



Estimating the burden of disease and the economic cost attributable to chikungunya, Andhra Pradesh, India, 2005–2006

T. Seyler^{a,b,*}, Y. Hutin^{c,d}, V. Ramanchandran^c, R. Ramakrishnan^c,
P. Manickam^c, M. Murhekar^c

^a Department of Social Sciences, French Institute of Pondicherry, 11 Saint Louis Street, 605 001 Pondicherry, India

^b European Programme for Intervention Epidemiology Training, European Centre for Disease Control, Stockholm, Sweden

^c Field Epidemiology Training Programme, National Institute of Epidemiology, Indian Council of Medical Research, Chennai, India

^d World Health Organization, India Country Office, New Delhi, India

ARTICLE INFO

Article history:

Received 6 March 2009

Received in revised form 10 July 2009

Accepted 10 July 2009

Available online 25 August 2009

Keywords:

Chikungunya virus

Disease outbreak

Disability-adjusted life years

Economic costs

Rational drug therapy

India

ABSTRACT

To estimate the burden and cost of chikungunya in India, we searched for cases of fever and joint pain in the village of Mallela, Andhra Pradesh, and collected information on the demography, signs, symptoms, healthcare utilization and expenditure associated with the disease. We estimated the burden of the disease using disability-adjusted life years (DALYs). We estimated direct and indirect costs and made projections for the district and state using surveillance data corrected for under-reporting. On average, from December 2005 to April 2006, each of the 242 cases in the village led to a burden of 0.0272 DALYs (95% CI 0.0224–0.0319) and a cost of US\$37.50 (95% CI 30.6–44.3). Overall, chikungunya in Mallela led to 6.57 DALYs and a loss of US\$9100. Out-of-pocket direct medical costs accounted for 68% of the total. From January to December 2006 the burden for Kadapa district was 160 DALYs (cost: US\$290 000). Over the same period the burden for Andhra Pradesh was 6600 DALYs (cost: US\$12 400 000). While the burden was moderate, costs were high and mostly out of pocket.

© 2009 Royal Society of Tropical Medicine and Hygiene. Published by Elsevier Ltd. All rights reserved.

1. Introduction

Chikungunya virus is transmitted through the bite of an infected *Aedes* mosquito. The disease presents with sudden onset of fever and joint pains, which are often incapacitating. The acute febrile phase can evolve towards a chronic phase, with persisting arthralgia that may last for several weeks. The disease is rarely fatal. There is no vaccine available; prevention and control depends entirely on vector control measures. Symptoms can be managed through effective oral medications, including painkillers (e.g. paracetamol) and non-steroidal anti-inflammatory

drugs. Antibiotics and injections are unjustified, ineffective and costly. In addition, they may have side-effects.

Since 2005, chikungunya re-emerged around the Indian Ocean,¹ reaching several southern Indian states, and even Italy.² As the disease had been absent from India for 30 years it generated anxiety in the local and national press, and led to a number of questions. One key issue was the setting of priorities for the implementation of prevention and control measures. However, no studies were available, assessing either the disease or the economic burden of chikungunya, that would help decision-makers to efficiently allocate scarce resources. There is no universal health insurance in India, and healthcare expenditure is largely financed out of pocket.

In October 2005, in the Indian state of Andhra Pradesh, an increase in the number of patients presenting with

* Corresponding author. Tel.: +91 413 233 4168.

E-mail address: thomas.seyler@gmail.com (T. Seyler).

fever and arthralgia was reported. By April 2006 the state reported more than 25 000 patients with symptoms compatible with chikungunya. The National Institute of Virology, Pune isolated the virus in blood specimens of patients and in *Aedes aegypti*.³ In March 2006, as the disease was spreading in Andhra Pradesh, we conducted a field investigation in an affected village in the state (Mallela, Kadapa district) to estimate the burden of the disease in terms of disability-adjusted life years (DALYs), and the economic cost in terms of US dollars.

