RESEARCH ARTICLE

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The Effect of Multimodal Interventions Regarding Early Cervical Cancer Diagnosis on the Women's Knowledge, Attitude and Participation in Cervical Screening Program

Seeta Devi*, Sonopant Joshi

Abstract

Objective: The objective of the present study was to assess the effect of multimodal interventions on women's knowledge, attitude, and behavior towards the participation in the cervical screening test. **Methods:** A quasi-experimental design is executed with a multi-stage sampling of 300 women residing in rural India. Various multimodal interventions, including a documentary film, face-to-face meetings, written booklets, reminder letters, SMS, and telephone calls, are used to motivate the women for cervical cancer screening. **Results:** Following the interventions, 99% of the participants became aware of cervical cancer and increased their participation in screening from 3.0 % (Pretest) to 79.9% (Posttest). Three reminders have been sent to the participants, throughout the intervention period which has led to a considerable rise in the participants' willingness to participate in screening, hiking from 58% to 79.9%. The Pap smear test results have shown that: among 288 women, 21 have Typical Malignant cells on their cervix, and two women have been diagnosed with cervical cancer (Stage 1a and Stage 1b). **Conclusion:** The findings of the study indicate that utilizing diverse interventions in health education alters women's behavior, enhances the compliance of cervical cancer screening, and ultimately helps to prevent life-threatening risks.

Keywords: Multimodal interventions- women's attitudes- woman's behavior- participation- cervical scr**ee**ning

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Introduction

The prevalence of Cervical Cancer (CC) draws the attention of clinicians, other healthcare professionals, and researchers. According to the World Health Organization report, Cervical Cancer is the fourth most frequently occurring cancer in women worldwide, with estimated new cases of 604,000 and 342,000 deaths per year. In India, CC is the third most typical cancer and the second leading cause of mortality at 9.1% (Sung et al., 2021). Papumpare district in Arunachal Pradesh, India, identified the highest incidence rate of CC in Asia (GACD, 2020).

Approximately 95% of cervical cancer cases are caused by Human Papilloma Virus (HPV). HPV is the most common viral infectious agent in the human reproductive system. Most of the men and women who are sexually active are infected with HPV at some point in their lives. However, 90% of the women have cleared the infection without interventions. The majority of the precancerous lesions resolve spontaneously. However, all women are at risk for HPV infection. Precancerous lesions becoming invasive precancerous lesions, take 15 to 20 years with a normal immune system (WHO, 2020). About 70 % of CC cases are associated with HPV types 16 and 18 (Bruni et al., 2010; Gollu et al., 2021).

WHO South-East Asia Region has developed deliberative guidelines for implementing cervical screening programs to detect precancerous lesions and CC at an early stage. As per these guidelines, the women need to be screened for CC within the age span of 30 to 60 years. As per the recent WHO strategies, there are three steps of CC prevention, including timely vaccination, periodic screening, and systematic treatment (Mehrotra and Yadav, 2021). As per the new targets of WHO (2021), 90% of girls should be vaccinated with two doses of HPV by the age of 15 years, 70 % of the women should be screened, and 90% of CC cases should receive the treatment precancerous stage itself.

The following are the primary reasons for the failure of the cervical screening programs: insufficient public awareness of HPV vaccination and cervical screening tests, scarcity of qualified healthcare providers, logistical difficulties reaching people for screening, expensive vaccinations, screening tests, etc. The improved educational programs and effective screening programs are required to lower the burden of cervical cancer (Drokow et al., 2021; Staley et al., 2021).

Midwives and nurses are the first frontline healthcare

*Symbiosis College of Nursing (SCON), Symbiosis International Deemed University (SIDU), Pune, India. *For Correspondence: drseetadevi1981@gmail.com*

providers to improve women's health. They can play a vital role in educating and increasing awareness of CC prevention. To increase cervical cancer screening rates among women, midwives should contemplate playing documentary films in outpatient departments and distributing written materials on cervical cancer to women during their clinic, hospital, and community visits. This exercise can reduce the burden of the CC.

The researchers of the current study developed a deep interest in developing multimodal interventions, including documentary films and distribution of written material on CC prevention, face-to-face meetings with women, and sending reminders via letters, SMS messages, and phone calls. The authors assumed that a multimodal interventional program would enhance the women's awareness of CC prevention.

