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Review

Expanding immunization coverage in rural India: A review of evidence for the role of community health workers

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ABSTRACT

Poor routine immunization coverage in India has led to a large burden of vaccine-preventable diseases borne by children under 5 years of age. Despite efforts to strengthen infrastructure and service delivery in the past decade, immunization coverage rates have reached a plateau. To meet the formidable needs of India's growing population and address the shortcomings of health services for rural populations, the country is now turning toward a new national community health worker (CHW) plan. This article reviews the effectiveness of CHWs in expanding immunization coverage in developing countries and examines the potential contribution of CHWs toward strengthening immunization services in rural India. While the limited number and quality of available studies make it difficult to directly compare CHW interventions to other strategies for improving immunization coverage, it is clear that CHWs make diverse contributions toward strengthening immunization programs. Incorporation of evidence-based strategies for CHW selection, retention, and training is critical for success of India's immunization program. In addition, there is growing need to develop efficient mechanisms for monitoring children's vaccination status to generate actionable feedback and identify cost-effective strategies.

Contents

1. Introduction

In all countries, developed and developing, the successful delivery of routine immunizations (RIs) represents a fundamental service of the public health system, offering one of the most cost-effective methods of reducing morbidity and mortality among children under the age of five [1]. Worldwide, an estimated 2 million deaths are averted each year by RIs, yet in 2002, 1.4 million non-immunized children under the age of five died due to vaccine-preventable diseases (VPDs) [2]. In India, immunization rates fall short of expectations of the government, multilateral donors, and non-governmental organizations (NGOs), which, at a minimum, target greater than 80% coverage [3]. The most recent national census revealed that only 44% of children aged 12–23 months were fully vaccinated in accordance with World Health Organization (WHO) recommendations for six VPDs (tuberculosis, diphtheria, pertussis, tetanus, polio, and measles) [4]. Moreover, India is the nation with the largest

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number of children who have never received immunizations [5].

Early efforts to improve immunization coverage in India were led by the adoption of the Expanded Programme on Immunization (EPI) in 1978 following the inertia of global efforts toward the eradication of smallpox. Urban communities, however, remained the primary beneficiaries until 1985, when the EPI program was extended nationwide and renamed the Universal Immunization Programme (UIP) [6]. Under the UIP, India established a massive infrastructure for vaccine delivery through indigenous vaccine production and progressive extension of the cold chain vaccine refrigeration system throughout the country [7]. The program led to a rapid increase in the number of fully immunized children from an estimated baseline of only 10% at the outset of the UIP [6].

In the past decade, however, there has not been significant improvement in the levels of full coverage despite concerted efforts [4]. For example, the Immunization Strengthening Project (2000–2003), which aimed to bolster polio eradication efforts in conjunction with strengthening RI services, yielded disappointing coverage rates [8]. Progress toward expanding immunization coverage has essentially reached a plateau as indicated by a mere 1.5% increase in fully immunized children aged 12–23 months between the two most recent National Family Health Surveys, conducted in 1998–1999 and 2005–2006 [4]. After a comprehensive review of India's UIP by both national and international experts, it was found that the "... basic infrastructure is in place. But, the system is largely failing to deliver (noting poorly performing states were reviewed)" [6].

Stagnation has occurred in part due to difficulties in delivering services to rural communities, which represent roughly 70% of the population. In rural settings, only 39% of children aged 12–23 months have been fully immunized, whereas 57% of children in this age group in urban areas have been successfully reached [4]. As a consequence, children in rural villages represent a disproportionate number of the 9.4 million non-immunized children in India [5].

From a broad view, the challenge of addressing this major public health problem is similar to other issues of maternal and child health in India, attempting to provide "health for too many" [9]. The WHO recognizes India's immunization program as one of the largest in the world in terms of number of beneficiaries served, vaccinations delivered, and the geographical spread and diversity of the regions covered [7]. Yet, under the present conditions of poorly controlled population growth, the Indian health system faces enormous economic constraints. Low morale due to poor working conditions, inadequate feedback, and irregular salary payments because of insufficient funding have created a shortage of human resources [6,10]. Furthermore, where healthcare services are available, low utilization rates persist, particularly among disadvantaged populations [4]. Both the costs of maintaining "high-level" workers (such as doctors and nurses) and underutilization of primary care services [4] have renewed interest in the potential of lay community health workers (CHWs) to meet the formidable needs of India's growing population [11,12].

In an effort to rejuvenate its rural health system, India has recently launched the National Rural Health Mission (NRHM), ambitiously training a cadre of 250,000 CHWs [13]. It is envisaged that CHWs will be better able to reach vulnerable populations and promote equity in the provision of primary care services, including RIs [14]. Ideally, CHWs are literate, middle-aged females with at least a primary education who are recognized as trustworthy members of the community [15]. As characterized by the WHO, CHWs require shorter training than professional workers and are native to the communities in which they work. Furthermore, while they are intimately supported by the health system, they are ultimately accountable to the community itself [12].

Because of the large burden of VPDs borne by rural Indian children [2], major setbacks in achieving polio eradication [16], and the growing need to incorporate new vaccines (against Hepatitis B, *Haemophilus influenzae* type b, and rotavirus) into an already complex childhood immunization schedule [17], CHW activities to improve immunization services represent a critical element of the NRHM. As such, a consideration of the effectiveness of CHWs in expanding vaccination coverage is particularly timely for India.

This review of the literature explores the potential contribution of CHWs in the expansion of immunization services in rural India. Although there are numerous factors that affect the viability and success of CHW interventions, emphasis herein is placed on considerations at the community level. First, a brief description of the overall structure of immunization services is provided to establish the context in which CHW contributions occur. In subsequent sections, the evidence base for the effect of CHW programs is reviewed, highlighting important limitations. Findings from CHW programs are then applied to the context of rural India, looking specifically at how CHW activities can affect the supply of immunization services, in terms of strategies for immunization delivery, and influence demand for immunizations. Finally, important aspects of CHW program implementation and evaluation are considered for India's NRHM.

2. Methods

Relevant literature was obtained by searching major electronic databases: PubMed, EMBASE, and Scopus using primary search terms, "community health worker," "immunization," and "developing countries," with corresponding synonyms and subject headings. Articles pertaining to the utilization of CHWs in routine immunization services for children less than 5 years of age were examined, and additional resources were identified by review of reference lists. This review considers CHW interventions drawn from recent systematic reviews that identify strategies for expanding immunization coverage in developing countries [17–19], and others that focus more broadly on the contribution of CHWs to addressing a diversity of health issues [11,12,20]. Finally, other sources, such as WHO reports and government documents, provided important contextual factors about immunization delivery and the use of CHWs in rural India.

3. Immunization delivery system in India

To understand the potential for CHWs to affect immunization coverage, it is necessary to consider the magnitude and complexity of the Indian health system, highlighting preconditions for their success. In India, immunization services must reach a greater number of newborn children than in any other country. In order to meet these needs, a "massive and comprehensive infrastructure" has been established [6]. Divisions within the immunization delivery system include the following administrative levels: national, state, district, and block.

Historically, centralized planning has been predominant throughout these levels [21]. The national government of India covers the entire cost of vaccines [22], and each state's immunization services have been guided through policy at the national level since the adoption of the UIP in 1985 [6]. At the district level, microplans are developed to ensure that every child has contact with immunization services. At the block level, community level structures are present in the form of a primary health center (PHC), which represents the furthest extension of the cold chain suitable for vaccination storage and the highest level within the purview of CHWs.