

EXPANDED PROGRAM ON IMMUNIZATION IN **BANGLADESH**

FEBRUARY
2017



THE STORY BEHIND THE SMILE

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Contributors

Samir K Saha(Concept)
Sudipta Saha (Writing and Editing)
Moniruzzaman (Photography)
Belal Hossain (Editing and Design)

Acknowledgment

Syed Abu Jafar Md. Musa
Mohd. Mahbubur Rahman
Md.Lutfor Rahman
Md. Abdul Jalil Mondal
Md. Tajul Islam
Md. Abdul Quader
Md. Tajul Islam A Bari
Md. Samsuzzaman
Md. Ruhul Amin
Abdullah H Baqui
Maksuda Islam
Senjuti Saha

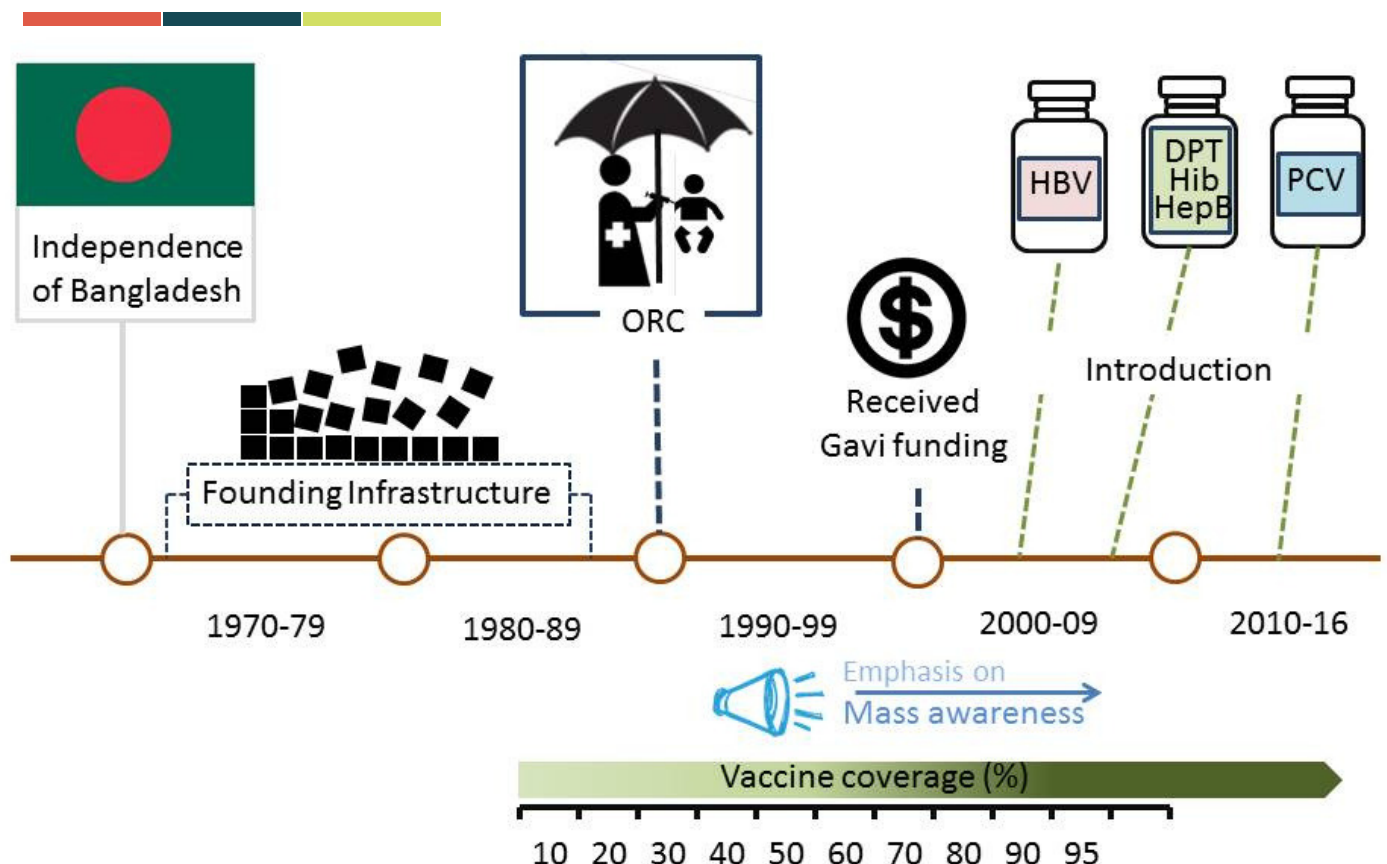
BRIEF HISTORY

After its independence in December 1971 following a bloody and brutal war, Bangladesh faced the formidable task of rebuilding and establishing infrastructure, often from scratch (7). In fact, until 1979, there was no coordinated effort to establish a vaccine delivery system; and when it did start, there was insufficient funding and vaccine supplies. In 1985, only 2% of infants were receiving all the necessary vaccines (1).