The study's objective as follows

To assess the effectiveness of multimodal interventions on the women's knowledge, attitude and participation in cervical screening programs.

Hypothesis of the study: Ho- There was no significant difference between knowledge, attitude, regarding CC and participation of women in screening and multimodal interventions.

Related work

As per the Literature Section Criteria (LSC), the authors have reviewed the relevant data in various databases, including SCOPUS, PubMed, and Web of Science, published between 2015 and December 2022. The importance of CC prevention and measures to prevent HPV transmission has been demonstrated in developed and developing nations, where they are readily accessible, durable, effective, and well-executed (Kifle et al., 2020). To some extent, the incidence and mortality rates of cervical cancer have significantly decreased by well-coordinated initiatives on HPV vaccination and CC screening in several countries (Cubie and Campbell, 2020). The Cervical vaccination is proven efficient, immunogenic, and effective in eliminating approximately 70% of CC globally (Huh wt al., 2017). However, inadequate awareness and knowledge could negatively impact HPV vaccination programs (Perlman et al., 2014). Modifying and establishing health behavior can assist in preventing the diseases that cause considerable morbidity and death (Anand et al., 2008).

Healthcare awareness can be influenced by various instructional practices, including web-based apps, face-to-face interaction, documentary films, pamphlets, and other reading materials (Dattilo et al., 2020). Online-based learning with the eccentric visual and audio instructional materials enables people to acquire knowledge from any location with network connectivity (Karakuş and Yanikkerem, 2020; Nho, 2016). A significant reduction in the prevalence was observed in the United States of America after implementing a Video-Based Educational Intervention (VBEI) (Stanczyk et al., 2015). VBEI is more welcoming to those with minimal health knowledge as it can be executed in various formats, such as downloaded media files, streaming videos, and multifunctional floppy disk video (Salim et al., 2020 and Sader., 2020). According to Ampofo et al., (2020) and Karakuş et al., (2019) the video-based instructional model is an excellent way to increase awareness about CC prevention and changed women's behavior. Altinel et al., (2022) stated that participation of women in screening from experimental group increased up to 93% after attending multiple interventions. The utilization of communication and information technologies presents an opportunity to enhance the knowledge of Indian women regarding CC prevention.

Materials and Methods

Study setting, population, sample size and sampling procedures

The study was executed at Primary Health Centers (PHC), Pune district, Maharashtra, India. The inclusion criteria of the study comprised women between 30- 60 years of age, who visited the PHC.

Researchers calculated the sample size using the method "$n = Z^2P(1-P)/d^2$," where 'n' represents the sample size, Z represents the z statistic for a certain level of confidence, typically 1.96 for a conventional level of 95% confidence. The calculated sample size in this study was 300. However, this study had a dropout rate of 12 out of 300.

PHCs and samples were selected using a simple and systematic Random Sampling Technique. In stage I, a Simple Random Sampling Technique was employed to select the four PHCs, namely PHC-Abdullah Shirol, PHC-Bijawadi, PHC-Mahalunge Padwal, and PHC-Rahu, Daund. In the second stage, Systematic Random Sampling was used to recruit the Kth sample, which was nominated, rendering the mean attendance of the women to the PHC (100) and the count per Month was 2,500; it was divided by a sample size of 300; Kth subject was 8. The first subject was randomly selected and 2nd sample onwards; every 8th sample was included in the study.

Study Design, data collection procedures and interventions

This study was undertaken during January 2019 to December 2020 to investigate the effect of multimodal interventions on CC prevention.

The sequence of the study is as follows: the first step includes a collection of baseline data and a pretest, and 2nd step consists of the administration of documentary film, face-to-face education, and distribution of the written content. The 3rd step comprises of the performance of the cervical screening (Pap test) for the women who were interested in taking part on the day of intervention, and 4th step consists of distributing initial letters to women who did not participate in the screening on the day of intervention, which consisted of next schedule of the Pap test. The 5th step includes the sending of three reminders: 1st reminder by written letter within 10 – 15 days of intervention (to the women those who had not participated on the day of intervention and with initial letters), 2nd reminder was sent by SMS within 10 – 15 days after 1st reminder (to the women who did not participate with 1st reminder) and 3rd reminder was sent by telephonic call

within 10-15 days of 2nd reminder (to the women who did not participate with the 1st and 2nd reminders) and 6th step includes the administration of posttest after one month of intervention and cervical screening to the women who had shown interest following the reminders. Women with abnormal Pap smear results were directed for biopsy and further referral. Blinding was maintained to ensure the participants' Pap smear results and other details remained confidential throughout the study.

