International Review of the Expanded Programme on Immunization in the Lao People’s Democratic Republic, May 2012
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## ABBREVIATIONS

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<th>Abbreviation</th>
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<tr>
<td>BCG</td>
<td>Bacillus-Calmette-Guérin vaccine</td>
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<td>cMYP Immunizations</td>
<td>Comprehensive Multi-Year Plan for Immunizations, 2012–2015, Ministry of Health, Lao People’s Democratic Republic</td>
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<td>CDC</td>
<td>United States Centers for Disease Control and Prevention</td>
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<td>DPT</td>
<td>Combined diphtheria-pertussis-tetanus vaccines</td>
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<tr>
<td>DPT-hepB-Hib or pentavalent</td>
<td>Combined diphtheria-pertussis-tetanus-hepatitis B-<em>Haemophilus influenzae</em> type B vaccine</td>
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<td>EPI</td>
<td>Expanded Programme on Immunization</td>
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<tr>
<td>EVM</td>
<td>Effective vaccine management</td>
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<tr>
<td>GAVI</td>
<td>Global Alliance for Vaccines and Immunization</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<tr>
<td>Hib</td>
<td><em>Haemophilus influenzae</em> type B</td>
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<tr>
<td>HSDP</td>
<td>Seventh Five-year Health Sector Development Plan, 2011–2015, Ministry of Health, Lao People’s Democratic Republic</td>
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<tr>
<td>IEC</td>
<td>Information, education and communication</td>
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<td>LSIS</td>
<td>Lao Social Indicator Survey (combined Multiple Indicator Cluster Survey and Demographic Health Survey)</td>
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<tr>
<td>LuxDev</td>
<td>Luxembourg Agency for Development Cooperation</td>
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<td>MCH</td>
<td>Maternal and child health</td>
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<td>MPSC</td>
<td>Medical Products Supply Centre, MOH</td>
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<td>MDGs</td>
<td>United Nations Millennium Development Goals</td>
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<td>MOH</td>
<td>Ministry of Health, Lao People’s Democratic Republic</td>
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<td>NCLE</td>
<td>National Centre for Laboratory and Epidemiology</td>
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<td>NHSDP</td>
<td>National Health Sector Development Plan</td>
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<td>OPV</td>
<td>Oral polio vaccine</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>VVM</td>
<td>Vaccine vial monitor</td>
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<td>WHO</td>
<td>World Health Organization</td>
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ACKNOWLEDGMENT

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The views expressed in this report are those of the participants in the 2012 International Review of the Expanded Programme on Immunization in the Lao People’s Democratic Republic and do not necessarily reflect the policies of WHO, UNICEF, CDC, GAVI or LuxDev.
EXECUTIVE SUMMARY

In April and May 2012, representatives of the World Health Organization (WHO), the United Nations Children’s Fund (UNICEF), the GAVI Alliance (GAVI), the Luxembourg Agency for Development Cooperation (LuxDev), and the United States Centers for Disease Control and Prevention (CDC) conducted a review of the Expanded Programme on Immunization (EPI) in the Lao People’s Democratic Republic. This is only the second programme review since 1996, and the review team reconfirms its high level of commitment to the programme.

Immunizations have exceptional public-good characteristics, are highly cost-effective and have clearly measurable disease impacts. As such, they are a useful benchmark for measuring the effect of government investments in public health and are arguably one of the highest priorities for government health expenditures. The achievements of the Lao People’s Democratic Republic in immunizations are considerable. Over the past five years, routine vaccination coverage has increased steadily. This increase follows more than a decade of stagnation. Supplementary immunization activities have successfully accelerated control of poliomyelitis, measles, and maternal and neonatal tetanus. Several new life-saving vaccines have been recently added to the national immunization schedule.

Despite this progress, routine vaccination coverage in many areas remains low and the majority of children are vaccinated late. Gaps and delays in programme funds limit current impact and future progress and place the programme at risk of slipping backward. The reliance on donor funds for 90% of vaccine and operational costs is the single most important challenge to overcome and raises questions of the degree of government commitment to the programme.

