

Determinants of women's participation in cervical cancer screening trial, Maharashtra, India

Bhagwan Nene,^a Kasturi Jayant,^a Silvina Arrossi,^b Surendra Shastri,^c Atul Budukh,^a Sanjay Hingmire,^a Richard Muwonge,^b Sylla Malvi,^c Ketayun Dinshaw^c & Rengaswamy Sankaranarayanan^b

Objective To determine the factors associated with participation in cervical cancer screening and follow-up treatment in the context of a randomized controlled trial. The trial was initiated to evaluate the efficacy and cost effectiveness of visual inspection with acetic acid, cytological screening and testing for human papillomavirus in reducing the incidence of and mortality from cervical cancer in Maharashtra, India.

Methods Between October 1999 and November 2003 women aged 30–59 years were randomized to receive one of the three tests or to a control group. Participation was analysed for all three intervention arms. The differences between those who were screened versus those who were not was analysed according to the sociodemographic characteristics of the 100 800 eligible women invited for screening. Those who were treated versus those who were not were analysed according to the sociodemographic characteristics of the 932 women diagnosed with high-grade lesions. Participation in screening and compliance with treatment were also analysed according to the type of test used.

Findings Compared with women who were not tested, screened women were younger (aged 30–39), better educated and had ever used contraception. A higher proportion of screened women were married and a lower proportion had never been pregnant. Of the 932 women diagnosed with high-grade lesions or invasive cancer, 85.3% (795) received treatment. Women with higher levels of education, who had had fewer pregnancies and those who were married were more likely to comply with treatment. There were no differences in rates of screening or compliance with treatment when results were analysed by the test received.

Conclusion Irrespective of the test being used, good participation levels for cervical cancer screening can be achieved in rural areas of developing countries by using appropriate strategies to deliver services. Communication methods and delivery strategies aimed at encouraging older, less-educated women, who have less contact with reproductive services, are needed to further increase screening uptake.

Bulletin of the World Health Organization 2007;85:264-272.

Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Introduction

In developed countries, cervical cancer prevention programmes have been shown to be effective in reducing the incidence of and mortality from cervical cancer, while in developing countries, where these programmes exist, they have failed to meet their objectives due to logistical, financial and social problems.^{1,2} One key issue is to determine how to obtain high levels of attendance, which is essential to achieving adequate coverage. Barriers to screening uptake include a lack of knowledge about the disease, a lack of familiarity with the concept of prevention, the geographical and economic inaccessibility of care, the poor quality of services and a lack of support from husbands and families.^{3,4} Evidence indicates that to minimize

these barriers, strategies in low-resource settings should be socially and culturally appropriate.^{3,5}

We carried out a population-based randomized controlled trial (RCT) comparing the effectiveness of cytological screening, testing for human papillomavirus (HPV) infection and visual inspection with acetic acid in reducing the incidence of and mortality from cervical cancer in rural India.⁶ The project was community-focused and used a multicomponent strategy to deliver services; this strategy included using mobile clinics; providing socially adapted health education, good quality services and counselling; and involving community stakeholders and husbands in prevention activities. The satisfactory participation rates (around 79%),

demonstrate the importance of using appropriate service delivery strategies to ensure adequate screening uptake in these settings. Nevertheless, 20% of women invited to participate did not accept the invitation to be screened, and 15% of those who tested positive did not agree to treatment. The analysis of sociodemographic determinants of participation and agreement to treatment is essential to help develop specific strategies to increase coverage; nevertheless, limited evidence exists about these issues in low-resource countries. We examined the sociodemographic characteristics associated with screening and agreement to treatment in the context of our RCT. The role of the different screening tests used was also examined. Visual inspection with acetic acid is a simple

^a Tata Memorial Centre Rural Cancer Extension Project, Nargis Dutt Memorial Hospital, Barshi, India.

^b International Agency for Research on Cancer–WHO, 150 cours Albert Thomas, 69372 Lyon cedex 08, France. Correspondence to Silvina Arrossi (e-mail: silviarrossi@yahoo.com).

^c Tata Memorial Centre, Mumbai, India.

doi:10.2471/BLT.06.031195

(Submitted: 23 March 2006 – Final revised version received: 25 July 2006 – Accepted: 28 July 2006)

inexpensive test that can be provided by nurses.^{7,8} The causative relationship between HPV infection and cervical cancer⁹ has encouraged the evaluation of HPV testing.¹⁰ Although evidence now exists about the accuracy of these tests,^{11,12} limited data are available about the role they have as determinants of participation in population-based screening programmes.

This was a collaborative project between the Nargis Dutt Memorial Hospital (Barshi, India), the Tata Memorial Centre (Mumbai, India), and the International Agency for Research on Cancer (Lyon, France).

Methods

Setting

The project area covers four subdistricts of the Osmanabad district in Maharashtra state. This underdeveloped rural region has a high incidence of cervical cancer (age standardized rate = 27.4/100 000 women).¹³ The literacy level is low at 58%.¹⁴ Health care is administered through primary health centres and rural hospitals. The area has a cancer hospital, the Nargis Dutt Memorial Hospital, which receives technical guidance from the Tata Memorial Centre. The study took place between October 1999 and November 2003.

