

The Impacts of Measles Elimination Activities on Immunization Services and Health Systems in Six Countries

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Abstract

Measles is a prime candidate for global eradication. Explicit goals to control or eliminate the disease have already been agreed upon by many countries and regions. One of the key concerns in determining the appropriateness of establishing the measles eradication goal is its potential impact on routine immunization services and the overall health system. To evaluate the impact of accelerated measles elimination activities (AMEAs) on immunization services and health systems, a study was conducted in six countries: Bangladesh, Brazil, Cameroon, Ethiopia, Tajikistan, and Vietnam. Primary data were collected through key informant interviews and staff profiling surveys. Secondary data were obtained from policy documents, studies, and reports. Data analysis used mainly qualitative approaches.

The study found that the impact of AMEAs varied, with positive and negative implications in specific immunization and health system functions. On balance, the impacts on immunization services were largely positive in all six countries, particularly in Bangladesh, Brazil, Tajikistan, and Vietnam; negative impacts were more significant in Cameroon and Ethiopia. Although weaker health systems may not be able to benefit sufficiently from AMEAs, in more developed health systems, disruption to health service delivery is unlikely to occur. Nevertheless, in none of the six countries was there an explicit objective to use AMEAs to help remove health system bottlenecks and

strengthen system capacity. Opportunities to strengthen routine immunization services and the health system should be actively sought to address system's bottlenecks so that benefits from the measles eradication activities as well as other health priorities can be optimized.

Introduction

Measles is the prime target as the next disease for a global eradication campaign. Its biological characteristics and effective intervention make it a feasible disease to eradicate at the current point in time (de Quadros et al. 2008). Considerable progress has already been achieved toward the global goal of a 90% reduction in measles mortality by 2010 (Dabbagh et al. 2009). In fact, five of the six WHO regions have already adopted a measles elimination target. Consequently, at the 2010 World Health Assembly, milestones toward measles eradication were endorsed (WHO 2010a).

One of the key concerns in determining the appropriateness of measles eradication is its potential impact on routine immunization services and the overall health system. Experiences from previous eradication efforts have shown that eradication activities tend to be conducted using a vertical approach, due to their targeted and time-limited nature. The debate around vertical versus horizontal modes of delivery has long been part of the public health literature (Bradley 1998; Cairncross et al. 1997; Frenk 2006; Mills 1983; Walsh and Warren 1979). Whereas some authors take the view that a horizontal or more integrated approach is preferable, since it includes contributions from other sectors and is more sustainable (Rifkin and Walt 1986), others argue that a more selective or vertical approach is required in view of resource constraints (Walsh and Warren 1979).

There are also questions on potential synergies between priority disease programs and the health systems, and how these disease programs can contribute to health systems strengthening. Although many reasons have contributed to the delays in achieving the eradication targets for guinea worm and poliomyelitis, one common factor is that residual transmissions take place in countries with extremely weak health systems (Wakabi 2009; Wassilak and Orenstein 2010). According to an independent evaluation of the polio eradication initiative, this program needs to contribute more systematically to immunization systems strengthening if interruption of the virus is to be accomplished in the remaining endemic countries (Mohamed et al. 2009; Global Polio Eradication Initiative 2010). With the substantial increase in the aid volume to combat diseases in developing countries, the debate on priority diseases and health systems has gained new momentum, and the term "diagonal" approach has been coined to argue that resources earmarked for a particular disease (e.g., HIV/AIDS) can serve to spearhead improvements in health systems (Atun et al. 2010; Ravishankar et al. 2009).

Lessons from polio eradication activities can help us understand the potential impacts of eradication efforts on health systems and immunization services. The Taylor Commission's qualitative study in six countries in the Americas concluded that overall there are more positive than negative implications; the greatest positive impact relates to social mobilization and intersectoral collaboration (Taylor et al. 1995). Negative implications were more frequent in poorer countries and involved primarily the diversion of resources away from other health activities. Møgedal and Stenson (2000) conducted detailed case studies on the impact of polio eradication activities on health systems in three countries (Tanzania, Nepal, and Laos) and concluded that there were mainly positive impacts, especially in Lao PDR. However, missed opportunities also led to some negative impacts, as observed in Tanzania and Nepal. Overall, the message from previous studies on polio eradication activities is mixed, although there seems to be evidence of health system and immunization system strengthening in countries with stronger health systems.

Measles eradication activities can benefit from earlier lessons of the polio eradication activities if key differences between the two are borne in mind. These include the mode of vaccine delivery and waste disposal, the type of health care providers that are required to carry out the activities, and the frequency of the immunization campaigns. Ultimately, an additional study is needed to evaluate the impact of AMEAs on routine immunization services and health systems.

Methods

Our study adapted the WHO (2007a) health system framework and the framework proposed by Atun et al. (2004) for rapid assessment of disease control programs in relation to health systems. A health system was described as having eight interlinked components:

1. governance,
2. planning and management,
3. financing,
4. human resources,
5. logistics and procurement,
6. information system,
7. surveillance, and
8. service delivery and demand generation.