In 1985, however, the intensification of the EPI started with reinvigorated efforts aimed towards achieving universal immunization by 1990. This high-set, and perhaps unrealistic, goal helped its rapid expansion. Initially, the objective was to expand coverage to all the 4,498 unions of Bangladesh through existing healthcare infrastructure.

However, even with these efforts, coverage remained low and in 1987 it

HISTORICAL TIMELINE





was still under 10%. One reason was the limited funding that was available; US\$ 17 million over 5 years; but the fundamental cause for the dismal performance was the fact that vaccine delivery locations were not in the vicinity of many families. Only fixed upazila healthcare centers were utilized, each of which served a large population. A significant portion of this population would naturally be far from the center itself.


Eventually, the establishment of a system of outreach centers (ORCs) to deliver vaccines using an additional US\$ 58 million helped to overcome this and by 1992 coverage reached 50%. A lot of this funding came from international organizations, especially UNICEF, with government contribution increasing from 2 percent in the mid-1980s to 45% in the mid-1990s (1).

From 1995 onward, emphasis was put on mass communication to raise awareness about vaccination and on involving local leaders and politicians to help in the process.

The EPI started to receive Global Alliance for Vaccine and Immunization (Gavi) funding in 2001 to improve infrastructure and introduce new vaccines. With Gavi support, it introduced the Hepatitis B vaccine in 2003 with simultaneous strengthening of the health system associated with vaccine delivery (1,8).

By 2004, more than 90% of infants were being vaccinated with at least the BCG vaccine (the first vaccine infants receive). DPT-Hib-HepB pentavalent (protecting against five diseases: diphtheria, pertussis, tetanus, *Haemophilus influenzae* type B infections and Hepatitis B) vaccine was introduced with Gavi's help in 2009 and the necessary system strengthening and refinement continued.

By 2011, 99% of the children were being vaccinated with BCG, 90% with Hib-pentavalent and 80% were fully vaccinated with all the vaccines offered by the EPI (6,8–10).

A man is walking on a dirt path through a forest. He is wearing a brown and grey sweater over a collared shirt, dark trousers, and sandals. He is carrying a metal case in his right hand and a green bag in his left hand. The path is surrounded by trees and foliage.

HEALTH WORKERS OFTEN HAVE TO WALK MILES TO REACH VACCINATION SITES. THEIR DEDICATION AS WORKERS AND COMMUNITY MEMBERS FAR EXCEEDS THEIR "JOB DESCRIPTION", WHICH HAS BEEN A KEY FACTOR IN ENSURING THE PROGRAM'S SUCCESS

**STRONG
PRIMARY
HEALTH CARE**

"EPI INVOLVED PEOPLE AT THE GRASSROOTS LEVEL SINCE THE VERY BEGINNING. SUCH INVOLVEMENT IS CRUCIAL IN BUILDING TRUST AND ACCEPTANCE OF VACCINES WITHIN THE COMMUNITY"



An influential factor in ensuring the EPI's success has been the primary healthcare infrastructure of Bangladesh and its continued strengthening. Each upazila has an Upazila Health Complex (containing 30 to 50 beds) that acts as a hub to provide the healthcare needs of that upazila's population, which ranges from around 17,000 to 900,000 (average ~250, 000) (11).

