

## The Cost Analysis of Cervical Cancer Screening Services Provided by Damavand Health Center in 2013

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### Abstract

**Background:** Today, the health sector in many countries is facing with severe resource constraints; hence it is absolutely necessary that cost-benefit and cost-effectiveness assessment have a major role in design of health services. The purpose of this study was to evaluate the cost-benefit and effectiveness of cervical cancer screening service (Pap smear test) done by the health centers in Damavand County in 2013.

**Methods:** This is a descriptive study with cross-sectional method. All data was extracted from existing documents in Damavand health network.

Cost of service screening for doing Pap smear test (manpower costs of performing the service, the cost of transferring samples, water, electricity, telephone and gas) was estimated in all health centers then results, were compared with the incomes of this service.

**Results:** Screening program coverage was 22.3%, 6.9% and 6.05% in 2011, 2012 and 2013 respectively. All costs and incomes of units performing Pap smear screening test were calculated. Entire costs and incomes of this service during 2013 were respectively 303,009,000 and 11,640,000 RLS equal \$12,227 and \$496.73. Therefore, the cost-benefit ratio of this screening test was approximately 0.040.

**Conclusion:** The costs of units performing cervical cancer screening test in Damavand Health Center were much more than this benefit and because of a none-positive Pap smear test in spite of high cost, performing this test in Damavand health centers was not cost effective.

**Keywords:** Cost, Cost-benefit analysis, Cervical cancer screening, Pap smear test

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### Introduction

According to the World Health Organization report, cervical cancer is the second most common female genital tract malignancy and annually there are about half a million new cases in the world. More than

half of sufferers will lose their lives. 80 percent of sufferers of this cancer live in developing countries (1).

In developing countries, the prevalence and mortality rates of cervical cancer are much higher than in developed countries (2).

According to the National Cancer Registration in Iran, the incidence of cancer among Iranian women have been reported about 7.1 per hundred thousand person in different provinces (3) and its mortality among women in all age groups is about 1.2 per hundred thousand person. Therefore, it is the ninth priority death due to cancer among women (4). This cancer due to having a long pre-aggressive duration, availability of member for sampling, the existence of a valid screening test as well as the possibility of effective treatment of premalignant lesions, can be identified at early stage and can be considered a preventable disease. Pap smear is a simple cytology test for cervical cancer detection. However, results of Ramezani et al. in 2011 indicated that about 41.6 percent of women to their study only have done Pap test once (2). Other studies confirm this result in the country. According to the importance of cervical cancer screening, based on the policies of the Ministry of Health and Medical Education, Pap smear sampling is done in the health centers for women in the age group 20-65 years old with specified condition in the national guidelines. The goal of this screening is early diagnosis and treatment of patients (5). Thus, like other parts of Iran, the pap smear screening program in Damavand health centers is running, and in the case of the success of screening program, the death of this disease in population has declined (5, 6). The high cost of health care and limitation of sources of supply the services (physical, manpower and equipment) are the most important problems in the field of health economics (6). The cost-benefit analysis compares economic benefits to the cost of each program and benefits are expressed in terms of money to be certain whether or not this program is beneficial in economic terms. The cost-effectiveness analysis is a method of economic evaluation in which compares the value of the resources spent for a health intervention with the value of health obtained from it (7). This study aimed to assess the cost-benefit and cost-effectiveness of cervical cancer screening (Pap smear) services in health centers conducting it in Damavand County in 2013. First, the cost of the resources used to provide Pap screening test

services and income of this service proffering is calculated. Subsequently, the cost to benefit ratio from its measuring was estimated. Thus, the economic benefits of the program were compared with its costs. As well as the number of positive results of this test measured in the years 2011, 2012 and 2013, because we would like to know by performing this test despite of high costs, how much is the health outcome. Therefore, we can make the correct decisions for better implementation of this important service.

## Methods

This is a cross-sectional descriptive study to analyze the cost-benefit and cost-effectiveness of service proffering cervical cancer screening test (Pap smear) by health centers in Damavand County with the use of the registered data and available documentation in statistics, finance, accounting, health networks, and family health and warehouse units.

In this study all costs include the cost of consumer and capital goods, the cost of salaries and benefits of midwives, crews and drivers who serve in screening (Pap smear test) unit and proceeds to perform this test was approximately calculated for 2013. Later, cost-benefit ratio estimation for this service was possible. In addition, the amount of cost effectiveness was measured considering how many unit of health is achieved in return amount of cost consumed.

To calculate the cost of consumer goods, we refer to the documentation in health network warehouse, and estimate cost of 200 speculum and 200 cytobrush was being bought in the 2013. For the calculation of the midwives salaries involved in this affair, the average salary for 26 midwives in 5 health centers and 2 health station were considered and value theirs salaries divided to 6. Since, as we estimated, one sixth of midwives' duties were related to Pap smear sampling. Other midwives activities included: pregnant women control, family planning, vaccination, health education for manpower and health education in schools.

