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## CLINICAL ARTICLE

## Effects of an extended free-of-fee strategy on the rate of cervical Papanicolaou smear screening in Israel

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## ABSTRACT

**Objective:** To investigate the influence of an extended free-of-fee strategy on the rate of cervical Papanicolaou (Pap) smear screening in Israel. **Methods:** A retrospective analysis was conducted of data obtained from a computer-generated list of women aged 15–74 years who attended appointments with Clalit Health Services between January 1, 2008, and November 30, 2011, during which Pap smears were taken. The basic strategy allowed a no-fee Pap smear once every 3 years between the ages of 35 and 54 years; the extended strategy allowed a no-fee Pap smear once every 3 years between the ages of 25 and 54 years. **Results:** In all, 65 565 Pap smears were taken. The mean monthly study population was 161 438 women. The mean monthly Pap smear rate for the basic strategy was  $0.64\% \pm 0.5\%$  (95% confidence interval [CI], 0.59–0.68) versus  $0.75\% \pm 0.6\%$  (95% CI, 0.70–0.79) for the extended strategy ( $P=0.004$ ). Age group ( $P<0.001$ ), Pap smear strategy type ( $P<0.001$ ), and combined age group and strategy type ( $P=0.028$ ) each predicted the monthly rate of Pap smear screening in a univariate analysis. **Conclusion:** Implementation of the extended free-of-fee strategy increased the rate of Pap smear screening among Israeli women.

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## 1. Introduction

The introduction of cervical cytology screening programs has been shown to decrease the incidence of cervical cancer [1,2]. Despite this obvious benefit, estimates indicate that approximately 50% of US women in whom cervical cancer is diagnosed have never undergone cervical cytology testing [3]. Therefore, the American Congress of Obstetricians and Gynecologists suggests that increasing screening rates among women who are currently not screened or screened infrequently may contribute to reducing the incidence, and even mortality, of cervical cancer [3]. Interventions to improve attendance of cervical cytology screening programs are generally focused on improving population-based screening initiatives [4]. One of the suggested strategies is the introduction of free or low-cost testing [4].

In Israel, cervical cytology screening is performed opportunistically using the Papanicolaou (Pap) smear test [5]. The state of Israel provides health services for all residents of the country subject to the National Health Insurance Law. Comprehensive health services are delivered by 1 of 4 independent healthcare providers (e.g. Clalit Health Services). Health insurance contributions are paid by each resident in accordance with their income and are collected by the

National Insurance Institute. Since the introduction of the National Health Insurance Law on January 1, 1995, Pap smears have been offered free of payment once every 3 years to all women aged 35–54 years [6]; furthermore, Pap smear testing with a deductible fee is available at any other age. Despite this policy, the proportion of women in Israel undergoing Pap smear screening remains very low, and it was estimated that just 12.2%–20.0% of all women aged between 20 and 70 years underwent an annual Pap smear test [7].

On February 1, 2010, Clalit Health Services extended the free-of-fee age group for cervical Pap smear screening to include all women aged 25–54 years. The purpose of the present study was to investigate the influence of this extended no-fee strategy on the rate of screening uptake among Israeli women.

## 2. Materials and methods

The present study was conducted in the Southern District of Israel among women covered by Clalit Health Services, which serves a population of approximately half a million enrollees. A retrospective analysis was performed of data obtained from a computer-generated list of medical appointments scheduled between January 1, 2008, and November 30, 2011, during which Pap smears were taken. The study protocol was approved by the Edith Wolfson Medical Center Institutional Review Board Committee, Holon, Israel (WOMC-0153-11). Informed consent was not required because individual participants could not be linked to personally identifiable data.

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Eligible participants were women aged 15–74 years. There were no exclusion criteria. Pap smears were taken by gynecologists in their clinics or in women's health centers.

Data analyzed included the patient's age, population sector (Jewish, Jewish ultra-Orthodox, or Bedouin), and area of residence (urban or rural). Big cities were defined as those having a population of more than 100 000 residents; small cities were defined as those having a population of 20 000–100 000 residents; towns were defined as urban settlements having a population of less than 20 000 residents; and villages were defined as rural settlements with a predominantly Jewish population (excluding Kibbutz). A Kibbutz was defined as a Jewish rural settlement with a collective community lifestyle. Bedouin settlements were defined as those with a predominantly Bedouin population, either in an urban or rural setting. In the Southern District of Israel, approximately 80% of the Bedouin population resides in urban settlements, while the remaining 20% live in small rural groups of tents or tin shacks.

The basic Pap smear strategy was defined as receipt a Pap smear test free of payment once every 3 years between the ages of 35 to 54 years. The extended Pap smear strategy was defined as receipt of a Pap smear test free of payment once every 3 years between the ages of 25 to 54 years. The basic Pap smear strategy was applied between January 1, 2008, and January 31, 2010 (25 months), while the extended Pap smear strategy was applied between February 1, 2010, and November 30, 2011 (22 months).

Data were analyzed using SPSS version 11.0 (IBM, Armonk, NY, USA). A Mann–Whitney test was used to compare mean Pap smear rates. A univariate analysis of variance was performed using a general linear model. The Kruskal–Wallis test was used to compare more than 2 groups or groups with ordinal dependent variables. The Bonferroni correction was used for multiple comparisons. All tests were 2-sided and a *P* value below 0.05 was considered statistically significant.

