



THE EXPECTATION OF LIFE WITHOUT DISABILITY IN SRI LANKA

Lakshman Dissanayake

Professor & Vice Chancellor of the University of Colombo and Senior Professor in the Department of Demography, University of Colombo, SRI LANKA.

ABSTRACT

This paper calculates the Expectation of Life without Disability for Sri Lanka. No one has ever attempted to calculate health expectancies up to now for Sri Lanka and hence, this paper will be the first of its kind and can be regarded as a great contribution to the field of Sri Lankan demography. Life expectancy is composed of lengths of time spent in different states of health until death. These lengths of time in different states of health are health expectancies and they combine information on both mortality and morbidity. The present paper contains estimates of "Disability-Free Life Expectancy" calculated using a method devised by Sullivan and applicable to any state of health definition. The *Sullivan health expectancy* reflects the current health of a real population adjusted for mortality levels and it is independent of age structure. Health expectancy calculated by Sullivan's method is the number of remaining years, at a particular age, which an individual can expect to live in a healthy state. The data used were the age-specific prevalence (proportions) of the population in unhealthy state, and age-specific mortality information taken from a period life table. Sullivan health expectancy is not very sensitive to the size of the age groups, and thus an abridged life table was used. It was observed that the total life expectancy for men and women was 72 and 78.6 years, respectively, for the 2011-13 period. The analysis on healthy life expectancy showed that it is 64.2 for males and 67.1 for females. This suggests that the gap between total life expectancy was 6.6 years between men and women but the health expectancy was only 2.9 years. In addition, proportion of life spent in disability-free state was 85.4 for women and 89.1 for men. This indicates that women spent more time in disability state compared to men. In other words, the majority of extra years of life among females were spent in poor health; females live 6.6 years longer than males, but only had 2.9 years longer in good health.

Keywords: Health expectancy, Sullivan Method, Sri Lanka, Life table, Disability-free life

INTRODUCTION

Life expectancy is a measure that is frequently used to determine the overall health of a community. Life expectancy at birth measures health status across all age groups. In addition, changes in life expectancy are often used to describe trends in mortality. Life expectancy, as it is not influenced by age structure of population and thus has been used to compare the health state between populations and also to display the impact of different interventions in the health area (Stevenson and Fryback, 202). The decline in mortality at young ages and the increase in longevity, and the heightened increase of degenerative chronic diseases, produce a rapid process of epidemiologic transition, striking a new public health agenda in the face of the complexity of the new morbidity pattern (Dissanayake, 2000, Field and Gold, 1998). Studies on longevity and health shows that the positive tendencies of prolonged life are not

always accompanied by similar trends in the extension of healthy life; in other words, a long life does not necessarily mean a healthy life (Rogers et al, 1990; Verbrugge, 1994; Olshansky et al.,1991). In contrast, with increased life expectancy, the proportion of years of life with degenerative chronic diseases, disabilities and socioeconomic disadvantages also amplified (Triantafillou et al., 2005). It is thus arguable that mortality measurements alone are deficient to effectively evaluate state of health, quality of life in a population, or the relative impact of medical interventions. In this context, great effort has been spent to develop synthetic health measures that consider, besides the effect of mortality, morbidity, limitations and disabilities, as well as concepts relative to the well-being and the quality of life of a population (Robine and Ritchie, 1991; Kenneth and Manton, 2000). A method to combine morbidity and mortality information was first proposed by Sanders and later developed by Sullivan (Sanders, 1964; Sullivan, 1971). This paper calculates the Expectation of Life without Disability for Sri Lanka. No one has ever attempted to calculate health expectancies up to now for Sri Lanka and hence, this paper will be the first of its kind and can be regarded as a great contribution to the field of Sri Lankan demography. Life expectancy is composed of lengths of time spent in different states of health until death. These lengths of time in different states of health are health expectancies and they combine information on both mortality and morbidity.

