

Impact of chronic diseases on health services and quality of life of a Chinese population

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Abstract

Background: Chronic diseases are becoming the major global burden of disease. Information on their impact on health services and quality of life of individual patients can facilitate the provision of appropriate care.

Objectives: To determine the self reported prevalence of chronic diseases and their impact on health service utilization and quality of life of individual patients.

Methods: A cross sectional random telephone survey was conducted on 2410 Chinese adults from the general population in Hong Kong using both a structured questionnaire and the 36 item short form Health Survey (SF-36). The effects of chronic diseases on consultation rates, hospitalization risk and the SF-36 scores were analyzed by multivariate stepwise regressions, controlling for sociodemographic variables and comorbidity.

Results: A total of 38% of subjects reported one or more chronic diseases with 59% being less than 60 years. Chronic joint problems were the most common. Every additional chronic disease increased the annual number of consultations by 60% and the likelihood of hospitalization in the last year by 79%. Most chronic diseases had a negative impact on quality of life with most associated with psychological problems.

Conclusions: One in three Chinese adults in Hong Kong reported having chronic diseases. The total number of chronic diseases had a linear relationship with service utilization, which could be a useful medical risk adjustment factor. Enhancing quality of life should be an important aim in the management of chronic diseases.

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Key words: Chinese, chronic disease, quality of life, service utilization, 36 item short form Health Survey.

Introduction

The success of life saving technology and medical care has resulted in a paradoxical increase in the prevalence of chronic disease. This has been termed by Gruenberg as the 'failure of success'.¹ It is projected that chronic diseases will become the major global burden of disease in the coming two decades.² Data on developed populations have shown that chronic diseases are associated with higher service utilization and poorer quality of life.³⁻⁶ The most rapid change in morbidity

pattern is expected to be in Asia. In spite of this, little data on the burden of chronic diseases is available from this part of the world.

Chronic diseases have become the major causes of hospital admissions and deaths in Hong Kong since 1971.⁷⁻⁹ A few recent studies have reported on the prevalence of chronic diseases in Hong Kong, but the results are limited either to a few conditions,⁸ the older population¹⁰ or diseases that required regular follow-up.¹¹ None of them has evaluated the impact of chronic diseases on health services or quality of life.

The objectives of the present study were to:

- estimate the population based self reported prevalence of chronic diseases
- find out if they were associated with higher health service utilization rates
- what impact they had on the quality of life of the Chinese adult population in Hong Kong.

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Methods

Study design and setting

The present study was a cross sectional random telephone survey of the general adult Chinese population in Hong Kong. Ninety-five percent of the Hong Kong population are Chinese and 15% of them are 60 years or older. All households in Hong Kong, except for the 0.1% who live on boats, have telephones and local calls are free of charge.¹² Lam *et al.* have shown that the results of telephone interviews were similar to that found in face-to-face household surveys.¹³

Sampling method

Household telephone numbers were selected randomly via computer from the Chinese Residential Telephone Directories that contained 90% of all residential telephone numbers in Hong Kong.¹⁴ Trained interviewers called the households in the order of the random telephone list in the evening of each weekday from 1 June to 30 September 30 1998. Among those members who were present in the contacted household, only the person who had the most recent birthday and was 18 years or above was surveyed.

Survey instrument and outcome measures

The survey instrument consisted of a structured questionnaire and the Chinese version of the 36 item short form health survey (SF-36).¹⁵ The structured questionnaire collected information on:

- sociodemographic data, including age, sex, educational level, marital status and social class by occupation.¹⁶
- chronic morbidity measured by the total number and diagnosis of self reported chronic diseases. Each subject was asked whether a diagnosis had been made (by a registered medical practitioner) of the following: hypertension, diabetes mellitus, heart disease of any kind, stroke, chronic pulmonary disease (asthma or other chronic respiratory problems), chronic joint problem, psychological illness or any other condition which had persisted for more than 1 month. The total number of chronic diseases was calculated by the summation of the number of positive responses to these questions.
- service utilization was measured by the self reported annual consultation rate (number of outpatient consultations in the past 1 year), monthly consultation rate (number of outpatient consultations in the past 1 month), hospitalization rate (any admission into the hospital in the past 1 year), the need for regular medications and the need for regular medical consultations.