The intervention in this study was employed based on the Health Belief Model (HBM) to overcome obstacles and highlight the benefits of screening, as this model is effective in recognizing barriers and encouraging favorable changes in behavior.

The documentary film used in this study was produced with the help of the Film and Television Institute of India (FTII) and experts from the Federation of Obstetric and Gynecological Societies in India (FOGSI). The film covered various topics related to cervical cancer, such as its causes, risk factors, symptoms, and prevention, including the HPV vaccine and Pap smear tests. FOGSI endorsed the content of all interventions used in the study.

The SMS invitation content included the woman's first and last name, the purpose of the invitation, appointment date, day and time, and information about the appointment and test. The woman was also asked to confirm the appointment by replying to the message with the word CONFIRM. The telephonic invitation involved greeting the woman by her first and last name and specifying the date, day, and time of the Pap test.

Outcome assessment

The experts in research methodology, gynecology and obstetrics, and oncology assessed and validated to ensure the legitimacy and soundness of the questionnaire.

Assessment of the knowledge: The structured Cervical Cancer questionnaire contains 37 items. The first two questions had four possible options; each with one has one right answer. Questions three to five have multiple-choice answers of "yes," "no," and "don't know." Questions six to eight give four options, each with one potentially valid solution. Question nine contains multiple options, allowing for more than one right answer.

Assessment of the Attitude: The attitude scale was made up of 13 statements, each having five response possibilities and related scores like: Strongly Agree (SA) received 5, Agree (A) received 4, Neither Agree Nor Disagree (NAND) received 3, Disagree (D) received 2, and Strongly Disagree (SD) received 1. Item analysis was performed in the current study.

Assessment of the barriers for non-participation in Pap test: The scale on reasons for non-participation in cervical screening following interventions consists of 13 items with three response options: Agree (A), Neither Agree Nor Disagree (NAND), and Disagree (D).

Results

Table 1 reports that the majority of the participants (84.33%) were in the age group between 30 to 50 years, 25.67% of participants started sexual exposure from the age of below 15 years, and 9.67 % of participants had more than one sexual partner and 97% of participants had never experienced cervical screening. Table 2 displays that before the intervention, the percentage of participants' knowledge of cervical cancer risk factors ranged from 10.67% to 20.33%, whereas after the intervention, knowledge significantly increased from 69.79% to 87.85%. Regarding the preventive measures, the knowledge score increased from 13% (pretest) to 77% (Posttest). Table 3 displays that 33.13% to 73.82% of women believed the Pap smear test may cause pain and discomfort. Similarly, 39.64% and 40.60% of women thought that Pap smear tests would be embarrassing leading them to the exposure to other infections individually.

Table 4 displays that p-values are less than 0.05 and the rejection of null hypothesis. The intervention was very effective in improving women's awareness and attitude on CC prevention. Table 5 reports that approximately 58% (167) of women participated in cervical screening on the day of interventions. About 5.20% (15) of women through initial letters, 6.6% (19) of women by written letters, 1% (3) of women via SMS, and 9% (26) of women through telephonic calls participated in cervical screening. Table 6 describes 21 (9.13 %) women who had Typical Malignant cells on their cervix. Table 7 reports that majority of the

Table1. Sociodemographic Characteristics of the Participants

Characteristics	Category	Number	Percentage
Age of participants in years	30-50	253	84.33
	>50	47	15.67
Educational qualification	> Post School Education	25	8.33
	< Post high School education	275	91.67
Occupation	Employed	158	52.67
	Unemployed	142	47.33
Income per month in Rs/-	More than 13495/-	157	52.33
	Less than 13495/-	143	47.67
Marital status	Single	41	13.67
	Living with partner	259	86.33
Age at marriage in years	< 15	101	33.67
	> 15	199	66.33
Duration of marriage in years	<10	72	24
	>10	228	76
Age at onset of sex in years	<15	77	25.67
	>15	223	74.33
Lifetime sexual partners	1	271	90.33
	>1	29	9.67
Lifetime pregnancies	0-2	154	51.33
	>2	146	48.67
Age at first child in years	<15	56	18.67
	> 15	244	81.33
Number of children	0 to 2	149	49.67
	>2	151	50.33
Experience of cervical screening	Yes	9	3
	No	291	97
Frequency of cervical screening	Once	9	3