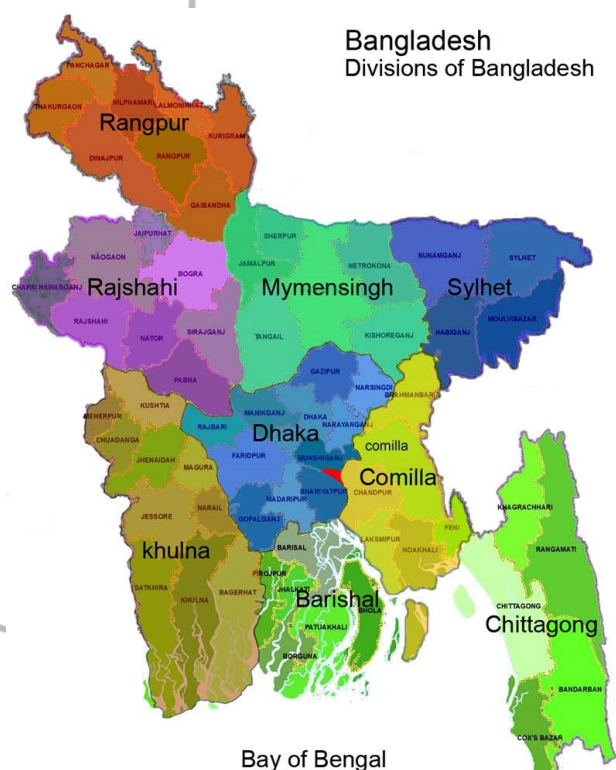
The field level employees employed here include Health Assistants (HAs) and Family Welfare Assistants (FWAs), the number of whom depend upon the population and unions in a particular upazila. They are primarily accountable to the Health Inspector and Family Planning Inspectors of each union (8).

The HAs primarily provide vaccination services in the rural areas, but are often helped by the FWAs. In some cases, when a HA is unavailable or the post vacant, the FWA carry out all vaccination activities.

While rigid specialization of these two roles may make vaccination more efficient in the long run, given problems of post vacancy that are present, this flexibility allows proper functioning of the immunization services. Since the FWAs and HAs are community members and have multiple roles in providing health services, they are also able to maintain a very good rapport with the local population in each area (1,8).

BANGLADESH

ADMINISTRATIVE DIVISIONS



Divisions (9)
↓
Districts (64)
↓
Upazilas (490)
↓
City Corporations (11)
↓
Unions (4554)
↓
Wards (13662)
↓
Blocks (109,296)

BASIC INFORMATION

Total Population	153,904,238
Rural Population	71%
Female (15-49 yrs)	41,092,431
Live Births	3, 478,236
Population <5 yrs	16,159,945
Neonate mortality rate	24/1000LB
Under 5 mortality rate	41/1000LB

Source: SEAR annual EPI reporting form, 2013 and WHO, World Health Statistics 2014

VACCINE SHCEDULE

BCG
at birth
DTP-Hib-HepB and PCV
6,10 & 14 wks
OPV
6,10,14 & 38 wks
Measles
38 wks



OUTREACH CENTERS

Among all the major decisions taken to improve the EPI, perhaps the most crucial was to establish outreach centers for vaccine delivery. In developing countries, even when vaccines are available in supply, vaccination remains a challenge, and Bangladesh is no exception.

With poor communication infrastructure posing obstacles that are exacerbated by huge water bodies and frequent flooding, coming to a vaccination center may mean using up a substantial part, if not the entirety, of a day (12).

Furthermore, in rural Bangladesh, mothers are often the linchpins of functioning families. In many families, with the fathers away working, it falls upon a mother to prepare meals, take care of livestock, and look after the children (13,14). Given a mother's many responsibilities, many children

were simply not brought to the fixed vaccine centers that were used by the EPI until 1987. Even if an extensive awareness campaign were to be undertaken, it was going to be difficult to convey the potential benefits of a dose of vaccine to parents whose child may be perfectly healthy at the time of vaccination.

It was clear that no matter how much money was spent on ensuring vaccine supply, vaccination could only be guaranteed by taking the vaccines to the people rather than asking them to come to the vaccines. The EPI, realizing this fundamental principle, worked on developing an effective vaccine delivery strategy that would make them truly accessible. Initially, a “four-site strategy” was followed, which was soon changed to an “eight-site strategy”. The “eight-site strategy” is a term EPI managers use to refer to the number of Outreach Centers (ORCs) set up in each rural Ward (a ward is the second smallest administrative unit).

Each outreach center is expected to have a catchment population of approximately 1000 (1,8). Except community clinic, an ORC is not a permanent building or establishment of the EPI, but rather a temporary makeshift vaccination center, often a part of some family's house.

Prior to the day scheduled for vaccine delivery, vaccinators will visit the area in which the ORC is to be set up and often ask one of the families to grant them access to a part of the house (a room or a front-yard for example), to set up a temporary vaccination center. On vaccination day, the Health Assistants and Family Welfare Assistants responsible for immunization set up the “Moni” flag near the house and set up vaccination services.

Ever years of campaigning and raising awareness, this flag has come to symbolize over years of campaigning and raising awareness, this flag has come to symbolize life saving interventions and is almost universally recognized in Bangladesh (1,8,15). When the “eight-site strategy” was implemented, there were 3 wards per union.



