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Original Research Article

Utilization of adolescent health services: is there a need for digitalization?

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ABSTRACT

Background: Adolescents have unique healthcare needs, yet utilization of adolescent-friendly health services remains low due to individual, sociocultural, and health-system barriers. Digital health interventions may enhance accessibility and engagement with healthcare services. This study assessed the utilization of adolescent health services, factors influencing utilization, and the perceived need for digitalization of these services.
Methods: A concurrent mixed-methods study was conducted among 100 adolescents aged 10–19 years residing in selected Urban Primary Health Centre areas of Visakhapatnam district. Participants were selected through simple random sampling. Quantitative data were collected using a face-validated semi-structured questionnaire and analysed using SPSS version 25. Descriptive statistics and Chi-square test were applied. Qualitative data were obtained through in-depth interviews and focus group discussions with adolescents, parents, and healthcare providers and analysed thematically.
Results: Good awareness of adolescent health services was observed among 53% of participants, whereas only 14% reported good utilization. Awareness was significantly associated with female gender ($p=0.02$) and higher educational status ($p=0.048$). Utilization was significantly associated with socioeconomic status ($p=0.038$) and preference for government healthcare providers ($p<0.001$). Facilitators included school-based sensitization, parental encouragement, and support from frontline health workers. Qualitative findings identified gaps in awareness, stigma, long waiting times, and preference for private healthcare services as barriers to utilization. Participants perceived digitalization as beneficial for improving privacy, accessibility, health information dissemination, and appointment scheduling.
Conclusions: A substantial awareness utilization gap exists among adolescents. Strengthening adolescent-friendly services and integrating digital health solutions may improve healthcare utilization among adolescents.

Keywords: Adolescents, Adolescent health services, Health service utilization, Digitalization

INTRODUCTION

The global adolescent population is currently estimated to be around 1.3 billion, which constitutes approximately one-sixth of the world's total population. Around 90% of the world's adolescents live in low and middle- income countries.[1] This number is steadily increasing and is expected to grow even more in the coming years. In India, there are about 253 million adolescents aged 10-19 years, making it the country with the largest population globally.[2] Adolescence is a critical period of physical, psychological and social development characterized by rapid changes and heightened vulnerability to health

risks.[3] Effective healthcare during this period is essential for laying the foundation for a healthy and happy adulthood.

Adolescent health services are designed to address their specific needs and provide comprehensive, accessible and high-quality healthcare to adolescents. Despite the increasing global focus on adolescent health, they face challenges in accessing services due to social stigma, confidentiality, geographical barriers and limited awareness about available resources.[3] The increasing penetration of smartphones and internet connectivity offers a unique opportunity to digitalize health services making them more accessible, confidential and youth friendly. Technology has the potential to influence adolescent behaviour change by offering new avenues for provider communication and support for healthy choices through many different platforms.[4]

Digital platforms can bridge gaps in information dissemination, appointment scheduling and telemedicine consultations.[5] While there is growing interest in digital health interventions, including e-health and m-health solutions, their effectiveness and user acceptance among adolescents remain underexplored, and the extent to which adolescents are willing and able to use these services remains unclear. Understanding their needs, perceptions of digital tools and healthy seeking behaviours is essential to design effective health systems. While quantitative findings provide information on the extent of utilization of adolescent health services, they do not fully capture the underlying reasons influencing adolescents' healthcare-seeking behaviour. Therefore, a mixed-methods approach was adopted to assess service utilization and explore the perceptions, barriers, facilitators, and expectations regarding digital health services among adolescents and other stakeholders. The objectives of the study are to assess the utilization of adolescent health services, to explore the facilitating and hindering factors for the utilization of adolescent healthcare services and to determine the need for digitalization in the delivery of healthcare services to adolescents.

METHODS

A concurrent mixed-methods study was done in urban primary health centre (UPHC) areas of Visakhapatnam district among adolescents aged 10-19 years from June to July 2024. Taking the prevalence of utilization of adolescent health services to be 6% from a study done by Gupta et al and by using the formula 4pq/l2, considering 95% confidence interval, absolute precision of 5% and non-response rate of 10%, the sample size was calculated to be 97 which was rounded off to 100.[6] A list of all the UPHCs in Visakhapatnam was obtained and three UPHC areas were selected randomly using lottery method. The list of all the households with adolescents was obtained from the health workers' records and the study participants were selected by simple random sampling technique. A written informed assent from adolescents and consent from parents was obtained from each participant after explaining the purpose of the study and data was collected using a face-validated semi-structured questionnaire which consists of socio-demographic data, questions assessing the awareness and utilization of adolescent health services.

