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Awareness, Access, and Use of Mobile Health Applications for Reproductive and Pregnancy Care among Rural and Urban Women Attending a Tertiary Care Hospital in Jaipur, India: A Cross-Sectional Study

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ABSTRACT

Background: Mobile health (mHealth) applications are widely used for pregnancy and reproductive-health information, reminders, cycle tracking and self-monitoring. Their usefulness in routine care depends not only on the availability of applications but also on access to smartphones and awareness among potential users.

Objectives: To assess smartphone access, self-reported reproductive-health knowledge, awareness and use of reproductive/pregnancy mobile applications, and perceived usefulness of these applications among women attending obstetric and gynaecological services, with comparison between rural and urban participants.

Materials and Methods: A hospital-based cross-sectional survey was conducted among 239 women attending the Department of Obstetrics and Gynaecology at Zanana Hospital, Jaipur, Rajasthan. Data were collected through an interviewer-administered questionnaire in one-to-one interviews. Categorical variables were summarized as frequencies and percentages, and rural-urban differences in binary outcomes were assessed using Fisher's exact test when cell counts were sparse or zero.

Results: Of 239 participants, 47 (19.7%) were rural and 192 (80.3%) were urban. Smartphone access was reported by 181 (75.7%) women and differed markedly by residence (3/47 [6.4%] rural vs 178/192 [92.7%] urban; P<0.001). Self-reported sufficient reproductive-health knowledge was recorded in 166/239 (69.5%) women (0/47 rural vs 166/192 [86.5%] urban; P<0.001). Awareness of reproductive/pregnancy health applications was reported by 140/239 (58.6%) women (0/47 rural vs 140/192 [72.9%] urban; P<0.001). Among smartphone owners, 138/181 (76.2%) reported using at least one relevant application; 99/138 (71.7%) users found the applications helpful. Menstrual calendar applications were the most frequently reported (n=77), followed by SwasthGarbh (n=56).

Conclusions: Marked rural-urban differences were observed in smartphone access, self-reported reproductive-health knowledge and awareness of mobile health applications. Most app users considered the applications helpful. Efforts to incorporate mHealth into reproductive and pregnancy care should therefore address access, digital literacy and language, particularly among women from rural areas.

Keywords*: mHealth; mobile applications; reproductive health; pregnancy; antenatal care; digital health; rural-urban disparity; India.*

INTRODUCTION

Mobile health (mHealth) has become a common way of delivering health information and supporting contact between patients and health services. In maternal care, mobile phones and applications are used for health education, appointment reminders, symptom monitoring, self-care and communication with healthcare providers. Systematic reviews suggest that

some mHealth interventions can improve maternal-health knowledge and antenatal-care uptake, although the effect varies across settings and interventions [1-3].

Pregnancy applications may provide gestational-age information, visit and medication reminders, weight or blood-pressure tracking, and educational material. Menstrual and fertility applications allow women to record cycle dates, symptoms and fertility-related information. These tools can support self-awareness and discussions with clinicians, but studies have also shown wide variation in the quality, evidence base and transparency of available applications [4-7].

In India, the rapid growth of mobile connectivity has not resulted in equal access for all women. Analyses of the National Family Health Survey show that personal phone access is lower among rural and socially disadvantaged women [8]. This gap is important when digital-health interventions are planned, because access to a device is the first requirement for regular use.

Indian programmes such as mMitra and Kilkari have shown that mobile communication can improve selected maternal-health knowledge and practices, but their evaluations have also documented incomplete reach, variable engagement, literacy-related difficulties and shared-phone access [9-13]. Similar barriers, including cost, digital literacy, infrastructure, privacy and usability, have been reported in reviews from low- and middle-income settings [14].

Women attending tertiary obstetric and gynaecological services in Rajasthan come from both rural and urban communities and may differ substantially in access to digital resources. Our study assessed smartphone ownership, reproductive-health knowledge, awareness and use of reproductive/pregnancy mobile applications, and perceived usefulness of these applications among women attending a tertiary-care hospital in Jaipur.

AIM

To assess smartphone access, self-reported reproductive-health knowledge, awareness and use of mobile applications for reproductive and pregnancy care, and perceived usefulness among women attending obstetric and gynaecological services.

OBJECTIVES

- To compare smartphone access among rural and urban participants.
- To assess self-reported reproductive-health knowledge and awareness/use of reproductive and pregnancy-related mobile applications by place of residence.
- To describe the types of applications used and their perceived usefulness among users.

