

From Awareness to Adoption: Prevalence and Determinants of Ayushman Bharat Health Account (ABHA) Adoption among Adults in a Community-Based Study from South India

Swathy M*, Rajeswari K, Balabaskaran S, Thamizhmathi J, Madhumadhi S, M Arthi
 Department of Community Medicine, Sri Venkateshwaraa Medical College Hospital and Research Centre

*Corresponding Author: Swathy M

E mail: swathym97@gmail.com

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KEYWORDS

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Abstract

Background: Electronic health records (EHRs) have altered healthcare by allowing for longitudinal tracking of patient data, improved treatment coordination, and increased community health surveillance. On September 27, 2021, India launched the Ayushman Bharat Digital Mission (ABDM), one of the most ambitious national digital health initiatives in low- and middle-income nations, in response to this worldwide issue. With the introduction of Ayushman Bharat Health Account (ABHA) IDs under ABDM, more than 42 crore health records were linked, and more than 1.3 lakh healthcare facilities—including 17,000 private institutions—were integrated into a single digital framework. Despite this significant growth, there is still little published data on population-level awareness and actual use of ABHA, and acceptance varies by location. Puducherry, a Union Territory in southern India, provides a unique backdrop for ABDM implementation due to its hybrid public-private healthcare system, linguistic diversity, and varying digital literacy. Strategies for expanding ABDM throughout peninsular India can be informed by knowledge of awareness and acceptance trends in such semi-urban and peri-urban environments. The purpose of this study was to investigate independent predictors of ABHA adoption, identify characteristics related to awareness, and evaluate the prevalence of ABHA awareness and use among adults in Puducherry.

Materials and Methods: Adults over the age of eighteen who had lived in specific Puducherry regions for at least six months participated in a community-based analytical cross-sectional survey. To find participants, systematic random sampling was used. A pretested, semi-structured, interviewer-administered questionnaire created following a thorough literature review was used to gather data. Digital health indicators, health behaviors, and sociodemographic traits were among the variables. Using multivariable logistic regression to find independent predictors, statistical analysis examined relationships between awareness/adoption and explanatory factors.

Results: Among the 336 adults, 32.7% were aware of ABHA, and 20.8% had an ABHA ID. Awareness was considerably greater among ABHA ID holders (92.9% vs. 16.9%) and those with health insurance (50.7% vs. 28.0%). Adoption was significantly correlated with insurance coverage (36.0% vs. 16.3%), awareness (59.1% vs. 2.2%), and depression level (31.0% vs. 17.3%). The biggest predictor of adoption, according to multivariable analysis, is awareness (AOR = 114.1; $p < 0.001$). Adoption was influenced by educational achievement; individuals with intermediate/diploma (AOR = 10.20), middle school (AOR = 9.07), and illiterate participants (AOR = 5.73) had greater odds than graduates. Adoption was higher in socioeconomic Class II (the largest group, 27.1%) and Class III (AOR = 5.15) than in Class I. Gender, age, and occupation did not show any independent significance.

Conclusion: According to this survey, just one-fifth of people in Puducherry had adopted ABHA, despite the fact that one-third was aware of it. This indicates a glaring disparity between awareness and utilization. The biggest independent predictor of adoption was awareness and those in middle socioeconomic classes and with less education had higher probabilities, indicating that ABDM outreach is effective with vulnerable populations. Adoption and awareness were aided by health insurance, but after adjustment, its importance diminished. These results emphasize the necessity of region-specific tactics, focused awareness campaigns, and digital literacy initiatives to increase ABHA uptake. ABDM's objective of universal digital health integration can be accelerated by addressing contextual constraints in semi-urban and peri-urban communities. Puducherry provides insightful information for scaling equitable adoption across various Indian contexts.