Design

An extensive description of the trial has been published elsewhere.⁶ The study was a cluster RCT of 497 rural villages in the Osmanabad district; these were grouped into 52 clusters based on primary health centres. Clusters were randomized into four arms: visual inspection with acetic acid, cytological screening, HPV testing and control group. Healthy women aged 30–59 years from the villages in the intervention arms were eligible to participate in the study. All households and residents in the study villages were enumerated, using a household survey, to identify eligible women who were subsequently invited for screening. Women in the control arm were given information on cervical cancer prevention and advice on how to avail themselves of such services; for the purpose of this paper they are excluded from the analysis. A central clinic was established at the Nargis Dutt Memorial Hospital with facilities for diagnosis and treatment.

Service delivery strategy

Services were delivered using a multi-component strategy to increase participation: the core components were common to all arms. These included providing adequate project staffing, involving community members and husbands, using face-to-face invitations, providing locally adapted health education as well as counselling both before and after screening and treatment, ensuring that privacy and hygiene were maintained, ensuring that screening and treatment were provided free of charge, and providing free transportation to the central clinic. An in-depth description of the community focus that underlies the service delivery strategy can be found in Coffey et al.³

Staff included medical officers and both male health workers and female health workers. Staff had different responsibilities according to their training, background and sex. Female health workers were mainly in charge of inviting women and providing health education and counselling; male health workers organized the clinics and liaised with husbands and community leaders. Before the study began project staff met district and health authorities, primary health workers and community leaders. They explained the aims of the study and invited them to participate in project activities, emphasizing their role in encouraging women to participate in screening.

Before the screening clinic was held, two female health workers, accompanied by community leaders, visited households and invited eligible women to attend the clinic. Informed consent was obtained, and socioeconomic and reproductive data were collected using a pre-tested questionnaire. While the female health workers invited women to participate, community leaders talked to husbands and emphasized the importance of screening. In the HPV arm, female health workers explained in simple, reassuring words how the test could detect a common viral infection that may lead to cervical cancer.

Women from all of the study arms were invited to a meeting led by female health workers in each village, where the purpose and characteristics of the screening were explained again and women could ask questions. On the evening before the clinic (which lasted for one day), a third health education meeting was organized in each community

for women and their families. During this meeting, village leaders talked to the public to express their support and invited men to support women's decisions to be screened. A film about cervical cancer prevention, made in the popular Indian cinematography style, was also shown. (Copies of health education materials used in the project are available from the corresponding author.)

Clinics were organized in villages; they were mobile and sited in places such as primary health centres and schools. Women in the visual inspection by acetic acid arm were seen by female nurses. This was followed by colposcopy during the same session for those who were acetopositive. Women with abnormal colposcopic results had biopsies and were given an appointment at the central clinic for treatment. Counselling was provided by female health workers who explained the test results and the purpose of follow-up.

In the cytological and HPV screening arms, female nurses took specimens and sent them to the project's laboratories for analysis. Two female health workers visited women with atypical squamous cells of unknown significance, low-grade squamous intraepithelial lesions, high-grade squamous intraepithelial lesions and invasive cancer in the cytological screening arm and those who were test-positive in the HPV arm to explain the results and make an appointment for colposcopy at the central clinic.

In all intervention arms women with a reproductive tract infection or anaemia were given medication.

Treatment was provided at the central clinic for all intervention arms. Women were offered cryotherapy, the loop electrosurgical excision procedure or conization (cone biopsy) depending on the clinical extent of their lesions.⁶ Women from the cytological and HPV screening arms who had colposcopically diagnosed high-grade lesions and were eligible for cryotherapy, were offered treatment during the same session as colposcopy. Biopsies were taken from screen-positive women after colposcopy, but treatment was provided based on colposcopic results. In all intervention arms, cryotherapy was performed on an ambulatory basis. Women treated with loop electrosurgical excision or conization stayed overnight at the hospital. Women with low-grade lesions were given the option of follow-up, but those wishing to receive treatment were given it. Counselling was provided to

all women both before and after treatment. Transportation to the hospital was provided free of charge.

Data analysis

Data entry was carried out using a Microsoft Access 2000 database. Data analysis was carried out using Stata statistical software version 7.0. Participation in the intervention arms was evaluated as the proportion of women invited to screening and who actually received screening. Compliance with treatment was evaluated as the proportion of women with high-grade lesions and invasive cancer who actually received treatment. Univariate and stepwise multivariate logistic regression analyses were used to evaluate the effects of the socioeconomic and reproductive characteristics of women on their participation in screening and compliance with treatment by estimating odds ratios and their 95% confidence intervals. The model used an entry criterion of $P = 0.05$ and removal criterion of $P = 0.051$ to calculate adjusted odds ratios. Variables that did not fulfil these criteria were removed from the model.

Findings

Of the initial 109 005 enumerated women in the intervention arms, 105 135 completed the individual survey and were invited to participate. Of these, 4335 (4.1%) were considered ineligible due to medical reasons (for example, having had a hysterectomy), leaving 100 800 eligible women who were invited for screening.

Of the 100 800 invited women, 79 449 (78.8%) were screened. The socioeconomic characteristics of screened and unscreened women in the intervention groups are presented in Table 1. Compared with women who were not tested, screened women were younger (aged 30–39), better educated, and had ever used contraception. A higher proportion of screened women were married and a lower proportion had never been pregnant. Overall, only 8 women had ever been screened for cervical cancer before our study.

