



Investigation of an outbreak of measles: Failure to vaccinate or vaccine failure in a community of predominantly fishermen in Kerala



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KEYWORDS

Measles;
Coverage;
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Kerala

Summary Measles outbreaks continue to occur in developing countries. This study attempted to explore the context of an outbreak of measles in a community of predominantly fishermen in Kerala to find out whether the outbreak was the result of a failure to vaccinate or failure of the vaccine itself. A cross sectional study was conducted in Mukkola village of Thiruvananthapuram district, Kerala, India. A total of 215 children of ages between 9 and 35 months were studied. Documented evidence of measles vaccination was available only in 71.6% (65.57–77.62) of the children. The risk factors for not being immunized against measles were being third or higher in birth order and having: a father whose occupation is fishing, low family income, lower parental education, Muslim religion and poor knowledge regarding measles and its vaccine. Of the 215 children studied, 43 had a history of measles. Thirty percent of these 43 children were younger than the age of vaccination. Unvaccinated children, children third or higher in birth order and children of families with more than 5 members had a significantly higher risk of contracting measles. Vaccine effectiveness was 76.6% (95% CI: 75.96–77.99). The prevalence of missed vaccination opportunities was found to be 15.8% (34/215). Even with the relatively low vaccine effectiveness, this outbreak could have been prevented by higher vaccination coverage. Lowering the age at administration of the first dose of measles vaccine needs to be considered. Effective utilization of opportunities for vaccination could enhance coverage and prevent outbreaks in the future.

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Introduction

Despite the availability of a safe and effective vaccine for the last 3 decades, measles continues to be a major cause of morbidity and mortality in most of the developing countries, including India. Although the WHO Region of the Americas has maintained measles elimination since 2002, and the WHO Western Pacific Region is on track to achieve the goal of elimination, large outbreaks of measles are jeopardizing progress in the remaining regions that have this goal. The measles outbreaks pose a serious challenge to regional elimination efforts and are a signal of where national health systems and routine immunization programs need strengthening [1].

Over 95% of measles deaths occur in low-income countries with weak health infrastructures [2]. Measles deaths are clustered primarily in Africa and India, as a result of sub-optimal implementation of immunization strategies. Goals have been set globally to reduce the incidence of measles to less than 5 cases per million [3]. Field investigations of recent measles outbreaks found that most cases were among unvaccinated persons, suggesting that the main underlying cause was persistent gaps in measles vaccine coverage despite coverage having increased overall [4,5]. Vaccine coverage of at least 95% interrupts endemic transmission of measles in many countries [6].

About 85% of children develop protective antibody levels when the measles vaccine is administered at nine months of age, and 90–95% have a protective antibody response after vaccination at 12 months of age [7]. Failures in cold chain and other programs have reduced vaccine effectiveness in rural [8,9] and urban [10,11] areas in developing countries. The assessment of field vaccine efficacy (vaccine effectiveness) explores both the potential clinical efficacy of the vaccine and the entire vaccination program as well [6].

Measles vaccine was introduced in the Universal Immunization Programme (UIP) in India in 1985, when a single dose was administered at 9 months of age. This study attempted to explore the context of a measles outbreak in a community comprised of predominantly fishermen in the Thiruvananthapuram district of Kerala, India. The outbreak occurred in 2003. Beginning in January 2003 and continuing until May of that year, there were 553 reported cases of measles (216 were unimmunized, 255 were immunized and the immunization status of 82 cases was unknown) in the district. The study area selected was one of the areas reporting maximum number of cases on the district. The objectives were to find whether the outbreak was the result of a failure to vaccinate or a failure of the vaccine

itself. The study also tried to find the coverage of other vaccines, find factors related to why children were not immunized and identify the prevalence of and reasons for missed vaccination opportunities.

Methods

Design, setting and participants

A cross sectional study was conducted in the Mukkola (Vizhinjam) Primary Health Centre area of Thiruvananthapuram district, Kerala, India, where the highest number of cases were reported during the measles outbreak. Vizhinjam is a locality of Thiruvananthapuram city in the Indian state of Kerala. This outbreak was confirmed by the district health authorities using appropriate laboratory methods. Vizhinjam is a village consisting of 15 midland and coastal wards. It has a population of 42,402. The participants were children 9–35 months old. The respondents were the parents/guardians of the participants.

Sampling and sample size

The number of subjects used for assessing measles immunization coverage was fixed at 210, and a 30 by 7 cluster sampling technique that was advocated for use in Universal Immunization Programme (UIP) coverage evaluation was used for selecting the study subjects [12]. The 30 by 7 method is an example of two-stage cluster sampling. In the first stage, 30 clusters were selected using the sampling technique of setting probability proportionate to size, while in the second stage, 7 households with eligible children were selected.

Data collection

Data collection was conducted by personal interview of a parent/guardian of the eligible child using a semi-structured questionnaire administered by house to house surveying. The questionnaire consisted of seven (VII) parts:

- I – Personal details like name, house no., DOB, sex, ward, religion, etc.
- II – Was on family details including age, education, and occupation of parents, family income, details of siblings, birth order and total no. of family members.
- III and IV – These sections consisted of cluster forms to note the status and source of immunization, with special emphasis on measles, and reasons for non-immunization, if any, for children

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