



Awareness, Risk Factors, and the Role of Emerging Innovations in Colorectal Polyp Prevention among Adults in Imo State, Nigeria

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Abstract:

Background:

Colorectal polyps, as precursors to colorectal cancer (CRC), pose a significant public health challenge in low- and middle-income countries like Nigeria, where awareness and screening remain limited. Early detection and prevention are essential for reducing CRC burden, yet public knowledge and uptake of emerging non-invasive technologies remain underexplored.

Objectives:

This study assessed the level of awareness, risk factors, and the receptiveness to innovative screening methods for colorectal polyps among adults in Imo State, Nigeria.

Methods:

A community-based cross-sectional survey was conducted among 1,200 adults across three senatorial zones using a multistage sampling technique. Data were collected using a pretested, semi-structured questionnaire addressing socio-demographics, knowledge, risk behaviors, and attitudes toward screening innovations. Quantitative data were analyzed using SPSS version 25, with significance set at $p < 0.05$.

Results:

Only 38.3% of respondents had ever heard of colorectal polyps, while 61.7% could correctly define the condition. Awareness was significantly higher among individuals with tertiary education and those in urban areas ($p < 0.001$). Key barriers to screening included fear of diagnosis (36.5%) and cost of procedures (28.2%). Despite limited use of digital health tools (46.8%), 71.3% expressed openness to non-invasive screening innovations such as stool-based DNA tests if recommended by healthcare professionals. High-risk behaviors, including low fruit and vegetable intake, physical inactivity, and alcohol use, were common among participants.

Conclusion:

Awareness of colorectal polyps remains low, particularly in rural areas, despite a high willingness to adopt non-invasive screening innovations. Interventions that leverage health education and digital health technologies, alongside policy support for subsidized screening, could enhance early detection and prevention efforts in Nigeria.

Keywords: Colorectal polyps, colorectal cancer, screening, awareness, lifestyle risk factors, Nigeria

Chapter One

Introduction

Colorectal cancer (CRC) is one of the most prevalent malignancies worldwide and a leading cause of cancer-related mortality. It is estimated that over 1.9 million new cases of CRC and 935,000 deaths occurred globally in 2020, with an alarming shift of disease burden to low- and middle-income countries (LMICs), including Nigeria (1). CRC commonly originates from precancerous lesions known as colorectal polyps, particularly adenomatous types, through a well-characterized adenoma-carcinoma sequence. Early detection and removal of these polyps through screening significantly reduce the incidence and mortality of CRC.

In high-income countries, routine screening modalities such as colonoscopy, fecal occult blood testing (FOBT), and fecal immunochemical testing (FIT) have contributed to substantial declines in CRC incidence. Conversely, screening uptake remains alarmingly low in LMICs, where healthcare access, affordability, and awareness are major barriers. In Nigeria, CRC is often diagnosed at an advanced stage due to low population-level knowledge of colorectal polyps, stigma surrounding gastrointestinal symptoms, and lack of systematic screening programs (9). The absence of national guidelines for CRC prevention and the underutilization of cost-effective screening strategies have exacerbated these disparities.

Emerging innovations present new opportunities for improving CRC screening and polyp detection in underserved populations. Non-invasive stool-based DNA tests, artificial intelligence enhanced endoscopy, and virtual colonoscopy are increasingly being adopted globally. Additionally, mobile health (mHealth) platforms, telemedicine consultations, and community-driven awareness campaigns have the potential to bridge information and accessibility gaps in resource-limited settings. However, the integration of such technologies must be context-specific, taking into account socio-cultural dynamics, health literacy, and digital infrastructure.

Furthermore, modifiable lifestyle factors such as smoking, alcohol consumption, poor diet, obesity, and physical inactivity are well-established risk factors for colorectal polyp formation and progression to CRC (11). Socio-demographic variables such as age, education, urban-rural residence, and gender also influence screening attitudes and risk perception (5). Despite this, few population-based studies in Nigeria have systematically assessed the interplay between awareness, behavioral risk factors, and openness to emerging screening approaches.

This study aims to fill this gap by evaluating the level of awareness, screening attitudes, and associated risk factors for colorectal polyps among adults in Imo State, Nigeria. In addition, the study explores the potential role of recent innovations in improving early detection and prevention, with implications for public health planning and cancer control policy in sub-Saharan Africa.

