FUTURE HEALTH PATTERNS OF SINGAPORE

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INTRODUCTION

Singapore has undergone dramatic changes in her disease patterns over the last three decades. These changes parallel those in the socio-economic scene. From a relatively quiet trading post, she has progressed to become a thriving and densely-populated metropolis. Such developments are bound to have effects on life styles, dietary practices and the state of health of the community.

MEASURING HEALTH

According to the World Health Organization, health is defined as follows:

> It is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

This is a statement of ideal with very little practical application.

The state of positive health is characterized by the following:

(a) growth and development within normal limits,

(b) proper working of bodily functions, and

(c) adaptability in the face of changing environmental conditions.

It is a continuing property from the ovum to death, lessening during illness but usually recovering to a reasonable level after that. But it cannot be satisfactorily measured except in terms of the absence of sickness and death. Indeed, it is often remarked that health is usually taken for granted until one is in danger of losing it.

This paper on the future health patterns of Singapore will cover the population growth, mortality patterns and some aspects of morbidity.

POPULATION CHARACTERISTICS (1-3)

When Singapore was founded in 1819, there was an estimated population of about 150 persons already living here. Stamford Raffles turned it into a trading post and soon the migrant population grew in leaps and bounds. Within 2 years, there were more than 5000 people, doubling to 10 000 in the next 3 years. Because of the migration influx, the average growth rate was about 8% per year. Immigration gradually slowed down, and by 1947, growth was mainly through natural increase.

It must be emphasized that the population is still a young one, although the porportions of young people have been decreasing. In 1957, there were 52.2% of persons below 20 years of age. In 1970, it was 50.7% and in 1980, 39.0%

The trend towards an aging population is also obvious. This is not clearly seen when one looks at the overall percentages of persons aged 60 years and above: 1957 — 3.8%, 1970 — 5.7%, 1980 — 7.2%. In terms of health planning, one has to look at the absolute numbers of those aged 60 years and above. In 1957, there were 55.3 thousand and in 1980, 173.6 thousand. The actual increase was 118.3 thousand and the percent increase, 214%.

In just 23 years, the number of elderly persons has more than trebled. The sharp increase in the number of older persons has been brought about by prolonged survival and the declining practice of the older generation to retire to their countries of origin. By the year 2000, there will be 305.9 thousand aged 60 and above, making up 10.4% of the population.

Given the limited land space, population growth and density will always be a matter of concern. The latest estimated population (1983) was 2.5 million, giving a population density of about 4048 persons per square kilometre. In fact the city has a density of 17-20 000 persons per square kilometre, certainly one of the highest in the world.

High-density living has serious implications for:

(a) the physical environment — in terms of food supply, water supply, transmission of infectious diseases, breeding of disease vectors;

(b) the social environment — in terms of noise, privacy, sociability, tolerance, jobs.

The spectre of pollution — physical, chemical, biological and social — looms high in all modern urban centres like Singapore.

The high human fertility of the 50's and 60's is now well under control. Due to the laudable work of the Family Planning Association and the Family Planning & Population Board, fertility has declined to 25% below replacement level. Crude Birth Rate has declined from 42.7 per 1000 population in 1957 to 22.1 in 1970 and 17.1 in 1980. The Rate of Natural Increase has also decreased from 3.5% in 1957 to 1.2% in 1980. The target is to achieve zero population growth by the year 2030, when the population is projected to stabilize at 3.5 million (4).

MORTALITY EXPERIENCE

With economic prosperity, standards of living including health have improved. As a result, crude death rates have declined. Many of the infectious diseases have been brought under control and nutritional deficiencies, both general and specific, have also been eliminated to a great extent. Thus, it would be reasonable for one to associate modernization and affluence with better living, good health and a prolongation of life expectancy.

Unfortunately, instead of a lasting utopia, modernization has also brought with it many ills that are very complex in nature. "New" diseases have emerged, most of which are more difficult to control. In the words of Kilbourne: "As societies evolve, they do not become free of disease, but they substitute new diseases for old" (5).

