

PATTERNS OF UTILIZATION OF MEDICAL SERVICES IN SINGAPORE¹

Geraldine CHEN Ph.D.

and

WANG Qinan Ph.D.

Lecturers
Nanyang Business School
Nanyang Technological University
Singapore 639798

Communications to:

Dr Geraldine Chen
S3-1A25
Nanyang Business School
Nanyang Technological University
Singapore 639798
Tel: 799-1324
Fax: 791-3697
E-mail: ayfchen@ntu.edu.sg

¹ This study was supported by Nanyang Technological University under Academic Research Grant No. RG56/94

I. Introduction

“With growing affluence and rising expectations, societies place more emphasis on the quality of life and value of life and demand better medical services. The problem is exacerbated by ageing populations, rising manpower costs and greater use of expensive medical technology and drugs.”

Affordable Health Care:
A White Paper, p. 12

These two sentences sum up the driving forces behind the inexorable rise in health care expenditure in Singapore, Europe, the United States and Canada. Total health care expenditure in the developed countries ranges from 8 – 13% of Gross National Product (GNP). Many developing countries, particularly those in Asia, until recently have been grappling with the problems of burgeoning populations. The spectre of rising health care cost due to a slowly but surely ageing population is only just beginning to gain the attention of governments and policy makers. In Singapore total public and private expenditure on health care accounts for about 3% of GDP.

While the potential for dramatic escalation have been recognised given Singapore’s greying population and rising incomes, there has been very little published work examining the patterns of utilisation of the various categories of health care services in Singapore. There is also little information on whether certain socio-economic groups use different types of health care services differently.

This study aims to begin to fill the information gap by finding out how often Singaporeans use medical services, how much they spend on the different types of care and to what extent utilisation depends on demographic factors such as age and gender, and socio-economic factors such as education and income. The issue of the availability of medical insurance and benefits and their impact on utilisation will be examined in a separate paper. The last known study focusing on the patterns of utilisation was done in 1985 and this was restricted to one geographical community [1]. Published information compiled by ministries and hospitals focus almost exclusively on the supply side. A recent study on the impact of population ageing on national health expenditure relies on predominantly macro data [2]. This study uses first-hand data obtained from a random household survey. This was part of a larger research project which sought to assess the health status of Singaporeans and measure people’s preferences for various health conditions. [3]

II. Method

Target Population and Sampling Method

The target population was all Singapore citizens. A random sample of individuals, one from each household was drawn from the 1992 Register of Electoral Voters. Sampling strictly following the racial composition of 76% Chinese, 11% Malay and 6% Indian would have accurately reflected Singapore's racial composition but this would have severely hampered statistical comparisons among the three groups. Sampling was thus designed to select 1,000 individuals or households comprising 45% Chinese, 35% Malay and 25% Indian. Random sampling of individuals or households was carried out until the quota for a racial group was met. The eligible age for voting in Singapore is 21 and since this study was carried out in 1996, the sampling frame covered all Singaporeans aged 25 and above.

Survey Design

We divided health care services into four categories: (i) Western medical services encompassing government outpatient clinics and private general practitioners; (ii) hospital services including both outpatient and inpatient services; (iii) traditional medical services including Chinese and Malay traditional medicines, and (iv) dental services. Respondents were asked to recall how many times they had visited a doctor and dentist in the 6 months prior to the interview. The six-month period was used instead of one-year to enhance the accuracy of the responses. All the results reported are thus for a six-month period unless stated otherwise. Respondents were also asked to recall the number of times they had visited or been admitted to hospital over the same period and if admitted, how long they stayed. Outpatient hospital visits were classified under hospital services rather than subsumed under general outpatient or ambulatory services as the former implied some kind of specialist care beyond the ambit of general practitioner or polyclinic outpatient care.

Respondents were also asked for the cost of all these services, regardless of who actually paid. For instance, if the bill for a parent was borne by the son, this would still be recorded as the parent's expenditure as the parent was the consumer of care. It was explained to respondents and their family members that their expenditure should consist of both out-of-pocket payments as well as deductions from Medisave accounts. If part of the bill was borne by an insurance company, by an employer or any other third party, this portion should be included in the cost of care. Casual information on the structure of family relationships in Singapore suggests that consumption of medical care services depends

more on total household income than on individual income. For this reason, information was sought on total annual household income rather than individual income. In addition, the respondent was asked if he enjoyed any medical benefits or medical insurance and whether these were extended to other family members. Respondents were encouraged to consult with their family members and to verify the details of their insurance policies. If they so desired, respondents could return the completed questionnaire to the interviewers in a self-addressed stamped envelope provided by the interviewers.