A toolkit explaining the methods in detail was developed for the field work (Griffiths et al. 2010). Overall, the study focused on three main areas of assessment:

1. A general description of the health system and immunization services, including measles elimination activities.

2. An analysis of the scope and level of integration of measles elimination activities within immunization services and the mainstream health system.
3. An assessment of the impacts of measles elimination activities on immunization services and health systems.

Factors that contributed to the effectiveness of AMEAs or the impacts of the health system on AMEAs were beyond the scope of the study.

The study was conducted in Bangladesh, Brazil, Cameroon, Ethiopia, Tajikistan, and Vietnam. The countries were selected so that different geographical regions, population sizes, income levels, and measles vaccination coverage rates could be analyzed (Table 17.1). Other key selection criteria were that countries should have recently completed measles supplementary immunization activities (SIAs) and that some of the countries had introduced a second dose of measles-containing vaccine (MCV2) in their routine schedule. Countries were selected in consultation with the WHO measles advisory committee and WHO regional offices.

Methods for collecting primary data included interviews of key informants, focus group discussions (where appropriate), and staff profiling surveys. Fieldwork took place between November 2009 and April 2010. In each country, interviews were conducted at the national level as well as at the service delivery level in either one or two selected districts. Key informants were selected on the basis of their experience in immunization services or relevant health system areas and were representative of all administrative levels and different institutions. A semi-structured questionnaire was used, and informed consent was sought prior to each interview. Between 22 and 60 key informants were interviewed in each country. Staff profiling surveys were conducted at the service delivery level in each country, except Brazil. Because measles elimination had already been achieved in Brazil, staff profiling surveys were not

Table 17.1 Demographic and economic summary statistics of six study countries.

Country	GNI per capita (2008 USD) ¹	2010 projected population ²	2008 estimated MCV1 coverage ³	Type of measles vaccine used in routine services
Bangladesh	520	164,425,000	89%	Measles
Brazil	7300	195,423,000	99%	MMR
Cameroon	1,150	19,958,000	80%	Measles
Ethiopia	280	84,976,000	74%	Measles
Tajikistan	600	7,075,000	86%	MR
Vietnam	890	89,029,000	92%	Measles

¹ GNI per capita from World Bank (World Bank 2011b)

² Population projections from UN Population Division (UNPD 2009)

³ Coverage from WHO UNICEF estimates

MCV1: first dose of routine measles vaccine; MMR: measles–mumps–rubella combined vaccine; MR: measles–rubella combined vaccine

included in our analysis. A self-administered questionnaire was used in the surveys, with questions on training, remuneration, time allocation, and opinion related to measles SIAs. Secondary data (policy documents, studies, and reports) were reviewed. Ethical approval was obtained from the LSHTM Ethics Committee as well as the national committees in the countries.

The process of research was iterative: ideas that emerged from the interviews informed the methodology and guided the collection of further data. Data analysis followed a framework analysis approach (Ritchie and Spencer 1994; Pope and Mays 1996). Qualitative data were validated through the triangulation of data sources and deviant case analysis. The level of integration was assessed in each of the eight critical components of a health system (Atun et al. 2010) into four levels (no interaction, linkage, coordination, and full integration), following the framework developed by Shigayeva et al. (2010). Quantitative data collected for the study were entered into Excel and checked for range and consistency. Building on the country-level synthesis of data and interpretations, a cross-country analysis enabled a broader understanding of the impacts of AMEA on immunization services and health systems and revealed lessons from country case studies that could have wider resonance in similar settings. A workshop was organized to synthesize and verify the country-specific findings and to develop policy recommendations for measles eradication, immunization services, and health systems.

Results

As methodologically intended, there is a large diversity in the characteristics of the six selected countries. The population of Brazil and Bangladesh is over 150 million, whereas Tajikistan and Cameroon have less than 20 million people. Three countries—Bangladesh, Ethiopia, and Tajikistan—are low-income economies according to the World Bank's classification. In 2009, Vietnam joined Cameroon as a lower middle-income economy. Brazil is an upper middle-income economy. Population health status in the six countries also varies: the average life expectancy ranges from 52.7 years in Cameroon to 75.4 years in Vietnam, and child mortality (under five years of age) ranges from 17 per 1,000 live births in Vietnam up to 80 per 1,000 live births in Cameroon.

In regard to health systems, the six countries have different extents of health governance and decentralization. The level of financial resources available in each country varies substantially according to their economic status. In 2007, the total health spending per capita ranged from as high as 837 International Dollars (purchasing power parity adjusted, PPP\$) in Brazil to 42 PPP\$ in Bangladesh and 30 PPP\$ in Ethiopia. Ethiopia relies heavily on external funding for its health system: in 2009–2010 external sources accounted for more than half of total health spending. In Bangladesh, Tajikistan, and Cameroon, external funding contributed around 5–8% to health expenditures, with only

2% in Vietnam and none in Brazil. Lack of human resources is a greater problem in all countries except Brazil and Tajikistan. Shortage is most prominent in Ethiopia and Cameroon, where there is a reliance on paraprofessionals and trained health volunteers to support the delivery of health services.

