



The use of social media to assess the knowledge of preconception care among adults in cameroon.

A cross-sectional descriptive survey

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Abstract

Introduction: Preconception care (PCC) is a crucial aspect of sexual and reproductive health. It plays a pivotal role in promoting optimal health for women and children. However, this topic has received little attention in low- and middle-income countries, including Cameroon. Social media, a vast and common platform for information sharing, that enables lower-cost and rapid data collection, has provided an opportunity to bridge this gap. This study, therefore aimed to use social media to assess the knowledge of preconception care among adults in Cameroon as a means to improve a healthy community.

Methods: A descriptive cross-sectional survey was used for two months. Our study population included adults residing in Cameroon. The data were collected using a structured questionnaire distributed in a closed WhatsApp group. A total of 258 adults residing in all ten regions of Cameroon completed the questionnaire after signing a consent form online to support the use of their data to promote health. The collected data were analyzed using the Statistical Package for Social Science (SPSS) version 21.0 to generate descriptive statistics, which were presented in tables and charts, and a p value <0.05 was considered to indicate statistical significance.

Results: A total of 258 adults participated in the study, and all the regions of Cameroon represented. The majority of the study population were from the Northwest Region, comprising 155 (60.1%) participants, followed by the Centre Region, with 44 (17.1%) participants. Approximately 177 (68.6%) had heard of PCC, with 88.03% having good knowledge of preconception care. A small proportion (59; 33.3%) practiced PCC. The factors related to knowledge of PPC that were statistically significant in this study were being a health- professional and being within the age range of 25-35. Finally, 78.3% of the adults with a history of birth with malformations in their family, had knowledge of PCC.

Conclusion: According to our study, there was a high level of knowledge of preconception care but a very low level of practice; therefore, measures to improve the practice of PPC as a primary preventive measure to reduce maternal and child mortality and morbidity in Cameroon are needed.

Keywords: Preconception care, Knowledge, Social media, Adults in Cameroon

Introduction

A healthy community largely depends on the health of mothers and children. Despite global efforts, maternal and child mortality still remains a public health issue. In 2020, the World Health Organization (WHO) reported that approximately 287,000 women died during pregnancy, during childbirth or after delivery, and this number is estimated to be approximately one maternal death every two minutes globally[1]. This rate is significantly higher than the Sustainable Development Goal (SDG) target, which recommends a maternal mortality rate of 70 deaths

per 100,000 live births[2]. In 2020, an estimated 5 million children under the age of 5 years died, for a mortality rate of 37 deaths per 1000 live births[1]. Sub-Saharan Africa continues to have the highest mortality rates in the world, at 74 deaths per 1000 live births[1][3]. In Cameroon, despite a 44% decline in maternal mortality and a decrease of 18.9% in child mortality rates, as in many other sub-Saharan African countries, there is a high burden of maternal and child mortality[4]. In 2012, the WHO identified preconception care (PCC) as a crucial strategy for reducing maternal and child mortality and improving maternal and child health in both high- and low-income countries[5].

The PCC provides biomedical, behavioral and social health interventions to women and men before conception occurs. It aims to improve mothers' short- and long-term health status while also targeting behaviors and individual and environmental factors that contribute to poor maternal and child health outcomes[5]. The PCC interventions recommended by the WHO include maternal nutrition, such as micronutrient supplementation (iron, folic acids); vaccination; cessation of tobacco and excessive alcohol use; prevention of interpersonal violence; sexual education; protection from environmental hazards; genetic counseling; and support for mental health[5,6,7]. These recommendations could benefit LMICs where antenatal care (ANC) is often started too late to prevent serious maternal and child health problems [8,9]. Thus, by the time most of these women recognize their pregnancy, most fetal organs have been formed[9].

PCC will promote early uptake of ANC and better management of medical conditions[6]. Despite all these benefits, there is limited awareness of most future parents about the benefits of PCC[10, 11]. A community-based study carried out in Ethiopia in 2019 showed that 70% of pregnant women lacked knowledge of PCC[9]. Another study conducted in Malawi in 2021 showed that approximately 46% of women and health workers lacked knowledge of PCC[12]. Most of these studies exclude men despite their vital role in family health. This study is crucial for advancing the practice of PCC.