The Survey

Thirty final year students from the School of Accountancy and Business, NTU working in teams of 3 carried out the survey. These student interviewers were trained by the project investigators over a three month period. They performed trial interviews with their peers and NTU lecturers and conducted a pilot study. Feedback from the pilot and trial interviews were used to improve the questionnaire. Data from the trial interviews and the pilot study have not been included in this report. Households were randomly assigned to each group and contact letters were sent out to the designated respondents. These were followed up by telephone calls. At least five attempts over a three-week period were made to establish telephone contact with a respondent before the name was dropped. At least two personal visits were made to those respondents with no listed telephone number.

Analysis of Data

The data were analysed using mainly crosstabulations and where appropriate, Pearson chi-square tests of independence.

Utilization is traditionally measured by the number of times a service is used (doctor office visits) or the duration of usage (number of days in hospital). In addition to the average number of visits, utilisation is also examined by an utilisation (U) index as follows:[4]

$$U_i = \frac{N_i}{\sum_{i=1}^n N_i} \cdot \frac{\sum_{j=1}^m P_{ij}}{P_i}$$

where U_i = utilisation index for group i , N_i = number of visits of group i and ΣN_i is the total number of visits for the service; P_i is the size of group i in the sample while ΣP_i is the size of the total sample. If a group has an U index close to 1, its percentage of the total number of visits is close to its proportion in the sample. If a group has an U index of < 1 , its percentage of total visits is less than its proportion in the sample while a group with an index of > 1 has a percentage higher than its percentage in the sample. This U index gives an indication of which group consumes a more than proportionate or less than proportionate share of resources.

Use of hospital services can also be measured in terms of the duration of stay upon admission. This can be called the “intensity of use of hospital services” and the intensity I index is calculated in the same way as the U index. To obtain the index, the share of hospital days of any one group is multiplied by its share in the sample. If the index is close to 1, it means that that group’s share of hospital days is about equal to its share in the sample. If the index is much smaller than one, it means that the share is less than the group’s proportion in the sample and vice versa. One respondent spent 90 days in hospital and the intensity index will be examined with and without this observation.

The distribution of expenditure on medical services is highly skewed to the right. Because of this skewed distribution, only median expenditures will be reported in the tables although mean expenditures will be discussed where appropriate.

III. Results

The Sample

Because of a time constraint, contact letters were sent to only 829 households between July and November 1996. 326 of these were not contactable over a consecutive three-week period. Language and other factors rendered another 50 households ineligible while 210 households refused to be interviewed. 243 households agreed to be interviewed resulting in a response rate of 53.6%. The 243 households yielded 981 individual respondents for the health care cost section of the survey. Interviews were conducted in English, Malay and Mandarin.

Table 1 compares the profile of the population in Singapore obtained from the 1990 Population Census with the profile of respondents in the survey. Females constituted 50.7% of the sample. 44% were Chinese, 31% were Malay and 25% were Indian. There were 8 Eurasian respondents and they were excluded in analyses by race but included in the

analyses by all other factors. Those who were still in full time education were omitted from analyses using education as a factor.

In terms of total income, 38% of the sample had total household income of less than \$30,000 a year whereas 9% enjoyed total household incomes of at least \$120,000 a year. The 1995 General Household Survey² provides some indication of household income. It shows that in 1995, 28% of the population enjoyed annual household incomes of at least \$60,000 and this is the same as the proportion of respondents in this category in the survey sample. The survey sample thus seems to be fairly representative of the target population.

Table 1
Population and Sample Characteristics

By Gender (n = 981)	Survey %	1990 Census %
Male	49.5	50.6
Female	50.5	49.4
By Age Structure (n = 966)		
14 & under	21.5	23.4
15-24	13.3	17.0
25-34	19.8	21.1
35-44	18.3	16.8
45-54	13.7	8.9
55-64	7.7	6.8
65 & over	5.8	6.1
By Marital Status (n = 977)		
Single	47.2	41.5
Married	51.8	51.7
Widowed	0.8	5.6
Divorced	0.2	1.2
By Educational Attainment (n = 662)		
No formal qualifications	18.0	29.5
Primary	23.3	31.9
Secondary	29.5	24.0
Post-secondary	12.5	6.7
Polytechnic	5.9	3.2
University	10.9	4.8

Source: Singapore Census of Population 1990

² As reported in The StraitsTimes, Saturday 5 April 1997, p. 26.

In terms of means of finance for medical care services, 42.3% of the respondents enjoyed medical benefits provided by their employers, or the employer of their spouse or parent. 36.5% of the respondents had some form of medical insurance coverage. Looking at medical benefits and insurance coverage together, 217 or 22.8% of the respondents had both medical insurance and medical benefits. 323 or 34% had either benefits or insurance coverage. The remaining 412 respondents (43.2%) had no form of coverage whatsoever.

