

## Effectiveness of two direct-mail strategies to encourage women to have cervical (Pap) smears

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### SUMMARY

The aim of this study was to assess the acceptability, utilisation and differential effectiveness of two direct-mail strategies for increasing community Papanicolaou (Pap) smear rates. The two strategies were: a personally addressed letter containing simple information about Pap smears and a personally addressed letter combined with a series of targeted behavioural prompts designed to address a number of aspects of screening which previous research had shown to be associated with poor screening rates. The two strategies were assessed in two geographically separated postal regions in Australia. Each region represented approximately 1000 women aged 18–70 years. Outcome data on the change in regional Pap smear rates were obtained from government health

insurance claims for cervical screening and from pathology service records. Both interventions resulted in statistically significant increases in attendances for screening over the post-intervention period: 42.2% in the region receiving the simple prompt and 39.6% in the region receiving the multi-faceted approach. There was no significant difference between the two intervention regions. The results indicate that direct-mail strategies can be effective in prompting attendance for cervical cancer screening. Furthermore, it would appear that a simple informational strategy can be at least as effective as a more elaborate package. Both interventions resulted in similar increases in attendances of around 40%.

*Key words:* cervical cancer screening; direct mail; Papanicolaou smears

### INTRODUCTION

In recent years, there has been an increasing recognition of the need to develop effective ways to encourage women to have regular Papanicolaou (Pap) smears (Eardley *et al.*, 1985). Estimates of screening rates indicate that, despite widespread acceptance of the Pap smear as a means to detect pre-cancerous changes in endocervical cells, and thereby allow prevention of cervical cancer (Fisher and Eckhart, 1989), many women are still not regularly screened. In a recent study undertaken in the United States of America, only 78% of women aged  $\geq 25$  years had been screened three or more times in the past 15 years (Cohen and Hammerstrand, 1989). Even lower

rates have been reported for other settings (Ross, 1989). In Australia, it is estimated that less than 70% of at-risk women have had a smear in the past 3 years (Australian Board of Statistics (ABS), 1992; Armstrong *et al.*, 1986; Mitchell and Medley, 1987; Shelley *et al.*, 1990; Bowman, 1991). Screening rates are lowest in those age ranges which are most at risk of developing cervical carcinoma (40–69 years) (Armstrong *et al.*, 1986; Mitchell and Medley, 1987; Shelley *et al.*, 1990; Bowman 1991). Current approaches to screening have not resulted in optimal screening patterns, and alternative strategies are required.

One approach which has been suggested is the

sending of regular reminder letters (Smith *et al.*, 1989; Australian Health Ministers' Advisory Council (AHMAC), 1991). Research into the factors associated with non-attendance for cervical cancer screening indicates that many women forget when their next smear is due (Hill *et al.*, 1985; AHMAC, 1991; Bowman, 1991). Therefore, reminders could be an effective strategy for promoting regular screening. In some settings, the use of reminder letters has resulted in high screening rates (Laara *et al.*, 1987; Wilson and Leeming, 1987; Havelock *et al.*, 1988; Pierce *et al.*, 1989; Robertson *et al.*, 1989). However, for many countries, there are major problems with establishing an accurate and comprehensive data-base of all eligible women, and identifying women who are due for a Pap smear (Bowling and Jacobson, 1989; Mitchell, 1990).

In the absence of means to identify unscreened women, remaining options for comprehensive reminder mechanisms include generalised prompts such as direct-mail strategies. Direct-mail strategies are recognised as one of the most effective mass media channels (Green *et al.*, 1980). They appear to act by increasing knowledge and awareness through the provision of simple information, reinforcing existing attitudes, and prompting behaviour change. Direct-mail strategies may be useful when there are favourable attitudes towards the target behaviour, and when the desired behaviour is simple and concrete, requiring a short-term infrequent response (Green *et al.*, 1980). Thus, direct-mail strategies would appear to be particularly suitable for the promotion of screening for cervical cancer. Surveys of women's knowledge and attitudes show that the majority of women are aware of the importance of regular Pap smears and see them as being worthwhile (Bowman, 1991; Shelley, 1991). Also, the target behaviour, attending for screening, is concrete and simple requiring a prompt, isolated response.

Direct-mail strategies have been used to encourage participation in other health-related behaviours such as smoking cessation programmes (Schmid *et al.*, 1989), weight-loss programmes (Schmid *et al.*, 1989), screening for hypertension (Murray *et al.*, 1989), and mammographic screening for breast cancer (AHMAC, 1990; Hurley *et al.*, 1992). Direct-mail may also be effective in promoting screening for cervical cancer. Mitchell *et al.* (1991) sent letters about cervical screening to 2000 Australian women randomly selected from the electoral roll. Women who received a letter were 1.61 times as likely to

be screened as women in the control region; an estimated 3% of all eligible women (who had not had a Pap smear in 2 years) were screened in response to the campaign.

