Hospitalisation trends due to selected non-communicable diseases in Sri Lanka, 2005–2010

R Premaratne[1], A Amarasinghe[1] and **AR Wickremasinghe[2]**

(Index words: Diabetes, hypertension, ischaemic heart disease)

Abstract

Objectives To project hospitalisation trends due to selected non-communicable diseases (NCD) from 2005 to 2010.

Design Morbidity data, maintained at the Medical Statistics Unit of the Ministry of Health, from 1981 to 2000, were used to model trends of hospitalisation due to diabetes mellitus, hypertensive disease and ischaemic heart disease. Linear and quadratic trends were used to model morbidity trends.

Results For all three diseases considered, the increase in the incidence of hospitalisation is exponential. An increase is estimated in the incidence of hopsitalisation by 36%, 40% and 29% due to diabetes mellitus, hypertensive disease and ischaemic heart disease, respectively, in 2010 as compared to 2005. The greatest burden and the largest increase in the rate of hospitalisation will be due to hypertensive disease.

Conclusions There will be an exponential increase in hospitalisation due to diabetes, hypertension and ischaemic heart disease. The health sector should provide additional resources to meet the demand.

Introduction

The incidence and prevalence of non-communicable diseases (NCDs) such as cardiovascular diseases, cancer, mental illness, accidents and traumatic injuries, and malnutrition are on the rise [1]. Malaria, tuberculosis, filariasis, respiratory illness and diarrhoeal diseases are still public health problems, and HIV/AIDS, viral hepatitis, Japanese encephalitis and dengue pose serious challenges. During the past 5 years, the government curative care institutions provided services to 3–4 million in-patients, 35–45 million out-patients, and 1 million patients attending various clinics, annually [2].

Clients and health sector professionals demand improved quality, efficiency and effectiveness of health care services. There is a growing need to ensure equity of access to utilisation and outcome of the health care system. To conform to the norms and standards in health care, additional human resource and better health management are required. These measures impose a demand for additional financial resources.

The purpose of this study was to project hospitalisation trends due to selected NCDs from 2005 to 2010 based on indoor morbidity data from 1981 to 2000 to determine and plan future health care services.

Methodology

Morbidity data were obtained from indoor morbidity and mortality statistics maintained at the Medical Statistics Unit, Ministry of Health from 1981 to 2000. Indoor morbidity statistics maintained at the Medical Statistics Unit are confined to in-patient data in government hospitals. Data on persons with NCDs visiting the out-patient departments of government health institutions, other systems of medicine and the private sector were not used in the projections, as such data are not routinely collected. Other than for the limited information collected through special surveys and registers maintained by the special campaigns and disease control programmes, the indoor morbidity and mortality return (IMMR) is the sole source of morbidity data in Sri Lanka. The IMMR used since 1996, is based on the 10th revision of the International Classification of Diseases.

When missing data were detected, estimates were derived by linear interpolation between values of immediately adjacent years. Disease specific rates were calculated per 100 000 population for each year based on population projections of the Department of Census and Statistics [3].

Linear and quadratic trends were used to model morbidity trends using SPSS and *MINITAB*® statistical software programmes as given below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2^2$$

where, β_0 is the intercept, β_1 is the regression coefficient of the linear component of time in years, and β_2 is the regression coefficient of the quadratic component of time in years.

Based on the developed models, projections including 95% confidence intervals were made up to the year 2010. The following assumptions were made: indoor morbidity data are complete and reliable; the age and sex structure

[1]Epidemiological Unit, Ministry of Health, 231 De Saram Place, Colombo 10; [2]Department of Community and Family Medicine, Faculty of Medicine, University of Kelaniya, Ragama.
Correspondence: AA, *e-mail: <anaamarasinghe@yahoo.com.uk>* *(Competing interests: none declared.) Received 20 June 2004 and revised version accepted 4 October 2004.*

of the population would not change over time; and the trend seen in the past would continue unchanged up to the year 2010.

Results

The results of the models used for disease projections are given in Table 1. For all three diseases considered, the quadratic trend is positive and significant, indicating that the increase in the incidence of hospitalisation is exponential. Table 2 gives the projected incidence of hospitalisation and the 95% confidence intervals of the projections. Based on these projections, by the year 2010 there will be an increase, as compared to the projections for the year 2005, in the incidence of hopsitalisation by 36%, 40% and 29% due to diabetes mellitus, hypertensive disease and ischaemic heart disease, respectively. The greatest burden and the largest increase in the rate of hospitalisation will be due to hypertensive diseases. Figures 1–3 show the projected incidence of hospitalisation due to these diseases with 95% confidence intervals till the year 2010.

