



The Socio-Economic Impact of LF and the Program to Eliminate It

The Global Alliance to Eliminate Lymphatic Filariasis

Lymphatic Filariasis and Poverty

In 1998, the World Health report ranked lymphatic filariasis (LF) as the 4th leading cause of permanent disability. (WHO 1998)

LF is a disease of poverty. In 2003, eighty percent of LF endemic countries were classified by the World Bank as low or lower-middle income countries. See www.worldbank.org/data/countryclass/classgroups.htm.

Rural to urban migration and increasing urbanization, both of which are occurring increasingly in low income countries, facilitate the spread of LF. This is mostly due to inadequate waste disposal and sanitation facilities, which increase the number of breeding sites for the mosquito vectors. (Evans et al. 1993)

LF is one of the neglected diseases that, if targeted, will provide much needed health care to the poorest of the poor, thus increasing their health, quality of life, and potential productivity.

Information on socio-economic consequences of the disease and the benefits of the country programs to eliminate it is still forthcoming. More studies are needed globally to better document the costs of LF-related disability and the costs of different strategies to combat LF.

Impact on Productivity

LF is thought to cause several billion US dollars a year in productivity losses.

- In India, LF causes almost \$1 billion a year in lost productivity. (Ramaiah et al. 2000)
- In Africa, LF causes more than \$1 billion in losses. (Haddix et al 1999)

Reduced productivity from LF disability has been documented in many industries.

- Rubber tappers in Malaysia. (Kessel 1957)
- Agricultural workers in (then) British Guiana. (Gigliolo 1960)
- In Haiti, women with lymphoedema often are unable to participate in market trading, the major form of economic activity available to women. (Coreil et al. 1998)
- In Rufiji District, Tanzania the average duration of an adenolymphangitis (ADL) episode (also referred to as an acute attack) was 8.6 days. In 72.5% of the episodes the affected individuals were incapacitated and unable to do their normal activities for an average duration of 3.7 days. (Gasarasi et al. 2000)

- In northern Ghana, 7% of potential male labor input may be lost due to chronic LF. (Gyapong et al. 1996) In some areas of Ghana, incidence of acute adenolymphangitis (ADL) reaches its peak during the rainy season, the time of peak agricultural activity, thus compounding productivity loss. (Gyapong et al. 1996)
- India
 - Cost of productivity loss to male weavers in India is estimated to be as high as 27%. (Ramu et al. 1996)
 - Chronic LF patients in Orissa, India lost a total of 68 days of work per year, equivalent to 19% of the total working time of the year. In addition, compared to the control group, which worked an average of 6.06 hours per day, the chronic LF group worked an average of 4.94 hours per day, a statistically significant difference. (Babu et al. 2002)
 - Overall, an estimated 8% of potential male labor is lost to LF. (Ramaiah et al. 1999)
 - Compared to matched controls in a study in India, female patients spent 0.31 ± 1.42 hours less on domestic activity per day. (Ramaiah et al. 1999)
 - Estimated average per capita loss to the endemic population due to LF per year is US\$2.00. The endemic population in India is 420 million people. (Ramaiah et al. 2000)

Entire communities have changed productive pursuits to adapt to LF. These activities often have lower economic returns but are less physically demanding.

- In Tanzania, some villages have switched from fishing to farming. (Muhondwa 1983)
- In Ghana, LF disability severely impacts subsistence farming communities causing them to switch to less productive, but less labor-intensive, crop and livestock activities. (Gyapong et al. 1996)

Financial Impact on Patients in India

Three-fourths of chronic LF patients in rural communities in Orissa, India sought treatment for their conditions. They spent an average of US\$8.70 a year on treatment, mostly on medicines. This is equivalent to 2% of the average yearly wage. (Babu et al. 2002)

The overall treatment cost per visit for chronic LF patients in urban areas was US\$0.35. The average cost per ADL episode was US\$0.46. Medicines accounted for approximately 45% of the total expenditures. (Nanda et al. 2003)

The direct treatment cost per year for adenolymphangitis (ADL) for individuals in Tamil Nadu, India ranged from US\$0.70 to \$2.38. Income foregone by patients due to reduced working time ranged from US\$4.29 to \$16.53 per year. (Krishnamoorthy 1999)

It is estimated that over US\$842 million is lost to patients and households in India every year from treatment cost and reduced working time. (Ramaiah et al. 2000)

Impact on Health Care Systems

Acute Attacks /Adenolymphangitis (ADL)

It is common to seek treatment for acute attacks. (Ramaiah et al. 1999; Gasarasi et al. 2000) In India, over 10 million people seek treatment each year, costing over US\$30 million. (Ramaiah et al. 2000)

Lymphoedema

Preliminary data from Haiti put the cost of a lymphoedema treatment clinic at US\$8000 per year for the health system. (Kanjilal 2003)

