0.269	1.057	0.072
Bambara	-0.468	0.626	0.343	1.142	0.127
Other	-0.157	0.855	0.440	1.663	0.644
Non-Gambians (Ref)					1
Religion					
Islam	0.228	1.255	0.772	2.041	0.359
Christianity (Ref)					1
Highest education					0.076
No education	-0.108	0.897	0.614	1.312	0.577
Primary	-0.292	0.747	0.502	1.111	0.149
Secondary	-0.246	0.782	0.533	1.148	0.209
Higher (Ref)					1

Variables	B (Regression coefficient)	Odds Ratio	95% C.I. for OR		p-value
			Lower	Upper	
Wealth index					0.595
Low	-0.030	0.971	0.784	1.201	0.784
Middle	-0.093	0.911	0.738	1.125	0.388
High (Ref)					1
Respondent currently working					
No	-0.053	0.949	0.844	1.066	0.376
Yes (Ref)					1
Number of living children					
0 – 2	0.765	2.148	1.843	2.504	0.000***
3+ (Ref)					1
Number of household members					0.049
0–10	-0.177	0.838	0.685	1.025	0.085
11–20	-0.223	0.800	0.670	0.957	0.014*
21+ (Ref)					1
Ideal number of children					
0 – 5	0.162	1.176	1.036	1.334	0.012*
>5 (Ref)					1
Husband's desire for children					0.002
Both want same	0.327	1.387	1.172	1.640	0.000***
Husband wants more	0.063	1.065	0.937	1.211	0.333
Husband wants fewer	0.197	1.217	0.719	2.060	0.464
Don't know (Ref)					1

Ref = Reference category, CI (Confidence Interval)

* P<0.05

** P<0.01

*** P<0.001

(44.8%), Kanifing (44.8%), Brikama (29.9%), Kerewan (31.3%) and Janjanbureh (48.9%). The likelihood reduces for women that are Mandinka, Wolof, Jola, and Fula by 32.4%, 34.0%, 29.1%, and 31.5%, respectively, as compared to non-Gambian/foreign women. Furthermore, the likelihood of women who had 0–2 living children increased significantly by a factor of 2.148 (OR: 2.148, 95% CI: (1.843, 2.504)) compared to those with 3 or more living children during the study.

However, the probability that women with 11–20 household members to have unmet FP needs declined by 20% relative to those with more than 20 household members. Women who see

0–5 children as the ideal number were 1.176 (OR: 1.176, 95% CI: (1.036, 1.334)) more likely to have unmet FP needs when compared with women with more than 5 ideal number of children. Furthermore, participants who reported to share the same desire for the number of children with their husbands/partners were 1.387 (OR: 1.387, 95% CI: (1.172, 1.640)) relative to those who reported that they don't know their partners desire for children.

Discussion

In this paper, we examined the prevalence and determinants of unmet FP needs in women who were within the age of reproduction in The Gambia. The prevalence of unmet FP needs

was 17.6% with 14.0% for spacing and 3.6% for limiting the number of live births. The results revealed that the age of women, region, ethnicity, number of living children, number of household members, ideal parity, and husband/partners' desire for more children were significant determinants of unmet FP needs. The most significant reason given by the women who had unmet needs as the barrier to the use of contraceptive methods was breastfeeding. We observed very low unmet need among women who were within the age bracket of 15–24 years, with peak in women in their late 20s to early 30s, and a decline was observed among those in their 40s. This indicates that there is a lower likelihood of unmet need among the studied female population as their age increases. That may be due to the fact that older women must have been in a marriage for a longer period than the younger women and therefore, may have gained experience in contraceptive use. This may have been a contributory factor to the reduction in the unmet observed among Gambian women. This result is in accordance with published studies from Myanmar²⁰ and Bangladesh²¹.