The rise of online access, with approximately 63% of the global population being internet users, presents an opportunity for efficient data collection via online surveys[13]. Social media platforms, in particular, have emerged as powerful tools for disseminating information[13] and engaging with diverse populations for the collection of data on people's attitudes and behaviors toward public health messages[14,15,16]. Emerging adults spend approximately six hours using social media every day and frequently use multiple platforms simultaneously[17]. Moreover, advertisements for any program or product will be easily shared with friends, colleagues and family members, extending this chain of information[18]. Thus, using social media will be the best way to reach out to many adults to assess their knowledge of PCC.

The Cameroonian Demographic and Health Survey conducted in 2011 indicated that more than 65% of pregnant women start ANC after 12 weeks of pregnancy[19]. This gap can be filled if the PCC is properly implemented. However, the PCC has received little attention in LMICs, including Cameroon[20]. Therefore, assessing the knowledge of the PCC among adults in Cameroon will provide baseline information on PCC awareness and will serve as a gateway in systematically implementing PCC in Cameroon.

Objective

The main objective of this study was to use social media to determine the prevalence of preconception care among adults in Cameroon.

Methods

Study design and duration:

This was a cross-sectional descriptive study carried out over a period of two months.

Study population:

The study population consisted of adults residing in Cameroon. We included all men and women. The criteria for exclusion were adults of a different nationality and those younger than 18 years because parental or guiding consent was difficult to ascertain and because PCC involves women of reproductive age, where 49 years was the cutoff age.

Sampling methods

The Cochran sample size formula was used to estimate the minimum sample size needed. Considering a 95% confidence level and $\pm 5\%$ precision and considering that 40% of the adults had access to at least one social media platform, an estimated sample size of 246 was obtained. A consecutive sampling technique was employed

Study procedure and data collection

Initially, a WhatsApp group was created to gather participants for easy access to information concerning PCC. This group was made available for anyone to join. The link to join was shared through various social media platforms, which included Facebook, Instagram, WhatsApp Status, LinkedIn and Twitter. To reach a larger audience, particularly adults, the content was boosted on Facebook. A brief description of the project and research was shared within the group, and a link to the questionnaire was subsequently shared for anyone willing to participate in the study. It was clear that those who did not complete the questionnaire were not excluded from the group, and they would gain full information on the PCC without any bias.

A structured, self-administered online questionnaire was pretested in a smaller WhatsApp group of diverse individuals, and corrections were made. The corrected questionnaire was subsequently used to collect the data. This questionnaire was sent to be completed online in such a way that once you click on the link, it takes you directly to the form, and each person had the chance to submit it only once. Immediately, anyone fills out the questionnaire, and the information will be displayed in Google Form, which can be accessed only by the principal investigator.

The questionnaire had 18 items divided into 4 sections. Section one included four questions on demographic characteristics, and section two contained six questions on knowledge of preconception care. Section three describes the practice of preconception care, and section four discusses the family history of malformation. The validity of the instrument was established during the pilot phase, during which the questionnaire was administered to individuals in another group to assess their understanding of the questions. Modifications were made based on feedback before final administration to the sample population.

Study variables:

There were three major independent variables. The first was the knowledge of preconception care, which was evaluated based on information from the proven FIGO preconception care checklist[21], which included questions such as "What is preconception care? What is the importance of PCC?". What are the benefits of PCC? When is the best time to start PCC? Additionally, we included questions such as is the PCC meant only for women? and if PCC is the same as premarital screening? Those who answered correctly were labeled "1", and those who answered incorrectly were labeled "0". Patients with poor knowledge of PCC were those who had <50% correct answers, and those with good knowledge had $\geq 50\%$ correct answers.

Second, practice of preconception care had the options 'yes', 'no' and 'not yet planning for pregnancies', with practices involving any aspect of follow-up or counseling before pregnancy.

Finally, we assessed the family history of congenital malformations and related it to the knowledge of PCC.

Data analysis

The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Using descriptive statistics with continuous variables, the data are presented in tables and charts. Additionally, cross tabulations were used to compare socio-demographic data to knowledge of the PCC among adults in Cameroon. A p value of <0.05 was considered to indicate statistical significance.

Ethical considerations:

Ethical approval for the study was obtained from the Northwest Ethical Reviewing Board. Participants had to consent for their information to be used by clicking “I Consent” after entering their information. Stringent measures were implemented to safeguard the information of the respondents. The data collected were securely stored on a computer protected by a password. All methods were performed in accordance with the relevant guidelines and regulations.