### 3. Results

The mean monthly study population during the study period was 161 438 women; a total of 65 565 cervical Pap smear tests were performed. The overall mean monthly Pap smear rate during the study period was 0.69%±0.6%. The mean monthly Pap smear rate for the basic strategy was 0.64%±0.5% (95% confidence interval [CI], 0.59–0.68) compared with 0.75%±0.6% (95% CI, 0.70–0.79) for the extended strategy (*P*=0.004). Age group (*P*<0.001), Pap smear strategy type (*P*<0.001), and combined age group and strategy type (*P*=0.028) each significantly predicted the monthly Pap smear rate in a univariate analysis of variance model.

The influence of age on the rate of Pap smear testing across strategy type is shown in Table 1. Overall, the highest rate of screening was observed among the 35–44 years age group. Following the change from the basic strategy to the extended strategy in February 2010, a significant increase in Pap smear testing was detected among the 25–34 years and 45–54 years age groups (*P*<0.001 and *P*=0.041, respectively). In addition, marginal increases were observed among the 35–44 years and 55–64 years groups, although these were not statistically significant.

**Table 1**  
Papanicolaou smear distribution rates across age groups according to strategy type.<sup>a</sup>

Age group, y	Total, %	Basic strategy	Extended strategy	<i>P</i> value <sup>b</sup>
15–24	0.30±0.22	0.29±0.21	0.31±0.23	0.239
25–34	0.98±0.48	0.82±0.43	1.13±0.48	<0.001
35–44	1.23±0.61	1.16±0.68	1.30±0.53	0.062
45–54	0.93±0.53	0.84±0.49	1.03±0.57	0.041
55–64	0.52±0.51	0.48±0.55	0.56±0.46	0.089
65–74	0.18±0.32	0.20±0.41	0.16±0.17	0.827

<sup>a</sup> Values are given as mean monthly rate±standard deviation.

<sup>b</sup> *P* values represent the difference between the basic and extended strategy periods.

**Table 2**  
Papanicolaou smear distribution rates across population sector according to age group and strategy type.<sup>a</sup>

Sector	Age group, y	Basic strategy, %	Extended strategy, %	<i>P</i> value <sup>b</sup>
Jewish	15–24	0.48±0.12	0.58±0.08	0.001
	25–34	1.27±0.20	1.63±0.18	<0.001
	35–44	1.41±0.25	1.65±0.26	0.002
	45–54	1.20±0.20	1.33±0.22	0.039
	55–64	0.68±0.14	0.81±0.16	0.011
Jewish ultra-Orthodox	65–74	0.27±0.07	0.37±0.08	<0.001
	15–24	0.24±0.26	0.17±0.21	0.475
	25–34	0.67±0.45	0.98±0.49	0.047
	35–44	1.40±0.98	1.41±0.63	0.749
	45–54	0.79±0.67	1.16±0.78	0.097
Bedouin	55–64	0.55±0.91	0.62±0.66	0.350
	65–74	0.23±0.74	0.00±0.00	0.153
	15–24	0.14±0.03	0.18±0.04	0.003
	25–34	0.52±0.11	0.77±0.17	<0.001
	35–44	0.68±0.17	0.84±0.17	0.002
	45–54	0.52±0.16	0.59±0.15	0.136
	55–64	0.20±0.11	0.23±0.10	0.701
65–74	0.12±0.10	0.11±0.10	0.449	

<sup>a</sup> Values are given as mean monthly rate±standard deviation.

<sup>b</sup> *P* values represent the difference between the basic and extended strategy periods.

Table 2 shows the influence of population sector on the Pap smear testing rates across strategy type. This parameter was found to significantly predict the monthly rate of Pap smear testing in a univariate analysis of variance (*P*<0.001). The prediction remained significant when age group was added to the model (*P*<0.001). Among Jewish women, a significant increase in Pap smear testing rates was observed for all age groups following the change from the basic strategy to the extended strategy. By contrast, a significant increase in Pap smear rates was only observed in the 25–34 years age group among Jewish ultra-Orthodox women (*P*=0.047). Among Bedouin women, a significant increase in Pap smear test rates was observed in the 15–24 years, 25–34 years, and 35–44 years age groups (*P*=0.003, *P*<0.001, and *P*=0.002).

The data were further analyzed to determine the influence of area of residence. Each area of residence differed significantly from every other area of residence in terms of the Pap smear testing rates (Table 3; *P*<0.05). The highest rate of Pap smear testing was observed in Kibbutz settlements. The Pap smear rate differences by age group also differed according to the area of residence (Table 4; *P*<0.05). In a univariate analysis of variance model, the mean monthly Pap smear rates differed significantly by area of residence, year, and age group (*P*<0.001 for all 3 parameters).

### 4. Discussion

The present study demonstrated that the overall mean monthly Pap smear test rate among Israeli women aged 15–74 years was 0.69%, equivalent to a 40% participation rate during the entire study

**Table 3**  
Papanicolaou smear distribution rates by area of residence.<sup>a,b,c</sup>

Area of residence	Distribution rate, %
Big cities	0.91±0.48
Small cities	0.76±0.42
Towns	1.30±0.64
Villages	1.00±0.59
Kibbutz settlements	1.50±0.73
Bedouin settlements	0.38±0.29

<sup>a</sup> The definitions of each area of residence are provided in the methods.

<sup>b</sup> Values are given as mean monthly rate±standard deviation.

<sup>c</sup> Each area of residence differed significantly from every other area of residence in terms of Papanicolaou smear distribution rate (*P*<0.05).

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