

Tuberculosis: New Face of Old Disease

One Japanese city's experience and its applicability

PUBP 757-001: Public Policy in Global Health and Medical

Professor Arnauld E. Nicogossian

December 8, 2006

Takeko Kumagawa

Contents

Contents	i
Abstract.....	1
Introduction.....	2
Methodology.....	8
Result	8
Tuberculosis statistics in Japan.....	8
Tuberculosis and homelessness	9
Tuberculosis and the city of Osaka.....	10
Tuberculosis control plans and strategies for the city of Osaka	13
<i>Objectives</i>	13
<i>Strategies</i>	13
Health system and payment	15
Tuberculosis control result in the city of Osaka	17
Discussion.....	18
Conclusion	19
References.....	21

Abstract

Japan enjoys the world's longest life expectancy for women, and men's life expectancy is also not far behind either. This longevity is due to continuous improvement of healthcare systems as well as nutritional factors. However, while Japanese are enjoying longer life, tuberculosis, or TB once thought a dying infectious disease, is on the rise again in Japan. Unlike pre-World War II era, tuberculosis is no longer the leading cause of death in Japan; however, the disease is still a major problem, especially in a big city like Osaka, in terms of public health prospective.

The city of Osaka has the highest rate of tuberculosis prevalence in Japan. The city has successfully reduced the rate by about half during 2001 to 2005 period; thereby proving the effectiveness of the WHO recommended strategy, DOTS (directly observed treatment short-course). Other effective strategies the city employed included frequent screenings and site visits.

The purpose of this paper is to explore the possibilities of whether there are any activities or policies/regulations that might help to reduce the tuberculosis prevalence rate and prevent the public in developing nations from being infected by this malicious disease. The city of Osaka's effort to battle the disease might give some ideas or guidelines to these nations where the disease is still the leading cause of death.

#

Introduction

Human beings and tuberculosis have coexisted since very early age. The trace of tuberculosis was found in the body of thousands years old Egyptian mummy. It was a fatal disease until the late 19th century. In 1882, the German microbiologist Robert Koch succeeded in viewing the tuberculosis bacteria. He discovered the way to grow the tuberculosis bacteria colonies in a lab and found how the disease spread out. This was the major break for the tuberculosis treatment. The tuberculosis treatment up until that time was to quarantine the tuberculosis patients in sanatoriums. The well-known tuberculosis vaccine, Bacille Calmette-Guerin (BCG) was first introduced in 1921. The vaccine, BCG was named after the two French scientists who developed the vaccine. After a baby was vaccinated for the first time in 1921, BCG has been administered to billions of people in the world. However, efficacy of the vaccine has been still questioned. In 1944, one of the most important tuberculosis treatment drugs, streptomycin was introduced, which, combined with other tuberculosis treatment drugs at that time, effectively ended the sanatorium era¹.

Tuberculosis is a lung disease transmitted though the air. If an infected person sneezes, coughs, or talks, tuberculosis germs spread out the air, which last for several hours. Fortunately, not everyone who inhales the contaminated air actually develops tuberculosis, only one in 10 to 15 people is infected. Who will get active tuberculosis? They are the

¹ National Institute of Allergy and Infectious Diseases, National Institutes of Health, “Focus on TB, Tuberculosis in History, Age of Optimism”.

http://www3.niaid.nih.gov/news/focuson/tb/research/history/historical_optimism.htm

Tuberculosis: New Face of Old Disease

people whose immune system is low, such as people with HIV/AIDS virus, older people, people with high stress, and people with malnutrition. As it takes a while to develop visible symptoms, tuberculosis infected people unknowingly transmit the disease to other people. Due to having seemingly a common cold, people sometimes do not know they have tuberculosis.

According to the World Health Organization (WHO), about 2 million people who live in the Western Pacific Region are infected by tuberculosis every year and only half of these cases are notified. Furthermore, of these notified cases, only half the people are actually enrolled in the WHO recommended strategy, DOTS (directly observed treatment short-course) program.

The DOTS strategy has the following elements:

- government commitment to tuberculosis control;
- use of sputum smear microscopy among symptomatic patients;
- implementation of the standard DOTS regimens of treatment;
- regular supply of anti-tuberculosis drugs; and
- standard recording-reporting system².