In light of the maturity of the Lao EPI and rapidly increasing levels of national economic development, the review team identified several priority areas for consideration by the Government and made the following key recommendations:

- Increase Government funding for immunizations from the current US $2 per child per year to US $8 per child per year by $2 per calendar year over the period 2013–2015 to cover the cost of:
  - Traditional EPI vaccines
  - Co-funding for new vaccines
  - Two additional rounds of outreach services per year in all provinces
– Essential programme management activities, including training; supervision; monitoring; evaluation; information, education and communication (IEC); vaccine transport; and cold-chain maintenance and repair.

• Improve and monitor the timeliness of funding disbursements for outreach activities to ensure that outreach funds are available at the district level by the start of each year.

• Increase the number of outreach sessions to at least six per year to achieve the national goal of at least 90% vaccination coverage by 2015, and to vaccinate at least 70% of children by recommended ages.

• Establish a national system of compulsory birth registration.

• Strengthen supervisory, monitoring and evaluation capacity at provincial and district levels, in particular: (1) more effective use of primary data at health centres to identify those with poor performance; (2) a problem-solving approach to evaluation that focuses on identifying underlying causes of poor performance and possible solutions; and (3) quarterly meetings of district and provincial supervisory staff to monitor progress.

• Develop a joint Ministry of Health and Ministry of Education and Sports regulation on national school-entry immunization.
I. INTRODUCTION

The Government of the Lao People’s Democratic Republic is rapidly expanding health expenditures in order to accelerate progress towards social development goals. Average annual gross domestic product (GDP) growth of 8% over the past decade has created space for additional health investments and there is high-level political commitment to achieving the Millennium Development Goals (MDGs) by 2015 and moving the Lao People’s Democratic Republic out of least-developed country status by 2020. There is also clear recognition of the important role that immunizations have in achieving broader development goals, including reducing childhood mortality and controlling communicable diseases.

Immunizations have exceptional public-good characteristics, are highly cost-effective and have clearly measurable disease impacts. As such, they are a useful benchmark for measuring the effect of government investments in public health and are arguably one of the highest priorities for government health expenditures. While the national goal of at least 90% of infants fully vaccinated by 2015 is feasible, achieving this target will require a major expansion of the Lao Expanded Programme on Immunization (EPI) over the next few years.

To assist the Government in addressing these strategic issues, representatives of the World Health Organization (WHO), United Nations Children’s Fund (UNICEF), GAVI Alliance (GAVI), the Luxembourg Agency for Development Cooperation (LuxDev), the United States Centers for Disease Control and Prevention (CDC), and members of the Technical Advisory Group on Immunization for the WHO Western Pacific Region conducted a review of the Lao EPI during April and May 2012.

The objectives of the review were to: (1) assess progress of EPI towards national, regional and global immunization goals; (2) identify challenges that would need to be overcome in order to achieve those goals; and (3) provide policy options and technical recommendations to strengthen the immunization programme. The process included a review of published and unpublished documents, stakeholder interviews and visits to 12 provinces to evaluate programme performance on site.\(^1\) In each of the 12 provinces, two districts were visited; one district with high performance and one with

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\(^1\) Provinces visited by review team members were: Bokeo, Bolikhamsay, Champasak, Luang Namtha, Luang Prabang, Saravan, Savannakhet, Sekong, Vientiane Prefecture, Vientiane Province, Xayabuly and Xiengkhuang.
low performance, based on reported coverage with three doses of combined diphtheria-pertussis-tetanus (DPT3) in 2011. In each district, one health centre and one outreach session or one fixed-site vaccination session were reviewed.

The participating agencies reconfirmed a high level of international commitment to EPI and identified several important policy and technical issues for consideration by senior Government officials. These issues are outlined in this report, with reference to relevant regional and global experience and suggested recommendations.
II. ACHIEVEMENTS AND CHALLENGES

EPI in the Lao People’s Democratic Republic is widely regarded as one of the country’s most successful public health programmes. Launched in 1979, the programme has established a system of outreach covering all villages nationwide. The Seventh National Health Sector Development Plan 2011–2015 (NHSDP) includes a goal of at least 90% vaccination coverage by 2015. In 2011, His Excellency, President Choummaly Sayasone, declared his commitment to achieving this goal at the Sixty-fourth World Health Assembly.