Table 1 Sociodemographic characteristics of study sample compared with the Hong Kong general population

	Sample <i>n</i> = 2410 %	Hong Kong adults 20+ years <i>n</i> = 4 959 100 %
Age group (years)		
18–39	47.2	46.2
40–59	27.2	34.3
60 or above	21.4	19.5
Refused to answer	4.2	0
Sex		
Male	47.8	48.9
Female	52.2	51.1
Marital status		
Now married	58.0	59.4
Never married	33.8	31.9
Widowed	5.8	6.0
Divorced/separated	1.3	2.7
Refused to answer	1.1	0
Educational level		
No schooling	6.9	8.4
Primary	22.3	20.5
Secondary	52.2	54.6
Tertiary	17.8	16.4
Refused to answer	0.9	0
Social class by occupation		
Professional	3.1	5.5 ^a
Associate professional	14.7	26.0 ^b
Skilled worker	35.4	33.5 ^c
Semi-skilled worker	24.6	15.0 ^d
Non-skilled worker and unclassified	14.4	19.8 ^e
Refused to answer	7.7	0

The distribution in occupation of subjects was not directly comparable to Hong Kong Census Data which used the International Standard Classification of Occupation: a. Professionals, b. Associate professionals, administrators and managers, c. Craft workers, plant and machine operators and assemblers, d. Service and shop sales workers, e. Workers in elementary occupation, agriculture and fishery, and unclassified. Percentages may not add up to 100% because of rounding.

The Chinese version of the SF-36 is a widely used health-related quality of life (HRQOL) measure which has been translated and validated on the adult Chinese population in Hong Kong.¹⁵ It measures eight domains of HRQOL: physical functioning (PF), role limitation due to physical problems (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitation due to emotional problems (RE) and mental health status (MH); each with a scale ranging

Table 2 The prevalence (%) of chronic diseases by age and sex groups

	Any Diagnosis	HT	DM	Heart	Pulmonary	Stroke	Joint	Psychological
All ages								
Overall (<i>n</i> = 2410)	38.0	11.2	4.6	3.9	5.3	0.9	19.6	3.9
M (<i>n</i> = 1152)	32.5	9.3	3.8	3.2	5.7	1.2	14.6	2.9
F (<i>n</i> = 1258)	43.2	13.0	5.2	4.5	4.9	0.6	24.2	4.8
Age 18–39								
Overall (1137)	20.5	1.8	0.9	1.4	5.2	0	6.9	1.6
M (<i>n</i> = 601)	19.3	1.2	0.8	1.3	4.8	0	5.5	2.0
F (<i>n</i> = 536)	21.8	2.6	0.9	1.5	5.6	0	8.6	1.1
Age 40–59								
Overall (<i>n</i> = 655)	47.0	13.1	4.1	2.4	5.8	0.8	26.0	7.3
M (<i>n</i> = 278)	37.8	10.4	4.0	1.8	6.5	0.7	18.7	4.0
F (<i>n</i> = 377)	53.8	15.1	4.2	2.9	5.3	0.8	31.3	9.8
Age 60+								
Overall (<i>n</i> = 516)	68.0	30.2	13.8	11.4	5.0	3.1	42.1	5.2
M (<i>n</i> = 245)	60.0	27.3	11.0	9.4	6.5	4.9	33.9	4.1
F (<i>n</i> = 271)	75.3	32.8	16.2	13.3	3.7	1.5	49.4	6.3

DM, diabetes mellitus; F, female; HT, hypertension; M, male. 102 subjects refused to disclose their age.

from zero to 100 with a higher score indicating better HRQOL.¹⁷

The whole survey took 15–20 minutes to complete.

