RESEARCH COMMUNICATION

Monitoring and Evaluation of a Model Demonstration Project for the Control of Cervical Cancer in Nakhon Phanom Province, Thailand

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Abstract

Cancer of the uterine cervix is the second most common cancer in females in the world with about half a million new patients per year. Since the introduction by Papanicolaou of cervical smear screening, the incidence of cervical cancer has declined in many developed countries. The decrease in the incidence of and mortality from cervical cancer is mainly due to the organized mass screening using Pap smear programmes. Uterine cervical cancer is the leading cancer among women in Thailand with age-standardized incidence rates of 24.7 per 100,000 in 1999. Most cases present at advanced stages with poor prognoses of survival and cure. In the present study, cervical cancer screening programme with cervical cytology was organized for Nakhon Phanom province, Thailand. The specific objectives were: 1) to evaluate the reduction in incidence and mortality from cervical cancer in the province by means of an organised low-intensity cervical cytology programme. 2) to demonstrate the different aspects of programme implementation as a potential model for nationwide implementation. The screening activities were integrated in the existing health care system. Organized screening for women in the target population (aged 35-54 years) at 5-year intervals was free of charge. Sample taking was done by trained nurses (midwives) and primary health care personnel in the local health care centers. Sample quality was under continuous controlled by the cytology laboratories and pathologists. Confirmation and treatment were integrated into the normal health care routines. The screening results of the programme, including histologically confirmed diagnosis, were registered at the National Cancer Institute using PapReg and CanReg 4 programmes. A population-based cancer registry in Nakhon Phanom province was also set up in 1997. In the period 1999-2002, 32,632 women aged 35-54 years were screened. Women with low-grade lesions returned for routine follow-up smears. High-grade preinvasive disease was further evaluated by repeating Pap smear, conization or biopsy and subsequent treatment through surgical removal or ablation. This organized low-intensity cervical cytology programme showed a considerable increase in early carcinoma *in situ* and CIN II – III cases and should reduce incidence of and mortality from cervical cancer in Nakhon Phanom province in the future. Screening with the Papanicolaou smear plus adequate follow-up diagnosis and therapy can achieve major reductions in both incidence and mortality rates.

Key Words: Demonstration project - organized screening - Pap smear – Nakhon Phanom - cervical cancer control

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Introduction

Cervical cancer continues to have a major impact on women worldwide, particularly women in developing countries including Thailand (Deerasmee and Srivatanakul,1999; Srivatanakul, 2007). It is the second most common cancer in women – affecting more than 1.4 million women worldwide (Ferlay et al., 2004). The most recent compilation of global data indicates that an estimated 493,243 new cases of cervical cancer occur annually among women worldwide. Nearly 80 percent of cases are in developing countries. Worldwide, cervical cancer takes the lives of 273,505 women annually, again with over 80 percent of these deaths occurring in

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developing countries. (Sherris and Herdman, 2000; Parkin et al., 2001; Parkin et al., 2002.)

Cervical screening has been proven to be effective in decreasing the incidence of invasive disease where comprehensive programmes exist (Parkin, 1985; Duguid, 1985). The Papanicolaou, or Pap smear, screening test is used worldwide and is primarily aimed at detecting precancerous changes within the cervix (i.e. abnormalities in the cells of the cervix known as dysplasia) before they have an opportunity to progress to invasive carcinoma. More than 90% of cervical cancers develop within a small area of the cervix known as the transformation zone and disease progression from dysplasia to invasive cancer is usually slow, therefore providing the opportunity to detect and treat precancerous disease. False-negative smear rates are depending on the quality control measures in force within individual screening laboratories. Where comprehensive screening programmes exist however, studies have shown that Pap smear screening can be linked to trends in cervical cancer survival, by identifying precancerous lesions, reducing their incidence and selectively preventing more aggressive cancers (Hakama et al., 1986; Miller et al., 1990; Miller et al., 2000).

Worldwide great variation exists between countries in terms of the coverage and uptake of cervical screening. In a number of countries including the UK, Finland, Australia, Sweden and Spain, national cervical cancer screening programmes have been introduced. Such screening programmes are usually aimed at those women most at risk of developing cervical cancer (i.e. usually women aged between 20 and 65 years).Recommendations vary between countries (IARC, 1986; Parkin, 1991; Miller, 1992; Hakama, 2000; PATH, 2000), but women are usually screened every one to five years. In many other countries Pap smear services are provided on a much more local basis, if at all. The majority of developing countries the lack of funds and qualified personnel limit the development of widespread screening initiatives. Cervical cancer incidence can be reduced by as much as 90 percent where screening quality and coverage are high (Eddy, 1986). For example, in Finland, a national cervical cancer screening program that was launched in 1963 decreased the cervical cancer rate to 5.5 cases per 100,000 women, a rate that is among the lowest in the world (Hakama et al., 1975). In contrast, in developing countries, where some 80 percent of all new cases exist, it has been estimated that only five percent of women have had a Pap smear in the last five years. (PATH, 2000).