Adolescent health services were categorized into nine components which are information related to outpatient services, nutrition counselling, weight management, haemoglobin testing and iron folic acid supplementation services, menstrual hygiene counselling, lifestyle habits counselling, stress counselling, pregnancy and family planning services and Reproductive and sexual health services. Each component was assigned a score of one. A score of 5 and more was considered as having good awareness/utilization of health services, while a score of less than 5 as poor awareness/utilization.

For the Qualitative component, In-depth Interviews (IDIs) and Focus Group Discussions (FGDs) were conducted among adolescents, parents at their residences, and healthcare providers at healthcare centres using purposive sampling. Data collection continued until data saturation was achieved, resulting in a total of twelve IDIs and two FGDs. An IDI/FGD guide with open-ended questions was used to explore the facilitating and hindering factors influencing the utilization of healthcare services and the perceived need for digitalization. The opinions of the participants were audio-recorded after obtaining verbal consent.

Data analysis for Quantitative component was done using Statistical Package for Social Sciences (SPSS 25.0) software for descriptive statistics like mean and standard deviation. The prevalence of utilization of adolescent health services was expressed as percentages. Associations between utilization of adolescent health services and sociodemographic characteristics were assessed using the Chi-square test or Fisher's Exact test, as appropriate. A $p<0.05$ was considered statistically significant. For Qualitative component, the audio recordings and the field notes were transcribed on the same day. The recorded responses were transcribed verbatim and translated into English. The data was analyzed thematically and was grouped into a few broad themes. On analyzing the main themes, new sub-themes and codes were generated. Adolescents and parents who were willing to participate were included in the study.

RESULTS

The mean age of the study population was 15 ± 2.07 years with 46% of them in early adolescent (10–14 years) phase and 54% in late adolescent (15–19 years) phase. Among the participants, 59% were females and 41% were males. The majority (69%) of participants were enrolled in middle and high school, while 32% were classified as upper middle class based on the Modified B.G. Prasad

Scale 2023.7 Nearly 70% of parents had received education up to the middle or high school level. Additionally, 54% of the participants preferred seeking healthcare services from private doctors. The socio-demographic features of the participants are shown in Table 1.

Table 1: Socio-demographic characteristics of the study participants (n=100).

Characteristics	Frequency (N)	Percentage (%)
Age (in years)		
Early Adolescents (10-14)	46	46
Late Adolescents (15-19)	54	54
Gender		
Male	41	41
Female	59	59
Socio-economic Status (According to modified B.G. Prasad scale 2023)		
Upper Class (I)	10	10
Upper Middle Class (II)	32	32
Middle Class (III)	31	31
Lower Middle Class (IV)	27	27
Mother's Education		
Illiterate	3	3
Primary School	4	4
Middle and High School	70	70
Higher Secondary School and above	23	23
Father's Education		
Illiterate	1	1
Primary School	2	2
Middle and High School	71	71
Higher Secondary School and above	26	26
Preference of Healthcare Provider		
Government	46	46
Private	54	54

A total of 53% of participants had good awareness of the healthcare services available to them, with 86% aware of outpatient services and only 12% were knowledgeable about reproductive and sexual health services. Among the late adolescents aged 15-19 years, 61.1% had good awareness, which was higher than that of the early adolescents, though the difference was not statistically significant. A higher percentage of females (62.7%) demonstrated good awareness compared to males, with the difference being statistically significant (p=0.02). Of the adolescents studying in middle and high school, 53.6% had poor awareness of health services, which was higher than those in higher secondary school and above, and this difference was statistically significant (p=0.048). Table 2 depicts the distribution of awareness of adolescent health services across selected sociodemographic characteristics of the study participants.

Table 2: Distribution of sociodemographic characteristics and awareness of adolescent health services (n=100).