² World Health Organization, Western Pacific Regional Office. "REGIONAL STRATEGIC PLAN TO STOP TB IN THE WESTERN PACIFIC." 2000. http://www.wpro.who.int/NR/rdonlyres/650D4190-E176-4960-AD58-9EF8A8806226/0/STB_Regional_Strategic_Plan.pdf

Tuberculosis: New Face of Old Disease

The Region is home to 1.7 billion people, of which one out of three people are tuberculosis infected³. This region alone hosts one-third of the world's tuberculosis infected populations. These tuberculosis-infected people are the most economically productive age groups, ages 25 to 64, in the region. Since tuberculosis is closely related to poverty, having the most economically productive age groups infected by tuberculosis is a serious problem in this region's economic development. The region will not be able to cut the vicious cycle, if these age groups are not healthy. Without healthy people, the economic growth in this region will not be feasible in the future, therefore, WHO declared "TB crisis" in 1999 to control tuberculosis in the region. Incidentally, Japan is located in this region. WHO has classified Japan as "intermediate burden of TB" among other countries, such as Brunei, Hong Kong, Republic of Korea, Macau (China), Malaysia, and Singapore. Although the tuberculosis prevalence rate in industrialized nations is increasing in recent years, the rate in Japan is significantly higher than that of any other industrialized nations. In 2003, the tuberculosis prevalence rate in Japan (25 per 100,000 population) was more than twice as much as that of the United Kingdom (11 per 100,000 population) and New Zealand and France (10 per 100,000 population). And it was three times more than that of Italy (7 per 100,000 population) and 5 times more than that of the United States (5 per 100,000 population)⁴.

³ World Health Organization, Regional Office for the Western Pacific. "Overview, Stop TB Special Project in the Western Pacific Region."

⁴ World Health Organization, Regional Office for the Western Pacific. "WORLD STOP TB DAY, Fact Sheet for the Media." 24 March, 2005.

http://www.wpro.who.int/media_centre/fact_sheets/fs_20050324+Stop+TB+Day.htm

Tuberculosis: New Face of Old Disease

The history of tuberculosis in Japan is traced back to the 3rd century. It was brought by the people who migrated from the Asian continent to Japan⁵. Since then the Japanese have been battling against tuberculosis. It was the leading cause of death in Japan until 1950 by the time streptomycin and PAS (Para-Amino-Salicylic Acid) were introduced as the major treatments for tuberculosis. The number of people who had tuberculosis declined dramatically between 1950 and 1970 (See Figure 1). After a steadily downward trend, the number of tuberculosis-infected people started rising again in 1997 (See Figure 2a and Figure 2b). Witnessing this sudden increase in the tuberculosis infectious rate, the Ministry of Health, Labour and Welfare issued tuberculosis emergency declaration in July 1999 and vowed to fight against the disease. The upward trend reached the peak in 1999 and started declining again; nevertheless, it is still a major infectious disease in Japan. There are about 50 mass tuberculosis infected cases reported in Japan each year.

The Japanese government has set a target to eliminate tuberculosis in Japan by the year 2030; however, it seems to be an impossible goal to achieve with the current tuberculosis prevalence rate. In 1996, the Ministry of Health, Labour and Welfare set the national tuberculosis awareness and preventive week (Kekkaku Yobou Shuukan), which date is set to September 24th through September 30th of each year in order to educate the public and, as a consequence, to encourage them to take preventive actions against the disease. During this week, all kinds

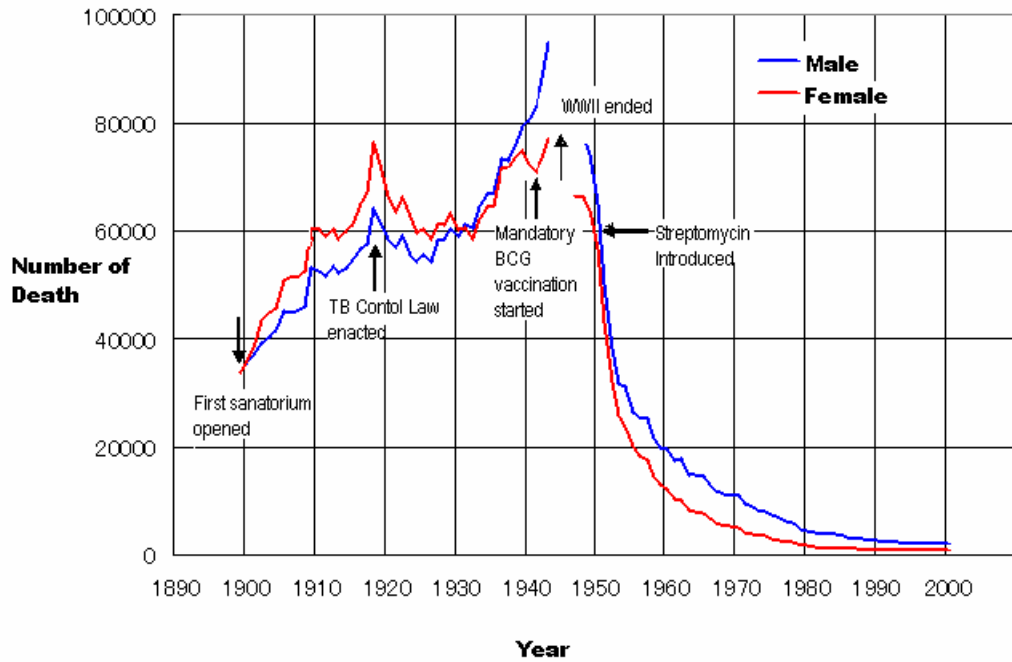
⁵ Japan Labour Health and Welfare Organization. "Health Q &A."

http://www.rofuku.go.jp/rosaibyoin/q_a/oha_38.html

Tuberculosis: New Face of Old Disease

of mass advertisement devices are used to inform and enlighten the public about tuberculosis and the tuberculosis booklet is distributed to each relevant organization.