The Lao EPI has protected millions of people against once-common and deadly diseases. Poliomyelitis was eliminated in 2000, and the country is close to eliminating measles and neonatal tetanus. New vaccines to prevent viral hepatitis, bacterial meningitis and pneumonia—important causes of mortality—have been added to the national immunization schedule and will further contribute towards reaching the MDGs. After more than a decade of stagnation that began in 1998, positive momentum has been regained and routine vaccination coverage has been climbing steadily since 2008 (See Figure 1). Both administrative reports and nationally representative household surveys indicate that routine infant immunization coverage has increased by 20% over the past five years. In addition to endemic disease control, EPI also plays an important role in epidemic disease control, including vaccination to prevent pandemic influenza.

Despite these achievements, progress remains uneven. In many areas, routine vaccination coverage remains low and outbreaks of pertussis and diphtheria continue to occur in all regions of the country. Timeliness of vaccination is extremely low, with most infants vaccinated after risks of infection are already high. Only 70 (13%) of 520 children whose vaccination records were reviewed by the team received all three doses of DPT-hepatitis B-Hib vaccine by the recommended age of four months. Among children registered for vaccination, one-third failed to receive all doses and were incompletely immunized, indicating a problem with follow-up.

2 Lao People’s Democratic Republic. Accelerating Progress towards the MDGs, 15 December 2010.
3 Both administrative reports and household survey data support a 15%–20% increase in DPT3 and OPV3 vaccination coverage from 2005/2006 to 2010/2011.
Adequate funding remains a major problem. Approximately 70% of children are vaccinated through outreach activities. Funding for outreach, however, is insecure and often delayed. Over 90% of vaccine and programme operational costs are funded by donors. Differences in donor funding cycles, planning and reporting requirements, and delayed financial disbursements make coordination of outreach services difficult. Ensuring nationwide coverage of outreach services is a continual challenge for EPI. The team found several instances where delays in disbursement of outreach funds had substantial negative effects on vaccination coverage.

Since 2009, the cold chain has been extended to the health-centre level, increasing access to vaccinations at fixed sites. There is inadequate maintenance and repair of the cold chain, however, and 10% of the cold-chain equipment donated and installed by LuxDev during 2009–2010 is already non-functional. Some local governments have not paid for the electricity or fuel needed to operate cold-chain equipment in health centres so refrigerators sit empty.

Rural community demand for vaccinations remains low. Few IEC materials to educate parents on the importance of immunization were seen. Funding delays push outreach sessions into the rainy season when fieldwork is a priority and many parents are unwilling to wait for outreach teams to arrive, reducing the efficiency of outreach services. Resources to disseminate available IEC materials and strategies have been inadequate.
II. MAIN ISSUES AND RECOMMENDATIONS

1. Government Commitment and Funding

The high political priority given to EPI is only slowly translating into increased Government investment. Although Government funding for immunizations has increased with co-funding of new vaccines and support for outreach services in selected areas, the overall level of Government investment in immunizations remains low and covers less than 10% of vaccine and operational costs.

In 2011, total Government expenditures on routine immunizations were 2.8 billion LAK (US$ 350 000) in 2011, or approximately 16 000 LAK (US$ 2) per infant. In contrast, the cost of fully vaccinating an infant in the Lao People’s Democratic Republic is approximately 240 000 LAK (US$ 30), similar to other developing countries. With the planned addition of pneumococcal vaccine to the immunization schedule in 2013, the cost of fully immunizing a child in the Lao People’s Democratic Republic will rise to over 320 000 LAK (US$ 40) per child.

The high reliance on donors places the programme at risk. Coordination to ensure nationwide coverage is a difficult and time-consuming process due to unanticipated delays in project approvals, differences in donor funding cycles and reporting requirements, and difficulties tracking fund disbursements. Funding is unpredictable and delays are common. Delays in funding for outreach in Luang Namtha, Luang Prabang and Xieng Kouang provinces in 2012 had clear negative impacts on vaccination coverage (See Figure 2).

Outreach sessions need to start early in the year during the dry season. Of the 24 districts visited, 13 (43%) received funding for 2011 outreach sessions during March–June, three to six months late. Only one province—Xiabouly where there is a large Save the Children Primary Health Care Project and outreach activities are funded by the Government—received funding in January. In two provinces visited by the team, funding for 2012 outreach

activities had still not reached districts by the time of this review in May 2012. Simple strategies to improve the effectiveness of service delivery—such as fixing the dates of outreach sessions—can’t be considered in the absence of predictable funding.

