SOLVING THE CHALLENGES OF GLOBAL HEALTH

SEVA

SMART EXTENSION OF VACCINATION ADMINISTRATION

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Abstract

Globally, the focus of improving health outcomes has shifted in favour of preventive care. It is a well-recognised that vaccines have proven to eradicate infectious diseases and have facilitated the process of development of herd immunity. However, a plethora of challenges continue to remain unaddressed. Primary surveys in Delhi along with research based on secondary data points to multiple bottlenecks like-inefficient data management, marked duplication of efforts, massive workload of ASHA workers and high vaccine drop-out rates due to ineffective supply chain management leading to a shift of focus away from healthcare management.

Our intervention is aimed at addressing the issues by offering a dual interface of app which will create a 'centralised data repository' leading to avoidance of duplication of efforts in terms of recording new data and updating existing ones. Not only will this online platform-reduce the need for paperwork substantially, but it will also contribute to time saving primarily due to- limiting records to relevant fields, doing away with the requirement of re-registration and ensuring execution of detailed monthly work plans for ASHA workers.

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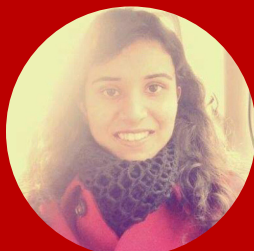
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1. Motivation

1.1. Problem Statement

It is clear that healthcare sector in general and vaccine management in particular faces significant administrative burden, especially in the context of management of physical data records and unintended duplication of efforts- which is then coupled with omnipresent supply chain weaknesses. However what is far less clear is whether this burden is justified, and whether it is worthwhile. Considering the case of US where most administrative hurdles have some rationale – whether fraud prevention, care management, risk adjustment, or otherwise, one is forced to rethink as to why a developing country like India which clearly lacks such facilities, still experiences a high administrative burden, though of a different kind. The key question for health care policy then is whether the burden is commensurate with the benefits. Is there a way that we can effectively digitise processes to reduce duplication of efforts, thereby allowing greater time and effort to be channeled towards improving health outcomes? Can greater efficiency and predictability as bestowed by digitised processes lead to better human resource management, creation of efficient and robust work plans, enable improved tracking of vaccines and (consequently) contribute towards better supply chain management? Is there a way that digitised solution could actually be implemented in remote settings characterised by network outages?

2. Global Trends

2.1. Current Trends (OECD and Least Developed Countries)

Data reveals that Global vaccination coverage – the proportion of the world's children who receive recommended vaccines in the given time frame– has remained unchanged over the past few years.

Each of the OECD member countries have set in place immunisation programmes based on their interpretation of the risks and benefits of each vaccine. In fact, there is strong evidence that suggests that vaccines provide safe and effective protection against diseases such as diphtheria, tetanus, pertussis and measles. It must be noted that the age of complete immunisation differs across countries due to differences in immunisation schedules.
This indicator is presented for measles and for diphtheria, tetanus and pertussis. It is measured as a percentage of children at around age 1.

In 2013, the Gates Foundation initiated collaborative efforts with 5 provincial governments in Mozambique, the national ministry of health, and Village Reach on developing a new system for delivering vaccines. The new system represented substantial changes over its current framework like- reconfiguration of the transport system, re-assignment of the roles and responsibilities of personnel, utilisation of data, and integration of supervision and cold chain maintenance into monthly vaccine distributions. This lead to greater probability of desired vaccines being available when children did show up at healthcare centres for immunisation in Gaza.

Based on current trends, it is clear that vaccine stock-outs have dropped from 43% in 2012, before the province revamped their system, to less than 3% today. This is in sync with the

idea that fixing the "last mile" issues of the system is one of the biggest challenges many countries face for vaccines and for other health commodities. It is well known fact that in a pull system, the health centres manage inventories and overburdened health care workers are usually tasked with arranging deliveries to their facilities based on requisition forms they are required to fill out on a monthly basis. However, quite often resources such as personnel, vehicles, and fuel are not available to facilitate effective distribution. Even in scenarios when stockouts are indeed reported, it can take several weeks to get vaccines. It is at this point that the entire system collapses into an ad hoc approach, wherein health workers arrange for third party transport and spend a day or more away from the health centre to fetch needed supplies themselves. Another possibility is that they will provide a partial vaccination session based on availability of vaccines, asking caregivers to come back later for the missing vaccines. These arrangements are embedded in the system and allow the system to work as a compromise in remote locations despite being inefficient. Next-generation supply chain models can help overcome these problems. However, routine expenses for the final steps are often overlooked in government budgets.

In Mozambique's emerging model, the province manages the distribution directly to the health facilities, while funding is still split between the province and the district. So funds are not always available in the right places, or for the right amounts, for fuel, staff per diems or vehicles – and when they're not, deliveries grind to a halt. Even with the next-generation system, about 10 percent of the time, vaccine deliveries aren't made due to lack of operational funding from the province. Although this issue is not unique to Mozambique.

Many country policies and corresponding financial flows still follow a traditional supply chain model that adhere to rigid government administrative structures, which are not always the most effective or efficient way to deliver health commodities. Eventually, however, countries will need to allocate more government resources at the right levels for these systems in order to reach the final 20% of children who still do not receive a basic set of immunizations.

Lasting system transformation is not straightforward. It involves fundamental changes to the health system, specifically changes to the administrative, policy and financing channels along with global donor engagement and increased country government commitments.

2.2. Challenges

Based on 2017 data, 19.9 million infants across the globe aren't covered for routine immunisation (for instance- 3 doses of DTP vaccine). 60% of these infants reside in just 10 countries (Afghanistan, Angola, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Iraq, Nigeria, Pakistan and South Africa). The challenge then involves analysing data at sub-national level so as to prioritise and tailor vaccination strategies to plug immunisation gaps and expand the reach of life saving vaccines

2.3. Solution Orientation

Immunisation outcomes are crucially dependent upon functional, end to end supply chain and logistics systems. Effective supply chain management ensures efficient vaccine handling, storage, stock management, temperature regulation (in cold chain) and maintenance of adequate information systems.
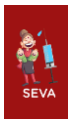
The objective of the process is to ensure uninterrupted supply of vaccines from manufacturers to service delivery levels, the idea being that vaccination schedules should not be disturbed because of unavailability of desired vaccine at the healthcare centre at the right time. Hence, as recommended by the WHO, system needs to develop to achieve '6 rights' of supply chain management:

- Right product
- Right quantity
- Right condition
- Right place
- Right time
- Right cost

Indeed, national vaccine supply chains are currently strained to effectively manage the surge of new vaccine introduction, adapt to new technologies and delivery strategy that can contribute towards improvement of immunisation outcomes. Therefore, WHO has prioritised this area of operation as a key building block of GVAP (Global Vaccine Action Plan)

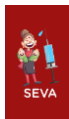## 2.4. Global Vaccine Action Plan

Broadly, the aim of Global Vaccine Action Plan (GVAP) is to provide a roadmap to prevent millions of deaths by ensuring a more equitable access to vaccines by the year 2020.

In May 2017, Ministers of Health from 194 countries had endorsed a new resolution on strengthening immunization to achieve the goals of the GVAP. The idea is well captured in the excerpt that follows:

"The resolution urges countries to strengthen the governance and leadership of national immunization programmes, and improve monitoring and surveillance systems to ensure up-to-date data guides policy and programmatic decisions to optimize performance and impact. It also calls on countries to expand immunization services beyond infancy, mobilize domestic financing, and strengthen international cooperation to achieve GVAP goals. Besides, it requests the WHO Secretariat to continue supporting countries to achieve regional and global vaccination goals. It recommends scaling up advocacy efforts to improve understanding of the value of vaccines and urgency of meeting the GVAP goals."

2.5. Delivery of the UK immunisation programme

In order to understand UK immunisation programme as a model for effective immunisation delivery necessitates an in depth analysis of its functioning. Childhood immunisations and immunisations for adults (as recommended nationally), such as influenza vaccine, are provided free of cost. None of the vaccination is compulsory. On reporting of a child birth, local health authority is notified and child is allocated to a general practitioner (GP). Post this, the process involves enrolling the child onto the local health authority computerised database that will schedule the immunisations, calculate local coverage, identify defaulters and arrange payments for the GPs. Health visitor is then required to visit the parents within 10 days of child being born to discuss immunisation scheduled and seek consent on enrolling child into computer based programme. Within first 6 weeks of childbirth, first immunisation is issued and the GP or local healthcare centre is notified of the date and time for child's scheduled immunisation and antigens needed for the same. Subsequent immunisation

schedule is carried forward in a similar way. Post administration of each vaccine, GP is required to submit a form to the local computer unit, triggering next steps.

This procedure that was put in place in the 1980s and 1990s, have led to impressively high coverage rate for immunisation. Various contributing factors include- initiating payments to GPs only when coverage targets are reached, improving computerised tracking system which allows for early identification and close follow up with defaulters, ensuring dissemination of updated guidelines on immunisation which are sent free to all health care professionals, appointing immunisation coordinators in each district, accelerating timings of scheduled immunisation and developing nationwide immunisation centric communication strategy.

2.6. Vaccination and Sustainable Development Goals

Vaccination has a direct or indirect influence on at least 10 of the 17 sustainable goals. For example, vaccination ensures healthier kids in a family, which translates into a higher number of school days attended, better learning outcomes, and less expenditure on health care services for children. Healthier and well-educated children can turn into more productive adults, thus reducing the incidence of poverty. Quality of education received by the children is directly linked to their health. As emphasized in Goal 3 of UN Sustainable Development Goals, Good Health, and Well Being declares that "Ensuring healthy lives and promoting the well-being at all ages is essential to sustainable development." To ensure healthy lives especially among younger children and infants, it is crucial to ensure full immunization coverage as emphasized in the literature.