Data analysis

The effects of sociodemographic variables on the total number of chronic diseases were tested by multivariate forward stepwise linear regression. Relevant multivariate forward stepwise linear or logistic regressions were carried out to determine the effects of the total number of chronic diseases or specific diagnosis on service utilization rates or the SF-36 scores, controlling for sociodemographic variables and comorbidity. Subjects with unknown or missing data in any variable were excluded from the relevant regression analysis, resulting in different sample sizes in different regression models. All data analyses were done by the SPSS Windows 8.0 program (SPSS, IL, USA).

This research project was approved by the Ethics Committee, Faculty of Medicine, the University of Hong Kong.

Results

Sample

The intended sample size was 2500, based on a power calculation for a standard error of percentage of no more than 2% at 95% confidence interval, assuming the prevalence was unknown. A total of 7185 telephone numbers were attempted. However, 4328 had to be excluded because 3957 were not answered,

despite three attempts, there were no eligible subjects in 266 and 105 were commercial or invalid numbers.

There were 2857 eligible subjects but 345 refused to participate; 2512 subjects were surveyed and 2410 completed the whole interview giving a final response rate of 84.4% (2410/2857). Table 1 shows the socio-demographic characteristics of the subjects compared with the Hong Kong general population data.¹²

Prevalence of chronic diseases

Nine hundred and seventeen (38.0%) subjects reported 1416 chronic diseases, no chronic disease was reported by 1349 (56.0%) subjects and 144 (6.0%) people were not sure whether they had any. Five hundred and forty-one (59.0%) of the subjects with chronic diseases were below the age of 60, although the age-specific prevalence increased with age.

Table 2 shows the prevalence of common chronic diseases by age-sex groups. The prevalence of most chronic diseases increased with age but psychological problems were most common (7.3%) in the 40–59 year old group. All diagnoses were more common in females, except for stroke and chronic pulmonary diseases. Two hundred and twenty-five (9.3%) subjects reported a variety of other chronic diseases including allergic rhinitis, gastrointestinal diseases, skin problems, eye conditions and cancer.

Multivariate linear regression showed that increasing age, being female and not currently married increased the number of chronic diseases, but social class and education level had no independent effect (Table 3).

Table 3 Effects of sociodemographic factors on the total number of chronic diseases

	Multivariate forward stepwise linear regressions			
	Coefficients [†]	Beta [‡]	<i>p</i>	R ² change [§]
Age	0.0251	0.478	<0.001	0.203
Sex (1 = male, 2 = female)	0.191	0.104	<0.001	0.010
Marital status (1 = married, 2 = others)	0.118	0.063	0.003	0.003
Social class	–	–	–	–
Education	–	–	–	–
Constant	–0.937			

[†]Regression coefficients of variables that were statistically significant at the 5% level are shown. The total number of chronic diseases can be estimated by summing the constant and the products of the value and regression coefficient of the independent variables. [‡]Beta is the standardized regression coefficient that indicates the change in standard units of the dependent variable for each increase of one standard unit in the independent variable. [§]R² change is the proportion of variance in the dependent variable explained by the relevant independent variable. –, Variable had insignificant effect.

Table 4 Distribution of service utilization rates by the number and type of chronic diseases

