Highlights

Highlights on the Expanded Program on Immunization (EPI) in Sudan

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Introduction

Immunization programs have had a major impact on the health status of the population, as many diseases are prevented through immunization. For instance, smallpox was globally eradicated in 1977 as one of the greatest achievements in the area of public health and since then EPI programs have been established all over the world on the foundation of smallpox eradication. It is one of the most cost-effective public health interventions ever known[1]. In Sudan, the Expanded Program on Immunization (EPI) was launched in 1976. The program has introduced the six traditional EPI antigens with the measles vaccine as the last antigen to be introduced in 1985. Polio, measles and Maternal and Neonatal Tetanus (MNT) campaigns conducted by the program supplement the routine immunization activities. In early 2005, with support of Global Alliance of Vaccines and Immunization (GAVI), the program has introduced Hepatitis B vaccine in a phased manner to complete national coverage by end of 2006[2].

EPI Mission

With support of different stakeholders, and through full engagement and participation of community members and target groups, EPI mission is to ensure provision of quality, efficient and sustainable immunization services for vaccine preventable diseases.

Program Objectives:

The Federal Ministry of Health (FMoH) policy document has endorsed the following program objectives;

- To achieve and maintain not less than 90% immunization coverage of all children less than one year old for all antigens.
- To eradicate poliomyelitis by the end of 2005.
- To eliminate maternal and neonatal tetanus by achieving an incidence rate of 1: 1000 Live Birth in all localities.
- To achieve 90% and 95% reduction of mortality and morbidity respectively due to measles.

Beside increasing the coverage rates and achieving disease eradication / elimination goals, the EPI strategic plan has the following objectives:

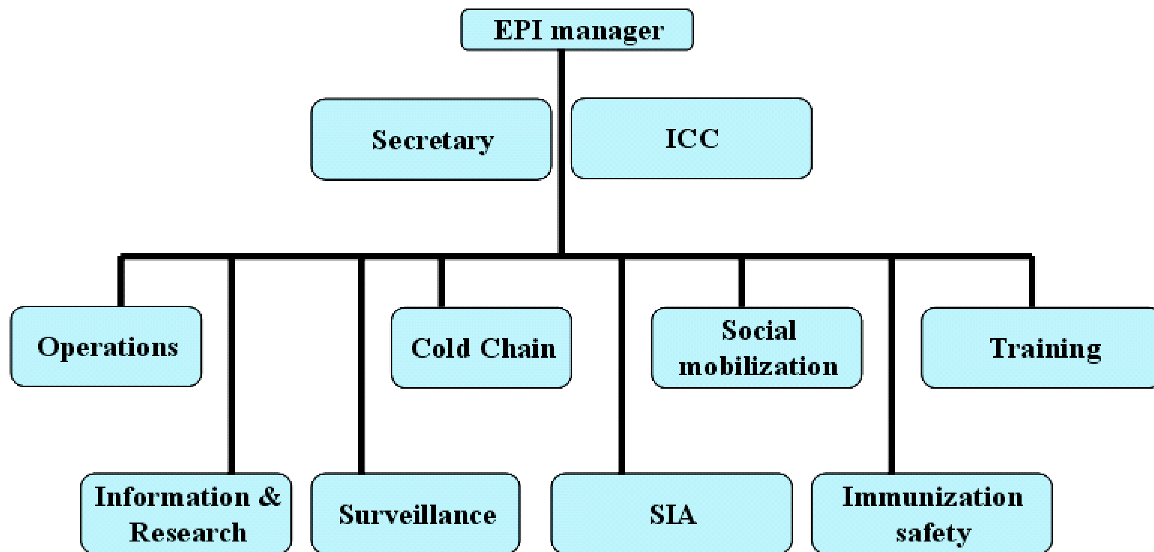
- Reinforcing management and strengthen micro-planning at locality level
- Rehabilitation, renewal and expansion of the cold chain system to cover all accessible populations.
- Introduction of Hepatitis B and Hib vaccines in the national immunization schedule.

Program Strategies:

The strategies adopted by the FMoH to improve the EPI services, include:

- Delivery of EPI services through a combination of fixed immunization posts with sustained outreach and mobile services.
- Strengthening of the cold chain system, with continued improvement of vaccine management
- Empowering the locality level and build up the capacity of EPI health personnel.
- Involvement of physicians and other health personnel in EPI activities and Increase co-ordination and collaboration among immunization stakeholders.

Figure 1: EPI- Sudan Organgram



- Strengthening of EPI information system with special emphasis on an integrated Acute Flaccid Poliomyelitis (AFP) surveillance system to improve all EPI disease surveillance.