As emphasized by the organization GAVI, almost all of the sustainable development goals are intertwined with the vaccination coverage. For example, GAVI declares that Innovative Partnerships can result in Unprecedented Results, even when we are talking in the context of vaccination, thus fulfilling sustainable development goal 17.

3. Vaccination in India

World Health Statistics 2018, reports 76% vaccine coverage for India, on the other hand, Niti Aayog, (an Indian Government think tank), in its baseline report, records 62% vaccine coverage among children aged 12 to 23 months. Niti Aayog has set an ambitious target of achieving full immunization coverage which seems like a far fetched dream right now. Shortage of health personnel, lack of proper infrastructure, indirect costs of vaccination, skepticism towards vaccination and supply chain mismanagement issues among many others, have led to a low coverage across India.

3.1. Government of India's efforts for vaccination

Fully fledged immunization program was launched by Indian Government in 1978 under, Extended Program for Immunization, a phrase borrowed from the campaign launched by the United Nations in 1974. It was renamed to Universal Immunization Programme (UIP) in 1985 and the target was to cover all the districts in a phased manner by 1989-90. Fast forwarding to 2014, Government of India launched Mission Indradhanush to energize the campaign for vaccination coverage. The target set was to fully immunize the children of up to two years of age and pregnant women. For this, the Government of India identified 201 high focus districts across the country which had the highest number of partially immunized and

unimmunized children. To further intensify the program, Government of India launched Intensified Mission Indradhanush (IMI) on October 8th, 2017.

According to the National Family Health Survey (NFHS-4) 2015-16, full immunization coverage in Delhi was 68.8% (a 5 percentage point improvement from the previous NFHS figure), which is also higher than 62% figure reported for India. But it is still very far from the target set by the Niti Aayog of 100% immunization coverage.

But astounding challenges remain. Challenges remain on both supply and demand sides of vaccination scenario in India. On demand side, the main issues are low awareness among people, the distance to the vaccination centres especially in the rural areas, scepticism towards vaccination programs in particular and government-run health programs in general and other indirect costs related to vaccination. On the supply side, shortages of vaccines, mismanagement of supply chains, lack of health-care personnel from community healthcare workers to doctors.

However, there are some bright spots within India as well. Government of India have successfully eliminated polio disease, and it successfully administers polio vaccines to millions of children every year. The sheer scale of the operation, the diversity in geography and among the demographics within India, makes this simple operation of administering polio vaccine (or for that matter any other vaccine) highly complex.

Around nine million routine immunization sessions are carried out within India, within each year, which is served through the massive infrastructure of more than 27,000 cold chain stores. The management of these cold chain stores, the real-time demand of a region, the real-time data, pertaining to the demand of region served by a cold chain store, being transferred to a central database, on which the supply of vaccines can be based can make a real difference in the cost-effectiveness as well as the immunization coverage and help achieve the full coverage target set by the Indian Government. It has the potential to decrease the dropout rates as the on schedule availability of vaccines can result in better compliance among people. For example, a female labourer with a young child might not be willing to visit an immunization centre again if the vaccine is not available the first time she visits, because visiting an immunization centre again involves the opportunity cost of her daily wages.

Moreover, the grassroots community health workers are overburdened with responsibilities, from physical record keeping to visiting families to surveying villages sometimes even for Non-Communicable Diseases etc. They are paid minimum wages, yet they remain committed to the mission of the fully vaccinated, healthy India.

This is where we come in with our solution, SEVA (Smart Extension of Vaccine Administration), which collects data digitally from the ground level community health workers (CHWs) and directly feeds into the central database MCTS (Mother and Child Tracking System), now renamed as RCH (Reproductive and Child Health). It helps in decreasing the burden from the shoulders of the CHWs and possibly, help reduce their work-related fatigue, thus building more conducive relationships with the people they are striving to help. By plugging in data inconsistencies of the system at the grass-root level, SEVA will

seek to improve current issues in both supply chain and administration of vaccines. Due to mammoth scale of this drive, we begin our proposal with a pilot in capital city of India – Delhi.

3.2. Reproductive and Child Health Service Delivery in India

In order to understand the need of SEVA, we elaborate on the present structure of reproductive and child health care delivery in India, focusing on roles played by various CHWs at their respective nodes.

The National Health Mission (NHM) is India's umbrella health scheme with a vision of achievement of universal access to equitable, affordable & quality health care services that are accountable and responsive to people's needs. It encompasses two sub-missions, the National Rural Health Mission (NRHM) and the National Urban Health Mission (NUHM). The details regarding NRHM and NUHM can be found in Appendix I.

Sub-centres (SCs) in rural areas and U-PHCs in urban areas act as hub of delivering outreach services to local community. One SC serves several villages. The ANM and male health worker (known as MPWs, i.e., Multi-Purpose Workers) conduct outreach to these villages on a monthly basis, focusing on infectious diseases and Mother and Child Healthcare. In urban areas, every UPHC has at least one ANM. Every village has an Anganwadi Worker (AWW) and one ASHA worker.

Since our pilot will begin from urban areas, we will now elaborate on duties and roles of these CHWs (primarily, ASHAs and ANMs because they are directly involved in delivery of vaccination to the community) in urban areas, i.e., under NUHM.

3.3. Community Health Workers and their role

3.3.1. Auxiliary Nurse Midwives (ANMs)

Created in the 1960s to man the SCs, ANM cadre was initially envisioned as village-level midwives. After a decade, in the early 1970s, the role of ANMs was expanded to include a range of preventive and curative work at the village level, particularly in regard to immunization. With this expansion, ANMs transitioned from being temporary to permanent staff within the health system, and were reclassified as a female MPW.

The National Rural Health Mission (NRHM) was launched in 2005 as an "architectural correction" for the rural PHC system. ANMs were positioned as a key health worker within the NRHM framework. They doubled the number of ANMs at sub-centers from one to two full-time staff. At the UPHC, every ANM will be responsible for a population of approximately 10,000. Since a UPHC covers an average 30,000-50,000 population, it will have 3-5 ANM.

Functions of ANM workers:

1. UPHC mapping

- A house-to-house survey is done to prepare a map of the catchment area of the UPHC and identify locations of slums and other locations where the vulnerable sections reside. All slums, low income housing, anganwadi centers, and landmarks such as schools, water bodies, large drains, landfill sites, other health facilities etc. are marked.
- The map helps in identifying if any areas or pockets of poor and vulnerable houses are being left out from coverage of any ASHA or ANM. They use this to assist ASHAs in vulnerability assessments as well.

1.2. Services delivered through outreach sessions and camps

- **Routine Outreach sessions** for routine RCH services (UHND) - ANM has to conduct a UHND in her area every month. She uses her record registers to prepare a micro plan to take care of awareness through ASHA and AWWS, and of supply and logistics to ensure coverage of all people under her and to reduce left-outs and drop-outs. During the session, she gives immunisation to the children, provides antenatal care to pregnant women, does postnatal check-ups, and provides counselling and contraceptive services to eligible couples. Referral to a doctor is done and followed up later in case of high level complications. **Records in different registers are made and updated for all the above tasks.**
- **Special Outreach sessions:** for hard-to-reach groups and specialized services like chronic disease screening, dental services, etc.; periodic as per local needs. ANMs and ASHAs need to map the people who will need these. Doctors/ Specialists provide services.

1.3. Services delivered during home and community visits

- ANMs conduct home visits for patients as referred to by the ASHA, **during which they have to update RCH registers, HMIS, MCTS and other health registers and records.**

4. Responsibilities of the ANM at the UPHC

- ANMs assisting the Medical Officer during OPD, and conducting ANC check-ups, immunization on the weekly fixed day/s, family planning counselling, provision of contraceptive services (IUCD, condoms, OCPs, emergency contraception), and screening for Non-Communicable Diseases.

5. Supervision and mentoring of Urban ASHAs

- Each ANM has 4-5 urban ASHAs in her area. She mentors them as follows:
- Holds weekly/ fortnightly meeting to discuss the activities undertaken during the week/fortnight.
- Trains and educates ASHAs on drugs, contraceptives, signs of preganancy complications.
- Informs ASHA about date and time of the outreach session and also guides her to bring the prospective beneficiaries to the session.
- Guides ASHAs in the organization of Health Days at the Anganwadi Center

6. Administrative responsibility

- *After introduction of RCH, Family Planning, Eligible Couples, Immunization and MCTS registers were combined into one integrated RCH register which is used for entry into the RCH portal ((see below for definitions). However, ANMs still need to maintain the following:*
- Lists of beneficiaries in the community– ANM has to ensure complete enumeration of population under her. She works closely with the ASHA for this. Individual health cards are made based on entries in theis register.
- Stock and inventory register
- ANC and PNC register
- Outreach Registers
- Disease surveillance including IDSP notifications
- NCD screening register
- Registration of vital events, e.g. births and deaths
- ASHA supervision and mentoring notebook

3.3.2. Anganwadi Workers (AWW)

The Government of India initiated the Integrated Child Development Scheme (ICDS) in 1975, in response to an inter-ministerial survey that claimed that existing social welfare and nutrition programs were not improving the nutritional status of children in India. Anganwadi Centers, staffed by AWWs, are responsible for ground-level implementation of the ICDS.

Functions of AWWs include:

- Providing information about basic child health

- Providing nutritional supplement for children below 6 years of age, adolescent girls and lactating women.
- Mobilizing the community on water and sanitation, participation in immunization activities.

3.3.3 Accredited Social Health Activist (ASHA)

One of the key components of NRHM was - making of a new cadre of ASHA workers to fill the void created by ineffective community outreach due to insufficiency of a SC. ASHAs are the grass-root level workers envisioned to provide health services access and direct sensitisation to the community, under NRHM and NUHM.