In the multivariate analysis (Table 2), the variables for age, marital status, level of education, household size, parity and contraceptive use were significantly associated with participation. Attendance for screening was higher among women who were young, married, or had higher levels of education; those liv-

Table 1. Socioeconomic characteristics of women who were screened or were not screened for cervical cancer, Maharashtra, India, October 1999–November 2003

Characteristics	Women ^a	
	Screened	Not screened
Total	79 449	21 351
No. of people in household		
1–2	3 612 (4.5)	1 774 (8.3)
3–4	16 444 (20.7)	4 222 (19.8)
≥5	59 391 (74.8)	15 355 (71.9)
Type of house		
Thatched	22 433 (28.3)	6 198 (29.1)
Tiled	49 027 (61.8)	12 747 (59.8)
Concrete	7 862 (9.9)	2 388 (11.2)
Age group (years)		
30–39	45 098 (56.8)	10 102 (47.3)
40–49	22 152 (27.9)	6 093 (28.5)
≥50	12 199 (15.4)	5 156 (24.1)
Educational level		
None	54 708 (69.1)	13 956 (79.4)
Primary school	9 232 (11.7)	1 482 (8.4)
Secondary school	9 502 (12.0)	1 323 (7.5)
Higher education	5 711 (7.2)	808 (4.6)
Marital status		
Married	72 417 (91.5)	14 980 (85.6)
Unmarried	6 703 (8.5)	2 523 (14.4)
Parity (no. of pregnancies)		
0	1 797 (2.3)	4 723 (22.3)
1–3	29 392 (37.0)	5 769 (27.2)
≥4	48 260 (60.7)	10 679 (50.4)
Contraception used		
No	16 548 (21.0)	5 945 (34.5)
Yes	62 181 (79.0)	11 278 (65.5)
Study arm		
Visual inspection with acetic acid	26 755 (33.7)	7 394 (34.6)
Cytology	25 535 (32.1)	6 601 (30.9)
Human papillomavirus testing	27 159 (34.2)	7 356 (34.5)

^a Values are number (percentage).

ing in households with 3–4 people; and those who had ever used contraception. The type of test did not appear to be a significant predictor of participation.

Of the 932 screened women with colposcopically diagnosed high-grade lesions and invasive cancer, 795 (85.3%) received treatment (Table 3). In the multivariate analysis, parity (number of pregnancies), marital status and educational level were significantly associated with compliance with treatment. Women with higher levels of education, fewer pregnancies and those who were married were more likely to comply with treatment. The type of screening test did not appear to be a significant predictor of compliance.

Discussion

This paper presents new data about sociodemographic variations in the uptake of cervical cancer screening in a large population-based programme carried out in a developing country; information on these variations is essential to help identify underserved women. Our service delivery strategy was designed to reduce the main barriers to screening, including the poor quality of health resources, economic and social inaccessibility, lack of knowledge about preventing cervical cancer, difficulties in paying for services and the social stigma associated with reproductive health problems.^{5,15,16} Our study showed that despite a satisfactory

Table 2. Univariate and multivariate analysis of predictors of women's participation in screening for cervical cancer, Maharashtra, India, October 1999–November 2003

Characteristics	No. of women eligible to participate ^a	Analysis			
		Univariate ^b		Multivariate ^b	
Total	100 800 (78.8)				
Age group (years)					
30–39	55 200 (81.7)	1			
40–49	28 245 (78.4)	0.81 (0.8–0.9);	<0.001	0.89 (0.8–0.9);	<0.001
≥50	17 355 (70.3)	0.53 (0.5–0.6);	<0.001	0.70 (0.7–0.8);	<0.001
No. of people in household					
1–2	5 386 (67.1)	1			
3–4	20 666 (79.6)	1.91 (1.8–2.0);	<0.001	1.12 (1.1–1.2);	0.002
≥5	74 746 (79.5)	1.90 (1.8–2.0);	<0.001	1.05 (0.9–1.1);	0.172
Type of house					
Thatched	28 631 (78.4)	1			
Tiled	61 774 (79.4)	1.06 (1.0–1.1);	<0.001		
Concrete	10 250 (76.7)	0.91 (0.9–1.0);	<0.001		
Educational level					
None	68 664 (79.7)	1			
Primary school	10 714 (86.2)	1.59 (1.5–1.7);	<0.001	1.48 (1.4–1.6);	<0.001
Secondary school	10 825 (87.8)	1.83 (1.7–2.0);	<0.001	1.60 (1.5–1.7);	<0.001
Higher education	6 519 (87.6)	1.80 (1.6–2.0);	<0.001	1.64 (1.5–1.8);	<0.001
Marital status					
Married	87 397 (82.9)	1			
Unmarried	9 226 (72.7)	0.55 (0.5–0.6);	<0.001	0.78 (0.7–0.8);	<0.001
Parity (no. of pregnancies)					
0	6 520 (27.6)	1			
1–3	35 161 (83.6)	13.39 (11.2–16.0);	<0.001	2.10 (1.8–2.4);	<0.001
≥4	58 939 (81.9)	11.88 (9.9–14.2);	<0.001	1.95 (1.7–2.3);	<0.001
Contraception used					
No	22 493 (73.6)	1			
Yes	73 459 (84.6)	1.98 (1.9–2.1);	<0.001	1.63 (1.5–1.7);	<0.001
Study arm					
Visual inspection with acetic acid	34 149 (78.3)	1			
Cytology	32 136 (79.5)	1.07 (0.8–1.4);	0.66		
Human papillomavirus testing	34 515 (78.7)	1.02 (0.7–1.4);	0.90		

^a Values in parentheses are the percentage that participated.

^b Values are odds ratio (95% confidence interval); *P*-value.

general level of participation (79%), women with a specific sociodemographic profile were still less likely to participate in the programme.

The lowest rate of participation was found among nulliparous women. In addition, women who used contraception were more likely to participate. Having had a higher number of pregnancies, using family planning and having contact with the health-care system have been found to be associated with an increased use of screening services,^{7,17–19} indicating that previous contacts with reproductive health services may increase awareness, making women more responsive to cervical cancer screening.