Results

Demographic characteristics of the respondents

A total of 258 adults participated in the study, with 208 (80.6%) women and 50 (19.4%) men. All the regions in Cameroon were represented, with the majority being 155 (60.1%) from the Northwest Region and 44 (17.1%) adults from the Centre Region (Figure 1). The mean age was 29 years, the median age was 24 years, the minimum age was 18

years, and the maximum age was 49 years. The majority (98, 38.0%) of the respondents were nonhealthcare providers, which included teachers, bankers, fashion designers, and entrepreneurs, followed by 88 (34.1%) health care providers, ranging from medical doctors to nurses, social workers, laboratory scientists, mental health specialists and public health experts. Very few (5; 1.9%) respondents were not employed (Table 1).

Knowledge of Preconception Care

Out of 258 respondents, 177 (68.6%) had heard of PCC. Among those who had heard of preconception care, 103 (88.03%) had good knowledge of preconception among adults in Cameroon (Figure 2). The majority of those who had heard of PCC were health professionals, and this difference was statistically significant (p=0.001). Furthermore, more women (144) had knowledge of PCC than men (33), and the majority of those with knowledge of PCC fell within the age range of 25-34 years, for a statistically significant difference (0.021) (Table 2).

Characteristics	Category	Frequency	Percentage
1. Sex	Male	50	19.4
	Female	208	80.6
2. Age Category	18-24	68	26.4
	25-34	135	52.3
	35-49	55	21.3
3. Region of residence	Northwest	155	60.1
	Southwest	19	7.4
	Centre	44	17.1
	Littoral	24	9.3
	East	01	0.4
	South	01	0.4
	Adamawa	02	0.8
	West	09	3.5
	North	02	0.8
	Far North	01	0.4
	Occupation	Student	67
Non-Health Professional		98	38.0
Health-Professional(including social workers, laboratory technicians, psychologist)		88	34.1
Unemployed		05	1.9
History of children born with malformation	Yes	37	14.3
	No	221	85.7

Table 1: Demographic characteristics of respondents among adults in Cameroon march to May 2024 (N=258)

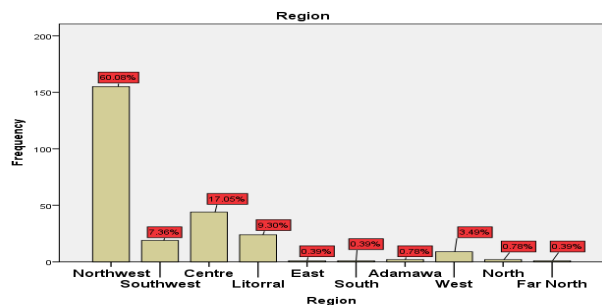


Figure 1: Regional Distribution of respondents across Cameroon

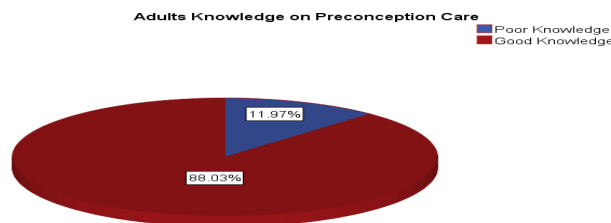


Figure 2: Knowledge of preconception care among adults in Cameroon

Variables	Knowledge on Preconception care		
	No	Yes	P Value
Occupation			
Student	20	47	0.001
Non-Health Professional	44	54	
Health-Professional(including social workers, laboratory technicians, psychologist)	14	74	
Unemployed	3	2	
Sex			
Male	17	33	0.65
Female	64	144	
Age Category			
18-24	21	47	0.027
25-34	43	92	
35-49	17	38	
Family history of congenital malformations			
Yes	8	29	0.166
No	73	148	

Table 2: Knowledge of preconception care in relation to demographic factors.

Practice of preconception care.

Of the 258 participants, 31.4% had never heard of PCC. Among those who had heard of preconception care, 36.43% did not practice PCC, 22.87% practiced at least one aspect of PCC, and 9.3% were not yet ready or not planning for pregnancy (Figure 3). Of the 177 individuals who had heard of PCC, only 33.3% practiced preconception care.

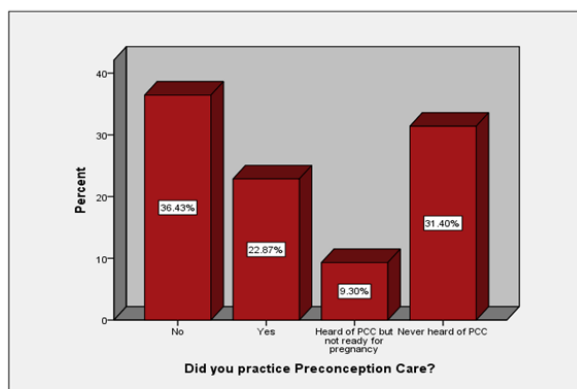


Figure 3: Practice of Preconception Care.