Chapter Two

Materials and Methods

2.1 Study Design

This study employed a descriptive community-based cross-sectional design to assess awareness, screening attitudes, and risk factors associated with colorectal polyps among adults in Imo State, Nigeria. The study was conducted between March and November and incorporated both urban and rural settings to ensure representativeness.

2.2 Study Area

Imo State is located in Southeastern Nigeria and comprises 27 Local Government Areas (LGAs), with an estimated population of over 5 million people. The state is characterized by diverse socio-economic, educational, and cultural backgrounds, and health access varies considerably between rural and urban areas. The study purposively selected three senatorial zones: Owerri Zone (urban), Orlu Zone (semi-urban), and Okigwe Zone (predominantly rural), representing the major geographical and demographic diversity of the state.

2.3 Study Population

The study population consisted of male and female adults aged 40–70 years, a demographic group considered at increased risk for colorectal polyps and colorectal cancer. Individuals with a previous diagnosis of colorectal cancer or inflammatory bowel diseases were excluded. Only residents who had lived in the area for at least one year were eligible to participate.

2.4 Sample Size Determination

The sample size was determined using Cochran's formula for sample size estimation for cross-sectional studies: (2)

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

Where:

Z = standard normal deviate at 95% confidence level (1.96)

p = estimated prevalence of awareness of colorectal polyps from a prior pilot study in southeastern Nigeria (0.50 for maximum variability)

d = margin of error (0.05)

$$n = (1.96)^2 \times 0.5 (1-0.5)(0.05)^2 = 384$$

To improve representativeness and account for design effect and non-response, the sample size was increased to 1,200 participants.

2.5 Sampling Technique

A multistage sampling technique was employed: one LGA was randomly selected from each senatorial zone, followed by random selection of two communities per LGA. Households in each community were systematically sampled, and one eligible adult was randomly selected per household.

2.6 Data Collection Instrument

Data were collected using a pretested, semi-structured questionnaire adapted from validated instruments in related studies. The tool comprised five sections: (1) socio-demographic characteristics; (2) knowledge and awareness of colorectal polyps and cancer; (3) screening behaviors and attitudes; (4) risk factor profile; and (5) willingness to adopt innovative screening technologies (e.g., FIT, virtual colonoscopy, AI-assisted tools).

The questionnaire was translated into the local Igbo language and back-translated to ensure accuracy. Trained community health volunteers and research assistants administered the questionnaires through face-to-face interviews.

2.7 Data Quality Control

A pre-test was conducted among 50 participants in a non-selected LGA (Mbaitoli) to assess clarity, reliability, and cultural appropriateness. Adjustments were made based on pretest findings. Field supervisors monitored data collection daily to ensure consistency and completeness.

2.8 Data Analysis

Data were analyzed using SPSS version 23.0. Descriptive statistics (frequencies, percentages, means, and standard deviations) were

used to summarize variables. Bivariate analysis using chi-square tests was conducted to explore associations between categorical variables. Multivariate logistic regression was performed to identify independent predictors of awareness and screening uptake. Adjusted odds ratios (AORs) with 95% confidence intervals (CI) were reported. Statistical significance was set at $p < 0.05$.

2.9 Ethical Considerations

Ethical approval was obtained from the Imo State University Research Ethics Committee (Ref: IMSU/REC/2025/034). Permission was also obtained from the selected LGA health departments and community gatekeepers. All participants provided informed written consent after being briefed on the study

objectives, voluntary nature of participation, and confidentiality protocols. Participation was anonymous, and data were stored securely.

Chapter Three

Results

3.1 Socio-demographic Characteristics of Respondents

A total of 1,200 adults participated in the study across the three senatorial zones of Imo State. The mean age of respondents was 51.2 ± 7.4 years, with 59.2% ($n = 710$) being female. Most participants (64.2%) resided in semi-urban or rural communities, and 50% had secondary education as their highest level of schooling.