INTRODUCTION

The World Health Organization's Global Strategy on Digital Health 2020-2025 outlines a vision in which digital innovations are harnessed to promote Universal Health Coverage (UHC), expand access to essential health services, and bolster the responsiveness of health systems across all levels of economic development.¹ Research demonstrates that digital health tools can enhance the continuity of care, shorten diagnostic delays, assist in clinical decision-making, and lead to improved health outcomes especially in low-resource settings.² The implementation of Electronic Health Records (EHRs) has facilitated the longitudinal tracking of patient health data, and consistent EHR adoption has been linked to better care coordination and more effective population health surveillance.³ Nevertheless, the advantages derived from EHR use are dependent on the ability of systems to communicate and exchange data seamlessly. The ability of various systems to interchange and utilise health data without hindrance continues to be a significant challenge in both technical and governance aspects on a global scale. In addition to technological frameworks, it is crucial that patient-centered designs, consent-driven data sharing, and fair access to digital resources serve as foundational elements for digital health efforts to truly act as robust pillars of resilient health systems.⁴⁻⁶ This necessity is especially critical in Low- and Middle-Income Countries (LMIC) where obstacles to implementation are particularly pronounced. India addressed this worldwide challenge with the official launch of the Ayushman Bharat Digital Mission (ABDM) on September 27, 2021. This initiative is recognised as one of the most ambitious national digital health programs executed in LMICs. Built upon the principles of Digital Public Infrastructure, ABDM seeks to establish a federated National Digital Health

Ecosystem that connects public and private healthcare providers through open standards and interoperable platforms. At the heart of this framework is the Ayushman Bharat Health Account (ABHA), a unique 14-digit health identifier that allows citizens to compile their health records over time across various facilities and healthcare providers. ABHA functions via a Health Information Exchange and Consent Manager (HIE-CM), enabling patients to selectively share their medical records with healthcare providers, based on informed consent, in alignment with India's Digital Personal Data Protection Act 2023. At the facility level, ABDM includes a Healthcare Professionals Registry and a Health Facility Registry, which bring together both public and private providers into a single digital platform, fostering an environment conducive to coordinated and continuous care. By September 2024, more than 67 crore ABHA accounts had been established, over 42 crore health records had been connected to these accounts, and more than 1.3 lakh healthcare facilities of which over 17,000 were private had been integrated into the ABDM framework, demonstrating the program's extensive reach and the government's dedication to nationwide digital health adoption.⁷ Nevertheless, despite this broad expansion, published data on population-level awareness and actual usage of ABHA remains sparse and unevenly distributed across regions. A mixed-methods study conducted among attendees of urban primary healthcare centers in Chandigarh revealed that 78% had adopted digital health IDs, with researchers attributing this relatively high rate to stronger digital preparedness and greater familiarity with health systems in an urban tertiary environment.⁸ In contrast, a large door-to-door survey involving 5,709 participants from underprivileged rural and urban communities in Bhopal and Raisen districts found ABHA possession rates of just 3.4% and 2.3%, respectively,

highlighting a significant gap between the program's intended reach and actual grassroots adoption.⁹ An institutional cross-sectional study of 425 outpatients at a tertiary hospital showed that 58.6% of respondents lacked sufficient knowledge of the ABDM, while the overall ABHA adoption rate across OPD visits during the study period stood at 23.96%.¹⁰ In Tamil Nadu, operational research carried out in primary health centers in Chengalpattu district found that 96.27% of patients with chronic illnesses were unaware of the ABHA mobile app, with low digital literacy, lack of smartphones, and limited internet connectivity cited as the main obstacles.¹¹ Across these studies, recurring factors contributing to non-adoption include insufficient awareness, low digital health literacy, failures in linking Aadhaar to mobile numbers, concerns over data privacy, and the absence of organized community outreach initiatives. The significant variation in adoption rates across different settings highlights that ABHA usage is deeply influenced by its surrounding context, driven by a complex interplay of sociodemographic, health system, and individual literacy factors.¹²

There are still large gaps in the research, despite the growing interest of academics in ABDM implementation. While data from the general adult population in community settings—which are crucial for precisely measuring awareness and adoption at the population level—remain sparse, most published research have concentrated on people utilizing primary care services or visiting hospital outpatient clinics. The majority of the information that is now accessible originates from North and Central India; however there is a notable lack of community-level data from South India, particularly from Union Territories like Puducherry. The process by which awareness leads to account creation, a crucial step for program implementation, has not been precisely characterized in community contexts, and only a small

number of research have examined both the factors influencing awareness and those driving adoption.¹³ Without this data, policymakers and planners for digital health are unable to precisely identify priority groupings, customize communication initiatives, or develop targeted interventions meant to bridge the awareness-adoption gap.

Puducherry, a Union Territory located in southern India, offers a unique context in which the implementation of ABDM engages with a blended public-private healthcare framework, linguistic variety, and differing degrees of digital connectivity and health awareness. Gaining insight into how widespread awareness and use of ABHA and what factors influence them in this context can provide evidence useful for designing programs in comparable semi-urban and peri-urban areas across peninsular India. In light of this, the current community-based study was conducted to assess the prevalence of awareness and use of the Ayushman Bharat Health Account (ABHA) among adults in Puducherry, explore factors linked to awareness, and pinpoint independent predictors of ABHA adoption.