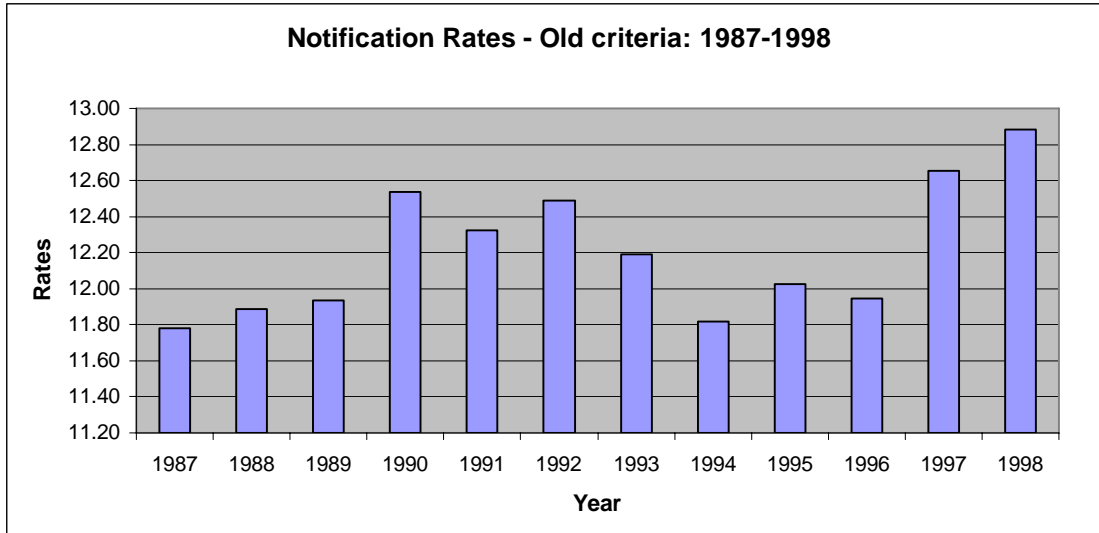
Figure 1: Trend of the Cause of Death from the Tuberculosis: 1889 - 2000



Source: Tokyo Metropolitan Institute of Public Health

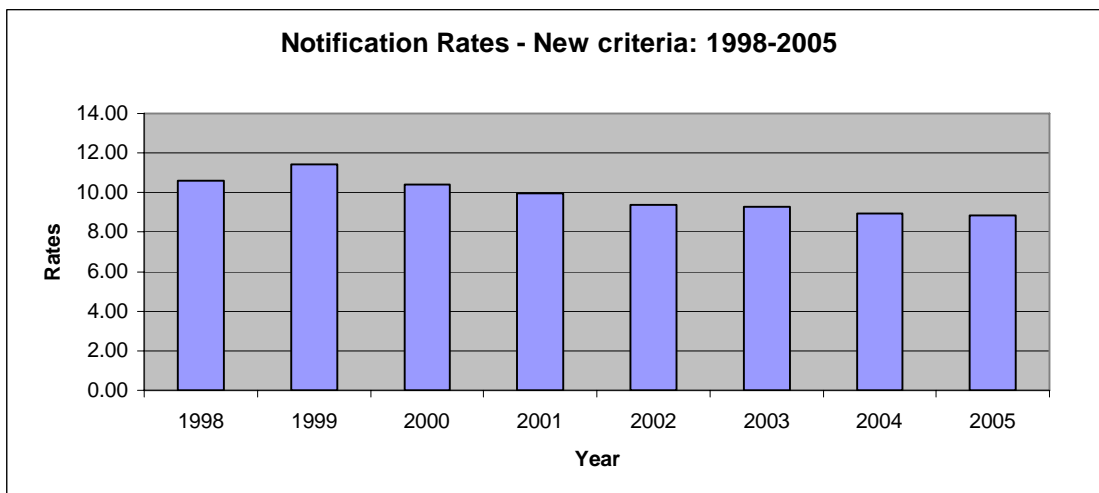
Tuberculosis: New Face of Old Disease

Figure 2.a: Notification Rates – Old Criteria: 1987-1998



Source: Research Institute of Tuberculosis, J.A.T.A.

Figure 2.b: Notification Rates – New Criteria: 1998-2005



Source: Research Institute of Tuberculosis, J.A.T.A.

Methodology

I reviewed articles and documents that described current conditions, policies, strategies, and activities to control tuberculosis in Japan through online resources and a phone interview.

The statistical data are mainly referenced from the Research Institute of Tuberculosis, J.A.T.A.