MATERIALS AND METHODS

Study design and setting

We conducted a hospital-based cross-sectional survey among 239 women attending the Department of Obstetrics and Gynaecology at Zanana Hospital, Jaipur, Rajasthan, India, an attached hospital of S.M.S. Medical College. Data were collected through individual, interviewer-administered, one-to-one interviews.

Study participants

A total of 239 women were included in the analysis. Place of residence was classified as rural or urban; 47 participants were from rural areas and 192 were from urban areas.

Questionnaire and study variables

The interviewer-administered questionnaire recorded place of residence; smartphone ownership; self-reported knowledge regarding the menstrual cycle and fertility, antenatal visits, medication use during pregnancy and contraception; awareness of mobile applications for reproductive and pregnancy care; use of such applications; type of application used; and perceived usefulness. Recorded application categories included menstrual calendars, SwasthGarbh, Garbh Sanskar, fertility-tracking calendars and contraceptive pill reminders.

Statistical analysis

Categorical variables were summarized as frequencies and percentages. Percentages were calculated from the observed cell counts. Rural-urban differences in smartphone ownership, self-reported reproductive-health knowledge, awareness of reproductive/pregnancy applications, and use of relevant applications among smartphone owners were assessed using Fisher's exact test because some cells had small or zero counts. All tests were two-sided, and $P<0.05$ was considered statistically significant..

RESULTS

Participant profile and smartphone access

Among 239 participants, 47 (19.7%) were from rural areas and 192 (80.3%) were from urban areas. Overall, 181 women (75.7%) reported owning a smartphone. Smartphone ownership differed significantly by place of residence: 3/47 rural participants (6.4%) had a smartphone compared with 178/192 urban participants (92.7%) (Fisher's exact P<0.001).

Table 1: Residence and smartphone access among study participants (N=239)

Characteristic	Rural, n (%)	Urban, n (%)	Overall, n (%)	P value*
Residence	47 (100.0)	192 (100.0)	239 (100.0)	-
Has smartphone	3 (6.4)	178 (92.7)	181 (75.7)	<0.001
No smartphone	44 (93.6)	14 (7.3)	58 (24.3)	