Overall Patterns of Utilisation

Table 2 summarizes the main findings of the survey. 358 respondents or 38% did not visit a doctor over the six-month period. 34.2% visited once or twice, 15% visited three or four times while about 13% made more than four visits. The average number of visits was 2.01. There were 10 respondents who visited the doctor more than 10 times over the six-month period. The highest number of visits was 72.

**Table 2
Summary of Results³**

(1)	Annual per capita expenditure on doctor and hospital services	\$364	
(2)	Annual expenditure per household on doctor and hospital services	\$1638	
(3)	(2) as % of annual household income	3.3%	
		Average No.	Median Exp. \$
(4)	Doctor Visits per capita	2.01	20
(5)	Hospital Visits per capita	0.26	115
(6)	Average Length of Hospital Stay (days)	7.4	
(7)	Dental Visits	0.33	50
(8)	Visits to Traditional Medicine Clinics	0.32	81

The mean expenditure of those who saw a doctor over the six-month period was \$110. Median expenditure was \$48. Per capita mean expenditure was \$70 while per capita median expenditure was \$20. Seven respondents spent more than \$1000 on doctor visits and the maximum amount spent by a single respondent was \$7000. In addition, there were 44 respondents who did not incur any personal expenses for their doctor visits. In most cases, their expenses were borne by their employers.

879 or 90% of the respondents did not use hospital services during the stipulated period. 89 respondents visited the hospital at least once, 43 for ambulatory services

³ Categories had fewer than 981 respondents because of missing data

with no hospital nights and 46 for admission. The average number of visits was 0.26. 8 respondents visited or were admitted to hospital for pregnancy-related reasons and these cases were omitted from the analysis. The rest utilised outpatient hospital services for consultations, physical exams, accident & emergency services and physiotherapy. Three respondents went to hospital for the last service, each chalking up about 25 visits over the six-month period.

Per capita expenditure on hospital services, both outpatient and inpatient, was \$115. However, mean expenditure for those who utilised hospital services was \$1606 while the median expenditure was \$300. \$1000 was the modal expenditure. The average length of stay in hospital was 7.4 days and the maximum was a 90-day stay for which the patient paid \$25000, the highest single expenditure on hospital services obtained in the sample.

The average number of visits for dental services and traditional medicine services was similar (0.3) while median expenditures seemed to be slightly higher for traditional medicines

Gender

Females have a significantly higher rate of utilisation for GP/polyclinic services as well as hospital services (Table 3). A test of independence between the number of visits and gender found statistically significant differences only for GP/polyclinic services (Pearson chi-square=14.84, p=0.005). Moreover, the mean and median expenditures for GP services are higher for females than for males. On the other hand, mean and median expenditures for hospital services was lower for females than males.

Table 3
Use of Health Care Services by Gender

	GP/Polyclinic Services		Hospital Services		Dental Services		Traditional Med. Services	
	U Index (n = 963)	Median \$ (n=552)	U Index* (n=976)	Median \$ (n=75)	U Index (n=972)	Median \$ (n=151)	U Index (n=973)	Median \$ (n=66)
Male	0.96	48.00	0.78	525.00	1.00	50.00	1.09	40.00
Female	1.04	50.00	1.22	240.00	1.00	50.00	0.91	30.00
	Pearson $\chi^2=14.843$ df = 4, p = 0.005							

* includes all observations except pregnancy-related visits/admissions

Race

41%, 40% and 31% of Chinese, Malay and Indian respondents respectively did not visit a doctor. A greater proportion of Indian respondents (17.2%) visited the doctor more than four times compared with 10.7% of Chinese respondents and 11.5% of Malay respondents who did so. The average number of visits by Indian respondents (2.49) was the highest while the number for Malay respondents (1.65) was the lowest. Utilisation was significantly different among the three groups ($p=0.004$). The U index for Indian respondents, 1.24, showed that they accounted for a greater proportion of doctor visits than their proportion of the sample. On the other hand, total visits by Malay respondents were less than proportionate (0.82). In terms of expenditures, Malay respondents registered the lowest mean and median expenditures of all three groups.