In addition to reviewing articles and documents regarding the national policies, strategies, development, and new measures, I paid special attention to the city of Osaka where the tuberculosis prevalence rate is significantly higher than that of any other major cities in Japan.

I investigated the city's policies/regulations, implementation activities, organizational structure, and their plans and strategies to battle the disease. Also, the problems arising from implementing these policies/regulations and treatments were reviewed. The data and other information regarding the city's tuberculosis control effort were derived from the city government's official website and a phone interview with the city's health center nurse.

Result

Tuberculosis statistics in Japan

According to the Infectious Agents Surveillance Report, as of the end of 2005 there were 68,508 registered tuberculosis cases nationwide in Japan. In 2005, there were 28,319 newly registered tuberculosis cases and these people were under the tuberculosis treatment.

Nationally, the prevalence of tuberculosis (22.2) per 100,000 population in 2005 decreased by 5 % (23.3) from 2004 though, the decline has been slow. Eighty percent of newly registered

Tuberculosis: New Face of Old Disease

cases had pulmonary tuberculosis and twenty percent had extrapulmonary tuberculosis.

Newly registered tuberculosis cases have been increasing every year among the people whose ages were over 60 years. The registered tuberculosis people over 60 years accounted for 60% of the total registered tuberculosis cases in 2005⁶.

Tuberculosis and homelessness

According to the government statistics in 2003, the city of Osaka hosted the largest number of the homeless people (6,603) followed by Tokyo (5,927) and Nagoya (1,788). Incidentally, these top three cities accounted for 57 percent of all homeless populations in Japan and these top three cities' prevalent of tuberculosis has been much higher than that of other cities in every year.

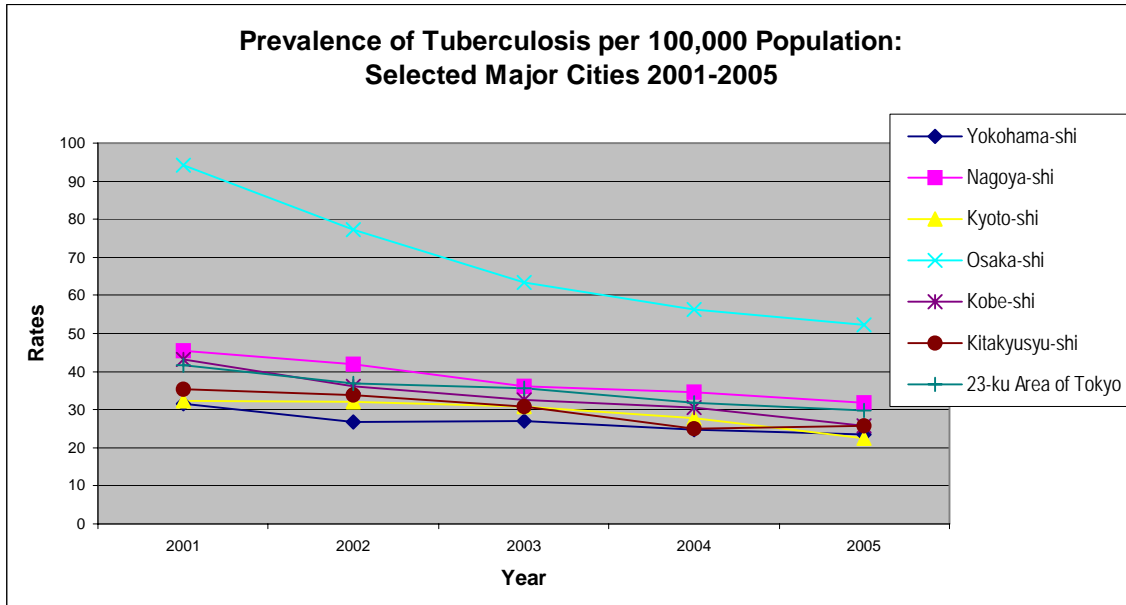
The statistics of the Research Institute of tuberculosis, J.A.T.A shows that, as of 2005, there were seven major cities whose prevalence of tuberculosis is more than 22.5 per 100,000 population. These cities were Osaka (52.2), Nagoya (31.8), Tokyo (29.7), Kitakyushu (25.8), Kobe (25.7), Yokohama (23.5), and Kyoto (22.6)⁷.

⁶ Infectious Disease Surveillance Center. "Tuberculosis as of 2005, Japan."

<http://idsc.nih.go.jp/iasr/27/320/tpc320.html>

⁷ Research Institute of Tuberculosis, JATA. "Prevalence of Tuberculosis per 100,000: Prefecture and Metropolitan cities, 2001-2005." http://www.jata.or.jp/rit/re/epro1_top.htm

Figure 3: Prevalence of Tuberculosis per 100,000 Population: Selected Major Cities 2001-2005



Source: Research Institute of Tuberculosis, J.A.T.A.