However, for many women a simple prompt may not be sufficient to overcome other commonly reported barriers to participation. Previous research reveals that women may fail to attend for Pap smears for a variety of other reasons including embarrassment (Hill *et al.*, 1985; King, 1987; AHMAC, 1991; Bowman, 1991; Cockburn *et al.*, 1985); discomfort during the procedure (Hill *et al.*, 1983; Bowman, 1991); not knowing enough about Pap tests (Bowman, 1991; Cockburn *et al.*, 1992); and being unable to find a suitable provider (Smith *et al.*, 1989; Bowman, 1991). Theoretical models of health behaviour change emphasise that health behaviours are influenced by several factors (Green *et al.*, 1980). Consequently, any plan to change behaviour should adopt a multi-faceted approach (Green *et al.*, 1980). This would suggest that a simple mail prompt might not be adequate. A more comprehensive mail strategy, which deals with a range of barriers, may be required.

The aim of this study was to assess the acceptability, utilisation and differential effectiveness of two direct-mail strategies for increasing community Pap smear rates. The strategies were designed to encourage women who had not had a Pap smear in the past year to attend for screening. (At the time this study was conducted, the New South Wales (NSW) State Cancer Council recommended annual Pap smears. More recently, a national screening policy of biennial screening has been adopted (AHMAC, 1991).) The two strategies were: (i) a personally addressed letter containing simple information about Pap smears and (ii) a multi-faceted approach incorporating a personally addressed letter, and a series of targeted behavioural prompts designed to address a number of aspects of screening which previous research had shown to be associated with poor screening rates (Hill *et al.*, 1985; King, 1987; AHMAC, 1991; Bowman, 1991; Cockburn *et al.*, 1992). The second strategy incorporates a number of tactics which have been associated with increased likelihood of behaviour change, including targeting of the intervention strategy, compliance aiding strategies, and counselling strategies used when preparing people for potentially threatening interventions (Peck and King, 1986; Ley, 1989). The value of these tactics when used as one-to-one health education tech-

niques is well accepted. However, modification of these tactics for use in a direct-mail package for cervical cancer screening is quite novel, and their impact in this medium is unknown.

## METHOD

### Study design

The effectiveness of each strategy was assessed using a multiple group time-series design (Windsor *et al.*, 1984) involving three postal regions in NSW, Australia. Each region represented approximately 1000 women aged 18–70 years, giving a total eligible population of 3640. The regions were chosen to be representative of the Australian population and were matched as closely as possible (using Australian Bureau of Statistics Census data) for age, sex, socio-economic class, ethnicity and size of the target population. To avoid contamination between the intervention groups, three geographically separate regions were selected for the study. Each region was randomly assigned to receive one of the two intervention strategies, or to act as a control.

### The mailing list

The mailing list was derived from the electoral register. The electoral register was chosen since it is the most accurate and accessible data base available for use in the Australian context. The register is maintained by the Australian Electoral Commission and is used in the conduct of all government elections. Enrolment is compulsory for all eligible individuals. Eligibility is dependent upon being aged  $\geq 18$  years and holding Australian citizenship (or being a British subject, enrolled prior to 26 January 1984). Information contained on the register includes the individual's name, address, gender, occupation, date of birth, date of registration, as well as information relevant to the conduct of elections (Commonwealth Electoral Act (CEA), 1918, 1990). A previous evaluation of the value of the register as a means to reach women in the target group indicated that 82% of women who had not had a Pap smear within a 3-year period could be located on the Australian electoral register (Bowman and Byles, unpublished data).

### The strategies

All women in the two intervention regions, who appeared on the electoral register and who were

aged between 18 and 70 years at the time of the study, were sent one of two direct-mail strategies designed to encourage unscreened women to have a Pap smear: (i) a personalised letter containing simple information about Pap smears; and (ii) a multi-faceted approach incorporating a personalised letter and a series of behavioural prompts. Each strategy is described in detail below.

#### *Intervention region 1: simple information*

This intervention consisted of a personally addressed letter which provided: (a) basic information about Pap smears and why they are important; (b) information on screening eligibility and frequency; (c) advice to have a Pap smear if more than 1 year had elapsed since their last smear (or if they had never been screened); (d) a lists of local service providers (including general practitioners, female providers, and free services); (e) an invitation to enrol with the NSW State Cancer Council's free Pap Smear Reminder Service. The letter was sent on behalf of the NSW State Cancer Council, a recognised local cancer authority. It was anticipated that the credibility of a letter from this source would be high. Assessment of the readability of the letter using the Flesch formula (Flesch, 1948) indicated that at least 90% of the population should be able to comprehend the content (Levy, 1988) (reading ease score: 67).