ASHAs are envisioned to be the *first* port of call for any health demands of the population, especially women and children, who find it difficult to access health services. They have a drug-kit and deliver first-contact healthcare. They receive performance based incentives for acting as the health activist at the grass root level in the community.

Facilitator of health services and link people to health care facilities

Provider of community level basic health care

Activist, who builds people's understanding of health rights and enables them to access their entitlements

Six major functions of ASHA are:

Home Visits	• To record EC, pregnancy and child related data • To counsel for family planning, pregnant women, ensure their ANC, post-partum visits • Visiting the new born - counsel on breast-feeding, routine examination of the child and mother, taking the child for complete immunization, nourishment and nutrition
Attending the UHND	• On one day every month, when ANM comes to provide ANC, immunisation and other services in the area, ASHA promotes attendance of those who need the AWW or ANM services
Visits to the Health Facility	• Accompanying a pregnant woman, or sick child who requests to be escorted to the PHC • Attend trainings or review meetings held by ANMs
Holding MAS meetings	• Mahila Aarogya Samiti (MAS) is a local women's collective, to take collective action on issues related to health, nutrition, water sanitation and its social determinants at Slum/Ward level.
Maintaining Record	• Three registers have to be maintained - Household Register, ASHA Diary and drug kit refill card
Vulnerability assessment	• Mapping, communicating, and mobilizing the homeless people living on roadsides, under bridges, flyovers and along railway tracks, in night shelters. Working as ragpickers, migrants, differently abled suffering from illnesses like HIV/ AIDS

3.4. MCTS/RCH and the need for SEVA

Mother and Child Tracking System (MCTS) is an information system for tracking maternal and child health beneficiaries within India's public health system, and improving service delivery planning and outcomes. This project was launched in 2009 to revamp the India's then Health Management Information System (HMIS) which was highly inefficient. (A Garai, 2010) and currently covers all states in India.

MCTS is designed to capture and track all pregnant women (from conception up to 42 days post-partum) and all new-born children (up to 5 years of age). Its objectives are to ensure that:

- All pregnanat women receive their full Ante Natal Care (ANC) and Pre Natal Care (PNC) services at the due times.
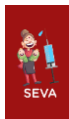
- Institutional deliveries for pregnant women, particularly for high risk mothers, are encouraged and
- All children receive the full immunization at their due times.

RCH portal is an upgraded version of MCTS. While MCTS tracks every pregnancy, RCH portal tracks a woman throughout her reproductive life cycle, thus making available information on obstetric history. RCH portal has been designed to meet the requirements of India's RMNCH (Reproductive, Maternal, Newborn, Child, and Adolescent Health) program which comes under the five major programs of National Health Mission. Transition from MCTS to RCH portal was made in a phased manner and is now complete.
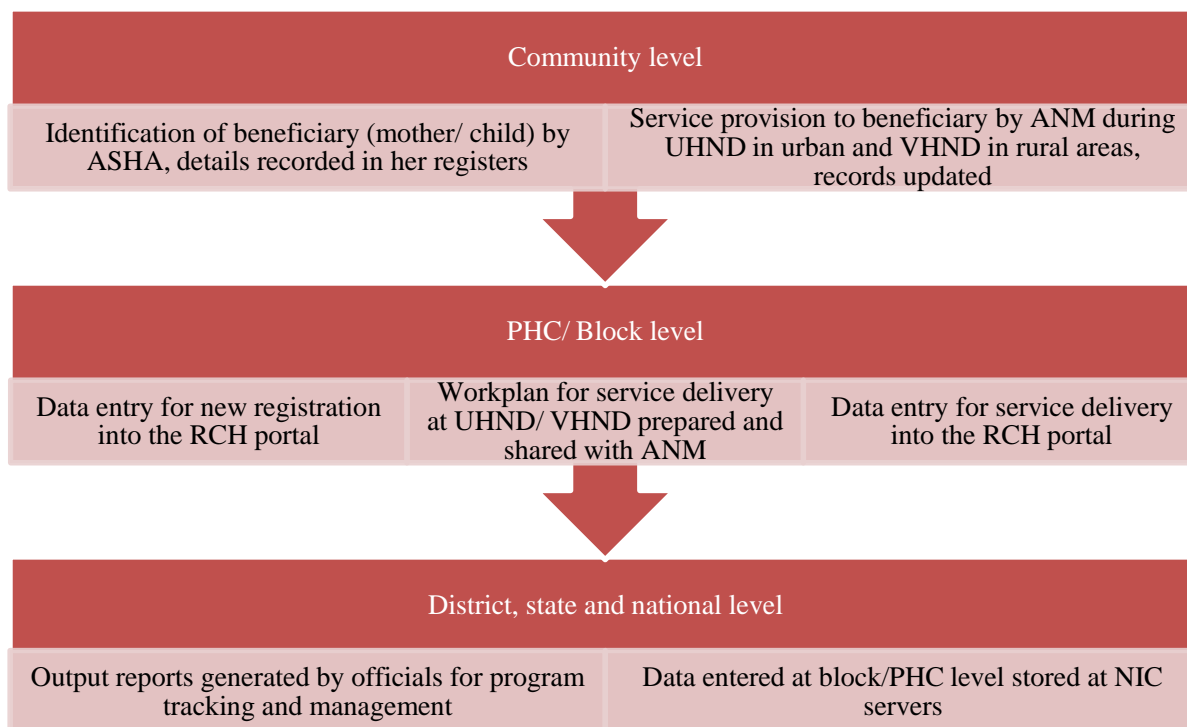
RCH is designed to capture and track eligible couples also, in addition to pregnant women and new-born children. Its objectives are to reduce the maternal, neonate and infant mortality rates and achieve the Millennium Development Goal (MDG) numbers four and five (to reduce child mortality and to improve maternal health respectively) through timely management of basic complications during pregnancy, childbirth and post-partum period at field level.

Beneficiary and service delivery data are written by ASHAs and ANMs on registers and forms and then these are sent to the nearest primary health centre (PHC) for entry into the RCH portal by data entry operators (DEOs) on a periodical basis. This data is supposed to enable RCH to generate workplans for ASHAs and ANMs – with details on forthcoming service delivery, such as ante- and pre- natal check-ups, and immunization sessions, on a per-beneficiary basis. Supervisory officials at block-levels can generate reports from the RCH web portal to get indicators on RCH performance (beneficiary registration rates) or service delivery performance (percentage of children fully immunized).

MCTS/ RCH data quality relies heavily on field-level data collection, consolidation and transfer. Assessment reports have found that registration rate was 63% for pregnant women and 59% for children relative to the estimated beneficiary population numbers. Wide discrepancies between service delivery rates in the HMIS and RCH portals was also found because even within registered profiles, only 40 - 60% are complete, 70-90% are accurate. (Rajeev Gera, 2011)

Flow Chart of data collection in MCTS/RCH:

Community level

Identification of beneficiary (mother/ child) by ASHA, details recorded in her registers	Service provision to beneficiary by ANM during UHND in urban and VHND in rural areas, records updated

PHC/ Block level

Data entry for new registration into the RCH portal	Workplan for service delivery at UHND/ VHND prepared and shared with ANM	Data entry for service delivery into the RCH portal

District, state and national level

Output reports generated by officials for program tracking and management	Data entered at block/PHC level stored at NIC servers

Reasons for this were –

1. Incompleteness of RCH registers filled by ANMs and ASHAs. This was found to be because of some unnecessary administrative information not asked by these workers on-field but required by the system, human negligence and duplication of data documentation work due to use of multiple data recording and transfer tools. ANMs transfer field information from their main registers onto hand-drawn formats to be transferred for data entry. Apart from RCH registers, ANMs used their diaries, local formats and tally sheets for recording service delivery information during immunization sessions.
2. RCH registers were not standardized to match the data needs of the RCH portal.
3. Lack of linguistic standardization in the names of data fields between the MCTS register and the portal. For example, the birth dose of the Hepatitis B vaccine was labelled "Hep B0" in the portal, but recorded as "Hep B1" in the register. These discrepancies can compromise data quality.
4. Entries made by the Data Entry Operators based on their assumptions can highly compromise the data. For example, the study found that in case of unavailability of information on Oral Polio Vaccine dose at birth (OPV0), DEOs carried forward Bacillus Calmette Guerin (BCG) vaccination dates for 0PV0, based on the assumption that BCG and OPV0 are provided to a child on the same day. This may not be the case for every child/ area due to reasons like vaccine shortages, poor training of health workers etc.
5. New beneficiaries mobilised by ASHAs should ideally be added to the system rapidly to forecast future service delivery requirements like vaccines. For this regular weekly/
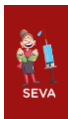
fortnightly meetings of ASHA and ANM is important for consolidation of data and entry into the portal. However, surveys found this frequency to be once in a month.

6. Shortage of manpower and insufficient hardware: One DEO is stationed at each PHC for online data entry. But, he is not dedicated to just MCTS/ RCH, but have to handle data coming from several programs and other operations such as RNTCP(Revised National TB Control Program), IDSP (Integrated Disease Surveillance Program) and ASHA payments. Overburdened staff hampers timely data entry.

7. There is poor logistic support in terms of electricity and Internet connectivity. During the working hours (10 AM-2 PM), several users log in simultaneously, which considerably slows down the server, thus delaying timely data entry. Power cut is also a major worry, which leads to backlog in data entry.

8. ANMs reported that they have to travel to the PHC every week to submit registers or work plans, which not only puts a financial burden due to the transportation cost but also hampers routine work rendering them unable to meet field visit targets.

In essence, MCTS and later, RCH did not reduce the paperwork of ASHA/ ANM.

It has an inbuilt mechanism for generating a due list of beneficiaries before each immunization session. The e-due list is called the MCTS workplan. Minimal use of these has been reported (in 5 out of 7 cases they were not shared with the ANM) and further with ASHA.