The salaries and benefits of chauffeurs were calculated for 4 persons who were responsible

for samples carrying from health centers to the healthcare network, and the Sevom Shaban hospital in Damavand city. Regarding to Pap smear transferring is only one tenth of drivers job. Thus, their salaries should have been divided to 10. In addition, the cost of depreciation of the vehicle was calculated as well as drivers' salaries. Another point, because the samples transferring to the Tehran (Imam Hossein hospital) was not a part of duty of Damavand health network; so, this was not calculated as network costs.

The salaries of the 7 crews serving in Pap smear sampling units of health centers calculated and regarding to their other duties, was divided to 10 (all the salaries was calculated for 6 months).

Proceeds from the Pap smear screening test was estimated with calculation of the sum of prices of 200 cytobrush and speculum was consumed, with price of each midwifery visit that all multiplied in number of taken specimens.

The cost of water, electricity, telephone and gas in health centers was calculated in the statistics units of health network for 2013, then all the cost divided by the size of 10 and then added together.

Noteworthy point is the amount of money taken from patient for samples interpretation in Tehran hospital was not included in the calculation of Damavand health network income.

## Results

Screening program coverage in Damavand health network (14000 women) was 22.3%, 6.9% and 6.05% in 2011, 2012 and 2013 respectively.

The midwives salaries calculated as  $12,000,000 \times 1.6 \times 26 \times 6 = 312,000,000$  RLS. It was equal to \$12,590. The staff salaries calculated as:

$8,000,000 \times 1.10 \times 7 \times 6 = 33,600,000$  RLS. It was equal to \$1,355. The driver salaries calculated as  $8,000,000 \times 1.10 \times 4 \times 6 = 19,200,000$  RLS. It was equal to \$774.82.

The cost of 200 speculum and 200 cytobrush purchased (8000 RLS for each unit) was  $(8000 + 8000) \times 200 = 3,200,000$  RLS. It was equal to \$129.14.

The cost of water, electricity, telephone and gas in 2013 for this service estimated as 25,009,000 RLS, which was equal to \$1,009.

Total calculated costs in 2013 in Damavand county health network were 303,009,000 RLS.

It was equal to \$122,279. Damavand county health network revenue in 2013 calculated as 24,000 RLS cost of each unit of midwifery visit plus 8000 RLS cost each unit speculum plus 8000 RLS cost per unit cytobrush.

The sum multiplied by 291, the number of taken samples.

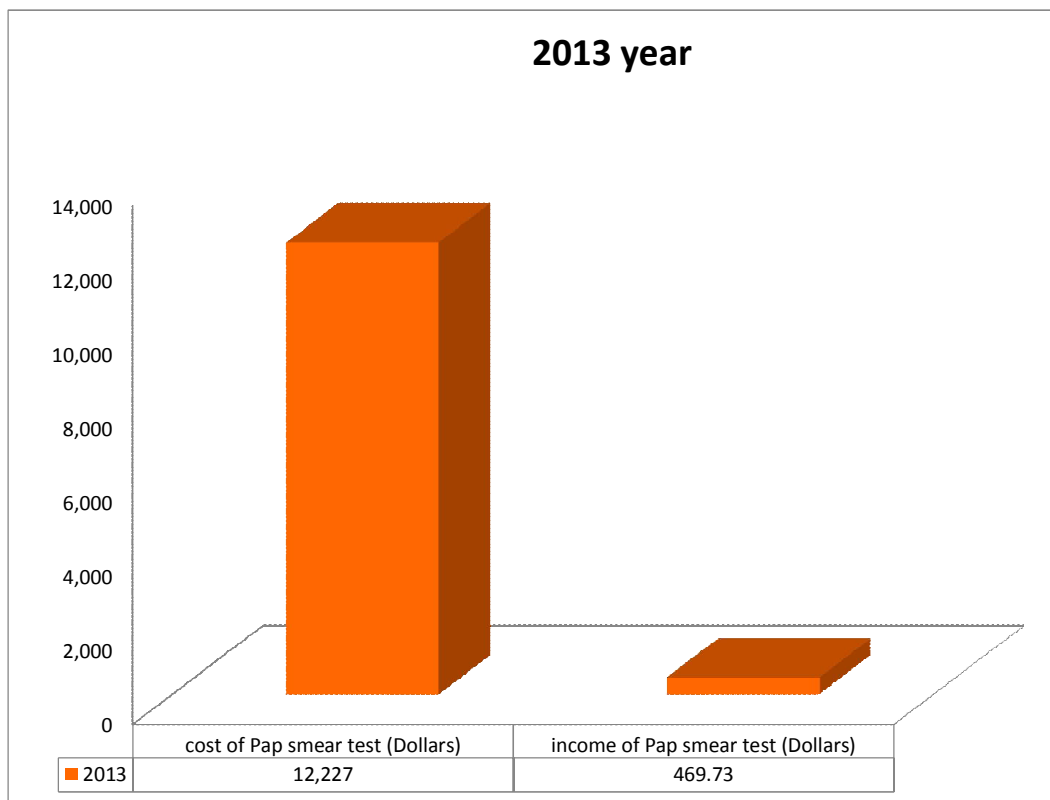
$(24000 + 8000 + 8000) \times 291 = 11,640,000$  RLS, which was equal to \$469.73.