#### *Intervention region 2: multi-faceted approach*

In addition to the letter described above, women in this region also received a multi-faceted intervention package designed to address a number of factors associated with screening behaviour. The package included a set of five prompt cards (Figure 1) which were designed to assist women in overcoming commonly reported barriers to screening, including forgetting to make an appointment (Hill *et al.*, 1985; AHMAC, 1991; Bowman, 1991), feeling uncomfortable about asking for a test (Hill *et al.*, 1985; Bowman, 1991), finding the test unpleasant (Hill *et al.*, 1985; King, 1987; AHMAC, 1991; Bowman, 1991; Cockburn *et al.*, 1992), not knowing enough about Pap tests, and not knowing where to go to have a Pap test (Bowman, 1991). The cards employed strategies which have been shown to be associated with increased likelihood of behaviour change: targeting of the intervention strategy, compliance aiding strategies and counselling strategies used in preparation for

<b>5 Reasons why women don't have Pap tests</b> <b>Do any of these apply to you?</b>		
<b>1</b>	<p><b>"I always forget to make an appointment"</b></p> <p>Place this card by the phone to remind you</p>	<p style="text-align: center;"><b>Ring and make an appointment for a Pap test</b></p> <p>Doctor's Phone Number .....</p> <p>Appointment:                      Day .....</p> <p style="margin-left: 200px;">Date .....</p> <p style="margin-left: 200px;">Time .....</p>
<b>2</b>	<p><b>"I don't feel comfortable asking for a Pap test"</b></p> <p>Take this card along to your doctor or clinic</p>	<p style="text-align: center;"><b>"I would like to protect myself against cervical cancer by having regular Pap tests"</b></p> <p>My last Pap test was on .....</p> <p>My next Pap test is due on .....</p>
<b>3</b>	<p><b>"I find having a Pap test unpleasant"</b></p> <p>Put this card where you will read it before you have your Pap test (in your purse; in your car)</p>	<p style="text-align: center;"><b>Pap tests do not need to be unpleasant</b></p> <ul style="list-style-type: none"> <li>• Have the test done by someone you feel comfortable with</li> <li>• Tell them if you feel anxious</li> <li>• Ask them to tell you what is happening</li> <li>• Tell them if it is uncomfortable at any time</li> <li>• Try doing some deep breathing to help you relax</li> </ul>
<b>4</b>	<p><b>"I've never had a Pap test before"</b></p> <p>Put this card by the phone to remind you to find out more about Pap tests</p>	<p style="text-align: center;"><b>A Pap test is an important way to protect yourself against cervical cancer</b></p> <p>Read the enclosed pamphlet today</p> <p>For more information:</p> <ul style="list-style-type: none"> <li>• ask your local doctor</li> <li>• talk to your friends</li> <li>• ring the NSW Cancer Council toll free (008) 422 760</li> </ul>
<b>5</b>	<p><b>"I don't know where to go to have a Pap test"</b></p> <p>Put this card by the phone</p>	<p style="text-align: center;"><b>Pap tests are done by</b></p> <ul style="list-style-type: none"> <li>• your local doctor (Phone .....</li> <li>• your gynaecologist</li> <li>• Community Health Centre (Phone .....</li> </ul>

Figure 1: Prompt cards.

potentially threatening interventions (Peck and King, 1986; Ley, 1988), see Figure 1.

## MEASURES AND ANALYSES

### Intervention effectiveness

The effectiveness of each intervention was assessed by comparing the change in attendance for cervical screening in the intervention regions with the change observed in the control region.

#### Attendances for cervical screening

For each region, the number of women who attended for cervical screening was assessed from two sources:

- (i) For each selected region, Health Insurance Commission (HIC) claims for cervical cytology services were analysed to determine the number of women lodging a claim each month for the 3 years 1987, 1988 and 1989. It has been estimated that >90% of cervical smears performed in NSW appear in these data (Shelley *et al.*, 1990).
- (ii) The HIC claims did not include smears taken by hospital clinics, or health screening services (Department of Community Services and Health (DCSH), 1987). To account for this, the number of smears taken by these service providers which were not charged to the HIC, was obtained from the centralised pathology service used by these groups. Separate data were obtained for each

selected region. These data were added to the monthly attendances calculated from HIC records.

Data were provided by date of service provision, not by date of processing and, therefore, reflect the time of attendance for a Pap smear.

#### Assessing the change in attendances

For each region, the change in attendances for cervical screening was assessed by comparing the attendance values which would be expected had the interventions not occurred (expected values) with the actual attendance values for the post-intervention quarter (observed values). The statistical significance of the difference between observed and expected values was assessed from the Z statistics (Armitage and Barry, 1987).

Expected values were calculated using a contingency table approach (Harden *et al.*, 1985). The details of this approach are provided in Table 1.

The differential effect of each intervention was assessed by comparing the between-pair differences in observed and expected attendance values. This allows assessment of the effect of each intervention relative to the control, and the differential impact of the two interventions.

#### Assessing the proportion of eligible women who attended in response to the intervention

While the analyses described above assess the change in the number of women who attended for Pap smears, they provide no information on the

**Table 1:** Contingency table approach for calculating expected values for the post-intervention quarter (July–September 1989)

Year/quarter	Jan–Mar	Apr–June	July–Sept	Oct–Dec	Annual total
1987					
1988					
1989			Post-intervention quarter		(b) Total 89
Total 1987–89			(a) Quarterly Total 87–89		(c) Annual Total 87–89

The rows of the table represent the year, the columns of the table represent the quarter, and the numbers in the cells are the number of women who attended for cervical screening. An initial estimate of the expected number of attendances for the post-intervention quarter (July–September 1989) was determined by multiplying the column total (a) by the row total (b) and dividing by the table total (c). Based on these estimates, the row and column totals were updated. The expected value was then recalculated using the updated values to obtain a more accurate estimate. The procedure was repeated until the difference between consecutive estimates was very small.