**Fisher's exact test for the rural-urban difference in smartphone ownership*

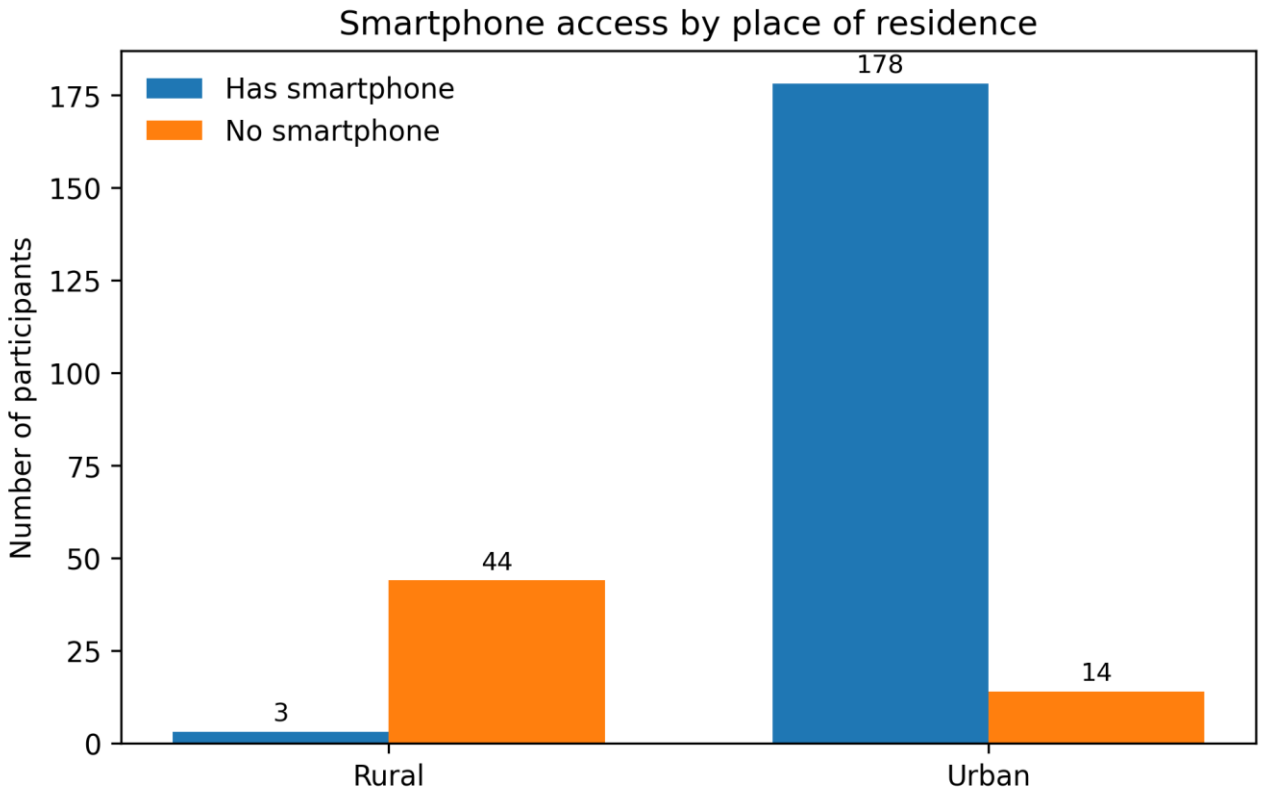

Figure 1: Smartphone access by place of residence.

Reproductive-health knowledge and awareness of mobile applications

Self-reported sufficient reproductive-health knowledge was recorded in 166 women (69.5% of the total sample), all from the urban group. Thus, 0/47 rural participants and 166/192 urban participants (86.5%) reported sufficient knowledge (P<0.001). Awareness that mobile applications could assist with reproductive health and pregnancy care was reported by 140 women (58.6% overall): 0/47 rural participants and 140/192 urban participants (72.9%) (P<0.001).

Table 2: Reproductive-health knowledge, app awareness and app use by place of residence

Outcome	Rural	Urban	Overall	P value*
Self-reported sufficient reproductive-health knowledge	0/47 (0.0%)	166/192 (86.5%)	166/239 (69.5%)	<0.001
Aware of reproductive/pregnancy health apps	0/47 (0.0%)	140/192 (72.9%)	140/239 (58.6%)	<0.001
Uses relevant app among smartphone owners	0/3 (0.0%)	138/178 (77.5%)	138/181 (76.2%)	0.013
Found app helpful among app users	-	-	99/138 (71.7%)	-