OBJECTIVES

Primary: To estimate the prevalence of awareness and adoption of the Ayushman Bharat Health Account (ABHA) among adults in Puducherry.

Secondary: To examine factors associated with awareness of ABHA, to identify independent determinants of ABHA adoption.

METHODOLOGY

Study design: A community-based analytical cross-sectional study was conducted among adults aged 18 years and above.

Study Settings and duration: The study was conducted in the rural and urban field

practice areas attached to the Department of Community Medicine in a tertiary care centre at Puducherry for the period of six months

Study population: The study population comprised adults aged 18 years and above residing in the selected study areas for at least six months.

Inclusion criteria: Adults aged 18 years and above, permanent residents of the study area (minimum six months) and individuals are willing to provide written informed consent.

Exclusion criteria: Individuals who were seriously ill during the survey and individuals who are unable to communicate or provide informed consent.

Sample size:

The sample size was estimated using the single population proportion formula:

$$n = \frac{Z^2 \times p \times (1 - p)}{d^2}$$

where n is the required sample size, Z is the standard normal deviate corresponding to a 95% confidence level (1.96), p is the anticipated uptake rate of the Ayushman Bharat Health Account (ABHA), taken as 78% based on the findings of Gandhi et al.,⁹ q (1 —p) is 22%, and d is the absolute precision of 5%.

Based on these assumptions, the minimum required sample size was calculated to be 264 participants. After accounting for an anticipated 20% non-response rate, the required sample size was increased to 330 participants. During the study period, a total of 336 eligible adults were recruited and included in the final analysis, thereby exceeding the minimum required sample size.

Sampling techniques: A systematic random sampling technique was employed to select the study participants. A sampling frame comprising households in the selected rural and urban field practice

areas was obtained from the respective health centres. The sampling interval (k) was determined by dividing the total number of households by the required sample size. The first household was selected using a random start, and thereafter every kth household was visited until the required sample size was achieved. If more than one eligible adult was available in a selected household, one participant was chosen using the lottery method.

Study variables

Outcome variables: Awareness of Ayushman Bharat Health Account (ABHA) and Adoption (possession) of ABHA ID

Independent variables: The independent variables included age, gender, type of family, educational status, occupation, socioeconomic status (Modified BG Prasad Classification 2024), health insurance coverage, tobacco use, alcohol consumption, physical activity, dietary pattern, sleep duration, screen time, depression status and Indian Diabetes Risk Score (IDRS).¹⁴

Data collection: Data was collected using a pretested, semi-structured, interviewer-administered questionnaire developed after an extensive review of the literature and previously published studies. The questionnaire was validated by experts in Community Medicine and pretested before the commencement of the study. The questionnaire comprised sections on participants' sociodemographic characteristics, awareness of the Ayushman Bharat Health Account (ABHA), possession of an ABHA ID, lifestyle-related factors (including tobacco use, alcohol consumption, physical activity, dietary pattern, sleep duration, and screen time), health insurance coverage, depression status, and diabetes risk assessed using the Indian Diabetes Risk Score (IDRS). Depression was assessed using the Patient Health Questionnaire-9

(PHQ-9). Total scores ranged from 0 to 27, and participants scoring >10 were considered to have moderate or severe depressive symptoms. Face-to-face interviews were conducted by trained investigators after obtaining written informed consent from each participant. The internal consistency of the questionnaire was assessed using Cronbach's alpha, which was found to be 0.82, indicating good reliability. The questionnaire was administered in the local language whenever required to ensure better comprehension. Privacy was maintained during the interviews, and the confidentiality of the information collected was ensured throughout the study.

Operational definitions

Awareness of ABHA: Participants who had heard about the Ayushman Bharat Health Account before the interview were considered aware.

Adoption of ABHA: Participants who had created and possessed a valid 14-digit

ABHA ID were considered to have adopted ABHA services.¹⁰

STATISTICAL ANALYSIS

The data collected was entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 29.0. Descriptive statistics were used to summarize the study variables. Categorical variables were expressed as frequencies and percentages. The prevalence of awareness and adoption of ABHA was estimated with corresponding percentages.

