

Swipe, Click or Flip? Learning Preferences for Pre-pregnancy Care Education Among Young Women: A Preliminary Study

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Abstract

Preconception care (PCC) reduces pregnancy and birth-related risks but remains underutilised, particularly among young Malaysian women. This study examines young women's preferences for digital and traditional health education environments to enhance engagement in PCC. A cross-sectional survey of 500 university females (ages 18–25) reveals a strong preference for digital platforms, mainly social media and mobile applications, while traditional formats such as printed materials and face-to-face sessions are also valued. The findings provide empirical evidence for developing culturally appropriate, theory-driven interventions that align with communication preferences. Integrating hybrid strategies can improve PCC awareness, health literacy, and maternal quality of life.

Keywords: Digital Health; Health Promotion; Preconception care; Quality of Life

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1.0 Introduction

Women's reproductive health forms a crucial aspect of their overall quality of life, encompassing their physical well-being and psychological health, autonomy, and empowerment in health-related decision-making (Whelan & Goodwin, 2023). The World Health Organisation recognises preconception care (PCC) as a key intervention to enhance pregnancy outcomes and promote lifelong health for women and their offspring (Benedetto et al., 2024). PCC addresses health risks before conception, focusing on chronic disease management, nutritional supplementation, lifestyle modification, genetic counselling, and immunisation (Benedetto et al., 2024).

Despite its importance, awareness and uptake of PCC remain low in many settings, particularly among young reproductive-aged women in low- and middle-income countries. In Malaysia, for example, maternal mortality rates have plateaued above national targets (WHO, 2025). Malaysia's maternal mortality ratio (MMR) has lingered between 20 and 30 deaths per 100,000 live births over the past two decades, far higher than the Sustainable Development Goal aim of less than 8.7 per 100,000 live births (Talib et al., 2018). This

stagnation reflects persistent gaps in maternal healthcare services, underlining the need for proactive preventive strategies such as PCC.

One critical challenge involves reaching young women early enough with effective, engaging health education that aligns with their communication preferences. Emerging digital technologies, mainly social media and mobile applications have transformed global information dissemination and behaviour change strategies (Lutkenhaus et al., 2023). Young adults today interact extensively with digital platforms, prioritising multimedia, interactivity, and personalised content (Lutkenhaus et al., 2023). However, conventional health education methods often neglect these communication environments, limiting engagement and awareness.

Many young women interact with health services only after pregnancy confirmation, which restricts opportunities for timely PCC (Holt et al., 2024). This reveals a critical gap in early education during the reproductive life course and highlights the need for innovative communication channels beyond traditional clinical settings. However, the effectiveness of PCC education hinges on delivery methods that align with young women's communication preferences and cultural contexts (Draper et al., 2019).

This study aims to evaluate the awareness of PCC services and identify communication preferences among female undergraduate students at a Malaysian public university. Specifically, it seeks to answer: (1) What is the level of PCC awareness in this population? Moreover, (2) What are their preferred digital and traditional channels for receiving PCC education? The findings will inform the development of user-centred, culturally appropriate interventions that align with young women's communication preferences, ultimately supporting enhanced health-related quality of life outcomes.

2.0 Literature Review

2.1 Preconception care awareness

Studies show that PPC awareness ranges widely which are often linked to education and socioeconomic factors (Welshman et al., 2023). Limited integration of PPC into routine healthcare and sociocultural barriers constrain uptake in Southeast Asia (Ismail et al., 2025). Educational institutions, particularly universities, represent potentially powerful platforms for PCC education delivery due to their access to many young women during a critical life stage. However, research examining the specific needs, preferences, and barriers faced by university students in Malaysia regarding PCC remains limited, representing a significant gap in the evidence base needed to develop effective interventions.

2.2 Digital health communication preferences

Young women increasingly rely on digital platforms for health information. Social media platforms such as TikTok, Instagram, and WhatsApp dominate this landscape, offering accessible, engaging content for young adults (Lutkenhaus et al., 2023). Research affirms social media's positive influence on enhancing awareness and motivating health behaviour change (Saleem & Jan, 2025). Digital learning favours interactivity, multimedia, and personalisation. Mobile applications supporting goal setting, reminders, and two-way communication improve knowledge retention and behaviour adherence in preconception health contexts (Ku et al., 2024). Despite digital benefits, risks include misinformation, limited critical appraisal skills, and the digital divide (Vissenberg et al., 2023).