However, the results are in contrast to the study conducted in Mumbai²² on the prevalence of unmet need for FP, which showed a rate of 40.6%, while in Nigeria, Okonofua²³ reported that the prevalence was less than 20%. Several studies such as The Gambia MICS report 2010²⁴ (22%), (18.7%) for South India²⁵, and (22.1%) in Nagpur²⁶ were found to be slightly higher than the reported prevalence for this study. However, the findings of this study were slightly lower than The Gambia DHS 2013 for overall unmet need for FP which was 24.9%. Furthermore, the unmet need prevalence as well as birth spacing and limiting as observed in this study were found to be slightly higher than that reported from an Ethiopia study in 2016. That study showed that the unmet need for FP prevalence was 16.2%, with 10.2% and 6.0% for child spacing and birth limiting unmet needs, respectively²⁷. These disparities could be attributed to cultural and religious variations, as well as the nature of the health systems in individual countries for the delivery of FP services. The fear of adverse effects, child sex preference and religious prohibitions were among the major deterrents for FP uptake in these studies.

The findings of this study show that urban women had a lower unmet need relative to those in the rural settings of The Gambia we attributed this to the availability of better healthcare services which supposedly is more available and accessible in urban settings than rural areas. Moreso, urban settings in the Gambia are assumed to have better facilities for health care services, and are more exposed in terms of access to information and education (in terms of adequate availability of various mass media services/programs), and the current trend in global health issues. Women from urban areas, as opposed to those from rural areas, could be more progressive and may have more autonomy to be independent in reproductive health decision making and utilization²⁸. Improved FP education and the systematic empowerment of rural women could lead to a reduction in the rate of unmet need in the rural parts of the Gambia.

The results of this study show that the educational status of the studied women is positively associated with a reduction in unmet

need in The Gambia. Other studies have revealed a similar pattern of improved FP use and maternal health service utilization in better-educated women^{28,29}. Women with higher levels of education could enable them to better understand the need for FP in reducing fertility, related maternal and child morbidities, and mortalities. The sum of births or living children among the studied women is a predictor of the prevalence of contraception in The Gambia. This study revealed that the increase in the number of living children among the studied women brings about a decrease in unmet need for FP, which was also seen in studies conducted in Ghana³⁰, Uganda²⁸, and Burkina Faso³¹. Higher parity women may have gained more experience on the probable adverse effects of FP methods either by consulting service providers or reading different publications about the side effect of contraceptive methods which increased their consistent use.

The reported prevalence for unmet need for FP in this paper is slightly below 25%, as compared to DHS 2013 cumulative percentage^{12,24,32} which could be due to slight variation in the estimation methods used (reproductive-age group versus married women)³³. Currently working and pregnant women had higher levels of unmet need for FP, which supported our initial postulation that unmet need for FP would be higher among women with a higher number of living children, and those that are unsure about their pregnancy status, as several studies^{34–37} have revealed. As a result of the socio-cultural settings, these women lives in, they could not decide on their own to prevent further pregnancies^{38,39}. In this study, almost one in five women in the rural areas that were in a marriage experienced an unmet FP need. This further suggests that the issue of unmet needs is still a huge problem and therefore requires urgent action from all concerned agencies.

The study findings are reminiscent of the assumption that the multidimensional nature of unmet need may not have any association with the infrastructural variances across quarters and regions, rather it may be as a result variation in women age, regional differences, educational level, women working status, marital status and number of children living, number of household members, the ideal sum of children and partners' desire for children across these settings. The authors have also acknowledged that the observed associations in unmet need and selected explanatory variables in this study may actually be dependent on the context and therefore may change when other outcome variables are manipulated. Since secondary data was used for this study, authors did not have control over them, there may be limitations to the intended analysis and therefore cannot change the original questions the researchers would want to answer.

Policy implications

Firstly, since uneducated women were found to be at higher risk of experiencing an unmet need for FP, there should be a continuous increase in the level of education which ultimately increases the chances of women using contraceptive methods. Therefore, the promotion of female education across primary, secondary, and tertiary levels should be institutionalized. Effective formulation of robust reproductive health policy with a clear strategy for its successful implementation among women (15–34 years) of age is highly required.

Secondly, the uptake of FP is very low among Mandinka and Wolof peoples, especially those from the rural areas of The Gambia. This could be as a result of fear of side effects, fertility preference, and partner desires for children. Therefore, the government together with development partners should provide adequate, timely, and reliable information to these women across the country. Thus, improving the skills and competence of service providers will enhance the consumption level of FP commodities in the Gambia.