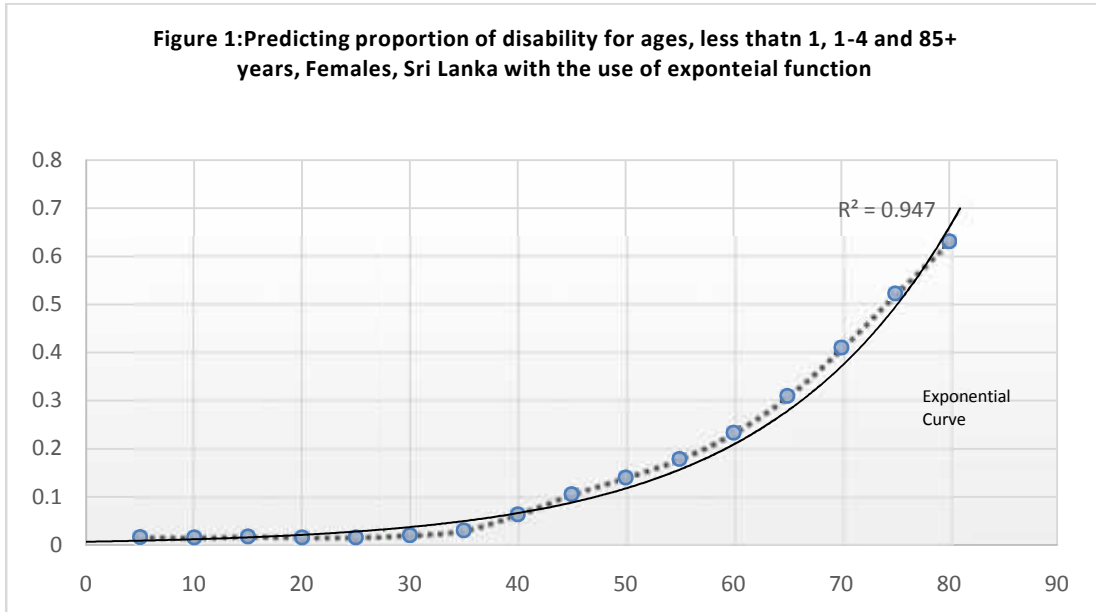
OBJECTIVES

The objective of this study is to use Sullivan's technique and estimate healthy life expectancy for Sri Lanka based on the vital statistics derived from the Registrar General's Office and data collected on disability at the Census in 2012.