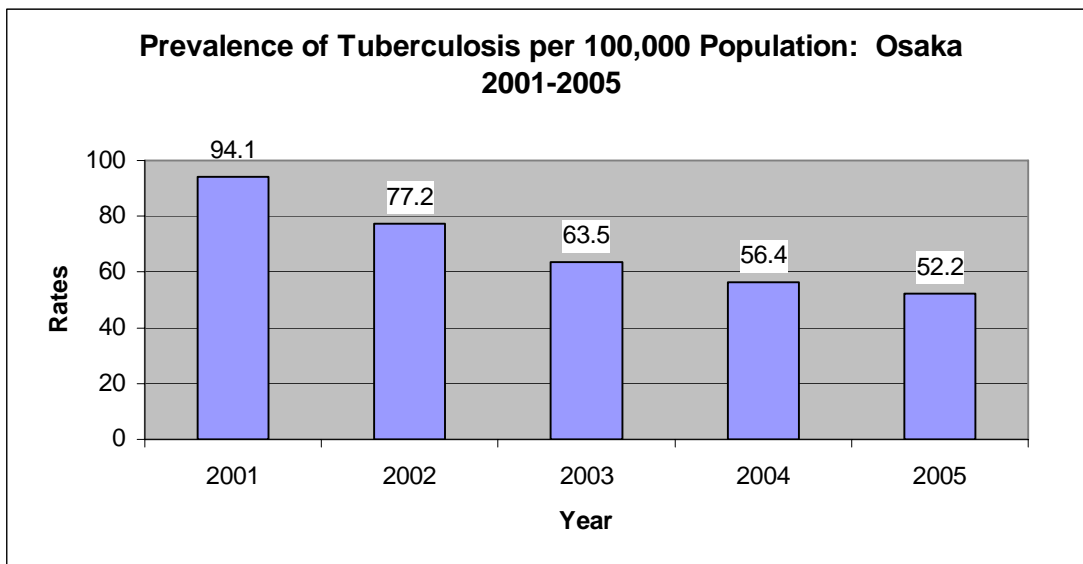
Tuberculosis and the city of Osaka

The statistics showed that the number of homeless living in Osaka was the highest in 2003. Parallel to the high homeless counts, the tuberculosis prevalence rate in Osaka was significantly higher than that of any other cities in Japan. Indeed, the city has been ranked the worst one for the past 15 years in terms of the tuberculosis prevalence rate per 100,000 population (see Figure 3). The city of Osaka hosted the largest homeless people in the nation. In addition, the city had distinct feature that contributed to the increase of tuberculosis rates compared with other major cities in Japan. One of the main characteristics was that a lot of

Tuberculosis: New Face of Old Disease

people who lived in this city were poor and moved around frequently to find low paid jobs. There were 2.6 million people living in the city of Osaka, of which 1.3 million people were moving around daily. That is, 1.3 million people were in and out of the city all the time. They were not homeless by definition though; they lived in the kind of slums where sanitation and living environments were not good at all. These highly mobile people were males in their 40s and 50s who moved frequently to find low paid jobs, becoming the medium of the disease transmitters.

Figure 4: Prevalence of Tuberculosis per 100,000 Population: Osaka 2001-2005



Source: Research Institute of Tuberculosis, J.A.T.A.

Tuberculosis: New Face of Old Disease

In 2003, there were 6,603 homeless people living in the city of Osaka and this number was the highest in Japan. Of those, about 20 percent of them were infected by tuberculosis⁸. Since these people moved frequently and freely, it was very difficult to take survey regarding tuberculosis infection let alone treat them. These people normally did not go to see a doctor voluntarily unless they felt extremely sick or someone forced them to see a doctor. Therefore, in 2006 the city started sending a doctor to the districts where homeless people live, as well as invested to operate a new mobile clinic to increase the number of regular screening sessions from once a month to three times a month in an attempt to reduce the infection rate. In addition, the city made an arrangement for the tuberculosis patients who did not have a primary physician to be able to take the tuberculosis treatment medicines at the nearby drugstores.

The city of Osaka presented notable tuberculosis treatment characteristics, such as a higher rate of recurrent tuberculosis treatment. The treatment rate for revisited tuberculosis infected people was 11.8 % in 2000 compared with 6.3 % nationwide. At the same time, the success rate of tuberculosis treatment was 75.5 %, which was the bottom third in ranking, compared with 80.9% of the national rate⁹.

⁸ Osaka Nichi Nichi Shinbun Newspaper. September 24, 2004. "Eliminate TB and Move up to Better National Ranking (NAKUSE!!OSAKA WORST ONE)." <http://www.nnn.co.jp/dainichi/kikaku/worst/worst040924.html>

⁹ Research Institute of Tuberculosis, J.A.T.A. "Tuberculosis in Osaka (OSAKA NO KEKKAKU)." <http://www.jata.or.jp/rit/rj/yossha.htm>

The city of Osaka has been the worst one in terms of prevalence of tuberculosis for the past 15 years. In order to eliminate this notorious ranking, the city has drafted and implemented detailed strategic plans to eliminate tuberculosis.