Increasing age has been found to be associated with a decreased use of screening services in several studies carried out in different settings.^{20–22} This has been confirmed in rural India in a study that screened with visual inspection with acetic acid.⁷ It has been suggested that older women may be less responsive to awareness activities because they believe that detection and treatment make no difference to them.²³ Therefore, strategies to promote cervical cancer screening should pay particular attention to incorporating messages specifically targeted at older women.

Our finding that married women are more likely to be screened is consistent

with previous studies in India and other low-resource settings.^{7,20} Two proposed reasons are: first, married women may receive more frequent obstetric or gynaecological care, making them more responsive to reproductive health care;²⁴ and second, a key factor in a woman's decision to participate in cervical cancer prevention services is her husband's positive emotional support.⁵ We believe that reasons related to social stigma should also be explored. In effect, cervical cancer is often associated with sexually transmitted infections.⁵ Because sexual relationships outside marriage are not culturally accepted in many rural areas of India,²⁵ unmarried women may have

Table 3. Univariate and multivariate logistic regression analysis of predictors of compliance with treatment for women with cervical cancer, Maharashtra, India, October 1999–November 2003

Characteristics	Total no. cases of high-grade squamous intraepithelial lesions and cancer cases ^a	Analysis			
		Univariate ^b		Multivariate ^b	
Total	932 (85.3)				
No. of people in household					
1–2	54 (75.9)	1			
3–4	190 (87.4)	2.19 (1.0–4.7);	0.040		
≥5	688 (85.5)	1.86 (1.0–3.6);	0.060		
Type of house					
Thatched	298 (87.6)	1			
Tiled	533 (84.1)	0.75 (0.5–1.1);	0.170		
Concrete	101 (85.1)	0.81 (0.4–1.6);	0.530		
Age group (years)					
30–39	453 (85.2)	1			
40–49	290 (84.5)	0.95 (0.6–1.5);	0.800		
≥50	189 (86.8)	1.14 (0.6–2.0);	0.660		
Educational level					
None	671 (82.7)	1			
Primary school	97 (91.8)	2.33 (1.0–5.3);	0.046	2.15 (0.9–4.9);	0.007
Secondary or higher education	160 (91.9)	2.36 (1.3–4.4);	0.007	2.18 (1.2–4.1);	0.015
Marital status					
Married	835 (86.1)	1			
Unmarried	94 (77.7)	0.56 (0.3–0.9);	0.023	0.56 (0.3–0.9);	0.021
Parity (no. of pregnancies) ^c					
0–3	323 (89.8)	1			
≥4	609 (82.9)	0.55 (0.4–0.8);	0.002	0.60 (0.4–0.9);	0.007
Contraception used					
No	187 (82.9)	1			
Yes	737 (85.9)	1.26 (0.8–2.0);	0.350		
Cervical intraepithelial neoplasia (grade)					
High-grade squamous intraepithelial lesions	704 (86.5)	1			
Cancer	228 (81.6)	0.69 (0.4–1.1);	0.120		
Study arm					
Visual inspection with acetic acid	280 (87.9)	1			
Cytology	346 (86.4)	0.88 (0.5–1.5);	0.650		
Human papillomavirus testing	306 (81.7)	0.62 (0.4–1.0);	0.043		

^a Values in parentheses are the percentage of women who had treatment.

^b Values are odds ratio (95% confidence interval); *P*-value.

^c The total number of pregnancies was re-categorized because only nine women who had never been pregnant were prescribed treatment.

refused to be screened out of fear of the potential social stigma they would suffer if they had a test perceived to be used for sexually active women. Despite the social stigma attached to screening for unmarried women, most unmarried women in this study (73%) were screened. One key activity that was aimed at reducing this barrier was the involvement of community leaders: they encouraged men to support women's participation irrespective of their age and marital status.

Women who were less educated were less likely to participate in screen-

ing, a finding that is consistent with previous reports.^{7,21,26} Previous research on the relationship between socioeconomic factors and the use of health services has shown that education influences screening behaviour through its effects on income and through its association with individual knowledge about cancer screening.²⁷ Because the screening procedure was free of charge, and no transport costs were involved, we believe that the economic constraints often associated with low levels of education were not the main barrier. The fact

that living in a thatched house, which was used as an indicator of low income level, was not associated with screening strengthens this hypothesis. It has been shown that women are less likely to be screened when they do not understand what is being asked of them or do not recognize the importance of recommendations.^{28,29} A study in the United Kingdom found that reasons for non-participation included lacking awareness of the benefits of the test, considering oneself not at risk and fearing embarrassment.³⁰ The association between

education and participation found in our study might reflect the difficulties that women with less education have in understanding the benefits of screening. However, Bradley et al. pointed out that providing an adequate prevention message does not simply mean providing information, it involves a process of filtering and reconstructing concepts in the context of women's lives.²⁶ The health-seeking behaviour of many of the women in this setting is guided by traditional notions of ill health; many of them are not sure about the healing provided by modern medicine.²⁶ Thus, communication problems that arose from differences among conceptions of health may also have contributed to the association between low levels of education and reduced participation.