Characteristic	Good Awareness N (%)	Poor Awareness N (%)	Chi-square (P value)
Age (in years)			
Early adolescents (10-14)	20 (43.5)	26 (56.5)	3.1
Late adolescents (15-19)	33 (61.1)	21 (38.9)	(0.078)
Gender			
Male	16 (39)	25 (61)	5.44
Female	37 (62.7)	22 (37.3)	(0.02)*
Adolescent education			
Middle and high school	32 (46.4)	37 (53.6)	3.92
Higher secondary school and above	21 (67.7)	10 (32.3)	(0.048)*

*A $p<0.05$ is statistically significant.

Only 14% of the participants demonstrated good utilization of healthcare services, with 40% utilizing outpatient services and only 1% reported utilization of pregnancy and family planning services available to them. A higher proportion of late adolescents (87%) exhibited poor utilization of healthcare services compared to early adolescents, although the difference was not statistically significant. Similarly, 90.2% of males showed poor utilization compared to females, but this difference was also not statistically significant. Among adolescents from the upper middle class, 81.3% had poor utilization of healthcare services, which was significantly higher than others (p=0.038). Additionally, all 54 adolescents who preferred healthcare from private healthcare providers had poor utilization of healthcare services, compared to those who preferred government healthcare providers, and the difference was statistically significant (p<0.001). Table 3 illustrates the relationship between sociodemographic characteristics and utilization of adolescent health services among adolescents.

Table 3: Distribution of sociodemographic characteristics and utilization of adolescent health services (n=100).

Characteristic	Good Utilization N (%)	Poor Utilization N (%)	Chi-square (P value)
Age (in years)			
Early adolescents (10-14)	7 (15.2)	39 (84.8)	0.105
Late adolescents (15-19)	7 (13)	47 (87)	(0.74)
Gender			
Male	4 (9.8)	37 (90.2)	1.04
Female	10 (16.9)	49 (83.1)	(0.31)
Socio-economic status			
Upper Class (I)	0 (0)	10 (100)	8.41
Upper Middle Class (II)	6 (18.8)	26 (81.3)	(0.038)*
Middle Class (III)	1 (3.2)	30 (96.8)	
Lower Middle Class (IV)	7 (25.9)	20 (74.1)	
Preference of Healthcare Provider			
Government	14 (30.4)	32 (69.6)	19.11
Private	0 (0)	54 (100)	(<0.001)*

*p<0.05 is statistically significant.

Among those who were utilizing the adolescent health services, the facilitating factors were school-based sensitization programs that improve awareness, along with active involvement of community health workers such as ASHAs, ANMs, and Anganwadi teachers who motivate adolescents to access care. Easy accessibility of nearby health centres, parental encouragement, and peer influence further promote service use. Adolescents' curiosity about bodily changes, especially among girls seeking menstrual hygiene counselling, also drives utilization. School health programs and Village Health and Nutrition Days (VHNDs) ensure regular check-ups and counselling for both in-school and out-of-school adolescents, with the trust placed in Anganwadi teachers strengthening engagement with health services.

However, several factors limit adolescents from accessing health services. Lack of knowledge about available services was identified as an important barrier, while stigma and embarrassment, especially around reproductive health, discouraged adolescents from seeking care. Fear of doctors, busy school schedules, and long waiting times at government hospitals further reduce utilization. Some male participants perceived adolescent health clinics as services primarily meant for girls. Some prefer private clinics due to distrust in government services. Out-of-school adolescents engaged in daily labour struggle to find time for health check-ups. Girls often feel uncomfortable discussing menstrual issues, and limited smartphone access makes digital health solutions less effective. The barriers to utilization of adolescent health services are depicted in Figure 1.