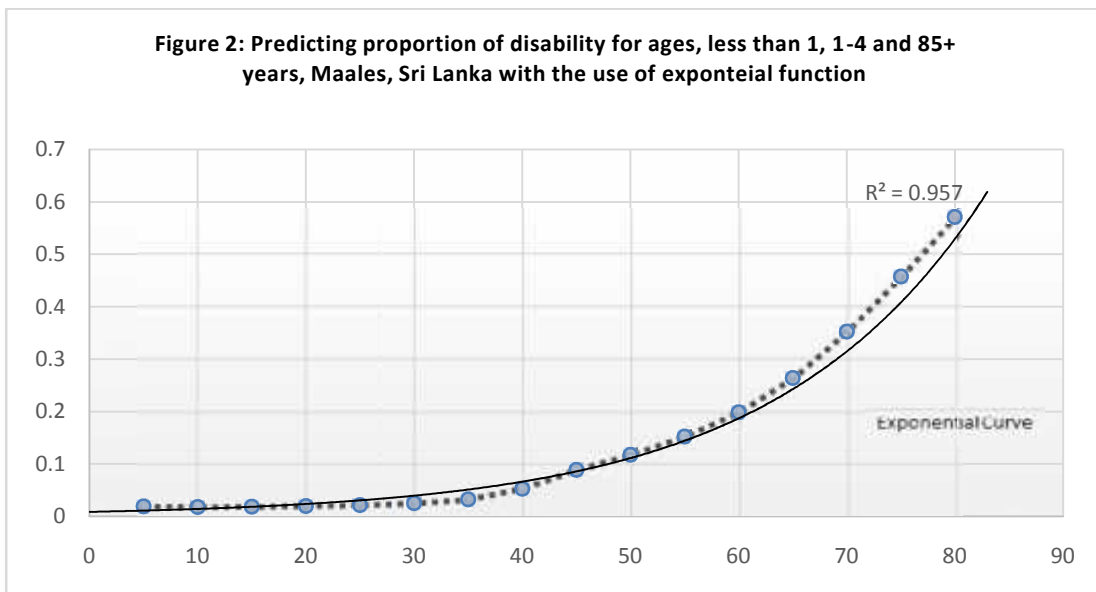
METHODS AND MATERIALS

In this study, the Sullivan Method (Sullivan, 1971) was used to calculate health expectancy. The materials necessary for applying the Sullivan method are: (1) data derived from conventional life table; (2) prevalence of disability status according to age. In the present study, the morbidity information used in applying the Sullivan method comes from the 2012 Census. The healthy life expectancy or expectancy of a life free of disability, proposed by Sullivan, is calculated using the life table constructed by the Department of Census and Statistics for the period 2011-2013.

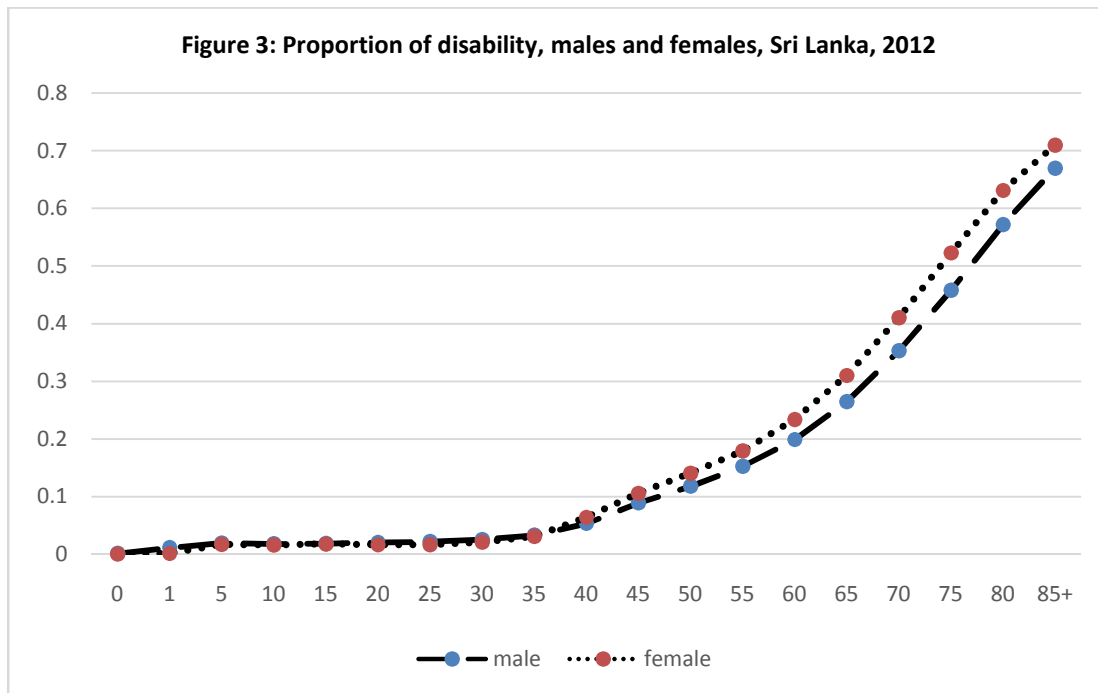
In order to calculate health expectancies with the use of Sullivan method, it is necessary to have data on disability for all the age groups starting from birth to age 85+ years. However, the Census of 2012 in Sri Lanka does not provide information on disability for the ages 0, 1-4 and 85+years. Several simulations carried out suggested that the proportion of disability for both men and women resembles the exponential function as seen in figures 1 and 2 and hence, the values for ages, 0, 1-4 and 85+ years were predicted with the use of exponential curve. The predictions for age 85+ years for both sexes were made by looking at both actual data and the behaviour of the exponential function after age 80 years. This determination proves reliable when disability proportions by age are drawn (see figure 3). Accordingly, proportion of disability for men and women is presented in figure 3. Figure 3 reveals that proportion of disability starts showing differences between men and women only after age 40 in favouring men.



Source: Author's calculation with the use of Census data, 2012, Department of Census and Statistics.



Source: Author's calculation with the use of Census data, 2012, Department of Census and Statistics.