Participation rates were similar in all arms, demonstrating that good coverage can be achieved irrespective of the test used if locally appropriate service delivery strategies are implemented. This is the first evidence of the high acceptability of HPV testing in a population-based project carried out in a low-resource setting. Our results also confirm that the use of a simple low-cost test, such as visual inspection with acetic acid, is acceptable to women.^{7,8,31}

There is little evidence about determinants of compliance with follow-up treatment in developing countries.^{32,33} In our study, the lowest compliance rate was found among unmarried women, those with low levels of education and those with a higher number of pregnancies. In many cases the association between low levels of education and reduced access to care signals the presence of economic barriers to follow-up care. However, in this study treatment was provided free of charge and transport to the central clinic was assured. These elements suggest that the economic barriers usually associated with low levels of education among participants are not likely to explain the reduced compliance with follow-up among less-educated women. Aspects of physician-patient communication and the content of that communication may play a large part in delaying the follow-up of abnormal screening results or the lack of follow-up.³⁴ Some studies have reported that patients with abnormal screening results were confused and did not understand the information provided by the physician or nurse.^{34,35} Thus, the reduced compliance among less-educated women might have been the result of inadequate

communication between the woman and her health worker, and this may have occurred despite our efforts to provide appropriate counselling. Cultural factors also affect women's ability to make decisions since husbands and mothers-in-law often have to be consulted before any treatment can be accepted.³⁶ The autonomy a woman has to make decisions has been positively associated with the use of reproductive health services.³⁷ However, it is not clear whether this relationship is mediated through education. A study carried out in Pakistan found that contraceptive use was strongly associated with a woman's educational level but this relation was not mediated by women's autonomy.³⁸ We do not know to what extent the reduced compliance of less-educated women resulted from a lack of autonomy, but clearly efforts are needed to ensure that there is family support for treatment.

Contrary to what was observed in the analysis of the determinants of participation in screening, we found an association between a higher number of pregnancies and lower compliance with treatment. Women had to travel to be treated, making treatment a more time consuming procedure than screening; additionally, women receiving loop electrosurgical excision had to stay overnight, interrupting their usual obligations for almost two days. Studies have shown that family constraints, such as having to take care of children, are major barriers to treatment^{21,39} because women attend clinics only when they can negotiate their home responsibilities.⁵ In a study that analysed barriers to screening among Asian women in the United Kingdom, the need for childcare was reported to be the main barrier.⁴⁰ Thus, women with more children may have found it more difficult to take the time needed to receive treatment.

After controlling for sociodemographic factors, compliance with treatment was not influenced by which test was provided. However, as has been previously reported, compliance with colposcopy among women who were positive on screening was significantly different between arms (visual inspection = 98.6% (3682/3731); cytological screening = 87.1% (1559/1790); HPV testing = 88.1% (2475/2812); $P < 0.001$).⁶ In the visual inspection with acetic acid arm, colposcopy was carried out at the clinic immediately after the test; in the HPV and cytological screening arms women had to be visited

to be informed of the test results and given an appointment for colposcopy at the hospital. Our data suggest that having to contact women again and the use of an extra follow-up appointment reduces compliance with colposcopy but not with treatment once women accept colposcopy. This indicates that visual inspection with acetic acid, which can be coupled with immediate colposcopy and eventually treatment, has a programmatic potential to reduce follow-up visits and, therefore, reduce loss to follow-up.

Our study has some limitations. First, it was not possible to trace 4% of the enumerated eligible women, thus, they were not invited to participate. Therefore, despite a participation rate of around 79%, coverage was somehow lower (around 76%). Because no sociodemographic data were collected for these women, they were not included in our analysis. Efforts should be made to determine their sociodemographic profile and to understand why they never received an invitation. Second, the study did not measure compliance with treatment according to the type of treatment. In the HPV and cytological screening arms, cryotherapy was offered in the same session as colposcopy, whereas an additional appointment was needed for loop electrosurgical excision. Moreover, women treated with loop electrosurgical excision stayed overnight in the hospital while cryotherapy was performed on an outpatient basis. These different patterns may have some bearing on the levels of compliance.

Conclusion

Our study indicates that irrespective of the test used, a good rate of participation can be achieved in rural areas of developing countries through the use of appropriate service delivery mechanisms. However, visual inspection methods have the potential to reduce loss to follow-up and, therefore, increase coverage. Communication methods and delivery strategies aimed at encouraging older less-educated women, who have less contact with reproductive health services, are needed to further increase screening uptake. Health-care providers should emphasize the importance of treatment to older, unmarried, test-positive women. Additional research is needed to understand what deters women with more children from receiving treatment. ■

Acknowledgments

The authors gratefully acknowledge the support of the Ministry of Health, Government of Maharashtra; Osmanabad district collectors; Zilla Parishad; chief executive officers; district health officers; other administrative authorities; civic office bearers; staff of health services;

voluntary organizations; and civic leaders in the project area who facilitated the conduct of our study. The authors thank Evelyn Bayle for her help with the manuscript. Finally, the authors are grateful to all the participants without whom this study would not have been possible.

Funding: The authors gratefully acknowledge the generous support of the Bill & Melinda Gates Foundation through the Alliance for Cervical Cancer Prevention.

Competing interests: none declared.

Résumé**Facteurs conditionnant la participation des femmes à un essai de dépistage du cancer du col de l'utérus, réalisé à Maharashtra (Inde)**

Objectif Identifier les facteurs amenant les femmes à se soumettre à un dépistage et à un traitement du cancer du col utérin dans le cadre d'un essai contrôlé randomisé. L'objectif de cet essai était d'évaluer l'efficacité et le rapport coût/efficacité d'une inspection visuelle à l'acide acétique, d'un examen cytologique et d'un test de dépistage du papillomavirus humain dans la réduction de l'incidence du cancer du col et de la mortalité due à cette maladie à Maharashtra en Inde.