	Number of consultations		Proportion of persons		
	Annual	Monthly	Hospitalized last year %	Regular consultations %	Regular medications %
Total sample (<i>n</i> = 2410)	3.73	0.48	4.5	18.2	16.6
No chronic disease (<i>n</i> = 1349)	2.75	0.28	2.5	4.3	2.2
≥One chronic disease (<i>n</i> = 917)	5.47	0.81	7.7	40.9	39.9
Total number of chronic disease					
One (<i>n</i> = 579)	4.82	0.66	5.9	29.9	27.3
Two (<i>n</i> = 226)	5.43	0.82	8.8	56.2	54.4
Three (<i>n</i> = 79)	8.90	1.34	8.9	62.0	70.9
Four (<i>n</i> = 20)	9.81	2.40	25.0	80.0	90.0
Five (<i>n</i> = 10)	0.50	1.50	40.0	70.0	80.0
Six (<i>n</i> = 3)	14.00	1.00	33.3 [†]	100	100
Specific diagnosis					
HT (<i>n</i> = 271)	6.68	0.81	9.6	64.2	73.7
DM (<i>n</i> = 110)	6.95	0.97	17.3	77.3	85.5
Heart (<i>n</i> = 94)	7.10	1.36	17.0	73.1	77.4
Pulmonary (<i>n</i> = 128)	6.04	0.88	14.2	30.5	28.9
Stroke (<i>n</i> = 21)	7.18	0.89	33.3	100	95.2
Joint (<i>n</i> = 473)	5.21	0.91	6.1	37.5	34.0
Psychological (<i>n</i> = 94)	6.69	1.30	8.5	42.1	41.5
Others (<i>n</i> = 225)	6.81	0.95	8.0	38.7	36.0

DM, diabetes mellitus; HT, hypertension. The differences in service utilization rates between each disease group and the 'no chronic disease' group were statistically significant by the two-sample *t*-tests or χ^2 tests, except for the group marked with

[†] (*p* = 0.06, Fisher's Exact Test).

Impact of chronic diseases on health service utilization

The subjects reported 7953 consultations in the previous year and 1137 consultations in the last month. The chronically ill had 52.7% of all the annual consultations and 63.9% of the monthly consultations.

Table 4 shows that the reported service utilization rates of each chronic disease group were much higher than those of subjects who did not report any chronic disease.

Table 5 shows the results of the multivariate stepwise regressions of consultation rates and hospitalization risk on the total number of chronic diseases and

Table 5 Effects of chronic diseases on service utilization rates

5a. Multivariate stepwise linear/logistic regressions on the total number of chronic diseases[†]						
	Annual consultation rate (n = 1904)		Monthly consultation rate (n = 2107)		Hospitalization risk (n = 2119)	
	Coefficients[§]	Beta[¶]	Coefficients[§]	Beta[¶]	Odds ratio^{††}	(95%CI)
Per chronic Disease	1.724	0.341	0.309	0.248	1.791	(1.527, 2.100)
R ² change	0.117	0.065	0.061			
5b. Multivariate stepwise linear/logistic regressions on chronic diagnosis[‡]						
	Annual consultation rate (n = 1904)		Monthly consultation rate (n = 2107)		Hospitalization risk (n = 2119)	
	Coefficients[§]	Beta[¶]	Coefficients[§]	Beta[¶]	Odds ratio^{††}	(95%CI)
HT	2.534	0.172	–	–		
DM	1.681	0.074	–	–	3.448	(1.812, 6.560)
Heart	–	–	0.521	0.086	2.212	(1.056, 4.634)
Pulmonary	2.223	0.114	0.330	0.067	3.416	(1.868, 6.247)
Stroke	–	–	–	–	5.776	(1.950, 17.116)
Joint	0.954	0.083	0.312	0.110	–	
Psychological	1.493	0.062	0.486	0.083	–	
Others	1.742	0.112	0.400	0.104	1.894	(1.070, 3.353)
R ² change	0.125		0.067		0.085	

DM, diabetes mellitus; HT, hypertension; –, variable had insignificant effect. [†]The total number of chronic diseases (continuous) and all sociodemographic variables were entered as independent variables. [‡]Diagnosis (0 = absent, 1 = present) and all sociodemographic variables were entered as independent variables. [§]Regression coefficients of variables that were statistically significant at the 5% level by multivariate linear regression. [¶]Beta is the standardized regression coefficient that indicates the change in standard units of the dependent variable for each increase of one standard unit in the independent variable by multivariate stepwise linear regression. ^{††}The odds ratios of variables that were statistically significant at the 5% level by multivariate stepwise logistic regression. R² change is the proportion of variance in the dependent variable explained by the relevant independent variables shown. The Nagelkerke R square was used for the logistic regression models.

specific diagnosis. The total number of chronic diseases had a linear correlation with consultation rates and hospitalization risk. The presence of any chronic diagnosis, except for stroke, significantly increased the annual and/or monthly consultation rates. All chronic diseases except hypertension, joint problems and psychological illnesses increased the risk of hospitalization significantly, the highest was associated with stroke.