Incompleteness of these plans renders them useless for the ANMs. They have to additionally go through their registers manually to cross-check details of the workplans assigned from MCTS. Autogenerated workplans did improve the motivation of ANMs as they felt their progress was being continuously monitored.

Incomplete data, regardless of accuracy, compromised effectiveness of service delivery planning and tracking of beneficiaries. If the vaccines were planned according to data recorded in MCTS, only 7 out of 21 women would get TT2 vaccination and 18 out of 40 children would get Hep B1 dose.

MCTS also included a SMS service for mobilisation of masses. However, a sample survey found, only 80% people (80) provided their phone numbers, of which only 22% received a SMS, of whom only 33% could understand the message due to technical language used. (Pallavan Nagarajan, 2016)

The utility of the MCTS data is limited because the huge volume of data fed into the MCTS database is not being used to generate reports at various levels. Reports are still prepared by compiling data from various registers, which takes a lot of time and is prone to errors. Data are sparingly used for decision-making.
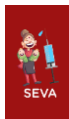
4. Our Intervention - SEVA

4.1. Outline

To address the problems of duplication of efforts, poor supply chain management of vaccines, high drop-out rates from the RCH system, we conducted multiple field surveys and visits to several Community Health Centres and try to follow several ASHA workers as they tried to do their daily tasks.

We then went back to the drawing board and tried looking at these problems through the disciplines of **Public Policy, Business Administration and Design Thinking.**

Looking at the needs of all the stakeholders and the society in general, we propose SEVA, a mobile application solution. The primary focus of the app will be improving the supply chain management of vaccines at every ANM centre, reducing the administrative workload of the ANM, avoiding any duplication of work between ASHA and ANM, creation of efficient work plan, reducing the dropout rates from the system and efficient recording of the data. On the front end, the data will be recorded in the app, however at the backend, all the data will be uploaded on the RCH portal. This way, all the costs of the proposed intervention are fixed incremental costs, since a data collection system is already in place. For areas with weak internet connectivity, the data recorded in the app would be saved offline and subsequently be uploaded on the data repository of the app whenever the smartphone gets an internet connection. The ANM/ASHA will be able to directly enter the data on the mobile application in real time, reducing the duplication of the work presently done by the data entry professional. Better recording of the data will facilitate precise estimation of demand of each vaccine at every ANM centre leading to availability of adequate vaccines during immunisation drives. The app, based on the details fed in by the RCH workers, would also provide a monthly work plan for the ASHA and ANM ensuring smooth execution of the immunisation drives and efficient delivery of services by the RCH workers.

Although, the first version of the app would be in English, subsequent versions would adapt to the local language of the states.

The next section elaborates the functionality of the application, including the journey of an Eligible couple on the SEVA app. Section 3 discusses about the user interface on the app.

4.2. Functionality

4.2.1. Registration of an Eligible Couple

In order to avail the benefits of the RCH Scheme, every eligible couple would have to register themselves on the SEVA app.
The registration of the eligible couple can be done by either ASHA on her regular field visits, or the couple can get themselves registered at the nearest ANM centre. In places where only ANMs are responsible for sensitization and mobilisation, the registration will be done by ANM.
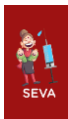
The following data entry points will be recorded at the time of registration:

Name (Wife + Husband)

Aadhar Number (Wife + Husband)

*Mobile Number (Wife + Husband)

*Age (Wife + Husband)

*Permanent Address

Current Address (option of same as permanent address)

Past medical history (Wife)

*to be auto filled by the Aadhaar number

Once the couple is registered, it would be provided with an autogenerated unique identity number. This would serve the purpose of identification whenever the couple next visits the centre. Location-tracking feature, based on the current address of the eligible couple, would help the ASHA/ANM in tracking the couple during the visits, post registration.

After the registration, the couple will receive an NFC card which will have its identity number stored in it. The Near-field communication (NFC) card will allow faster identification process during visits at the centre, is more durable than paper (thus, there would be no need of maintaining multiple records of the same couple which is ,presently, due to the short durability of the paper registration card) and is cheaper to produce. If the registration is done by the ASHA during a field visit, the couple can collect their NFC card on their first visit at the ANM centre, or during the next visit made by the ASHA worker.

By bringing the card near the smartphone with the application open, the couple specific information would automatically pop up on the app. This feature would help save the time of the data entry professional or the ANM/ASHA, to get the information about the couple and to feed in new reports.

*Aadhaar is a 12-digit unique identity number that can be obtained voluntarily by residents of India, based on their biometric and demographic data.

*Near Field Communication (NFC) technology is a standards-based wireless communication technology that allows data to be exchanged between devices that are a few centimetres apart.

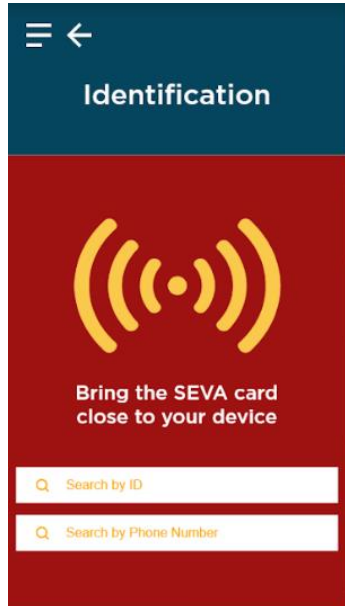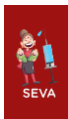Fig.1 : Registration of the Eligible couple, which can be done by ASHA as well as ANM

Fig.2: Establishing communication between the smartphone and NFC card

Fig.3: Location Tracking of the Elgible Couple.

4.2.2. Tracking of Family Planning Services

The mobilisation work of the ASHA also involves sensitizing couple about the contraception and prevention of common infections including Reproductive Tract Infection/Sexually Transmitted Infections (RTIs/STIs). The details of the contraceptives distributed by the ASHA/ANM on their field visit could also be, therefore, recorded on the SEVA app. Whenever the women get pregnant, the same is recorded on the app and then the app will automatically take its user on the Ante Natal Care visit details window.

4.2.3. Ante-natal Care Visit

Once the women get pregnant, her medical history would be recorded on her first ante natal care visit at the ANM centre. Medical history is recorded under the current scheme as well. But the record is first maintained on papers and later fed into the system. The real time recording of the medical history of the mother would ensure timely updation of the records as well as the accuracy of the records.

The following details of the mother would be recorded at the time of the visit:

1. Height
2. Weight*
3. BP*
4. Sugar*
5. Number of Children
6. Existing medical condition
7. Issues in past pregnancies.

*To be recorded at every visit

The details of subsequent prenatal visit would be updated under this section with the records maintained for each visit and could be viewed by the ANM to review the health of the mother any time.
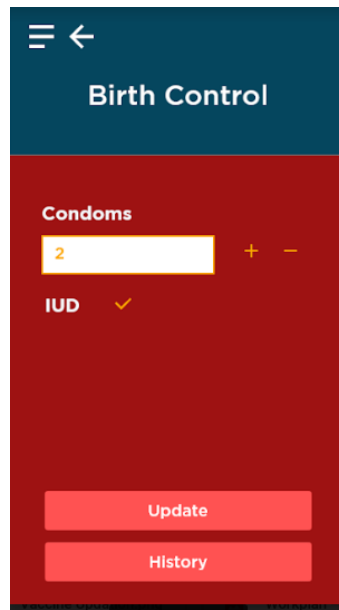
Fig.4: Details of Birth Control Sensitisation
drives made by the ASHA in her area.

Fig.5: Recording Mother's previous medical
historty on her first Ante-natal visit.

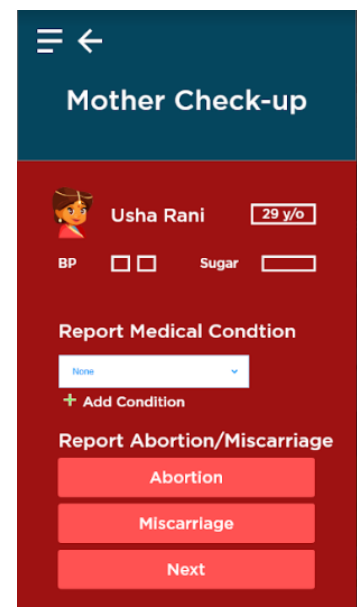
Fig.6: Details of Mother's checkup on every
Ante-natal visit to the ANM centre.

4.2.4. Child's Birth

Upon completion of the term and once the child is born, the app will generate a new identification number for the child, linked to the identification of the mother. (New identification being generated implies that the child will be registered on the app.) The interface for the child will be similar to that of the mother, recording the height, weight, health conditions of the child at every postnatal visit. The NFC card provided to the couple would serve the purpose now as well, with the dashboard for the couple showing an additional section for the child.

4.2.5. Immunisation

The immunisation tab for the child will have all the necessary vaccines that are required to be administered in a pre-specified order. The current process entails searching for the name of vaccines from a huge list and then updating the vaccine administered. The application will instead show the vaccine that should next be administered according to the record of the past vaccine administered. This will save the paperwork required to keep a track record of the vaccines as well as the time of the ANM. This particular tab would also maintain data at a macro level, wherein the future requirements of various vaccines at the ANM centre would be generated, ensuring availability of the required vaccines on every immunisation drive. This feature would also help reduce the presently high dropout rates, which are partly due to the unavailability of the vaccines whenever the couple visits the centre.