Méthodes Entre octobre 1999 et novembre 2003, on a sélectionné au hasard des femmes de 30 à 69 ans pour les soumettre à l'un des trois tests ou les intégrer à un groupe témoin. La participation a été étudiée pour chacun des trois bras d'intervention. Les différences entre les personnes testées et non testées ont été analysées en fonction des caractéristiques sociodémographiques des 100 800 femmes remplissant les critères d'inclusion dans l'essai et invitées à subir ce dépistage. De même, les différences entre les femmes traitées et non traitées ont été analysées en fonction des caractéristiques sociodémographiques des 932 femmes chez lesquelles on avait diagnostiqué des lésions de haut grade. La participation au dépistage et l'observance du traitement ont fait l'objet d'une analyse selon le type de test utilisé.

Résultats Par comparaison avec les femmes non testées, celles

s'étant soumises à un dépistage étaient plus jeunes (30 à 39 ans), présentaient un niveau d'éducation plus élevé et avaient fait usage d'une contraception. Parmi les personnes testées, on relevait aussi une proportion plus forte de femmes mariées et plus faible de femmes n'ayant jamais eu de grossesse. Chez les 932 femmes diagnostiquées comme porteuses de lésions de haut grade ou atteintes d'un cancer invasif, 85,3 % (795) avaient reçu un traitement. La plus forte probabilité d'observance du traitement s'observait chez les femmes possédant un bon niveau d'éducation, chez celles ayant eu jusque là un petit nombre de grossesses ou chez les femmes mariées. L'analyse en fonction du type de test subi n'a fait apparaître aucune différence concernant les taux de dépistage et d'observance du traitement.

Conclusion Quel que soit le test employé, il est possible d'obtenir des taux de participation au dépistage du cancer du col utérin satisfaisants dans les zones rurales des pays en développement en appliquant des stratégies de prestation des services appropriées. Pour accroître encore le recours au test, des méthodes de communication et des stratégies de prestation de services, visant à encourager à se faire dépister, les femmes plus âgées et moins éduquées, ayant moins de contacts avec les services de santé génésiques, sont nécessaires.

Resumen**Factores determinantes de la participación de las mujeres en un ensayo de cribado del cáncer cervicouterino en Maharashtra, India**

Objetivo Determinar los factores asociados a la participación en el cribado y el tratamiento de seguimiento del cáncer cervicouterino en el contexto de un ensayo controlado aleatorizado. Se emprendió este ensayo a fin de evaluar la eficacia y la relación costo/eficacia de la inspección visual con ácido acético, el cribado citológico y el análisis de la presencia de papilomavirus humano como medios para reducir la incidencia de cáncer cervicouterino y la mortalidad por esa causa en Maharashtra, India.

Métodos Entre octubre de 1999 y noviembre de 2003 se distribuyó aleatoriamente a una muestra de mujeres de 30 a 59 años para que se sometiera a una de las tres pruebas o formara parte del grupo testigo. Se analizó la participación para los tres tipos de intervención. Las diferencias entre las mujeres sometidas a cribado y las demás se analizaron en función de las características sociodemográficas de las 100 800 mujeres elegibles invitadas a someterse al tamizaje. El análisis comparativo de las tratadas y las no tratadas se realizó en función de las características sociodemográficas de las 932 mujeres a las que se les diagnosticaron lesiones de gran malignidad. La participación en el cribado y el cumplimiento del tratamiento se analizaron también según el tipo de prueba utilizada.

Resultados En comparación con las mujeres no sometidas a análisis, las mujeres cribadas eran más jóvenes (30–39 años), tenían un mayor nivel de estudios y habían usado anticonceptivos con más frecuencia. Una mayor proporción de las mujeres sometidas a cribado estaban casadas, y una proporción inferior no había estado nunca embarazada. De las 932 mujeres a las que se les diagnosticaron lesiones de gran malignidad o cáncer invasivo, el 85,3% (795) recibieron tratamiento. Las mujeres con mayor nivel de instrucción, que habían tenido menos embarazos y que estaban casadas tenían más probabilidades de seguir el tratamiento. Cuando se procedió a analizar los resultados en función de la prueba realizada, no se observó ninguna diferencia en cuanto a las tasas de cribado o la observancia del tratamiento.

Conclusión Independientemente de la prueba utilizada, si se usan las estrategias apropiadas para dispensar los servicios, es posible lograr un buen nivel de participación en el cribado del cáncer cervicouterino. Si se desea aumentar la participación en las iniciativas de cribado, se necesitan métodos de comunicación y estrategias de prestación de servicios que motiven a las mujeres de más edad, con menor nivel de instrucción y con menor contacto con los servicios de atención reproductiva.

ملخص

مُحدِّدات مساهمات النساء في دراسة تحريّ سرطان عنق الرحم في ماهاراشترا، الهند

للتحري، (فكانت أعمارهن تتراوح بين 30 و 39)، وكُنَّ يتمتعن بمستوى أفضل من التعليم، وسبق لهنَّ أن استخدمن مانعات الحمل ولو لمرة واحدة في حياتهنَّ. وكانت نسبة مئوية كبيرة ممن خضعن للتحري من المتزوجات، فيما كانت النسبة القليلة ممن لم يحملن من قبل. ومن بين 932 امرأة شُخصت لديهن إصابات بدرجات متفاوتة من السرطان الغزوي تلقى 85.3% (795 مصابة) منهن المعالجة. وقد كان أكثر من اثنان للمعالجة النساء اللواتي حصلن على مستويات رفيعة من التعليم، واللاتي لديهن عدد أقل من الحمل، والمتزوجات، ولم يكن هناك فروق في معدلات التحري أو الامتثال للمعالجة عند تحليل النتائج وفقاً للاختبار المجري لهنَّ.