Source: Author's calculations

The expectancy of healthy life reflects the state of health of population adjusted by the level of mortality and morbidity. In the present study, healthy life expectancies were estimated according to sex, since health states vary considerably between genders, especially at more advanced ages.

RESULTS AND DISCUSSION

Tables 1 and 2 show that health expectancy for males and females separately for Sri Lanka. These tables display the total life expectancy and the total healthy life expectancy (disability free life expectancy) for birth to age 85+ years, according to sex. The number of unhealthy years lived is also shown, as well as its relative proportion of the total life expectancy. The tendency for the proportion of individuals in an unhealthy state to increase with age is found for both men and women.

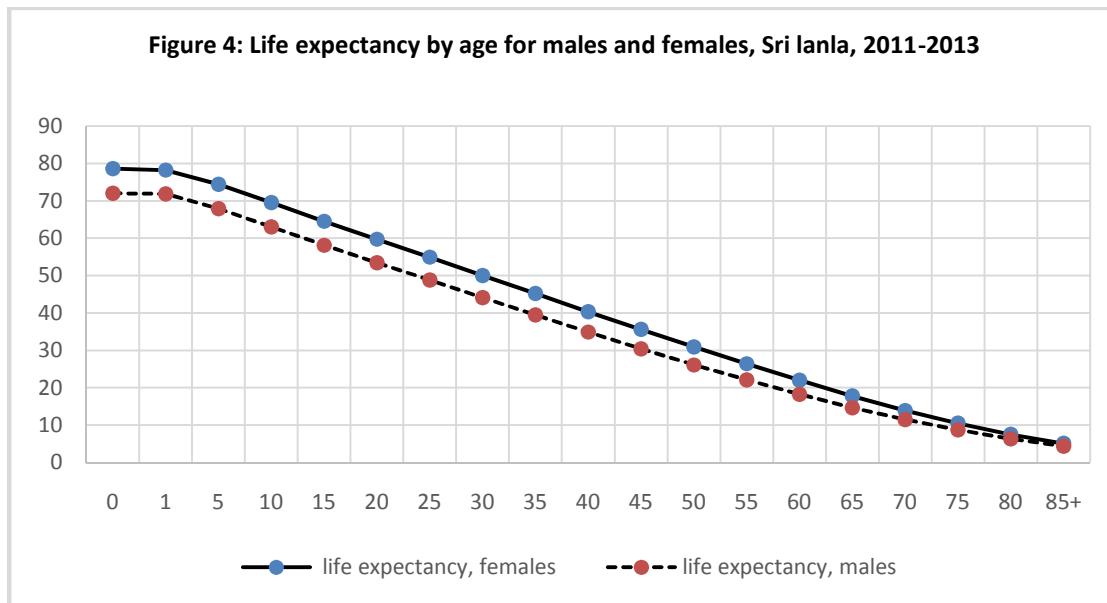
Table 1: Health Expectancy for Males, 2012, Sri Lanka

Age at start of interval	Age group	numbers surviving to age x	person years lived in age interval	total number of years lived from x	total life expectancy	proportion with disability	person years lived without disability	total years lived without disability from age x	disability-free life expectancy
x	x - x+n	lx	nLx	Tx	ex	pix			DFLE _x
0	0	10000	9905	720313	72.0	0.0011	98941.05	641757	64.2
1	1-4	98976	3954	710408	71.8	0.0112	390976.46	631863	63.8
5	5-9	98766	4934	670868	67.9	0.0193	483949.95	592765	60.0
10	10-14	98623	4926	621521	63.0	0.018	483792.12	544370	55.2
15	15-19	98441	4911	572255	58.1	0.0185	482074.52	495991	50.4
20	20-24	97969	4881	523138	53.4	0.0203	478192.55	447784	45.7
25	25-29	97242	4843	474328	48.8	0.0218	473765.74	399964	41.1
30	30-34	96482	4804	425896	44.1	0.0254	468264.11	352588	36.5
35	35-39	95684	4759	377849	39.5	0.0329	460276.74	305761	32.0
40	40-44	94637	4697	330256	34.9	0.0532	444793.38	259734	27.4
45	45-49	93176	4603	283277	30.4	0.0888	419441.76	215254	23.1
50	50-54	90773	4455	237245	26.1	0.1178	393038.63	173310	19.1
55	55-59	87222	4244	192693	22.1	0.1525	359751.89	134006	15.4
60	60-64	82294	3950	150245	18.3	0.1988	316534.09	980317.02	11.9
65	65-69	75337	3536	110737	14.7	0.2647	260060.90	663782.93	8.8
70	70-74	65593	2958	753695.00	11.5	0.3532	191332.50	403722.03	6.2
75	75-79	52210	2231	457881.00	8.8	0.4582	120915.13	212389.53	4.1
80	80-84	36771	1430	234708.00	6.4	0.572	61233.53	91474.40	2.5
85+	85+	20603	9163	91639.00	4.4	0.67	30240.87	30240.87	1.5