Discussion

NCDs are and will be the leading cause of morbidity, mortality and long term disability in Sri Lanka over the next decade, despite the many interventions for their control. The incidence and prevalence of NCDs increase with age and given the demographic projections for the country, it is inevitable that Sri Lanka will be faced with an explosive epidemic of NCDs.

The trends projected in this study have important implications for health planning. The increase in the incidence of hospitalisation due to these three diseases range from 29% to 40% over a period of 6 years. The trends in hospitalisation are projected only for three chronic diseases and, if cancers and traumatic injuries are also taken into account, the demand for hospital beds in the future will be even higher.

The provision of adequate in-patient care facilities to meet the future demands will be a major challenge for the Ministry of Health. The issue of bypassing of smaller hospitals and overcrowding of larger hospitals needs to be addressed to utilise optimally underutilised institutions. In addition to providing basic infrastructure in terms of buildings, facilities and beds, the Ministry of Health will also have to provide adequate human resource. It has been reported that Sri Lanka will have an excess of doctors by 2010 [4]. Unless the current shortage of allied health staff including nurses and other paramedical staff is corrected, the increase in demand in the coming years will be difficult to meet. Even though the private sector is investing in health care, it is unlikely that the contribution of the private sector can, by itself, significantly bridge the gap between what exists and what is projected. Hence, the public sector health care services need to make a major contribution.

The increase in the overall burden of NCDs in Sri Lanka is largely due to the increase in the ageing population. The impact of NCDs on families, communities and the health services will be significant both socially and economically. In contrast to the control of communicable

Table 1. **Summary of Regression models used for disease projections**

Disease (ICD code)	*Regression coefficients in fitted model*					R^2
	Intercept	*Linear trend*		*Quadratic trend*		
		β_1 (± SE)	*p-value*	β_2 (± SE)	*p-value*	
Diabetes mellitus (ICD/E10-E14)	68.8545	–1.5066 (± 1.5778)	0.3530	0.3962 (± 0.0729)	< 0.0001	0.9549
Hypertensive disease (ICD/I10-I15)	199.0141	–10.7568 (± 3.4281)	0.0060	1.1114 (± 0.1586)	< 0.0001	0.9442
Ischaemic heart disease (ICD/I20-I25)	112.7820	1.4338 (± 3.9028)	0.7179	0.3938 (± 0.1805)	0.0435	0.8704

R^2 refers to the coefficient of variation; Model: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2^2$

Table 2. **Projected incidence of hospitalization for selected diseases 2005–2010**

Disease	*Projected incidence of hospitalisation (95% confidence interval) (per 100,000 population) for selected diseases for years*					
	2005	*2006*	*2007*	*2008*	*2009*	*2010*
Diabetes mellitus (ICD/ E10-E14)	278.8	297.5	317.0	337.3	358.3	380.2
Hypertensive disease (ICD/ I10 – I15)	624.7	670.7	718.8	769.2	821.8	876.6
Ischaemic heart disease (ICD/ I20 – I25)	394.8	416.3	438.6	461.7	485.5	510.2

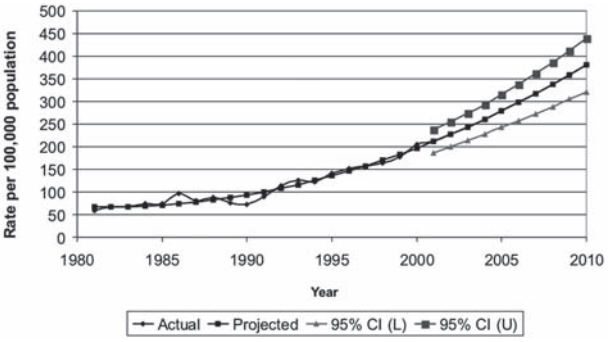

Figure 1. Projected incidence of hospitalisation due to diabetes mellitus 2001–2010.