الاستنتاج: بغض النظر عن الاختبار المجري، فإن المستويات الجيدة للمساهمة في تحري سرطان عنق الرحم يمكن بلوغها في أرياف البلدان النامية باستخدام استراتيجيات ملائمة لإيلاء الخدمات. وتمس الحاجة إلى طرق للتواصل وإلى استراتيجيات لتقديم الخدمات تستهدف تشجيع النسوة الأكبر سناً والأقل مستوى من التعليم واللاتي يقل تأسههن مع خدمات الصحة الإنجابية للحصول على نتائج أفضل في التحري.

الهدف: تحديد العوامل المصاحبة لمساهمات النساء في تحري سرطان عنق الرحم، ومتابعة معالجتهم، في سياق دراسة معشاة ومضبوطة بالشواهد. بُدِئت الدراسة لتقييم كفاءة كل من التقصي البصري باستخدام حمض الأستيك، والتحري السيتولوجي، والاختبارات لكشف فيروس الورم الحليمي البشري في إنقاص معدل الوقوع ومعدل الوفيات الناجمة عن سرطان عنق الرحم، وما يتمتع كل منها من فعالية لقاء التكاليف، في ماهاراشترا، في الهند.

الطريقة: وُزعت النساء اللاتي تتراوح أعمارهن بين 30 و 59 عاماً في الفترة بين تشرين الأول/أكتوبر 1999 وتشرين الثاني/نوفمبر 2003 في مجموعتين، واحدة لتلقي ثلاثة اختبارات والأخرى إلى مجموعة الشواهد، وحُلَّت مساهماتهن ضمن مجموعات التدخل الثلاث، وحُلَّت الفروق بين مجموعة اللواتي أُجريت التحري ومجموعة اللواتي لم يجريه، وذلك وفقاً للخصائص الاجتماعية الديموغرافية لدى 100800 امرأة، دُعيت لإجراء التحري. وحُلَّت النسوة اللاتي عولجن مقابل اللاتي لم يعالجن وفقاً للخصائص الاجتماعية والديموغرافية لدى 932 امرأة ممن شُخصت لديهن آفات متقدمة الدرجة. وحُلَّت المساهمة في التحري، ومدى المطاوعة للمعالجة وفقاً لنمط الاختبار الذي استعمل.

الموجودات: كانت النسوة اللاتي خضعن للتحري أصغر سناً ممن لم يخضعن

References

- Lazcano-Ponce EC, Moss S, Alonso dR, Salmeron CJ, Hernandez AM. Cervical cancer screening in developing countries: why is it ineffective? The case of Mexico. *Arch Med Res* 1999;30:240-50.
- Sankaranarayanan R, Budukh AM, Rajkumar R. Effective screening programmes for cervical cancer in low- and middle-income developing countries. *Bull World Health Organ* 2001;79:954-62.
- Coffey P, Arrossi S, Bradley J, Dzuba I, White S, ACCP Community Involvement Affinity Group. *Improving screening coverage rates of cervical cancer prevention programs: a focus on communities*. Seattle: Alliance for Cervical Cancer Prevention; 2004. (Issues in Depth No. 4.) Available from: http://www.path.org/files/RH_accp_improve_screening.pdf
- Nene BM, Jayant K, Malvi SG, Dale PS, Deshpande R. Experience in screening for cervical cancer in rural areas of Barsi Tehsil (Maharashtra). *Indian J Cancer* 1994;31:34-40.
- Bingham A, Bishop A, Coffey P, Winkler J, Bradley J, Dzuba I, et al. Factors affecting utilization of cervical cancer prevention services. *Revista Mexicana de Salud Publica* 2003; 45 Suppl 3:S408-16.
- Sankaranarayanan R, Nene BM, Dinshaw KA, Mahe C, Javant K, Shastri SS, et al. A cluster randomized controlled trial of visual, cytology and human papillomavirus screening for cancer of the cervix in rural India. *Int J Cancer* 2005;116:617-23.
- Sankaranarayanan R, Rajkumar R, Arrossi S, Theresa R, Esmey PO, Mahe C, et al. Determinants of participation of women in a cervical cancer visual screening trial in rural south India. *Cancer Detect Prev* 2003;27:457-65.
- Gaffikin L, Blumenthal PD, Emerson M, Limpaphayom K. Safety, acceptability, and feasibility of a single-visit approach to cervical-cancer prevention in rural Thailand: a demonstration project. *Lancet* 2003;361:814-20.
- Bosch FX, Munoz N. The viral etiology of cervical cancer. *Virus Res* 2002; 89:183-90.
- Duarte Franco E, Franco EL. Cancer of the uterine cervix. *BMC Womens Health* 2004; 4 Suppl 1 :S13.
- Franco EL. Chapter 13: primary screening of cervical cancer with human papillomavirus tests. *J Natl Cancer Inst Monogr* 2003;31:89-96.
- Sankaranarayanan R, Chatterji R, Shastri SS, Wesley RS, Basu P, Mahe C, et al. Accuracy of human papillomavirus testing in primary screening of cervical neoplasia: results from a multicenter study in India. *Int J Cancer* 2004;112:341-7.
- Parkin DM, Whelan SL, Ferlay J, Raymond L, Young J. *Cancer incidence in five continents*. vol. VII. Lyon: International Agency for Research on Cancer Press; 1997.
- Registrar General and Census Commissioner, India. Census of India 2001. Available from: <http://www.censusindia.net/>
- Deschamps M, Band PR, Hislop TG, Clarke HF, Smith JM, To YN. Barriers to cervical cytology screening in native women in British Columbia. *Cancer Detect Prev* 1992;16:337-9.
- Agurto I, Bishop A, Sanchez G, Betancourt Z, Robles S. Perceived barriers and benefits to cervical cancer screening in Latin America. *Prev Med* 2004; 39:91-8.
- Lazcano-Ponce EC, Moss S, Cruz-Valdez A, de Ruiz PA, Martinez-Leon CJ, Casares-Queralt S, et al. The positive experience of screening quality among users of a cervical cancer detection center. *Arch Med Res* 2002;33:186-92.
- Ronco G, Segnan N, Ponti A. Who has Pap tests? Variables associated with the use of Pap tests in absence of screening programmes. *Int J Epidemiol* 1991;20:349-53.
- Mandelblatt JS, Gold K, O'Malley AS, Taylor K, Cagney K, Hopkins JS, et al. Breast and cervix cancer screening among multiethnic women: role of age, health, and source of care. *Prev Med* 1999;28:418-25.
- Nascimento CM, Eluf-Neto J, Rego RA. Pap test coverage in Sao Paulo municipality and characteristics of the women tested. *Bull Pan Am Health Organ* 1996;30:302-12.
- Perez-Stable EJ, Sabogal F, Otero-Sabogal R. Use of cancer-screening tests in the San Francisco Bay Area: comparison of Latinos and Anglos. *J Natl Cancer Inst Monogr* 1995;147-53.
- Hsia J, Kemper E, Kiefe C, Zapka J, Sofaer S, Pettinger M, et al. The importance of health insurance as a determinant of cancer screening: evidence from the Women's Health Initiative. *Prev Med* 2000;31:261-70.
- Chamberlain J. Reasons that some screening programmes fail to control cervical cancer. In: Hakama M, Miller AB, Day NE, eds. *Screening for cancer of the uterine cervix*. Lyon: International Agency for Research on Cancer/ International Union Against Cancer; 1986. pp. 161-8.
- Siahpush M, Singh GK. Sociodemographic predictors of pap test receipt, currency and knowledge among Australian women. *Prev Med* 2002; 35:362-8.
- Bott S, Jejeebhoy S, Shah I, Puri C. *Towards adulthood: exploring the sexual and reproductive health of adolescents in South Asia*. Geneva: WHO; 2004.
- Bradley J, Risi L, Denny L. Widening the cervical cancer screening net in a South African township: who are the underserved? *Health Care Women Int* 2004;25:227-41.