The World Health Organization have calculated the level of protection women gain as a population by regular screening and the number of tests they will need in a lifetime (IARC, 1986). Annual screening smears provide a 93.5% reduction in the incidence of cervical cancer and will mean a woman has 50 smear tests in her lifetime. A smear every 2 years provides a 92.5% reduction with a woman having 25 screening smears in total. Three yearly smears mean women will have a total of 16 screening smears to achieve a 90.8% reduction. Five yearly smears will mean a total of 10 screening smears with an 83.6% reduction in the incidence of cervical cancer. Even a smear every 10 years has a benefit with a 64.1% reduction in incidence.

In particular important issues for Pap smear screening includes the rate of false negatives and the possibility that lower grade cervical abnormalities will never progress to invasive cancer. In many cases the lower grades of cervical dysplasia will spontaneously regress or never develop into cancer. However, women with such grades of dysplasia may suffer adversely through receiving an abnormal smear test result and perhaps undergoing unnecessary treatment.

Countries with low to medium levels of resources should consider addressing key priorities in a demonstration area. Each priority can be approached in a stepwise manner allowing for a systematic progression and expansion, both in terms of programme content and geographical scope. It is also important to ensure the use of appropriate technology that is cost-effective and sustainable in situations where resources are constrained.

For Nakhon Phanom Province in the northeastern region of Thailand with low levels of resources, the majority of patients are currently diagnosed in advanced stages. We implement a model demonstration programme of cervical cancer screening with cytology as the principal screening test and management of preinvasive and invasive lesions in Nakhon Phanom province as a fore-runner to a country-wide programme in future. We establish core surveillance and information systems that allow them to monitor and evaluate epidemiological and programmatic data by using Pap Reg Program and Can Reg4 Program. These are essential for the coordination of a screening programme, monitoring its progress, and evaluating its results. Evaluation and monitoring of the total programme is organized so that it is possible to calculate incidence and mortality rates separately for those participating and those not participating in the programme, at the level of the total target population.

The organized cervical cancer screening programme in Nakhon Phanom province was evaluated for both ongoing activities and long-term impact on the reduction in incidence and survival from cervical cancer in Nakhon Phanom province. Evaluation and monitoring were done for the Process measures ; number of smears taken, how many women were examined (by age), number of positive smears, number (%) who attend (compliance), number of cervical intraepithelial meoplasia lesions (CIN), cancer, and the outcome of the screening programme : incidence of cancer (stage distribution) and survival from invasive cancers

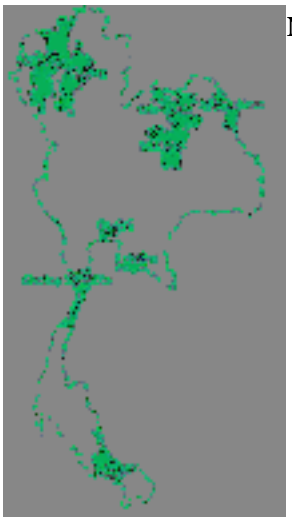
Materials and Methods

Target Population, Target age group

When determining the target age group for screening – the most appropriate ages to initiate and to stop screening – the following should be taken into consideration :

- The risk of the disease in various age groups.
- The performance characteristics of the screening tests to be used with respect to various age ranges.
- The availability of resources needed to provide screening and treatment.

According to IARC screening should initially focus on women in their 30s and 40s - the ages where women



Nakhon Phanom Province

Population	**1998**
Total	**669,264**
Male	**333,026**
Female	**336,236**
Target Women	**80,000 in 5 yrs**
(35-54 yrs)	**16,000 in 1 yr**

Health Care Services

1	**Provincial Health Office**
1	**Provincial Hospital**
10	**Community Hospitals**
11	**District Health Offices**
148	**Primary Health Care Centers**

Figure 1. Nakhon Phanom Population and Health Care Services

are at the highest risk of precancerous lesions but before the incidence of invasive cancer begins to peak. In most countries including Thailand, the incidence of invasive cervical cancer is very low among women under age 25. Generally, incidence increases thereafter and reaches a maximum in women in their 50s and 60s. Data from cancer registries in Thailand indicate that approximately 70% of confirmed cases occur among women aged 45 or older. Precancerous lesions, however, are generally detectable for ten years or more before cancer develops, with a peak at about age 35. Women over 50 who have never been screened are at relatively high risk of cervical cancer, though women in this age group who have had one or more negative screens in the last ten years are at low risk.

Women aged 35-54 years (~80,000women), resident in areas covered by each Primary Health Centers (PHC) in Nakhon Phanom province (see Figure 1), were invited to undergo a pelvic examination to facilitate taking a Pap smear for cytological examination. Approximately 16,000 women were invited per year (1,330 women/month/148 PHC centers) for screening. We integrated all activities in the existing health structure, existing provincial policy on cervical cancer prevention, availability of personnel and material resources.

Screening frequency

Cervical cancer generally develops slowly from precursor lesions. Therefore, screening can take place relatively infrequently and still have a significant impact on reducing cervical cancer morbidity and mortality. Resources in Nakhon Phanom Province allow cytology screening for cervical cancer at 5- years intervals to women at aged 35 – 54 years.

