

CANCER SCREENING AND PREVENTION IN CHINA



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Due to the increasing burden of cancer in China, the Chinese government launched a series of projects on cancer screening and prevention. Cervical and breast cancer screening are the most successful ones which cover a large number of rural women all over China. Screening has increased the detection of early cancer cases which could be treated more effectively. New technologies and highly efficient strategies are essential for expanding the current screening programmes to the whole population at risk.

With the rapid economic development of China, tremendous changes have been seen in the Chinese population because of environmental conditions, chronic infection, dietary intake, nutritional status and lifestyle factors. As a consequence, the cancer burden in China has increased over the past three decades.¹ In the latest report from the National Cancer Registry Centre, the estimate of total nationwide cancer cases and cancer deaths in China was approximately 3.5 million and 2.5 million per year respectively in 2009, with the incidence (age-standardized rate with the world standard population [WASR]) of 191.72 per 100,000 and mortality (WASR) of 115.65 per 100,000, respectively.² Although the total cancer incidence rate was higher in urban areas than in rural areas, the upward trend in rural areas was more obvious than in urban areas.³

Among known and avoidable risk factors causing cancer

deaths in the Chinese population, the most important are chronic infection (29.4%), tobacco smoking (22.6%), low fruit intake (13.0%), alcohol drinking (4.4%), low vegetable intake (3.6%) and occupational exposure (2.7%).⁴ However, the ranks are different when stratified by gender. The top six factors in men are tobacco smoking, chronic infection, low fruit intake, alcohol drinking, low vegetable intake and occupational agents; whilst those in women are chronic infection, low fruit intake, tobacco smoking, low vegetable intake, occupational agents and environmental agents.⁴ Because prevention (such as changing lifestyles) is a long-term effort and the effects will not be seen in the near future, then secondary prevention, which is known as early detection and early treatment, is the most effective measure for cancer control and prevention in China.

Following the guidelines of “Programme of Cancer Prevention and Control in China (2004–2010)” which has

Table 1: Demonstration project on the early detection and treatment of cancer in rural China, 2008

Cancer types	No. of Sites	Target population		Screening Methods
		Ages (years)	Gender	
Cervical cancer	3	30–54	Female	VIA/VILI followed by colposcopy
Esophageal cancer	3	40–69	Male/female	Endoscopy
Colorectal cancer	2	40–74	Male/female	QRA and FOBT followed by DRE and colonoscopy
Liver cancer	2	35–64 (Male);	45–64 (Female)	HBsAg followed by AFP and ultrasound
Nasopharyngeal cancer	2	30–59	Male/female	CE and EBV antibody (VCA/IgA) detection followed by fibronasopharyngoscopy
Gastric cancer	1	40–69	Male/female	QRA and serum PG detection followed by gastroscopy

Abbreviations: VIA: visual inspection with acetic acid; VILI: visual inspection with Lugol's iodine; QRA: quantitative risk assessment; FOBT: faecal occult blood testing; DRE: digital rectal examination; AFP: alpha-fetoprotein; CE: clinical examination; EBV: Epstein-barr virus; VCA: virus capsid antigens; PG: pepsinogen.

been endorsed by World Health Organization as an example of a top-down planning process⁵, a series of demonstration projects have been proposed by the Cancer Foundation of China and sponsored by the central government. At the very beginning, two screening demonstration sites were established for cervical cancer; one in Xiangyuan, Shanxi Province, for a rural model and the other in Shenzhen for an urban model⁶ and two esophageal cancer sites for the rural model in the Grand Junction Area of Taihang Mountain in 2004. Subsequently, this has been expanded to 13 demonstration sites for six cancer types (including cervical cancer, esophageal cancer, colorectal cancer, liver cancer, nasopharyngeal cancer and gastric cancer) from 2008 (Figure 1). The target population and main screening methods for each cancer in this demonstration project are listed in Table 1.

Based on the experience gained from the demonstration projects and other countries, screening for cervical cancer and breast cancer are the most effective ones with developed technologies, which could be implemented on an extensive scale. After expanding the project sites for cervical cancer screening to five counties in 2006 and 43 in 2008, the Ministry of Health and All-China Women's Federation proposed a three-year project targeting 10 million women for cervical cancer screening and 1.2 million women for breast cancer screening in rural China in 2009–2011. The cervical cancer screening was implemented on 221 sites across China with free visual inspection with acetic acid/iodine solution (VIA/VILI) or Pap smear; and breast cancer screening covered women living in 200 counties in China with free clinical breast examination triaged by ultrasound examination.⁷ In spite of this effort, the estimation of the total number of rural Chinese women in the target age group (i.e., 35–59 years) who need this kind of cervical cancer screening is approximately 142 million.⁸ At the current rate of expansion, it would take another additional 40 years to screen each woman within this age group once. China cannot wait any longer to

take measures to avoid this delay in screening.

With strong support from central government, this project is continuing and has been tripled to 10 million women for cervical cancer and 1.2 million women for breast cancer screening per year from 2012. However, the limited capacity of the current health service in China requires new highly efficient technology to realize the goal of nationwide cervical cancer screening. HPV DNA testing has been proved to be an effective method for primary screening in both developed and developing countries.^{9–11} Recently, the new rapid and simple HPV DNA testing, careHPV, has been developed and evaluated in multiple countries.^{12–15} It has a high sensitivity, moderate specificity, and can test both clinician- and self-collected specimens at 90 tests per run with a lower cost. This technology has been approved by China Food and Drug Administration in 2012 and is now in production. Combined with self-sampling, HPV-based screening could improve the participation rate to some extent, while the sensitivity is much higher than VIA/VILI or Pap smear.¹⁶ Scientists are now promoting these new technologies or strategies to the current national cervical cancer screening programme in China.

Besides nationwide implementation, screening for other major cancers was also expanded in other high-risk areas. As of 2013, there have been 110 sites for upper gastrointestinal cancer (including esophageal cancer, cardiac cancer and gastric cancer), 5 for colorectal cancer, 11 for liver cancer, 6

Figure 1: Map of demonstration sites for early detection and early treatment of cancer in China, 2008



Table 2: The primary results of cancer early detection and treatment projects in rural China (2012–2013)¹⁷

Cancer Types	No of screenings	Detection rate (%)	Early detection rate† (%)	Treatment rate (%)
Upper gastrointestinal cancer	189,329	1.6	72.4	84.6
Colorectal cancer	40,510	6.2	91.9	91.5
Liver cancer	14,964	0.7	55.6	91.7
Nasopharyngeal cancer	9,046	0.5	64.4	100.0
Lung cancer	4,845	1.4	45.6	75.0
Total	258,694	2.2	80.2	87.8

† Early detection rate = Number of early cases detected / Number of total cases detected *100%.

for nasopharyngeal cancer and 3 for lung cancer in rural areas. From the latest Annual Report,¹⁷ the early detection rate ranged from 45.6% for lung cancer to 91.9% for colorectal cancer; and the treatment rate ranged from 75% for lung cancer to 100% for nasopharyngeal cancer (Table 2). In addition, this project also provided training for a group of technicians and clinicians who work in primary health care institutions. This project has been introduced into urban areas in China from 2012 and targets screening for lung cancer, breast cancer, colorectal cancer, upper gastrointestinal cancer and liver cancer.

With more than one fifth of the world's population, as well as the increasing cancer burden in the contemporary Chinese population, China's fight against cancer will have a global impact on human health. The experience in cancer prevention and control in China will also help other low- and middle-income countries, which account for 60% of the world cancer burden, to fight against cancer. •

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