Associations between independent variables and awareness or adoption of ABHA were assessed using the Chi-square test or Fisher's exact test, wherever appropriate. Variables with p value of less than 0.20 were entered into a multivariable logistic regression model to identify independent determinants of ABHA adoption. Adjusted odds ratios (AORs) with 95% confidence intervals (CI) were reported. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1. Sociodemographic characteristics of the study participants (n = 336)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	20–29	57	17.0
	30–39	97	28.9
	≥40	182	54.1
Gender	Female	248	73.8
	Male	88	26.2
Type of family	Nuclear	247	73.5
	Joint	56	16.7
	Three-generation	33	9.8
Educational status	Illiterate	89	26.5
	Primary school (1–5)	45	13.4
	Middle school (6–8)	42	12.5
	High school (9–10)	54	16.1
	Intermediate/Diploma	57	17.0
	Graduate/Postgraduate	49	14.6
Occupation	Unemployed	190	56.5
	Unskilled	61	18.2

	Semi-skilled	34	10.1
	Skilled	21	6.3
	Clerical/Shop owner/Farmer	12	3.6
	Semi-professional	9	2.7
	Professional	9	2.7
Socio-economic status (Modified BG Prasad 2024)	Class I	78	23.2
	Class II	91	27.1
	Class III	59	17.6
	Class IV	51	15.2
	Class V	57	17.0

A total of 336 adults participated in the study. More than half (54.1%) were aged 40 years or older, and the majority were female (73.8%). Most participants belonged to nuclear families (73.5%), while 26.5% were illiterate and 14.6% had completed graduation or higher education. More than half (56.5%) were unemployed. Based on the Modified BG Prasad

socioeconomic classification, the largest proportion belonged to Class II (27.1%), followed by Class I (23.2%) (Table 1). From table 2, overall, 110 participants (32.7%) were aware of the Ayushman Bharat Health Account (ABHA) ID, whereas 70 participants (20.8%) reported having created an ABHA ID.

Table 2. Awareness and adoption of Ayushman Bharat Health Account (ABHA) ID among study participants (n = 336)

Variable	Category	Frequency (n)	Percentage (%)
Awareness of ABHA ID	Yes	110	32.7
	No	226	67.3
Adoption of ABHA ID	Yes	70	20.8
	No	266	79.2

Table 3. Factors associated with awareness of Ayushman Bharat Health Account (ABHA) ID among study participants (n = 336)

Variable	Category	Aware of ABHA ID n (%)	Not aware n (%)	Total (n)	p-value*
Age group (years)	20–29	18 (31.6)	39 (68.4)	57	0.267
	30–39	38 (39.2)	59 (60.8)	97	
	≥40	54 (29.7)	128 (70.3)	182	
Gender	Male	27 (30.7)	61 (69.3)	88	0.632
	Female	83 (33.5)	165 (66.5)	248	
Type of family	Nuclear	84 (34.0)	163 (66.0)	247	

	Joint	16 (28.6)	40 (71.4)	56	
	Three-generation	10 (30.3)	23 (69.7)	33	0.701
Educational status	Illiterate	25 (28.1)	64 (71.9)	89	
	Primary school	12 (26.7)	33 (73.3)	45	
	Middle school	15 (35.7)	27 (64.3)	42	
	High school	20 (37.0)	34 (63.0)	54	
	Intermediate/Diploma	22 (38.6)	35 (61.4)	57	
	Graduate/Postgraduate	16 (32.7)	33 (67.3)	49	0.679
Socio-economic status (BG Prasad 2024)	Class I	26 (33.3)	52 (66.7)	78	
	Class II	32 (35.2)	59 (64.8)	91	
	Class III	21 (35.6)	38 (64.4)	59	
	Class IV	16 (31.4)	35 (68.6)	51	
	Class V	15 (26.3)	42 (73.7)	57	0.811
Health insurance coverage	Yes	38 (50.7)	37 (49.3)	75	
	No	67 (28.0)	172 (72.0)	239	
	Don't know	5 (22.7)	17 (77.3)	22	<0.001
Possession of ABHA ID	Yes	65 (92.9)	5 (7.1)	70	
	No	45 (16.9)	221 (83.1)	266	<0.001

There were no statistically significant associations between awareness of ABHA ID and age, gender, family type, educational status or socioeconomic status (all $p > 0.05$). However, awareness was significantly higher among participants with health insurance coverage than

among those without insurance (50.7% vs. 28.0%; $p < 0.001$). Participants who possessed an ABHA ID were also substantially more likely to be aware of ABHA compared with those without an ABHA ID (92.9% vs. 16.9%; $p < 0.001$) (Table 3).