Identification of women in the target population

Women aged 35 – 54 years were identified by the health personnel in each Primary Health Center and Provincial Health Office in Nakhon Phanom Province. The target women are registered including name, date of birth and address.

Ensure High Coverage and Attendance

Knowledge and beliefs are important in determining participation. We have campaigns to make the public awareness of the symptoms of the disease and of the benefits of diagnosis, public education, and personal invitations to screening by PHC personnel.

Screening Test for Cervical Cancer Prevention

Conventional cervical cytology the Papanicolaou test was used to detect abnormal cells in a sample taken from the cervix. The extended-tip spatula, modified Ayre spatula was the collection device for obtaining cervical cytology samples. In the year 1999-2002, all women in Nakhon Phanom Province, aged 35-54 years, received a personal invitation to attend the organized screening programme for cervical cancer by PHC personnel. She can come to have a Pap Test at the PHC or the hospitals in Nakhon Phanom Province.

Existing services were used eg Family planning, or special clinics in all of the hospitals in Nakhon Phanom Province and in private clinics. For the existing services and clinics, the screening process were performed by doctors and nurses.The smears were stained and read by the trained cytotechnicians at the cytology laboratory of the Nakhon Phanom Hospital.

The screening activities were integrated in the health care system. Attending organized screening for women at target population (aged 35 – 54 years) at 5 – year intervals was free of charge. Pap smear taking was done by trained nurses (midwives) and Primary Health Care personnel in the local health care center. Quality control is essential – special measures needed plus continuing education of cytotechnicians and was done by Dr. lttee S. Chonmaitri Consultant, National Cancer Institute and Dr. Hutcha Sriplung, Faculty of Medicine, Prince of Songkla University.

Training

Training courses for Nurses and PHC personnel for the techniques of taking smears, fixation and The Bethesda System (TBS) reporting and the referral system, were held at Nakhon Phanom Provincial Hospital and Community Hospitals. PHC Personnel (easily accessible, privacy, comfort, female staffs) were trained for taking smears in District Health Offices.The cytotechnicians were trained for CIN/TBS reporting. A wide range of competently trained medical personnel, both physicians and non – physicians, can provide cervical cancer screening and treatment. There are guidelines for all health personnel.

Follow-up and Treatment of lesions

Women with LSIL or worse lesions on cytology were follow – up for diagnosis and appropriate treatment of confirmed neoplastic lesions and for the follow – up of treated individuals by the gynecologists at the Nakhon Phanom hospital. Those with features of CIN II and III lesions were treated by cold knife conization. Those with invasive cancer were referred to the Regional Cancer Centers or other hospitals for surgery and/or radiotherapy. Those not complying with invitation for screening,

diagnostic test and treatment were personally contacted by social workers to encourage participation.

Information collection and processing

We set up the central cytology resister and the population-based cancer registry was set up in 1997 at NCI, Bangkok to monitor cancer incidence and mortality to evaluated the impact of the screening programme. The screening results of the programme, including histologically confirmed diagnosis, were registered at the National Cancer Institute by using PAPREG Programme (Thitima Srivatanakul, Puay Sasipongpairog and Pornchai Phruthanontachai) and CanReg 4 Programme (IARC, Thai version by Hutcha Sriplung).

Appropriated registers and mechanisms were created to ensure call, recall, referral, investigations and treatment of women. We have three registries : women in the target population, women with Pap tests done and their results and women with cervical cancers.

Screening coverage

Coverage referred to the extent of participation of eligible (i.e., target age) women in the screening program in a given time period and was calculated by dividing the number of eligible women screened during a given time by the total number of eligible women. High coverage of the target population is one of the most important components of successful cervical cancer prevention program (Pretorius et al., 1991; Sasieni 1991).

All suspected cases of cancer were promptly referred for appropriate diagnosis and therapy, and the institutions with the staff and facilities necessary to provide effective treatment were identified and accessible to patients (Nakhon Phanom Provincial Hospital, Regional Cancer Centers at Ubon Ratchathani and Udon Thani, and National Cancer Institute). The primary care team must know where and to whom to refer patients with apparently curable cancers.

Methods used to evaluate the efficacy of screening

Reductions in mortality and / or incidence of invasive disease are fundamental measures of the efficacy of screening. A reduction in the incidence of invasive disease as a consequence of the treatment of disease precursors is a predictor of a reduction in mortality from cervical cancer.

Because screening for cervical cancer results in the detection and treatment of precursors, reduction in the incidence of the disease is an appropriate outcome measure. Reduction in mortality was used in some early studies to evaluate cervix cancer screening. It is accepted that case survival is not an appropriate outcome, because of lead time, length bias, selection bias and overdiagnosis bias.

Data Analysis

A population-based cancer registry of the province was performed using the CanReg Software provided by the International Agency for Research on Cancer (IARC). Items collected are according to the national consensus of population-based cancer registries in Thailand. They include demographic, disease status, treatment, and follow-up data. The incidence rate of cervical cancer is analyzed as age-standardized rate (ASR) using the direct method described by the IARC. CanReg software gives an ASR when the number of population at risk in a time period by 5 year age group is provided. Though the incidence of precancerous lesions (ICD-O behaviour code less than 3) is not provided by the software, it can be calculated manually by the direct method. Other descriptive indices are calculated as percent, and 95% confidence interval.