How does it work?

The EPI program is run by the FMoH in close collaboration with WHO, UNICEF and other partners represented in the Inter-Agency Coordinating Committee (ICC). There is a felt need by Government of Sudan (GoS) and partners to co-ordinate technical and material inputs to the immunization program. In light of current and future support, increased technical co-ordination would ensure efficient use of available resources. To this effect the ICC was established in order to serve as an advisory body to the FMoH. This committee is chaired by HE the federal minister of health and has about four meetings annually to review and endorse policies and strategic plans and holds monitor progress of implementation of annual plans as well.

EPI Structure and Organization:

Inside the FMoH, EPI is one of the PHC departments; it is managed by national well trained staff at different levels (figure 1). At the Federal level, all the policies, technical guidelines, and strategic plans are developed in close collaboration with partners and then disseminated to all levels. The federal level is also responsible for training of trainees, technical support, supervision, monitoring and evaluation of the states performance. This level is managed by the National EPI Director and heads of various sections in EPI (Acute Flaccid Poliomyelitis (AFP) Surveillance, Supplementary Immunization Activities (SIA), Information and Research, Training, Operations, Immunization Safety, Social Mobilization and Cold Chain) and each section has a set of identified activities.

The second level is the states, which are the implementing body for the EPI activities. At this level the state operation officers under the supervision of State Ministry of Health (SMoH), PHC director manage the daily activities of the programme. The state operation officer with locality (district) operation officers, are responsible to prepare and implement state and locality micro plans.

Micro-plans are usually set up on the foundation of reliable collected information at the locality level. Data on EPI situation at lower level was collected,

compiled and analyzed, in order to identify the anticipated problems facing implementation of the programme whether regarding accessibility and/or utilization of human or financial resources etc. To this end, the micro-plans were prepared, including the specific targets and indicators to measure performance at the district level.

In addition, and as a part of technical support, there are zonal coordinators who are supposed to supervise and closely monitor all EPI activities at the states (locality) level and then to monthly report to the federal office.

The National Immunization Schedule

Routine vaccination of children

According to the National Immunization Policy, the objective of the EPI is to complete vaccination of children before their first birth day according to the schedule shown in table 1:

Table 1: The current immunization schedule in Sudan

Vaccine	At Birth	6 weeks	10 weeks	14 weeks	9 months
BCG	☻				
OPV	☻	☻	☻	☻	
DPT		☻	☻	☻	
Hepatitis B		☻	☻	☻	
Measles					☻

Tetanus vaccination for pregnant women

The current policy is to give all pregnant women tetanus toxoid vaccination according to the national immunization schedule (table 2). But, in addition to the routine vaccination of pregnant women conducted in the health facilities, a Maternal and Neonatal Tetanus Elimination (MNTE) program was initiated. The aim of this program is to eliminate MNT by lowering the incidence of MNT to less than 1 per 1000 live births. TT vaccination campaigns are conducted in high risk localities targeting all childbearing age women (15-45 years). Beside the campaigns the elimination strategies include advocacy for clean delivery practices and improving the surveillance of MNT and improving routine immunization with DPT and TT vaccines as well.

Table 2: Tetanus vaccination schedule

Dose	Schedule	Protection
TT1	At the first contact	Provides no protection
TT2	After (1)month	Protection for 3 years
TT3	After (6)month	Protection for 5 years
TT4	After one year	Protection for 10 years
TT5	After one year	Life- long protection

Antecedents to current program

The first five-year plan for EPI was formulated in 1985. In 1990, vaccination coverage of children under one year of age reached 62.4% for DTP3 as a national figure. During the period 1990-1994, EPI coverage dropped to 51% due to lack of financial and material support from the GoS and from donors besides USA government sanctions against the country. It should be noted that prior to 2005 and till now, the three Southern States of Warab, Albohirat Equatoria in the Sudan People Liberation Movement (SLPM) territories are not served by the EPI FMoH program. The immunization activities in these States, and other rebel controlled areas in South Sudan, were supported and managed directly by UNICEF from Nairobi through what is called Operation Lifeline Sudan (OLS).

During 1995–2001, coverage ranged between 50–79% with ups and downs periods reflecting the failure of having a sustainable immunization services[3]. The program is totally dependent on external support and the government contribution was limited to salaries of the staff and a minimum share for the operation cost.

As a consequence there are wide variations within the country in terms of delivery of services, vaccination coverage and disease incidence. Access to fixed immunization services is estimated to be less than 50% of the population in the whole country. When transportation is available, mobile teams conduct immunization activities in remote areas in an irregular manner.