Funding gaps were identified for outreach, traditional EPI vaccines, training, supervision, monitoring and evaluation, IEC, and vaccine transport and cold chain. While there has been increased donor interest in supporting integrated Maternal Neonatal Child Health (MNCH) outreach services in the past two years, most donors are only supporting four rounds of outreach per year. This low frequency of contacts will make it difficult to reach the 90% vaccination coverage goal and impossible to substantially improve timeliness of vaccination. For some vaccine-preventable diseases, such as pertussis, where mortality is concentrated in young infants, more deaths would be prevented by achieving on-time immunization at lower coverage levels, than achieving higher coverage of without attention to timeliness.6 On-site supervision is cursory and there appears to have been little training in effective supervisory skills. IEC materials and strategies have been developed, but there are inadequate funds to produce and disseminate them. A shortfall of donor funding for traditional EPI vaccines is anticipated in the fourth quarter of 2012. How and whether these gaps will be filled is unclear.

Figure 2. Coverage with three doses of DPT-HepB-Hib vaccine in infants born in 2009, 2010 and 2011 at six health centres reviewed in Xieng Kuang, Luang Prabang and Luang Namtha provinces.

(Source: 2012 EPI Review)

Recommendations

1. Increase government funding for immunizations from the current US $2 per child per year to US $8 per child per year by $2 per calendar year over the period 2013–2015 to cover the cost of:
   (a) Traditional EPI vaccines
   (b) Co-funding for new vaccines
   (c) Two additional rounds of outreach services per year in all provinces
   (d) Essential programme management activities including training, supervision, monitoring, evaluation, IEC, vaccine transport, and cold-chain maintenance and repair.

2. Streamline and monitor financial planning and disbursement procedures for outreach to ensure that funding for the first outreach sessions reach districts by January; the MNCH Technical Working Group should review and monitor the timelines of outreach funding disbursements at each meeting.

3. Further advocate the critical role of the immunization programme in national health so as to mobilize more funds from donors for filling in funding gaps.
2. Increasing the Impact of EPI

a. Expanding Access to Vaccination Services

Much of the Lao People’s Democratic Republic’s population is rural and scattered in difficult-to-access areas. Approximately 70% of infants in the Lao People’s Democratic Republic are vaccinated through outreach services offered four times per year. Because at least four contacts are needed during the first year of life to fully immunize a child and not all target infants are found at each outreach session, increasing the proportion of infants who are fully vaccinated to at least 90% by 2015 will require increasing the number of outreach rounds to at least six rounds per year, or increasing the proportion of target children found during each outreach session to at least 98%. A national immunization policy has been drafted that recommends at least six rounds of outreach per year but has not yet been finalized.

Because of the low frequency of outreach sessions, the timeliness of vaccination is very low nationwide. Even in areas where vaccination coverage is high, timeliness is low. To ensure that infants develop protective immunity as early in life as possible, WHO recommends that DPT, hepatitis B, Haemophilus influenzae (Hib) and OPV vaccine doses be administered at six, 10 and 14 weeks of age. In health centres reviewed, only 30% of infants received a first dose of DPT-hepatitis B B-Hib vaccine by the recommended two months of age and only 13% had received three doses of DPT-hepatitis B-Hib vaccine by the recommended four months of age. With only three to four contacts per year, most infants are being vaccinated after their risks of infection have already reached high levels. The incidence of pertussis, Hib, pneumococcal and hepatitis B infections is substantial during the first three to four months of life. Diarrhoea is a leading cause of childhood mortality in the Lao People’s Democratic Republic, and rotavirus accounts for 54% of diarrhoea admissions of children under five years of age in the Mahosot National Hospital in Vientiane. The Lao People’s Democratic Republic is eligible for GAVI rotavirus vaccine support. Introduction of rotavirus vaccine could substantially reduce diarrhoeal deaths in children. The incidence of severe rotavirus gastroenteritis, however, starts to peak at four months of age. Unless timeliness is improved, the full impact of the Lao vaccination programme will not be realized.

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7 A minimum of four separate contacts are needed to fully vaccinate an infant. If on average 80% of target children are vaccinated during each outreach session, the probability of contacting a child four times with four outreach sessions is only 41%. With five sessions that probability increases to 73%, and with six outreach sessions that probability increases to 90%. With just four outreach sessions, at least 98% of target children would have to be found at each session to achieve 90% coverage overall; timeliness of vaccination, however, even in this setting would still be very low.