In comparison of the efficacy of the organized screening programme, risk ratio between those who screened against those not screened is one of the indicator. The risk ratio in this case is the ratio of detection rate abnormal Pap smear results (LSIL or CIN I, HSIL or CIN II and III, and cancer) among those who compiled to the screening programme in reference to those where abnormal Pap smear results were incidentally detected when they had symptoms or visited doctors by any other reasons. The ratio is calculated by dividing the risk of detecting abnormal Pap smears, stratified into CIN I to III and cancer, among those who screened to those not screened. Standard error and 95% confidence interval of the risk ratio were calculated accordingly.

In this research, the cumulative rate is the summation of abnormal Pap smear cases occurring once in life from the age of 35 to 54. The method was performed at a starting population of 100,000 at the age group 35-39. Expected cases developing abnormal Pap test were calculated by

Table 1. The Number of Screened Women* in All Age Groups

Year	Total women	Target women 35 – 54 years	Women other age group
1999	14,784	7,870	6,914
2000	13,469	8,462	5,007
2001	17,227	12,861	4,366
2002	13,464	10,113	3,351
Total	58,944	39,306 (66.7%)	19,638 (33.3%)

* Including repeated cases

Table 2. Number of Target Women Having Pap Test in 1999 - 2002

District	Total Number of Target Women	Number of Target Women Having Pap Test	Percentage of Coverage
Muang	13,660	5,879	43.0
Na Kae	7,688	3,639	47.3
Tha Uthen	4,723	2,295	48.6
That Phanom	7,703	3,210	41.7
Si Songkhram	6,166	2,848	46.2
Renu Nakhon	4,359	2,173	49.8
Na Wa	4,382	2,350	53.6
Ban Phaeng	2,872	1,754	61.1
Phon Sawan	4,352	3,544	81.4
Pla Pak	4,818	3,485	72.3
Na Thom	1,958	899	45.9
Wang Yang	1,270	556	43.8
Nakhon-Prathom Province	63,951	32,632	51.0

Table 3. The Number of Target Women with Different Age Groups

Age group	Number of Target women
35 – 39 years	11,535 cases (35.3%)
40 – 44 years	8,886 cases (27.2%)
45 – 49 years	6,936 cases (21.3%)
50 – 54 years	5,275 cases (16.2%)
Total	32,632 cases

Table 4. Target Female Population of Nakhon Phanom in the Year 2000

	Age group (years)				
	35-39	40-44	45-49	50-54	Total
Female Population in 2000	24,464	21,921	18,388	15,166	79,939
Pop at Risk (4/5 of population in 2000)	19,571	17,537	14,710	12,133	63,951
Non-Screened Population	8,036	8,651	7,774	6,858	31,319
Screened Population	11,535	8,886	6,936	5,275	32,632

Table 5. The Number and Percentage of Pap Smears for Adequacy of Specimen

Satisfactory	22,374 cases	68.56%
Satisfactory with limitation	10,244 cases	31.39%
Unsatisfactory	14 cases	0.04%

multiplying the age-specific rate for this age group by 100,000. The number of expected cases was subtracted from the starting number and the resulting population, then, was treated as the target population for the second age group, 40-44. The method was iterated until age group 50-54. Cumulative rate was the sum of expected number of cases with abnormal Pap smear from 35 to 54 divided by 100,000. Finally, cumulative risk was the ratio of cumulative rate in those who divided by the rate in those not coming to the screening programme.

Table 6. The Number and Percentage Distribution of Pap Smears in the Screening Programme by Cytological Diagnosis

Within normal limits	19,474 cases	59.70%
Descriptive diagnosis	13,144 cases	40.30%
Descriptive Diagnosis		
Benign cellular changes	12,738 cases	39.05%
Epithelial cells abnormality	405 cases	1.24%
Squamous		
Atypical squamous cells of undetermined significance (ASCUS)	96 cases	0.29%
Low grade SIL (LSIL) only	66 cases	0.20%
Low grade SIL (LSIL) with HPV	41 cases	0.13%
High grade SIL (HSIL) only	88 cases	0.27%
High grade SIL (HSIL) with HPV	20 cases	0.06%
SIL	3 cases	0.01%
Squamous cell carcinoma	28 cases	0.09%
Glandular		
Endometrial cells	14 cases	0.04%
Atypical glandular cells of undetermined significance (AGUS)	35 cases	0.11%
Endocervical cells	11 cases	0.03%
Adenocarcinoma	3 cases	0.01%

Survival analysis

Survival proportion for all causes of death was calculated by Kaplan-Meier method using R software version 2.5.1. Stratification by two time periods, before and during screening, gave a comparative insight of survival probability between the two periods.

Results

Number of target women

The organized low intensity cervical cytology programme in Nakhon Phanom province was established in 1999. There are facilities at primary care level and all hospitals for taking Pap smear.