Table 2: Health Expectancy for Females, 2012, Sri Lanka

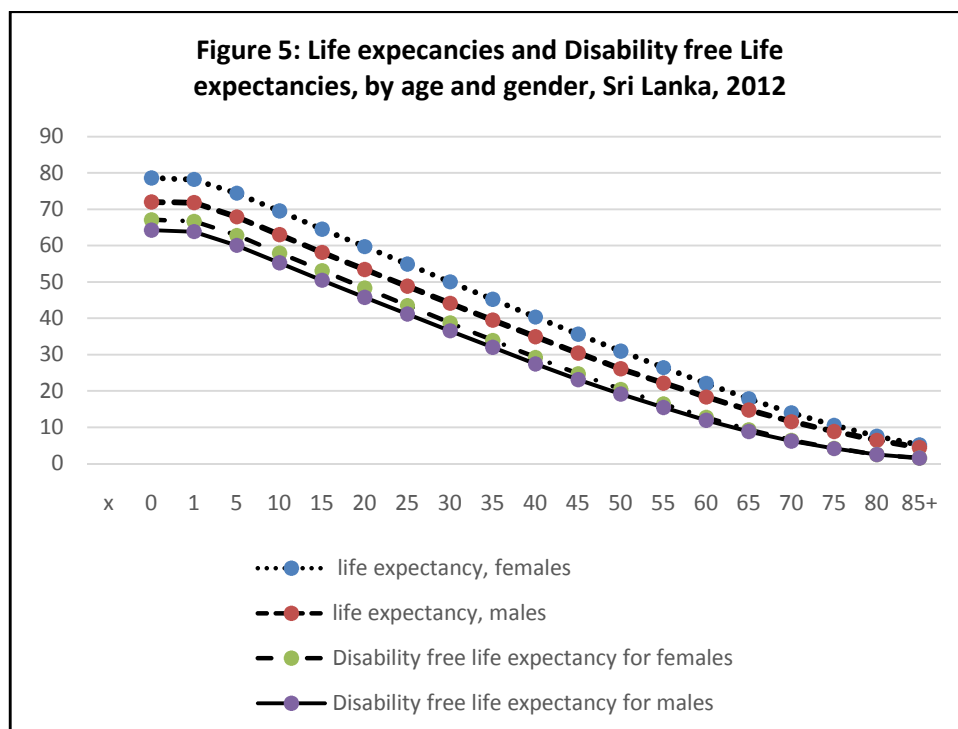
Age at start of interval	Age group	numbers surviving to age x	person years lived in age interval	total number of years lived from x	total life expectancy	proportion with disability	person years lived without disability	total years lived without disability from age x	disability-free life expectancy
x	x - x+n	lx	nLx	Tx	ex	pix			DFLE _x
0	0	10000	99287	7863301.00	78.6	0.0001	99277.07	6713382.67	67.1
1	1-4	99231	396518	7764014.00	78.2	0.0011	396081.83	6614105.60	66.7
5	5-9	99068	495043	7367496.00	74.4	0.0168	486726.28	6218023.77	62.8
10	10-14	98949	494412	6872453.00	69.5	0.0156	486699.17	5731297.49	57.9
15	15-19	98816	493525	6378041.00	64.5	0.0176	484838.96	5244598.32	53.1
20	20-24	98579	492165	5884516.00	59.7	0.0161	484241.14	4759759.36	48.3
25	25-29	98283	490735	5392351.00	54.9	0.0162	482785.09	4275518.22	43.5
30	30-34	98009	489263	4901616.00	50.0	0.0208	479086.33	3792733.12	38.7
35	35-39	97686	487458	4412353.00	45.2	0.0307	472493.04	3313646.79	33.9
40	40-44	97276	484984	3924895.00	40.3	0.0638	454042.02	2841153.75	29.2
45	45-49	96675	481170	3439911.00	35.6	0.1056	430358.45	2387111.73	24.7
50	50-54	95717	474985	2958741.00	30.9	0.1404	408297.11	1956753.28	20.4
55	55-59	94164	465508	2483756.00	26.4	0.1791	382135.52	1548456.18	16.4
60	60-64	91879	451138	2018248.00	22.0	0.2337	345707.05	1166320.66	12.7
65	65-69	88278	427412	1567110.00	17.8	0.31	294914.28	820613.61	9.3
70	70-74	82137	386517	1139698.00	13.9	0.4104	227890.42	525699.33	6.4
75	75-79	71712	324133	753181.00	10.5	0.5228	154676.27	297808.91	4.2
80	80-84	57116	237722	429048.00	7.5	0.6313	87648.10	143132.64	2.5
85+	85+	37302	191326	191326.00	5.1	0.71	55484.54	55484.54	1.5