Thirdly, spousal communication should be strengthened as both partners' desire for children, the number of living children and the ideal number of children were found to be significant predictors of unmet need for FP in The Gambia. Advocacy for male involvement through raising their awareness of the benefits associated with various contraceptive methods should be prioritized and intensified.

Conclusion

The study revealed that about one in five women experiences an unmet FP needs in rural areas in The Gambia, largely due to selected adverse socio-demographic and related characteristics. The prevalence of unmet FP needs in The Gambia is still very high (17.6%) and there are more unmet spacing needs (14.0%) than limited (3.6%). Thus, some determinants of unmet FP need, such as women's age, region, ethnicity, living children, number of household members, the ideal number of children and partner's desire for children and effective community-based FP

interventions, should be designed to reinforce the existing provision in order to spread to a larger amount of females^{38,40}. Breastfeeding was found to be the foremost cause of non-use of contraceptives across women with an unmet need for FP. The study findings suggest the need to expand FP programs and related strategic communications especially for younger women, including those in their late 20s and early 30s in order to improve their contraceptive prevalence. Improving women's access to FP and the empowerment of women will help to lessen the current trend towards rising unmet need in The Gambia.

Data availability

Underlying data

Data for this study were sourced from Demographic and Health surveys (DHS), Gambia 2013, and available here: <http://dhsprogram.com/data/available-datasets.cfm>.

Access to the dataset requires registration, and is granted to those that wish to use the data for legitimate research purposes. A guide for how to apply for dataset access is available at: <https://dhsprogram.com/data/Access-Instructions.cfm>.

Acknowledgments

We would like to thank Measure Evaluation and Gambia Bureau of Statistics (GBoS) in making the GDHS data publicly available.

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? **Justice Moses K. Aheto**

Department of Biostatistics, School of Public Health, College of Health Sciences, University of Ghana, Accra, Ghana

Barrow and colleagues examined prevalence and determinants of unmet family planning needs among women aged 15-49 years in The Gambia using secondary data based on the 2013 Gambia DHS datasets. They attempt to address an important public health issue. Studies of this nature are central to policy and intervention strategies aimed at monitoring and reducing unintended pregnancies with its associated health and socioeconomic complications among this group of women, including their families.

However, I am concerned about the fact that in the modelling, the authors ignored the hierarchical structure of the DHS dataset used where we have women nested within households, and households nested within clusters. This could lead to spurious statistical significance and its associated misleading interpretation and policy decisions.

See more details below:

Introduction:

1. The authors provided enough background to the study.
2. The authors could clearly state some of the interventions so far launched in The Gambia to address the problem of unmet needs for family planning in the country, and as to whether the interventions are working or not.
3. The statement "Gender norms and traditional values in Gambian society ..." at page 3 must be supported with appropriate reference, and properly cited.
4. For better understanding and context, I suggest that the authors change the word "covariate" to 'factors' in the statement "... need for a proper understanding of various covariates associated ..." at page 3.

Methods:

1. The Gambia DHS datasets just like any other DHS data is hierarchical in nature. For example, we have women nested in households and households nested in studied clusters. The analysis in this study completely ignored this design which could lead to spurious statistical significance and its associated misleading interpretation and policy decisions. The authors must explore this using multilevel models.
2. The authors should properly cite the data source in this paper under the sub-heading "Data source".
3. How was the multicollinearity test conducted before deciding on 0.7 threshold as the cut-off? Can you provide an appropriate reference to support the cut-off or 0.7? Surely, examining correlation matrix among the variables can be a pointer but not sufficient. In regression analysis like this, you could use generalised variance inflation factor (GVIF), tolerance etc. For example, $GVIF < 10$ is acceptable to declare absence of multicollinearity between variables (See Fox and Monette, 1992¹ and Hair *et al.*, 1992²).
4. Was the bivariate analysis based on simple logistic regression or Chi-square test as indicated at page 4? The authors should make this much clearer.