9 Aloun DS, Nyambat B, Phetsouvanh R, et al. Rotavirus diarrhea among children less than 5 years at Mahosot Hospital, Vientiane, Lao PDR. Vaccine, 2009; 275:F85–8
In addition to timeliness, ensuring the delivery of potent vaccines is critical to increasing EPI’s impact. Vaccines with vaccine vial monitors (VVMs) showing that the vaccine had received excessive heat exposure were found in one-third of the health centres visited. Each year EPI distributes millions of dollars worth of vaccines nationwide and investments to ensure that these vaccines are viable at the time of vaccination should be a high priority. Extension of the cold chain to the health-centre level since 2009 has increased access to vaccinations. With urbanization, the proportion of infants vaccinated at fixed sites will continue to increase. Most of the health centres visited that had working refrigerators provided vaccinations five days a week. However, 10% of the approximately 600 Electrolux refrigerators that LuxDev installed in health centres in 2009 and 2010 are already non-functional. There has been little preventive maintenance or repair of this equipment by the Medical Products and Supply Centre (MPSC), Ministry of Health. While centralization of equipment repair and maintenance under MPSC is conceptually attractive, in reality MPSC does not have the network of staff needed to service equipment at the health-centre level. Without an updated cold chain inventory and replacement and repair plan, cold-chain equipment recently installed in health centres could be non-functional in a few years. In some areas, local governments have not budgeted for the electricity or fuel needed to run the refrigerators, so they sit empty.

**Recommendations**

1. Increase the frequency of delivery of preventive outreach services to at least six rounds per year, with four rounds conducted during the dry season.
2. Improve timeliness so that at least 70% of vaccinations are given by the recommended age.
3. Consider introducing rotavirus vaccine with GAVI support.
4. Ensure the functional capacity of the vaccine distribution system including:
   (a) reviewing and evaluating the ability of the Medical Products Supply Centre to maintain and repair cold-chain equipment in health centres with learning from best practices of other countries;
   (b) budgeting health centre cold-chain operating costs in local government budgets;
   (c) conducting vaccine time-temperature monitoring studies from procurement to vaccination; and
   (d) developing a national database for a comprehensive inventory of functioning and non-functioning cold-chain equipment.
b. Improving EPI Performance

Supervision, monitoring and evaluation are ongoing processes essential for strengthening programmes. Problems that are not identified and monitored will not be corrected. The review team found that the quality of supervision, monitoring and evaluation was weak. Many problems were readily apparent to review team members at health centres and district offices visited, including: storage of vaccine with vaccine vial monitors indicating excessive heat exposure; incomplete or incorrect data in vaccination registers; low percentages of target children vaccinated during outreach sessions; poor vaccination timeliness; high drop-out rates, lack of IEC materials; vaccine stock-outs, limited use of data to identify problems; and discrepancies in reported coverage data between different administrative levels. Information on individual health centre performance is not routinely monitored, and provincial and district supervisors appear to have little sense of which health centres are performing poorly, or why.

The current weakness in management, particularly at the provincial and district levels, may be due to several factors. There appears to have been limited training and modeling of effective supervisory skills and critical analysis of data and problems. Currently, so much of EPI performance is dependent on factors related to the adequacy and timeliness of funding beyond the control of lower-level health staff that staff members may feel little ownership and accountability for programme successes and failures. Without secure and predictable funding, it will be difficult to strengthen management at the provincial and district levels to improve programme performance.

Poor quality data are also a barrier to improving programme management. Vaccination coverage data from the current reporting system have limited utility. The number of target children each year is based on Ministry of Health (MOH) estimates of the number of births projected from 2005 census data. In contrast, numbers of vaccinations are reported for all children vaccinated during the calendar year and include multiple birth cohorts. For example, if MOH estimates that there were 10 000 births in a province in 2011, and 8000 DPT3 doses were reported administered in 2011, DPT3 coverage is calculated as 80%. However, because some of the DPT3 doses administered during 2011 were administered to children born in 2010, actual DPT3 coverage in children born in 2011 was substantially less than 80%. Because the number of children in the numerator and denominator of reported coverage estimates are derived from different birth cohorts and cover different time intervals, the administrative coverage data are difficult to interpret, untimely and lack sufficient sensitivity to identify districts and health centres with poor performance. The accuracy of MOH birth estimates is also unknown. In 2008, the number of births projected by MOH was approximately 17% lower than official estimates of births projected by the
National Statistics Center. The difference in reported coverage and coverage in recent nationally representative household surveys suggests that MOH estimates of births may be too low.