Table 2. Participants' Knowledge on Risk Factors of Cervical Cancer, Warning Signs and Controlling Measures of Cervical Cancer

Variable	Pre-test (n,%)	Post-test (n,%)	Difference in%
Knowledge on risk factors			
Site of the cervix in our body	47 (15.67)	240 (83.33)	67.67
Concept of CC	52 (17.33)	253 (87.85)	70.51
Multiple pregnancies	32 (10.67)	224 (77.78)	67.11
Smoking	54 (18.00)	250 (86.81)	68.81
Multiple sex partners	35 (11.67)	231 (80.21)	68.54
Over weight	50 (16.67)	244 (84.72)	68.06
A diet low in fruits and vegetables	61 (20.33)	224 (77.78)	57.44
Long-term use of oral contraceptives	54 (18.00)	223 (77.43)	59.43
Teenage pregnancy	61 (20.33)	237 (82.29)	61.96
Poverty	39 (13.00)	222 (77.08)	64.08
Family history	45 (15.00)	201 (69.79)	54.79
Sexual partner who has not circumcised	60 (20.00)	229 (79.51)	59.51
Warning signs of cervical cancer			
Irregular vaginal bleeding	48 (16.00)	228 (79.17)	63.17
Foul smelling vaginal discharge	40 (13.33)	220 (76.39)	63.06
Pain during sexual intercourse	35 (11.67)	205 (71.18)	59.51
Unusual vaginal discharge	53 (17.67)	217 (75.35)	57.68
Heavier periods than usual.	59 (19.67)	217 (75.35)	55.68
Pelvic pain	41 (13.67)	212 (73.61)	59.94
Fatigue	49 (16.33)	229 (79.51)	63.18
Weight loss	50 (16.67)	210 (72.92)	56.25
Preventive measures of reducing CC			
Avoid early sexual intercourse	38 (12.67)	223 (77.43)	64.76
HPV vaccine at 9-13 years	39 (13.00)	228 (79.17)	66.17
Avoid too many pregnancies	49 (16.33)	228 (79.17)	62.83
Prevent STD using barrier methods	65 (21.67)	219 (76.04)	54.38
Stop smoking	31 (10.33)	223 (77.43)	67.1
Avoiding long term oral contraceptive pills	42 (14.00)	222 (77.08)	63.08
Regular exercise	54 (18.00)	228 (79.17)	61.17
Regular cervical screening	63 (21.00)	236 (81.94)	60.94

participants expressed their embarrassment for the test. Figure 1 depicts the management and follow-up protocol for women diagnosed with CC and precancerous lesions.

Discussion

The study focuses on assessing the effectiveness of the multimodal interventions in increasing the awareness and attitude regarding CC and, importantly, women's willingness for cervical screening. The study shows that multimodal interventions can enhance women's knowledge and cervical screening participation. The results of the previous study conducted by Al-Hosni et al., (2021) were consistent with the results of the current study. This study directed the current researchers to incorporate multimodal interventions, including oral, printed, and digital materials, to enhance knowledge and participation in cervical screening. Kocaöz et al., (2018) reported that educating participants regularly could significantly improve women's participation in cervical screening. According to the findings of the current study, there has been a substantial improvement in women's knowledge and attitude about CC and their participation in cervical screening. These findings were also lined up with earlier research studies (Huh et al., 2017; Ampofo et al., 2020).

Rosser et al., (2015) and Kenya et al., (2015) reported that health education with multiple interventions could increase the knowledge regarding cervical cancer. However, stigmatization and faulty perceptions regarding the Pap test failed to improve after simply informing women about free screening. The current study observed that 23.33% (70) of women did not participate in screening due to certain barriers such as fear of tests, embarrassment, discomfort/pain, and lack of family/husband support. Lott et al., (2020) review also supported the results of the current study. The outcomes of the present study regarding barriers to participation in cervical screening were aligned with the results of Ahmed et al., (2022) in which Egyptian