The slides were sent for reading at the cytology laboratory, Nakhon Phanom hospital. In practice, many women were screened, usually at shorter intervals than recommended. In addition, most women attending screening at regular health services such as maternity care are not the women at highest risk age (more than 45 years). Many cervical smears are taken outside the organized programme by private clinics and other hospitals in the other provinces. 58,944 Pap tests in all ages were performed in the year 1999 – 2002 (Table 1). Only 66.7% of all screened women were the target women. About 6,674 cases were repeated Pap Smears.

The number of target women (35 – 54 years) who had Pap test in 1999 – 2002 in 12 districts of Nakhon Phanom province are shown in Table 2, the number of target women with different age group are shown in Table 3, and the number of screened and non-screened target female population in 4 years are shown in Table 4.

Specimen adequacy

The Bethesda System requires that every cervical cytology specimen be assessed with respect to its adequacy. There is an important of identifying a transformation zone component (e.g., squamous metaplastic cells) or endocervical cells in a cervical cytology preparation. Because the majority of high – grade precursor lesions arise within the transformation zone. After training for smear taking , there are only 0.04% of unsatisfactory slides (Table 5) and 4.03% of satisfactory limitation by no endocervical / transformation zone component. It is also important to recognize that endocervical cells are less frequently found in cervical cytology specimens from women using oral contraceptives, pregnant or postmenopausal women (Davey et al, 2002).

With increasing age, the squamocolumnar junction migrates inward from the readily visible portion of the endocervix towards the endocervical canal, so lesions probably become more difficult to identify with visual methods in older women (the age of 50 years).

Results of cytological findings

The number and percentage distribution of Pap Smears from 32,632 target women in the screening programme by cytological diagnosis was shown in Table 6. The slides with unsatisfactory for adequacy of specimen were 14 cases (0.04%). Therefore, no results could be reported in

Table 7. Number of Cases and Age-Standardized Incidence Rates of Cervix Cancer from 1997 to 2002

Year	Age group (years)				
	<35	35-54	>54	All	ASR
1997	3	22	9	34	10.4
1998	1	20	11	32	9.3
1999	2	29	14	45	14.0
2000	1	24	12	37	10.5
2001	1	24	9	34	9.7
2002	6	13	7	26	6.9

those cases. There were within normal limits 19,474 cases (59.70%), benign cellular changes 12,738 (39.05%), epithelial cells abnormalities 405 cases (1.24%).

Indicators of effect

The purpose of screening is to reduce the mortality from the cancer subjected to screening. Therefore, the primary indicator of effect is the observed mortality compared with the expected, assuming no screening. For cervical cancer, the preinvasive disease is detected by screening and therefore reduction in incidence of invasive cancer is also a valid indicator of effectiveness.

Process or intermediated indicators are also used in the evaluation of screening. They are applicable if there is proof of effect in terms of reduction in mortality, and evidence of a relationship between the intermediated indicators and the outcome indicator. The best of these intermediate indicators is change in the incidence (not proportion) of advanced disease, due to screening. Most process indicators are the results of the screening examinations, such as the numbers or proportions of early or preinvasive cancers detected at screening or the proportion which such cases comprise of all cancers. Short term follow-up may permit estimates of the validity of the screening test.

The cancer registry collects data on the incident cases, and provides indicators of programme validity through the follow-up of the target population and the linkage of cancer registry and screening information. The data provided by cancer registries are an important component of this evaluation, and they remain so in the monitoring of existing screening programmes. The number of cases and age-standardized incidence rates of cervix cancer from 1997 to 2002 are shown in Table 7.

The drop in recent years (2000-2002) may be the phenomenon usually observed in case ascertainment by

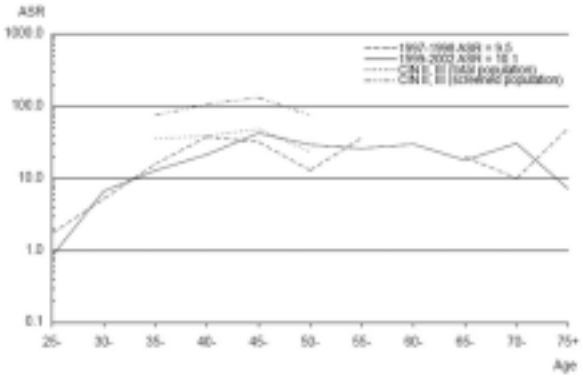


Figure 2. Age-Standardized Incidence Rates of Cervical Cancer and Precancerous lesions before (1997-1998) and during (1999-2002) Screening Periods

cancer registry where some cases are in the process of investigation and might later be changed from preinvasive to invasive disease.

The ASR of cervical cancer in the period 1997-1998 was 9.5 (95%CI: 7.1-11.9) per 10^5 population and that in the screening period between 1999 and 2002 was 10.1 (95%CI: 8.5-11.8) per 10^5 population (Figure 2). The ASR increased by 0.6 (95%CI: -2.3 – 3.5) per 10^5 population without statistical significance.