Figure 4 shows that there is a significant differences of life expectancy by gender at all ages with minimum differences at ages 75 and above, in favoring women.



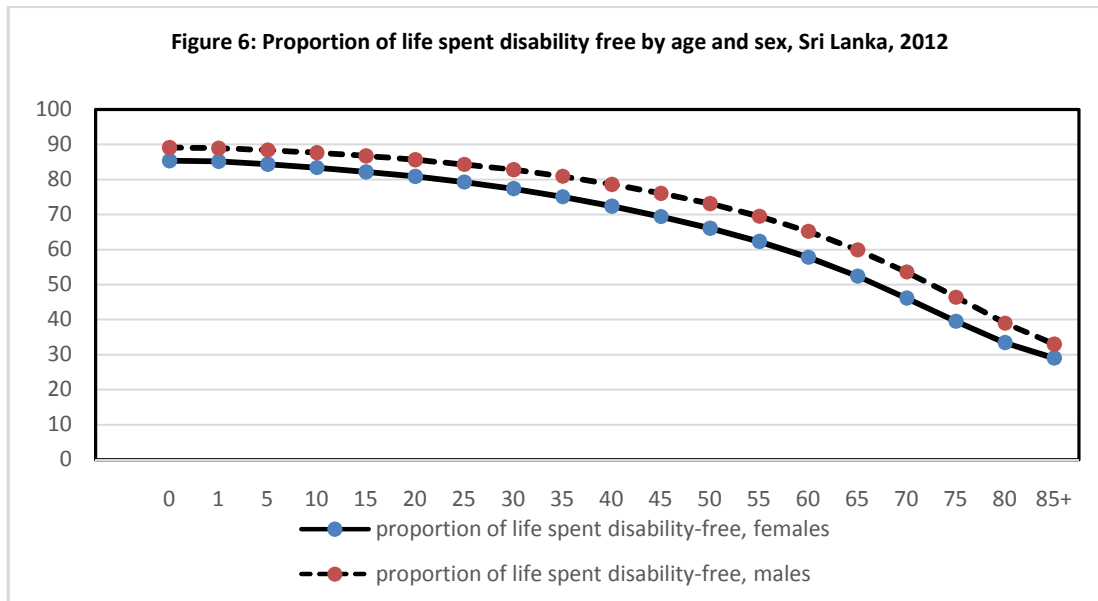
Source: Drawn by the author from the data obtained from the Department of Census and Statistics, Sri Lanka

Figure 5 exhibits both total life expectancies and disability free life expectancies. It reveals that sex differences in disability free life expectancies are substantially lower at each age compared to that of total life expectancies. Although life expectancy is greater among females, they lose, relatively, more healthy years than males.