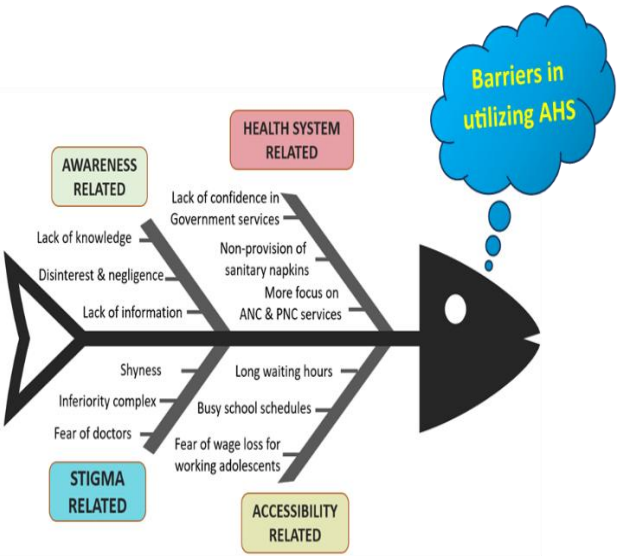

Figure 1: Fish bone diagram showing barriers to utilization of adolescent health services.

When the study participants were asked about usage of Mobile phones in relation to their health issues, 35% used mobile phones for nutrition counselling services, followed by 29% for weight management, 20% for outpatient services, and 20% for information related haemoglobin testing and iron-folic acid supplementation services. Only 1% of the participants used mobile phones to access pregnancy and family planning services. The distribution of mobile phone usage for accessing adolescent health services is depicted in Figure 2.

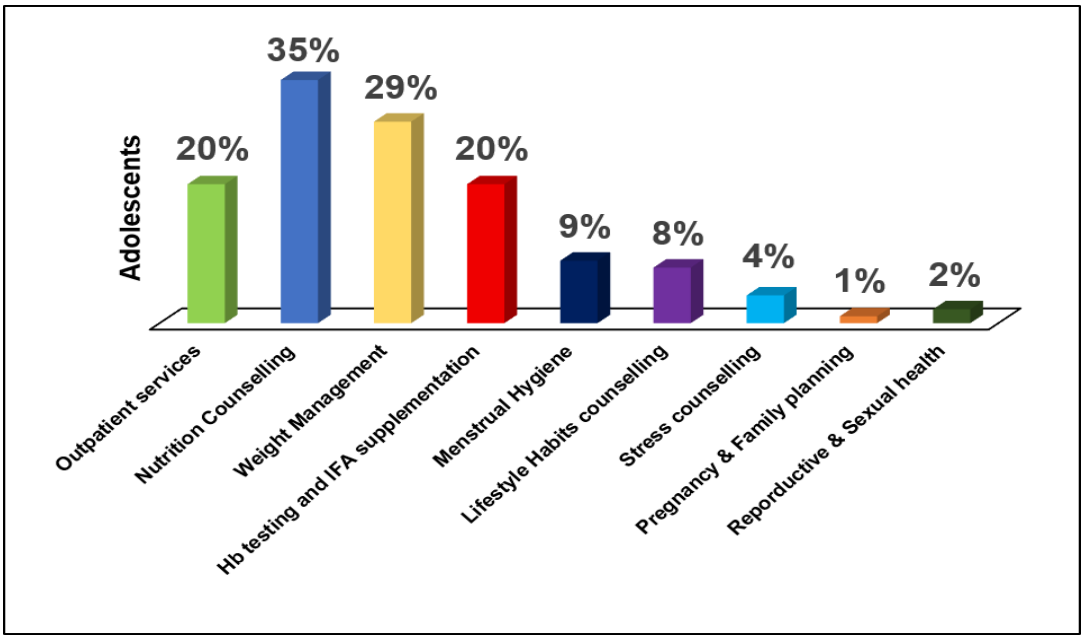

Figure 2: Distribution of mobile phones usage for accessing adolescent health services.

Factors "for" and "against" the need for digitalization of adolescent health services, as perceived by adolescents, parents, and healthcare providers, are presented in Table 4. Representative verbatim quotations from the IDIs and FGDs are also included to support the identified themes and subthemes.

Table 4: Perceived Factors "FOR" and "AGAINST" the need for digitalization of health services.