*Note:* This method assumes that attendance values for the October–December quarter of 1989 will not be affected by the intervention. If values remain elevated during this period, the expected values for July–September 1989 will be exaggerated. This may lead to an underestimate of the intervention effect.

significance of the effects on a community scale. Large increases in the number of attendances for screening may reflect attendance by only a small proportion of the total target population. For instance, if the expected attendance value was 50 women, then attendance by an additional 25 women would represent a 50% increase. However, if there were 1000 women in the target population, then these 25 women would represent only 2.5% of all women. At a population level, the impact of the programme would be minimal.

In order to gauge the magnitude of benefit of each intervention, the proportion of women in each community who were screened in response to the campaign was estimated. The estimate was based on the pre- to post-intervention increase in the proportion of women aged 18–69 years who had lodged at least one claim for cervical cytology over the previous 3 years. The total number of women aged 18–69 years, with adjustment for an estimated hysterectomy rate of 15%, was used as a denominator. The adjustment was based on previous estimates of the prevalence of hysterectomy among Australian women (Dickinson *et al.*, 1988; Bowman, 1991; ABS, 1992).

#### Acceptability of the interventions

One month after distribution of the intervention strategies, a random sample of 650 women from the electoral register for each intervention region was sent a questionnaire. The questionnaire was designed to collect information on the following domains:

- (i) *Basic demographic details*: date of birth, country of birth, aboriginality, level of

education, employment status, occupation and marital status.

- (ii) *Recall of receipt of interventions*: women were asked whether they had received a letter in the past month, whether they read this letter, whether they received some cards with the letter and whether they received a pamphlet with the letter.
- (iii) *Acceptability of the intervention strategies*: in order to assess the acceptability of a personalised letter, women were asked to indicate how they felt about having the letter addressed to them. Women were also asked to indicate whether they thought that the letter/information package should be sent to women in general. For each item, the response was recorded on a five-point Likert scale (Likert, 1932) which included a 'not sure' option.

One month after distribution of the questionnaire, non-responders were sent a reminder notice, followed up by a telephone call. To control for the prompting effect of the questionnaire and follow-ups, a random sample of 650 women enrolled on the electoral register for the control region underwent the same survey procedures described above.

## RESULTS

### Intervention effectiveness

#### *The change in attendance for cervical screening*

Observed and expected attendance values for the 3-month post-intervention period are presented in Table 2.

**Table 2:** Observed and expected attendance values for the 3-month post-intervention period

Region	No. women expected to attend (% of target population <sup>a</sup> )	No. women observed to attend (% of target population <sup>a</sup> )	Percentage increase in attendance $\left(\frac{\text{obs}-\text{exp}}{\text{expected}}\right)$	Percentage point increase $\left(\frac{\text{obs}-\text{exp}}{\text{target pop}^a}\right)$	Z	p
Control (n = 1202 <sup>a</sup> )	96 (8.0%)	97 (8.1%)	1.04%	0.1%	0.17	0.87
Intervention region 1 (n = 959 <sup>a</sup> )	69.5 (7.2%)	99 (10.3%)	42.4%	3.1%	3.47	<0.0001 <sup>b</sup>
Intervention region 2 (n = 933 <sup>a</sup> )	68.1 (7.3%)	95 (10.2%)	39.6%	2.9%	3.2	<0.0001 <sup>b</sup>

<sup>a</sup> Adjusted for estimated hysterectomy rate of 15%.

<sup>b</sup> Statistically significant ( $p < 0.0001$ ), 2-tailed test.

In the control region, it was expected that 96 women would attend during July–September 1989 (8.0% of the target population). Observed attendances were not significantly different to expected ( $Z = 0.17$ ;  $p = 0.87$ ). This indicates that the described method provides a reasonable means to predict expected values. In each intervention region, the total number of claims observed over the 3-month post-intervention period was significantly greater than the expected values. In the region receiving the simple prompt (Intervention region 1), there was a 42.4% increase in the number of women attending for a Pap smear ( $Z = 3.47$ ;  $p < 0.0001$ ). In the region receiving the multi-faceted strategy (Intervention region 2) there was a 39.6% increase ( $Z = 3.2$ ;  $p < 0.0001$ ). Changes in both intervention regions were significantly different to the change in the control region (Intervention region 1/control:  $Z = 2.35$ ;  $p = 0.019$ , 2-tailed test. Intervention region 2/control:  $Z = 2.18$ ;  $p = 0.03$ , 2-tailed test). There was no difference between the two intervention regions ( $Z = 0.142$ ;  $p = 0.2$ , 2-tailed test).

These results suggest that both interventions were effective in increasing screening rates. However, the proportion of the target population who attended in response to the interventions (percentage point increase) was small (~3% of the target population).