Table 1: Socio-demographic Characteristics of Respondents ($n = 1,200$)

Characteristics	Frequency ($n=1200$)	Percentage (%)
Age		
40-50	428	35.7
51-60	686	57.2
61-70	86	7.1
Total	1200	100
Mean age (S.D)	51yrs(± 7.4)	
Gender		
Male	490	40.8
Female	710	59.2
Total	1200	100
Education		
Primary	94	7.8
Secondary	600	50.0
Tertiary	469	39.1
No formal Education	37	3.1
Total	1200	100
Occupation		
Farming	187	15.6
Artisans	394	32.8
Jobless	332	27.7
Civil servant	287	23.9
Total	1200	100
Religion		
Christianity	819	68.25
Islam	246	20.5
Traditional	60	5.5
Others	75	6.25
Total	1200	100
Monthly income in Naira (₦)		
0 - 8,000	355	27.9
9,000 -19,000	172	14.4

20,000 - 24,000	188	15.7
30,000+	485	40.4
Total	1200	100
Place of Residence		
Urban	430	35.8
Rural	770	64.2
Total	1200	100

3.2 Awareness and Knowledge of Colorectal Polyps

Only 38.3% (n = 460) of respondents had ever heard of colorectal polyps, while 61.7% (n = 740) could correctly define the condition as shown in figure 1A. Awareness was significantly higher among respondents with tertiary education ($p < 0.001$) and those residing

in urban areas.

Among those aware, 59.7% identified colorectal polyps as a risk factor for colorectal cancer, and 40.3% were aware of at least one screening method as shown in Figure 1B

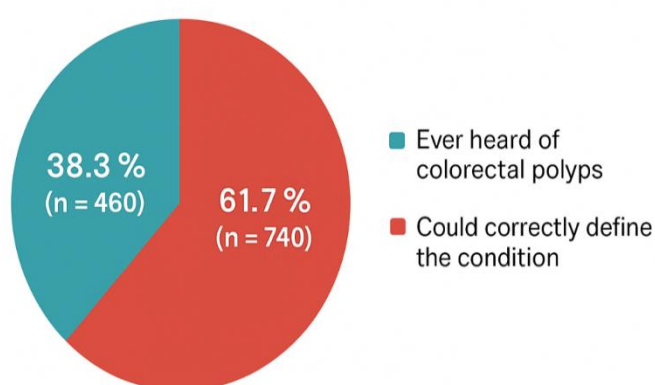


Figure 1A: Awareness of Colorectal Polyps

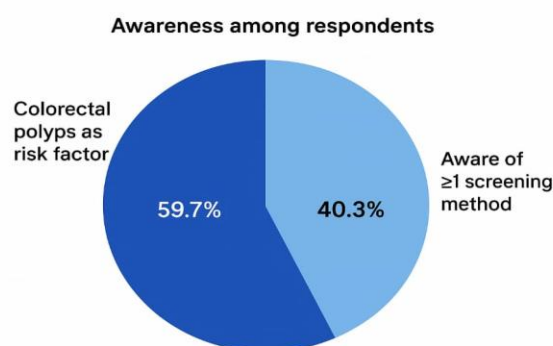


Figure 1B: Awareness by Educational Level

3.3 Screening Uptake and Attitudes among Respondents

Table 2 presents data on colorectal polyp screening behaviors and attitudes among 1,200 respondents. Only 27.5% (n = 330) of the total study sample (n = 1,200) reported having undergone screening. This percentage is not limited to participants above 50 years.”Among those screened, 45.5% did so quarterly, while 33.9% and 20.6% reported annual and biannual screening, respectively. This suggests that among the screened subgroup, a

notable proportion maintained regular screening intervals.

Conversely, 72.5% (n = 870) of respondents had never been screened. The most cited barriers were lack of funds (17.6%), inaccessibility (10.8%), and non-availability of screening services (12.2%) as illustrated in **figure 2**. Notably, over half (51.9%) indicated lack of interest, underscoring a substantial gap in motivation or health literacy.

Among the 740 participants aware of colorectal polyps, only 42.2%

recognized their potential to progress to colorectal cancer, while 34.3% had no such awareness, and 23.5% were uncertain. This reveals significant knowledge deficits, even among those with basic awareness.

Access to screening services varied; 14.5% reported no available centers, and 33.6% had access to only one. For the 633 respondents

in areas with at least one center, perceptions of service effectiveness were mixed: 30.6% rated centers as passive, while 52.1% considered them active or very active. Lastly, only 9.3% reported a family history of bleeding polyps, while 25.3% were unsure, indicating a need for better family health communication and risk awareness.