Perceived factors "for" digitalization of health services		
Adolescents	**Parents**	**Healthcare providers**
Privacy in accessing health information	Can monitor children's health remotely	Efficient record-keeping and patient tracking
Convenience of 24/7 access to health advice	Easier access to vaccination and health reminders	Reduces patient overload in hospitals
Encourages open discussion on sensitive topics	Increases awareness of adolescent health issues	Enables remote consultations, reducing travel time
Interactive and engaging learning via apps	Helps us in guiding children on health topics	Facilitates integration with public health programs
Can seek medical advice without stigma	Reduces dependency on physical hospital visits	Saves consultation time for minor cases
Quick access to emergency health resources	Can track children's nutrition and growth	Enables better disease surveillance and reporting
Awareness about sexual and reproductive health	Provides verified medical information from trusted sources	Telemedicine support improves rural healthcare
Encourages self-monitoring of health	Reduces misinformation through credible platforms	Training tool for healthcare workers to stay updated
Easy appointment booking and reminders	Helps in planning doctor visits efficiently	Remote health data collection aids research
Reduces hesitation to seek professional help	Convenient access to government health guidelines	Strengthens preventive healthcare initiatives

Continued.

Perceived factors "against" digitalization of health services		
Adolescents	**Parents**	**Healthcare providers**
Limited Smartphone & Internet Access	Digital literacy barriers for some parents	Need for additional training to use digital tools
Preference for Face-to-Face Doctor Interaction	We prefer direct doctor interactions	Privacy concerns regarding patient data storage
Fear of Online Data Privacy Issues	Risk of misinformation from unreliable sources	Resistance to changing from traditional consultation methods

Note: Verbatim quotations from IDIs and FGDs represent participants' views on digitalization of adolescent health services.

The findings indicate a generally positive perception towards the digitalization of adolescent health services among adolescents, parents, and healthcare providers. Participants perceived digital platforms to improve accessibility, privacy, awareness, continuity of care, and service efficiency. However, concerns regarding limited digital access, preference for face-to-face interactions, digital literacy challenges, misinformation, and data privacy were identified as potential barriers to the successful implementation of digital health services.

DISCUSSION

The present study reveals a substantial gap between awareness and utilization of adolescent health services, with particularly low uptake of reproductive and sexual health components. This finding reinforces evidence from both Indian and international settings that the mere availability of adolescent-friendly services does not ensure their utilization. Similar observations have been reported by Tylee et al, Ambresin et al, Mazur et al and Senderowitz et al who emphasized that accessibility, confidentiality, effective communication, supportive provider attitudes and youth-friendly service environments are essential for improving adolescent healthcare utilization.[8-11]

Low utilization observed in this study is consistent with findings from Armenia, where Hayrumyan et al reported poor use of adolescent-friendly services due to inadequate awareness, lack of privacy, breaches of confidentiality, inconvenient clinic hours, and long waiting times.[12] Similar barriers have also been documented by Envuladu et al who highlighted inadequate adolescent-friendly facilities, limited trained staff, and inconvenient service delivery arrangements, underscoring the critical role of health-system characteristics in influencing adolescents' healthcare-seeking behaviour across diverse contexts.[13]

Age and gender-related differences in utilization observed in this study are supported by evidence from studies done in Kenya and Nepal. Mutua et al and Giri et al reported higher utilization among late adolescents and significant associations with gender, education, and maternal education.[14,15] Indian studies by Mahalakshmy et al, Biswas et al, Desai et al and Bali et al similarly reported poor awareness and low utilization of adolescent-friendly health services, particularly among boys, highlighting the persistent gap between service availability and uptake despite the implementation of adolescent health programmes.[3,16-18]

Socio-economic and educational inequities influencing utilization in the present study are consistent with findings from Chandigarh reported by Gupta et al who demonstrated lower awareness and utilization among out-of-school adolescents and those with lower educational attainment.[6] Comparable inequities have also been reported internationally, highlighting that socially and educationally marginalized adolescents remain less likely to access adolescent-friendly services. Kumar et al further emphasized the importance of strengthening adolescent-friendly services and school-based health promotion to improve awareness and utilization among adolescents.[19]

The preference for private or general outpatient services over adolescent-specific services observed in this study has been widely documented. In Uttar Pradesh, Davey et al. and Ojha et al reported low utilization of AFHCs despite service availability, with adolescents preferring general or private healthcare.[20,21] Evidence from urban slums of Jaipur by Prasad et al further corroborates delayed care-seeking and low utilization due to lack of privacy, parental neglect, financial constraints, and inconvenient clinic timings. Importantly, counselling by frontline health workers was identified as a key facilitator, aligning with the present study's findings on the role of ASHAs, ANMs, and Anganwadi teachers.[22]