#### *The proportion of eligible women who attend*

The change in the proportion of women who had had a smear in the past 3 years is presented in Table 3.

In Intervention region 1, an additional 2.3 women were screened for every 100 women in the target population (95% CI: 1.35–3.25). In Intervention region 2, an additional 2.15 women per 100 were screened (95% CI: 1.22–3.08). There was no increase in screening in the control region. These increases represent 5.7% of all eligible (unscreened or overdue) women in Intervention region 1 and 5.5% of all eligible women in Intervention region 2.

#### **Acceptability of the interventions**

Of the 1300 questionnaires which were distributed to the two intervention groups, 65 were returned as 'no longer at this address'. Telephone follow-up revealed a further 14 women who had moved from the address, leaving an effective sample of 1221. A further 297 (23%) of the study population had no registered telephone number. Only 384 (31%) of the 1221 eligible questionnaires were returned (213 from Intervention region 1; 171 from Intervention region 2).

The characteristics of survey respondents were compared with 1986 census data for women in these regions. Older women, women who left school prior to year 10, divorced, widowed or separated women, and women who had never been married were under-represented by the survey respondents. Young women, women with tertiary qualifications and married women were over-represented. The proportion of respondents who had had a hysterectomy was consistent with prevalence estimates from other surveys (Dickinson *et al.*, 1988; SNW State Cancer Council Education Research Project, 1988–1989; Bowman,

**Table 3:** Proportion of women who had had a Pap smear in the past 3 years, women aged 18–69 years

Region/ total women 18–69 years	Target population <sup>a</sup>	June 1989 (Pre-intervention) <i>n</i> (% of target population)	September 1989 (3 months post-intervention) <i>n</i> (% of target population <sup>a</sup> )	Population coverage (95% CI)	Effectiveness index <sup>b</sup>
Control <i>n</i> = 1414	1202	886 (73.72%)	879 (73.13%)	—	—
Intervention region 1 <i>n</i> = 1128	959	575 (59.97%)	597 (62.27%)	2.30% (1.35–3.25)	5.7%
Intervention region 2 <i>n</i> = 1098	933	570 (61.07%)	590 (63.22%)	2.15% (1.22–3.08)	5.5%

<sup>a</sup> Adjusted for estimated hysterectomy rate of 15%.

<sup>b</sup> Effectiveness index (the population of unscreened or overdue women who were screened during the intervention period):  $EI = (P_2 - P_1)/(100 - P_1)$ . Where  $EI$  = the effectiveness of index;  $P_1$  is the percentage of the population who had been screened prior to the intervention period, and  $P_2$  is the percentage who have been screened at the end of the post-intervention period (after Green, 1986).

1991; Schofield *et al.*, 1991; ABS, 1992; Santow and Bracher, 1992).

Recall of receipt and utilisation of the intervention is presented in Table 4. In the region receiving the simple prompt (Intervention region 1), 72% of respondents (154 women) reported that they had received the letter and 69% (147 women) said that they had read it (95% of those who recalled receipt). In the region receiving the multi-faceted strategy (Intervention region 2), 78% of respondents (134 women) said they had received the letter, and 75% (128) of women had read it (86% of those who recalled receipt). Fifty-eight per cent of respondents from Intervention region 2 (100 women) reported that they had received the cards, but only 4% of respondents (7 women) said that they had used them. Sixty-four per cent of respondents (109 women) reported that they had received the pamphlet, and 59% of respondents (101 women) said they had read it.

Acceptability of the interventions is presented in Table 5. Only one respondent from Intervention region 1 (1%) and three respondents from Intervention region 2 (2%) said that they were displeased or very displeased to receive the letter. Nearly all respondents agreed that such letters

should be sent to all women (>95% from each region).

## DISCUSSION

This study explored the acceptability, utility and differential effectiveness of two direct-mail strategies designed to encourage women to attend for cervical cancer screening. The results suggest that the interventions were acceptable to women. Of the women who responded to the survey, only four reported that they were displeased or very displeased to receive the letter. However, women who felt that the interventions were unacceptable may have been less likely to respond to the survey. Similarly, while a high proportion of women said they read the letter, women who didn't read it may have been less likely to respond to the survey. In contrast, to the high reported use of the letter, very few women (4%) said they used the cards. This additional component did not appear to be of use to the majority of women in the study (even taking the poor response rate into account).

The effectiveness of the interventions was tested on a population basis, under the actual con-

**Table 4:** Recall of receipt of the interventions

	Intervention region 1 ( <i>n</i> = 213)		Intervention region 2 ( <i>n</i> = 171)	
	<i>n</i>	%	<i>n</i>	%
Received letter	154	72	134	78
Read letter	147	69	128	75
Received cards	NA		100	58
Used cards	NA		7	4
Received pamphlet	NA		109	64
Read pamphlet	NA		101	59

NA, not applicable.