Table 2: Screening Uptake and Attitudes among Respondents

Variables	Frequency (n=1200)	Percentage (%)
Have you ever participated in a colorectal polyp screening?		
Yes	330	27.5
No	870	72.5
Total	1200	100
If yes, how regularly have you been screened for polyps?		
Yearly	112	33.9
Six monthly	68	20.6
Three monthly	150	45.5
Total	330	100
If no, why have you not been screened for polyps?		
Lack of funds	153	17.6
Proximity to the screening Centre	60	6.9
Not accessible to us	94	10.8
Screening not available at all	106	12.2
Lack of interest	452	51.9
Total	870	100
Among those 740 aware of polyps, is there awareness that colorectal polyps may progress to colorectal cancer?		
Yes	312	42.2
No	254	34.3
No Idea	174	23.5
Total	740	100
Among the 740 participants who are aware of polyps, how many health or screening centers are available in your locality?		
None	107	14.5
1	249	33.6
2	194	26.2
3	130	17.6
4	60	8.1
Total	740	100
For the 633 participants with screening centres in their area, how effective are the health/screening centers?		
Active	150	23.7
Very active	178	28.4

Passive	196	30.6
Very Passive	109	17.2
Total	633	100

Has any member of your family been diagnosed of a bleeding polyp before?

Yes	58	9.34
No	409	65.40
No Idea	158	25.26
Total	740	100

Footnote:

Percentages calculated based on total sample size (n = 1,200).

Screening was not restricted to older age groups

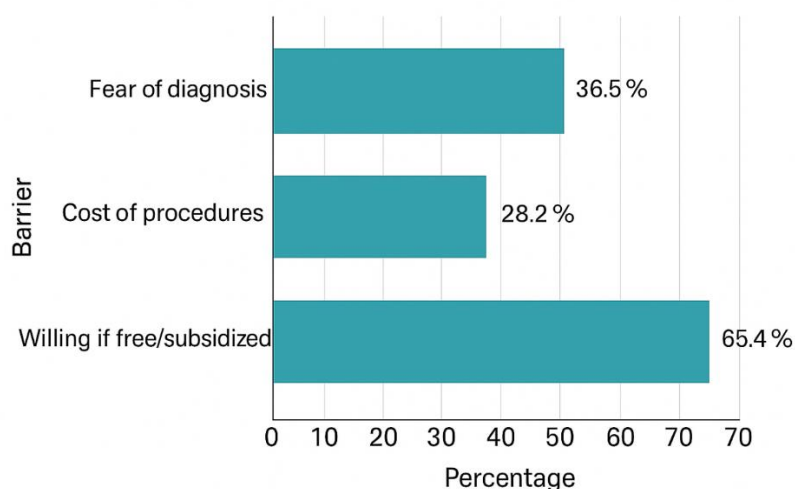


Figure 2: Reasons for Non-Participation in Colorectal Screening

3.4 Behavioral and Lifestyle Risk Factors among Respondents

The findings from **table3A** indicate substantial lifestyle-related risk factors among respondents. Although 59.9% of participants reported engaging in physical activity at least two days a week, 20.7% rarely exercised, and 53.2% reported sedentary behavior

due to constraints. High intake of red meat (32.3% "very often") and low consumption of a fiber-rich diet (only 22.7% reported a balanced meal) were noted. Furthermore, 35.5% were exposed to tobacco, and 40.6% consumed alcohol 2–3 times weekly.

Table 3a: Behavioral and Lifestyle Risk Factors among Respondents (n = 1200)

Variable	Response Category	Frequency (n)	Percentage (%)
Exercise Frequency	Daily	347	28.9
	2–3 days/week	372	31.0
	Weekly	157	13.1
	Monthly	76	6.3
	Rarely	248	20.7
Balanced Diet (Low Carb, High Fiber/Protein)	Yes	272	22.7
	No	475	39.6

	No Idea	453	37.7
Alcohol Consumption	Daily	112	9.3
	2–3 times/week	487	40.6
	Weekly	395	32.9
	Monthly/Biweekly	206	17.2
Smoking/Exposure to Smoke	Yes	426	35.5
	No	774	64.5
Red Meat Consumption	Very often	387	32.3
	Sometimes	301	25.1
	Not at all	512	42.6
Sedentary Behavior	Yes	638	53.2
	No	562	46.8
Daily Water Intake	2 glasses	405	33.8
	2–5 glasses	584	48.5
	≥6 glasses	211	17.7
Junk Food Consumption	Yes	273	22.8
	No	927	77.2
Weight (kg)	40–60	555	46.3
	61–70	311	25.9
	71–90	249	20.8
	≥91	85	7.1
Fruit Intake	Very often	550	45.8
	Not quite often	476	39.7
	Not at all	174	14.5