The general mortality trends show mortality from all causes declining from about 12.0 per 1000 population in 1950 to 6.2 in 1960, and 5.2 in 1970 and 1980 (6). Singapore has probably reached the limit of core problems, and the rate is not likely to go down any further. As the population ages, the crude rate will increase again. At the same time, increased risks of dying from cancer and heart disease can also cause the rate to go up.

Another way of looking at mortality experience is to study the life expectancy. The life expectancies at birth of the 3 census years are as follows:

Year	Male	Female
1957	60.5 years	66.6 years
1970	65.1 years	70.0 years
1980	68.7 years	74.0 years

There is an average increase of about 3—4 years for every decade.

Mortality patterns differ in the different age-groups. Infant mortality has improved from 82.2 per 1000 live-births in 1950 to 34.9 in 1960, 20.5 in 1970, and 11.7 in 1980. It is now 9.2 in 1983, one of the lowest in the world. The causes of infant death have also changed. In 1955, about 39% were attributable to recognized infections as compared to 16% in 1980. Relatively speaking, congenital anomalies and perinatal causes have increased in importance. With the advancement of neonatal intensive care, paediatricians are faced with the challenge of managing very low birth weighi babies. A direct consequence of this development is the likely increase in Infant Mortality Rate, due to the addition of high-risk infants who might otherwise have been delivered as stillbirths.

Among children (aged 1—14 years), congenital anomalies remain important causes of death in 1980. Pneumonia ia always a frequent end-stage condition just preceding death, and this diagnosis appears often in all aged-groups. Injuries of various causes are also important in the young.

In the 15—44 years group, going by the 1980 statistics, the relative importance of injuries is remarkable. The 3 frequent causes in males pertain to traffic accidents, other accidents, and suicides. The situation is no different in females, except for traffic accidents. From cause-specific mortality rates in this age-group, there does not appear to be any marked increase in the risk of dying from accidents and suicides over the last 25 years. Instead, these causes have merely gained in importance because of the decline of infections and nutritional diseases. This highly avoidable loss of potential man-years of productive life is most regrettable.

In the middle-aged (45—64 years) and elderly (65 + years) groups, the relative importance of cancer, ischaemic heart disease and cerebrovascular disease are well known. The mortality rates for all these diseases are still increasing. In 1982, out of 12 896 deaths, 54.1% (6977) were attributed to cancer, ischaemic and hypertensive heart disease, and cerebrovascular disease.

MORBIDITY EXPERIENCE

Unfortunately, rather sketchy data on morbidity experience are available, especially those which can be applied to the whole country. Hospital data are biased,

SINGAPORE: IMPORTANT CAUSES OF DEATH, BY AGE-GROUP, 1980 (a)

Male	Female
1—14 years	
124 deaths	116 deaths
1. Other accidents (20.2%)	1. Pneumonia (16.4%)
2. Congenital anomalies (10.5%)	2. Congenital anomalies (15.5%)
3. Cancer (10.5%)	3. Other accidents (8.6%)
4. Pneumonia (8.9%)	4. Infectious diseases (8.6%)
5. Traffic accidents (6.5%)	5. Traffic accidents (7.8%)
15—44 years	
896 deaths	507 deaths
1. Other accidents (17.4%)	1. Cancer (26.6%)
2. Cancer (15.7%)	2. Suicides (13.2%)
3. Traffic accidents (12.9%)	3. Nephritis, etc (7.1%)
4. Suicides (8.1%)	4. Other accidents (6.1%)
5. Ischaemic heart disease (6.8%)	5. Cerebrovascular disease (4.7%)

SINGAPORE: IMPORTANT CAUSES OF DEATH, BY AGE-GROUP, 1980 (b)