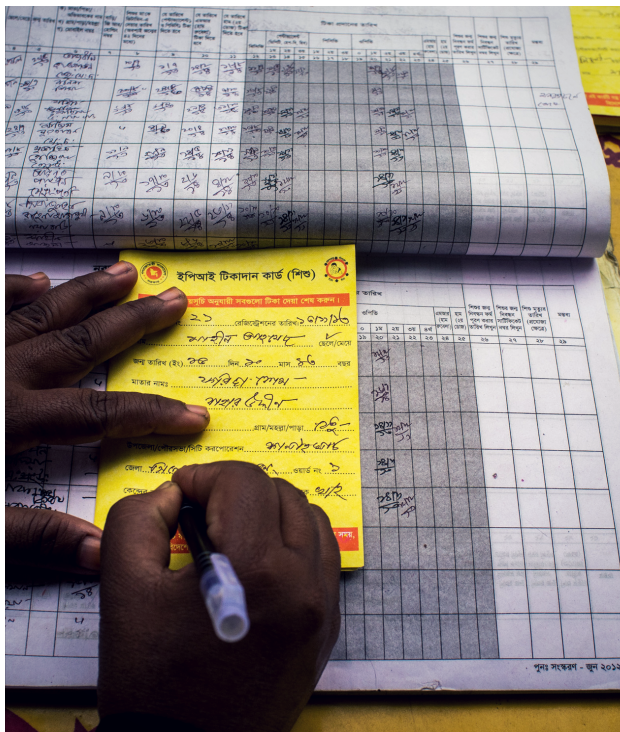
Each ward was initially divided into 4 sub-blocks. This was updated and currently there are a total of 8 sub-blocks per ward. Although new legislation has increased the number of wards per union, the division of sub-blocks for EPI's ORCs has remained the same (1,8).

The ORCs are operated on a rotational basis every month. This means that every month, all the eight outreach sites will be used, and the entire population of a ward will be covered in a month. This gives healthcare workers in a particular ward a week to prepare for and provide service to two outreach centers (1,8).



TALLY BOOKS AND VACCINATION CARDS

Although outreach centers help make vaccines more accessible, they do not guarantee that all eligible babies in an area get vaccinated. There are always people who will not be able to make it be due to competing priorities, short immunization sessions, lack of awareness, communication, or urgency. To aggressively pursue high coverage rates and to keep track of vaccinations, the program needs a robust record-keeping system. Until recently, the health workers in the ORCs maintained a tally-book that just recorded the number of vaccines administered in a particular session.



Rudimentary way of record keeping system

This is a rudimentary way of keeping track; if one knows the population and the number of births in an area, one can have an estimate of the number of babies one expects to show up for vaccination. This is important for keeping track of the number of doses dispensed, amount of vaccine wasted, and getting aggregate data for certain areas. However, this system becomes less and less effective in further increasing coverage as it nears 100%. Such increases would require more detailed tracking to ensure all babies born in an area are vaccinated.

In 2009, a new tally book form was developed and implemented nationwide and it has greatly improved the tracking and monitoring of vaccination. It contains the names and addresses of the children and mothers living in the area serviced by an ORC and information regarding administered vaccine doses.

When a dose is missed, a reason is mentioned in the book if the health worker is aware of it. What makes this form really helpful is that it allows the workers to see exactly which babies have missed out on a designated session. Their names are transferred to the list for the next session at an adjacent ORC that is next on the monthly rotational schedule. If the children can be located, the health workers try to reach the families and ask them to come to the next session.

Ideally, to keep track of all newborns, the Health Assistants (the vaccinators) will copy names and details of newborns from books maintained by Family Welfare Assistants, whose job is to monitor pregnant women and deliveries in a particular area. This goes hand in hand with the aim of ensuring birth registration for all newborns, and integrating the EPI with that system.



This is to ensure that all newborns are vaccinated and initial coverage is increased. However, universal birth registration in itself is another challenge. As all births may not be registered in an area, the HA will often supplement the list with his/her own knowledge of the neighborhood. Since the coverage of BCG administration is already 95%, this new tally book has mainly contributed to decreasing dropout rates and increasing the percentage of fully-vaccinated children (8,16,17). In spite of the maintenance of these tally-books, a lot of children cannot be followed due to migration. A common tactic used to allow families to keep track of their own vaccination records is the use of a vaccination card. This is given to the mother whenever a baby is vaccinated for the first time, and includes identifying information about the child, the family and a vaccination schedule that is ticked off by health workers after each vaccine administration. Since mothers often have difficulty recalling which vaccine was administered when, this universally acceptable vaccination card enables health workers and pediatricians to get that information (1,8).