A family history of congenital malformations.

The study showed that a total of 37 (14.3%) adults agreed to have a history of with malformations in their family, The majority of the malformations mentioned were first malformed legs, such as bow legs, followed by poor development, which included cerebral palsy, autism, blindness, Down Syndrome, web/absent toes, and spinal bifida (Figure 4). Among those who had a history of congenital malformation, 29 (78.3%) had knowledge of PCC (Table 2).

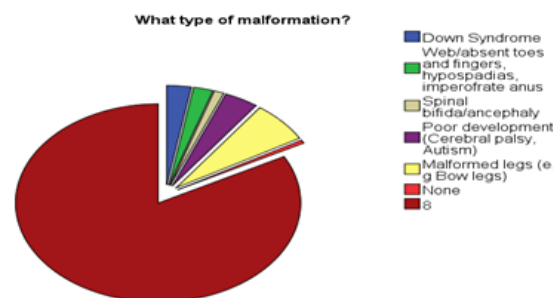


Figure 4: Various types of malformations present in families.

Discussion

Preconception care is an evidence-based strategy for preventing maternal and neonatal mortality. This study aimed to use social media to evaluate preconception care knowledge among youths in Cameroon. We found that of the 258 respondents, 177 (68.6%) had heard of PCC and 88.03% had good knowledge of preconception care. Of the 177 individuals who heard of the PCC, only a small proportion (59; 33.3%) practiced PCC. The factors related to knowledge of PPC that were statistically significant in this study were being a health professional and being within the age range of 25-35.

Demographic characteristics

The majority of the participants were female, which was similar to the findings of a study performed by Karatsoli *et al.* in 2020, which showed that many more women access social media than men do[22]. All 10 regions of Cameroon were involved in the study, but we had a very small population from the Far North, South, and East regions, which could be explained by the fact that the questionnaire was in English and

that most of those from these regions did not understand the English language properly. Our study revealed that knowledge of PCC was more common among health professionals (41.8%), which was similar to the findings of a 2021 study carried out by Winifred C *et al*(42.8%) [20] evaluating PPC in sub-Saharan Africa. This is because healthcare workers are more knowledgeable about various aspects of health-related issues than non-health workers are. In this study, more than half (52.3%) of the respondents were aged 25-34 years. This finding was contrary to the study of Dhakal & Gautam, 2016 in which approximately half of the respondents were aged 21-25 years[23].

Knowledge of Preconception Care

Approximately 68.6% of the participants had ever heard of PCC. This study was similar to studies conducted in Nigeria, which showed that 63.5% had heard of PCC[24], and in Kenya, 2024, which showed that the overall knowledge of PCC was 63.35%[25]. This could be explained by the fact that more than half of the healthcare providers in Nigeria had received training on PCC and therefore were all involved in advocacy at all levels. Additionally, some studies have shown a significantly lower PCC level, such as studies conducted in Adet town, Northwest Ethiopia, which showed that the overall knowledge of PCC was 27.5% [26]. This inconsistency might be due to differences in the study period and sociocultural factors. This might also be because we included both men and women. Our study revealed that 88.03% of the participants had good knowledge of preconception care. This finding was similar to that of a study performed in Zambia 2024 (81.3%)[27] in Nepal, 2016 (69.1%)[28], Northwest Ethiopia 2019[29] and Iran (68%)[30], which had good to moderate knowledge of preconception care. In contrast, in Ethiopia in 2021, 17.1% had good knowledge of PCC[31]. This might be due to differences in the cultural and socioeconomic status of the populations.

Preconception care practice

Of those who agreed to have knowledge of PCC, only 33.3% agreed to have practiced PCC, which was similar to the findings of a study performed in Nigeria by Opeyemi in 2019, in which 34.2% had received PCC before the index pregnancy[32], and in Nepal by Nepali & Sapkota in 2017, in which only 26% had good practice[33]. This finding contradicts the findings of Kasim, Draman, Kadir, and Muhamad, 2016, in which approximately half (45.2%) of the respondents practiced good practices[34], and the findings of Gayatri *et al.* in Nepal showed that 51% of the study population practiced PCC[33].