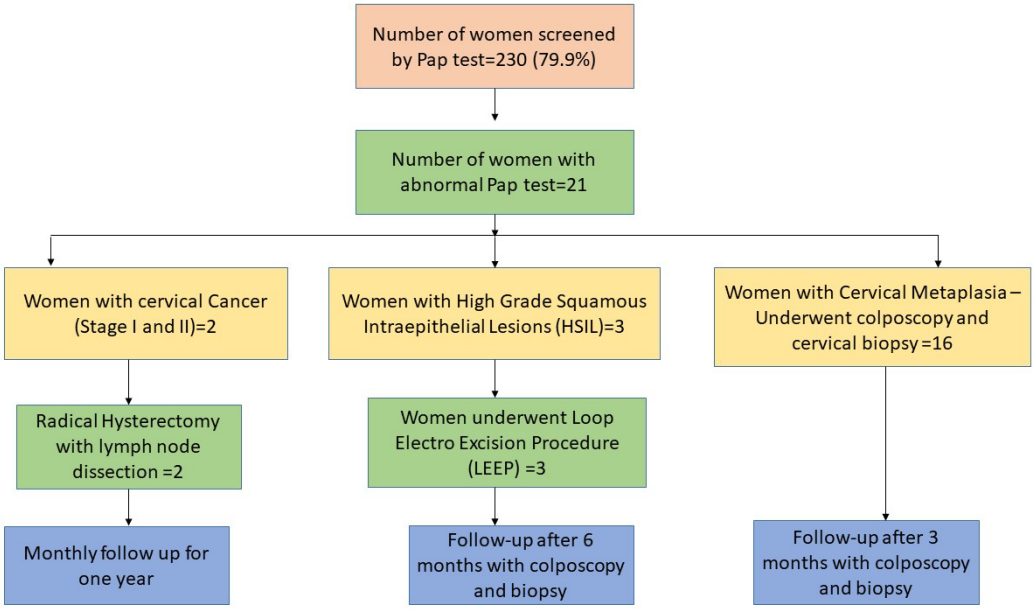

Figure 1. Management of Women with Abnormal Pap Test

Table 3. The Attitude of Women towards Cervical Screening before and after Interventions

Variable	Pre-test (n,%)	Post-test(n,%)	Difference in%
It causes pain and discomfort	497(33.13)	1063 (73.82)	40.69
It is too embarrassing	522 (34.80)	1072 (74.44)	39.64
It exposes me to other infections	490 (32.67)	1055 (73.26)	40.6
It causes sexually transmitted diseases	496 (33.07)	1095 (76.04)	42.98
It causes CC	503 (33.53)	1055 (73.26)	39.73
If unmarried woman goes for test , everyone thinks that she is having sex	557 (37.13)	1081 (75.07)	37.94
Willing for test if friends / family members recommend	537 (35.80)	1067 (74.10)	38.3
I go for test if my partner suggests	573 (38.20)	1108 (76.94)	38.74
I go for test if my health care provider recommends	529 (35.27)	1079 (74.93)	39.66
I go for test if the media suggests	550 (36.67)	1100 (76.39)	39.72
I need reminders about the schedule of PST	554 (36.93)	1078 (74.86)	37.93
I am healthy , do not require PST	625 (41.67)	1106 (76.81)	35.14
I think this test is harmful	540 (36.00)	1099 (76.32)	40.32

women had a high perception of barriers to intervention, even after its implementation.

Ornelas et al., (2018) results suggested that culturally tailored narrative, educational videos could effectively increase cervical screening. In the current study, the authors provided face-to-face education to the participants after showing the documentary film in their local language that could increase their participation in cervical screening. It was implemented as per the Guide to Community Preventive Services (2027). Similarly, Abiodun et al., (2014) provided face-to-face education and a video presentation which effectively increased awareness and perception of women about CC and improved attendance in cervical screening.

Tavasoli et al., (2016) reported that the invitation and reminder letters strategy could increase cervical screening participation, whereas contrary results were noticed in the current study. In our study, phone call reminders showed

Table 4. Descriptive Statistics Regarding Knowledge and Attitude of Women in Pre-Test and Post- Test

Variable	Pretest		Posttest		P- Value
	Mean+ SD	Skewness	Mean+ SD	Skewness	
Risk factors of CC	49.36+10.33	-0.53	230.72+14.81	-0.27	0.05
Warning signs of CC	46.71 + 8.38	0.021	215.71+7.73	0.48	0.005
Preventive measures for CC	47.625 +12.28	0.291	225.875 +5.27	0.824	0.005
Knowledge on Screening	45.22 +10.24	-1.036	219.33 +11.82	-0.184	0.005
Attitude of women towards CC	539.66+37.11	0.86	1082.917+18.66	0.1684	0.05