After the course of vaccines and post-natal check-ups of the child is completed, the app will take the couple again as the eligible couple. However, there wouldn't be any need of re-registering the couple again. The identification number of the couple would still remain the same and the entire cycle would begin again. Thus, every couple would be registered only once with the RCH, unlike the present system, wherein re-registration is required every time a cycle is completed. This would help save time and enable better recording and tracking of the couple.
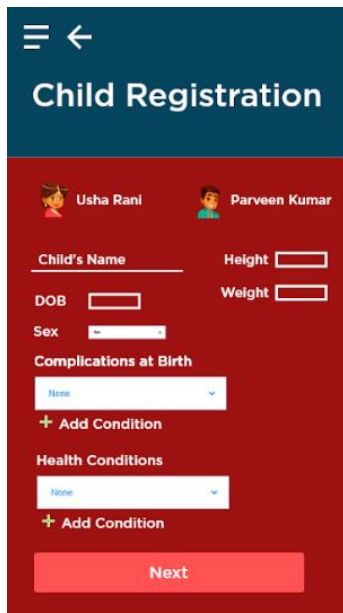
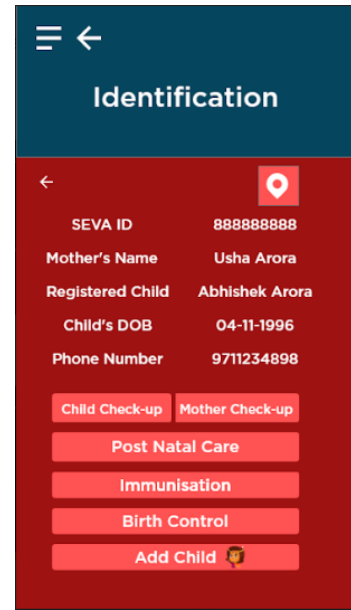Fig.7: Registration of Child and generation of Child's unique ID

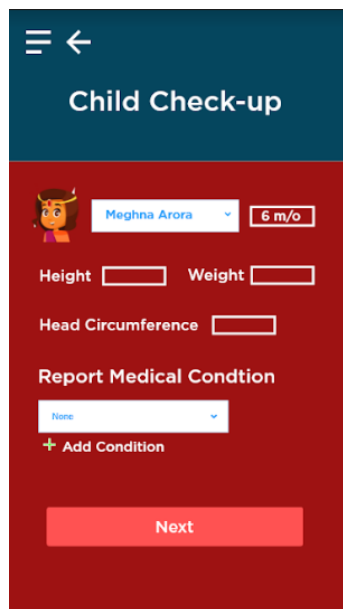Fig.8: NFC identification of the child, linked to its mother's id

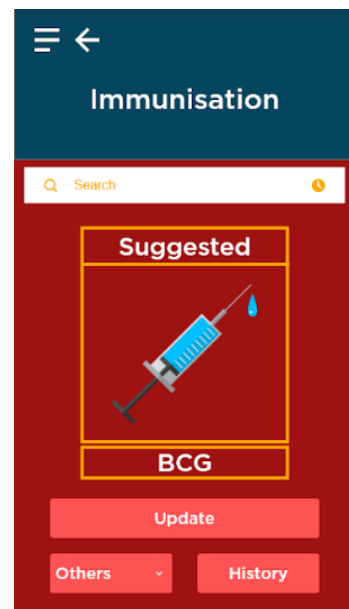Fig.9. Details of Post-Natal Checkup of the Child

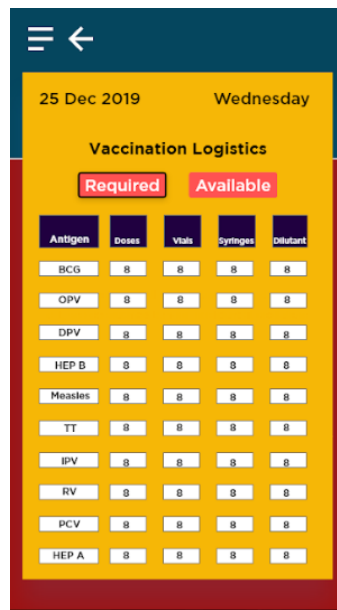Fig.10. Updating details of the Vaccination Drive
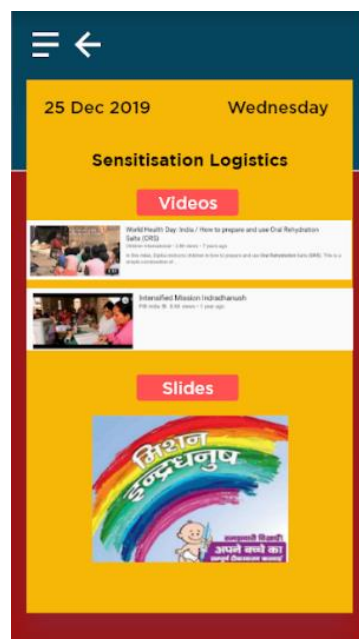
Fig.11. Automatic Estimation of
Vaccines required, ensuring smooth
supply chain management.

Fig.12. Sensitisation videos, to educate
people during field visis.

4.3. User Interface

The SEVA application will have a dual facing operating model, comprising an interface for ASHA and another for the ANM. Both the users can log in to the app using their unique SEVA ID and password. Owing to a larger number of responsibilities of an ANM (compared to that of ASHA) the interface of an ANM will show all options, starting from registration of an eligible couple to the post-natal check-ups and birth control measures. An ASHA is on the other hand responsible for mobilisation and sensitisation in the community. Hence, the interface of ASHA will have limited data entry points to be uploaded like new registration, details of the field visit (mentioning each household visited and problems encountered by her), households sensitized, contraceptives distributed, ante natal care visits, details of visits accompanying a pregnant woman, sick child, or some member of the community needing facility based care.

Not all the areas in Delhi are assigned an ASHA worker. In order to facilitate complete recording of the data, all the options available to ASHA would also appear in ANM's interface. To avoid duplication of work, the information collected by the ASHA worker will be automatically uploaded on the account of the ANM who is supervising the ASHA worker. Currently, ANMs spend long hours transferring the data from ASHA's register to one of her own, which is then handed over to the Data Entry Professional for uploading it on the RCH portal. This particular feature of SEVA will help us save the time of ANM and eliminates the requirement of a Data Entry Professional.

Coupled with the benefit of maintaining very few records, this intervention would also help in keeping a track of the duties performed by the worker. Given the fact that the salary received by an ASHA worker is incentive based, real time recording of the tasks performed would enable timely and fair delivery of the salaries to the ASHA worker.

Inefficient work plan formation was another caveat of the current RCH system highlighted in the problem statement. Based on algorithms and data fed into the app, SEVA will create a monthly work plan for ASHA as well as for the ANM. This will help to smoothen out the delivery of services by the RCH workers and enables them to focus more on their primary task which is maintaining sound health of the community.
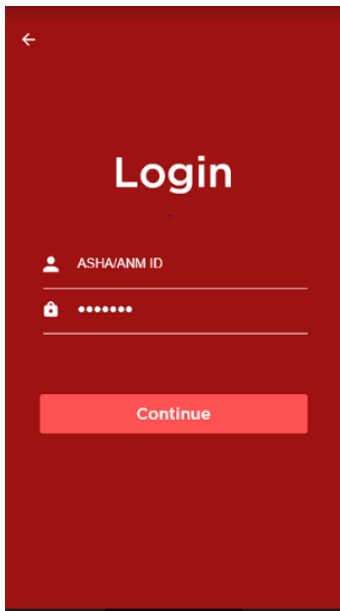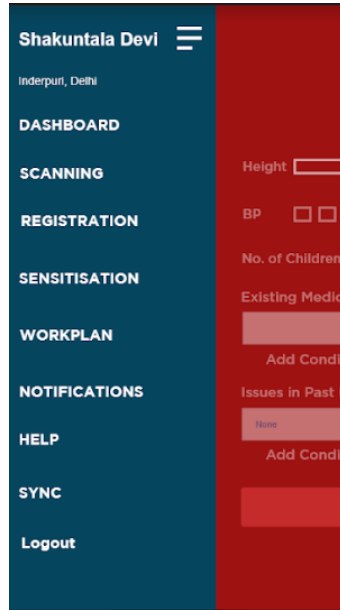
Fig.13. Log in window of ASHA/ANM
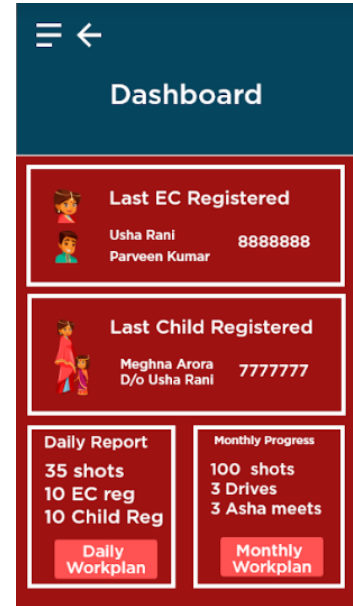
Fig.14. Home Page after Log in

Fig.15. At a glance view of activities done by ASHA
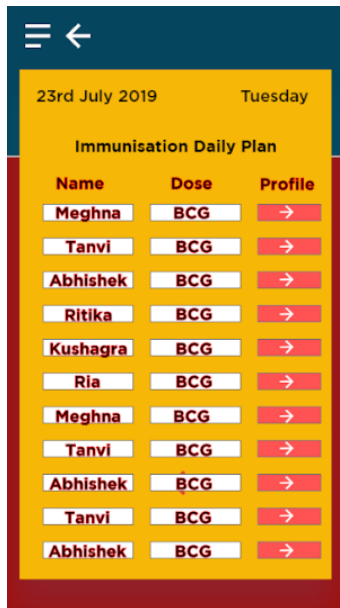
Fig.16. Summarised Daily Workplan of the ANM