Uncertainties in the actual number of births mean that health programmes and health workers cannot identify the children they need to reach, cannot accurately estimate programme coverage, and are unable to accurately plan for the amounts of vaccines and other drugs needed. Given the relatively low number of births per village per year and the extensive government network that exists at the grassroots level in the Lao People’s Democratic Republic, instituting a system of compulsory birth registration is considered to be feasible and critical to strengthening the national immunization programme. Many other programmes would also benefit by having accurate data on numbers of births.

In contrast to reported data, the team found that the primary data at health centres was of high quality and useful for timely identification of performance problems. The review team found that review of vaccination registers could provide timely and accurate data on coverage, timeliness of vaccination and drop-out rates, and that review of summary forms that have the number of target children and the number vaccinated during outreach sessions by village could provide a rapid sense of how well outreach sessions have been organized. For example, summary outreach forms clearly showed that in some outreach sessions fewer than half of the target infants were vaccinated, indicating a problem with organization or timing of the outreach sessions. Despite the abundance of primary data in health centres that could be used to identify performance problems, these data appear to be underutilized during regular supervisory visits.

Low demand for vaccination services was also cited by many health workers interviewed as an important challenge to increasing vaccination coverage. The team saw few IEC materials that workers could use to educate parents about the importance of immunizations and other preventive health services. This is particularly a problem in minority areas where staff members at health centres don’t speak the local language and cannot verbally provide health education.

Recommendations

1. Expand programme management capacity at the subnational levels through:
   (a) strengthening province- and district-level staff supervisory, monitoring and evaluation skills;
   (b) building capacity among province- and district-level staff to use existing primary data at health centres to identify health centres with poor performance (e.g. village vaccination registers and summary health centre outreach vaccination forms to monitor the proportion of target children vaccinated during outreach sessions, vaccination coverage by birth cohort, and drop-out rates);
   (c) building capacity among province- and district-level staff evaluation and supervisory skills to identify reasons for poor performance as well as strategies to address them; and
   (d) establishing quarterly meetings with province- and district-level supervisory staff to monitor health centre performance.

2. Advocate with the Ministry of Home Affairs to establish a national system of compulsory birth registration.
c. Innovative Delivery Strategies

Given the need to increase routine vaccination coverage by an additional 20%–30% by 2015, other innovative delivery strategies should be considered. These include school-entry immunization requirements, the use of hepatitis B vaccine out of the cold chain and reducing missed opportunities for vaccination.

Primary school enrollment in the Lao People’s Democratic Republic is 84% and targeted to reach 98% by 2015. In countries where primary school is compulsory, checking the vaccination status of all children entering school and offering them another opportunity for immunization have markedly increased vaccination coverage, particularly in groups that tend to be missed during infancy. School entry immunization laws in the United States of America, Hong Kong (China) and China have increased vaccination coverage in children entering school by 30%–40%.11

Although school-entry immunization is not a substitute for timely infant immunization, teachers can be powerful advocates for immunization. The process of implementing school-entry requirements can increase overall community awareness of the importance of immunizations. Because schools are often the first opportunity for non-immune children to congregate in sufficient numbers to support transmission of some vaccine-preventable diseases, school-entry immunization requirements can also reduce the potential for school outbreaks. In 2011, 24% of measles cases and 38% of pertussis cases in the Lao People’s Democratic Republic occurred in school-age children. Such efforts can build on the already successful collaboration established between the ministries of Health and Education and Sports for mass vaccination and deworming campaigns.

Hepatitis B virus infection is endemic in the Lao People’s Democratic Republic and perinatal infection is the most important risk factor for developing the chronic infections that lead to fatal hepatocellular carcinoma and cirrhosis. The review team was pleased to find that 87% of infants born in hospitals in the 12 districts visited received a timely birth dose of hepatitis B vaccine. Because less than half of infants are born in health facilities, however, reaching the national goal of timely hepatitis B birth dose coverage of at least 65% by 2015 will require other strategies. Hepatitis B vaccine is heat-stable and has been used successfully out of the cold chain in other countries of the

region with high rates of home deliveries, including China, Indonesia and Viet Nam.\textsuperscript{12}

Integrated Management of Childhood Illnesses (IMCI) is a facility-based component of the MNCH integrated service delivery package. The IMCI guidelines include reviewing vaccination histories of children presenting for sick child consultations and referring under-immunized children for vaccination. This does not appear to be common practice and should be reinforced during IMCI training and supervision. Reducing missed opportunities for vaccination will become increasingly important with planned introduction of free maternal and child health services.

