



Original Research

Evaluation of a model demonstration programme for the control of cervical cancer in rural China: A cross-Sectional study on existing databases from 2009 to 2014



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ABSTRACT

Background: Since 2009, a nationwide free cervical cancer screening project in rural China has been gradually expanded. Here, we evaluated a demonstration screening programme in rural China to facilitate the development of the comprehensive guidelines for quality assurance of the cervical cancer screening in Rural China.

Methods: The organised cervical cancer screening programme in Zhushan county was evaluated for both on-going activities and outcome impact from 2009 through 2014. A descriptive analysis of performance indicators and outcome measures related to screening was conducted.

Results: Of the 73,847 Pap tests performed in 2009–2014, 69127 (93.6%) were in the target age group (25–64). The screening coverages by township were between 10% to 30% in each 2-year screening round. About half of eligible women underwent at least once Pap test over the six-year period. The recall rates for the second and third period were 11.3% and 17.2%, respectively. The annual truncated age-standardized incidence rate seemed to be stable with some variation during the first four years after the initiation of the organised screening programme and dropped in the later two years.

Conclusion: Our results indicate that the cervical cancer screening programme in Zhushan county was successful in terms of decreasing the cervical cancer burden. Though 2-year coverage was around 18%, the overall 6-year coverage reached 49.5%. We recommend a set of indicators compiled from the regular monitoring process and the methods to estimate the achievement of the programme based on the limited budget and resources available in the area.

1. Introduction

Cervical cancer is one of the most common cancers among women in China. The Chinese National Central Cancer Registry (NCCR) reported an overall age-standardized incidence rate of cervical cancer (China population 2000) of 11.39 per 100,000 women in 2012 [1]. The evidence is consistent with a higher burden of cervical cancer in rural areas [2]. Organised screening programmes have been long proven as the most effective intervention for cervical cancer [3–5]. From 2009–2011, the Chinese government launched a nationwide free cervical cancer screening project for 10 million rural women across 221 counties. With strong support from the central government, from 2012 this project is continuing and has covered 1140 counties for 30 million rural women [6].

The Chinese Ministry of Health developed a technical solution for

cervical cancer screening project in 2009. It provided a number of recommendations including screening frequency, target screening age group, screening methods, the management of abnormalities, the training and quality control requirements for both laboratories and programmes, and the need for an information system. Three main indicators suggested for evaluating the programmes were participants rate, prevalence rates of cervical lesions, and rate of knowledge known of gynaecological diseases. However, some key performance indicators suggested by guidelines from WHO [7] and other organisations [8–10], were not included.

High coverage of target population is crucial for a successful cervical cancer prevention programme [7]. *Coverage rate* is defined as the proportion of the number of women who get screened in the target age group among the eligible women during a period. The *recall rate* is defined as the percentage of eligible women re-screened within defined

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period after a negative cytology test results in the last period. The *detection rate* is the percentage of women with cervical lesions detected among women having a cytology test during the screening period. The detection rate is stratified into cervical intraepithelial neoplasia (CIN) grade I to III and cancer. The *early treatment rate* is defined as the proportion of screened women with CIN II or worse receiving proper treatment within one year.

A reduction in the incidence of invasive lesions from the cervix as a consequence of the early treatment of precancerous lesions is indicative of a reduction in mortality from cervical cancer. Therefore, intermediate indicators such as incidence and disease extent at diagnosis were widely used in the evaluation. Disease extent at diagnosis was defined as the percentage of cancer cases in different cancer stage.

In comparing the efficacy of the organised screening programme, risk ratio between those screened and those not screened is one indicator [11]. The ratio reflects the chance or risk of detecting different stages of the disease, i.e. the CINs and invasive cancer if the screening programme is in place in comparison to none.

To evaluate the performance and success of the cervical screening programme in rural China, this study took place in Zhushan county of Hubei province—central China, where cervical cancer is among top five cancers [1]. Zhushan county is a typical low-income county in north-western Hubei province. Since 2009, it became one of the national demonstration counties in the free cervical screening project. The programme was financed annually by the central government and the local screening offices managed the screening process in their area by themselves and sent the reports back to the central government.