3.4.1 Family and Medical History-Related Risk Factors among Respondents

Concerning hydration and nutrition, only 17.7% consumed at least 6 glasses of water daily, while 22.8% consumed junk food frequently. Although 45.8% reported regular fruit intake, a notable

14.5% did not consume fruits at all as shown in Table 3b. From a medical standpoint, 58.3% had a personal or familial history of IBD, 65% reported ulcer, and 44.1% had upper GI issues. Over 70% reported elevated blood sugar or hypertension, and 18.2% had a family cancer history as illustrated in table 3b.

Table 3b: Family and Medical History-Related Risk Factors among Respondents (n = 1200)

Variable	Response Category	Frequency (n)	Percentage (%)
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Inflammatory Bowel Disease in Self/Family	Yes	700	58.3
	No	500	41.7
History of Cancer in Self/Family	Yes	218	18.2
	No	618	51.5
	No Idea	364	30.3
Elevated Blood Sugar or Hypertension	Yes	867	72.3
	No	333	27.7
Pile or Anal Surgery	Yes	325	27.1
	No	875	72.9
Ulcer History in Self/Family	Yes	780	65.0
	No	420	35.0
Upper GI Issues in Self/Family	Yes	529	44.1
	No	671	55.9

3.5 Digital Literacy and Attitudes toward Innovative Screening Tools

Less than half (46.8%) of respondents owned smart phones or had ever used digital health services. However, a significant proportion

(71.3%) indicated openness to non-invasive screening tools (e.g., stool-based DNA test) if recommended by healthcare professionals as illustrated in figure 3 below.

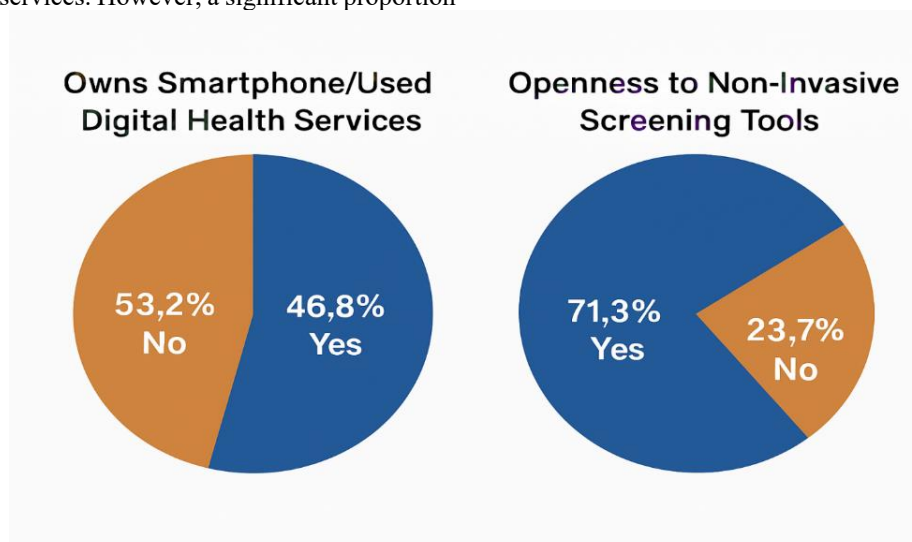


Figure 3: Willingness to Use Innovative Screening Technologies (Survey data on digital health trends)

3.6 Bivariate and Multivariate Analysis

Bivariate analysis revealed significant associations between polyp awareness and tertiary education ($\chi^2 = 43.7$, $p < 0.001$), urban residence ($\chi^2 = 27.5$, $p < 0.001$), and prior health check-ups ($\chi^2 = 21.4$, $p = 0.002$). Multivariate logistic regression identified tertiary

education (AOR = 3.42; 95% CI: 2.14–5.47), urban residence (AOR = 2.26; 95% CI: 1.49–3.45), and previous digital health exposure (AOR = 1.76; 95% CI: 1.15–2.68) as independent predictors of awareness as illustrated in **table 4**

Table 4. Bivariate Associations and Multivariate Predictors of Awareness of Colorectal Polyps among Respondents (n = 1200)