27. Lantz PM, Weigers ME, House JS. Education and income differentials in breast and cervical cancer screening: policy implications for rural women. *Med Care* 1997;35:219-36.
28. Bowman J, Sanson-Fisher R, Boyle C, Pope S, Redman S. A randomised controlled trial of strategies to prompt attendance for a Pap smear. *J Med Screen* 1995;2:211-8.
29. Eaker S, Adami HO, Sparen P. Attitudes to screening for cervical cancer: a population-based study in Sweden. *Cancer Causes Control* 2001;12:519-28.
30. Fylan F. Screening for cervical cancer: a review of women's attitudes, knowledge, and behaviour. *Br J Gen Pract* 1998;48:1509-14.
31. Ngelangel CA, Limson GM, Cordero CP, Abelardo AD, Avila JM, Festin MR. Acetic-acid guided visual inspection vs. cytology-based screening for cervical cancer in the Philippines. *Int J Gynecol Obstet* 2003;83:141-50.
32. Lacey L, Whitfield J, DeWhite W, Ansell D, Whitman S, Chen E, et al. Referral adherence in an inner city breast and cervical cancer screening program. *Cancer* 1993;72:950-5.
33. Michielutte R, Diseker RA, Young LD, May WJ. Non-compliance in screening follow-up among family-planning clinic patients with cervical dysplasia. *Prev Med* 1985;14:248-58.
34. Yabroff KR, Kerner JF, Mandelblatt JS. Effectiveness of interventions to improve follow-up after abnormal cervical cancer screening. *Prev Med* 2000; 31:429-39.
35. Kavanagh AM, Broom DH. Women's understanding of abnormal cervical smear test results: a qualitative interview study. *BMJ* 1997;314:1388-91.
36. Bradley J, Coffey P, Arrossi S, Agurto I, Bingham A, Dzuba I, et al. Women's perspectives on cervical screening and treatment in developing countries: experiences with new technologies and service delivery strategies. *Women Health* 2006. In press.
37. Al Riyami A, Afifi M, Mabry RM. Women's autonomy, education and employment in Oman and their influence on contraceptive use. *Reprod Health Matters* 2004;12:144-54.
38. Saleem S, Bobak M. Women's autonomy, education and contraception use in Pakistan: a national study. *Reprod Health* 2005;2:8. Available from: <http://www.reproductive-health-journal.com/content/2/1/8>
39. Formenti SC, Meyerowitz BE, Ell K, Munderspach L, Groshen S, Leedham B, et al. Inadequate adherence to radiotherapy in Latina immigrants with carcinoma of the cervix: potential impact on disease free survival. *Cancer* 1995;75:1135-40.
40. Naish J, Brown J, Denton B. Intercultural consultations: investigations of factors that deter non-English speaking women from attending their general practitioners for cervical screening. *BMJ* 1994;309:1126-8.