The effects of chronic diseases on HRQOL

Table 6 compares the unadjusted SF-36 scores of the different chronic disease groups. Chronic diseases were associated with lower (poorer) SF-36 scores in all domains and the unadjusted effect sizes were generally large. Multivariate regression analysis controlling for sociodemographic factors showed that every additional chronic disease reduced the SF-36 scores by 5–12 points (Table 6), which was equivalent to a moderate effect size of 0.4 standard deviations.¹⁸ The effect of each chronic disease on the SF-36 scores, controlling for sociodemographic variables and comorbidity, are also shown in Table 7.

Discussion

A reported prevalence in the present study of 38% for chronic diseases was close to the 43% found in Japan¹⁹ and lower than the 53% in the USA.⁶ A local household survey among older adults found similar age-specific prevalence (41% in the 45–59 age group and 72% in the 60 or above group), suggesting the results of the present study were valid.¹⁰ Lo and Yeung reported a much lower prevalence of 16.8% of chronic diseases because they included only those conditions that required regular doctor follow-up.¹¹

The majority of people with chronic diseases were in the working age group, contrary to the general impression that chronic diseases are mainly problems of the elderly. This was because the absolute number of people in this age group was high in the population. Hoffman *et al.* also found that 60% of the chronically ill in the USA were in the age group of 18–64.⁶ Health care systems that subsidize only the elderly population will exclude the majority of the chronically ill.

Five percent of the elderly and 7.3% of the middle-

Table 6 Mean SF-36 scores by number of chronic diseases and diagnosis

	PF	RP	BP	GH	VT	SF	RE	MH
All subjects (<i>n</i> = 2410)								
Mean	91.83	82.43	83.98	55.98	60.27	91.19	71.66	72.79
SD	12.89	30.97	21.89	20.18	18.65	16.57	38.36	16.57
No chronic disease (<i>n</i> = 1349)								
Mean	96.12	89.05	89.75	62.12	63.86	92.96	75.61	75.25
SD	6.89	24.68	17.21	17.60	17.42	14.27	35.98	14.71
≥One chronic disease (<i>n</i> = 917)								
Mean	85.07	71.78	75.49	46.88	55.25	88.81	65.98	69.67
Effect size	0.86	0.56	0.65	0.76	0.46	0.25	0.25	0.34
Hypertension (<i>n</i> = 271)								
Mean	80.89	71.40	76.40	46.34	56.68	88.98	68.02	71.57
Effect size	1.18	0.57	0.61	0.78	0.38	0.24	0.20	0.22
Diabetes mellitus (<i>n</i> = 110)								
Mean	77.36	63.86	72.31	40.76	55.09	86.59	67.27*	71.93**
Effect size	1.46	0.81	0.80	1.06	0.47	0.38	0.22	0.20
Heart disease (<i>n</i> = 94)								
Mean	72.55	57.98	67.85	35.04	50.16	84.04	60.99	67.62
Effect size	1.83	1.00	1.00	1.34	0.73	0.54	0.38	0.46
Pulmonary (<i>n</i> = 128)								
Mean	85.94	59.77	72.28	44.20	53.52	84.57	55.99	66.09
Effect size	0.79	0.95	0.80	0.89	0.55	0.51	0.51	0.55
Stroke (<i>n</i> = 21)								
Mean	68.57	58.33	66.48	34.10	55.48	79.76*	58.73**	68.38**
Effect size	2.14	0.99	1.06	1.39	0.45	0.80	0.44	0.41
Joint (<i>n</i> = 473)								
Mean	81.58	68.39	70.90	44.70	52.93	88.42	65.12	68.80
Effect size	1.13	0.67	0.86	0.86	0.59	0.27	0.27	0.39
Psychological (<i>n</i> = 94)								
Mean	82.55	55.05	70.49	37.10	44.52	80.32	51.06	55.66
Effect size	1.05	1.10	0.88	1.24	1.04	0.76	0.64	1.18
Others (<i>n</i> = 225)								
Mean	86.64	69.11	71.00	44.16	54.16	86.56	63.70	68.50
Effect size	0.74	0.64	0.86	0.89	0.52	0.39	0.31	0.41