Immunization interagency coordinating committees (ICCs) exist in all countries except Brazil. In Ethiopia, ICCs have even been established in some of the regions as well. In all of the countries, immunization services confront different types of challenges; the strongest programs are found in Brazil and Vietnam, with the weakest in Cameroon and Ethiopia. Routine measles coverage varies from 74% in Ethiopia to 99% in Brazil, where measles is considered to be eliminated. These national estimates hide, however, great disparities between districts within the countries themselves. Low rates of measles vaccine coverage in certain areas of the country are especially a problem in Cameroon, Ethiopia, and Bangladesh.

Measles SIAs, the type of vaccine used, and the availability of add-on interventions vary across the six countries (Table 17.2). Nonetheless, each country has undertaken measles SIAs within the past three years. Brazil, Tajikistan, and Vietnam implement routine second dose of measles-containing vaccine (MCV) with periodic catch-up or follow-up SIAs. Bangladesh, Cameroon, and Ethiopia do not have a routine second dose of MCV.

- *Bangladesh* had its catch-up SIA in 2005–2006 for over 35 million children, age 9 months to 9 years. A follow-up SIA that covered 20 million children was conducted in 2010, and there is a plan to introduce routine MCV2 in the near future.
- *Brazil* has had four measles SIAs in 1992 (catch-up), 1995, 2000, and 2004 (follow-ups). It also conducted a catch-up SIA for its rubella campaign with measles and rubella vaccine in 2008, with a target population of almost 70 million.
- *Cameroon* had catch-up SIAs in 2002 for over 7 million children (age 9 months to 15 years). Follow-up SIAs for children age 9–59 months were conducted in 2006–2007. The most recent national follow-up SIA was conducted in July 2009 and reached over 3 million children.
- After a major catch-up SIA, which reached over 23 million children in 2002–2004, *Ethiopia* conducted two extensive follow-up SIAs that covered children (age 6–59 months) in all districts in 2005–2006 and 2007–2008. Over 10 million children were reached in each SIA. More follow-up SIAs were conducted in May 2009, with subsequent nationwide SIAs in October 2010 and February 2011.
- *Tajikistan* introduced routine MCV2 for 6-year-old children in 1986 (with a temporary change in immunization schedule to children under three years of age from 1993–2001). Two major SIAs took place in 2002/3 and 2004, and the latest catch-up campaign was conducted in 2009 for over two million children ages 1–14.

Table 17.2 Most recent supplementary immunization activities (SIAs) for measles in the six study countries.

Country	Year	Target population	Type	Vaccine used	Interventions included in SIAs
Bangladesh	2010	20,000,000	Follow-up	Measles	Vitamin A and polio vaccine
Brazil	2008	69,700,000	Catch-up	MMR	Catch-up EPI vaccines, health education on dental care, hypertension, diabetes, and STDs
Cameroon	2009	3,435,546	Follow-up	Measles	Vitamin A, polio vaccine, catch-up EPI vaccines including TT for women, IPTp, anti-helminthics ¹ , yellow fever vaccine in selected districts
Ethiopia	2009	276,695	Follow-up	Measles	Vitamin A and anti-helminthics ¹
Tajikistan	2009	2,340,440	Catch-up	MR	Vitamin A and mebendazole ¹
Vietnam	2009	1,036,222	Subnational follow-up	Measles	Vitamin A

¹ Mebendazole or albendazole for deworming

MMR: measles–mumps–rubella combined vaccine; EPI: expanded program on immunization; STDs: sexually transmitted diseases; TT: tetanus toxoid vaccine; IPTp: intermittent preventive treatment in pregnancy; MR: measles–rubella combined vaccine

- *Vietnam* introduced a nationwide routine second dose in 2006 for all first-grade children at the time of school entry. Its latest subnational follow-up SIA took place in five provinces in 2008 and reached a target population of over a million individuals between the ages of 7–20.

Integration of Measles Activities into the EPI and Health System

Within Routine EPIs

While measles vaccination was reported to be, in general, fully integrated within routine EPI programs in all countries, SIAs were implemented in a less integrated manner within routine EPI programs, dependent on a number of EPI functions. In terms of financing, for example, SIAs tended to attract a high proportion of external funds that needed to be used independently of other EPI activities in all countries except Brazil and Vietnam. For planning, SIAs required specific planning exercises in most countries. In addition, the information system for SIAs often required dedicated reporting forms that were adapted or

developed from routine reporting forms, such as in Ethiopia, to accommodate reporting of additional public health interventions delivered during SIAs.