The risk ratio of cancer detection among screened and non-screened target women is not significantly different (Table 8), 1.1 (95%CI: 0.7-1.7), the benefit of early detection of CIS and severe dysplasia (CIN III) was obvious with a risk ratio of 6.9 (95%CI: 3.5-15.0). The benefit of getting CIN II and CIN I lesions by Pap smear screening was 48.9 times (95%CI: 5.3-81.7) and 34.9 (95%CI: 11.6-172.3) times higher among screened than non-screened target women.

The rates of detecting CIN I, CIN II – III and cervix cancer are shown in Figure 3.

Stage of disease

Although the primary objective of cervical screening is to prevent the development of invasive cervical cancer, the screening test also detects asymptomatic invasive disease, and hence the introduction of cervical screening will also affect the stage distribution of invasive disease. The stage distribution of cervix cancer cases before (1997 – 1998) and during (1999 – 2002) screening periods in screened and non-screened populations (Table9) and in screened and non-screened target groups (Table10) are

Table 8. Risk and Risk Ratios of Getting Precancerous and Cancerous Lesions in Non-Screened and Screened Target Women

		35-39	40-44	45-49	50-54	Total	Cumul. risk	Crude risk ratio	Cumul. Risk	Lower lim.	Upper lim.
non-screened	CIN I	0	0	3	0	3	0.0004	0.0001	1.0		
	CIN II	1	0	0	0	1	0.0001	0.0000	1.0		
	CIN III	5	1	4	0	10	0.0013	0.0003	1.0		
cervix	cancer	9	11	13	9	42	0.0054	0.0013	1.0		
screened	CIN I	46	29	25	9	109	0.0125	0.0033	34.9	11.6	172.3
	CIN II	12	18	15	6	51	0.0063	0.0016	48.9	5.3	81.7
	CIN III	21	19	21	11	72	0.0090	0.0022	6.9	3.5	15.0
cervix	cancer	5	10	22	11	48	0.0068	0.0015	1.1	0.7	1.7

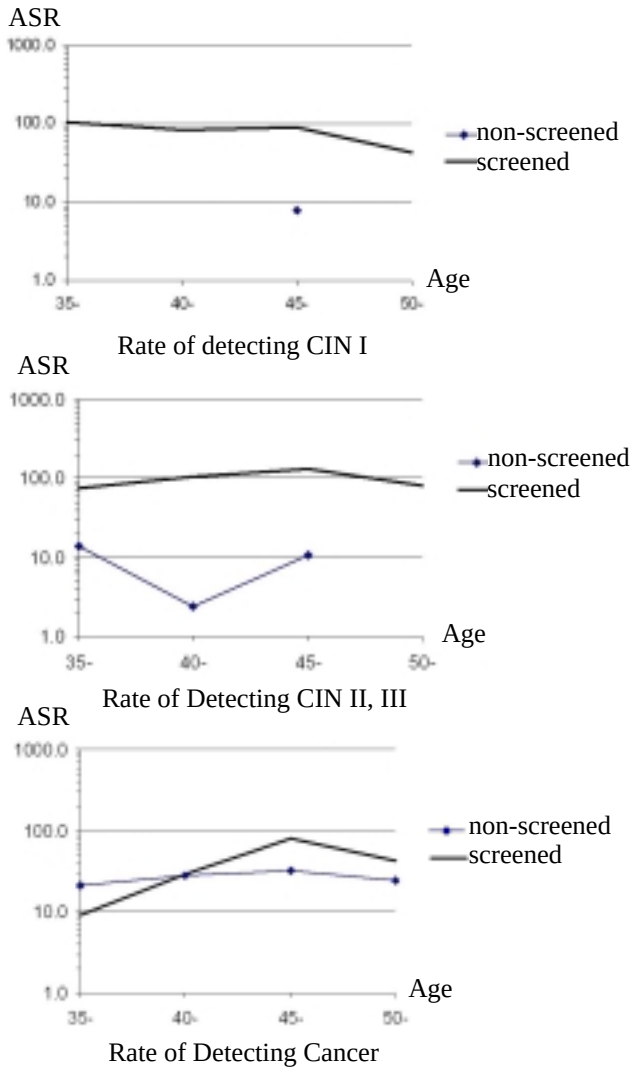


Figure 3. Rates of Detecting CIN I, CIN II – III and Cervix Cancer

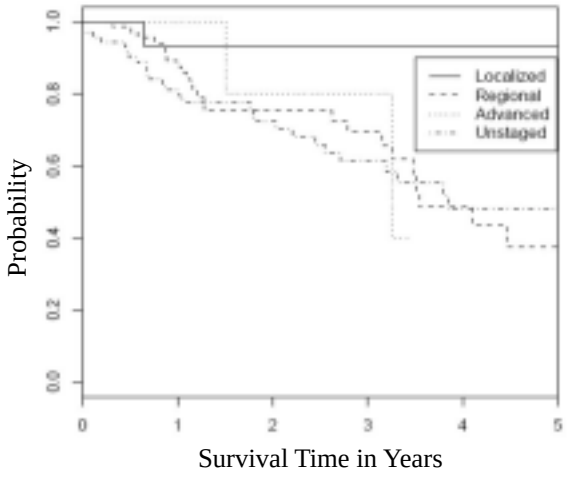


Figure 4. Survival (years)from Cervix Cancer by Clinical Extent of Disease: Nakhon Phanom, 1997 - 2002

