

CERTAINTIES AND UNCERTAINTIES OF THE EXPANDED PROGRAMME OF IMMUNISATION (EPI) IN UGANDA: ARE THE ACHIEVEMENTS SUSTAINABLE?

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Abstract

Health status indicators in Uganda have recently shown much awaited improvement after a long lull of stagnation and reversal. The EPI programme has been credited with some of the success in the reduction of Infant and Child Mortality. It has ensured and sustained high immunisation coverage through most of the country. However, as a vertical programme, it has used some approaches which come into question by the article. This article gives a critical analysis of the challenges facing Uganda in the struggle to sustain the currently high immunisation coverage rates. The three challenges singled out for future attention by the programme are establishing mechanisms to monitor imported cases of controlled diseases from unstable regions of neighbouring countries, maintaining the crucial and more effective routine immunisation in the face of the more lucrative mass immunisation campaigns and sustaining constant availability of immunisation resources.

Introduction

The recent publication of the 2006 Uganda Demographic and Health Survey (UDHS), the most reliable source for the main health status indicators in the country (UBOS, 2007), was received with satisfaction and a huge sigh of relief by the local Ministry of Health technocrats. After a period of stagnation and reversal, punctuated with a lot of critical bashing, the Infant Mortality Rate (IMR), Child Mortality Rate (CMR) and Maternal Mortality Ratio (MMR) eventually started declining (see Table 1), though sailing still too far from the Millennium Development Goals (MDGs) which Uganda is expected to reach by 2015.

Table 1: Trend of Mortality in Uganda

| Indicator | 1988 | 1995 | 2001 | 2006 |
|-------------------------------|------|------|------|------|
| IMR (per 1,000 live births) | 101 | 81 | 88 | 76 |
| CMR (per 1,000 live births) | 180 | 147 | 152 | 137 |
| MMR (per 100,000 live births) | | 527 | 505 | 435 |

Source: Uganda Demographic Health Surveys of 1988, 1995, 2001 and 2006 (UBOS)

According to the MDGs, two thirds reduction of Uganda's 1990 mortality rates should bring the figures to an IMR of 31/1,000 and MMR of 131/100,000 by 2015. These look indeed overambitious, if not unachievable (Kirunga and Ogwal, 2004).

Five years ago, it was extremely difficult to find a plausible explanation for the stagnation of mortality rates, more so in a period that witnessed a decline in the HIV-sero-prevalence in the country, an increase in public health expenditures, a reduction in absolute poverty and reasonably stable security in most of the country. Just as then, the real causes of this current improvement are a puzzle to many a health analyst. Mortality rates represent a multi-factorial and very complex phenomenon in interpretation. For IMR and CMR, the introduction of the Home-Based Management of Fever (HBMF) strategy is likely to have contributed by providing a widely available prompt and effective treatment for malaria to all under-5 children, who are known to be the most prone to fatal attacks. In spite of some obvious disadvantages of this approach (Anand and Barnighausen, 2007), there is evidence of its effectiveness (Batega et al., 2004; Fapohunda et al., 2004) particularly considering its roll-out countrywide. Though there is no official evaluation of the first three years of its implementation, which saw highs and lows (mostly due to the repeated shortages and/or expiry of copiously supplied medicines), unpublished data from the routine Health Management Information System (HMIS) in some districts documented a consistent reduction in the proportion of malaria cases out of all paediatric OPD encounters, in the number of paediatric hospital

admissions for anaemia and in the case fatality rate from anaemia (Nebbi DDHS, 2007).

The Expanded Programme of Immunisation in Uganda

Another contributory factor to the reduction of the IMR and CMR is, certainly, the Expanded Programme of Immunisation (EPI), which has, since 2002, introduced *Haemophilus Influenzae type B (Hib)* and viral hepatitis B (*HepB*) vaccines onto the menu of routine vaccination, thanks to funds provided by the Global Alliance for Vaccines and Immunization (GAVI). *Haemophilus* infections are estimated to cause almost half a million deaths in under-5 children annually (WHO, 2001). Vaccination has proven to be feasible, safe and effective. It contributed to a drastic drop of respiratory infections and bacterial meningitis (von Gottberg, 2006). Although its cost remains high, especially for resource-constrained countries, there is sufficient evidence of its cost-effectiveness (Akumu et al., 2007). Moreover, vaccination is regarded to be among the most cost-effective public health interventions in playing a role to sustain child survival in high mortality rate settings, as clearly depicted in the Child Survival series published by *The Lancet* a few years ago (Jones et al., 2003).