Despite the high level of knowledge on preconception care, the practice of preconception care is very limited, possibly because of the lack of availability of preconception care centers or because health personnel are not trained adequately to provide PCC with all necessary knowledge. Moreover, PCC is not regularly updated through in-service education[25], which can prompt patients to be educated even when they consult for other health conditions.

Limitation of the Study

Very few adults from other regions, such as the northern, southern and eastern regions of the country, participated in the study and assessed the knowledge of adolescents younger than 18 years of age using social media.

Conclusion

With a high knowledge of preconception care but a very low level of practice, there is a need to reinforce measures to improve the practice of PPC as a primary preventive measure to reduce maternal and child mortality and morbidity in Cameroon.

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Aknowledgement of Authors

Gwanyama designed the study; Ndo'ofwo designed the questionnaire; Gamnje, Numfor, Mbwame, Amamboh, Sama, and Nigel took part in the online webinar; Ombaku, Ambe, and Kan took part in training the volunteers; Pishoh and Fomenky read and corrected the article and Nsame offered administrative assistance.

References

1. WHO, *9 Steps to Improve Data Quality in Healthcare in 2023*, vol. 27, no. 2. 2023.
2. WHO, "Preconception care; maximizing...," *Dep. Matern. Newborn, Child Adolesc. Heal.*, pp. i-7, 2013, [Online]. Available: <https://iris.who.int/bitstream/handle/10665/340533/WHO-FWC-MCA-13.02-eng.pdf?sequence=1>
3. "Trends-in-Maternal-Mortality-2000-2020".
4. J. A. O'Brien Quinn, "Cameroun," *Annu. Surv. African Law Cb Vol. One 1967*, pp. 335-347, 2021, doi: 10.3917/afco.215.0093.
5. [WHO] World Health Organization, "Meeting to develop a global consensus on preconception care to reduce maternal and childhood mortality and morbidity," *WHO Headquarters, Geneva Meet. report. Geneva ...*, p. 78, 2013, [Online]. Available: <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Meeting+to+Develop+a+Global+Consensus+on+Preconception+Care+to+Reduce+Maternal+and+Childhood+Mortality+and+Morbidity#0%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Meeting+t>
6. Gerberding JL and *et al*, "Morbidity and Mortality Weekly Report Recommendations and Reports Recommendations to Improve Preconception Health and Health Care-United States A Report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care Centers for ," *Web page*, vol. 55, pp. 1-23, 2006.
7. H. K. Atrash, K. et al., "Preconception care for improving perinatal outcomes: The time to act," *Matern. Child Health J.*, vol. 10, no. 1, pp. 3-11, 2006.
8. S. Dean *et al.*, "Setting Research Priorities for Preconception Care in Low- and Middle-Income Countries: Aiming to Reduce Maternal and Child Mortality and Morbidity," *PLoS Med.*, vol. 10, no. 9, 2013
9. F. Teshome, et al., "What do women know before getting pregnant? Knowledge of preconception care and associated factors among pregnant women in Mana district, Southwest Ethiopia: A community-based cross-sectional study," *BMJ Open*, vol. 10, no. 7, pp. 1-9, 2020
10. J. Shawe *et al.*, "Preconception care policy, guidelines, recommendations and services across six European countries: Belgium (Flanders), Denmark, Italy, the Netherlands, Sweden and the United Kingdom," *Eur. J. Contracept. Reprod. Heal. Care*, vol. 20, no. 2, pp. 77-87, 2015

