

University of Macau

Abstract

The Study on Input and Output of
Public Health Services System in Macao SAR

by Lao Tek

Thesis Supervisors: Prof. Wang Yitao, Dr. Bian Ying
Medicinal Administration

The first western hospital in China was set up in Macao in the 16th century. Over the past five hundred years, Macao health services system has gradually formed its shape to its current system, especially since 1980s. The target of Macao is to achieve “Health for All”. All Macao citizens are entitled to free health care service in health centers.

Aim: The main aim of this research project is to examine the input and output of Macao public health services system in the past 15 years (1990-2004) and their changes; to analyze any difference between before handover (before 1999) and after handover (after 2000) of Macao public health services system; thus give suggestions on improvement for this system.

Methodology: (1) *Data resources:* Department of Health, Department of Statistics and Census, Department of Finance Services, WHO Statistical Information System etc. (2) *Document resources:* Government evaluation reports namely “A Study of Macau’s Healthcare System” and “The Health System of Macao — Diagnosis and Recommendations”; publications and website of Department of Health; and papers about Macao Health System published in “Macao Research” and other related books/journals. (3) *Modeling:* Simple calculations such as growth rate on yearly base and fixed base, and annual increase rate were used. Data were divided into two groups, 1990-1999 (before handover) and 2000-2004 (after handover). SPSS’ One-Way Anova was used to analyze the difference between before handover and after handover of this system. SPSS’ multi-linear regression was used to arrive with an equation for input and output. Some indicators were compared with the average of

WHO countries.

Results: Macao public health services system is a two level system. General health care services are carried out by health centers while special health care services are carried out by Hospital Centre Conde S. Januario. The Macao Department of Health works closely with private health care providers. It subsidizes Kiang Wu Hospital and Worker's Clinic to provide free health care services to certain Macao citizens. It works together with Kiang Wu Hospital in providing health care services to cancer patients and patients with chronic renal failure.

(1) Input: There was an increase of 27.80% in the total number of professional medical staff since 1992. The annual increase rate of the period 1992-1999 (before handover) was 3.44%; the annual increase rate of the period 2000-2003 (after handover) was 0.40%.

In the period of 1992-2003, the population:doctor ratio decreased from 1543:1 to 1304:1; the population:nurse ratio decreased from 786:1 to 694:1; and the total professional medical staff decreased from 232:1 to 215:1. The total growth rates were 15.48%, 11.70% and 7.32% respectively. The ratio of nurses to doctors decreased from 1.96:1 to 1.88:1, the growth rate was 4.08%.

In 1990-2004, the public expenditure on health was about 9% of the total government budget. In 1990-1999 (before handover), the public expenditure was mostly less than 9% of the total government budget. Whereas in 2000-2004 (after handover), the public expenditure was all over 9%.

In 1990-2004, the public expenditure on health as a percentage of GDP was about 2%. In 1990-1999 (before handover), the public expenditure on health as a percentage of GDP was mostly less than 2%, whereas in 2000-2004 (after handover), it was over 2%, except in 2004.

In the years of 1990-2004, there was an absolute increase of 394.29% in public expenditure on health. The annual increase rate of the period 1990-1999 (before handover) was 17.64%; the annual increase rate of the period 2000-2004 (after handover) was 4.57%.

The public expenditure on health of Macao government can be divided into three parts by function. Administration, regulation and investigation made up the largest

part of the public expenditure on health in 1990-2004, it ranged from 72.40-97.21% of the whole. Medicine made up 1.79-26.53%, with an average of 9.39%. Hygiene and public health made up 0.19-6.48%, with an average of 2.02%. In recent year, there was an increase in the percentage of hygiene and public health in total public expenditure on health.

In the years of 1990-2004, the public expenditure on health per population increased 260.65%. The annual increase rate of public expenditure on health per population in the period 1990-1999 (before handover) was 14.60%; the annual increase rate in the period 2000-2004 (after handover) was 2.61%.

The budget on personnel made up the largest part of the total expenditure of the Department of Health, which was more than 50% of the total. The average salary (constant price) of professional medical staff increased 104.10%. The annual increase rate of the expenditure on personnel in the period of 1992-1999 (before handover) was 11.33%; the annual increase rate in the period of 2000-2003 (after handover) was -0.66%.

The number of beds in Hospital Centre Conde S. Januario increased 25.07% in the period 1991-2003. The annual increase rate of number of beds in the period 1991-1999 (before handover) was 2.23%; the annual increase rate in the period 2000-2003 (after handover) was 2.06%. The population per bed was about 1000:1, which means that there was one bed for about every thousand population.

The total number of medical staff in health centers increased 22.29% in the period 1993-2003. The annual increase rate of the total number of medical staff in health centers in the period 1993-1999 was 2.84%; the annual increase rate in the period 2000-2003 was 0.63%. The distribution of doctors and nurses at different health centers was quite even.