Table 4
Use of Health Care Services by Race

	GP/Polyclinic Services		Hospital Services		Dental Services		Traditional Med. Services	
	U Index (n=955)	Median \$ (n=548)	U Index* (n=968)	Median \$ (n=75)	U Index (n=964)	Median \$(n=148)	U Index (n=965)	Median \$ (n=67)
Chinese	0.99	50.00	0.96	411.50	1.08	50.00	1.59	30.00
Malay	0.82	35.00	0.53	234.00	0.88	50.00	0.23	31.20
Indian	1.24	50.00	1.68	345.00	0.99	55.00	0.95	70.00
	Pearson $\chi^2 = 18.92$ Df = 6 p = 0.004		Pearson $\chi^2 = 11.81$ df = 4 p = 0.019				Pearson $\chi^2 = 28.379$ df = 6 p < 0.0005	

* includes all observations except pregnancy-related visits/admissions

Looking at the pattern of visits by race and gender in Table 5, it appears that Indian women had the highest utilisation rate and Malay women the lowest utilisation of all the groups in terms of average number of visits.

Table 5
Average Number of Visits by Race and Gender

	Chinese	Malay	Indian
Male	1.98	1.68	2.03
Females	1.97	1.63	2.94
Total	1.97	1.65	2.49

Differences in utilisation of hospital services are also apparent among the three racial groups. Indian respondents registered the highest proportion having been admitted at least once (38.5%) while Malay respondents had the lowest proportion doing so (25.0%). 7% of Indian respondents had the highest proportion using hospital services two or more times

compared with 3.3% of Malay respondents and 2.8% of Chinese respondents doing the same. In other words Indian respondents had the highest rate of utilisation. Their share of the total number of visits was 68% greater than their share of the total hospital-visiting sample. In contrast, Malay respondents' share of the total number of hospital visits was only about half their proportion of the sample. There thus seems to be a statistically significant relationship between race and the number of hospital visits ($p=0.019$).

Indian respondents appear to account for the largest share of hospital days in relation to their share in the sample, both with and without the extreme 90-day observation. When the extreme value is included, Indian respondents' share was 83% higher than their share of the sample. When the value is omitted, this share rises to two-and-a-half times. In contrast, the I index was the lowest for Malay respondents both with and without the extreme observation. The pattern of utilisation in terms of race appears to be consistent for doctor visits, hospital visits and hospital days.

However in respect of the use of traditional medicine services, Chinese respondents accounted for 50% more of total visits than their share of the sample while Malay respondents' share was only about one-fifth (0.23) their share of the total sample. The relationship between race and use of traditional medical facilities is statistically significant ($p<0.0005$). Indian respondents appeared to spend more than Malay and Chinese respondents. There did not seem to be any differences in the utilisation of dental services among the three groups and median expenditures were also similar.

Age

Age appears to exert an influence on doctor visits, hospital visits and dental visits (Table 6). Respondents aged 15-54 made up a less than proportionate share of total doctor visits while the share of those aged 55 and over was greater than their proportion in the sample ($p < 0.0005$). The latter constituted 14% of the sample but accounted for 24% of total visits to GPs. Average expenditures on GP services also appear to rise with age.

A similar pattern is evident for the use of hospital services ($p < 0.0005$). Respondents aged 55 and over made up a greater than proportionate share of total visits. When all observations are taken into account, the U index increases with age and peaks for those aged 45-54. This group constituted 13.5% of the sample but made 24% of the total number of hospital visits/admissions. If the three observations for physiotherapy are omitted, the U index also increases with age group, peaking for those aged 65 years and over. Age also seems to influence the length of stay in hospital as measured by the I index (Figure 1). The

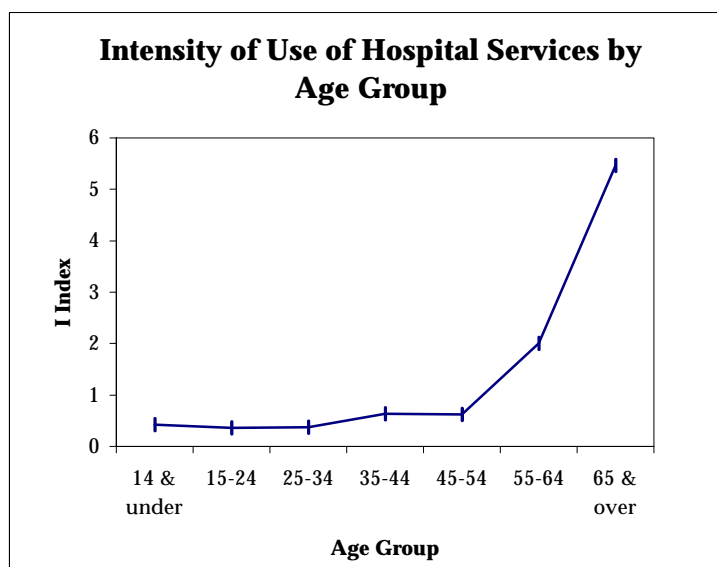
share of hospital days of those aged 55-64 is double their share of the sample and this share increases to five-and-a-half times the share of the sample for those aged 65 and over (I = 5.47).