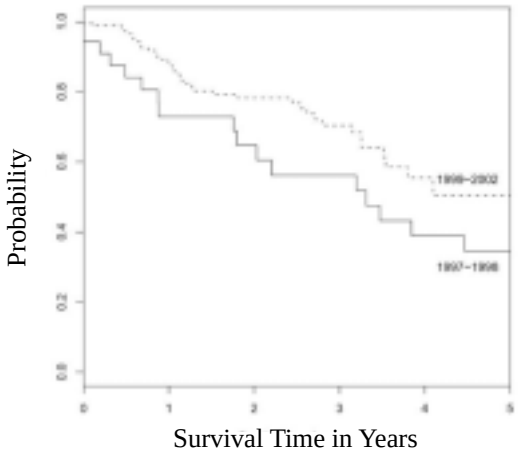


Figure 5. Survival (years) from Cervix Cancer: Nakhon Phanom, 1997-1998 and 1999-2002

shown. The screening programme led to a considerable increase in early carcinoma *in situ* cases.

Though the numbers suggest a trend towards localized disease, stage distribution among full blown cancer cases both in non-screened and screened populations did not change from that in before-screening period with p-value = 0.71 and 0.32 respectively. When *in situ* cases are included, however, stage distribution among diseased

Table 9. Stage Distribution of Cervix Cancer Cases before (1997-1998) and during (1999 -2002) Screening Periods in Screened and Non-screened Populations. A) excluding in situ cases, B) including in situ cases

A	1997-1998 Non-screened Cases	%	1999-2002 Non-screened Cases	%	Screened Cases	%
Localized	16	23.9	23	24.0	14	31.1
Regional	34	50.7	52	54.1	13	28.9
Metastasis	3	4.5	4	4.2	1	2.2
Unknown	14	20.9	17	17.7	17	37.8
B	1997-1998 Non-screened Cases	%	1999-2002 Non-screened Cases	%	Screened Cases	%
In situ	3	4.3	14	12.7	72	61.5
Localized	16	22.8	23	20.9	14	12.0
Regional	34	48.6	52	47.3	13	11.1
Metastasis	3	4.3	4	3.6	1	0.9
Unknown	14	20.0	17	15.5	17	14.5

Table 10. Stage Distribution of Cervix Cancer Cases aged 35-54 before (1997-1998) and during (1999 -2002) Screening Periods in Screened and Non-screened Target Group. A) excluding in situ cases, B) including in situ cases

A	1997-1998 Non-screened Cases	%	1999-2002 Non-screened Cases	%	Screened Cases	%
Localized	11	26.2	9	20.0	14	31.1
Regional	22	52.4	27	60.0	13	28.9
Metastasis	2	4.8	3	6.7	1	2.2
Unknown	7	16.6	6	13.3	17	37.8
B	1997-1998 Non-screened Cases	%	1999-2002 Non-screened Cases	%	Screened Cases	%
In situ	3	6.7	3	6.3	72	61.5
Localized	11	24.4	9	18.7	14	12.0
Regional	22	48.9	27	56.3	13	11.1
Metastasis	2	4.4	3	6.2	1	0.9
Unknown	7	15.6	6	12.5	17	14.5

cases both in non-screened and screened population obviously moved towards *in situ* stage when compared with that in before-screening period, p-value = 0.87 and <0.001 respectively.

Survival

Cancer registries are concerned with follow-up of registered cases in order to perform survival analyses. The information on cancer deaths from the cancer registry is more accurate than from only death certificates. The date of diagnosis is also reliable at the cancer registry. Figure 4 shows survival from cervix cancer by clinical extent of disease in 1997 – 2002 and Figure 5 shows survival from cervix cancer in Nakhon Phanom province before (1997-1998) and during (1999-2002) screening periods. The organized cervical cytology screening has been shown to be effective in reducing mortality from cervical cancer. The trend in survival was due to a shift to earlier stage at diagnosis as well as better survival within stage.

Discussion

To make an impact on the epidemiology of cervical cancer, as with any screening programme , national organized programmes that achieve high participation are required. This study confirmed that integration of screening services into the existing health-care systems is the way that high participation rates could be achieved. Absence of policy has resulted in lack of action and in screening of women at inappropriate ages. In addition, facilities for treatment of precancerous lesions are often inadequate.

Obtaining the high levels of attendance for screening are essential to reduce the incidence of cervical cancer. Besides a high screening coverage of the population at risk, a comprehensive cervical screening programme must also assure maximum return rates among women with abnormal screening results and ensure appropriate care for women requiring follow-up treatment.