BP, bodily pain; GH, general health; MH, mental health status; PF, physical functioning; RE, role limitation due to emotional problems; RP, role limitation due to physical problems; SF, social functioning; VT, vitality. The differences in mean 36 item short form Health Survey (SF-36) scores between the disease group and people without any chronic disease were statistically significant with $p < 0.01$, except for those marked with * (significant with $p < 0.05$) or ** (not significant with $p > 0.05$) by the two-sample *t*-tests. Effect size = difference in mean score between the disease and 'no chronic disease' groups/standard deviation (SD) of all subjects.

age subjects reported chronic psychological problems, but the Census Household Survey found only 0.4% of the elderly admitting to have depression and provided no data for the middle aged.¹⁰ The discrepancy was because the present study included not only depression, but also other psychological problems. Many Chinese people are not familiar with the term depression, and tend to somatize, therefore psychological problems tend to be underreported in surveys of Chinese populations.^{20,21}

There was a linear correlation between consultation rates and the total number of chronic diseases, irre-

spective of the diagnosis. The number of annual consultations increased by 1.7 (60% of the baseline rate of people without chronic disease) per person for each additional diagnosis, after controlling for sociodemographic factors (Table 5). The odds ratio of hospitalization in the last year was 1.79, which is equivalent to about 79% increase in relative risk, for every additional chronic disease. The total number of chronic conditions can be used as a medical risk adjustment factor for service planning and resource allocation, if the predictive relationship and coefficients can be confirmed by prospective studies.

Table 7 Effects of chronic diseases on SF-36 scores**7a. Multivariate stepwise linear regression on the total number of chronic diseases[†]**

<i>n</i> = 2122	Regression coefficient ^{††} (beta [‡])							
	PF	RP	BP	GH	VT	SF	RE	MH
Per chronic Diseases	- 5.16 (-0.37)	- 11.67 (-0.35)	- 8.48 (-0.35)	- 8.47 (-0.38)	- 5.92 (-0.29)	- 4.46 (-0.25)	- 9.76 (-0.23)	- 4.66 (-0.26)
R ² change	0.274	0.118	0.127	0.162	0.055	0.030	0.017	0.029

7b. Multivariate stepwise linear regression on diagnosis[‡]

<i>n</i> = 2122	Regression coefficient ^{††} (beta [‡])							
	PF	RP	BP	GH	VT	SF	RE	MH
HT	-3.54 (-0.08)	-	-	-3.70 (-0.06)	-	-2.94 (-0.06)	-8.90 (-0.07)	-2.91 (-0.06)
DM	-4.12 (-0.07)	-10.57 (-0.07)	-6.52 (-0.06)	-9.34 (-0.10)	-	-4.02 (-0.05)	-	-
Heart	-8.67 (-0.13)	-15.17 (-0.09)	-7.79 (-0.07)	-11.10 (-0.10)	-7.16 (-0.07)	-4.17 (-0.05)	-	-
Pulmonary	-4.49 (-0.08)	-18.79 (-0.14)	-10.94 (-0.11)	-9.75 (-0.11)	-4.61 (-0.06)	-5.28 (-0.07)	-11.72 (-0.07)	-5.02 (-0.07)
Stroke	-10.14 (-0.08)	-	-	-	-	-	-	-
Joint	-6.56 (-0.20)	-13.56 (-0.17)	-13.26 (-0.24)	- 9.22 (-0.18)	-8.76 (-0.19)	-3.98 (-0.10)	-12.65 (-0.13)	-5.72 (-0.14)
Psychological	-4.62 (-0.07)	-22.71 (-0.14)	-5.85 (-0.05)	-12.20 (-0.12)	-13.94 (-0.14)	-10.11 (-0.12)	-20.91 (-0.11)	-16.64 (-0.19)
Others	-3.06 (-0.07)	-11.25 (-0.11)	-11.87 (-0.16)	-9.95 (-0.14)	-5.47 (-0.09)	-4.22 (-0.08)	-8.41 (-0.06)	-3.57 (-0.06)
R ² change [§]	0.128	0.131	0.141	0.164	0.077	0.052	0.046	0.077