Fig.17. Daily Workplan of the ANM
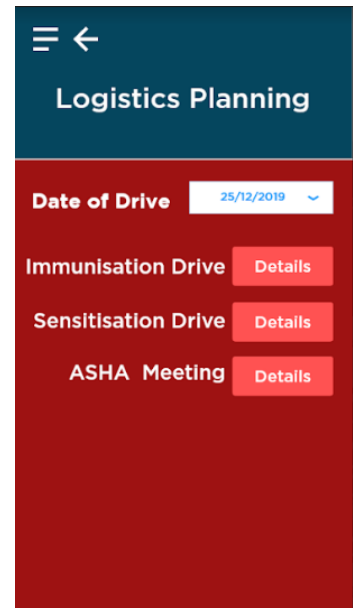
Fig.18. Logistics Planning for ANM

5. A Financial Appraisal of SEVA

5.1. Approach

Any proposal is incomplete without examining its feasibility from a financial angle. We will attempt to do so in this section. The following pointers need to be kept in mind while going through the analysis:

- The approach followed is a standard cost-benefit analysis
- The costs and benefits are both incremental in nature. For example, since we are linking our app to an existing Reproductive and Child Health (RCH) Database, we don't need to make any additional costs for database management or any additional investment in servers
- There were some crucial assumptions (grounded by reality) which were made over the course of the analysis. These are stated before the actual cost calculations along with some references that help grounding them (A1 , A2 etc.)
- The source spread sheet is fully editable and can be used to evaluate the impact of any changes in the assumptions made. Click here to redirect to the live spread sheet

5.2. Cost

5.2.1. Assumptions

A1	Scheme Coverage	
	#	Notes/References
No of Couples Covered	68,00,000	
No of Children covered	2,50,00,000	
Accounting for increase in immunisation Coverage (couples)	1,00,00,000	https://indianexpress.com/article/india/how-mission-indradhanush-vaccinated-over-2-55-crore-children-across-the-country-5014477/

A2			
	#	Notes	References
No. of ASHA	8,82,947	as of Jan 2017	http://nhsrcindia.org/sites/default/files/Update%20on%20ASHA%20Programme-%20January-2017.pdf
No. of ANM	212185	as of March 2015	https://community.data.gov.in/auxiliary-nurse-midwife-anm-at-primary-health-centres-and-sub-centres-in-march-2015/

(No of Health Workers Nationally)
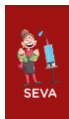
We first estimate the number of phones required per Asha/ANM using smart phone penetration data			
A3 Estimating the number of Smartphones required		**Penetration %**	**Notes/References**	
	Smarphone penetration india	24%	as of 2019	https://venturebeat.com/2019/02/05/pew-south-korea-has-the-worlds-highest-smartphone-ownership-rate/
	Women	18%	Assuming women have 3/4th of that penetration	
	ANM	14%	Discounting Penetration by Economic status of the Health worker	
	ASHA	7%	Discounting Penetration by Economic status of the Health worker (ASHA worker has an even lower social status)	
	No of ANM without Smartphones	1,81,630		
	No. of ASHA without Smartphones	8,19,375		
	Total Phones required	10,01,005		

Estimiating required IT Staff						
A4	**Job title**	**#**	**Avg. Salary**	**Total Cost/annum**	**Notes**	**Reference**
	IT support	25	1,80,000	4500000	For handling small tech queries	Payscale.com
	Dev Ops	6	480000	2880000	For bug fixes and app updates	Payscale.com
	IT Manager	2	8,00,000	16,00,000	To oversee the tech operations	Payscale.com

We look at **Recurring Cost** and **Initial Cost Outlay** separately. The former only would be directly compared with the benefits.

5.2.2. Recurring Cost (In INR – Indian Rupee)

Cost Centre	Unit Cost	Subsidy	Net Unit Cost	# of Units	Total Cost to Gov	Replacement Rate (years)	Annual Cost
Mobile Phones*	₹ 4,000	50%	₹ 2,000	10,01,005	₹ 2,00,20,10,352	₹ 4	₹ 50,05,02,588
IT Staff**	NA					NA	₹ 89,80,000
Internet Provision**	₹ 576			10,95,132	₹ 63,07,96,032		₹ 63,07,96,032
Total Annual Recurring							₹ **1,14,02,78,620**

Total Annual Recurring Cost in USD = **$17.10 Million**

*Only those ASHAs and ANMs who don't have smartphones are counted ; Phone model : Jiophone- NFC enabled; refer : A2, A3 for unit estimation

** refer A4 for staffing

*** For ALL ASHA and ANM ; a representative plan : https://www.jio.com/jiophone-recharge-plans
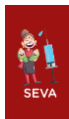
5.2.3 Initial Fixed Cost

Training Cost	Training	Unit Cost	Total cost = Unit * No. of Health Workers	Notes
	ANM	₹ 1,000.00	₹ 21,21,85,000.00	Fresh Recruits can be trained by existing workers and developed capabilities
	ASHA	₹ 500.00	₹ 44,14,73,500.00	
	Total		₹ 65,36,58,500.00	

NFC Enabling Cost		Unit Cost	Total Cost = Unit* No. of Couples expected to cover		Expected # of Couples derived From A1
	NFC Card Enabling	18	180000000	Old cards will be brought into circulation at no cost by imposing a security deposit on the card, fully refundable after return (2x of card Value)	https://www.indiamart.com/proddetail/smart-cards-4639749512.html

				USD Million
Total Initial Expenditure	**₹ 83,36,58,500.00**	**$ 1,25,04,877.50**		**$ 12.50**

5.3. Benefit

There are many indirect benefits of increased immunisation coverage due to better supply chain management, better data recording and increased focus of ASHA/ANM on non-administrative tasks due to our intervention among others highlighted in the previous sections. The analysis that follows however would only focus on the direct benefits: Time savings of health workers and lesser reliance on separately hired Data-Entry Professionals. It turns out (as shown below) that these direct benefits themselves are enough to offset the costs incurred and give a monumental benefit vis-à-vis the cost.

5.3.1 Assumptions

No of Health Workers-Support Staff		References
No. of ASHA	8,82,947	http://nhsrcindia.org/sites/default/files/Update%20on%20ASHA%20Programme-%20January-2017.pdf
No. of ANM	212185	https://community.data.gov.in/auxiliary-nurse-midwife-anm-at-primary-health-centres-and-sub-centres-in-march-2015/
No. of Data Entry Operators	1378	1 for 4 Community Health Centres ; 5510 CHCs are in India since March '16

Total Work Days of Health workers	
Total Work days	300
Total Work hours in 1 year	1800
Total Work hours in 1 day	6

Salary of Health Workers-Support Staff (Annual)		References
ANM salary	2,00,000	From field work and online sources
ASHA salary	1,20,000	
Data Entry Operator Salary	3,00,000	Glassdoor.in avg

5.3.2. Annual Incremental Benefit (INR)

1. Time Savings of Health Workers			
		Per year	**Per hour**
ANM salary		₹ 2,00,000	₹ 111.11
ASHA salary		₹ 1,20,000	₹ 66.67
	Daily	**Yearly**	
Total Work hours	6	1800	
Hours Saved ASHA	1.5	450	
Hours Saved ANM	1	300	
	1 worker	**All workers**	
Yearly Gain from Asha Time Saving	₹ 30,000.00	₹ 26,48,84,10,000	
Yearly Gain from ANM Time Saving	₹ 33,333	₹ 7,07,28,33,333	
			USD Million
Total time-saving gain/year		₹ 33,56,12,43,333	$ 503.42

2. Savings from not hiring Data entry operator				
	Per Year	**#**	**Total Savings Annually**	**USD Million**
Data Entry Operator Salary (Data entry Operator wont be needed so their entire salary can be considered a cost saving)	₹ 3,00,000.00	137 8	₹ 41,32,50,000.00	6.19875

5.4. Summary of Cost and Benefits and a Comparison

Considering only recurring Annual Costs and Benefits		
	INR	**USD Million**
Costs		
Mobile Phones	₹ 50,05,02,588.00	$ 7.51
IT Staff	₹ 89,80,000.00	$ 0.13
Internet Provision	₹ 63,07,96,032.00	$ 9.46
Total Annual Recurring	**₹ 1,14,02,78,620.00**	**$ 17.10**
Benefits		
Yearly Gain from Asha Time Saving	₹ 26,48,84,10,000.00	$ 397.33
Yearly Gain from ANM Time Saving	₹ 7,07,28,33,333.33	$ 106.09
Yearly Saving from Not requiring Data Entry Operator	₹ 41,32,50,000.00	$ 6.20
Total Annual Benefits		**$ 509.62**
Benefit / Cost %	2979%	
Absolute (USD million) Gain from SEVA (Benefit – Cost)	$ 492.51	

5.4.1. Making Sense out of the numbers

Clearly, just from the perspective of a financial audit, SEVA is sound. This analysis can be enriched further by estimating the impact of increased immunisation coverage due to SEVA on various parameters like decrease in Infant Mortality Rate(IMR), no. of instances and disability-adjusted life years lost (DALYs). We don't do this analysis here but we intend to do this study after conducting a pilot.

6. The Way Forward

Having identified the main issues at the outset- inefficient data management, duplication of efforts, supply chain weaknesses, ineffective work plan execution, high drop- outs; the proposed intervention by offering dual interface (for ASHA and ANM) will create a centralised data repository leading to avoidance of duplication of efforts in terms of recording new data and updating existing ones. Not only will this online platform- reduce the need for paperwork substantially, but it will also contribute to time saving primarily due to- limiting records to a bare minimum set of extremely relevant fields, doing away with the requirement of re-registration and ensuring execution of detailed monthly work plans for ASHA workers. Innovative techniques like use of NFC tag, real time updating, vernacular medium of app, family location tracking and temporary sinking of data to overcome network outages in remote districts will also be employed.