IMMUNIZATION IN URBAN AREAS

An unique collaboration between public and private sectors

Historically, EPI policies have mainly targeted the rural areas of Bangladesh, where the vast majority of the population lives (18). However, with growing urbanization and migration to urban sites, the EPI faces new challenges in delivering vaccines to large urban populations.

Urban areas do not have the same robust governmental primary health care system that rural areas do, and most of the healthcare is provided by large public and private hospitals. This, combined with the inherent difficulties of community intervention among migrating urban populations that include densely populated slums, makes vaccine delivery quite challenging (19,20).

The EPI sets up immunization centers through City Corporations and Municipalities under whose jurisdiction the urban areas fall. However, the bulk of the

immunization in cities is supported by local and international Non-Governmental Organizations (NGOs). There are two main projects carrying out this task: the USAID funded Smiling Sun Franchise Program and the Urban Primary Health Care Project funded by a consortium of international NGOs. The latter is helping to develop infrastructure related to primary care that will eventually be transferred to city governments to streamline EPI's urban services.

Although the NGOs carry out vaccinations, the government sets standards (MoLGRD), provides contracts to NGOs based on competitive biddings, and ensures and encourages delivery of the services through monitoring and a performance based reward system.

The vaccines and logistics are provided by the EPI as well, but the vaccinators are workers funded and managed by the NGOs. In addition to this, the EPI also provides vaccines for free to public and nonprofit hospitals. At the same time EPI encourages private pediatricians to vaccinate their patients in their practicing centers (1,8,21,22).





ROBUST COLD CHAIN

The operation of approximately 134,000 outreach centers throughout the country presents an immense logistical challenge. Vaccines not only need to reach these places timely, but also need to be maintained under a certain temperature right up until delivery.

The maintenance of such a cold chain is one of the greatest logistical challenges for the EPI. After being received from the manufacturer, vaccines are stored in the central cold storage of the EPI Headquarters (HQ) in the capital city of Dhaka. A coincidental advantage with regard to vaccine distribution is that the capital is approximately in the geographical center of the country. Vaccines worth 6 months' supply are stored in the walk-in cooler located at EPI HQ; this includes a 3-month supply



and a 3-month buffer stock. Buffer stocks are kept at every stage to ensure that vaccination is possible even if there are blockages in the supply chain upstream.

From the primary vaccine store, vaccines are distributed to district vaccine stores that include 3 months' supply and 1-month buffer stock. They are transported using cold boxes that can maintain temperatures for up to four days. From the district store, the vaccines are distributed monthly to the upazilas within that district, where they are stored in Ice Lined Refrigerators in Upazila Health Complexes (UHC) with a 1 month working stock and a 15-day buffer stock. Ice Lined Refrigerators maintain temperatures for prolonged periods in case of power outages.

From the UHCs, vaccines are transported to designated ORCs every day by porters using Vaccine Carriers (portable insulated boxes) that can maintain the necessary temperatures for a day (1,8,23).

Although the infrastructure needed to maintain this cold chain has been developed and is now in a commendable state, there is always the chance of this chain failing, especially right before vaccine delivery. The use of Vaccine Vial Monitors that include heat-sensitive spots indicating exposure to higher than recommended temperatures has helped ensure that vaccines that have not been properly maintained are not used (24). In the recent days Bangladesh EPI has introduced freeze tag to monitor the temperature and fluctuation.

