The Comprehensive Prevention and Control of Cancer in Jiangsu Province, China

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Jiangsu province is one of the developed provinces, located in the center of the coastal zone of eastern China. It covers an area of 102,600 sq.km. There are 13 municipalities directly under the jurisdiction of the province, and Nanjing is the capital. The total population of Jiangsu is 75.49 million.
## Major health statistical indicators, 2006

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total population</strong></td>
<td>75.49 million</td>
</tr>
<tr>
<td>--Birth rate</td>
<td>9.36‰</td>
</tr>
<tr>
<td>--Death rate</td>
<td>7.08‰</td>
</tr>
<tr>
<td><strong>Life expectancy</strong></td>
<td>74.13 yrs (in 2000)</td>
</tr>
<tr>
<td>--Male</td>
<td>71.88 yrs (in 2000)</td>
</tr>
<tr>
<td>--Female</td>
<td>76.47 yrs (in 2000)</td>
</tr>
<tr>
<td><strong>Infant mortality</strong></td>
<td>5.95‰</td>
</tr>
<tr>
<td><strong>Maternal mortality</strong></td>
<td>11.47/100,000</td>
</tr>
</tbody>
</table>
Part I
Cancer epidemiologic characteristics and prevention works in Jiangsu
Cancer prevalence in Jiangsu

- Jiangsu is a high cancer incidence area. Cancer has been the first leading cause of deaths since 1970s. Cancer mortality is 50% higher than the national average.
Cancer prevalence in Jiangsu

- Cancer mortality was 126.5/100,000 according to the first death retrospective survey (1973-1975). The mortality was the second highest nation-wide, less than Shanghai.

- Cancer mortality was 159.8/100,000 according to the second death retrospective survey (1990-1992), the second highest nation-wide again.

- The third death retrospective survey (2003-2005), cancer mortality was 225.6/100,000 (much higher partly due to more cancer high incidence areas were involved).
Age-standardized cancer mortality of three death cause retrospective surveys
Cancer Mortality in Jiangsu from 1973-1975

Mortality of Cancer:
- 59
- 60 - 99
- 100 - 139
- 140 - 179
- 180 - 200
The highest mortality of cancer in Jinagsu from 1990–1992
Trends of crude cancer mortality in recent 20 years
The top 10 leading causes of death in Jiangsu, 2006

<table>
<thead>
<tr>
<th>Disease</th>
<th>Mortality (1/100,000)</th>
<th>Ratio (%)</th>
<th>Order of death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>184.37</td>
<td>30.72</td>
<td>1</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>122.56</td>
<td>20.42</td>
<td>2</td>
</tr>
<tr>
<td>Disease of respiratory system</td>
<td>83.99</td>
<td>13.99</td>
<td>3</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>78.68</td>
<td>13.11</td>
<td>4</td>
</tr>
<tr>
<td>Trauma and poisoning</td>
<td>39.58</td>
<td>6.60</td>
<td>5</td>
</tr>
<tr>
<td>Disease of digestive system</td>
<td>14.97</td>
<td>2.49</td>
<td>6</td>
</tr>
<tr>
<td>Other disease</td>
<td>13.30</td>
<td>2.22</td>
<td>7</td>
</tr>
<tr>
<td>Disease of urogenital system</td>
<td>6.47</td>
<td>1.08</td>
<td>8</td>
</tr>
<tr>
<td>Psychonosema</td>
<td>5.79</td>
<td>0.97</td>
<td>9</td>
</tr>
<tr>
<td>Nervous system disease</td>
<td>5.29</td>
<td>0.88</td>
<td>10</td>
</tr>
</tbody>
</table>
Liver, gastric, lung and esophageal cancer are most common cancers, accounting for 80% of total cancer deaths.

Currently, liver cancer is the first leading cancer death in rural areas, lung cancer is the first in urban areas.

Lung cancer is increasing rapidly, while esophageal and stomach cancer are decreasing gradually.
The geographic distribution of cancer in Jiangsu

- High cancer incidence areas of total cancer mortality are located in Lixiahe area (Middle Jiangsu) and some areas around the Tai Lake.
The geographic distribution of liver cancer

For liver cancer, high cancer incidence areas are mainly in the middle and south-eastern coastal area along Yellow Sea, such as Qidong and Haimen County.
The high risk areas of lung cancer are sporadic, mainly in some big cities and industrialized areas, such as Nanjing, Xuzhou, and some cities/counties in southern Jiangsu as well.
Stomach cancer high incidence areas are at the center of Huai’an, Yangzhong and Jintan, most parts of southern and middle Jiangsu are included.
Most high esophageal cancer incidence areas are located in Lixiahe area and north of Yangtze river.
Major risk factors of cancer