Besides, detailed assessment of associated costs and benefits yields total annual incremental benefit of $509.62 Million attributable to time saving by ASHA and ANM (along with savings channeled from payments made to Data Entry Operator); dwarfing the annual recurring costs estimated at $17.1 Million relating to purchase of Mobile phones, remuneration to IT Staff and payments for internet facility.

As far as implementation is concerned, it is planned to occur in a phased manner- application development and training of ASHA and ANMs will be followed by pilot testing phase, impact evaluation and finally the process will culminate with pitching ideas to government authorities for full fledged implementation.

Though our intervention- if duly implemented, will address the issues so observed, it is inevitable that there would be more such challenges in the pipeline. Several of those issues might take on unconventional forms which we are currently unaware of, given our level of understanding.
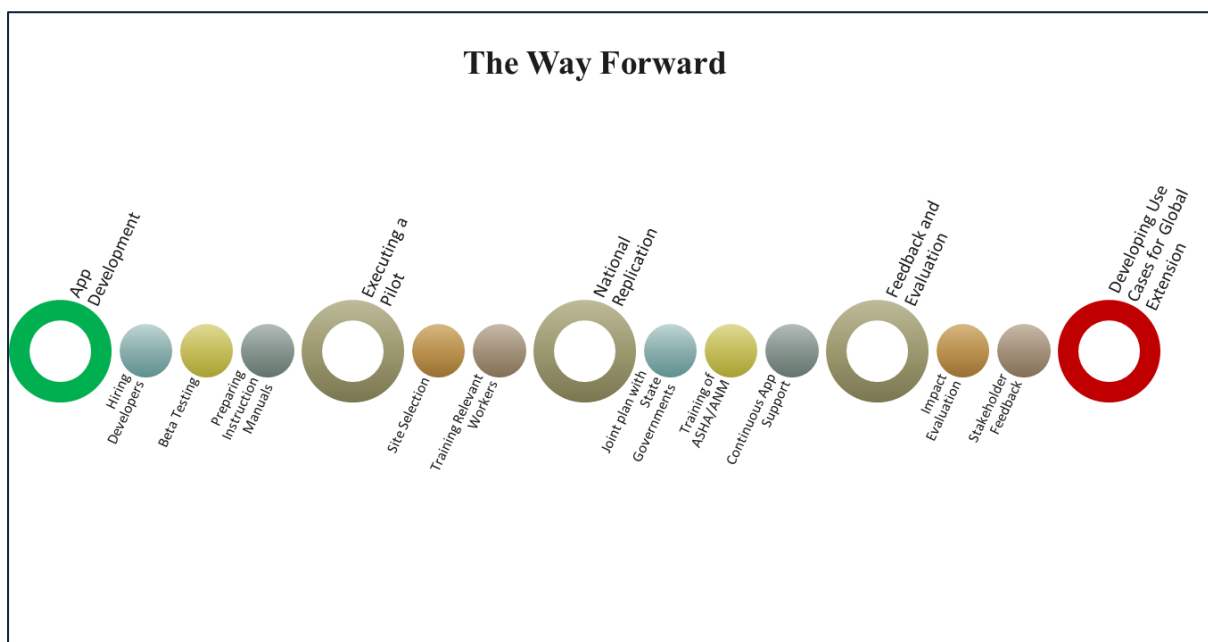

Fig. 19. Planned Glide Path

One among these relates to the process of administering the right vaccine dosage in an efficient and cost effective manner at the right place. Henceforth, as an extension- it would be worthwhile to introduce the idea of oral vaccines. When compared to the process of administering vaccines via syringe, oral administration of vaccine is simpler and more promising.This is primarily because of the fact that oral vaccines offer greater safety and a higher degree of program suitability in low-resource settings. In fact, optimal balance between safety and usability is achieved by minimizing the number of steps involved in preparing and delivering the vaccine at the point of use, and by ensuring vaccinator control over the dispensing speed. Since, in the past reconstitution of vaccine components had led to grave errors on the part of practitioners- like administering incorrect level of dilution or mistaking diluent as the complete vaccine, oral vaccine formulations need to be offered in a ready to use format. Even in cases where preparation steps are unavoidable, the containers should be easy to use and all the accompanying equipment should be disposable and packaged with each dose of vaccine. What is crucial is that this co-packaging requirement should apply to water as well, since clean water may not be available at immunization sites in developing nations.

However, it is true that vaccine antigens and adjuvants administered orally need some kind of buffering against the degradative effects of low stomach pH, besides the type/ volume of antacid buffer require special attention for infants. Additionally, closure systems need to be compatible with vaccine formulations, protect against gas and water transfer, and have minimal impact on the cold chain.

Therefore, manufacturers must consider new combinations- dry versus liquid format, varied levels of buffer, diluent etc. in early stages of vaccine development and assist health care givers achieve greatest possible quality coverage for the vaccine without unnecessarily taxing the existing supply chain systems; thereby creating a collaborative- stakeholder driven approach to address emerging healthcare challenges. Further research in the domain can truly serve millions of homo sapiens- for generations to come.

Appendices

Appendix I : Details of health facilities under National Health Mission in both rural and urban areas.

HEALTH FACILITIES UNDER NRHM

Name	Population coverage	Providers	Services
Sub-Centres	3000 population in tribal hilly areas; up to 5000 population in plain areas	- One ANM* - Multipurpose health worker in some places *(A second ANM has been placed in certain states)	- Conducts VHND and other outreach services - Family Planning services like provision of OCPs, condoms, IUCD insertion and counselling - Complete ANC including pregnancy registration, PNC and immunisation. - Growth Monitoring and Nutritional Counselling - Treatment of minor illnesses and childhood diseases including prompt referral when required - Follow up on treatment for TB, Leprosy, Malaria and activities for control of vector borne diseases
Primary Health Centre (a referral unit for 6 Sub-Centres)	20,000 in hilly, tribal, or difficult areas and 30,000 population in plain areas	- One MBBS Medical Officer - One AYUSH doctor - One staff nurse - 1 Sanitary staff	- 24-hour institutional delivery services both normal and assisted - Out-patient care for all ailments - Essential New born care - Abortion services - Male/female Sterilisation services - Health check-up and treatment of school children and adolescent friendly clinic for addressing adolescent health concerns - Screening of general health, assessment of Anaemia/ Nutritional status, visual acuity, hearing problems, dental check-up, common skin conditions, Heart defects, physical disabilities, learning disorders, behaviour problems, etc.
Community Health Centre (referral for 4 PHCs)	80,000 in tribal/ hilly/desert areas and 1,20,000 In plain areas.	5-6 doctors including specialists for different types of healthcare. Nurses and Paramedical	- Apart from all services that a PHC is meant to provide, each CHC also provides clinical care services in some of the specialist areas and institutional delivery services. - Some CHCs are designated and equipped to provide services of Caesarean Delivery.

		staff more than PHC	
District Hospital	One per district	Specialists for different types of healthcare with adequate number of nurses and Paramedical staff.	- It is a hospital at the secondary referral level - Generally provides all basic speciality services - It has Specialised New born Care Unit for sick and high risk new borns, blood bank, specialised labs, and provides services for caesarean sections, care, safe abortion and family planning procedures. - Provides most of the surgical services and has a well- equipped Operation Theatre. - It has provisions for dealing with accident and emergency referrals, rehabilitation, mental illnesses and other forms of communicable and non-communicable diseases

HEALTH FACILITIES UNDER NUHM

Name	Population coverage	Providers	Services
Outreach services		- One ANM per 10,000 population	- Routine outreach sessions - Immunization & ANC check up - Special outreach sessions - Health Camp with doctors, specialists, pharmacist, lab technicians providing screening and check-up services. - Social Mobilization and Community level activities
Urban Primary Health Centre (UPHC)	50,000-60,000 population located within/ near a slum	- One full time Medical Officer - One part time Medical Officer - 3 Staff Nurses - 1 Pharmacist - 1 Lab Technician - 1 LHV - 4-5 ANMs	- OPD services - Basic Diagnostic services - Referral services - Collection and reporting of vital events and IDSP - Counselling - - Services for Non Communicable Diseases
Urban Community Health	30-50 bedded facility in	5-6 doctors including specialists for	- Apart from all services that an urban PHC is meant to provide as detailed above, each hospital also provides

Centre (UCHC) acts as referral unit for 4-5 U-PHCs)	non-metro cities and 75-100 bedded facility for metro cities	different types of health care. Nurses and Paramedical staff as per the need		clinical care services in some of the specialist areas and institutional delivery services.
			-	Some hospitals are designated and equipped to provide services of Caesarean section.
District Hospital	75 to 500 beds depending on the size, terrain and population of the district. One per district	Specialists for different types of healthcare with adequate number of nurses and Paramedical staff.	-	It is a secondary referral facility
			-	Provides all basic speciality services and also certain kinds of highly specialized services.
			-	Has Specialized New-born Care Units (SNCUs) for sick and high risk newborn, blood bank, specialized labs, and provides services for Caesarean section, post- partum care, safe abortion and all kinds of family planning procedures.
			-	Also provides most of the surgical services and has a well- equipped Operation Theatre.
			-	Has provision for dealing with accidents and emergency referrals, rehabilitation, mental illnesses and other forms of communicable and non- communicable diseases

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Appendix 2: Inefficiency and Duplication in Data Collection Methods of MCTS/RCH