Results:

1. The results presented are supported by the data but could be improved based on the issues raised in the methods section.
2. The authors should explain the category 'Other' for the ethnicity variable in Tables 1 and 2 at pages 5 and 7 respectively.
3. It is very difficult to appreciate the value of "Don't know" responses for some variables like 'husband/partner's education level' and 'husband desire for children' in the analysis (see Table 3). The question is, how will one interpret the 'Don't know' responses which is the reference category in relation to the remaining categories in the model? How will that be appropriate for any meaningful intervention purposes? See Table 4.

Discussion and conclusion:

1. The discussion provided by the authors is supported by the data, but the issues raised in the previous sections must be considered to improve the manuscript.
2. One major limitation is reporting bias because most of the variables used are based on recall from the respondents and this should be acknowledged in the limitations of the study.

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2. Hair JF, Anderson RE, Black WC, Tatham RL: Multivariate Data Analysis. New York: Macmillan. 1992; **3rd Edition**. [Reference Source](#)

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Development and applications of (Bio)Statistical and Epidemiological methods in population health sciences (Public Health). Areas of application include but not limited to malnutrition, family planning, child vaccination, child mortality, hypertension, asthma, TB, HIV, AIDs, and malaria.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 16 Jan 2021

Amadou Barrow, University of The Gambia, Kanifing, The Gambia

Response to Reports:

"Barrow and colleagues examined prevalence and determinants of unmet family planning needs among women aged 15-49 years in The Gambia using secondary data based on the 2013 Gambia DHS datasets. They attempt to address an important public health issue. Studies of this nature are central to policy and intervention strategies aimed at monitoring and reducing unintended pregnancies with its associated health and socioeconomic complications among this group of women, including their families.

However, I am concerned about the fact that in the modelling, the authors ignored the hierarchical structure of the DHS dataset used where we have women nested within households, and households nested within clusters. This could lead to spurious statistical significance and its associated misleading interpretation and policy decisions."

Response: Thank you very much for the commendations and for letting us know that multilevel analysis (hierarchical structure) was important to forestall spurious statistics. We would like to let the reviewer know that it is not in all cases of DHS data use that should involve multilevel analysis. The objective of the study determines what analysis is required. In this case, the objective did not require hierarchical structure analysis (multilevel). However, this has given us an idea of a potential paper that would involve multilevel analysis, considering the hierarchical structure of GDHS data.

See more details below:

"Introduction:

1. The authors provided enough background to the study."

Response: Thank you.

"2. The authors could clearly state some of the interventions so far launched in The Gambia to address the problem of unmet needs for family planning in the country, and as to whether the interventions are working or not."

Response: Thank you very much for this insightful comment. Unfortunately, we do not know of any intervention(s) by the government, NGO, Faith-based mission that have targeted unmet need of family planning in the Gambia except for the routine facility family planning services which do not aggressively cause any changes over time.

"3. The statement "Gender norms and traditional values in Gambian society ..." at page 3 must be supported with appropriate reference, and properly cited."

Response: This statement has been deleted. Thank you.

"4. For better understanding and context, I suggest that the authors change the word "covariate" to 'factors' in the statement "... need for a proper understanding of various covariates associated ..." at page 3."

Response: We have now changed "covariate" to factor as recommended. Thank you.

"Methods:

1. The Gambia DHS datasets just like any other DHS data is hierarchical in nature. For example, we have women nested in households and households nested in studied clusters. The analysis in this study completely ignored this design which could lead to spurious statistical significance and its associated misleading interpretation and policy decisions. The authors must explore this using multilevel models."

Response: Thank you very much for the commendations and for letting us know that multilevel analysis (hierarchical structure) was important to forestall spurious statistics.

We would like to let the reviewer know that it is not in all cases of DHS data use that should involve multilevel analysis. The objective of the study determines what analysis is required.

In this case, the objective did not require hierarchical structure analysis (multilevel). See below that the use of DHS data does not compulsorily lead to conducting multilevel analysis:

1. <https://doi.org/10.1186/s12905-020-01112-4>
2. <https://doi.org/10.1186/s12978-020-01032-4>
3. <https://bmjopen.bmj.com/content/10/11/e036516>
4. <https://doi.org/10.1186/s40834-020-00126-5>
5. <https://bmcwomenshealth.biomedcentral.com/articles/10.1186/s>
6. https://www.dhsprogram.com/Publications/Journal-Articles-Search.cfm?TI=&page=1&C_ID=0&T_ID=5&p_id=0&r_id=0&year1=&year2=&All=0&sort=2&subtopic=155&sta

However, the comment has given us an idea of a potential paper that would involve multilevel analysis, considering the hierarchical structure of GDHS data.