**Recommendations**

1. Develop a joint Ministry of Health and Ministry of Education and Sports regulation on national school-entry immunization.

2. To increase birth dose coverage of hepatitis B:
   (a) increase hepatitis B birth dose coverage in facility births to at least 95%;
   (b) promote facility delivery of births;
   (c) ensure skilled birth attendants to administer birth dose vaccine to home births; and
   (d) develop and conduct pilot strategies for reaching home births through use of hepatitis B vaccine off the cold chain with Uniject delivery devices.

3. Reinforce IMCI training and supervision to reduce missed opportunities for vaccination during sick child consultations.

3. **EPI and the Integrated Maternal, Neonatal and Child Health (MNCH) Services Strategy**

In 2009, the Government and donors developed an integrated MNCH strategy and framework to strengthen progress towards MDG 4 (reducing child mortality) and MDG 5 (improving maternal health). One component of this integrated service delivery package is expansion of EPI outreach to include services in addition to vaccinations, such as antenatal care, contraceptives, micronutrients and nutrition counseling.

While the team is concerned that the integrated MNCH service delivery package has resulted in loss of visibility for EPI, it is too early to evaluate the effects on EPI performance since implementation of the package is only being scaled up this year. Qualitatively, nearly all health workers interviewed by review team members said that the addition of more services to outreach sessions makes it easier to find and vaccinate target children because parents are willing to wait for arrival of the outreach team.

Save the Children Australia’s Primary Health Care Projects in Xiabouly and Luang Prabang provinces merit special mention. These projects have achieved rapid and marked increases in service utilization and decreased childhood and maternal mortality using a three-year step-by-step health systems approach to strengthen horizontal delivery of primary health care. This approach has resulted in disease impacts that far exceed what has been achieved in other provinces. Keys to the success of this approach are well documented and include: a focus on capacity-building; training of village health volunteers; training of traditional birth attendants in all remote villages; construction or renovation of peripheral health facilities; provision of basic medical equipment and essential medicines; outreach services to all remote villages; growth monitoring and nutrition education in selected villages; regular supervision and monitoring of all health facilities and village volunteers; and intersectoral collaboration. Tellingly, an early review of this project highlighted the need for a strong national EPI to ensure the success of integrated delivery of primary health care services.

The success of these large-scale projects supports their use as models for scaling up implementation of the MNCH service delivery package. They also demonstrate that a strong national EPI is a critical component needed to ensure successful delivery of integrated maternal, neonatal and child health outreach services.

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Recommendations

1. Closely monitor vaccination coverage, timeliness and drop-out rates further at subnational levels to identify possible unintended positive or negative consequences of implementing the integrated MNCH service delivery package on EPI performance.

2. Further review and evaluate the implementation and impact of the integrated MNCH package both at health facilities and in outreach activities, and provide practical recommendations for its improvement.

3. Ensure greater autonomy for EPI in planning activities and making decisions so that it can further enhance its ability to implement activities in a more timely fashion and manage the programme more effectively.
4. Vaccine-preventable Disease Surveillance

Surveillance for vaccine-preventable diseases is the responsibility of the National Centre for Laboratory and Epidemiology (NCLE), Department of Hygiene and Prevention, MOH. Although NCLE and EPI are in the same department of MOH, coordination is irregular and driven by the occurrence of vaccine-preventable disease outbreaks. Use of vaccine-preventable disease surveillance data by EPI to inform programmatic decisions has not been common.

There is concern that strengthening vaccine-preventable disease surveillance has become a lower priority with more recent focus on surveillance of new and emerging diseases. Unlike vaccine-preventable disease surveillance that focuses on investigation of all suspect cases, surveillance for new and emerging diseases focuses on detection of outbreaks. Surveillance for acute flaccid paralysis (AFP) has dropped below WHO minimum reporting rates for countries certified as polio free, and surveillance for measles, Japanese encephalitis, pertussis, diphtheria and mumps, and maternal and neonatal tetanus remain inadequate. In 2012 to date, the non-polio AFP reporting rate is below WHO recommended rates of one per 100,000 children less than 15 years old. Less than 50% of acute fever and rash cases have laboratory samples taken to confirm measles infection. Several cases of neonatal tetanus were not reported to the NCLE even though they were identified at national hospitals.