1.2 Section-1 Tracking of Eligible Couples and use of Contraceptives

1.2.1 Index of Tracking of Eligible Couples and use of Contraceptives

Table-2: Column-wise instructions for Index of EC

No.	Heading	Instructions to record the information
1	Serial Number	Serial number denotes the running serial number (e.g. 1,2,3,4 & so on ….) of the register for each woman/EC being registered. **The services rendered to each woman/EC have to be recorded in the row against the serial number of the respective woman/EC.**
2	MCTS/RCH ID. No. of woman *	When the woman/ couple is contacted first time, write their details in Section-I, and get them registered in the MCTS/RCH portal, automatic **MCTS/RCH ID No. will be generated only for the woman from the MCTS/RCH portal.** Note down this ID No. and write in this column.
3	Name of woman	Write name of the woman/wife of eligible couple
	Name of husband**	Write name of the husband of eligible couple. If name of the husband is not disclosed, write "Not applicable".
4	Aadhaar No. and Bank details of woman	
	Aadhaar No./ Not Available	Write Aadhaar number of the woman. If she has not registered for Aadhaar number, write 'Not Available'(NA)
	Bank Account No/ NA	Write Bank account number of the woman. If she does not have any bank account, write 'NA' (Not available).
	Name of Bank and Branch / NA	Write name and branch of the Bank in which the woman has her saving account. If she does not have any bank account, write 'NA' (Not available).
5	Aadhaar No. and Bank details of husband**	
	Aadhaar No./ Not Available	Write Aadhaar number of the husband. If he has not registered for Aadhaar number, write 'Not Available' (NA). If name of the husband is not disclosed, write 'Not Applicable' and write in all the three columns of the serial number 5.
	Bank Account No / NA	Write Bank account number of the husband. If he does not have any bank account, write 'NA' (Not available).
	Name of Bank and its Branch / NA	Write name and branch of the Bank in which the husband has his saving account. If he does not have any bank account, write 'NA' (Not available).
6	Mobile No. of the Husband/ Woman/Family (Specify)	Write mobile number of husband/woman or any family member. If the mobile number given is one of the family members, specify the relation and write it in the bracket. Please do not keep this column blank. **It is mandatory to write the mobile number.**
7	Page number***	Write page number of the register, wherein the details of the respective woman / eligible couple are being recorded. **Example-** If a woman/an eligible couple is at serial number 12 of the index and their detailed information is recorded on page number 15 of this register, write 15 in this column.

> Use of this is negligible. It's not even entered in the registers of ASHA and ANM.

* From MCTS/RCH portal, after it is operational for eligible couples. This MCTS/RCH ID No. of the woman will remain the same throughout her span of reproductive period up to the age of 49 years.

** If name of the husband is not disclosed, write 'Not Applicable'

*** Page number of this register (on which details of woman / EC are being recorded)

NA- Not available

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Table-3: Column-wise instructions for EC-1 format

No.	Heading	Instructions to record the information
1	Sr. No.	Write the same serial number of the respective woman / EC as written in the Index of this Section –I. **Example-** If the serial number allotted to a woman / EC is 5 under Index of Section-I, it should be '5' under 'EC-1' also. **Record details of each woman / EC in the row against the serial number of the respective woman / EC.**
2	MCTS/RCH ID No of woman*	Write the same MCTS/RCH ID number of the respective woman as indicated in the Index of the Section –I
3	Date of registration#	Write the date (dd/mm/yyyy) on which the eligible couple is being registered first time in this RCH register.
4	Woman's details	
	Name	Write name of the woman
	Current age (in years)	Write the current age(in complete years) at the time of registration of the woman / wife
	Age at marriage (in years)**	Write the age (in complete years) at the time of marriage. If marital status is not disclosed, write 'Not Applicable'. **Example-** If age at marriage of the woman / wife was 19 years and presently she is 20 years old, record 20 and 19 respectively at appropriate places.
5	Husband's details	
	Name of Husband**	Write name of the husband. If name of the husband is not disclosed, write 'Not Applicable' and write in all the three columns of the serial number 5.
	Current age (in years)	Write the current age (in complete years) at the time of registration of the husband
	Age at marriage (in years)**	Write the age (in complete years) at the time of marriage. If marital status is not disclosed, write 'Not Applicable'. **Example-** If age at marriage of the husband was 21years and presently he is 22 years old, record 22 and 21 respectively at appropriate places.
6	Address	Write complete residential address of the eligible couple/ woman
7	Religion	Write the religion of the EC (Hindu or Muslim or Sikh or Christian). If the religion is other than these, please write as 'Other' and specify.
8	Caste SC/ST/ Others	Write the caste of the EC in this column. If the caste is other than Scheduled Caste (SC) or Scheduled Tribe (ST), write 'Other'. **Note: If the option is other, specify; OBC (Other Backward Class), General category etc.**
9	BPL/APL	As per the criteria of the respective state, write the category whether the woman belongs to Below Poverty Line (BPL) or Above Poverty Line (APL).

Same information is being entered again, on the very next page.

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1.3 Section-II Tracking of Pregnant Women

1.3.1 Index of Tracking of Pregnant Women (PW)

Table-5: Column-wise instructions for Index of PW

No.	Heading	Instructions to record the information
1	Serial No	Serial number denotes the running serial number (e.g. 1,2,3,4 & so on ….) in this register for each pregnant woman registered. The serial number of the pregnant woman (PW) may be different from the serial number allotted to this pregnant woman as EC under Index of Section –I (Tracking of EC) of the register.
		Record each PW details in the row against the serial number of the respective PW.
		Whenever a woman gets pregnant, a new serial number in this register will be assigned to her, even if she had already been registered earlier for previous pregnancy.
2	MCTS/RCH ID No. of Pregnant Woman[1]	Write the same MCTS/RCH ID number allotted to 'this' pregnant woman as EC in the Index of the Section –I (Tracking of EC) of the register. The MCTS/RCH ID number will remain the same, even if she is registering for 2nd or 3rd pregnancy.
3	Name of Pregnant Woman	Write name of the pregnant woman.
4	Name of Husband[2]	Write name of the husband of the pregnant woman. If name of the husband is not disclosed, write ' Not Applicable'
5	Aadhaar No. and Bank details of pregnant woman	
	Aadhaar No./ Not Available	Write Aadhaar number of the pregnant woman. If she has not registered for Aadhaar number, write 'Not Available'.
	Bank Account No./ NA	Write Bank account number of the pregnant woman. If she does not have any bank account, write 'NA' (Not available).
	Name of Bank and branch / NA	Write name and branch of the Bank in which the pregnant woman has her saving account. If she does not have any bank account, write 'NA' (Not available).
JSY beneficiary details		
6	JSY beneficiary (Yes / No)	As per the state specific criteria, if the pregnant woman is eligible for JSY benefits, write 'Yes' otherwise write 'No'.
	Payment received[3] (Yes/ No)	If pregnant woman is a JSY beneficiary and received JSY payment, write 'Yes'; if she has not received the payment, write 'No'. Also write the date of JSY payment made.
7	Page number[4]	Write the page number of this register, wherein the details of the respective pregnant woman are being recorded.
		Example-If serial number of a pregnant woman is 20 and her detailed information may be recorded on page number 25 of the register, write 25 in this column.

Same information is being entered again when the woman becomes pregnant, because data from EC cannot be used here as the ID number is not being utilised.

History of past pregnancies has to be entered again because it cannot be populated from before.

1   ID number of pregnant woman will be the same as respective MCTS/RCH ID No. of the woman under Section- I (Tracking of EC) of this register. However, health services shall not be denied to any beneficiary, if she is not having MCTS/RCH ID number.
2   If name of the husband is not disclosed, writes 'Not Applicable'.
3   Applicable only for the JSY beneficiary
4   Page number of this register on which details of the pregnant women are being recorded
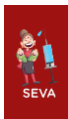
1.4.3 Tracking of Children (CH-2)

Table-13: Column-wise instructions for CH-2 format

No.	Heading	Instructions to record the information
13	Sr. No.	Write the same serial number of the respective child as written in CH -1 format.
14	Child name	Write the same name of the child as written under CH-1 of the respective serial number.
15	BCG⁽¹⁾	Write date on which BCG vaccine was given. Refer National Immunization Schedule for all the vaccines for children (Annexure-4.5 of Section-IV).
16	OPV 1	Write date on which the first dose of OPV vaccine was given.
	DPT 1	Write date on which the first dose of DPT vaccine was given.
	Hepatitis B 1	Write date on which the first dose of Hepatitis B vaccine was given.
	Pentavlent 1*	If Pentavalent vaccine is introduced in the district, do not give DPT 1 and Hep B 1, give Pentavalent vaccine in place of DPT and Hep B. Write date on which the first dose of Pentavalent vaccine was given.
17	OPV 2	Write date on which the second dose of OPV vaccine was given.
	DPT 2	Write date on which the second dose of DPT vaccine was given.
	Hep B 2	Write date on which the second dose of Hep B vaccine was given
	Pentavlent 2*	If Pentavalent vaccine is introduced in the district, do not give DPT 2 and Hep B 2, give Pentavalent vaccine in place of DPT and Hep B. Write date on which the second dose of Pentavalent vaccine was given.
18	OPV 3	Write date on which the third dose of OPV vaccine was given.
	DPT 3	Write date on which the third dose of DPT vaccine was given.
	Hep B 3	Write date on which the third dose of Hep B vaccine was given
	Pentavlent 3*	If Pentavalent vaccine is introduced in the district, do not give DPT 3 and Hep B 3, give Pentavalent vaccine in place of DPT and Hep B. Write date on which the third dose of Pentavalent vaccine was given.
19	Measles 1**	Write date on which first dose of Measles vaccine was given. **Also fill up the CH-3 Format of the register on the same day.** **Note:** Measles vaccine given to children during an outbreak setting should not be counted here.
	Vitamin A 1	When child comes for the first dose of Measles vaccine, on the same day, give first dose of Vitamin A also, and write the date.
	JE 1	If JE vaccine is introduced in the district give first dose of JE vaccine on the same day when first dose of Measles vaccine and Vitamin A were given, write the date (dd/mm/yyyy).

This page is for every child.

ANM and ASHA flip through several pages to track this every time that child visits.

These dates also have to be mapped for every vaccine every child to determine the number of vaccines required for next RI.

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