Table 6
Use of Health Care Services by Age Group

Age	GP/Polyclinic Services		Hospital Services		Dental Services		Traditional Med. Services	
	U Index (n=948)	Median \$ (n=544)	U Index* (n=961)	Median \$ (n=73)	U Index (n=957)	Median \$ (n=150)	U Index (n=958)	Median \$ (n=65)
14 & under	1.05	45.00	0.70	240.00	1.33	27.50	0.27	38.00
15-24	0.76	40.00	0.31	500.00	1.13	30.00	0.53	52.50
25-34	0.87	40.00	1.22	193.50	0.61	50.00	1.09	30.00
35-44	0.71	45.00	0.88	850.00	1.21	50.00	1.02	24.00
45-54	0.98	60.00	1.76	184.00	1.15	65.00	1.29	51.00
55-64	1.93	90.00	1.17	1000.00	0.57	60.00	1.47	27.00
65 & over	1.49	100.00	1.34	1500.00	0.37	65.00	3.05	80.00
	Pearson $\chi^2 = 58.489$ df = 18 p < 0.0005		Pearson $\chi^2 = 36.091$ df = 12 p < 0.0005		Pearson $\chi^2 = 26.448$ df = 12 p < 0.009			

* includes all observations except pregnancy-related visits/admissions

Figure 1



Age also seems to have a significant impact on the use of dental services ($p=0.009$). Utilisation was highest for those aged 14 and under followed by those aged 35-44. Median expenditure also appears to increase by age of the respondent.

The impact of age on the use of traditional medicines is reversed. Those aged 14 and below had the smallest U index which increased steadily with age to peak for those aged 65 and over. This group which constituted 6% of the sample made 18% of all visits to traditional medical halls and chalked up the highest median expenditure for all age groups.

Education

In terms of education, 22.7% of the respondents without formal educational qualifications visited the doctor more than four times while 9.7% of those with university qualifications did the same. In terms of their shares of total visits, those with at most primary education constituted 41.6% of the sample but made 54% of all visits to GPs. This group also registered the highest average expenditure for all groups. The U index was highest for those with at most primary education and lowest for those with post-secondary education. Table 7 shows that these differences in the utilisation of the educational groups were statistically significant ($p=0.016$).

Table 7
Use of Health Care Services by Education Level

Education	GP/Polyclinic Services		Hospital Services		Dental Services		Traditional Med. Services	
	U Index (n=647)	Median \$ (n=346)	U Index* (n=657)	Median \$ (n=56)	U Index (n=656)	Median \$ (n=117)	U Index (n=657)	Median \$ (n=54)
No qual.	1.31	77.50	1.34	800.00	0.53	50.00	1.93	29.00
Primary	1.30	58.00	0.95	270.00	0.67	55.00	1.30	24.50
Sec.	0.79	49.00	1.23	600.00	1.40	60.00	0.32	55.00
Post-Sec.	0.70	40.00	1.05	150.00	1.30	50.00	1.25	20.00
Poly.	0.84	43.00	1.03	900.00	1.13	45.00	0.56	40.00
Univ.	0.84	50.00	2.45	5000.00	1.02	50.00	0.58	52.50
	Pearson $\chi^2 = 28.981$ Df = 15 p = 0.016				Pearson $\chi^2 = 19.347$ df = 10 p = 0.036			

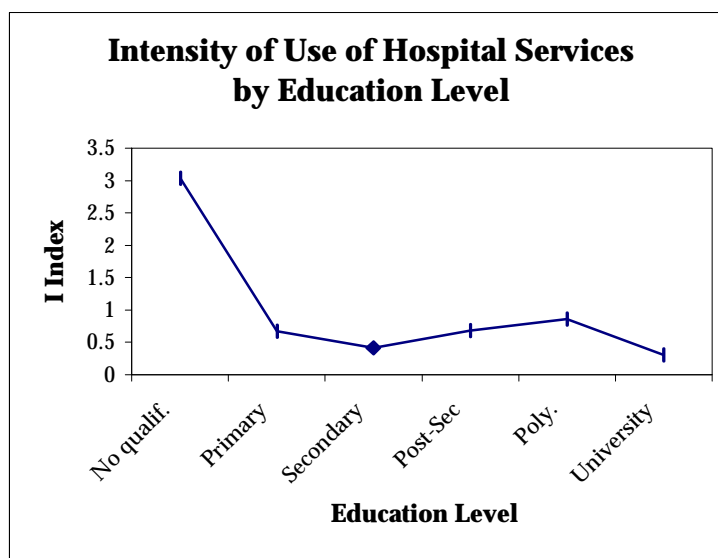
* includes all observations except pregnancy-related cases