2.3 Mobile health application in reproductive education

Mobile health applications specifically designed for reproductive health education demonstrate measurable clinical improvements. Meta-analyses reveal that mobile interventions enhance self-management, improve psychological well-being, and increase reproductive health knowledge compared to standard care approaches (Wei et al., 2023). These platforms may be more effective when incorporating evidence-based content, user-centred design principles, multimedia elements, and personalised feedback mechanisms. However, implementation challenges include ensuring data privacy, device security, and regulatory oversight (Logie et al., 2020). Malaysia's evolving digital health regulatory landscape underscores the need for robust frameworks ensuring content quality and user protection. Cultural sensitivities affect acceptance, necessitating contextually appropriate content and inclusive development processes that respect Malaysia's religious and ethnic diversity.

2.4 Hybrid communication approaches

Hybrid educational models combining digital tools with printed and face-to-face formats effectively accommodate diverse preferences and mitigate access disparities, particularly important in Malaysia's multiethnic society and varied socioeconomic strata (Garba & Abdulhamid, 2024). The digital divide, characterised by unequal internet access and device ownership, disproportionately excludes rural, low-income, and marginalised women. Hybrid approaches help bridge these disparities through multi-modal delivery that accommodates varying digital literacy levels and infrastructure limitations. Healthcare providers have reported that digital resources complement, rather than replace, face-to-face interactions, enabling more efficient consultations and ongoing support between appointments (Zammit et al., 2023).

This literature demonstrates the potential for culturally appropriate, theoretically grounded interventions that address young women's specific communication preferences while acknowledging the importance of integrated approaches in diverse global contexts.

3.0 Methodology

3.1 Study design and setting

A cross-sectional survey was conducted between May and June 2023 among female undergraduate students at Universiti Teknologi

MARA, Selangor Branch, Malaysia. The Selangor Branch, located in the Klang Valley region, serves as a major educational hub with students from across Malaysia, providing a reasonably representative sample of young Malaysian women pursuing higher education.

3.2 Participants

The study included 500 female undergraduate students aged 18–25 from 11 faculties representing diverse academic disciplines, including health-related and non-health-related fields. Inclusion criteria were being female, aged 18–25 years, unmarried, and enrolled as a full-time student. This age range was selected as it represents a critical period in reproductive health planning when PCC education would be most beneficial and relevant for future pregnancy outcomes. The unmarried status criterion was applied as the study focused on preconception rather than interconception care needs.

3.3 Sampling and recruitment

A purposive selection of respondents was carried out. The primary researcher collected data using a self-administered, online, Malay-language questionnaire created with Google Forms. Survey links were distributed through WhatsApp. Reminders were also circulated via WhatsApp groups managed by student representatives to improve response rates, after consent was obtained from the respective faculty deans and the academic affairs department. Participation was voluntary. Respondents were required to provide electronic consent before proceeding with the survey. The survey used proxy identifiers instead of personal information to preserve confidentiality and anonymity. All mandatory questions in Google Forms were set as "required" to prevent missing responses. Participants did not need to create accounts or log in to access the questionnaire.

3.4 Instrument

The data collection instrument was an online Malay-language questionnaire developed based on a literature review and expert input on PPC. The questionnaire captured: (1) sociodemographic characteristics, (2) awareness of PCC services (yes/no), and (3) preferred communication environments for PCC education, including social media platforms (yes/no), online tools (yes/no), printed materials (yes/no), and face-to-face formats (yes/no). Participants who selected social media ranked five platforms (TikTok, Instagram, WhatsApp, Telegram, Facebook) by preference. Participants who selected online tools can choose multiple response from mobile application, website, online course, live stream and e-book.

3.5 Data analysis

Data were analysed using descriptive statistics in SPSS. Frequencies, percentages, means, and standard deviations were reported.

3.6 Ethical consideration

The study received ethical approval from Universiti Teknologi MARA Research Ethics Committee with reference number 100 - FPR (PT.9/19) (FERC-03-23-06).

4.0 Findings

4.1 Sample characteristics

The sample comprised 500 female undergraduate students with a mean age of 21.39 ± 1.29 years. Participants were predominantly Malay (94.8%) and from B40 income households (53.4%). Over half (53.8%) were enrolled in health-related programs, while 46.2% studied non-health disciplines. Table 1 provides detailed demographic characteristics.

