

# LIFE TABLE ANALYSIS OF ASCARIASIS IN A RURAL COMMUNITY IN JIANGXI PROVINCE, CHINA

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**Abstract.** The prevalence of ascariasis is very high in parts of rural areas in southern China. The high prevalence of ascariasis is one of the most neglected public health problems. A longitudinal investigation on the prevalence of ascariasis in a rural community in China was reported previously. In this article, we re-analyze the reported age specific prevalence of ascariasis using a life table method. The results from our analysis may provide a better summary of the impact of the disease on the studied population.

## INTRODUCTION

Roundworms (*Ascaris lumbricoides*) have infected most people in tropical and subtropical developing countries (Chan *et al*, 1994). Ascariasis is defined as human infection with *Ascaris lumbricoides* (Peng *et al*, 1998).

Although the prevalence of the infection is high and widely spread in most developing countries, there is relatively less attention paid to the public health problems caused by the infection due to competing demands of the resources and low burden in developed countries. In China, a large scale survey on human parasites was conducted in 1992 (Yu *et al*, 1994). There have been many reports published after the survey (Xu *et al*, 1995; Lai and Hsi, 1996). A comprehensive review on ascariasis in China was published recently (Peng *et al*, 1998).

A longitudinal investigation on infection with roundworm (*Ascaris lumbricoides*) was conducted in a rural community (Manhu village) of Jiangxi Province in southern China. The age specific prevalence of ascariasis in Manhu village during June 1993 to June 1994 was published (Peng *et al*, 1996). The dynamics of ascariasis in the village were presented in a raw form without using summary indicators. In this article, according to the healthy expectancy concept (Robine *et al*, 1999), we used a method to further convert the age-specific prevalence into expected years of life with ascariasis. This indicator provides a useful measurement of the impact of the disease on the population under investigation.

## MATERIALS AND METHODS

To estimate the expected years of life with ascariasis, we used Sullivan's (1971) method. The method combines the age specific prevalence of ascariasis from longitudinal survey with life table functions and gives the expected years of life with ascariasis.

The method is described as follows:

First, we constructed the life table of the rural Chinese population based on the data from the 1990 population census of China (State Statistical Bureau, 1993) using Chiang's method (1984). We then multiplied the age specific prevalence with the life table function  $L_x$  (the person-years lived in age group  $x$ ) and got the person-years ( $L'_x$ ) lived in age group  $x$  with ascariasis. Thus the expected years of life with ascariasis is  $e'_x = T'_x/l_x$ , where  $l_x$  is the total number of survivors at age  $x$  and  $T'_x = \sum_{a=x}^{\omega} L'_a$  is the total person-years lived beyond age  $x$  with ascariasis and  $\omega$  denoting the upper limit of the age.

To compute the partial expected years of life with ascariasis between age  $x$  and  $x+l$ , we divided the person-years lived with ascariasis in this age interval,  $T'_x - T'_{x+l}$ , by the number of survivors at age  $x$ ,  $l_x$ . That is, the expected years of life with ascariasis between age  $x$  and  $x+l$  is  $e'_{x,x+l} = (T'_x - T'_{x+l})/l_x$ . It is noteworthy that the classical life expectancy at age  $x$  is equivalent to the expected years of life within  $(x, \omega)$ , where  $\omega$  is the upper limit of the age. The above method was also used to compute the partial life expectancy  $e_{x,x+l}$  within  $(x, \omega)$  by using  $T_x = \sum_{a=x}^{\omega} L_a$  directly. That is,  $e_{x,x+l} = (T_x - T_{x+l})/l_x$ .

In our computation, we assumed the prevalence of ascariasis for the elderly (65+) was equal to that of the age group (60+) since the published

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data (Peng *et al*, 1996) were truncated at 60+.

RESULTS

The last row of Table 1 presents the partial life expectancy of the Chinese rural population (rural China) at age 0, pre-school ages (0-4), elementary and middle school ages (5-14), working ages (15-64) and for the elderly (65+). The longitudinal results of the expected years of life with ascariasis for a rural community (Manhu village) in Jiangxi Province, China, are also shown in Table 1.