Integration of EPIs within the Health System

In most countries, with the exception of Brazil and to some extent Bangladesh, EPIs generally operated as a vertical program; they had their own funding stream, dedicated staff at the national level, specific procurement and logistics systems, and separate planning and information system. Brazil had by far the most integrated system; all EPI functions operated as routine health services. In the other countries, certain EPI functions were less integrated into the wider health system (e.g., financing, logistics, and health information). Logistics tended to be managed separately from other supply chains within the Ministries of Health, and procurement was often carried out by the UNICEF procurement facility. In many cases, this separation stems from historical patterns of government funding and donor investment. The information system in Vietnam was not integrated; separate reporting forms were used for specific vaccine-preventable diseases.

Service delivery and disease surveillance are the EPI functions that were most integrated into health systems. At the service-delivery level, vaccination services were, to a large extent, well integrated with primary care services; they were delivered by general or multipurpose health workers, although they retained a vertical element when vaccinations were offered through dedicated outreach services. Across all study countries, vaccine-preventable disease surveillance accounted for one of the most integrated health functions, notably owing to the integrated disease surveillance system which shares resources and data collection as well as reporting and laboratory diagnostic procedures across several diseases.

Governance of EPIs was more difficult to assess. Some countries have a high degree of integration with mother and child health (MCH) teams, as in Ethiopia and Bangladesh, whereas elsewhere it was independent from other programs and had limited contact with other departments. Governance of the EPI program tended to be less integrated within the health system at higher levels, while being more integrated at district level or below. This was also the case for overall planning. In Tajikistan, however, staff involved in conducting routine measles activities had limited formal collaboration with family doctors, whose role it is to organize primary health care in a specific area, or with MCH staff. Vaccination services in Tajikistan were seen as separate from the rest of primary care activities: a system inherited from the Soviet model prior to independence in 1991.

Table 17.3 summarizes the integration of EPI within the health system and AMEAs within the EPI for all six countries.

Table 17.3 Integrating measles activities with EPI and health systems.

	Cameroon EPI and Measles health SIA and EPI system	Ethiopia EPI and Measles health SIA and EPI system	Tajikistan EPI and Measles health SIA and EPI system	Vietnam EPI and Measles health SIA and EPI system	Bangladesh EPI and Measles health SIA and EPI system	Brazil ¹ EPI and Measles health SIA and EPI system
Governance						
Financing						
Planning						
Human resources						
Logistics						
Information system						
Surveillance						
Service delivery						

¹ Not enough information available to analyze the level of integration of measles SIAs and EPI in Brazil



Impacts of AMEAs on Immunization Services and Health System

The impacts of AMEAs were assessed according to each of the eight components: governance, planning and management, financing, human resources, logistics and procurement, information system, surveillance, and service delivery and demand generation. A summary of the results is provided by function below, with accompanying statements from some informants.

Governance

According to key informants in all countries, AMEAs contributed to partnership building across Ministry of Health departments and stimulated collaboration across partner agencies to improve EPI governance and service delivery. In Bangladesh, Ethiopia, and Tajikistan, open involvement of communities and community leaders improved the accountability of EPI and raised awareness about the importance of immunization at both national and local levels. In Cameroon, Vietnam, Bangladesh, and Tajikistan, measles SIAs fostered active involvement from political leaders.

According to a health staff member in Vietnam: “The success of measles campaigns can be used as the most persuasive evidence to lobby for preventive medicine.”

A district hospital physician in Tajikistan reported that “after the SIAs, local authorities are more attentive and responsive to child health care issues.”

However, some key informants in Cameroon and Ethiopia expressed concerns over the imposition of funding conditions and the use of SIAs as the main elimination strategy. Donor earmarking of funding for measles activities was perceived as undermining local resource allocation decisions. Informants also believed that the implementation of measles SIAs as a priority activity separate from general health system strategies contributed to fragmented policy-making and priority-setting. In Ethiopia and Tajikistan, measles SIAs were perceived by some to have reduced motivation for adequate investment in broader health service delivery and primary health care.

Planning and Management

AMEAs helped to develop strategies and skills required for planning and management at all government levels and stimulated interdepartmental and intersectoral planning. This was particularly the case in Cameroon and Ethiopia, which used the opportunity of annual Child Health Days to deliver measles vaccines, and involved the complex planning of multiple child health-related interventions. Strengthened skills included the capacity to identify, map, and target hard-to-reach populations, both for vaccination and other outreach activities. In Ethiopia, preparations for SIAs required the development of

innovative strategies to cover the underdeveloped Afar and Somali regions. In Tajikistan, SIAs achieved high coverage among groups that are traditionally isolated geographically for parts of the year.

From a health staff member in Vietnam: “My skills for planning and management improved after being trained to do measles SIAs, and it is beneficial for planning and managing other health programs in my commune.”

Management skills acquired in the process of implementing measles activities were reported to be applicable to other preventive activities, such as planning for pandemic influenza vaccination. Key informants in Bangladesh and Tajikistan mentioned the stimulation of a culture of long-term planning in the health sector as another positive impact. However, in Cameroon, informants reported that measles SIAs could interfere with planning of routine EPI activities and other health services at regional and district levels. This is mainly because of short notice from the national level with many SIAs being conducted each year for various diseases.

According to a district informant in Cameroon: “We must stop everything at once to produce results....activities that were planned in March had to be shifted to April because of SIAs.”