**Fisher's exact test. For app use, denominators are smartphone owners (rural n=3; urban n=178).*

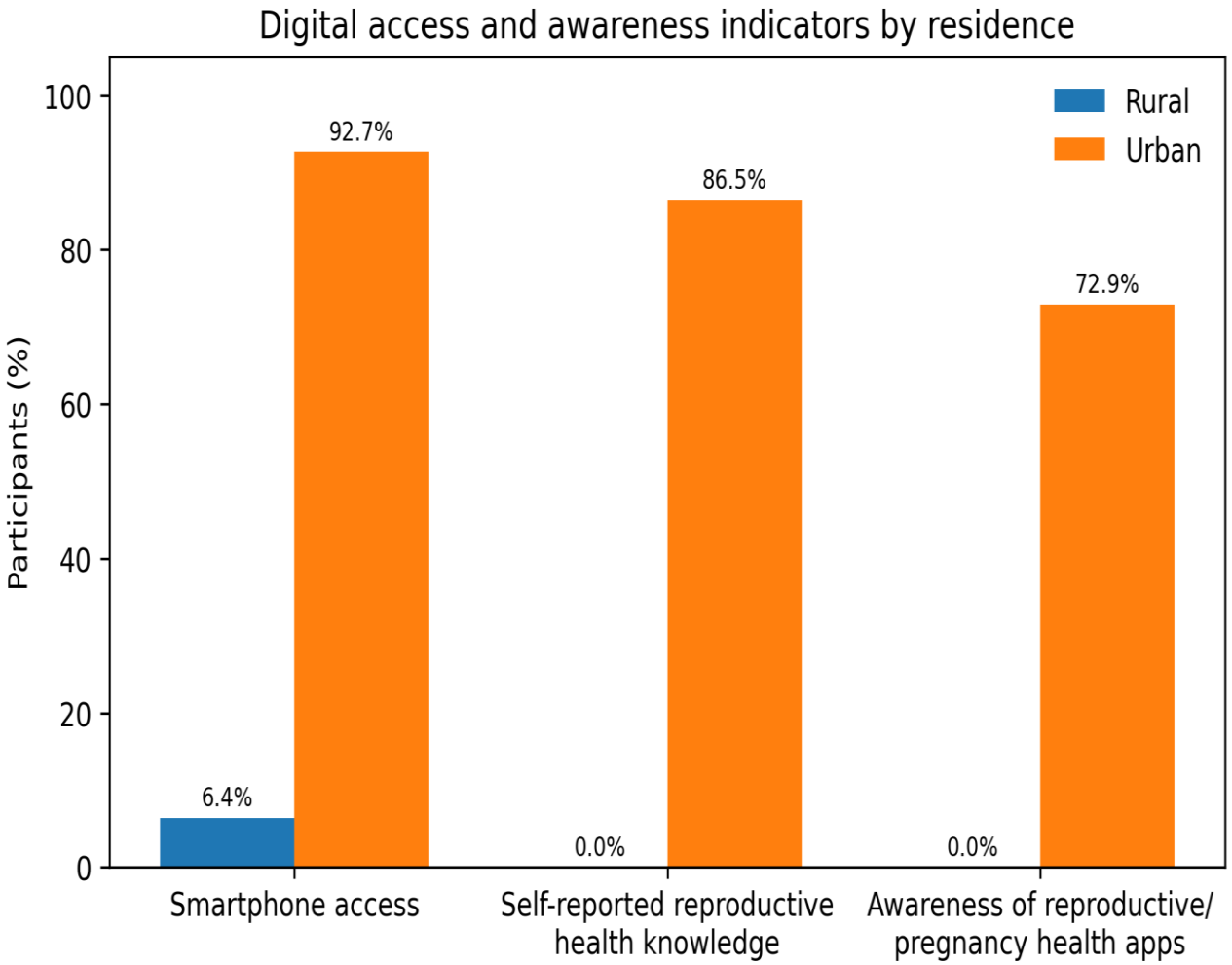

Figure 2: Rural-urban differences in smartphone access, self-reported reproductive-health knowledge and awareness of reproductive/pregnancy health applications.

Application use and perceived usefulness

Among 181 smartphone owners, 138 (76.2%) reported using at least one reproductive or pregnancy-related mobile application. No relevant application use was reported among the three rural smartphone owners, whereas 138/178 urban smartphone owners (77.5%) reported such use (P=0.013). Because the rural smartphone subgroup was very small, this comparison should be interpreted cautiously. Among the 138 app users, 99 (71.7%) reported that the applications were helpful and 39 (28.3%) did not.

The most frequently reported application category was a menstrual calendar (n=77), followed by SwasthGarbh (n=56), Garbh Sanskar (n=35), contraceptive pill reminders (n=35) and fertility-tracking calendars (n=27). Participants could report more than one application category; therefore, the category counts were not mutually exclusive.

Table 3: Mobile applications reported by participants

Application/category	Number reporting use	% of 138 app users*
Menstrual calendar	77	55.8
SwasthGarbh	56	40.6
Garbh Sanskar	35	25.4
Fertility-tracking calendar	27	19.6
Contraceptive pill reminder	35	25.4