Table 4. Factors associated with adoption (possession) of Ayushman Bharat Health Account (ABHA) ID among study participants (n = 336)

Variable	Category	ABHA ID Present (%)	ABHA ID Absent (%)	Total (n)	p-value*
Age group (years)	20–29	10 (17.5)	47 (82.5)	57	
	30–39	22 (22.7)	75 (77.3)	97	
	≥40	38 (20.9)	144 (79.1)	182	0.750
Health insurance coverage	Yes	27 (36.0)	48 (64.0)	75	
	No	39 (16.3)	200 (83.7)	239	
	Don't know	4 (18.2)	18 (81.8)	22	0.001
Tobacco use	Current user	2 (10.5)	17 (89.5)	19	
	Past user	2 (20.0)	8 (80.0)	10	

	Never used	66 (21.5)	241 (78.5)	307	0.519
Alcohol consumption	Never	61 (20.5)	236 (79.5)	297	
	Current/Occasional/Past	9 (23.1)	30 (76.9)	39	0.846
Physical activity level	Sedentary	3 (9.4)	29 (90.6)	32	
	Mild	14 (15.6)	76 (84.4)	90	
	Moderate	45 (24.5)	139 (75.5)	184	
	Heavy	8 (26.7)	22 (73.3)	30	0.104
Type of diet	Vegetarian	4 (36.4)	7 (63.6)	11	
	Mixed	66 (20.3)	259 (79.7)	325	0.197
Sleep duration (hours/day)	<5 or >9	22 (27.2)	59 (72.8)	81	
	5–9	48 (18.8)	207 (81.2)	255	0.258
Screen time (hours/day)	≤3	47 (22.4)	159 (77.6)	206	
	>3	23 (17.7)	107 (82.3)	130	0.732
Depression status	Present	27 (31.0)	60 (69.0)	87	
	Absent	43 (17.3)	206 (82.7)	249	0.006
IDRS risk category	Low	8 (17.4)	38 (82.6)	46	
	Moderate	54 (21.2)	201 (78.8)	255	
	High	8 (22.9)	27 (77.1)	35	0.804
Awareness of ABHA ID	Yes	65 (59.1)	45 (40.9)	110	
	No	5 (2.2)	221 (97.8)	226	<0.001

Adoption of ABHA ID was significantly associated with health insurance coverage, depression status and awareness of ABHA. Participants with health insurance had higher adoption than those without insurance (36.0% vs. 16.3%; $p = 0.001$). Adoption was also higher among participants with depression than among those without depression (31.0% vs. 17.3%; $p = 0.006$). Furthermore,

participants who were aware of ABHA were considerably more likely to possess an ABHA ID than those who were unaware (59.1% vs. 2.2%; $p < 0.001$). No significant associations were observed with age, tobacco use, alcohol consumption, physical activity, diet, sleep duration, screen time or diabetes risk category (Table 4).

Table 5. Multivariable logistic regression analysis showing factors associated with adoption of ABHA ID (N = 336)

Variable	Category	Adjusted Odds Ratio (AOR)	95% CI	p-value
Gender	Female	Reference	–	–
	Male	0.42	0.13 – 1.42	0.162
Education	Graduate / Post-graduate	Reference	–	–
	Illiterate	5.73	1.25 – 26.36	0.025

	Primary school (1–5 std)	3.25	0.57 – 18.57	0.185
	Middle school (6–8 std)	9.07	1.79 – 45.94	0.008
	High school (9–10 std)	1.60	0.34 – 7.58	0.555
	Intermediate / Diploma	10.20	2.16 – 48.14	0.003
Occupation	Clerical / Shop owner / Farmer	Reference	–	–
	Professional	–	–	0.989
	Semi-professional	2.48	0.10 – 59.45	0.575
	Semi-skilled	1.13	0.11 – 11.55	0.920
	Skilled	0.76	0.05 – 12.04	0.844
	Unemployed	0.79	0.09 – 7.11	0.836
	Unskilled	3.21	0.31 – 32.66	0.326
Socio-economic status (BG Prasad 2024)	Class I	Reference	–	–
	Class II	2.00	0.61 – 6.54	0.250
	Class III	5.15	1.42 – 18.62	0.012
	Class IV	2.10	0.54 – 8.20	0.284
	Class V	2.25	0.54 – 9.45	0.268
Awareness of ABHA ID	No	Reference	–	–
	Yes	114.1	36.17 – 359.93	<0.001
Health insurance coverage	Don't know	Reference	–	–
	No	0.50	0.08 – 3.02	0.451
	Yes	1.30	0.20 – 8.67	0.787