A Cameroon health facility staff reported “If we knew at the beginning of the year when the campaign would take place, we would be able to solve many issues.”

Financing

Findings from key informant interviews show mixed patterns of impact that AMEAs had on the financing of immunization services, in particular, and health systems, in general. In all countries except Brazil, measles elimination activities helped leverage additional fund-raising from local and international partners to deliver both measles activities and additional public health interventions. In Bangladesh, Tajikistan, and Vietnam, reports also show that skills in fund raising were enhanced.

At the same time, concern was also expressed that the motivation to strengthen routine immunization services and the health system, in general, could be reduced because external funds were channeled primarily to finance SIAs for measles rather than routine vaccination services. Earmarking of donor funding for SIAs was perceived in Cameroon to be possibly detrimental to longer-term investment in routine vaccination services. However, quantitative evidence from budget allocations failed to show a decrease in resources for non-measles EPI funding in any of the countries. While external partners almost fully funded the Bangladesh catch-up SIAs in 2005–2006, the Bangladesh government largely funded the catch-up SIAs in 2010. In Cameroon, external partners were responsible for financing the procurement of vaccines and delivery of vaccines

and integrated interventions during SIAs. In Bangladesh and Vietnam, tensions were reported regarding financing at the district and provincial levels to cover the operational costs of SIAs.

An informant from Bangladesh stated: “A Civil Surgeon had to ask local health officers to manage money for organizing the SIAs from their own sources as funds from headquarters were delayed.”

Human Resources

In many countries, the quantity and quality of EPI staff reportedly increased as a result of AMEAs. Staff size increased, although most were volunteers (e.g., youth and women’s groups) who were mobilized for measles SIAs or used to help out in other EPI activities (e.g., temporary or retired staff workers). In regard to quality, key informants in all countries stated that the additional staff training provided as part of preparations for AMEAs helped improve the knowledge and skills of health staff on immunization planning, management, and service delivery as well as disease surveillance, laboratory diagnosis, and information management. In Brazil, skills in vaccine-preventable disease surveillance were especially noted to have improved as a result of AMEAs.

From a staff member at a Vietnam commune health center: “Yes, knowledge and skills of my commune health center staff on reporting, injection technique, campaign planning, and community mobilization have improved a lot.”

The use of incentives and different remuneration mechanisms for staff engaged in measles-related activities produced mixed results. The level of SIA payments, when compared to salary, was low in Vietnam, Bangladesh, and Tajikistan, but could be as high as half of salary income or more for some involved personnel in Cameroon and Ethiopia (Table 17.4). Key informants in Bangladesh and Ethiopia reported that the incentives provided by AMEAs helped motivate staff to become more committed to their responsibilities. In Ethiopia, where additional remuneration provided for SIAs was considerably higher than the government allowance, incentives reportedly contributed to retaining health workers in the public sector. However, negative impacts on other staff not directly involved in AMEAs were also reported. In Cameroon and Tajikistan, some key informants stated that staff may have been less motivated to perform routine immunization activities and other primary care tasks because of the lack of incentives for routine activities.

There were reports of EPI staff feeling overloaded from additional work from SIAs in Bangladesh, Cameroon, Ethiopia, and Vietnam. Results from the staff profiling surveys in Bangladesh, Cameroon, and Ethiopia show that more than two-thirds of the surveyed staff reported skipping other important tasks because of SIAs (Table 17.5).

A Cameroon health facility staff reported: “I was alone during the campaign [to carry out all other activities].”

From a health worker working for a nongovernmental organization: “We are a poor country...if you go to some areas you can find only one or two health workers providing clinical services so what do you do? How can you conduct these [measles] campaigns unless you use these workers?”

In Brazil, measles SIAs were only conducted during the weekends with participation of community volunteers; this helped to avoid interruptions to routine

Table 17.4 Survey results on the time required for measles SIAs and estimated remuneration. N/A: not available.

Country ¹	No. of respondents	Range of number of days spent on measles SIAs/campaigns (average number)			Estimated SIA remuneration as % of monthly salary (average)
		Planning	Implementation	Evaluation	
Bangladesh	60	2–42 (13.33)	1–30 (10.9)	N/A	16%
Cameroon	16	2–21 (6.31)	3–10 (6.13)	0–4 (2.19)	6–360% (43%)
Ethiopia	36	1–20 (5.6)	3–30 (9.8)	0–4 (1)	36–562% (157%)
Tajikistan	25	30–180 (73)	15 (15)	0–20 (12)	0–91% (35%)
Vietnam	351	1–15 (7.02)	2–12 (2.52)	N/A	Less than 10%

¹ Staff profiling surveys were not conducted in Brazil because measles elimination had already been achieved.