11. J. Stephenson *et al.*, “How do women prepare for pregnancy? Preconception experiences of women attending antenatal services and views of health professionals,” *PLoS One*, vol. 9, no. 7, 2014
12. M. Munthali *et al.*, “Knowledge and perceptions of preconception care among health workers and women of reproductive age in Mzuzu City, Malawi: a cross-sectional study,” *Reprod. Health*, vol. 18, no. 1, pp. 1–10, 2021
13. E. A. Beam, “Social media as a recruitment and data collection tool: Experimental evidence on the relative effectiveness of web surveys and chatbots,” *J. Dev. Econ.*, vol. 162, 2023
14. J. Wang, S. Madnick *et al.*, “Effect of media usage selection on social mobilization Speed: Facebook vs E-Mail,” *PLoS One*, vol. 10, no. 9, 2015
15. K. E. Sutherland, *Social Media Strategy Development*. 2021. doi: 10.1007/978-981-15-4658-7_2.
16. N. F. Frennesson *et al.*, “Evaluating Messaging on Prenatal Health Behaviors Using Social Media Data: Systematic Review,” *J. Med. Internet Res.*, vol. 25, no. 1, pp. 1–13, 2023
17. J. Hruska and P. Maresova, “Use of social media platforms among adults in the United States—Behavior on social media,” *Societies*, vol. 10, no. 1, 2020
18. D. Voramontri and L. Klieb, “Impact of social media on consumer behavior,” *Int. J. Inf. Decis. Sci.*, vol. 11, no. 3, pp. 209–233, 2019
19. “2018 Demographic and Health Survey Summary Report Cameroon,” 2012. [Online]. Available: www.DHSprogram.com
20. W. C. Ukoha *et al.*, “Current state of preconception care in sub-Saharan Africa: A systematic scoping review,” *African J. Prim. Heal. Care Fam. Med.*, vol. 14, no. 1, pp. 1–11, 2022
21. C. Benedetto *et al.*, “FIGO Preconception Checklist: Preconception care for mother and baby,” *Int. J. Gynecol. Obstet.*, vol. 165, no. 1, pp. 1–8, 2024
22. M. Karatsoli and E. Nathanail, “Examining gender differences of social media use for activity planning and travel choices,” *Eur. Transp. Res. Rev.*, vol. 12, no. 1, 2020
23. K. Giri and S. Gautam, “Knowledge on Preconception Care Among Reproductive Aged Women in Kaski District, Nepal,” *Janapriya J. Interdiscip. Stud.*, vol. 7, no. 1, pp. 46–56, 2018
24. P. Care *et al.*, “Awareness knowledge and uptake of preconception care among women in Ife Central Local Government Area of Osun State Nigeria,” *J. Community Med. Prim. Heal. Care*, vol. 27, no. 2, pp. 83–92, 2015.
25. L. Mukolwe *et al.*, “Factors influencing the Delivery of Preconception Care Services among Nursing and Midwifery Students at Aga Khan University, Kenya,” *East. African J. Humanit. Soc. Sci.*, vol. 3, no. 1, pp. 28–41, 2024
26. Y. Ayalew *et al.*, “Women’s knowledge and associated factors in preconception care in adet, west gojjam, northwest Ethiopia: A community based cross sectional study,” *Reprod. Health*, vol. 14, no. 1, pp. 1–11, 2017
27. G. Sakanyi *et al.*, “Provision of Preconception Care by Midwives, Nurses and Doctors at Ndola Teaching Hospital in Ndola District, Zambia,” *Open J. Obstet. Gynecol.*, vol. 14, no. 03, pp. 393–421, 2024
28. T. Rosy and S. Babita., “Knowledge on Preconception Care: an Issue Among Reproductive Age Women Attending Gynae/Obstetric Opd of National Medical College,” *Int. J. Adv. Res.*, vol. 5, no. 2, pp. 2311–2314, 2017
29. M. M. Bekele *et al.*, “Knowledge of Preconception Care and Associated Factors among Healthcare Providers Working in Public Health Institutions in Awi Zone, North West Ethiopia, 2019: Institutional-Based Cross-Sectional Study,” *J. Pregnancy*, vol. 2020, pp. 1–7, 2020
30. N. Jahani Shourab *et al.*, “Application of Donabedian Quality-of-Care Framework to Assess the Outcomes of Preconception Care in Urban Health Centers, Mashhad, Iran in 2012,” *J. Midwifery Reprod. Heal.*, vol. 2, no. 1, pp. 50–59, 2012.
31. T. Lemma *et al.*, “Knowledge of preconception care among reproductive-age women in Debre Berhan Town, Ethiopia: A community-based, cross-sectional study,” *BMJ Open*, vol. 12, no. 5, pp. 1–7, 2022
32. C. C. Azodo and V. O. Omuemu, “Perception of spirituality, spiritual care, and barriers to the provision of spiritual care among undergraduate nurses in the University of Lagos, Nigeria,” *J. Clin. Sci.*, vol. 14, no. 1, pp. 119–125, 2017
33. G. Nepali and S. D. Sapkota, “Knowledge and practice regarding preconception care among antenatal mothers,” *Int. J. Perceptions Public Heal.*, vol. 1, no. 4, pp. 224–227, 2017.
34. R. Kasim *et al.*, “Knowledge, Attitudes and Practice of Preconception Care among Women Attending Appointments at a Rural Clinic in Kelantan,” *Educ. Med. J.*, vol. 8, no. 4, 2016