2. Methods

2.1. Data collection

2.1.1. Village survey

We selected the village of Mallela in Kadapa district, as local health authorities reported a high number of chikungunya cases in the area. We conducted the field investigation on 28 and 29 April 2006. We defined a probable case of chikungunya as an acute onset of febrile illness with joint pain since 1 December 2005 among the residents of Mallela village (1965 inhabitants).⁴ We searched for cases door to door, covering the entire village. After obtaining informed consent we interviewed all probable case-patients to collect information on demographic characteristics (age and gender), the episode of illness (symptoms and their duration, number of working days lost), healthcare utilization (visits to medical camps, health centres and hospitalization), treatment received (including injections – defined as procedures introducing a substance into the body by piercing the skin or a mucosal membrane) and income (daily wage). To estimate out-of-pocket expenditure we collected information regarding estimated expenses incurred in obtaining treatment, including transport to seek care at health facilities.

2.1.2. Cost identification

During the outbreak, public health authorities set up special medical camps to screen the population for symptoms, and provide healthcare (such medical camps for case-finding and treatment are a classical outbreak-response measure in India). In Kadapa district, medical camps were conducted in 46 villages. Typically, a camp provided medical care in the same locality for less than a week (range: 1–7 days). We selected one typical medical camp for which documentation was available. We interviewed medical staff and reviewed reports to estimate the cost of medical camps (including salaries, transport, equipment and supplies), by listing the resources used, and estimating quantities and unit costs. We estimated the average cost of a visit to a health centre, and the average daily cost of hospitalization in a tertiary hospital, using data extracted from the WHO country profile.⁵

2.2. Data analysis

2.2.1. Disability-adjusted life years (DALYs)

We estimated the burden of chikungunya using DALYs, which estimate the amount of time, ability or activity lost by an individual from disability (years lost to disability) or

death (years lost to death) resulting from a disease. This loss is then adjusted to account for age of onset, severity of disability and duration of disability. We estimated the DALYs for each probable case of chikungunya in Mallela using the formula:⁶

$$- \left[\frac{DCe^{-\beta a}}{(\beta - r)^2} [e^{-(\beta+r)(L)}(1 + (\beta + r)(L + a)) - (1 + (\beta + r)a)] \right]$$

L represents the years lost to death or disability, and D is the disease-specific disability weight. C and β are positive constants, a is the age of the patient in years and r is the social discount rate (Table 1).

In the absence of a standardized disability weight for chikungunya in *The Global Burden of Disease*,⁷ we distinguished between the two phases in the clinical history of chikungunya: the acute phase, characterized by an acute episode of fever and joint pain, and the chronic phase, corresponding to the persistence of joint pain beyond the disappearance of fever. We assumed the disability weight for the acute phase of the disease to be 0.81 – equal to the disability weight used for dengue in Puerto Rico.⁸ This assumed that the acute chikungunya symptoms incapacitated a person, leaving them unfit for almost all usual daily activities. For the chronic phase of the disease we assumed a disability weight of 0.2, corresponding to rheumatoid arthritis in *The Global Burden of Disease* (Table 1).⁷ To allow direct comparison with the DALYs from other diseases, we choose values for C , β and r equal to those used in the *World Development Report*.⁹

2.2.2. Economic cost

We expressed all economic costs in US dollars using the March 2006 exchange rate (US\$1 = 42.9 Indian rupees). Direct costs met by public expenditure included the cost of diagnosis and treatment at medical camps and health centres, and the cost of hospitalization for severe case-patients. Direct costs also included out-of-pocket expenditure by affected households (e.g. transport costs to the health centres, private consultations, medicines).

Indirect costs included loss of income related to absence from work because of the disease, among patients aged over 15 years, and to mothers who stayed at home or the hospital to look after their children aged under 15 years. There were no vector-control measures during the outbreak in Mallela.

2.2.3. Projections

First, we estimated the burden of disease and the economic cost per chikungunya case in Mallela village. We then projected these estimates to the district (Kadapa) and state (Andhra Pradesh) levels. At each level we used the number of chikungunya cases reported by the National Vector Borne Disease Control Programme¹⁰ and adjusted it for the proportion of cases captured by the surveillance system (those who sought treatment in medical camps or public healthcare facilities). Based on a comparison of surveillance data with the results of a door-to-door survey in Mallela village, we estimated that the surveillance system captured 30% of all cases. We checked that the age- and gender-specific attack rates at the district and

Download English Version:

<https://daneshyari.com/en/article/6137568>

Download Persian Version:

<https://daneshyari.com/article/6137568>

[Daneshyari.com](https://daneshyari.com)