Tuberculosis control plans and strategies for the city of Osaka

Objectives

The city planned to reduce the prevalence of tuberculosis below 50 per 100,000 population and to reduce the tuberculosis infection rate of infants/toddlers (under 4 years old) to zero during 2001 to 2011 years.

Strategies

1. Manage tuberculosis patients and promote appropriate treatment
 - Promote appropriate treatment—recommend prescribing 4 basic drugs, including PZA, as the first treatment for active tuberculosis patient.
 - Manage tuberculosis patients—establish a network among institutions; including hospitals and other health organizations.
 - Interview a newly notified tuberculosis patient within 2 weeks.
 - Promote DOTS (directly observed treatment short-course).
 - Petition to establish a tuberculosis facility model project – establish regulation to invest, maintain, and subsidize temporary emergency tuberculosis facility.

2. Early tuberculosis patient detection

Tuberculosis: New Face of Old Disease

- Implement non-regular thorough health examination in addition to the regular checkup – examine all notified patients and implement RFLP analysis.
- Implement thorough regular health examination – form alliance among health organizations to encourage more people to get health checkup.
- Handle homeless people – inform tuberculosis related health examination to homeless people and implement health examination for homeless people.
- Implement thorough tuberculosis notification process and speed up tuberculosis diagnosis – inform doctors and healthcare employees regarding tuberculosis notification form during training session, provide information to improve tuberculosis diagnostic knowledge and training session.

3. Prevention and spread its information

- Improve infant BCG vaccination ratio and technique – implement thorough BCG vaccination to infant less than 1 year old, understand current vaccination environment and improve its technique.
- Implement trial preventive treatment to older people – prescribe INH as trial prevention.
- Enhance enlighten and spread information project – create a tuberculosis handling manual for healthcare organizations, enlighten the public by showing videos and holding exhibitions.
- Educate healthcare workers to become tuberculosis specialists – hold training session for the doctors to improve their diagnostic technique and appropriate tuberculosis

Tuberculosis: New Face of Old Disease

treatment, educate employees of schools and nursery schools regarding tuberculosis, hold training session for healthcare workers who are engaged in DOTS.

4. Collect, research, analyze, evaluate, and feedback information

- Enhance tuberculosis prevalence survey project – acquire more accurate information, research, analysis, and evaluation, feedback to each regional health center.
- Analyze and evaluate tuberculosis treatment results – investigate and analyze tuberculosis medical examination and diagnosis delay.
- Evaluation and feedback tuber project – establish tuberculosis project evaluation committee and evaluate effectiveness of DOTS.

Health system and payment

The Japanese government has established a universal health insurance system shortly after the WWII and since then all Japanese citizens are covered by some insurances. There are two major insurances, Employee's Medical Insurance and National Health Insurance. The classification of these insurances depends on the age and employment status of enrollees. Employee's Medical Insurance covers employees and their dependants; National Health Insurance covers self-employed, farmers, retirees and their dependents. Since all Japanese are supposed to enroll in one of the health insurances, theoretically all Japanese citizens are covered by some of the insurance. The co-payment for each one of the citizens is, at maximum, 30 percent per visits. The city of Osaka provides the government assistance to pay

Tuberculosis: New Face of Old Disease

for the tuberculosis treatment for the homeless as well as other tuberculosis patients. Since the Japanese government recommends all citizens have a regular check up once a year, an annual regular health check up takes place in every school and work place throughout the nation. The city of Osaka government offers free tuberculosis screening session for the people who do not have an access to get an annual health check up.

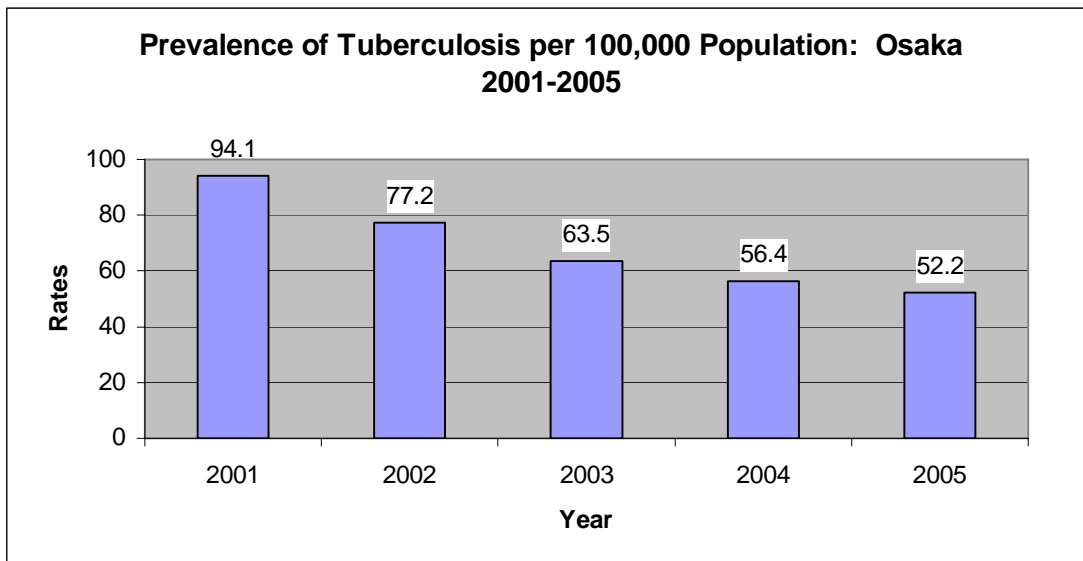
The Japanese administration system works the following way; the central government (the Ministry of Health, Labour and Welfare) draws the objectives, health policies, and regulations; under the ministry, there are 47 prefectures where each prefecture has corresponding health department that consists of totaling 3300 municipalities¹⁰. The law also requires establishing a health center for every 100,000 population. Each health center is staffed by health center nurses who play the significant role to implement health policies. They advise and enlighten the public regarding healthcare and nutrition. They also take extensive survey regarding the health status of the residents. The health policies are carried out through these channels. The health center nurses in the city of Osaka visit the areas where the majority of homeless people live and help them to contact the healthcare facilities.