Future collaboration between EPI and NCLE may be strengthened by the inclusion of EPI staff in the new field epidemiology training (FET) class and a recent training on vaccine-preventable disease surveillance that called together for the first time participants from EPI, MCH and NCLE.

Recommendations

1. Establish monthly technical coordination meetings between EPI and NCLE at all levels to share vaccine-preventable disease surveillance data and discuss analysis to plan immunization interventions.

2. Develop standard operating procedures for vaccine preventable disease outbreak response based on recommendations from the WHO Regional Office for the Western Pacific, including securing funds for outbreak vaccination when necessary.
IV. CONCLUSIONS

In conclusion, the review team was impressed by the progress made by EPI in the past five years, reversing many years of low and stagnating vaccination coverage. Access to vaccination services has been greatly expanded at fixed sites. A number of strategies could greatly increase the impact of EPI. These include increasing the frequency of outreach services to at least six rounds per year, with at least four rounds conducted during the dry season and greater attention to improving the timeliness of vaccination and increasing the efficiency of immunization services to vaccinate a higher proportion of target children at each outreach session.

Implementation of these strategies, however, depends on ensuring stable and sufficient government funding for essential recurrent costs that cannot be adequately met by donors. The high political commitment given to EPI in the Lao People's Democratic Republic has been instrumental to its success but has only slowly been translated into greater public funding. The review team is confident that this level of commitment will be continued and encourages the Government to shoulder a larger percentage of the costs of this flagship national public health programme to reduce critical funding constraints that limit EPI from achieving its full impact.

Management capacity remains weak, particularly in areas of supervision, monitoring and evaluation. District and provincial supervisors could make much better use of primary data in health centres to identify those that are performing poorly. Training and modeling of more effective supervisory skills are needed to enable supervisors to identify causes and potential solutions for poor performance. Currently, management at lower levels is difficult to strengthen because so much of EPI performance is impacted by funding gaps and delays outside of the control of provincial, district and health centre staff, highlighting the need for stable, adequate and predictable funding. The absence of accurate data on numbers of births and surviving infants makes it difficult to monitor programme performance. The functional capacity of the vaccine distribution system should be ensured and include evaluating the ability of the Medical Products Supply Centre to maintain and repair cold-chain equipment in health centres.

Insufficient attention and resources have been allocated to dissemination of effective IEC materials and strategies to educate parents in rural areas on the importance and benefits of immunizations. Collaboration with the National Committee for Mother and Child, the Lao Women's Union, other organizations and local authorities is good but could be strengthened.
School-entry immunization requirements have been a useful strategy for increasing coverage and demand. In countries where this strategy has been implemented, teachers became powerful advocates for immunization able to greatly increase overall community awareness of its importance.

New vaccines and new vaccination strategies could play an important role in increasing the impact of EPI in the Lao People’s Democratic Republic. The burden of rotavirus diarrhoea in the country is high and well documented. Introduction of rotavirus vaccine, a vaccine supported by GAVI, could have a large impact on childhood mortality and further progress toward reaching MDG targets. Birth dose coverage with hepatitis B vaccine has increased to high levels in infants born at hospitals but remains low in infants born at home. Hepatitis B vaccine is relatively heat-stable and several countries in the Western Pacific Region have increased birth dose coverage by administering the birth dose out of the cold chain.

In 2009, the Government and donors developed a strategy and framework to strengthen progress towards MDGs 4 and 5, which call for reducing child mortality and improving maternal health. The effect of integrating service delivery on EPI and MNCH programme performance should be closely monitored. While the impact of this strategy on EPI is unclear since the strategy is only now being scaled up, the visibility of EPI has clearly declined. Immunizations appear to be just one of many services in a much larger package, even though the outreach network established by EPI is the backbone needed to ensure delivery of many integrated MNCH services. The performance of EPI during 2012 and 2013 should be closely monitored to ensure that recent positive momentum is sustained. Despite recent progress, EPI is still a fragile programme in need of continued high-level political support and financial resources.
International Review of the Expanded Programme on Immunization in the Lao People’s Democratic Republic, May 2012