The pattern of utilisation of the different educational groups is strongly affected by extreme values for three respondents who used hospital services an average of 25 times for physiotherapy over the six-month period. When all observations are included, respondents with university qualifications had the highest U index of 2.45 followed by those with no qualifications with $U = 1.34$ (Table 7). When the three physiotherapy observations are

excluded, the U index for those without formal qualifications remained the highest while the U index for those with university education dropped to the smallest of all the groups. Those with no qualifications, who made up 18% of the sample, accounted for 24% of total visits when the physiotherapy visits were included and 19% when they were not. The expenditure pattern mirrors utilisation when all observations are included. Median expenditures are highest for those without formal qualifications and those with university education. However as there were less than five observations each in the post-secondary and university categories, the expenditure figures may be biased.

Respondents with no formal qualifications appeared to be also more intensive in their use of hospital services in terms of their share of the total number of hospital days. When all observations are included, the share of this group of respondents was three times their share of the sample.

Figure 2



Educational attainment also seemed to influence utilisation of dental services. Respondents with secondary and post-secondary qualifications made the most number of visits in relation to their proportions in the sample. In contrast respondents with no formal and primary education accounted for roughly half the proportion of total visits (0.53, 0.67) that was predicted by their share of the sample and these differences between educational groups were statistically significant ($p=0.036$). Median expenditures were broadly similar for all categories.

On the other hand, respondents with no education seemed to account for a greater share of visits to traditional medical halls. Those with at most primary education made 65% of all visits but constituted only 42% of the sample.

Total Household Income

Respondents with total household income of less than \$30,000 had the largest proportion (47%) who did not visit the doctor at all while those with annual household income of \$150,000 or more had the smallest proportion (30.0%) doing the same. The latter group had the largest proportion of respondents (22.5%) who visited the doctor more than four times. Only two groups exhibited a greater than proportionate share of total visits, those in the income groups \$60,000 - \$89,999 and \$150,000 & over (Table 8). However these differences were not statistically significant.

Median expenditure rises with income group, dips for the \$120,000–\$149,999 group and then rises sharply for those with annual household incomes of \$150,000 and over. The expenditure figures for those in the \$120,000 - \$150,000 group may have been affected by the small number of observations in this category.

Table 8
Use of Health Care Services by Annual Household Income

Income	GP/Polyclinic Services		Hospital Services		Dental Services		Traditional Med. Services	
	U Index (n=910)	Median \$ (n=525)	U Index* (n=920)	Median \$ (n=74)	U Index (n=916)	Median \$ (n=143)	U Index (n=917)	Median \$ (n=21)
< \$30,000	0.87	40.00	0.95	267.00	0.86	35.00	1.41	42.00
\$30,000 – \$59,999	0.98	45.00	0.80	725.00	0.96	53.00	0.92	42.50
\$60,000 – \$89,999	1.30	50.00	1.37	100.00	0.89	50.00	0.47	21.00
\$90,000 – \$119,999	0.97	80.00	1.56	352.50	1.35	60.00	0.68	.
\$120,000 – \$149,999	0.56	25.00	0.98	50.00	1.17	25.00	0.40	15.00
\$150,000 & over	1.68	127.00	3.49	5300.00	2.20	87.50	0.24	.

The pattern of utilisation of hospital services appears to be similar to that for doctor visits. The U index is highest for the group with annual household income of at least \$150,000 (U=3.49) and for those in the middle \$90,000-\$119,999 category (U = 1.37). The former group comprised 4.3% of the sample but made 15% of the total number of hospital

visits/admissions. When the 3 observations for physiotherapy are omitted from the analysis, the highest utilisation is registered by the group with income \$90,000 - \$119,000. The highest average expenditure was registered by those with income \$150,000 and over. The median expenditure for this group was thirteen times the median for the sample. Small numbers of observations may have biased the expenditure figures for those with secondary and post-secondary education.

For dental services, those with annual household incomes of \$150,000 and over had the highest average number of visits and this group's share of total visits was double its share of the total sample. The high utilisation of this group is coupled with the highest average expenditure of all the income groups. This seems to suggest that utilisation increases with income.

A pattern for utilisation of traditional medicine facilities by income group is also discernable. Those with annual household income of less than \$30,000 registered the highest average number of visits with more than 4 out of 10 respondents having visited a traditional medical hall. This proportion declines steadily as income increases. For those with annual household income of at least \$150,000, the average number of visits is almost zero. As such the U index is the highest for those with annual household income of less than \$30,000 and lowest for those with incomes of at least \$150,000.