From Table 1, we can see that the highest disease burden measured by the expected years of life with ascariasis at age 0 was at October (46.79) and January (46.32). The expected years of life with ascariasis were about 67% and 66% of the total life expectancy (69.62 years) in these two surveys, respectively. The expected years of life with ascariasis in October and January were also high across all age groups (0-4, 5-14, 15-64 and 65+). April had the lowest (37.30) disease burden measured by the expected years of life with ascariasis at age 0.

The school age group (5-14) had the highest percentage of the expected years of life with ascariasis to the partial life expectancy of the age group (9.96) across the surveys. For example, for October and January surveys, the percentages were

as high as 93% and 94%, respectively.

Fig 1 presents the percentages of the expected years of life with ascariasis as compared to the life expectancy for several age intervals across the surveys. For age group 5-14 (c), the percentage of expected years of life with ascariasis was the highest as compared to other age groups (a ,b, d, e).

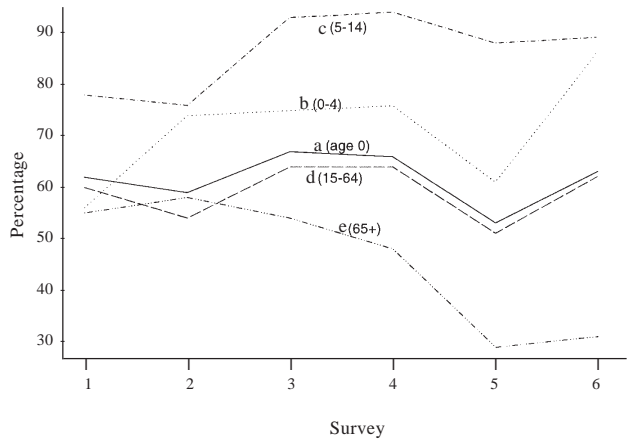


Fig 1—The percentages of the expected years of life with ascariasis versus the partial life expectancy for the age intervals: (a) At age 0, (b) age 0-4, (c) age 5-14, (d) age 15-64 and (e) age 65+ and across surveys: 1 (June, 1993), 2 (August, 1993), 3 (October, 1993), 4 (January, 1994), 5 (April, 1994), 6 (June, 1994).

Table 1  
The partial life expectancy of the rural population of China<sup>a</sup> and the expected years of life with ascariasis in a rural community in Jiangxi, China<sup>b</sup>.

	Age group (years)				
	0	0-4	5-14	15-64	65+
June, 1993	42.88	2.71	7.73	28.22	7.89
August, 1993	41.21	3.59	7.53	25.52	8.20
October, 1993	46.79	3.64	9.30	29.91	7.68
January, 1994	46.32	3.66	9.39	29.91	6.90
April, 1994	37.30	2.97	8.74	23.89	4.08
June, 1994	43.57	4.14	8.85	28.96	4.43
Rural China	69.62	4.84	9.96	46.86	14.26

<sup>a</sup> The partial life expectancy of the rural Chinese population was computed from the the 1990 census of China and the data of the longitudinal survey on ascariasis in a rural community in Jiangxi, China.

<sup>b</sup> The expected years of life with ascariasis were computed based on the Sullivan's method (1971) by combining the rural life table of China and the prevalence from the longitudinal survey on ascariasis in a rural community in Jiangxi, China. The expected years of life with ascariasis at age 0 are not a simple sum of the expected years of life with ascariasis in the age groups 0-4, 5-14, 15-64 and 65+.

## DISCUSSION

Most surveys on ecological and epidemiological aspects on human parasites are cross-sectional investigations. The longitudinal study conducted by Peng *et al* (1996) provided us a dynamic feature of ascariasis in the community. The expected years of life with ascariasis calculated from our study gives us a better assessment of the burden of the disease than the sole use of prevalence across the time.

Manhu village is located northern part of Jiangxi Province and is not far from the capital city, Nanchang. The climate of this part of the province is humid during the summer and early fall, however, during the winter, the temperature is relative low (it is very often below 10°C). According to the life cycle of *Ascaris lumbricoides*, from the ingestion of infective eggs to the mature worms in the small intestine is about three months (Bogitsh and Cheng, 1998). Our results suggest that the most of the infections happened during humid days.

A good health indicator with effective estimation can lead to optimal decision making. Our results on the expected years of life with ascariasis may enable us to form an optimal treatment strategy for the disease.

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