- Ageing
- Liver cancer: HBV, aflatoxin, microcystin, micronutrients deficiency
- Esophageal and gastric cancer: unhealthy dietary habits, nitrosamines in foods, helicobacter pylori infection
- Lung cancer: smoking, in door or environmental air pollution
- Environmental pollution
- Development of diagnostic and treatment skills leads more cancer patients are easy to be identified rather than die from other diseases.
Starting of cancer prevention and control activities

- Cancer prevention and research activities have been conducted since 1970s.
- Cancer epidemiologic characteristics were identified through retrospective surveys which were conducted in 1970s, 1990s.
- Death reporting system was established in some counties in 1970s. In 1982, 11 counties were involved in it.
- Cancer prevention agencies such as cancer hospitals, cancer prevention offices and research institutes were founded in some high incidence areas.
The provincial government set cancer prevention as a priority. In 1998, several meetings were held by the provincial government to discuss cancer prevention in high incidence counties. An expert group was set up to help local governments and health agencies. More funding was put into cancer prevention works.
Current cancer prevention works

Till the end of 1998, cancer prevention strategies and plans were approved by local government and the expert group in 9 high incidence counties. Nowadays, cancer prevention activities are conducted according to the approved plans in these 9 counties, leading by the local government.
Besides 9 high incidence counties, now cancer prevention works are carried out throughout the whole province, including cancer registry, health education, intervention on risk factors, screening, scientific research, etc.
Health education

- Cancer prevention knowledge are distributed through health education activities, not only during the Tumor Prevention Week but also in normal days.
Risk factors intervention

- Smoking is an important risk factor for many cancers, tobacco control campaign has been carried out in many counties.

- Vaccination of HBV is used for liver cancer prevention.

- In some areas, intervention on environmental risk factors (water and air pollution) were conducted by cancer prevention agencies, cooperated with environmental protection department.
Screening

- Supported by MOH, screening projects on esophageal cancer, liver cancer, breast cancer and cervix cancer are being conducted among high risk population in some high incidence areas.

- Some areas also carried out cancer screening activities with endoscopic biopsy, TSGF and B-ultrasound skills and so on.
Patient management

- The management of cancer patients now is ongoing in many counties.
- Health record setting up and management of cancer patients have been involved in the Farmer’s Health Project, which was started and funded by the provincial government in 2006.
Surveillance

- Cancer registry
- Death certificate
- Behavior risk factors surveillance
Cancer registry system has been established in at least 56 counties. It covers a population of 32.9 million, more than 44% of the total population.
江苏省恶性肿瘤病例报告卡

编号: [空格]

门诊号: [空格] 住院号: [空格] 身份证号: [空格]
姓名: [空格] 性别: 男 女 电话: [空格]
出生日期: 年 月 日 资料年: 岁 民族: [空格]
职业(工种): [空格] 工作单位: [空格]
详细地址: 县(市、区) 乡(镇、街道) 村(居委) [空格]
ICD-10 编码: [空格]

d更正诊断报告单
(原诊断有误时填写)
更正诊断: [空格] 原诊断: [空格]
更正日期: [空格]

临床: [空格] 生化: [空格] 免疫: [空格]

病例类型: [空格] 临床分期: [空格]
(如是多发肿瘤: 请尽可能注明原发部位)

【录入肿瘤病例报告卡信息】

肿瘤病例报告卡

患者编号: [空格] 地区名称: [空格] 地区编码: [空格]
住救编号: [空格] 联系电话: [空格] 患者姓名: [空格]
性别: 男 女 [空格] 出生日期: [空格]
年龄: [空格] 民族: [空格]
患者职业: [空格] 职业编码: [空格]

临床: [空格] 生化: [空格] 免疫: [空格]

【录入肿瘤病例报告卡信息】

ICD-10名称: [空格] ICD-10编码: [空格]

【录入肿瘤病例报告卡信息】

【录入肿瘤病例报告卡信息】
Death certificate

- Death certificate system has been applied in almost 90 counties in the province, covers more than 80% of the total population.
Behavior risk factors surveys, BRFSS

- Behavior risk factors surveys were conducted in some areas in 1990s.

- The provincial behavior risk factors surveillance started from 2004, but only 3 counties were involved in the beginning.

  The second provincial behavior risk factors surveillance was conducted in 2007, representative data was acquired as 14 counties participated.
The preliminary progresses of cancer prevention

- An effective cancer prevention network down to village level has been established.
- Population cancer prevention knowledge has been increased significantly.
- Some cancer mortalities began to decrease by effective control activities, such as liver cancer in Qidong and esophageal cancer in some high risk areas.
Problems and difficulties

Although some progress has been made in cancer prevention, but there still are many problems and difficulties.