¹⁰ Matsuda, Shinya and Mieko Yamamoto. "Long-term care insurance and integrated care for the aged in Japan". International Journal of Integrated Care (IJIC). Published online 1 September 2001.
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1484411>

Tuberculosis control result in the city of Osaka

The city's strategies and efforts to control tuberculosis have been successful. In 2006, due to successful implementation of DOTS strategy, the tuberculosis rate was cut by 40 percent during the past 6 years in the city of Osaka¹¹ (see Figure 4).

Figure 4: Prevalence of Tuberculosis per 100,000 Population: Osaka 2001-2005



Source: Research Institute of Tuberculosis, J.A.T.A.

¹¹ Asahi Shinbun Newspaper. June 6, 2006. "DOTS Proved Successful (KEKKAKU KANJYA 4WARIGEN, FUKUYAKU SHIDOU GA SOUKOU, Osaka)."

http://mytown.asahi.com/osaka/news.php?k_id=28000000606060001

Discussion

The conventional understanding regarding tuberculosis is that it is closely related to poverty, yet Japan does not fall into this category. According to WHO, about 95 percent of new tuberculosis cases and 99 percent of tuberculosis deaths occurred in developing countries¹².

Why is the tuberculosis rate in Japan much higher than that of other industrialized nations?

There seem to be a couple of reasons why this is so. One reason appears to be due to a decade long economic recession which has contributed to an increase in the number of homeless people in Japan. Since early 1990s, the economic gap between haves and have-nots has been ever increasing. Japan used to be a very egalitarian and more family oriented society, which prevented the Japanese society from producing the homeless people. However, as the structural change in society and economy progresses, there are more and more homeless people in Japan. These homeless people are predominantly older males. According to the Ministry of Health, Labour and Welfare, as of 2003 there were 25, 296 homeless of which 65.7 % of them were aged between 54 and 64¹³. The recent trend showed that as the number of homeless people increases, more and more homeless people started living in the suburbs. Nevertheless, the major cities are still home to most of the homeless people. As statistics showed twenty percent of homeless people who live in the city of Osaka is tuberculosis infected, controlling the homeless is also controlling tuberculosis.

¹² World Health Organization, Regional Office for the Western Pacific. "Overview: Stop TB Special Project in the Western Pacific region."

¹³ Ministry of Health, Labour and Welfare. "Basic plan of helping the homeless people's financial independence (HOMELSS NO JIRITSUSHIEN TOU NI KANSURU KIHONHOUSHIN)." <http://www.mhlw.go.jp/>

In addition to increase in homeless population, the Japanese society is aging rapidly. As people get older their immune system starts to decline, which makes older people prone to tuberculosis infection. Growing ageing population contributes to the high tuberculosis prevalence rate. Declining birth rate and increasing aging population have been the major concern in Japan. The number of older people is increasing rapidly; therefore, early detection is very important for preventing the older people from being tuberculosis infected.

In order to encourage the homeless people to visit nearby health centers, it might be a good strategy to give some money to these people, if they visit one of health center to get a regular check up. Also, since people in the city of Osaka are highly mobile, it might be a good idea to place more healthcare staffs in the health centers that locate in the most homeless populated areas. This will provide more health center nurses who can visit these areas more often. In addition, more health center nurses means more staffs in each health center. The health center nurses will be able to educate and enlighten aging people as well.

Conclusion

Tuberculosis is not only the leading cause of death in developing nations but also it has become one of the major public health concerns in developed countries. Although the Japanese effort to fight against the disease has been successful, there is more worrisome phenomenon has emerged. Tuberculosis becomes more drug resistant than before and these cases are on the rise. The city of Osaka's strategies and implementations show that there need

Tuberculosis: New Face of Old Disease

to be more public education and awareness and, at the same time, the accessibility to the health system is very important.