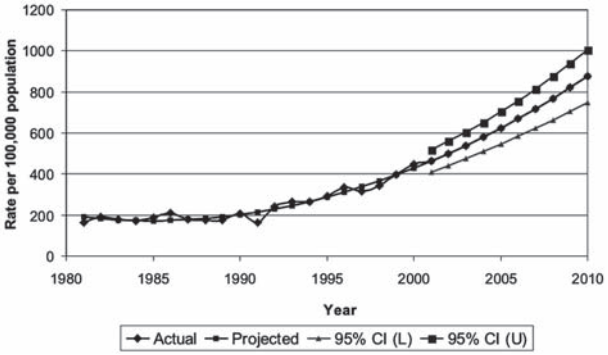

Figure 2. Projected incidence of hospitalisation due to hypertensive disease 2001–2010.

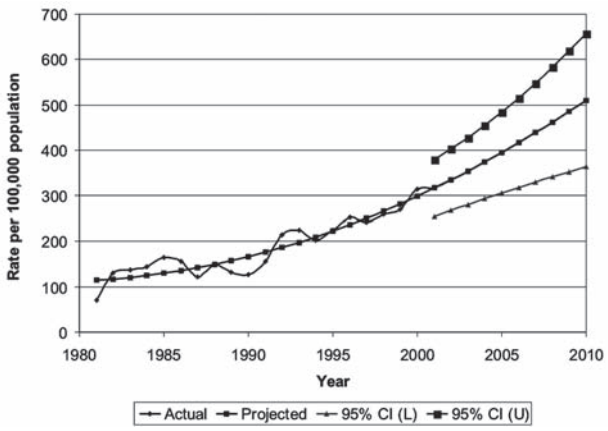

Figure 3. Projected incidence of hospitalisation due to ischaemic heart disease 2001–2010.

diseases, which is well defined and for which preventive strategies are well established, the control of NCDs is more difficult given their multifactorial origin. The pathogenesis of the diseases has probably already started in susceptible persons. Control efforts that are carried out today will take over 20 years to show results.

Age and period cohort effects are intimately related and any relationship observed between a disease and time (disease trend) as an outcome at a particular age may be confounded by birth cohort or period cohort effects. Different age cohorts and period cohorts experience different exposures to risk factors. This is particularly important for the environmental and behavioural risk factors and provision of health care, as they may change markedly over time [5, 6]. Cohort effects include risk factors which act early in life or which are characteristic of a given generation over a long period of life such as smoking habits, alcohol use, diet, etc.

The projections indicate that during the next 6–7 years there will be an appreciable increase in the morbidity due to the NCDs studied. Disease burden projections in other parts of the world have yielded similar or inconsistent results [7, 8].

The projections made in this study are somewhat crude. Data only from the Medical Statistics Unit of the Ministry of Health were used as it is considered the most reliable data that reflect morbidity patterns in government institutions. Morbidity data of patients attending the out-patient departments of government health institutions, ayurvedic institutions and the private sector are not routinely collected and were not considered in our projections. Since it is estimated that approximately 50% of the population uses the private sector for out-patient consultations [1], the projections made in this study may, thus be a gross underestimate of the real disease burden.

Missing data pose a serious limitation in making disease projections and trend analyses [9]. It was a major problem in some provinces largely due to the interruption of the health information system. In most provinces, age specific data were not available and this prevented us from making a more reliable age standardised projections.

Although qualified medical officers make diagnoses in hospitals, the accuracy of the diagnoses is questionable. Due to the lack of awareness of ICD codes and classification, especially due to revisions of the ICD during the review period, there may have been errors. However, it is unlikely that the errors would have been major enough to affect the overall results as the diseases reviewed are well established and widely recognised by most doctors.

In general, diagnoses of morbidity are more reliable than of mortality. Reporting common diseases as a cause of death is not uncommon, particularly if a definitive diagnosis has not been made. This is especially true for smaller institutions where adequate diagnostic facilities are lacking. The biases due to misclassification of disease status may be in either direction and we do not feel that it would dramatically alter the projections made in this review.

The quality and extent of data reviewed determines the accuracy of projections of morbidity patterns. In this study, data of only a 20-year period were considered due to the absence of data over a longer period of time. This period of observation may not be sufficient for accurate projection of morbidity patterns.

Despite the many data-related limitations and the method of projection, we feel that the trends, which are unlikely to drastically change because of individual extreme values, should be given due priority in projecting for future demand scenario in the health sector.

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