Strengthening routine immunization

With the cooperation of the partners including GAVI, most of the projected objectives of the plan have been achieved, whereas the immunization

coverage (DTP3) in Sudan increased from 64% in 2002 to %79 by the end of 2004 and 83.4% in 2005[4] (Figure 2). The number of States achieving 80% coverage increased from 7 in 2002 to 10 in 2003 then reached 14 states in 2004 and 15 states by the end of 2005 (Figure 3). At district level 68% of districts achieved coverage of 80% and more in 2005[4] compared to 22% in 2002 (Figure 4).

All these achieved figures have been further supported by the improved EPI information system that had been accredited by passing the Data Quality Audit (DQA) in 2004 with Verification Factor (VF) of 0.96 and a quality of system index of 90.6%.

Figure 2: DTP3 national coverage rate, Sudan (2002–2005)

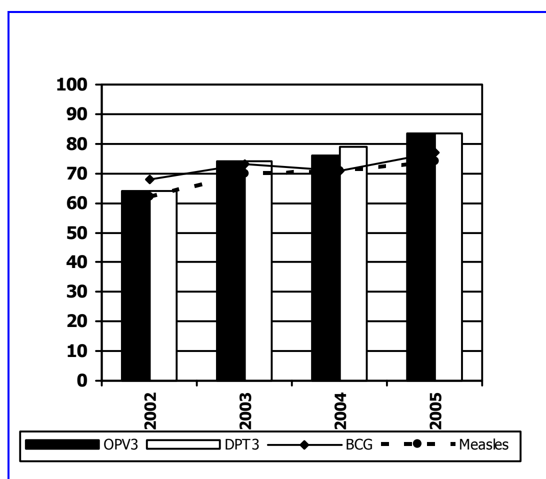
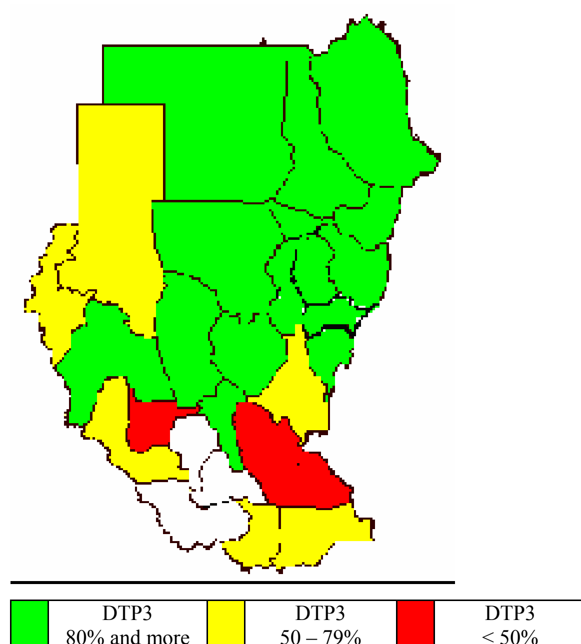
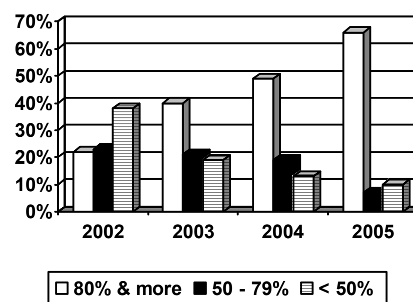


Figure 3: A map representing DTP3 coverage per state



DTP3 80% and more	DTP3 50 – 79%	DTP3 < 50%

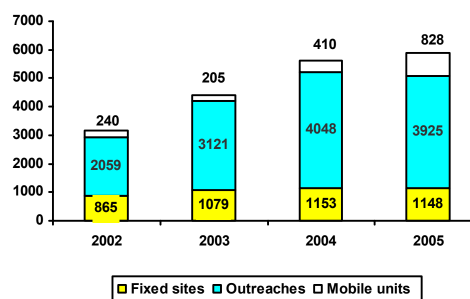
Figure 4: Overall locality performance in Sudan, 2002 – 2005.



Building of EPI infrastructure

Vaccines are very delicate and they have to be stored in the cold chain between 2 – 8° C. The cold chain is the back-bone of EPI and composed of a network of cold/freezer rooms, refrigerators, freezers and cold boxes organized and maintained by teams of people all over the world. During 2002 – 2004, the program started a nation-wide rehabilitation of cold chain at all levels, resulting in improved cold chain functionality from 50% during 2001 to above 80% in 2004. In addition, in 2005, there was also an expansion in EPI service delivery network, the fixed sites were increased by 33% (1148 site), and there was an increase of 91% in the outreach services (3925 site), and 245% in the mobile activities (828 mobile team) from 2002 figures as was shown in figure 5, with the accompanying provision of needed cold chain equipments and transportation.