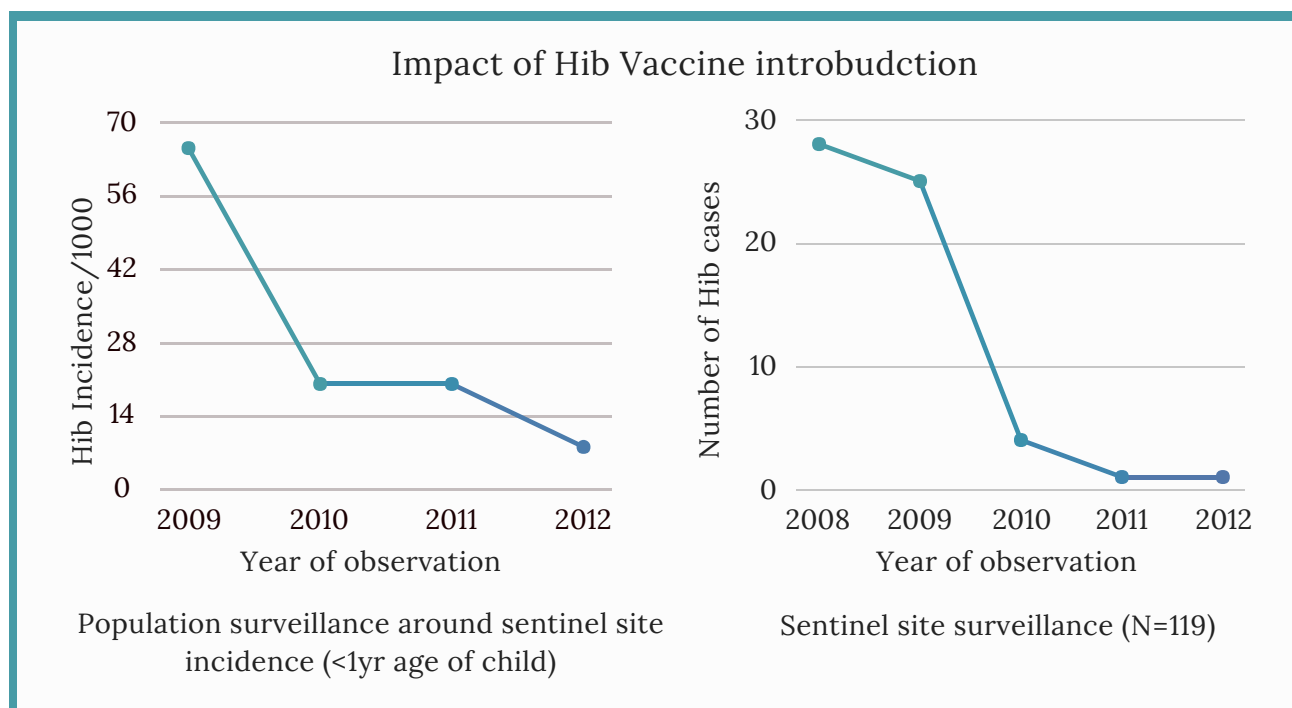




INTRODUCTION OF Hib-PENTA

The introduction of Hib-DPT-HepB pentavalent vaccine was a landmark event for Bangladesh's EPI. It was the first time that a vaccine was introduced based on country-specific evidence generated by local scientists and organizations about the burden of the disease in terms of deaths and disabilities caused. Effectiveness of this vaccine introduction was also assessed following the introduction.

Although there were global estimates of *Haemophilus influenzae* type B (Hib) burden (8 million cases of serious disease in children per year), disease estimates for Bangladesh was lacking (25). However, since the late 1990s, a body of evidence started to accumulate showing not only a high Hib burden in terms of disease, but also increasing antibiotic resistance and a heavy burden of long-term sequelae in survivors (26–28). Meanwhile, Gavi and the WHO strongly supported introduction of the vaccine into EPI programs.



It was a smart decision to introduce this new pentavalent vaccine not only because it would decrease the burden of diseases caused by Hib, but also because the vaccine combined antigens for four other diseases. This meant that Bangladesh would be saving money by not having to take over costs for HepB vaccine and not

having to invest much in the cold chain. At the same time, the Hib pentavalent vaccine could be procured in single-dose vials, which prevents wastage. Gavi spent more than US\$160 million for the introduction of this vaccine with co-financing from the Government of Bangladesh (8,9).

INTRODUCTION OF IPV & PCV

More recently, the EPI has introduced two new vaccines - the Inactivated Polio Virus (IPV) and the Pneumococcal Conjugate Vaccine (PCV). The introduction of IPV is part of a global push to eliminate polio - (the Polio Eradication and Endgame Strategic Plan 2013-2018).

Ten-valent PCV (PCV-10) was introduced in March 2015. Like the Hib-pentavalent vaccine introduction, the introduction of PCV-10 was also based on country-specific data (29). In addition, studies are underway to use baseline pneumococcal epidemiology data to measure vaccine effect on disease in the years following introduction (30).



GAVI SUPPORT

Support from the Gavi the vaccine alliance formally known as Global Alliance for Vaccine and Immunization (GAVI) has been crucial in recent years for the introduction of new vaccines and also for strengthening the existing system. Bangladesh applied for Gavi support in 2001 and started receiving funding from the end of 2002. Gavi has been providing support through four categories: New Vaccine Support (NVS), Injection Safety Support (INS), Immunization Service Support (ISS) and Health System Strengthening (HSS). So far, Gavi has given a total of US\$ 322 million (8,9).