The aim of this study was to evaluate the coverage and effectiveness of the cervical cancer screening programme during the first six years of operation in Zhushan county as the representative of rural China. The study in this county could reflect the quality of the screening programme in the low-income counties where the incidence of the cancer is still high and provide information feedback to improve performance of the national cervical screening programme policy for rural China.

2. Methods

2.1. Study setting and target population

Zhushan county, has a total population of about 440,000 residing in an area of 3588 square kilometres where more than 80% of the land is mountainous. A total of 17 townships with 254 villages are administered by the county. The main medical and health care services in the county include one county hospital, one maternal and child health hospital, and 17 township health centres.

The cervical cancer screening programme actively promoted collaboration between multiple institutes and encouraged the integration of regional medical resources. The county maternal and child health hospital was designated to implement the screening programme. The screening office was made up of about ten staff members who went around the screening sites at township health centres. Female residents in Zhushan county aged 25–64 years (~120,000 women), were notified by telephone calls, text messages, local broadcast and television, or the village doctors.

2.2. Screening process

All women participants filled in a survey form which included questions on their demographic and a few other variables before receiving an examination by trained medical personnel. The cervical exfoliated cells collected were sent to make Pap smears and screened using the ThinPrep imaging system. Abnormal results were classified into 8 grades according to the Bethesda System (TBS) [12]. Subjects with abnormal test results were referred to colposcopic examination in the county maternal and child health hospital. All suspicious lesions under colposcopic examination were biopsied for pathological

confirmation. About 20% of the positive results and 10% of the negative results were randomly sampled to be verified by screening experts as a routine quality assurance protocol. Women with a negative test result or with no lesion detected by colposcopy were advised to undergo re-screening after two years. Subjects with abnormal screening result were notified by telephone. Follow-up was monitored by 17 township health centres. The screening office was responsible for collecting and computerising the individual screening information cards from townships. The screening information records included name, age, address, reproductive history, date of screening, primary test results, and histologically confirmed results. About 5% of all record cards were randomly checked to ensure the proportion of errors to be less than 5%.

2.3. Study design

The screening programme was evaluated for both ongoing activities and outcome impact from 2009 through 2014. A descriptive analysis of performance indicators and outcome measures related to screening was conducted. Performance indicators used in this study included screening coverage, recall rate, percentage of abnormal smears, pre-cancer and cancer detection rate, early treatment rate, incidence rates of precancerous and cancerous lesions, and disease extent at diagnosis.

To evaluate the efficacy of the programme in the area, risk ratio between those screened and not screened was also estimated. Screening data were linked to the patients' database to identify the women who screened and women whose abnormal cervical lesion detected only in the hospitals in the county were considered as women not covered by the screening programme. The risk ratio here was the ratio of detection rates between women complied with the screening programme and those whose cancer was detected by doctors with symptoms of genital tract disease without passing the organised screening programme.

2.4. Data collection

The information of individuals participating in the screening programme from 2009 through 2014 was extracted from the screening institution in the county maternal and child health hospital. Female population in each year during the period was derived from the Bureau of Health and Family Planning. The number of women in each township was obtained from the Sixth National Population Census surveyed by the National Statistical Office in 2010 [13].

Cervical cancer patients' information was collected from two county-level hospitals and three tertiary hospitals. The county maternal and health care centre is the designated screening institution where most of the data of CIN patients were collected. We expected the majority of patients to go to one of the five aforementioned hospitals. Patients' data were extracted from the medical records from 2009 through 2014 using ICD-10 codes C53.X. Information collected from the hospitals included name, id, age, date of diagnosis, cancer stage, and treatment. The screening databases by year were all merged to find those who came to screening in the same and across 2-year periods. The screening databases were merged with the databases of cervical cancer cases treated in the five hospitals in the area by id or name to find those who passed the screening programme and those who came directly to the hospitals.

2.5. Data analysis

Screening coverage rate was calculated and stratified by age group and township from 2009 to 2014. Age-specific incidence rates (ASIR) were calculated for twelve different 5-year age groups (15–19, 20–24, ..., and 70+). Truncated age-standardized incidence rates (TASR) for an age range of 25–64 years were calculated, using weights of 8, 6, 6, 6, 5, 4 and 4 for the individual 5-year age groups derived from Segi's world standard population [14]. A log-linear model was fitted and plotted to visually illustrate the trends. The 95% confidence interval

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