Table 17.5 Survey results on staff’s opinion regarding the impacts of measles SIAs. N/A: not available

Country ¹	No. of respondents	Skip important tasks because of campaign	Believe measles SIAs slow down routine immunization	Believe measles SIAs improve routine immunization	Support a measles elimination goal
Bangladesh	60	86%	0%	83%	87%
Cameroon	16	75%	60%	93%	100%
Ethiopia	36	72%	18%	93%	100%
Tajikistan	25	N/A	24%	100%	100%
Vietnam	60	21%	5%	84%	96%

¹ Staff profiling surveys were not conducted in Brazil because measles elimination had been already achieved.

services. Key informants in Bangladesh stated that SIAs enhanced the capacity of immunization staff to work under pressure, while in Tajikistan they reportedly became more energized and motivated to work on other EPI activities because of the feeling of achievement developed from expanding vaccination coverage and positive feedback on their work.

Logistics and Procurement

From a vaccinator in Tajikistan: “During SIAs we received a new refrigerator.”

AMEAs were reported to contribute to the improvement of cold-chain system and logistics in all six countries. In Cameroon and Tajikistan, investment in storage and better management of contaminated sharps became useful for services beyond the EPI programs. Logistics-related skills were enhanced and, in Tajikistan, the benefit extended to the drug delivery system, since the skills learned from vaccine management could also be applied to other pharmaceutical products; an increasing share of these tasks were taken over by government services. In Cameroon, however, a substantial share of transportation activities deployed during measles SIAs were rented rather than purchased, so an opportunity to strengthen the routine EPI program after the SIAs was lost.

Information System

One significant positive impact on the national health information system that was an indirect result from AMEAs was better information on target populations. The expansion of or the improvement in birth registration in Bangladesh, Ethiopia, and Vietnam is valuable and can be used for other EPI activities and health programs. In Tajikistan, AMEAs provided an incentive to reconcile differences between census and facility data, and resulted in an agreed upon basis for coverage calculation. In addition, measles SIAs contributed to the mapping of targets and hard-to-reach populations for EPI outreach activities in Cameroon and Tajikistan.

In Ethiopia and Bangladesh, however, national information requirements from SIAs generated many forms to be completed and submitted separately from the routine reporting system, thus generating an additional workload. A similar pattern of duplication occurred in Tajikistan. This, however, resulted primarily from the existing reporting protocol in the general public health system rather than as a result of the SIAs. In Cameroon and Ethiopia, data collected during SIAs were sent directly to national level without adequate utilization at lower levels.

Surveillance

An integral part of AMEAs is a move from population-based to case-based measles surveillance. All countries reported that AMEAs strengthen disease

surveillance skills among EPI staff. National surveillance systems benefited through integrated surveillance for a number of vaccine-preventable diseases and other diseases. New laboratory equipment was purchased in Brazil and Vietnam, which was then available for other disease control activities. In Cameroon and Ethiopia, financial incentives provided for reporting measles cases through the Integrated Disease Surveillance Response system and were found to help improve other disease reporting. At the same time, some key informants in Cameroon voiced concerns over the sustainability of current measles surveillance, since it largely depends upon polio eradication program staff.

Service Delivery

A major concern over the impact of AMEAs was on the performance of the routine immunization system. One key assessment is the change in EPI coverage in relation to measles SIAs. At the national level, our study found no pattern of decrease in DPT3 coverage in the years of measles SIAs in any of the six countries (Figure 17.1). According to a report by the Ministry of Health in Vietnam (2006:5), the big reduction in DPT3 coverage in 2002 was due to shortage of vaccine. Latest statistics for 2009, however, show a decline in DPT3 coverage in Ethiopia and Cameroon. At the district level, data on coverage trends in the study districts were not always available, but findings from staff surveys indicate that the impact on routine immunization was perceived to be more positive than negative (Table 17.4).

One commonly reported benefit of AMEAs on immunization services was its capacity to raise community awareness on the benefits of vaccination and primary health care. Resources made available for SIA mobilization through

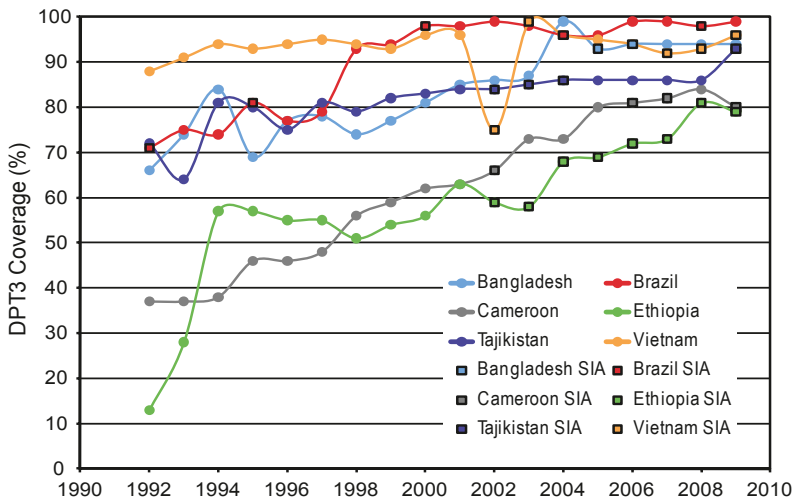


Figure 17.1 DPT3 coverage trends in relation to the years with measles SIAs.

national and local media also reportedly contributed to increased uptake of routine vaccines. It was stated that measles SIAs provided the opportunity to trace and vaccinate defaulters for other vaccines. In Cameroon and Tajikistan, there was an increase in outreach activities to hard-to-reach populations, thus facilitating access to vaccination and other primary care services for these populations. Measles SIAs also stimulated collaboration between state and non-state private providers which resulted in the joint provision of services.

