PATH

Engaging
private-sector
providers in
immunization data
management and use

PERSPECTIVES

FROM VIETNAM

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Abbreviations

API	**application program interface**
CDC	**Centers for Disease and Control**
CHC	**commune health center**
DHC	**District Health Center**
EIR	**electronic immunization registry**
EPI	**Expanded Program on Immunization**
FIF	**fee-based immunization facilities**
GDPM	**General Department of Preventive Medicine**
IDEAL	**Introducing Digital immunization Exchange And Learning**
MOH	**Ministry of Health**
NEPI	**National Expanded Program on Immunization**
NIIS	**National Immunization Information System**
PHD	**Provincial Health Department**
SOP	**standard operating procedure**

Introduction

Vietnam National Immunization Information System

The National Immunization Information System (NIIS)—a sustainably planned, government-run, nationwide electronic immunization registry (EIR) system—was officially launched with national mandates on system use for all facilities, including fee-based immunization facilities (FIFs). The NIIS can track all vaccinations, including those outside of the National Expanded Program on Immunization (NEPI) age range (0 through 3 years old), and is available to a broader variety of health center providers. The aim is to track immunization records for all individuals in Vietnam from birth until the end of their lives. Following the success of the implementation of the NIIS in Vietnam in late 2018, the Bill & Melinda Gates Foundation provided PATH with the Introducing Digital immunization Exchange And Learning from Vietnam - IDEAL Vietnam - project to continue supporting the Vietnamese government in the transition from the paper-based system to a paperless system, as well as to facilitate the exchange and sharing of lessons learned in Vietnam with other countries. This funding will help PATH to continue providing technical support to strengthen the implementation of the NIIS, develop national guidelines and toolkits, and support the paperless transition.

By 2020, the NIIS included 20 million client records and was used by nearly 15 thousand facilities. The benefits of an EIR was demonstrated by much evidence,[1] such as providing timely data for decision-making, providing more accurate population data to help in planning for service delivery, and preparing coverage estimates; making it easier to identify infants who do not start vaccination or who drop out; reducing paper-based data-collection forms and tools; and creating visibility into supply data. However, to get the benefits from the EIR, the immunization data of all children need to be entered into the system from all of the immunization facilities, including FIFs. Although there were regulations mandating that immunization facilities enter all the data into the system, implementation of these regulations has been taken lightly and reluctantly, especially in the FIF sector, leading to an inaccurate and incomplete database. Furthermore, there is lack of evidence research on the engagement of FIFs in immunization data collection, analysis, and use.

Purpose of the case study

This case study aims to understand the current status of FIFs' contribution to, perceptions of, and relationship with the NIIS and provide a current snapshot of how the government works with and regulates FIFs in Vietnam. To improve data quality and increase data use of the system, the study will summarize key lessons learned from Vietnam to encourage FIFs (especially from the private sector) to use the system and determine facilitators of and barriers to their engagement in the NIIS implementation.

Hanoi and Son La are the two project provinces chosen, based on differing variables, to gather a range of information representative of Vietnam as a whole. This includes polarized geography, population density, and facility type.

The province of Hanoi has a better infrastructure system overall, a large and growing population, a geographical mix of rural and urban settings, and a larger number of FIFs. In contrast, Son La represents a mountainous province with limited resources, a large group of minorities, and a small number of FIFs.

Fee-based immunization services in Vietnam

The global immunization community has recognized the critical role the private sector plays in immunization services. This includes filling gaps identified in the public sector (such as hard-to-reach areas and marginalized populations) and thereby helping to reduce inequities in the availability of services between geographic areas and population groups and increasing overall coverage of immunization services. Engaging the private sector in immunization service standardizations is an intricate part of coordinating, planning, and monitoring countries' national immunization activities.[2]