DM, diabetes mellitus; HT, hypertension; SF-36, 36 item short form Health Survey; -, variable had insignificant effect. [†]The total number of chronic diseases (continuous) and all sociodemographic variables were the independent variables. [‡]Diagnosis (0 = absent, 1 = present) and all sociodemographic variables were the independent variables. [§]Regression coefficients of variables that were statistically significant at the 5% level are shown. [¶]Beta is the standardized regression coefficient that indicates the change in standard units of the dependent variable for each increase of one standard unit in the independent variable. ^{††}The R² change is the proportion of variance in the dependent variable that is explained by the relevant independent variables shown.

The lack of correlation between stroke and consultation rates could be a type II statistical error because the sample size of 21 might not have enough power to reach statistical significance. Furthermore, 86% of the stroke subjects had coexisting hypertension, diabetes mellitus or heart disease. The effects of these conditions might have 'cashed in' before stroke could be entered into the stepwise regression models.

Each chronic disease had a unique effect on different quality of life domains. As shown in other studies, psychological illnesses impair quality of life more than any other chronic disease.²²⁻²⁴ It is anticipated that mental illnesses will become a major global burden of disease and cause of disability in the next two decades.²⁵ Chronic joint problems affected quality of life as much as chronic pulmonary diseases and more than hypertension and diabetes mellitus did. Unfortunately, they have been much neglected by governments and the medical profession because they are

rarely lethal and are often regarded as part of normal aging.^{24,26,27}

New models of care that incorporate the promotion of HRQOL are needed for people with chronic diseases.^{2,28,29} The enhancement of HRQOL is not only an end in itself, it can also be a means to reduce the demand on health services because there is an inverse relationship between HRQOL and service utilization.³⁻⁶

Limitations of the study

The present study sample had a relatively smaller proportion of middle aged adults than the Hong Kong general population, probably because some working adults had not returned home during the time of the telephone calls.

Self reported morbidity and service utilization data may not be totally accurate because of recall errors.

However, self reporting is commonly used in population and household surveys.^{10,13,30,31} The reported prevalence of chronic diseases was likely to be a conservative estimate because only diagnoses that were recalled were counted. The service use rates reported should not be interpreted as the actual rates, but an indication of the use pattern.⁵ Despite these limitations, the results of the regression analyses should be valid because there was no suggestion of any systematic bias.

The association between chronic diseases and service utilization rates or quality of life found in the present cross sectional study might not be causal although it was suggestive. Further prospective studies are needed to confirm the relationship and determine the predictive coefficients more accurately.

Conclusions

Chronic diseases are common among Chinese adults in Hong Kong, affecting more than one in three people. They significantly increase health service utilization rates and impair quality of life. The annual consultation rate increases by approximately 60% and

hospitalization risk increases by 79% for every additional condition.

Each chronic disease has a unique influence on different domains of quality of life. Management programs need to be multidimensional and tailored to the special needs of each disease group. The quality of life of a person may be further compromised if income needs to be diverted from other life needs to pay for health services. Therefore, a good health-care system must ensure that the chronically ill are not deprived of adequate care because of a lack of means.

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