The cost-benefit ratio derived from performing service of Pap sampling in Damavand County health centers is  $11640000 / 303009000$  which became equal to 0.038.

## Discussion

Based on the results obtained in this research, the cost of cervical cancer screening service done through sampling (Pap smear test) for 2013 in Damavand health network was estimated to be \$122,279, which is 26.03 times the proceeds from this service, which is about \$469.73 in the same period of time. Despite the high expenditure for the provision of this service for the network, there is not even one positive screening test from 2011 to 2013. In spite of this pleasant report, according to the country statistics the incidence rate of cervical cancer cases was 7.1 percent in one hundred thousand people. It is expectable to be approximately 2 case of cervical cancer was found; therefore, this result seems unlikely.

This statistics indicates the provision of this service in the Damavand County health network economically is not beneficial and due to the same nature of how to provide this service in other cities may be predicted that



the cost-benefit ratio of performing the screening test in other health centers resembles to this ratio in other cities.

The absence of a positive report could be due to false negative cases, which is related to how to perform the test by unskilled midwives because the better sampling method gives much more accurate information. Other factor is that if the samples are exposed to air, it will dry rapidly so this should be fixed quickly (18). In addition, because it takes a long time for samples to transfer to Tehran hospital, any delay in this process can lead to the destruction of the samples and a false negative response. Lack of women awareness of the best testing-time and preparation before performing the test can affect the test result. Therefore, the skilled midwives are responsible for this important healthy task. Moreover, appropriate sample staining by the skilled pathologist, is very effective in correct reports (18). Other reason to not find positive Pap smear test screening, even one case, can

be samples taken away by individuals to private laboratory, because these results are not returned to health network.

Another debatable issue of the results obtained in this study is the amount of utility from this service compared to the total population covered by Damavand health network, which was too low and this report from 2011 to 2013 was 22.3, 6.9 and 6.05 percent respectively.

The most common cause of peoples low utility in research in or out of Iran included the fear of positive result or developing cervical cancer, painful nature of the test, the embarrassment of performing the test, the lack of awareness of the impact of doing this test in the prevention of cervical cancer, anxiety of test response, cultural problems and cost of screening program (18,19). Therefore, the proper consultation for women on necessity of Pap smear screening test could reduce their anxiety. The service utility could increase by effective strategies like

introducing expert midwives to them and providing methods to reduce costs (5).

In this study in particular the cost of Damavand County health care network, as well as its income from serving Pap smear test screening was calculated. Economic dimension of the cancer of cervix has many costs on the family, community and health system. Some of these costs are diagnostic radiology costs, cost of frequent tests, surgical and operating room, medical care and other radiation oncology and other sanitary costs. Therefore, cost of doing Pap smear against these costs are very low (20) and benefit of rescuing even one person in the early stages of this cancer for the entire health system is much more than the cost of this test.

On the other hand, life expectancy in these patients depends on the stage of the diagnosis of disease (20) and failure to perform regular screening is accompanied with increasing 2-6 times of cervix cancer risk (21). To reduce the cost of health care network of Damavand County for serving cervical cancer screening (Pap smear test) maybe leaving this service to private sector. Obviously, with the support of health insurance coverage this has a better result in terms of quality of service, control on properly testing, transferring process, sample interpretation, patients' satisfaction and reducing the cost of the network. For limitation of this study we can mention that a detailed estimation of all assessed costs was not possible. Moreover, since some women did the test in private gynecology clinics, exact evaluation of number of Pap smear screening test was taken and new cervical cancer cases found, therefore, was not predictable.

### Conclusion

Based on the statistics obtained, cost of serving cervical cancer screening, Pap smear test, is much more than the income for the health network Damavand city and benefit-cost ratio of this service is under 1. According to the results, in spite of the high cost, no

positive case of the Pap smear was reported. Thus, this test in period of 2011-2013 was not cost effective.

Researchers suggest more research to be done in order to find out defects that led to the no positive test was found. These defects can be from primary sampling procedures to interpretation steps. On the other hand, active relationship between health care network and gynecology clinics can increase positive Pap smear tests and cervical cancer.

Furthermore, providing this service by the private sector obviously, with the support of health insurance coverage; perhaps, has a better results in terms of quality of service, control on properly testing, transferring and interpretation steps, patients satisfaction, shortening the waiting period for patients at health centers, also reduce the costs of health care network.

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