(2) *Output*: The rate of natural increase of Macao population decreased from 16.4‰ in 1990 to 3.8‰ in 2004. The crude birth rate decreased from 20.9‰ in 1990 to 7.2‰ in 2004. The crude death rate decreased from 4.5‰ in 1990 to 3.4‰ in 2004. The infant mortality rate decreased from 8.4‰ in 1990 to 0.6‰ in 2003. The life expectancy at birth increased from 76.6 to 79.2 in the period of 1993-2003, with a growth rate of 0.39% in total.

The number of discharges increased 25.8% in the period of 1991-2003. The annual increase rate of discharges in the period of 1991-1999 (before handover) was 1.19%; the annual increase rate in the period of 2000-2003 (after handover) was 3.05%. The number of in-patient bed days increased 11.10% in the period of 1991-2003. The annual increase rate of in-patient bed days in the period of 1991-1999 (before handover) was 1.21%; the annual increase rate in the period of 2000-2003 (after handover) was -0.96%. Average length of stay decreased 11.66% in the period of 1991-2003. Bed occupancy rate was around 70% in the period of 1991-2003.

Out-patient department visits increased 185.32% in the period 1990-2003. The annual increase rate of out-patient department visits in the period of 1990-1999 (before handover) was 8.72%; the annual increase rate in the period of 2000-2003 (after handover) was 6.31%. Emergency department visits increased 286.55% in the period 1990-2003. The annual increase rate of emergency department visits in the period of 1990-1999 (before handover) was 13.03%; the annual increase rate in the period of 2000-2003 (after handover) was 6.44%.

The number of out-patient visits at all health centers increased 138.08% in the period of 1993-2003. The annual increase rate of out-patient visits at all health centers in the period of 1993-1999 was 10.55%; the annual increase rate in the period of 2000-2003 was 1.22%.

(3) Analysis on input-output: The annual increase rate of output in the period of 1993-1999 (before handover) was 10.55%; the annual increase rate of output in the period of 2000-2003 (after handover) was 1.22%. There was a huge significant difference in output before and after handover. An increase of 2.11% in public expenditure on health and 0.26% in number of professional medical staff could give an increase of 1% in output. An increase of 2.26% in number of beds could give an increase of 1% in in-patient bed days.

A model is developed to analyze the relationship between input and output. By using multi-linear regression analysis in SPSS, the following equation can be derived.

$$y = -3470189.322 + 13.263x_1 - 298.584x_2 - 2.223x_3 + 367.443x_4 - 4021.370x_5$$

There were significant differences between before handover and after handover in public expenditure on health, public expenditure on health per population, number of

discharges, in-patient bed days, out-patient visits, emergency department visits and out-patient visits at health centers. They are the main factors affecting the multi linear regression model.

Discussion: The general government expenditure on health as a percentage of total general government expenditure in Macao was lower than that of WHO countries' average. And the per capita government expenditure on health at average exchange rate (US\$) in Macao was higher than that of WHO countries' average.

The expenditure on personnel accounted for the largest percentage of the total expenditure of Department of Health and the average salary of professional medical staff was increasing. Overtime working is common and compensation is high. It is suggested that the Department of Health increase number of professionals to solve the shortage of medical staff and decrease the expenditure on compensation for overtime work. The expenditure on payment to pharmacies is increasing, some medicines are overcharged and there is no limitation to prescriptions. It is suggested that price of medicine should negotiated.

Macao is facing an aging population and threat of influenza pandemic. The public expenditure on health cannot go on increasing unlimited. Other ways such as co-payment and cost sharing must be considered to maintain current level of health services. The demand from immigrants is not to be neglected. The resident population is increasing in Taipa, Hospital Centre Conde S. Januario cannot meet the increasing demand for health services and GDP is increasing fast. Government can consider building a third hospital in Taipa.

Conclusion: (1) *Input:* The annual growth rates of input were higher before handover than after handover. There was significant difference between before handover and after handover in public expenditure on health and public expenditure on health per population. (2) *Output:* The annual growth rates of output were also higher before handover than after handover. There was significant difference between before handover and after handover in all indicators of output. (3) *Analysis on input-output:* An increase of public expenditure on health gave a small increase in output of public health services while an increase of professional medical staff gave a big increase in output of public health services. The result of the multi-linear regression indicated that the public expenditure and GDP had a negative effect on the

output, whereas the number of professional staff had a positive effect on output. (4) Government need to slow down the growth rates of the public expenditure on health while increase the number of professional medical staff. In order to maintain current level of efficiency or even improve efficiency, government has to consider charging some of its health services or share costs with patients.

Keywords: Input, Output, Public Health Services System, Macao SAR