After adjustment for potential confounders, awareness of ABHA remained the strongest independent predictor of ABHA adoption (adjusted odds ratio [AOR] = 114.1; 95% CI: 36.17–359.93; $p < 0.001$). Compared with graduates/postgraduates, participants with intermediate/diploma education (AOR = 10.20; 95% CI: 2.16–48.14; $p = 0.003$),

middle school education (AOR = 9.07; 95% CI: 1.79–45.94; $p = 0.008$) and those who were illiterate (AOR = 5.73; 95% CI: 1.25–26.36; $p = 0.025$) had significantly higher odds of ABHA adoption. Participants belonging to socioeconomic Class III also had higher odds of adoption compared with Class I (AOR = 5.15; 95% CI: 1.42–18.62; $p = 0.012$). Gender,

occupation and health insurance coverage were not independently associated with ABHA adoption after adjustment (Table 5).

DISCUSSION

The present study reported that 32.7% of adults in Puducherry were aware of Ayushman Bharat Health Account (ABHA), whereas only 20.8% had created an ABHA ID, revealing a major awareness-to-adoption gap despite the nationwide implementation of Ayushman Bharat Digital Mission.¹⁴ Our study reported lower estimates compared to those reported by Gandhi et al., in Chandigarh, with 35.6% aware and 78% had created an ABHA ID, reflecting the effect of assisted registration and intensive implementation in that setting⁸. A study done by Ahmad et al. reported lower registration in Kashmir, showing limited awareness¹⁵. Similarly, Annadurai and Soundararajan reported that 96.3% in Tamil Nadu were unaware of ABHA, suggesting community-level ABHA adoption varies considerably across settings and depends on implementation intensity and availability of assisted registration¹¹.

Health insurance coverage was the only factor significantly associated with awareness of ABHA in this study. Another study done by Ranjan et al. in Agra reported that health literacy was associated with ABHA adoption; Kumar et al study reported that individuals enrolled in health insurance schemes may have more frequent contact with healthcare facilities, thereby increasing their exposure to digital health initiatives.^{10,16}

Ranjan et al. similarly demonstrated that digital health literacy was independently associated with ABHA adoption and patient satisfaction among outpatient attendees in Agra.¹⁰ Kumar et al., in a multicentre study across six Indian sites, reported that lack of awareness or perceived benefit and cited non-

availability of a mobile phone as reasons for non-registration.¹⁶ Systematic reviews by Kruse et al. and Boonstra and Broekhuis have consistently identified awareness, perceived usefulness, trust, user training, and organisational support as key determinants of electronic health record adoption.^{17,18} These findings reinforce the importance of integrating ABHA awareness into routine primary healthcare services through structured information, education, and communication activities.

The strongest independent predictor of ABHA adoption after multivariable adjustment was awareness, suggesting that awareness is a requirement for adopting digital health. Additionally, individuals in socioeconomic Class III had higher odds of adopting ABHA than those in Class I (AOR 5.15), and those with lesser educational attainment were illiterate (AOR 5.73), middle school (AOR 9.07), and intermediate/diploma (AOR 10.20). These findings indicate assisted enrolling through public healthcare facilities, where persons from lower socioeconomic strata are more commonly able to make use of it than individuals with digital competency. Similar obstacles at the provider and patient levels, such as low digital literacy and a lack of support during consultations, were noted by Annadurai and Soundararajan as possibly limiting the realization of benefits.¹¹ Dagar et al. identified poor internet connectivity, lack of smartphones, language barriers, and operational challenges as major barriers to ABHA integration.¹⁹ Strengthening digital infrastructure, expanding assisted registration through frontline healthcare workers, improving digital health literacy, and building public trust are essential to enhance ABHA adoption.

LIMITATIONS

The present study was a cross-sectional study with predominance of female

participants, which may limit generalisability and lack of knowledge. The findings may not be generalisable to other regions with differing digital infrastructure or implementation intensity.

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