The success story of the city of Osaka showed that the WHO recommended strategy, DOTS (directly observed treatment short-course) has been extremely effective. Although WHO strongly recommends implementing the DOTS strategy for eliminating tuberculosis in developing countries, treating and preventing tuberculosis is very labor-intensive, which imposes a heavy financial burden on developing nations.

It might not be feasible for developing nations to follow the same steps as the city of Osaka; however, the governments of developing nations need to set aside some money to educate and enlighten the public regarding tuberculosis. In addition, establishing a small health center that is staffed by healthcare nurses seems to be a good option combined with sending a mobile clinic. Although the efficacy of BCG vaccination has been questioned, it is still one of the major preventive treatments. These activities require a lot of money and most of developing nations do not have the resources to allocate for reducing tuberculosis infection rate.

Nevertheless, it is worth taking these small steps, such as acquiring a mobile clinic and establishing health centers as well as establishing a good health system to implement the strategies to fight against tuberculosis. By doing so, developing nations might be able to have an early detection and, as a result, be able to reduce the number of tuberculosis-infected people.

References

Akihiro Seita. ““Think PHC, Do TB”, Integration-based scale up of tuberculosis control in Japan.” <http://www.hsph.harvard.edu/takemi/RP217.htm>

Asahi Shinbun Newspaper. June 6, 2006. “DOTS Proved Successful (KEKKAKU KANJYA 4WARIGEN, FUKUYAKU SHIDOU GA SOUKOU, Osaka).”
http://mytown.asahi.com/osaka/news.php?k_id=28000000606060001

City of Osaka Health Center, Infectious Disease Control Division. Interview with health center nurse.

City of Osaka Health Center, Infectious Disease Control Division. “Tuberculosis control plans and strategies for the city of Osaka.”
<http://www.city.osaka.jp/kenkoufukushi/kansensyou/kekkaku/sisin.html>

City of Osaka Health Center, Infectious Disease Control Division. “Knowing about Tuberculosis (KEKKAKU NI TUI TE SHIROU).”
<http://www.city.osaka.jp/kenkoufukushi/kansensyou/kekkaku/kekkaku.html>

Goethe-Institute Japan. “Homeless Today (HOMELESS NO JIJYO).”
<http://195.127.17.194/ins/jp/lp/prj/obd/exp/exj/ja1513552.htm>

Tuberculosis: New Face of Old Disease

Infectious Disease Surveillance Center. “Tuberculosis as of 2005, Japan.”

<http://idsc.nih.go.jp/iasr/27/320/tpc320.html>

Japan Labour Health and Welfare Organization. “Health Q &A.”

http://www.rofuku.go.jp/rosaibyoin/q_a/oha_38.html

Matsuda, Shinya and Mieko Yamamoto. “Long-term care insurance and integrated care for the aged in Japan.” International Journal of Integrated Care (IJIC). Published online 1 September 2001. <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1484411>

Ministry of Health, Labour and Welfare. “Basic plan of helping the homeless people’s financial independence (HOMELSS NO JIRITSUSHIEN TOU NI KANSURU KIHONHOUSHIN).” <http://www.mhlw.go.jp/>

National Institute of Allergy and Infectious Diseases, National Institutes of Health, “Focus on TB, Tuberculosis in History, Age of Optimism.”

http://www3.niaid.nih.gov/news/focuson/tb/research/history/historical_optimism.htm

Osaka Nichi Nichi Shinbun Newspaper. September 24, 2004. “Eliminate TB and Move up to Better National Ranking (NAKUSE!!OSAKA WORST ONE).”

<http://www.nnn.co.jp/dainichi/kikaku/worst/worst040924.html>

Tuberculosis: New Face of Old Disease

Research Institute of Tuberculosis, JATA. “Prevalence of Tuberculosis per 100,000: Prefecture and Metropolitan cities, 2001-2005.” http://www.jata.or.jp/rit/re/epro1_top.htm

Research Institute of Tuberculosis, J.A.T.A. “Tuberculosis in Osaka (OSAKA NO KEKKAKU).” <http://www.jata.or.jp/rit/rj/yossha.htm>

Tokyo Metropolitan Institute of Public Health. “TB Control for the 20th Century Based on the Population Statistics (JINKOUDOUTAITOUKEI KARA MITA 20SEIKI NO KEKKAKU TAISAKU).” <http://www.tokyo-eiken.go.jp/SAGE/SAGE2003/sage.html>

World Health Organization, Western Pacific Regional Office. “REGIONAL STRATEGIC PLAN TO STOP TB IN THE WESTERN PACIFIC.” 2000.
http://www.wpro.who.int/NR/rdonlyres/650D4190-E176-4960-AD58-9EF8A8806226/0/STB_Regional_Strategic_Plan.pdf

World Health Organization, Regional Office for the Western Pacific. “Overview, Stop TB Special Project in the Western Pacific Region.” [final_factsheet_2001.pdf](#)