A national-level key informant in Bangladesh reported: “Before SIAs, we used to visit the people, motivate them to bring their children to the center, but now people themselves mostly come to EPI centers which [has] helped in improving coverage of other vaccines....this is just because of SIAs and publicity.”

A district EPI director in Tajikistan stated that “SIAs help us to reach unreached children.”

Although demand for vaccines has increased through social mobilization, in Cameroon, where vaccine-preventable disease SIAs are regularly conducted, concern was expressed that the population might become more passive, possibly waiting for the next campaign rather than actively seeking to complete the routine vaccination schedule.

Because of AMEAs, the quality of immunization service delivery, especially in regard to injection safety and hygiene, has reportedly improved in most countries. Measles SIAs have provided a platform for additional vaccines, including yellow fever, polio, tetanus, BCG, or pentavalent vaccines (Table 17.2). Other public health activities were also included: the delivery of insecticide-treated bed nets, vitamin A supplementation, anti-helminthics, and nutritional screening. It was noted, however, that multiple integrated interventions in SIAs can, in certain circumstances, put pressure on service delivery and be complex to manage.

Effects on other health care services were mixed. In Cameroon and Ethiopia, health care services were interrupted during SIAs because of both staff shortages and inadequate preparation, frequently due to short notice of the event. Some activities at health centers and hospitals were suspended temporarily or only limitedly provided. However, in Bangladesh, key informants stated that health care utilization rates for antenatal care and other primary health care activities had increased due to public mobilization associated with AMEAs. In Tajikistan, there was also an increased demand for primary health care services through social mobilization at local level, which was initially created to support SIAs. Significant reduction in measles outbreaks and morbidity after vaccination also freed up health care facilities in all countries.

A senior pediatrician in Cameroon: “Most young doctors have never seen a measles case.”

Summary of Impacts

Our findings show that the impacts of AMEAs on EPI programs and health systems are highly varied. There are both positive and negative implications in most of the health system and immunization functions. The results also vary with the existing system capacity and context as well as in the way AMEAs were implemented. On balance, positive impacts on immunization service were acknowledged in all countries, particularly Bangladesh, Brazil, Vietnam, and Tajikistan; however, more negative impacts were reported in Cameroon and Ethiopia. Impacts on the health system tend to be limited. A weaker health system may not be able to benefit sufficiently from the AMEAs, whereas in more developed health systems, disruptions are less likely to occur.

Discussion

Earlier studies on polio eradication emphasized potential negative implications for health systems because of resource diversion from routine immunization services and other health programs, particularly in financial and human resources (Aylward and Linkins 2005; Loevinsohn et al. 2002). Our study shows that there is no evidence of a direct financing impact from AMEAs at the national level. This is likely due to the high financial support for vaccines provided by external partners in most countries. Success in measles SIAs was even quoted as bringing credibility to the EPI program to be able to secure more support. However, the earmarking of funds for SIAs by donors was pointed out by several countries as rigid and not conducive to long-term strengthening of routine immunization services. Another reported problem in selected countries was the delay in budget disbursement. In Vietnam there was some tension in funding operational costs that were not provided by the central level.

The possible negative impact on workload and interruption of services was confirmed in this study from both key informant interviews as well as surveys of fieldwork staff. One factor that has contributed to a higher interruption from AMEAs is attributable to the need to mobilize qualified vaccinators for measles vaccine injection; this is not required in polio campaigns. Delays and interruption of health services were reported to vary. Although the period of disruption tends to be short, because SIA implementation did not take long, it was argued that the number of SIAs covering all antigens strained both planning and service delivery, notably in resource-poor countries. Similar to early studies on polio eradication, most of the disruptions could have been avoided through better planning (Aylward and Linkins 2005).

A number of positive impacts on immunization services were found in the country studies. Many of them resulted from having measles activities integrated in the EPI system. Skills of health staff (e.g., immunization service training, program management training) improved and better equipment and

information systems (for surveillance, monitoring, and evaluation) were made available, thus benefiting the overall EPI program. By increasing coordination with other sectors, networks were expanded, thus increasing future collaboration on SIAs and mass campaigns for other preventive health programs.