Hydrocoele

A district hospital in Tanzania reported that 15% of major surgeries were for hydrocoele. (Wegesa et al. 1979)

In a hospital in Northern Ghana, 25% of all surgeries in 1998 were for hydrocoele. (Ghana Ministry of Health, personal communication) However, at US\$30, the hydrocoele operation costs more than the average monthly Ghanaian income, so most sufferers remain untreated. (Gyapong et al. 1996)

Globally, most men cannot afford hydrocoele surgery (Lu 1988; Wegesa 1979) and many mention the high cost as a barrier to receiving treatment. (Ahorlu et al. 2001)

An Affordable Elimination Program

There exists a feasible, effective, and inexpensive prevention strategy, the administration of two oral drugs once a year.

- Mass drug administration campaigns distribute albendazole plus diethylcarbamazine (DEC) or Mectizan® (generic name: ivermectin) to the general population in endemic areas. Once yearly administration of the drugs, for at least five years and at least 60% coverage, is adequate to interrupt transmission of the parasite that causes LF.
- An alternative strategy is to fortify salt with DEC. Two years of DEC-fortified salt consumption in over 80% of the endemic population is needed to break the transmission cycle.

This strategy costs from just pennies a person in Bangladesh, India, and Sri Lanka to slightly over one dollar per person in countries in the Americas.

- The per capita cost for two rounds of MDA in rural villages in South India was US\$1.49. The cost per person treated was US\$2.42. (Krishnamoorthy et al. 2002)
- In rural areas of Tamil Nadu, India, the average cost of blood smear collection, used to monitor and evaluate the program, was US\$0.42 per person. (Das et al. 1995)
- The per capita cost of the National Filaria Control Programme was estimated to be Rs. 2.6 (US\$0.06) per year. (Krishnamoorthy 1999)

- Additional costs to the health system of US\$790 per primary health center per year are necessary to implement a DEC MDA control program for five years in Tamil Nadu, India. (Krishnamoorthy et al. 2000)

Integration

LF strategies can be integrated into other programs to improve cost effectiveness.

- Mass drug distribution can be combined with programs to eliminate onchocerciasis and trachoma, to fight Vitamin A deficiency, and with immunization programs. (Haddix 1999; Hopkins et al. 2002)
- DEC salt fortification to eliminate LF transmission can be combined with iodine and micronutrient fortification schemes. (Freeman et al. 2001)

In addition, development projects that reduce mosquito breeding sites, improve housing and sanitation facilities and stimulate economic development are likely to aid in reducing the transmission of LF. (Haddix et al. 2000)

Impact and Return on Investment

The China Story

- Before control strategies were implemented, 330 million people were at risk of becoming infected with LF in China, with over 30 million cases documented. (China 1997)
- In the early 1950s, China targeted five diseases as a means of improving agricultural productivity, one of which was LF.
- As of 1994, LF transmission was interrupted in China.
- The Chinese estimate that the LF program returned US\$15 in benefits for every dollar invested.
- A cost-benefit analysis on an LF control program in Zhejiang Province, China calculated a cost-benefit ratio of 1 to 5.7, implying that one Yuan spent on filariasis control produced 5.7 Yuan in benefits. (Shi, Sun et al. 1995)

The Africa Program

One-third of persons with LF are in Africa and one-half billion Africans may be at risk. LF programs in Africa are likely to produce increases in health status, quality of life, and the productive potential of workers.

Epidemiological modeling was used to estimate both the costs of implementing LF mass drug administration (MDA) activities in the context of ongoing onchocerciasis activities and outcomes associated with the MDA activities.

- The population at risk was assumed to be 314 million residents in areas with known active LF transmission.
- On average, acute attacks were assumed to reduce a worker's labor productivity by 2% per year, hydrocoele and lymphoedema by 20% per year.
 - Productivity was measured using the marginal productivity of agricultural labor.
- LF was found to cost Africa US\$1.3 billion per year from LF disability:
 - 6% (US\$78 million) from acute attacks

- 11% (US\$140 million) from lymphoedema
- 83% (US\$1.1 billion) from hydrocoele
- The LF program would cost from US\$0.20 - \$0.50 per person per year.
- By 2029, the number of men with hydrocoele would fall from almost 20 million to less than 4 million, the number of people with lymphoedema from about 4 million to less than 1 million, and the incidence of acute attacks would almost disappear.
- The economic rate of return for the African LF program would be approximately 27%.

For more information

Abstracts to the publications cited and marked with a star can be accessed at PubMed, the National Library of Medicine database, at www.ncbi.nlm.nih.gov/entrez/query.fcgi.

More articles regarding lymphatic filariasis, including the socio-economic aspects of the disease, can be found at the Open Access to the Lymphatic Filariasis Knowledge database site at www.filariasis.net.

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