The main goal of the Ugandan EPI is to make sure that all children are fully immunised against eight vaccine-preventable diseases before their first birth day and all babies are born protected against neonatal tetanus. Its mission is to contribute to reduction of morbidity and mortality due to childhood immunisable diseases to levels where they are no longer of public health importance (MOH, 2006), thus contributing to the attainment of MDG No. 4.

A noteworthy development has been achieved in immunisation coverage throughout the last three decades in Uganda: in 1980, DPT₃ coverage was as low as 9% and measles coverage was 22%, but in 2005 they reached 84% and 86% respectively (Figure 1).

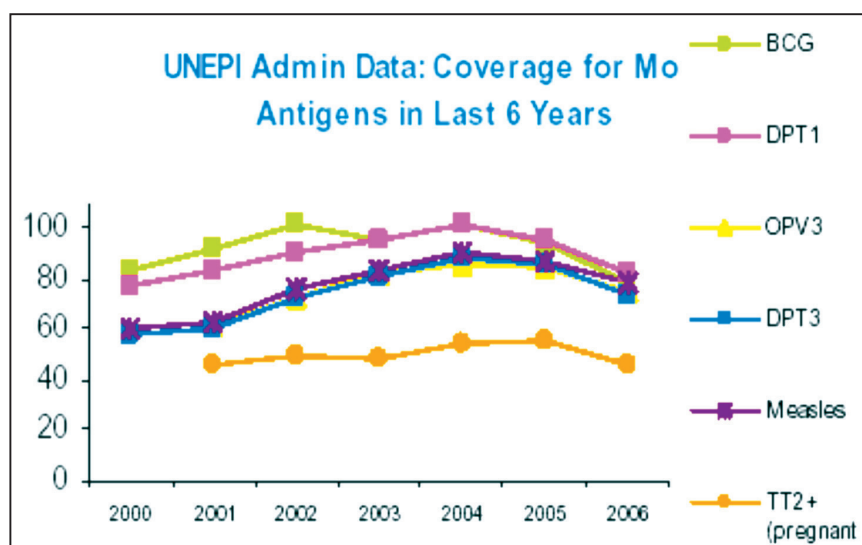
The recent revitalisation of EPI

Since the late '90s, the Ministry of Health has put a special emphasis on EPI to reverse its negative trend and revitalise it, supported politically by personal efforts of the president of Uganda himself. In Uganda's first Health Sector Strategic Plan (HSSP I) of 2000-2005, the EPI was explicitly stated as one of the priority interventions (MOH, 2000). By its end, most of the immunisation targets had been achieved and some, even surpassed. The second Health Sector Strategic Plan (HSSP II) of 2006-2010 (MOH, 2005) moves along the same lines and underscores the contribution of immunisation towards the global goals of polio eradication and the elimination of both measles and neonatal tetanus.

Uganda has so far "religiously" followed the recommendations of the World Health Organisation (WHO) regarding the mass immunisation campaigns. Since 1996, it has conducted 16 rounds of National Immunisation Days (NIDS). One of them was held in early 2005 as sub-National Immunisation Days (s-NIDS) in 14 northern districts, following the threats of confirmed polio cases in southern Sudan. Starting from 2002, a campaign of elimination of neonatal tetanus (NNT) has also been carried out, initially in the high NNT-incidence districts and subsequently in all the others; child-bearing age women have been targeted for three rounds of vaccination within six months, irrespective of their vaccination status. The