- A government leading, multi-department involved cooperative prevention framework has not been established yet.

- The input for cancer prevention is not enough. More budget should be used for surveillance and primary prevention.
Cancer prevention works remain unbalanced in the province, for some areas still need to be improved.

Primary prevention are difficult to conduct as risk factors for cancer are still not clear enough.

Technical skills and guidelines on screening and treatment for certain cancer are not available yet.

Some cancer patients can not be effectively treated in time because of the incomplete social security system.
Strategies of cancer prevention and control

- **Primary prevention**
  - Health education and promotion
  - Healthy lifestyle
  - Environmental protection
  - Tobacco control
  - Legislation
  - Infection control
  - Vaccination
  - Reasonable diet

- **Early screening**

- **Cancer surveillance**
Part II
An introduction of etiological heterogeneity of top 4 cancers in high and low risk areas of Jiangsu Province, China
Abstract

- Population based case-control, case-case and follow-up study on top 4 cancers were conducted in high (Dafeng, Huai’an) and low risk areas (Ganyu, Tongshan), to identify associated risk and protective factors, and to explore the reasons that accounting for the significant geographic difference of cancer mortality. Results will be used for cancer prevention, treatment and prognosis prediction in the whole province.
Main goals

- To explore the associated risk and protective factors of top four cancers in both high and low incidence areas.
- To identify the reasons that accounting for the significant geographic difference of cancer mortalities.
Specific goals

- To conduct researches on risk factors, protective factors, genetic susceptibility and gene-environmental interaction on top 4 cancers in low and high incidence areas, respectively.

- To identify the heterogeneity associations of environmental, genetic factors and their interaction with cancer development by case-case study in both low and high incidence areas.
Specific goals

- To explore the factors and gene-environmental interactions associated with precancerous diseases and their regression in low and high incidence areas.

- To conduct demonstration intervention trials for helping formulate the comprehensive cancer intervention strategy in the province.
Study contents

- To compare the risk factors of liver, stomach, esophageal and lung cancer in both low and high risk areas.

- To explore genetic susceptibility and its interaction with environmental and behavior factors in low and high risk areas.

- To compare the difference of association in low and high risk areas.
Study contents

- To study the role of genetic susceptibility and environmental, behavior factors in the development of precancerous diseases and cancer.

- To observe the effect of behavior and dietary intervention on the development of precancerous disease.
Study design

- Identical protocols are used for population based case-control and case-case study in Dafeng, Huai’an, Ganyu and Tongshan County simultaneously.
Study subjects

- **Cases:** Newly diagnosed cancer patients from local adult residents, secondary and recurrent cancers are excluded.

- **Controls:** Eligible controls are randomly selected from the general population of the same county. Controls and cases are 1:1 matched for gender, age (±5 years) and years of inhabiting (±5 years).
Sample size

- 600 cases and 600 controls for each cancer site will be recruited in each county, therefore, 2400 pairs of case and control for one cancer site will be recruited in total.
Data collection

- **Questionnaire**: including cancer related variables, such as demographic information, living conditions, lifestyle, disease history.
- **Physical examination**: height, weight, blood pressure etc.
- **Blood sampling**
- **Biopsy tissue for some cases**
Quality control

- All investigators must be trained and qualified for the study.
- A pilot study was used to test the validity of questionnaire and study design.
- Cases and controls are strictly matched by gender and age.
Quality control

- Supervisors are used for checking and inspection.
- 5% questionnaires will be re-investigated for validation.
- Lab quality control methods include control set up and repeat measurements.
- Data should be double entry and cleaned to minimize the input mistake.
## Current progress

<table>
<thead>
<tr>
<th>Site of Cancer</th>
<th>Case Investigated</th>
<th>Blood sampled</th>
<th>control Investigated</th>
<th>Blood sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophagus*</td>
<td>3480</td>
<td>2239</td>
<td>2324</td>
<td>2305</td>
</tr>
<tr>
<td>Stomach *</td>
<td>2545</td>
<td>1745</td>
<td>1638</td>
<td>1630</td>
</tr>
<tr>
<td>Lung</td>
<td>2387</td>
<td>1689</td>
<td>1545</td>
<td>1541</td>
</tr>
<tr>
<td>Liver</td>
<td>1921</td>
<td>1225</td>
<td>1019</td>
<td>1017</td>
</tr>
</tbody>
</table>

**Note:** *The field works have been finished*
Lab and blood samples
Current progress

- Data collection for esophageal and stomach cancer has been finished, for lung and liver cancer are still ongoing.
- Data are being analyzed, some papers have been published, other papers will come out gradually.
- Analysis on gene environmental interaction will be set as priority for the next step.
Thank you!