Variable	Bivariate Analysis χ^2 (p-value)	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)
Education Level	$\chi^2 = 43.7$ ($p < 0.001$)	3.42	2.14 – 5.47
Residence (Urban vs Rural)	$\chi^2 = 27.5$ ($p < 0.001$)	2.26	1.49 – 3.45
Previous Health Check-Up	$\chi^2 = 21.4$ ($p = 0.002$)	–	–
Previous Digital Health Exposure	Not included in bivariate table	1.76	1.15 – 2.68

Discussion

This study provides critical insights into the awareness, risk perception, and screening attitudes regarding colorectal polyps among adults in Imo State, Nigeria. The findings reveal that only 38.3% of respondents had ever heard of colorectal polyps, indicating a substantial knowledge gap in the population. This level of awareness is considerably lower than reports from more developed settings, where awareness often exceeds 70% due to widespread health campaigns and routine screening programs (3, 4).

Educational attainment and urban residence were significantly associated with higher awareness, reflecting the influence of social determinants on health literacy. This is consistent with existing literature showing that individuals in urban areas and with higher education levels tend to have better access to health information and preventive services (5). The digital divide manifested in low Smartphone usage and limited digital health engagement (46.8%) further underscores the need for targeted communication strategies that reach digitally and economically marginalized populations.

Despite the low baseline awareness, the study found that a substantial proportion of respondents (71.3%) were open to using non-invasive screening methods such as stool-based DNA tests if recommended by a healthcare provider. This reflects a latent readiness to engage in preventive health behavior when appropriately guided. Similar trends have been observed in other low- and middle-income countries, where healthcare provider recommendation remains a strong predictor of screening uptake (6, 7).

Barriers to screening reported in this study particularly fear of diagnosis (36.5%) and cost of procedures (28.2%) mirror findings from multiple global studies. Fear of a cancer diagnosis and its perceived implications can deter individuals from seeking timely screening, especially in contexts where treatment is costly or stigmatized (8, 9). The cost barrier is especially pronounced in Nigeria, where out-of-pocket health expenditures remain high and CRC screening is not routinely covered under national health insurance schemes (10). These findings highlight the urgent need for subsidized or free screening services, especially for high-risk populations.

Notably, the study identified a high prevalence of modifiable risk

factors, including poor dietary habits, tobacco use, alcohol consumption, and limited physical activity. These findings align with established evidence that lifestyle factors contribute significantly to the development of colorectal polyps and subsequent colorectal cancer (10). In Nigeria, the ongoing nutrition transition marked by increased consumption of processed foods and reduced fiber intake may further elevate population-level risk. The willingness of respondents to undergo screening if the procedure is subsidized suggests that financial accessibility could significantly improve screening uptake. Public health interventions that reduce costs, coupled with culturally sensitive education campaigns and trust-based engagement through healthcare professionals, may catalyze behavior change and improve early detection outcomes.

Furthermore, integrating CRC education and screening into existing primary healthcare and non-communicable disease (NCD) frameworks could enhance program sustainability (11). Leveraging community health workers and local influencers to disseminate information and facilitate referrals may also prove effective in low-resource settings (12).

Conclusion

In sum, the study underscores a paradoxical yet promising scenario: while awareness of colorectal polyp's remains low, openness to screening particularly non-invasive and professionally endorsed methods is high. Tackling structural and informational barriers through policy, education, and innovation offers a viable path toward reducing the burden of colorectal cancer in Nigeria and similar settings.

Recommendations

- Increase Awareness:**
Implement targeted public health campaigns to raise awareness of colorectal polyps and their link to colorectal cancer, especially among rural and less-educated populations.
- Integrate Screening into Primary Care:**
Incorporate routine, subsidized screening—particularly non-invasive methods like stool-based tests—into primary healthcare services.
- Empower Healthcare Providers:**
Train and encourage healthcare workers to recommend screening and educate patients during consultations.

4. Address Barriers:

Reduce fear and cost-related concerns through community education, counseling, and inclusion of screening in health insurance schemes.

5. Expand Digital Access:

Improve digital health infrastructure and literacy to support tech-driven awareness and screening initiatives.

6. Support Further Research:

Conduct in-depth studies to understand behavioral drivers of screening uptake and test the effectiveness of tailored interventions.

Limitations:

The limitation of this study includes, its cross-sectional design, which limits causal inference, and potential self-reporting bias. However, the large sample size and robust sampling strategy enhance the generalizability of findings within the state.

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