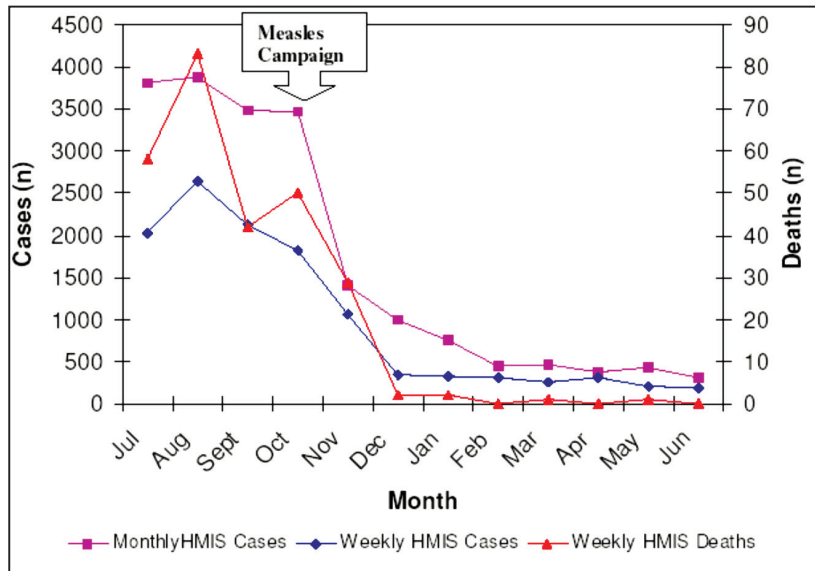
overall coverage at third round has been over 80%, followed by a sharp reduction of neonatal tetanus cases reported countrywide. In October 2003, the first measles mass vaccination campaign directed to all under-5 children was launched, with a triumphant outcome of over 100% coverage; a similar campaign for nearly six million children aged 9-23 months was successfully repeated in November 2006, after epidemiological surveillance had recorded an increase in measles cases especially in the southern and central districts. As a result,

Figure 1: Trend in vaccine coverage by antigen (official data)



both morbidity and mortality attributable to measles have declined by over 90% (Figure 2), as experienced in other sub-Saharan African countries which embarked on the same intervention (WHO, 2005).

Figure 2: Number of measles cases and deaths before and after the measles immunisation mass campaign of 2005



Source: MOH, 2006

Some Considerations

When one examines the various documents regularly produced and published by WHO and UNICEF (WHO/UNICEF, 2006; WHO, 2007) on their respective websites regarding the immunisation profile by country, the trend is often amazing and its fluctuations usually demand for an explanation. In the case of Uganda, the DPT₃ coverage – commonly used as a proxy for the estimate of the fully immunised children – has been increasing until the early '90s and then it stagnated or declined in the subsequent years; from 2001 it started increasing again gradually and constantly, though it unexpectedly dropped between 2005 and 2006. The decline of the 90s has been attributed to the process of decentralisation, whereby the districts became fully responsible for the logistic and financial support of all public health activities (EPI included) without sufficient expertise and resources. The increase in coverage observed at the beginning of this decade can be ascribed to the improved managerial capabilities of local health officials and the expansion of peripheral EPI static units, coupled with an effective support and monitoring of the cold chain component.

Elaboration on immunisation coverage data requires some caution. There are some obvious limitations which are common in the data management of most developing countries (with few exceptions) which weaken their reliability. Some of these are:

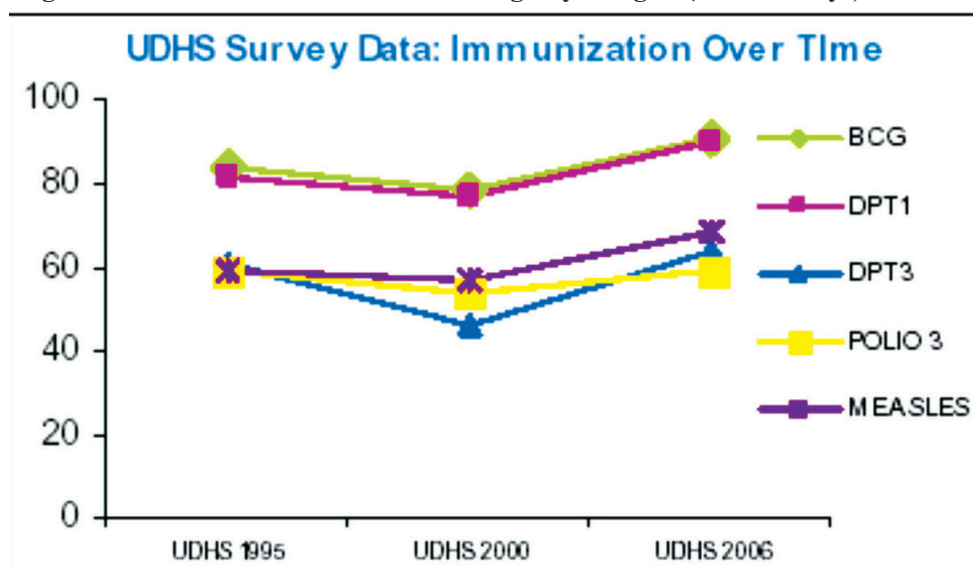
Inaccurate Population Data: where a vital registration system is not in place and as long as the population estimates are being projected from the census figures, there are growing inaccuracies that frustrate the attempt to guess the true denominator of children eligible for immunisation. Even the Birth and Death Registration programme strongly supported by UNICEF countrywide and implemented by the districts cannot provide precise and unanimous references of the target populations. In addition to that, cross-border and cross-district population flows can affect the final result, to the extent of producing an over-estimation of the coverage rates. On several occasions, immunisation coverages exceeding 100% has been widely accepted as good performance.

Inadequate Vaccine Registers: these rarely exist and are rarely updated, leaving all data regarding the individual children recorded on the Child Health Card, which is kept by the care-taker, and therefore only available to the health system at the time of a visit. At the Health Unit, the only available data are the periodic summaries of various antigens administered to the infants and the 1-5 years old children separately. Actually, the HMIS provides a very useful Child Register recording the child's and mother's name, the child's date of birth, the village of residence and all immunisation received. This register could enable all health workers to easily and promptly identify those children who dropped out from their schedule and the cohorts of those eligible for a specific antigen at a given time; moreover, we can reasonably assume that every child has access at least once to immunisation (the most likely being BCG), making the Child Register a potentially vital tool for quantification, monitoring and follow-up of vaccination. Unfortunately, no tracing of drop-outs (who could be grouped by village and searched for by the respective Village Health Team Members) takes place.

Discrepancies among data sources: there exist discrepancies in the different data sources available, especially between routine HMIS data and periodic surveys (EPI Survey and DHS Survey). Sometimes, the more rigorous approach of the surveys is the main contributor to these differences (*figure 3*), especially when the Child Health Card and not the verbal history

of immunisation are being used to estimate the vaccine coverage. In some instances, however, the differences are so profound that they inevitably raise some queries about the reliability of the HMIS data collection (and the ability and/or accuracy in tallying). In the case of Uganda, an EPI survey conducted at the end of 2005 indicated the DPT₃ coverage to be 76% and measles coverage 71%, differing from the routine data showing it ranged from 8-15%. However, in general, the EPI survey findings have shown widespread improvement from the previous exercise carried out in 1998, validating the reports of a rising trend of immunisation coverage recorded by the routine information.

Figure 3: Trend of immunisation coverage by antigen (DHS surveys)



Disparities masked through aggregation of data: National figures tend to mask existing disparities. It is known that socio-economic factors, educational level of the mother and health worker density play a crucial role in determining all service indicators, including immunisation coverage. In addition, distance from health units – which translates into transport, lunch and other non-medical costs – can heavily influence the demand and uptake for immunisation and other preventive. Although national figures suggest significant improvement, district disparities are striking (*figure 4*). It is not by chance that the most disadvantaged areas – identified by their Human Development Index (HDI) presented in the recent UNDP national report of 2005 (UNDP, 2006) – are also the same whose immunisation coverage is low and on a declining trend. Besides, , as shown in *figure 5*, there seems to be a problem of access and utilisation, indicating potential constraints in the logistics, organisation of mobile clinics, social mobilisation and health education.