IV. Discussion

This paper presents a preliminary insight into the utilisation and expenditure patterns of Singaporeans for four types of health care services: general practitioners, hospital services, dental services and traditional medicines. The use of traditional medicines is not usually included under the term "medical services" but given its prevalence in the local context, we thought it appropriate that it be included. Traditional medicines are often used for preventive and rejuvenating purposes, areas which are usually not considered in utilisation studies. This issue pinpoints one of the major difficulties of this type of study - defining the purview of "medical care services". Most studies have restricted the term to services involved in the treatment of ill health. However with the greater diffusion of information and affluence, better-educated consumers are increasingly undertaking activities that are perceived to maintain or increase health e.g. taking more exercise, eating more nutritious foods. These may help to reduce expenditure for and utilisation of the other more conventional types of health care services.

This study tried to obtain information on the full direct cost of treatment. It may not however capture expenditure on medical equipment and on services like home nursing care. Moreover, the cost of ill health entails not only the direct cost of treatment but also opportunity cost in terms of lost workdays and the cost of travel time. All estimates of expenditure on health care services therefore understate the true cost of ill health. Nonetheless, the expenditure on health care, particularly as a proportion of income, borne directly by the household indicates the extent of the financial burden. The percentage of income spent on health care for households in the various income groups is shown in Table 9.

Table 9
Health Expenditure as % of Household Income

Annual Household Income (1)	Annual Household Expend. On Doctor and Hospital Visits (2)	(3) = (2) / (1) *100 **
< \$30,000 (n=85)	659	4.39
\$30,000 - \$ 59,999 (n=62)	1036	2.30
\$ 60,000 - \$ 89,999 (n=37)	2304	3.07
\$ 90,000 - \$ 119,999 (n=11)	955	0.91
\$120,000 - \$149,999 (n=7)	394	0.29
\$150,000 and over (n = 9)	14101	7.05
All households (n=211)	1638	3.34***

** \$15,000 used for lower open ended category; \$200,00 used for upper open ended category and mid-points used for all other categories

*** computed as a weighted average of the percentage expenditure of all households

The number of households in the higher income groups is too small for any conclusions to be drawn. However, households in the lowest income bracket appear to spend about four and a half percent of annual income on doctor and hospital visits. On average, a household spends about 3.34% of household income on doctor and hospital visits.

The 1992/93 Household Expenditure Survey shows that expenditure on health accounted for 2.6% of total average household expenditure, with some variation among households in different types of dwelling (Table 10). The dollar value of health care expenditure for the average household rose 104% between 1988 and 1993, the fifth highest increase after transport & communications, housing, education and clothing.

If it is assumed that those who live in public flats have lower household incomes than those who live in private flats, tables 9 and 10 seem to indicate that those with lower household incomes spend more on health care services. But the analysis in this paper

Table 10
% Household Expenditure on Health by Type of House

Type of Household	% Expend. on Health	Av. Annual Expend. Per Household
Bungalows & Terrace Houses	2.3	7036
Private Flats	1.4	6230
Public Flats	2.8	2580
Others	2.5	2867
All Households	2.6	3034

Source: Singapore Department of Statistics, *Report on the Household Expenditure Survey 1992/93*, Table 7, p. 11

appears to indicate that income is not a significant determinant factor. Instead, the level of education was found to be significantly related to doctor and dental visits. Thus at the micro level, the effects of education may have confounded the influence of household income on utilisation. More complete analyses of the determinant factors of utilisation will be undertaken in a separate paper after an examination of the impact of financing on utilisation and expenditure.

What does seem to influence utilisation is age. The dimensions of ageing and the problems associated with it have been documented elsewhere. [5] The median age of Singapore's resident population rose from 25.5 years in 1982 to 30.6 years in 1992. The proportion of those aged 60 years and over has risen in tandem, from 7.7% in 1982 to 9.4% in 1992 (Table 11). Hospital morbidity for heart disease, cancer and cataract operations also rose steadily over the same period.

Table 11
Population aged 60 years and over

Year	% of pop.	Hospital Morbidity*	Hospital Bed days**	Av. length of stay in hosp (days).
1982	7.7	23.7	25.7	14.9
1983	7.8	22.6	28.3	15.8
1984	8.0	25.3	26.9	14.1
1985	8.1	25.2	28.3	14.5
1986	8.3	28.4	28.3	14.3
1987	8.5	31.3	28.8	13.6
1988	8.7	32.0	28.7	12.9
1989	8.9	33.2	30.9	15.1
1990	9.1	32.5	29.4	14.5
1991	9.3	34.7	30.8	12.6
1992	9.4	Na	Na	Na

* for heart disease, per 1000 residents aged 60 years and over.