**Categories were non-mutually exclusive; percentages therefore sum to more than 100%.*

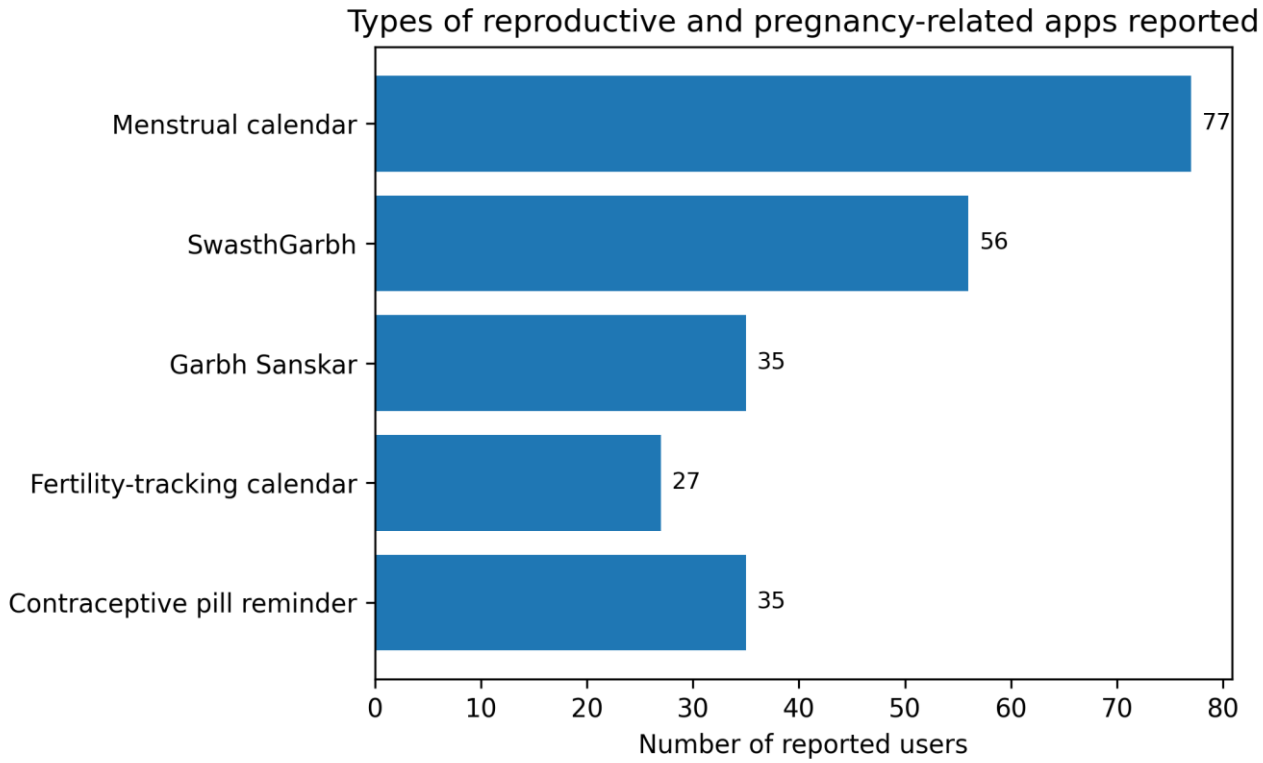

Figure 3: Distribution of reported reproductive and pregnancy-related mobile applications.

DISCUSSION

Our study showed a marked rural-urban gap in smartphone access, self-reported reproductive-health knowledge and awareness of mobile applications. Although 75.7% of the overall sample reported smartphone ownership, ownership was 92.7% among urban participants and 6.4% among rural participants. Self-reported reproductive-health knowledge and awareness of reproductive/pregnancy applications followed a similar pattern. Among participants who used relevant applications, 71.7% considered them helpful.

The difference in smartphone access is consistent with national evidence from India. Mohan et al., using National Family Health Survey data, reported lower phone access among rural women and cautioned that digital-health programmes may reproduce existing inequities when access is uneven [8]. The rural-urban difference observed in our hospital sample was larger than national estimates and should not be interpreted as a population prevalence estimate. It nevertheless shows that an apparently high overall rate of smartphone ownership may conceal substantial differences between subgroups.

The high proportion of users who found the applications helpful is in keeping with studies of pregnancy-app use in other settings. In an Australian survey, Brammall et al. reported widespread use of pregnancy applications and found that women placed particular importance on safe and trustworthy information [15]. Reviews of pregnancy applications have also shown considerable variation in content quality, professional input and evidence base [4,5]. In clinical practice, app use can be discussed during routine consultations, and recommendations should favour applications with reliable content and clear data practices.

Our findings are also consistent with Indian evidence showing that mHealth can improve maternal-health knowledge and selected practices when women are reached and remain engaged. The mMitra voice-message programme improved several knowledge and practice indicators among low-income women [9]. Evaluations of Kilkari and other direct-to-beneficiary programmes have reported benefits for selected reproductive, maternal and child-health behaviours, while also showing that enrolment alone does not ensure consistent exposure or engagement [10-12]. A recent Indian scoping review identified limited phone access, literacy, technical problems, household responsibilities and difficulty understanding messages as recurring barriers [13].

These findings indicate that access and awareness remain important prerequisites for mHealth use. In hospitals serving rural populations, mobile applications should complement rather than replace face-to-face counselling and routine services. Useful measures may include assisted introduction to applications during clinic visits, Hindi or regional-language content, low-data or offline options, and voice-based communication for women with limited literacy. Reviews from developing-country settings similarly identify digital literacy, infrastructure, affordability, privacy and usability as important determinants of mHealth uptake [14].

Menstrual calendars were the most commonly reported applications in our study, followed by SwasthGarbh and other pregnancy- or contraception-related tools. These applications serve different purposes, including cycle tracking, fertility planning, antenatal reminders and medication support. During routine care, clinicians can ask women about the applications they use, explain the limits of predicted ovulation or fertility windows, and advise them not to delay medical assessment when concerning symptoms or pregnancy complications occur.

CONCLUSION

Among women attending a tertiary obstetric and gynaecological hospital in Jaipur, smartphone ownership, self-reported reproductive-health knowledge and awareness of reproductive/pregnancy applications were considerably higher among urban participants than rural participants. Most women who used relevant applications found them helpful. Incorporating mHealth into reproductive and pregnancy care may be useful, but strategies should also address access, digital literacy and language, especially for women from rural areas.

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