ISS support consisted of \$23.3 million which was utilized for improving vaccine transportation to hard-to-reach areas, giving rewards to outstanding workers to promote higher coverage rates, communication and awareness building, building better surveillance for any adverse events Following Immunization (AEFI) and for renovation of vaccine stores in some districts. Initially, INS support of US\$ 6.1 million

was provided in the form of Auto Disable (AD) syringes. With the help of the International Association of Safe Injection Technologies, a transfer of technology was successfully carried out as a result of a partnership between a British and a Bangladeshi firm; since 2007, the EPI has been procuring AD syringes from the WHO prequalified local supplier (8,9,31).

All vaccines are now being administered through AD syringes which has decreased the likelihood of AEFIs, and nullified laborious sterilization processes. For HSS, Gavi has committed US\$ 13.7 million. This is mainly utilized to address low immunization coverage in certain areas by strengthening human resource and logistics management and community participation (8,9).

However, the greatest role of Gavi has been in the introduction of new vaccines. It has contributed US\$ 243 million and is continuing its support for introduction and use of Hib pentavalent vaccine. It has also helped finance other vaccines as well, including the newly introduced PCV and IPV (9).

MATERNAL IMMUNIZATION

ELIMINATION OF MATERNAL AND NEONATAL TETANUS

In 1993, the government endorsed a maternal tetanus vaccine dose schedule. Since then, the EPI has also been responsible for implementing this by vaccinating women of childbearing age (15- 49 years) to protect against maternal and neonatal tetanus. With a large percentage of deliveries occurring at home, Bangladesh had a high rate of neonatal tetanus in the mid 1980s: 20- 40 cases per 1000 live births. Almost 71% of deliveries still take place at home and skilled assistants are present for only 32% of 5 deliveries (1,8,32). Under such challenging circumstances, an effective vaccination program is

imperative for keeping maternal and neonatal tetanus in check.

The EPI vaccination schedule includes Tetanus Toxoid (TT) doses to be administered to women of childbearing age (15-49 years). In addition to this scheduled vaccination, TT vaccine is also provided to pregnant women as two doses during pregnancy provides protection even if no prior doses were administered as part of routine immunization. Although TT5 (complete tetanus immunization) is comparatively low (53%), the percentage of women receiving 2 or more doses is quite high. This has been instrumental in bringing down neonatal tetanus, which went under 1 per 1000 live births (defined as elimination) by 2008. In 2011, nine in ten mothers had had their last live birth protected against neonatal tetanus (8,33).





Health workers work together even though they are culturally different.

A COLLABORATION BETWEEN MULTIPLE STAKEHOLDERS



Researcher are generating evidences to support the vaccine introduction

Government institutions in Bangladesh are often judged as inefficient and extremely bureaucratic (5,34). However, the EPI has been performing in quite the opposite manner and has a very good track record. Achieving more than 90% vaccine coverage in a resource and infrastructure poor country is no easy feat.

Although the decision making process, funding and government willingness play important roles in ensuring this success, one often overshadowed aspect is the passion of the EPI personnel – from the level of the directors down to the health workers at the community level. The EPI is one of the few government programs where the constant dedication and passion of the people appointed have allowed such rapid improvement.

The ownership felt by the workers at EPI is quite evident – retired former managers of the program are constantly involved in guiding and providing feedback to the present managers using their experience.

This intergenerational support mechanism of the EPI managers is even more surprising given the polarized nature of Bangladeshi politics. A change in government can result in drastically different policies. In an extremely rare example, subsequent governments have not only upheld decisions of previous administrations, but also facilitated their implementation with regards to the EPI.

This was very evident during the introduction of the Hib-Pentavalent vaccine. Although the government changed just before

the introduction of the vaccine, the new administration carried out the plan without any delay. Politicians take pride in championing this as a great cause. In something akin to a positive feedback cycle, effective leadership has led to effective policies and implementation that, in turn, has made future leadership and implementation accountable to the standards being set.

The importance of the EPI in saving the lives of children has also led eminent people of the civil society to step forward and use their influence to convey the message to the public as well. This includes media personalities and intellectuals who have lent voices during national campaigns promoting vaccination or during World Pneumonia Day (35,36).

The EPI has also benefited from the support of professional bodies. Organizations like the Bangladesh Pediatric Association and Bangladesh Medical Association have not only helped in raising awareness among the public and caregivers, but have also helped in providing valuable inputs in the national decision making process. This collaboration enables the EPI to engage in an informed decision-making process as members of these professional bodies often have valuable insight on prevailing caregiver attitudes (35,36).

Although initially decisions regarding vaccination policies were mostly taken considering evidences from other parts of the world and subsequent extrapolations, over the last decade, data generated through research in Bangladesh have helped develop an evidence-based decision making system.