Additional positive impacts beyond immunization occurred when other health care interventions were added to measles SIAs or outreach services, where the existing delivery system was weak. Immunization programs have long been viewed as a natural vehicle for public health interventions and have contributed to increased coverage of the combined interventions, higher efficiency of service delivery, and enhanced equity for multiple interventions in hard-to-reach populations (WHO Regional Office for Africa 2010). It has been argued that key success factors for integration of interventions with SIAs are program compatibility and the existence of a robust EPI program (WHO Regional Office for Africa 2007). We note that in our study, integrated interventions are primarily used in countries where the health system is relatively weak. In Cameroon, as in other countries, coverage achieved for additional interventions was reported to be high (87% coverage rate achieved for deworming in the 2009 measles SIA); however, there were reports that the large number of additional interventions was complex to plan and deliver. Both the number and the effectiveness of integrated interventions in SIAs are rarely evaluated.

Despite our mixed findings on the impacts with mostly positive effects on many functions, particularly on immunization service, the effects were not equally manifested in all six countries. Low-resource countries with weaker underlying systems tend to bear more unfavorable impacts and opportunity costs from AMEAs. In these countries, there could be several disease campaigns each year because of the limited capacity in the routine delivery system, thus creating additional burden on the health care staff, especially when these interventions are not well coordinated and planned. Sustainability of effective service provision is also more at risk when a program's interventions are not effectively integrated into the mainstream of a national health system. Earmarking of funds and separation of logistics or reporting system is not conducive to a long-term strengthening of routine immunization services and health system. Inversely, when the level of integration between AMEAs, routine immunization services, and the health systems is greater, benefits tend to be higher, such as for disease surveillance and health service delivery activities.

Avoiding negative impacts alone is not adequate. Even though eradication initiatives cannot be expected to solve all problems in the health system, it is argued that opportunities to strengthen routine immunization services and health system development need to be actively sought and action taken (Salisbury 1998). Measles eradication strategy should help tackle root causes in the health system that would incur benefits to several priorities simultaneously, thus leveraging the opportunity for success of its program (Travis et al. 2004). In this study, AMEAs were not shown in any of the study countries to have explicit

objectives to help strengthen health system capacity beyond improving EPI service and disease surveillance.

The recommendations to include health system strengthening actions with the disease control activities in disease elimination or eradication effort are not new (Taylor and Waldman 1998). Melgaard et al. (1999) recommended that strengthening existing systems should be prioritized over new systems, and donor financing for eradication should be extended to other health system investments. While acknowledging the tensions between the concepts of eradication and sustainable health development, the WHO Workgroup on Disease Elimination/Eradiation and Sustainable Health Development made the following recommendation (Salisbury 1998:78):

Potential benefits of eradication to health development should be identified at the outset ...[and] measurable targets should be set for achieving these benefits. The eradication program should be held accountable for the attainment of these wider objectives.

The challenge is how to ensure that these recommendations are translated into actual interventions that are fully financed and included in the disease eradication plans with effective implementation and active monitoring of the impacts. The toolkit developed for this study (Griffiths et al. 2010) can be adapted for country-level impact evaluation assessment.

This study has a number of limitations. Assessing the impact of AMEAs is not conceptually straightforward. Separating the impact of the measles vaccination program from other ongoing immunization efforts is difficult because, in all six countries, AMEAs are integrated to varying degrees in the existing immunization services. In addition, a health system is not static; ongoing changes and reforms complicate the assessment of impact. Nevertheless, efforts were made in all aspects of the study to differentiate the implications of AMEAs from other ongoing activities.

Findings of this study may not be generalizable to a wide range of countries, and there may be inherent bias through selection of informants. However, the case study design sought to employ a range of complementary methods, and efforts have been made to improve the validity of the findings by triangulating data sources and placing data within the context of the existing literature.

Conclusion

This research study in six countries shows that the impacts of measles elimination activities on immunization services and health systems are mixed. There are both positive and negative implications in most of the health system and immunization functions. The results varied with national system capacity and context as well as in the way AMEAs were implemented. The negative implications include perceived diversion of priority from other necessary health

interventions, which tend to be more palpable in countries with low resources that rely more on SIAs and a vertical approach to measles elimination. Positive impacts from activities to improve measles vaccination delivery include (a) staff training which leads to improved planning, monitoring and evaluation skills, (b) additional cold-chain and diagnostic laboratory equipment, and (c) better management and information systems which will benefit other EPI activities and primary health care services. On balance, positive impacts on immunization service were acknowledged in all six countries, particularly in Bangladesh, Brazil, Tajikistan, and Vietnam; more negative impacts were reported in Cameroon and Ethiopia. Nevertheless, in none of the six countries were measles eradication activities shown to have an explicit objective to help remove health system bottlenecks and strengthen system capacity.

The study suggests that weaker health systems may not be able to benefit sufficiently from the AMEAs, whereas in more developed systems disruptions are unlikely to occur. The integration of additional services into the planned delivery of measles vaccine could help improve access to health care, especially to those difficult to reach. Potential negative implications regarding EPI programs and health systems must be avoided, and opportunities should be taken to address health system barriers and strengthen routine service delivery to benefit other public health priorities. Obviously, strategies and actions need to be customized specifically to the nature and context of the existing health system in each country as well as to the strategy and activities recommended for measles elimination.

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