Figure 5: Number of different vaccination posts in Sudan, 2002–2005.



With regard to the area of human resources development and in order to raise the technical capacities of the EPI staff many training modules

and guidelines had been produced following the WHO manuals and guidelines. Refresher training courses are conducted on regular basis in EPI. In addition to the training activities, the process of developing and updating locality micro plans has a major effect on improving planning capabilities of EPI at all levels.

Where are we compared with others/ regional or international targets?

Polio Eradication Initiative

In recent years, Sudan has demonstrated one of the greatest priorities and successes of the global/ regional polio eradication initiative despite being the largest country in Africa sharing borders with 9 other countries, suffering a long standing internal conflict and having sub-optimal routine immunization coverage.

Polio eradication activities were started in 1994 and since then, the EPI has implemented over 13 National Immunization Days (NIDs), each of them targeted around 6 million children below the age of five years; and with a reasonable quality observed by all the concerned international organizations, a matter which greatly contributed to the interruption of the endogenous transmission of the wild poliovirus in the country. The last confirmed polio case, before the importation, was reported in April 2001, in Unity State in southern Sudan. Consequently, in 2003 and because of global shortage of funds as well, there was cessation of polio NIDs. This stoppage was the main reason behind the increase in the number of children susceptible to the disease in the country. Hence, in May 2004, a suspected polio case was reported at the border village in West Darfur State. Laboratory tests proved that the case was of North Nigerian origin. The imported poliovirus spread rapidly and 18 states were re- infected. As a result, the cases amounted to 127 confirmed polio cases by end of 2004 and 26 cases in 2005.

Sudan re-infection has been attributed to the following reasons;

- The importation had occurred at the beginning of the high transmission season;
- low population immunity due to the cessation of NIDs in 2003 and suboptimal routine immunization;
- large population movements as a result of the ongoing conflict in western Sudan, peace agreement in the south, west African pilgrims and seasonal agricultural labourers from west to central Sudan.

To stop this outbreak and to maintain the accomplished gains and eradicate polio from the country, a series of NIDs were re-continued throughout 2004 and 2005, with the aim to increase the immunity among the Sudanese children less than five years of age. This was supported by a sensitive AFP surveillance system.

The AFP surveillance (366 sentinel sites) has maintained a distinguished performance since its establishment in 2001. All surveillance quality performance indicators are above the required certification standards. It was this excellent performance of the AFP surveillance that was behind the early notification of the imported viruses reported in 2004 and the timely response thereafter.

Measles Elimination program

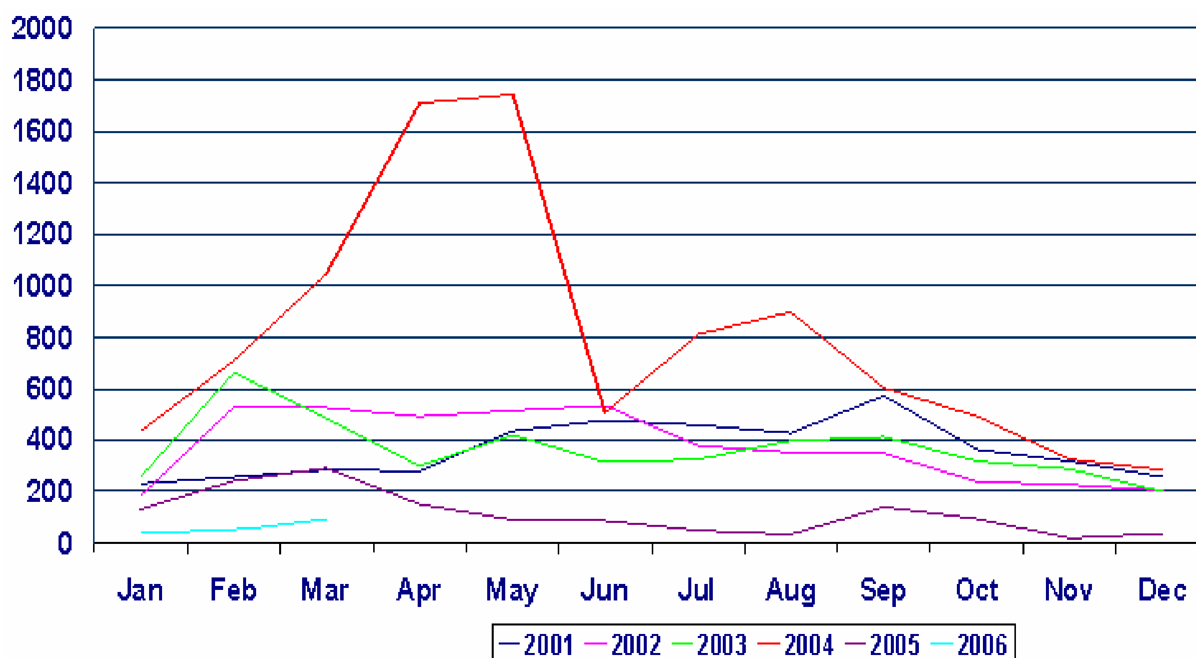
Measles is the third cause of infant mortality in Sudan and the first cause of mortality among the vaccine preventable diseases. Prior to the introduction of vaccine in 1985, the country experienced large nationwide outbreaks on a regular basis with 50 to 75,000 cases and 15,000-30,000 deaths annually. There has been a considerable decrease in disease incidence as vaccination coverage has increased. Approximately 40% of patients with acute disease are in the age group 5 to 15 years of age.