"2. The authors should properly cite the data source in this paper under the sub-heading "Data source"."

Response: Thank you very much. The Gambia Demographic and Health Survey has been well-cited as recommended.

"3. How was the multicollinearity test conducted before deciding on 0.7 thresholds as the cutoff? Can you provide an appropriate reference to support the cut-off or 0.7? Surely, examining correlation matrix among the variables can be a pointer but not sufficient. In regression analysis like this, you could use generalised variance inflation factor (GVIF), tolerance etc. For example, GVIF<10 is acceptable to declare absence of multicollinearity between variables (See Fox and Monette, 19921 and Hair et al., 19922)."

Response: Thank you very much for this comment. We used both the correlation matrix and generalized variance inflation factor and none established any multicollinearity. Though we mentioned the correlation matrix only. Based on your recommendation, we have revised this statement appropriately.

See the reference:

"Midi H, Sarkar SK, Rana S: Collinearity diagnostics of binary logistic regression model. J Interdiscip Math. 2010;13:253-267. 10.1080/09720502.2010.10700699"

"4. Was the bivariate analysis based on simple logistic regression or Chi-square test as indicated at page 4? The authors should make this much clearer."

Response: We have clarified that Chi-square test was used in the bivariate analysis. Thank you.

"Results:

1. The results presented are supported by the data but could be improved based on the issues raised in the methods section."

Response: Thank you very much. We have clarified all issues as appropriate.

"2. The authors should explain the category 'Other' for the ethnicity variable in Tables 1 and 2 at pages 5 and 7 respectively."

Response: We used secondary data in this study. DHS constructed the "Other" ethnic group and we have no control over that as the various ethnic groups that made up the "Other" category was not declared in the data. Since only 1% of the respondents made up this group, we believe it is no issue and does not present any concerns. Thank you.

"3. It is very difficult to appreciate the value of "Don't know" responses for some variables like 'husband/partner's education level' and 'husband desire for children' in the analysis (see Table 3). The question is, how will one interpret the 'Don't know' responses which is the reference category in relation to the remaining categories in the model? How will that be appropriate for any meaningful intervention purposes? See Table 4."

Response: Thank you very much for this comment. Based on the DHS recode manual, the "Don't know" category infers the husbands that felt unconcerned as per desire for the number of children. We have clarified this and hope it is accepted.

"Discussion and conclusion:

1. The discussion provided by the authors is supported by the data, but the issues raised in the previous sections must be considered to improve the manuscript."

Response: Thank you.

"2. One major limitation is reporting bias because most of the variables used are based on recall from the respondents and this should be acknowledged in the limitations of the study."

Response: Thank you for the insightful comment. We have acknowledged this.

References

1. Fox J, Monette G: Generalized Collinearity Diagnostics. Journal of the American Statistical Association. 1992; 87 (417): 178-183 Publisher Full Text
2. Hair JF, Anderson RE, Black WC, Tatham RL: Multivariate Data Analysis. New York: Macmillan. 1992; 3rd Edition. Reference Source

Competing Interests: No competing interests were disclosed.

Reviewer Report 14 September 2020

<https://doi.org/10.21956/gatesopenres.14374.r29473>

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Erin M. Reynolds

University of Southern Indiana, Evansville, IN, USA

The current work provides details regarding the unmet need for family planning in the Gambia. The study is done using the Gambian DHS survey and includes expanded analysis of the variables related to FP with the use of t-test, chi-squared, and logistical regression. The authors break down the results by region, age, and other variables to explore the issues specific to the Gambia. Due to the specificity of the analysis and datasets, the results are not applicable outside of the Gambia, other than to provide country level comparisons to other West African countries. The authors provide policy steps that can be implemented to meet the FP needs in the Gambia.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.**Reviewer Expertise:** Social epidemiology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.