** as percentage of total bed days.

Source: Singapore Department of Statistics, Singapore 1992 Statistical Highlights
March 1993

In the survey, age was found to be significantly related to the utilisation of GP, hospital and dental services. This is in line with previous studies.[4] The results indicate that the lower educated elderly tend to use doctor and hospital services disproportionately. Moreover, those who were aged 65 & over were found to use hospital services more intensively, accounting for 32 percent of all hospital days while making up 5.8% of the sample. This finding is fairly consistent with the national figure in Table 11, which estimates that those aged 60 years and over, 9.4% of the total population, accounted for almost 31% of all hospital days in 1991. The projected increasing share of the elderly in the population means that their share of hospital services can be expected to rise. In 1992, only 33% of elderly males and 7% of elderly females were economically active.[9] The vast majority of those aged 60 years and over are thus economically inactive. The affordability of health care services to the elderly becomes critical. The issues of health care financing will be addressed in a separate paper.

For the most part, only average or median values of expenditure have been reported. As was noted earlier, health care utilisation and expenditure patterns have two characteristics: a large proportion of the sample do not use health care services over a stipulated period and over the same period, a few consumers will have expenditures which are much higher than average. In statistical parlance, these observations are outliers and are sometimes omitted from analysis. However, these are precisely the cases that need to be identified – those who are more likely to suffer from chronic disabilities, who require long term care and who are likely to incur substantial medical bills. A case in point is the respondent who spent 90 days in hospital and incurred a hospital bill of \$25,000. It is for cases such as these that financing ability is critical and their needs should be the subject of more detailed study.

Acknowledgements

We would like to thank Professor Tan Teck Meng for his support of this project;
Dr Wu Yuan for his assistance in devising the sampling procedure;
Ms Yvonne Chung, our indefatigable project officer for coordinating the project;
Gao Fei, Chen Boon Kong and Goh Day Jiant for their help in translating the interview instruments into Chinese and Malay;
Colleagues at the Nanyang Business School who participated in the trial interviews and provided feedback on the interview instruments: John Beck, Chen Kang, Chung Lai Hong, Robert Lian, Ambar Agustono Machfoedy, Dewi Puspa Indriani Binte Machfoedy, Diana Ooi, Roger Wright, Soon Lee Ying, Tan Joo Seng, Wang Ruifang, Roger Wright, Yao Hong, Yew Siew Peng;
and of course our students for conducting the interviews: Chua Swee Leong, Goh Sock Fong, Heng Sock Hoon, Hsu Chong Hoe, Kwa Wee Keng, Lay Chee Seng, Kerry Leow, Lee Wei Lin, Lim Ai San, Lim Boon Kee, Lim Leong Hee, Lim Wei Jin, Loh Siow Ping, Lynn Lim, Ng Lee Ngee, Ng Pui Sang, Ng Siew Cheng, Ng Tse Leng, Ong Geok Yong, Sam May Yen, Seah Bee Chin, See Toh Wai Ling, Soon Sor Hoon, Tan Li Kiang, Tan Mei Ling, Tan Su Fen, Tan Su May, Wong Sze Teen, Yeo Chay Hoon, Yue Pei San,

References

1. Fong, NP and Phua KH. 1985. Utilization and Expenditure on Medical Services in a Local Community. *Singapore Medical Journal*; 26(2).
2. Low, Linda, Phua Kai Hong, Toh Mun Heng, Yap Mui Teng (1996). The Effect of Population Ageing on National Health Expenditure, mimeo.
3. Wang, Qinan and Geraldine Chen. (1997) The Functional Status of the Singaporean Population as Measured by a Multiattribute Health Status System. SABRE Centre Working Paper
4. Kop, Yaakov and Haim Factor. 1985. Changing Characteristics of the Israeli Population and the Utilization of Health Care Services. *Israel Journal of Medical Sciences*, Vol. 21, pp. 205 – 211
5. Shantakumar, G. 1994. *The Aged Population of Singapore*. Singapore, National Printers.

6. Newhouse, J, 1977. Medical care expenditure: A cross national survey. *Journal of Human Resources*, 12, 115-125.
7. Moore, William J, Robert J. Newman, Mohammad Fheilli. 1992. Measuring the relationship between income and NHEs. *Health Care Financing Review*, 14(1).
8. Singapore Department of Statistics, *Singapore 1992 Statistical Highlights*, p. 31.
9. Hulka, Barbara S. and John R. Wheat. 1985. Patterns of Utilization: The Patient Perspective. *Medical Care*, Vol. 23, No. 5, pp. 438 – 460.