In order to achieve the global and regional measles elimination targets, EPI program in collaboration with WHO, CDC Atlanta and UNICEF has developed the national measles mortality reduction plan in 2003. The plan has to be implemented in four phases 2004 – 2006. The strategies of this plan include:

- *Keep up* routine infant immunization coverage above 90%.
- Provision of a second opportunity for measles immunization in a form of:
  - One time *catch-up* campaign targeting children 9 months to 15 years of age.
  - A *follow – up* campaign 4–5 years later targeting the cohort of under five born after the first catch –up campaign.
- Establishing a *case-based surveillance* system for measles.
- Ensuring injection safety and monitoring of *Adverse Events Following Immunization (AEFI).*

The catch–up campaigns planned were implemented in the 15 northern states targeting children 9 months – 15 years of age out of whom 10,648,960 were vaccinated (97%)[2]. The 10 southern states were delayed to the third quarter of 2006. These campaigns have great impact on the reduction of morbidity and mortality from measles in the above mentioned states. Measles cases had dropped from 10,131 cases in 2004 to 1374 in 2005[3] as the least number of cases ever reported during the last 5 years as shown in figure 6.

Figure 6: Incidence of suspected measles cases in Sudan, 2001 – 2006



Sources of finance:

The main partners of the EPI are WHO and UNICEF with other NGOs. The main partners provide the technical and financial support to the programme in routine as well as the supplementary immunization activities[5]. WHO provides technical support by international, national officers and co-coordinators at Federal and state levels. The main support of WHO goes to AFP Surveillance with all its expenses, NIDs for polio eradication and training. UNICEF provides the vaccines with syringes and safety boxes as a bundle for routine and campaigns; they provide financial and technical support to NIDs, MNT and other routine EPI activities with special emphasis on social mobilization as well.

In 2002, the program has got approval for GAVI support for five years. GAVI provides

immunization services support for routine activities against certain targets to be achieved every year. GAVI alliance also supports the introduction of new vaccines. Thus, hepatitis B vaccine introduction was approved for ten years; which was introduced into the EPI in 2005 in a phased manner and a nation-wide roll out was planned to be achieved by end of 2006.

The government is mainly responsible for the payment of the permanent EPI staff at all levels (Federal–Health unit), and supporting the programme in transportation and other logistical issues.

Challenges

Challenges faced by the program include the followings;

- Difficult access to some areas because of insecurity.
- Old census (1993) and absence of a birth registration system
- Overdependence on external support.
- Rural-urban migration.
- Natural disasters and civil conflict in South Sudan and Darfur.
- Open borders with 9 countries and massive cross border movement.

Future prospects

At international level The Global Immunization Vision and Strategy (GIVS) provides an excellent opportunity to reach more children and to expand the immunization services beyond the childhood, introduce new vaccines and technologies, linking EPI to other health interventions like nutrition, malaria control and reproductive health as well as immunizing in a context of global interdependence which will facilitates outbreak response, information sharing and will be reflected in vaccine cost. All these strategic areas are included in the comprehensive Multi-year plan (2006–2010) prepared by the programme last year[6]. At a local level Comprehensive Peace Agreement (CPA) provides a golden opportunity for the EPI to implement its plans and improve access to populations.

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