In this study, the younger women are more likely to attend for screening than the older women (Table 3) same as the other studies (Calle et al., 1993; Perez-Stable et al., 1995; Mandelblatt et al., 1999; Hsia et al., 2000; Sankaranarayan and Wesley., 2003). Participation in cervical cancer screening was associated with higher income and educational level in many studies (Calle et al., 1993; Katz & Hofer, 1994; Perez-Stable et al., 1995; Nascimento et al., 1996; Lazcano-Ponce et al., 1997; Borras et al., 1999; Hsia et al., 2000; Maxwell et al., 2001; Hewitt et al., 2002; O'Malley et al., 2002, Siahpush and Singh, 2002; Selvin and Brett, 2003). However, in this study, higher participation is seen in rural areas more than in urban areas. Knowledge about the screening test increased the probability of screening. The efficacy of a personal contact, the face- to-face approach significantly increased screening participation, screening with a female nurse practitioner and primary health care personnel.

Low rates of attendance at screening services by women in the high – risk age group can often be attributed to problems with health services, including poor availability, poor accessibility, and / or poor quality of care, as well as to lack of information and cultural and behavioral barriers.

A lack of policy guidelines, infrequent supply of basic materials and absence of suitably qualified staff were the common reasons reported for the low percentage of women actually screened. The integrating cervical screening into the existing health – care services offers the best approach to reducing cervical cancer mortality. Direct communication strategies that speak to women who have low literacy rates and who live in low-resource settings is a challenge in itself. A combination of direct communication and mass media can significantly increase uptake of Pap smears. Men can have in improving women's participation and compliance with screening and precancer treatment, and the project staff implemented several interventions to mobilize male community members. A curriculum was developed to train peer educators to inform men about cervical cancer prevention and motivate them to support women in seeking screening and complying with posttreatment instructions.

On the other hand, both male and female staff are needed for effective communication with women and men in the community. Female health workers had primary responsibility for providing counseling to women, while male health workers participated mainly in community educational and promotion activities. Male health workers also had responsibility for communication with husbands and male community leaders, because these audiences are likely to accept information more easily when other men provide it.

Services should be offered according to a fixed schedule that women can count on and that appointment dates and times of follow – up visits should be flexible and adapted to women's scheduling needs. This was done in Nakhon Phanom hospital. Cervical cancer prevention programs that listen to and learn from the community and that involve community members in program implementation and materials development are more likely to increase demand, ensure follow-through for treatment, and, ultimately, reduce disease burden.

Available, affordable, and high-quality screening, diagnostic, and treatment services are essential for cervical cancer prevention programs to achieve the high coverage necessary for effective disease reduction in the population. We have referring system to cancer centers and university hospitals. At the same time, health care providers need to be aware of the socioeconomic, cultural, and behavioral characteristics of the target population that influence participation in prevention programs.

Ensuring that women who have abnormal screening test results undergo diagnostic testing (colposcopy and / or biopsy) and / or treatment is an essential element for disease reduction. Some women do not return for diagnosis or treatment visits because health services may keep poor records that do not allow tracking of progress through the diagnostic and treatment protocols, or women may be unable to follow provider recommendations for management. Women may have a poor understanding of the importance of follow – up tests and treatment, which may lead them to discontinue care. In addition, they may lack family support to seek further care or may be unable

to pay the associated expenses.

In this study, screening services were offered closer to where women lived and provided free of charge, to improve accessibility and alleviate geographic and economic constraints. This improved accessibility of services, particularly among women from remote areas.

The screening activities were integrated in the health care system. Attending organized screening for women at target population (aged 35-54 years) at 5-year intervals was free of charge. Sample taking was done by trained nurses (midwives) and primary health care personnel in the local health care centers and the sample quality was under continuous control done by the cytology laboratories and pathologists. Our study showed that after training all responsible personnel for Pap smear taking and using modified Ayre spatula, adequacy of specimen is good (Table 5). Thus, training of Pap smear taking and using modified Ayre spatula is very important for the success of organized Pap smear screening for cervical cancer. Buntinx and Brouwers (1996) conducted a meta-analysis looking for any relationship between sampling device and detection of abnormality and concluded that either the extended – tip spatula, a combination of any spatula plus cytobrush or cotton swab, or the plastic broom should be used for cervical screening.

Confirmation and treatment were integrated into the normal health care routines. Woman with low-grade lesions return for routine follow- up smears. High-grade preinvasive disease was further evaluated by repeating Pap smears, conization or biopsy and subsequent treatment through surgical removal or ablation. One hundred twenty three cases of CIN II and CIN III could be detected in the screened group of this organized cervical cancer screening programme whereas only eleven cases could be detected in the non-screened group (Table 8).

Cervical cancer is the second most common cancer in women worldwide and the most common cancer among women in developing countries. A comprehensive, resource appropriate approach to cervical cancer screening and the recent arrival of vaccines against the main carcinogenic strains of the human papilloma virus (HPV) now make it the most preventable and treatable of all cancers. In some countries, screening through HPV testing and Pap smears may be appropriate; in others, screening may rely in the first instance on visual inspection, after application of acetic acid or Lugol's iodine (Sankaranarayanan et al., 2007)

It has been demonstrated that the substantial decrease in the incidence and mortality cervical cancer in Finland is mainly due to the organized mass-screening (Nieminen et al., 1999). In this study, it has also been demonstrated that the organized cervical cancer screening programme in Nakhon Phanom province have a long-term impact on the reduction in incidence and mortality from cervical cancer in Nakhon Phanom province.

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