Source: Author's calculations

It is seen from figure 6 that proportion of life spent disability free is higher for men compared to women at each age although women enjoy higher life expectancy at each age. This suggests that women have become sick at some point of age but they have expand their morbid status throughout the life span although they have better life expectancy than men. The differences observed are greater after age 40 years and favoured men.



Source: Author's calculations

The Sullivan health expectancy reflects the current health of a real population adjusted for mortality levels and independent of age structure. Health expectancy calculated by Sullivan's method is the number of remaining years, at a particular age, which an individual can expect to live in a healthy state (however health may be defined). The study calculated the total life expectancy and the total healthy life expectancy for all the ages from birth according to sex. The number of unhealthy years lived was also derived, as well as its relative proportion of the total life expectancy. A newborn baby boy could expect to live 72 years and a newborn baby girl 78.6 years if mortality rates remain the same as they were in Sri Lanka in 2011 to 2013 throughout their lives. A newborn baby boy could expect to live 64.7 years in good health if they experienced the same health status rates as observed in 2012, 2.4 years lower than it was for baby girls. In reference only to the mortality component, females at the age of 20 expect, on average, to live 6.3 years more than males (59.7 years versus 53.4 years). At the age of 65 the difference by sex is, on average, 3.1 years in favor of females. The analysis suggests that women at the age of 20 could expect to live 48.3 years without disability compared to 45.7 years for men. It was observed that women in 2012 at age 65 could expect to live a further 17.8 years of which 9.3 years (52.4%) would be spending without disability, disability being defined as restrictions in daily activities due to longstanding illness(es), condition(s) or handicap(s). In the case of men who were at age 65 in 2012 could expect to live 14.7 years of which 8.8 years (60%) would be spending without disability. The analysis suggests that men live a greater proportion of their lives without disability than do women. The greatest loss in years of healthy life results prominently in every age group from the presence of a long-term disease or disability which limits daily functions (Weeratunga, 2015)

It appears that there is significant sex differences in health and survival in Sri Lanka. It appears that this remarkable discrepancy between the health and survival of the sexes perhaps due to so-called male-female health-survival paradox (Alberts et al., 2014). The male-female health-survival paradox is the phenomenon witnessed in modern human societies by women

having superior longevity but experience higher rates of disability and poor health than men. Some have attempted to propose explanations for this paradox by relating this phenomena to biological, social, and psychological factors (Kinsella, 2000; Case and Paxson, 2005; Oksuzyan et al., 2008; Lindahl-Jacobsen et al., 2013). These explanations may be due to multiple causes that contain fundamental biological differences between men and women such as genetic factors, immune system responses, hormones, and disease patterns. Behavioral dissimilarities such as risk-taking and reluctance to search for and realize with medical treatment may also play a part. Another dimension is that part of the difference may be due to data defects arising from selective non-participation and under-reporting of health problems, and delayed health seeking behaviour by men.

CONCLUSION

Total life expectancy and healthy life expectancy are major measures of the health status of population. The healthy life expectancy measure adds a 'quality of life' dimension to estimates of life expectancy by considering the time spent in different states of health. It is quite important to estimate the number of years of life spent in poor health because it has strong bearing on the demand for health and social care and the associated costs, especially when Sri Lanka is currently experiencing a significant growth in its elderly population (Dissanayake and Weeratunga, 2017). The analysis on healthy life expectancy (the number of years lived in self-assessed good health) showed that it is now 64.2 for males and 67.1 for females. However, proportion of life spent in disability-free state was 85.4 for women and 89.1 for men. This indicates that women spent more time in disability state compared to men. In other words, the majority of extra years of life among females were spent in poor health; females live 6.6 years longer than males, but only had 2.9 years longer in good health. Health risks are in transition due to various factors such as ageing owing to successes against infectious diseases and patterns of physical activity and food, alcohol and tobacco consumption are shifting. Sri Lanka currently encounters a double burden of increasing chronic, non-communicable conditions, as well as the resurgence of different types of communicable diseases such as dengue fever that affect not only the poor but entire nation (Dissanayake, 2014). Therefore, investigation into the role of these risk factors is vital for formulating vibrant and effective strategies for improving health of the Sri Lankan population.

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