**Table 5:** Acceptability of the interventions

	Intervention region 1	Intervention region 2
How did you feel about having this sort of letter addressed to you personally?	<i>n</i> = 151	<i>n</i> = 132
Pleased	118 (78%)	89 (68%)
Displeased	1 (1%)	3 (2%)
Not sure	32 (21%)	40 (30%)
In general, do you think that is something which should be sent to all women?	<i>n</i> = 155	<i>n</i> = 130
Yes, definitely/probably	152 (98%)	124 (95%)
Not sure	1 (0.7%)	5 (4%)
No, probably not/definitely not	2 (1.3%)	1 (1%)



ditions in which they would be used. A major limitation of this design is that it is less rigorous than studies where individuals are randomly allocated to intervention and control groups (Windsor *et al.*, 1984). On the other hand, there are three main advantages in using a population-based design. First, the results reflect the impact which could be expected if the intervention had been implemented as part of a public health programme. Second, the potential for control group contamination was minimised since the groups were geographically separate. Third, randomisation by group allowed objective and comprehensive outcome data to be obtained (based on residential postcode). This data was not available for individual women (DCSH, 1987). To enhance the strength of evidence from this study, the three groups were matched on demographic characteristics, regions were randomly allocated to intervention or control conditions, and time-series data were used to predict the attendances which were expected in the absence of an intervention. This type of design has been identified as the most rigorous other than a randomised controlled trial (Windsor *et al.*, 1984).

To increase the comparability of the intervention and control regions, regions were selected to be demographically similar. Ideally, they should also have been matched on baseline screening rates. However, this was not possible as the relevant data were unavailable when the study commenced. From Table 3 there is evidence that the control region had higher screening rates at baseline. Theoretically, unscreened women from the control region could have been harder to influence than unscreened women from the intervention regions (Horland *et al.*, 1949; Green, 1986). Therefore, the change in screening in the control region was likely to be less significant than in regions where the baseline was low.

Interpretation of the results of the study is limited by the short follow-up period. Longer term follow-up was restricted by a regional media campaign, which was screened in all regions in October 1989. This campaign would have obscured the impact of the interventions, as well as contaminating the control group. However, it would be expected that maximum response to the interventions would occur within the first 3 months.

The results suggest that simple direct-mail strategies may be effective in prompting attendance for cervical cancer screening. In contrast to

the control region, significant increases in the number of women attending for a Pap smear were observed in the regions receiving a direct-mail intervention. Furthermore, it would appear that a simple informational strategy can be at least as effective as a more elaborate package. Both interventions were associated with statistically similar increases in attendances, and an equivalent magnitude of benefit with ~20 additional women screened for every 1000 women in the target population.

The failure of the multi-faceted approach to achieve a better response than the simple prompt could be interpreted in a number of ways. It is possible that the elaborate package was too complex and the simple message was obscured. Alternatively, the elaborate package may have failed in its attempt to address additional barriers such as feeling uncomfortable about asking for a Pap test, finding the test unpleasant, and not knowing enough about Pap smears. Perhaps these barriers are too complex to address adequately through written information. Face-to-face communication may be required for particular women who are difficult to recruit. A third possibility is that these reported barriers may not have any functional significance, and women may remain unscreened even when these barriers have been removed. Further research is required to explore the relative importance of these barriers, and means to address them.

As well as producing an increase in the number of women who attended for a Pap smear, both of the interventions were associated with an increase in the proportion of women who had had a smear in the past 3 years. This is an important consideration when assessing intervention effectiveness. Demonstration of a short-term increase in attendances for Pap smears is, on its own, inadequate since this increase may merely reflect a change in the timing of presentation by regular screeners. An intervention which increases demand for Pap smears without altering the triennial screening rate will do little to enhance efforts to prevent cervical cancer. In fact, such programmes are likely to be detrimental to preventive efforts since they place an additional burden on the health care system leaving less resources for screening women in need. Thus, evidence of success in encouraging screening by previously unscreened or overdue women is fundamental to establishing the effectiveness of any intervention to promote screening for cervical cancer.

In this study, the increase in the proportion of women screened (population coverage) was small (~2% of women in the target age range). However, it is important to remember that these women have been hard to reach through the existing system, for whatever reason, be it that they were never offered screening, or that they refused screening when it was offered. If the results of this study were extrapolated to the target group for all of NSW, then a state-wide programme, in which every woman in NSW was sent a simple letter about Pap smears would result in an additional 40 000 women having Pap smears. However, since each intervention has only been tested in one community, such an extrapolation may not be valid. Individual community factors, such as availability, accessibility and acceptability of services, may significantly influence the capacity of women to respond to the intervention. Such factors are likely to vary greatly between communities. In order to gain a better indication of the magnitude of effect which could be achieved by such a programme, the intervention should be tested in a greater number of communities.

Another important consideration in assessing the benefit of any health campaign is its cost-effectiveness. This study did not allow for assessment of the costs of widespread implementation of a direct-mail strategy. The per capita costs involved in producing and disseminating letters in this trial would far exceed the per capita costs of implementing the strategy on a regional, state or national basis. However, considering postal costs alone, current costs for posting a single page letter to 1000 women would be around \$A450.00, a cost of around \$A22.50 per additional woman screened. This cost must be considered against the value of screening, in both economic and human terms, and against the costs of alternative screening promotion strategies. Further evaluation of the differential cost-effectiveness of direct-mail in comparison to other promotional strategies is required.