Qualitative evidence from Nigeria by Nmadu et al reinforces the sociocultural and provider-related barriers identified in the present study, including stigma, parental and religious influences, inadequate knowledge, poor provider attitudes, and inconvenient facility hours. These similarities suggest that sociocultural norms and provider behaviour are persistent determinants of adolescent health-seeking behaviour across settings.[23]

The facilitating role of schools, frontline health workers, and trusted community platforms identified in this study is supported by evidence from India, Nepal, Kenya and Central India. Salam et al highlighted the importance of adolescent-friendly delivery platforms, while Khapre et al reported poor utilization largely due to lack of awareness, inadequate training, and implementation challenges.[24,25] Together, these findings emphasize the importance of school-based sensitization programmes, community engagement, peer educators, and supportive provider

behaviour in improving adolescent health service utilization.

Findings related to digitalization in the present study align with international evidence. Radovic et al reported adolescents' preference for digital platforms for information-seeking and self-management, while emphasizing concerns related to privacy and confidentiality.[4] Similarly, Laar et al and Aschbrenner et al reported that adolescents and young people preferred digital health and mHealth platforms because of their convenience, accessibility, privacy, and confidentiality.[26,27] Wong et al highlighted the potential of digital health technologies to enhance adolescent preventive services, while cautioning against challenges related to data security, misinformation, and poor integration with clinical care.[28] Shrivastava et al, Salam et al and Patton et al, further recognized the potential of digital technologies, telehealth services, and information and communication technologies to improve adolescent engagement and expand access to health information and healthcare services.[5,24,29] However, barriers such as poor connectivity, limited smartphone access, digital literacy challenges, privacy concerns, and preference for face-to-face consultations remain important considerations. These opportunities and concerns were similarly reflected by adolescents, parents, and healthcare providers in the present study, indicating that digital interventions should complement rather than replace conventional health services.

Overall, convergence of evidence from Indian and international studies suggests that low utilization of adolescent health services is driven by multifactorial barriers, including limited awareness, sociocultural stigma, gender norms, socio-economic inequities, and health-system constraints. The present study adds to existing literature by reaffirming the awareness utilization gap and emphasizing the importance of trust-based, school and community-linked approaches, supported by thoughtfully integrated digital solutions, to improve adolescent engagement with health services.

Strengths

The strengths of this study include the use of a concurrent mixed-methods design, which enabled triangulation of quantitative findings with qualitative insights. Inclusion of perspectives from adolescents, parents, and healthcare providers provided a comprehensive understanding of facilitators and barriers to adolescent health service utilization. The study also explored the emerging role of digital health solutions in improving adolescent healthcare access.

Limitations

The study was conducted among a relatively small sample of adolescents from urban areas of Visakhapatnam, which may limit the generalizability of the findings. In addition, the use of self-reported information may have introduced recall and social desirability bias.

CONCLUSION

The study demonstrates a marked gap between awareness and utilization of adolescent health services, with overall utilization remaining low despite moderate awareness. Utilization was influenced by gender, socio-economic status, educational level, and preference for private healthcare providers. Reproductive and sexual health services were particularly underutilized, reflecting persistent stigma, lack of privacy, and health system–related barriers. The findings indicate that availability of services alone is insufficient and emphasize the need for adolescent-friendly environments that address both individual and structural determinants of service uptake. Participants also perceived digitalization as a promising approach to improve access to adolescent health information and services through enhanced privacy, convenience, and accessibility. However, concerns related to smartphone access, digital literacy, misinformation, and preference for face-to-face consultations suggest that digital solutions should complement existing adolescent health services rather than replace them.

Recommendations

Improvement in utilization of adolescent health services, strengthening school- and community-based sensitization activities and reinforcing the role of frontline health workers such as ASHAs, ANMs, and Anganwadi teachers is recommended. Health facilities should focus on improving privacy, reducing waiting times, and ensuring adolescent-friendly service delivery. Special attention is required to engage boys and out-of-school adolescents, who remain underserved. Digital health interventions may be explored as a complementary approach to existing services, provided they are implemented with adequate digital literacy support, data privacy safeguards, and integration into the public health system.

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