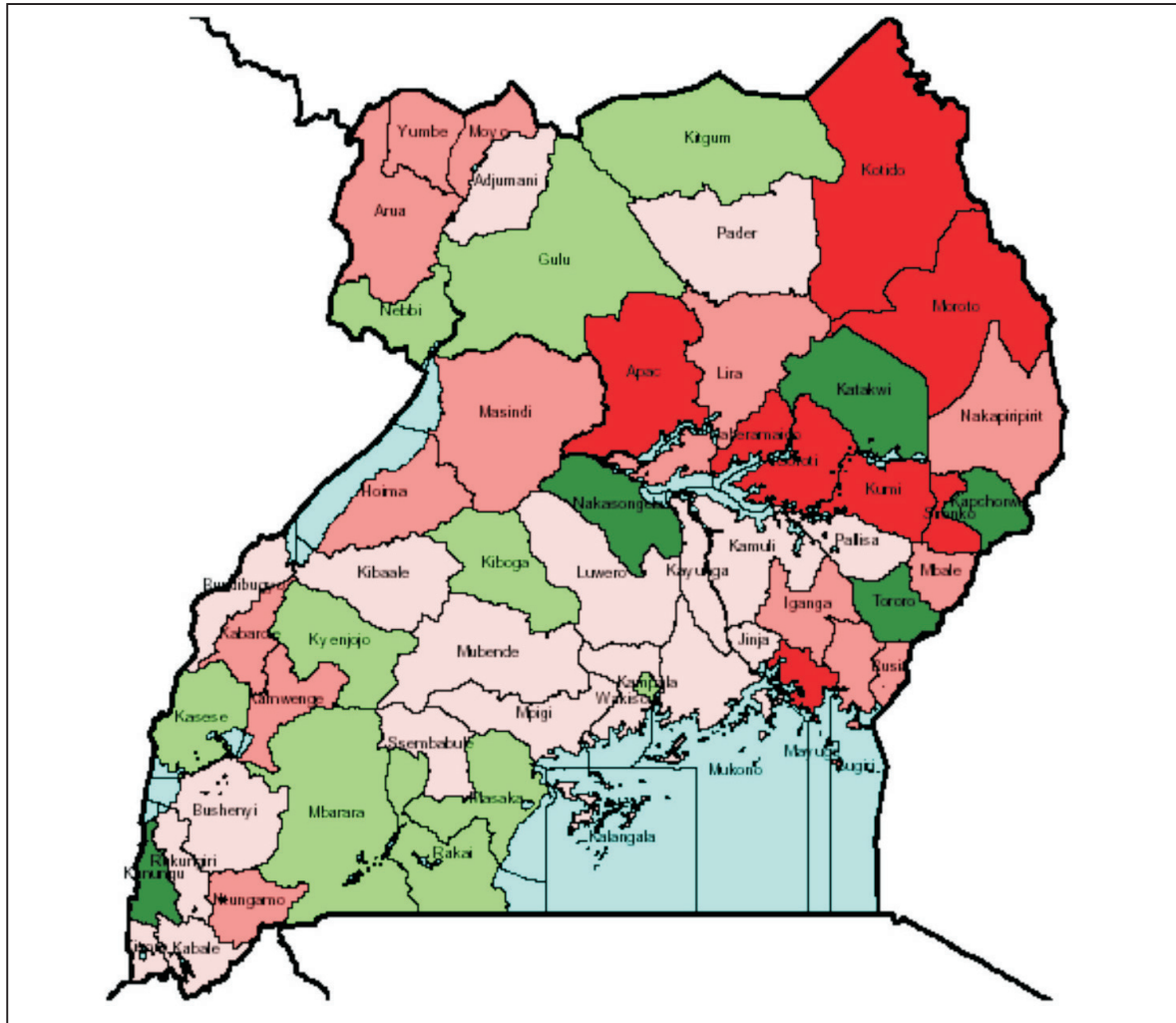
Programmes with differing objectives: the EPI incorporates an obvious element of efficiency, attempting to minimise the vaccine wastage; this is somewhere in antagonism with the overall goal of the programme itself that is to Reach Every Child (so-called REC strategy) at all costs and with the emphasis on immunisation put by the IMCI programme, which encourages not to miss any opportunity to immunise a child at any encounter. Reaching every child and exploiting all opportunities for vaccinating children may require opening a vaccine vial exclusively for one or two beneficiaries alone, thus improving the effectiveness (and equity) at the expenses of efficiency.