Table 5. Participation of Women in Cervical Screening after Interventions

Interventions and reminders	Number	Percentage
Participation in screening immediately after intervention	167	58
Initial invitation includes next appointment details	15	5.2
1st reminder by written letter 10-15 days after intervention	19	6.6
2nd reminder by SMS 10-15 days after written letter sent	3	1
3rd reminder by telephonic call 10- 15 days after SMS sent	26	9
Not participated	58	20.1

Table 6. Reports of Pap Test of Women Participated in Cervical Screening

Pap Test report	Number	Percentage
Squamous metaplasia of endocervix	80	34.78
Normal cervix	3	1.3
Cervicitis	8	3.48
Bacterial vaginosis	50	21.74
Typical Malignant cells	21	9.13
Nonspecific inflammatory pathology	14	6.09
Inflammatory pathology with Pyometra and decubitus	4	1.74
Inflammatory pathology with ruptured nabothian cyst	9	3.91
Candidiasis and Bacterial vaginosis	15	6.52
Acute inflammatory pathology – Candidiasis	19	8.26
Inflammatory pathology - Trichomoniasis	7	3.04

more effective results than text messages and written letters, comparable to the study conducted by Kiran et al., (2018). Automated voice calls are a low-cost alternative that is more efficient when used with letters for cancer screening than either strategy alone. Other strategies such as follow-up by telephonic conversation following nonresponse to a mailed letter and participant navigation (Staley et al., 2021).

Despite implementing practical measures to address shortcomings and limitations, however, certain limitations remained as the challenges. For instance, the participant's responses to questions about their readiness for screening might have been impacted by the quality of their relationship with the research team. Tracking the participants, which involved sending reminders and making phone calls, was one of the challenges of the study. The proposed study design was carried out effectively owing to the project's financing, despite the challenges. In addition, the participants were allowed to receive free Pap tests.

In conclusion, the current study highlighted the significance of employing multimodal interventions as health education in transforming knowledge, attitudes and increasing cervical cancer screening uptake. The initiatives such as face-to-face interaction and personalized telephonic calls to the participants could help to reduce the likelihood of cervical screening barriers.

Author Contribution Statement

Conceptualization, S.D., and S.G.J., methodology, S.D., and S.G.J., software, S.D.; validation, S.D., and S.G.J., formal analysis, S.D., investigation, S.D., and S.G.J.; resources, S.D., and S.G.J., ; data curation, S.D., and S.G.J., ; writing, S.D.; writing, review and editing, S.D., and S.G.J.,; S.D., and S.G.J.; supervision, S.D., and S.G.J ; project administration, S.D.

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Table 7. Barriers for Non-Participation in Cervical Screening

Variables	Agree		Neither agree nor disagree		Disagree	
	Number	Percentage	Number	Percentage	Number	Percentage
Assuming test is painful	49	84.48	0	0	21	36.21
It is too humiliating	45	77.59	2	3.45	23	39.66
I have only one sexual partner	45	77.59	1	1.72	24	41.38
My family stops me for Pap test	48	82.76	2	3.45	20	34.48
Feeling healthy right now	54	93.1	3	5.17	13	22.41
Fear of test and results	54	93.1	2	3.45	14	24.14
Lack of time	44	75.86	6	10.34	20	34.48
Due to job in weekdays	32	55.17	5	8.62	33	56.9
Clinic is far from home	46	79.31	3	5.17	21	36.21
Appointment timings are not suitable	16	27.59	3	5.17	51	87.93
Waiting list is too long	11	18.97	3	5.17	56	96.55
Forgotten screening dates	17	29.31	1	1.72	52	89.66
Did not understand the importance of test	12	20.69	1	1.72	57	98.28

Approval

The authors obtained formal permission from concerned PHCs to conduct the study.

Ethical Declaration

The authors had obtained ethical approval from the Independent Ethics Committee (IEC) of SIU, Pune, Maharashtra, India. Informed oral and written consent was obtained from all the participants.

Data Availability

Data was collected from the study participants. The data are not publicly available due to privacy and ethical reasons.

Conflict of Interest

The authors declare no conflict of interest.

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