Another important aspect of the effectiveness of any promotion campaign is the impact of the campaign on individuals who are at highest risk of developing the target disorder. Ideally, a cervical cancer screening programme would be maximally effective in encouraging screening by older women, women of lower socio-economic status, and women who have not had a smear in the past 3 years. In this study, the size of the target population did not allow analysis of the differential impact of the programme on women of differing

age or socio-economic groups. Women who were most likely to be at risk of cervical cancer were under-represented by the survey respondents. The reasons for this are unclear. It may be that the electoral register, which was used as the sampling frame, was not accurate for women in these categories. If this is true, an alternative database is required to provide access to these women. More likely, women in these groups may be less inclined to respond to items received in the mail. In any case, the impact of the intervention for these groups of women remains unexplored. Further investigation of the value of direct-mail strategies in promoting screening by women at high risk should be undertaken.

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#### REFERENCES

- Armitage, P. and Barry P. (1987) *Statistical Methods in Scientific Research*, 2nd edn. Blackwell Scientific Publications, Oxford.
- Armstrong, B. K., Rouse, I. L. and Butler, T. L. (1986) Cervical cytology in Western Australia: frequency, geographical distributions and providers of the service. *Medical Journal of Australia*, **144**, 239-247.
- Australian Health Ministers' Advisory Council (1990) Breast Cancer Screening Evaluation Steering Committee. Breast cancer screening in Australia. Future directions. Australian Government Publishing Service, Canberra.
- Australian Health Ministers' Advisory Council (1991) Cervical Cancer Screening Evaluation Steering Committee. Cervical cancer screening in Australia: options for change. Australian Institute of Health: Prevention Program Evalua-