This contradiction sometimes puzzles the health workers themselves, confused by conflicting instructions and unable to make a coherent decision.

Vertical vs. Horizontal: the EPI in Uganda started as a typical vertical programme, which has progressively integrated itself into the other primary health care activities and interventions. Immunisation data are now being

captured by the routine HMIS, rather than being presented in a separate data collection system (the UNEPI monthly report) as it was in the past. The role of the vaccinator has gradually faded, leaving all health workers to be equally responsible for the administration and general management of vaccines. The EPI out-reaches are commonly combined with other activities conducted at community level. A “vertical” component, though, still remains: the system of ordering, procurement, delivery and distribution of vaccines and vaccine-related supplies. Even the district Cold Chain Assistant (CCA), responsible for immunisation equipment inventory, ordinary maintenance and repair of refrigerators and other equipment, monitoring and ordering vaccine supplies and record-keeping, is a residual function of the initial vertical structure of the programme. This role has, in fact, been poorly developed somewhat at the newer Health Sub-District (HSD) level. Currently, this function still depends on the CCA at the district. The CCA tends to programme and conduct his visits to the peripheral units autonomously, rarely coordinating

Figure 4: change in measles coverage by district between 2005 and 2006 (increasing = from light to dark green; declining = from light to dark red)



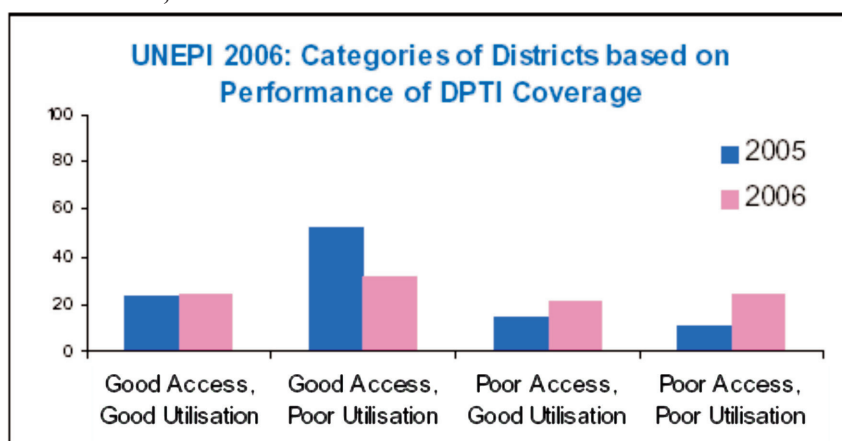
or moving with other district health officials. However, it is debatable as to whether this approach is a weakness, since vertical programmes have actually obtained their success from this degree of autonomy.

The available resources: though the financial support of UNICEF is still vital for the Uganda EPI, it is expected that decentralised local governments and individual health facilities offer their contribution to the whole system. The central Ministry of Health sends funds for immunisation as part of the non-wage PHC allocations to the local governments, the HSDs and health facilities to support their preventive, curative and rehabilitative health activities approved in their annual workplans, according to their grade. This means that EPI activities inevitably compete with other programmes for these funds, which are locally apportioned along a priority ranking. As a result, the provision of vaccination-related allowances to the health providers holds immunization out-reaches at ransom: if not available, the whole system of mobile clinics gets paralysed. Moreover, the attitudes of health

workers, their knowledge of vaccination policies, schedules, adverse effects and national targets is quite low, indicating a rather inadequate commitment for such a high priority programme.

Routine immunisation vs. mass immunisation: the outcome disparities between the often struggling routine immunisation programme and the more fashionable mass campaigns are also striking. The latter have a number of advantages: they are vertical interventions, are generally availed much more generous financial assistance, are usually well supported by local politicians because they are more visible and of a shorter duration; the immunization posts are numerous enough to considerably reduce the average distance for the beneficiaries to cover, the strategy to conduct them over weekends makes them capture all those attending religious functions; and last but not least, the communities themselves seem to be more actively involved and to prefer the mass campaigns more than the routine immunisation.