Table 1. Participant Demographics and Preconception Care Communication Preferences

Variables		Frequency, n (%)	Mean (SD)
Age			21.39 (1.29)
Faculty	Health Related	269 (53.8%)	
	Non-Health Related	231 (46.2%)	
Ethnicity	Malay	474 (94.8%)	
	Bumiputera	26 (5.2%)	
Household Income	B40	267 (53.4%)	
	M40	189 (37.8%)	
	T20	44 (8.8%)	
PCC Service Awareness	No	249 (49.8%)	
	Yes	251 (50.2%)	
Social Media Preference	No	21 (4.2%)	
	Yes	479 (95.8%)	
Social Media Platform (First Choice)*	Tik Tok	268 (55.9%)	
	Instagram	126 (26.3%)	
	Whatsapp	89 (18.6%)	
	Telegram	56 (11.7%)	
	Facebook	30 (6.3%)	
Online Tool Preference	No	29 (5.8%)	
	Yes	471 (94.2%)	
Online Tools Selected (Multiple responses)**	Mobile application	323 (68.6%)	
	Website	321 (68.2%)	

	Online course	230 (48.8%)
	Live stream	197 (41.8%)
	E-book	181 (38.4%)
Face-to-face Preference	No	153 (30.6%)
	Yes	347 (69.4%)
Printed Materials	No	112 (22.4%)
Preference	Yes	388 (77.6%)

*Among those who selected social media preference (n = 479)

** Among those who selected online tool preference (n = 471)

(Source: Author's own work)

4.2 Awareness of PCC

Only half of the participants (50.2%) reported awareness of preconception care services.

4.3 Digital communication preferences

Digital platforms dominated communication preferences, with 94.2% of respondents favouring online tools for PCC education. This near-universal preference suggests strong potential for digital health interventions. Mobile applications were most preferred (68.6%), followed closely by websites (68.2%). This preference likely reflects the convenience of accessing health information through familiar mobile interfaces. The minimal difference between mobile application and website preferences suggests that participants value both dedicated applications and web-based resources, possibly for different purposes or contexts. Websites may be preferred for more comprehensive information seeking, whilst applications might be favoured for regular engagement and reminders. E-books showed the lowest preference among digital formats at 38.4%, possibly reflecting preferences for more interactive and multimedia-rich content formats over traditional text-based resources, even in digital form. Social media platforms showed near-universal appeal (95.8%), with distinct platform preferences emerging: TikTok was the primary choice (55.9%), followed by Instagram (26.3%), WhatsApp (18.6%), Telegram (11.7%), and Facebook (6.3%). Facebook is the least preferred suggesting declining popularity among younger demographics despite its historical significance in social media adoption. This finding aligns with broader trends showing younger users migrating towards newer platforms.

4.4 Traditional communication preferences

Despite strong digital preferences, traditional methods retained substantial support. Printed materials were preferred by 77.6% of participants, and face-to-face formats by 69.4%, suggesting that hybrid communication approaches combining digital and traditional elements optimise educational reach and effectiveness. Participants may value printed materials for their reliability, ease of reference, ability to be shared with family members, and independence from technology infrastructure. Whereas face-to-face preference likely reflects the value participants place on personalised communication, immediate feedback, opportunity for questions and clarification, and the trust and credibility associated with direct interaction with healthcare professional. The preference distribution indicates young women's openness to multiple communication channels, supporting an integrated intervention design that leverages contemporary digital platforms and established traditional methods.

5.0 Discussion

5.1 Summary of key findings

This study reveals clear preferences among young Malaysian women for digital platforms in pre-pregnancy care (PPC) education, with mobile applications and social media leading engagement choices. TikTok emerged as the dominant social media platform, affirming its relevance for health education targeting this demographic. Despite the digital preference, traditional methods such as printed materials and face-to-face formats remain highly valued, supporting the rationale for hybrid communication models. Despite over half being enrolled in health-related courses, the limited PCC awareness (50.2%) among university students highlights significant educational gaps. This finding underscores the urgent need for targeted interventions that align with communication preferences while addressing the broader challenge of reproductive health education in young adult populations. The demographic profile, with 53.4% from B40 income backgrounds, suggests digital platforms may provide cost-effective access to health education resources while addressing traditional barriers, including economic and geographical limitations.

5.2 Implication for practice

The overwhelming preference for digital communication channels likely reflects the ubiquity and convenience of smartphones and internet access among university students. Particularly, TikTok's dominance can be attributed to its short-form, visually engaging, and algorithm-driven content delivery, effectively capturing and sustaining attention in younger demographics. Mobile applications, favoured by a majority, offer personalised, interactive, and on-demand health information, suitable for ongoing engagement with PCC content. Websites, online courses, and live-streamed formats also received substantial support, indicating openness to diverse digital educational modalities. These platforms can complement each other, serving distinct roles ranging from comprehensive information repositories to interactive, real-time learning experiences. Despite the strong digital inclination, nearly 78% of participants preferred printed materials, and nearly 70% valued face-to-face education. This suggests that tangible, easily accessible resources and interpersonal communication retain importance, possibly due to perceptions of credibility, trust, and ease of use in areas with varying digital literacy or internet access challenges. Health educators should leverage these insights by designing hybrid PCC educational interventions that

combine digital tools with traditional materials and personal counselling. Such integrated approaches can address young adult populations' diverse learning needs and preferences, enhancing reach, acceptability, and effectiveness. Moreover, incorporating digital literacy components could empower all users to maximise the benefits of digital PCC resources and bridge potential competency gaps.