- tion Series no. 2. Australian Government Publishing Service, Canberra.
- Australian Bureau of Statistics (1992) 1989-90 National Health Survey, Screening for Breast and Cervical Cancer, Australia, Catalogue no. 4378.0. Australian Government Publishing Service, Canberra.
- Bland, M. (1987), *An Introduction to Medical Statistics*. Oxford University Press, Oxford.
- Bowling, A. and Jacobson, B. (1989) Screening: the inadequacy of population registers. *British Medical Journal*, **298**, 545-546.
- Bowman, J. A. (1991) Screening for cancer of the cervix: barriers to utilisation and strategies for promotion. Doctoral dissertation. University of Newcastle, NSW.
- Cockburn, J., White, V. M., Hirst, S. and Hill, D. (1992) Barriers to cervical screening in older women. *Australian Family Physician*, **21**, 973-978.
- Cohen, M. M. and Hammerstrand, K. M. (1989) Papanicolaou test coverage without a cytology registry. *American Journal of Epidemiology*, **129**, 388-394.
- Commonwealth Electoral Act 1918 (1990) Reprint no. 3. Australian Government Publishing Service, Catalogue no. 89 68907.
- Department of Community Services and Health (Australia) (1987) Notes on statistics relating to services rendered for which Medicare benefits were paid. Medical Statistics Section, Canberra.
- Dickinson, J. A., Leeder, S. R. and Sanson-Fisher, R. W. (1988) Frequency of cervical smear tests among patients of general practitioners. *Medical Journal of Australia*, **148**, 128-131.
- Eardley, A., Elkind, A., Spencer, B., Hobbs, P., Pendleton, L. and Harna, D. (1985) Attendances for cervical screening—whose problem? *Social Sciences and Medicine*, **20**, 952-962.
- Fisher, M. and Eckhart, C. (eds) (1989) Guide to Clinical Preventive Services: an assessment of the effectiveness of 169 interventions. Report of the US Preventive Services Task Force. Williams and Wilkins, Baltimore.
- Flesch, R. (1948) A new readability yardstick. *Journal of Applied Psychology*, **32**, 221-233.
- Green, L. (1986) Health education strategies and approaches to evaluation in community and mass media. In Crofton, I. and Wood, M. (eds) *Smoking Control: Strategies and Evaluation in Community and Mass Media Programmes. Report of a Workshop*. Health Education Council, London.
- Green, L. W., Kreuter, M. W., Deeds, S. G. and Partridge, K. B. (eds) (1980), *Health Education Planning, A Diagnostic Approach*. Mayfield, Palo-Alto, CA, chapter 6, pp. 91-92.
- Hakama, M. and Miller, A. B. (eds) (1986) *Screening for Cancer of the Uterine Cervix. Report from the IARC Working Group on Cervical Cancer Screening and the UICC Project Group on the Evaluation of Screening Programmes for Cancer*. IARC Scientific Publications, Lyon.
- Hardes, G., Gibberd, R. W., Lam, P., Callcott, R., Dobson, A. J. and Leeder, S. R. (1985) Effects of random breath testing on hospital admission due to traffic accident casualties in the Hunter region of NSW. *Medical Journal of Australia*, **142**, 625-626.
- Havelock, C. M., Webb, J. and Queenborough, J. (1988) Preliminary results of a district call scheme for cervical screening organised in general practice. *British Medical Journal*, **297**, 1384-1386.
- Hill, D., Gardner, G. and Rassaby, J. (1985) Factors predisposing women to take precautions against breast and cervix cancer. *Journal of Applied Social Psychology*, **15**, 59-79.
- Horland, C., Lumsdane, A. and Sheffield, F. (1949) *Experiments on Mass Communication*. Princeton University Press, Princeton, NJ.
- Hurley, S. F. (1990) Screening: The need for a population register. *Medical Journal of Australia*, **153**, 310-311.
- Hurley, S. F., Jolley, D. J., Livingston, P. M., Reading, D., Cockburn, J. and Flint-Richter, D. (1992) Effectiveness, costs and cost-effectiveness of recruitment strategies for a mammographic screening program to detect breast cancer. *Journal of the National Cancer Institute*, **84**, 855-863.
- King, J. (1987) Womens' attitudes towards cervical smears. *Update*, **34**, 160-168.
- Laara, E., Day, N. E. and Hakama, M. (1987) Trends in mortality from cervical cancer in the Nordic countries: association with organised screening programmes. *Lancet*, **i**, 1247-1249.
- Ley, P. (1988) *Communicating with Patients: Improving Communication, Satisfaction and Compliance*. Croom Helm, London.
- Likert, R. (1932) A technique for the measurement of attitudes. *Archives of Psychology*, **140**, 1-55.
- Mitchell, H. (1990) Reminder letter for women when repeat Pap smears are due. *Community Health Studies*, **14**, 126-131.
- Mitchell, H. and Medley, G. (1987) Age trends in Pap smear usage. *Community Health Studies*, **11**, 183-185.
- Mitchell, H., Hirst, S., Cockburn, J., Reading, D. J., Staples, M. P. and Medley, G. (1991) Cervical cancer screening: a comparison of recruitment strategies among older women. *Medical Journal of Australia*, **155**, 79-82.
- Murray, D. M., Kurch, C. L., Finnegan, J. R., Pirie, P. L., Admire, J. B. and Luepker, R. V. (1988) Direct mail prompt for follow-up care among persons at risk for hypertension. *American Journal of Preventive Medicine*, **4**, 331-335.
- New South Wales State Cancer Council (1990) *Annual Report, 1898-90*. NSW State Cancer Council, Sydney.
- NSW State Cancer Council Education Research Project (1988-89) Newcastle Health Survey, University of Newcastle. Unpublished data.
- Peck, C. and King, N. L. (1986) Medical compliance. In King, N. L. and Remenyi, A. (eds) *Health Care: A Behavioural Approach*. Grune & Stratton, Sydney.
- Pierce, M., Lundy, S., Palanisamy, A., Winning, S. and King, J. (1989) Prospective randomised controlled trial of methods of call and recall for cervical cytology screening. *British Medical Journal*, **299**, 160-162.
- Robertson, A. J., Reid, G. S., Stoker, C. A., Bissett, C., Waugh, N., Fenton, I., Rowan, J. and Halkerston, R. (1989) Evaluation of a call programme for cervical cytology screening in women aged 50-60. *British Medical Journal*, **299**, 163-166.
- Ross, S. K. (1989) Cervical cytology screening and government policy. *British Medical Journal*, **299**, 101-104.
- Stantow, G. and Bracher, M. (1992) Correlates of hysterectomy in Australia. *Social Science and Medicine*, **34**, 929-942.
- Schofield, M. J., Hennrikus, D. J., Redman, S. and Sanson-Fisher, R. W. (1991) Prevalence and characteristics of women who have had a hysterectomy in a community survey. *Australia and New Zealand Obstetrics Journal of Gynaecology*, **31**, 153-158.
- Schmid, T. L., Jeffery, R. W. and Hellerstedt, W. L. (1989)

- Direct mail recruitment to home-based smoking and weight control programs: a comparison of strategies. *Preventive Medicine*, **18**, 503-517.
- Shelley, J., Irwig, L., Simpson, J. M. and Macaskill, P. (1990) Pap smear rates in New South Wales—1984 to 1988. *Medical Journal of Australia*, **153**, 631.
- Shelley, J. M., Irwig, L. M., Simpson, J. M. and Macaskill, P. (1991) Evaluation of a mass-media-led campaign to increase Pap smear screening. *Health Education Research*, **61**, 267-277.
- Smith, A., Elkind, A. and Eardley, A. (1989) Making cervical screening work. Better management of the system is essential. *British Medical Journal*, **289**, 1662-1664.
- Wilson, A. and Leeming, A. (1987) Cervical cytology screening: A comparison of two call systems. *British Medical Journal*, **295**, 181-182.
- Windsor, R. A., Baranowski, T., Clark, N. and Cutter, G. (1984) *Evaluation of Health Promotion and Education Programs*. Mayfield, Palo Alto, CA.