Researches have helped the EPI by not only generating evidence, but also by translating that research into possible vaccination policies and advocating for actions that the evidence points towards. The first instance of this occurred in 2009 when the Hib pentavalent vaccine was introduced based on evidence-based decisions (25,29,37).

Although all these stakeholders have played important roles in helping the EPI, vaccination ultimately comes down to the mothers and the vaccinators at the grassroots level. The role of the mothers in Bangladesh's success in achieving MDG4 cannot be overestimated. The acceptance that the EPI receives from the

community is truly amazing and is one of the core drivers behind its performance. The rapport established between the health workers and the families is crucial for working under the current EPI model. It is truly remarkable that time and again, families readily give up a part of their homes to allow the health workers to set up outreach centers and often surpass great obstacles to have the children vaccinated.

The vaccinators will often surpass equally great obstacles to ensure that children at hard-to-reach places are not left out. They often go out of their way to ensure as many vaccinations as possible. In one such case, Dr. Amjad Hossain, a former district immunization and surveillance medical officer in Bangladesh, instituted a new and improved process to register, track and locate pregnant mothers. In addition, by adding phone numbers to vaccination cards and registering the mothers, he ensured that vaccinators and mothers were accessible for each other (16).



ROOM FOR IMPROVEMENT



VACCINE WASTAGE

While aiming to increase vaccine coverage and reach as many children as possible, the EPI has also increased the vaccine wastage rates. Compared to the WHO recommendations, Bangladesh has extremely high wastage rates. The implementation of the 8-site strategy has led to 99% of EPI sites being outreach sites, cumulatively covering 85% of the total population. Although frequent establishment of the ORCs has been successful in increasing coverage tremendously, it has also meant that each session results in the vaccination of just 2 to 3 children.



However, the BCG vaccine comes in 20 dose formulations and the measles, OPV and TT come in 10-dose vials; once opened, these vials have to be discarded regardless of number of doses used (8,38). One obvious way to reduce wastage is to use vials containing a small number of doses.

In fact, the Hib-pentavalent vaccine, which comes in 1 dose vials, drastically reduced wastage from 43% for DPT/HepB to 0.45%. However, even when vials with smaller number of doses are available, distribution of these requires a large increase in cold chain capacity – each vial takes up a large volume of space, compared to the number of doses it contains. The capital investment in increasing the cold chain capacity may be more beneficial if the extra space is used

for new vaccines, instead of new single-dose formulations. This, combined with the fact that traditional vaccines have extremely low cost per dose, means that the best way to tackle wastage may be to introduce new vaccines in 1-2 dose vials and to rethink and test new strategies to optimize vaccine usage in outreach centers. As always, in settings with limited resources, very strict cost-benefit analyses have to be considered (8,39).



VACANT POSITION

One of the key barriers to achieving even higher number of vaccinations, and may be even maintaining current levels, is the number of vacant posts in the health system. This is especially true for posts at the community level: those of Health Assistants and Family Welfare Assistants. Currently around 11% of the posts of Health Assistants are vacant, although the flexibility of the roles of FWAs has helped to minimize the effect. This issue needs to be addressed by streamlining the recruitment process and providing adequate benefits. A lack of workers at these posts can put the EPI's community outreach model at stake and also make supervision of vaccination difficult (8).



LOOKING FORWARD

Over the last 28 years, the Expanded Program on Immunization in Bangladesh has made extraordinary progress in vaccinating children, strengthening the health system, and ultimately, saving lives. It has been one of the core components in the larger success story of Bangladesh's health performance. This trajectory of improvement has not always been constant - there have been numerous roadblocks as well as milestones along the way. Yet, it is quite possible that now is one of the most crucial moments in its history. Until recently, the challenge was reaching high coverage rates with the "traditional" vaccines recommended in the EPI package. Now that the relatively "low-hanging fruits" have been attained, the challenges are much greater. Ensuring this system persists with an ever-growing population, that the final few percent of the population is covered to ensure universal coverage, that new evidence is generated regarding other diseases,

and that this is incorporated into a local decision-making process are all mammoth tasks. These, in turn, need to go hand in hand with other, broader improvements in the health system. For example, there needs to be a combined push for universal birth registration to provide health services to all newborns, and keep track of their immunization records. There are some very promising and innovative ideas being tested out. For example, a project called mTikka is trying to use cellphone technology to register babies, track their immunization records in a central database and send reminders to parents⁴⁰. New vaccines are currently being considered for introduction, and studies are evaluating ways of improving current limitations of the program. Hopefully, the trajectory of progress will continue, and more successes will follow.

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