Male	Female
45—64 years	
2318 deaths	1240 deaths
1. Cancer (27.7%)	1. Cancer (31.1%)
2. Ischaemic heart disease (26.1%)	2. Cerebrovascular disease (14.3%)
3. Cerebrovascular disease (10.3%)	3. Ischaemic heart disease (14.0%)
4. Pneumonia (4.4%)	4. Pneumonia (5.2%)
5. Infectious diseases (3.5%)	5. Hypertensive heart disease (3.4%)
65 years and above	
3451 deaths	3227 deaths
1. Cancer (21.2%)	1. Cerebrovascular disease (17.3%)
2. Ischaemic heart disease (17.3%)	2. Ischaemic heart disease (15.8%)
3. Cerebrovascular disease (11.7%)	3. Cancer (15.1%)
4. Pneumonia (11.3%)	4. Pneumonia (13.8%)
5. Infectious disease (4.0%)	5. Hypertensive heart disease (3.7%)

and they refer to episodes of hospitalization. A portion of the data from private hospitals would include foreigners, who are of course highly selected. Health care planners all over the world are well aware of the phenomenon that is often dubbed "Roemer's Law", which states that the rate of hospital admissions is influenced to some extent by bed availability (7). Every hospital bed made available will tend to be filled. In other words, within limits supply can create its own demand and one should exercise caution in projecting hospital bed requirements on the basis of admission rates.

From the national point of view, there are only two reliable sources of information, viz:

(a) population — based disease registers,

(b) surveys

Examples of these include:

(a) Registers: TB
Cancer
Occupational Diseases
Infectious Diseases (gazetted)

(b) Surveys: TB
Diabetes mellitus
Hypertension
General morbidity

SINGAPORE: CAUSES OF INFANT DEATHS — RELATIVE PROPORTIONS (%)

	1955	1980
Infections:		
TB	1.2	0
Intestinal	14.5	2.3
Newborn Inf.	6.8	0
Pneumonia	12.9	9.5
Meningitis	1.0	1.7
Others	2.5	2.7
Neoplasms	0.2	0.4
Circulatory dis.	0.4	2.5
Cong. Anomalies	3.6	25.3
Birth Trauma	5.1	2.1
Perinatal Causes	24.7	45.0
Other Causes	27.1	8.5
All causes	100.0	100.0
No. of deaths	2869	482

INFECTIOUS DISEASES (8)

Although they have declined as causes of death, mainly because of effective treatment, infectious diseases remain very important causes of morbidity and sickness-absence. They are responsible for the bulk of outpatient attendances.

Some of them have decreased in incidence, e.g. leprosy, diphtheria, poliomyelitis and tetanus. In fact, smallpox has been eradicated from this earth, and is no more a problem. Tuberculosis has decreased from a notification rate of 307 per 100 000 in 1960 to 83 in 1983. Yet, there are still about 2000 new cases of tuberculosis in a year.

Singapore was declared "malaria-free" by WHO in 1982, indicating an absence of local transmission. However, in 1983, there were just over 200 cases of malaria, mainly imported and a few introduced. This city-state cannot relax its vigilance as it is a malaria receptive area in an endemic region. The other vector-borne disease, Dengue Haemorrhagic Fever, is still present, with a five-yearly cycle of outbreaks. The control of this disease is heavily dependent on Aedes mosquito control. For both these diseases, scientists have yet to develop safe and effective vaccines.

Among the many endemic infectious diseases, there is a big group of food- and water-borne diseases (viz: typhoid, cholera, paratyphoid, Hepatitis A, etc.). The number of notifications on food poisoning (about 1300 in 1983) is only the tip of the iceberg. Eating out is so much a way of life here in Singapore that this group of diseases will continue to be important. There is nothing that can replace good old-fashioned food and personal hygiene.

The viral infections will continue to dominate the morbidity scene, being mainly responsible for the leading condition — Acute Respiratory Infections. Influenza remains a worldwide problem because of its antigenic shifts. Many new viruses continue to be discovered, and naturally, effective vaccines will have to be developed. There is also much more work to be done on safe and effective anti-viral agents. Sexually transmitted diseases will continue to be highly endemic until such time when vaccines are made available.