Figure 5: Districts grouped according to access to and utilisation of EPI services, 2005-2006



Not Only Vaccines

All the above-listed challenges represent realistic warnings for whatever interpretations and considerations we may want to make in regard of EPI in Uganda: our conclusions could be either doubtful or controversial. Moreover, there information concerning the effectiveness of the cold chain system in its last stages, from the district vaccine store to the vaccine administration site is inadequate. Though routine supervision of the peripheral health units can verify the minimum requirements to be met by a static unit (adequate vaccine stock, daily recording of the fridge temperature, availability of injection safety material), the vaccine efficacy is not assessed. Eventually, we are not confident enough to boldly affirm that all “vaccinated” children are also “immunised” children. The resurgent outbreaks of immunisable diseases in areas of high coverage need to be investigated seriously.

Figure 6: key components of EPI activities

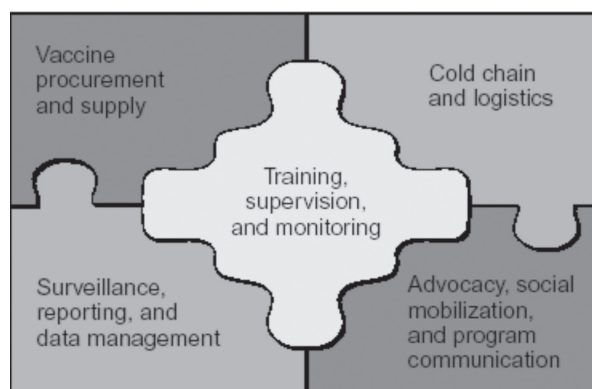
It is fundamental to keep in mind that a successful EPI needs to fulfil other essential components, whose achievement might not be under the health workers’ control (*figure 6*). First, the logistics can be a source of programme instability. During the financial year 2005/06, an abrupt shortage of gas for the refrigerators in the country hit the whole system hard. In the following financial year, a vaccine shortage also heavily contributed to significantly decreasing their availability. Secondly, effective social mobilisation, advocacy and political support to the immunisation activities also lie beyond the scope of the health workers. Although it should be a task for the local political leaders, a general indifference is commonly observed, particularly if there is no promise of a token of appreciation for their mobilisation efforts. Political support is of paramount importance in creating

awareness and ensuring the necessary community participation, as well as in preventing decampaigning activities that could be extremely detrimental for the final immunisation outcomes.

Conclusions

Although the national EPI in Uganda has recently achieved satisfactory results, and the sustained emphasis on its support is encouraging, three areas still need to be carefully monitored.

First, the possible threat posed by importation of polio cases from the neighbouring conflict-affected countries – mainly DRC and Sudan, must be always considered. To accomplish this purpose, epidemiological surveillance of some selected communicable diseases is supposed to operate effectively in order to raise the alarm about any suspected case and for their early identification. Sadly, this is not the case, since the notification and investigation aspects of the surveillance system are often incomplete and painfully inadequate.



Secondly, a fair balance between the mass campaigns and the routine interventions is necessary, in order to sustain the otherwise ephemeral successes of the former. The costs of these campaigns may be too high to be affordable with the meagre resources available, without heavy external financial support. Moreover, they may generate the misconception that their value is higher than the routine activities and that sooner or later a campaign will be called to rectify the poor results of the routine immunization. Investing into the Child Health Days could be a viable strategy, where the intervention is concentrated within a limited time allowing for a wide integration of different services being provided together.

Thirdly, the logistic aspect is paramount: regular availability of vaccines and related supplies is an equally necessary condition for achieving and maintaining high coverages. Any interruption in procurement and delivery systems can only frustrate community efforts with resultant decrease in interest in immunization activities.

The EPI in Uganda should be poised to increase its effectiveness in contributing to decreasing the IMR when the new promising vaccines currently under development (in particular, the pneumococcal and the rotavirus vaccines (Glass, 2006)) are finally approved and adopted. At the same time, other types of interventions to reduce the IMR are vital, both from within the health sector – adapting the evidence-based findings on child survival to local context – and from outside: social and economic determinants of health need also to be addressed to escape from the poverty trap and to significantly improve the health status of the whole population (Whitehead, 2001).

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