5.3 Implication for policy

Embedding PCC education within national health strategies and reproductive health services, such as premarital courses and reproductive screenings (e.g., compulsory HIV testing), offers significant opportunities to institutionalise awareness and uptake. Digital health policies must prioritise the regulation and quality assurance of emerging Femtech and mHealth applications to safeguard data privacy, ensure content accuracy, and build user trust. Investments in digital infrastructure and internet accessibility, particularly targeting rural and lower-income communities, are crucial to prevent the exacerbation of health inequities. Equity-focused policy frameworks aim to reduce the digital divide, ensuring educational innovations benefit all population segments.

5.4 Implication for equity

Digital exclusion remains a critical concern. Women in lower socioeconomic groups or underserved regions risk being marginalised if digital health initiatives fail to account for access and literacy barriers. Programme developers should prioritise culturally tailored content and engage community stakeholders to foster acceptance and relevance, ensuring that digital advancement does not widen existing health disparities.

5.5 Strengths and limitations

This study is among the first to document PCC communication preferences among Malaysian women, with a large sample size and detailed analysis of platform rankings. The single-institution recruitment and cross-sectional design limit generalizability and causal inference capabilities. However, the purposive sampling may not represent the broader Malaysian young women population, particularly those outside university settings. Future research should examine communication preferences across diverse populations and investigate longitudinal relationships between platform preferences and health behaviour outcomes.

6.0 Conclusion & Recommendations

This study highlights young Malaysian women's strong preference for digital platforms, especially mobile applications and social media, for PPC education. It reveals that traditional communication methods such as printed materials and face-to-face sessions retain significant value within the digital-first landscape. The findings provide crucial empirical evidence to guide the design of culturally sensitive, user-centred PPC education interventions. Framing this work within Precision Public Health emphasises tailoring education to specific population preferences and needs, thereby improving health literacy and maternal quality of life. These findings contribute to quality-of-life research by identifying communication preferences that enhance young women's access to reproductive health information, supporting their autonomy in health decision-making and reproductive planning. By aligning preconception care education with identified preferences, interventions can improve awareness, knowledge acquisition, and service utilisation, ultimately contributing to enhanced maternal and child health outcomes.

6.1 Recommendation for practice

Health educators and service providers should prioritise developing engaging, interactive PPC education content optimised for mobile apps and social media platforms favoured by young women, including TikTok and Instagram. Simultaneously, maintaining complementary traditional education materials and personal counselling is critical to address varied learning needs and bridge digital access gaps. Integrating digital literacy training can empower users to navigate and utilise digital health resources effectively.

6.2 Recommendation for policy

Policy frameworks must incorporate PPC education within national health agendas, including premarital courses and reproductive health screenings such as HIV testing. Regulatory oversight of Femtech and mHealth applications is essential to ensure data privacy, content accuracy, and user safety. Investments focused on reducing the digital divide, expanding internet access, and fostering inclusivity are fundamental to equitable healthcare education access.

6.3 Recommendation for research

Building upon this preliminary work, future research should develop and rigorously evaluate theory-driven PPC education protocols through randomised controlled trials. Research should explore how gender dynamics, cultural factors, and digital equity influence PPC education uptake and outcomes. Longitudinal designs will clarify causal pathways and the sustainability of behaviour change, supporting precision-based public health interventions.

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Paper Contribution to Related Field of Study

This study makes four contributions to the field of preconception health and digital health promotion. First, it addresses a major evidence gap by documenting awareness and communication environment preferences for PCC among young adult women in Malaysia. Second, it highlights the growing importance of digital communication environments, particularly TikTok, and mobile applications, as preferred sources of health information, while demonstrating the continued relevance of traditional methods. Third, as a preliminary study, it provides empirical justification for a subsequent protocol to design and validate a culturally adapted, theory-driven PCC mobile health application using human-centred design. Finally, it advances the application of Precision Public Health principles by proposing hybrid strategies that integrate digital delivery with existing offline entry points such as premarital courses and premarital HIV screening. Together, these contributions support innovation in maternal health promotion and policy development.

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