NON-COMMUNICABLE DISEASES

Cancer is without doubt a very important group of diseases today. In the first 10 years (1968—1977) of cancer registration in Singapore, there was a slight increase for all sites combined in both sexes (9). The most remarkable trend was the rapid increase seen in cancer of the large bowel in both sexes, averaging 2—5% per annum. Lung cancer was also increasing, particularly in males. Also suggestive of an increasing trend were cancer of the breast and prostate.

Cancers on the decline included oesophagus (3% in males and 10% in females) and stomach (1—2% in both sexes).

It is also known that coronary heart disease is increasing rapidly, although there are no population figures to substantiate this. Cerebrovascular disease shows only a marginal increase, but it remains an important cause of disability.

The few population-based surveys conducted in recent years show the following:

(a) Prevalence of hypertension ($>$160/95): 14.1% (10)

(b) Prevalence of diabetes mellitus: 2.0% (11)

(c) Prevalence of tuberculosis: 1.1% (12)

Again, it is not known whether these prevalences have gone up or down. Many of the chronic, degenerative diseases like diabetes mellitus and hypertension require lifelong treatment. Physicians cannot be oblivious to the fact that having increasing numbers of the aging population on long-term pharmacotherapy will impose a heavy financial burden on the community. With improvements in diagnostic capabilities and the widespread use of automated multi-channel analysers, the pressure to diagnose conditions in the earliest possible stages will intensify. This will result in massive increases in disease load, thereby stretching even further the limited resources available for health care.

It would be pertinent to consider some aspects of disease-causing factors before concluding. In fact, rising costs will compel the health care planners of the future to seriously consider risk factor intervention in seeking to reduce disease incidence to a manageable level.

Practitioners have the impression that obesity is increasing. A report from the School Health Service estimated that about 2% of 6-year-olds and 10% of 11-years-olds are obese (13). More than 65% of these students have a family history of obesity.

A survey of 2300 adults aged 40 years and above attending some government polyclinics in 1979 showed the following: (14)

(a) 31% were overweight;

(b) 26% were current smokers;

(c) 8% were regular drinkers;

(d) 45% undertook regular but light physical exercise (mainly walking and arm-swinging).

Surveys in the mid-70's have estimated that about 25% of adults smoke (15). Males predominate 5: 1, with the peak age at 40—49 years. Average daily consumption was about 16 for males and 10 for females. The growth of this harmful habit must be checked, especially in the young. A recent survey by the Straits Times revealed a smoking prevalence of 18% in Singaporeans aged 15 years and above. Hopefully, this is an indication of a declining trend.

Singapore's society of migrants from the more traditional communities of China, India, Malaysia and Indonesia has undergone dramatic changes in lifestyles. In a comparative study of suicides seen in government hospitals between 1970 and 1980, Tsoi et al found an increase of 30% in the overall rate for attempted suicides (16). Obviously, these figures merely indicate the tip of the iceberg. A preliminary survey of mental health in a new town in Singapore revealed that 21.8% of subjects aged 15—55 years were psychoneurotic (17). A review by Leighton showed that about 20% of adults in the Western world are suffering from mental disorders of all types, and Singapore seems to have a similar extent of the problem. One is well aware of the dangers of using psychotropic drugs to solve everyday problems of relationships, and this situation will get worse as the population ages.

CONCLUSION

There is no doubt that Singapore's general physical health will continue to improve. The one problem of the future is its aging population, with all the associated medico-social problems. The modern lifestyle of stress, overeating, smoking and inactivity can and should be corrected. As people live longer, more will have a greater chance of developing the chronic degenerative diseases which often require long-term therapy. Futhermore, with education and rising expectations, the people will demand higher standards of medical practice. Therein lies the proverbial bottomless pit of health care.

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