Contribution of fee-based immunization services

Dual system

Vietnam currently operates a "dual system" of free-of-charge Expanded Program on Immunization (EPI) services and non-EPI fee-based immunization services, available in health facilities across the country in both the public and private sectors.
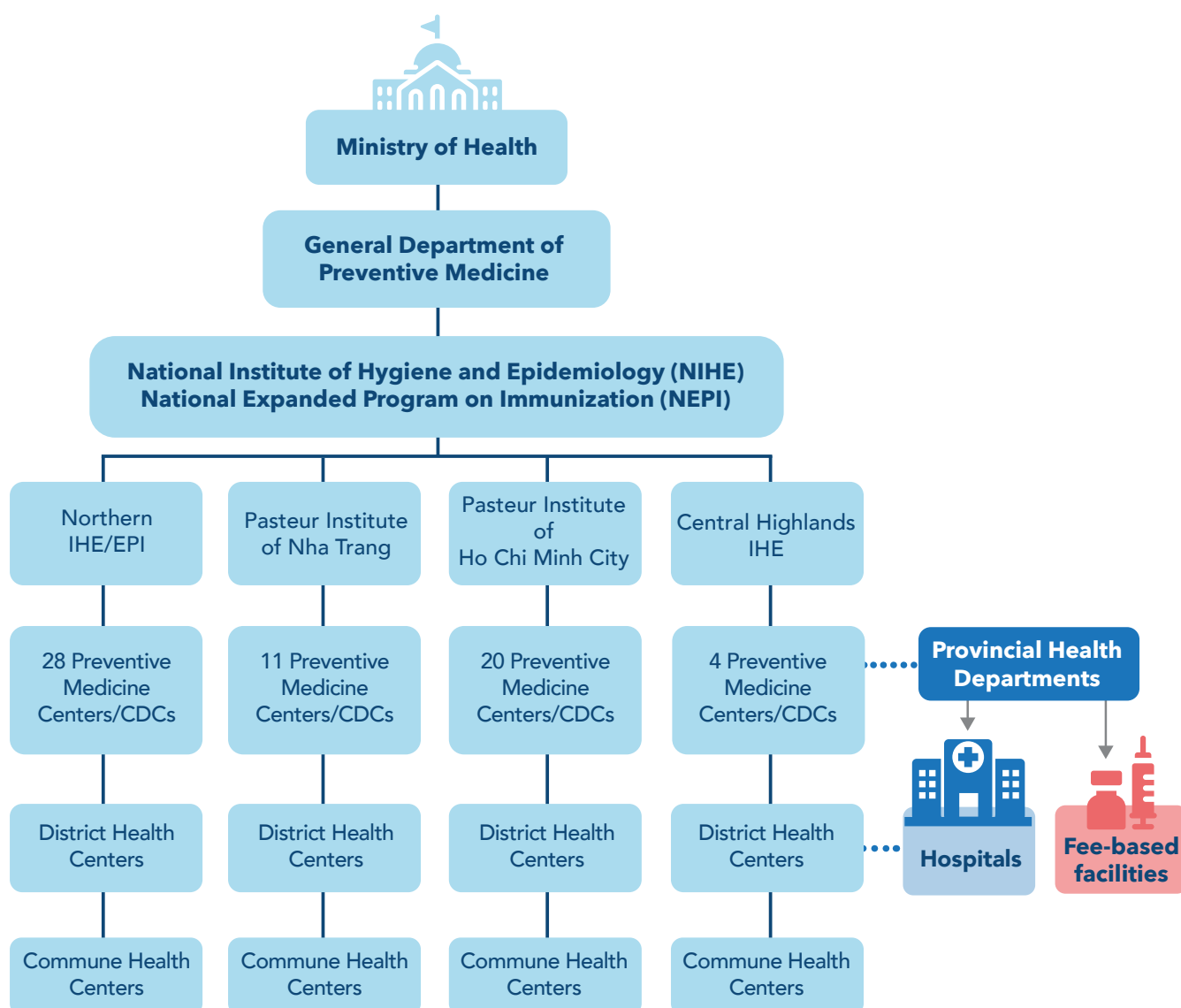

Figure 1. Structure of the immunization program in Vietnam.

Services provided at FIFs are paid for directly by clients/patients out-of-pocket. Previously, fee-based immunization services were implemented by the public sector only for services not covered under the national health plan; however, in 2008, Decision No. 23/2008/QD-BYT was issued by the Ministry of Health (MOH), which granted access to the private sector. Since then, private-sector access for immunization services has been increasing.

In Vietnam, free-of-charge EPI immunization is provided in the structured network of around 12,000 commune health centers (CHCs), as well in hospitals/facilities with birth rooms (for hepatitis B birth dose) for children and pregnant women,[3] while non-EPI immunization is provided at approximately 2,000 FIFs (including both private and public facilities). Ho Chi Minh and Hanoi are two cities with the greatest number of FIFs (about 140 and 125 facilities, respectively). Approximately 60 percent of outpatient care is private.[4]

Fee-based non-EPI vs. EPI services

Both EPI and fee-based immunization services have followed the same NEPI standards and guidelines on storage, management, and operation of vaccinations to ensure the same high quality, and the dual system offers different alternatives, thus making services more accessible for patients/caregivers:[5]

• As shown in Figure 1, FIFs are under the umbrella of the Provincial Health Departments (PHDs) and report directly to them. At the same time, for immunization services they also have to report to Provincial Centers for Disease and Control (CDCs), using particular forms created for FIF use only.[6]

• FIFs provide people with alternative non-EPI vaccine options that protect them from many vaccine-preventable diseases, including those diseases for which EPI vaccines provide protection.

• While EPI public facilities have scheduled immunization days (usually 2 or 3 days in a month), FIFs operate daily, during regular office time. This provides more flexibility and convenience for parents in taking their children without missing workdays if vaccination is only available at fixed, limited times.
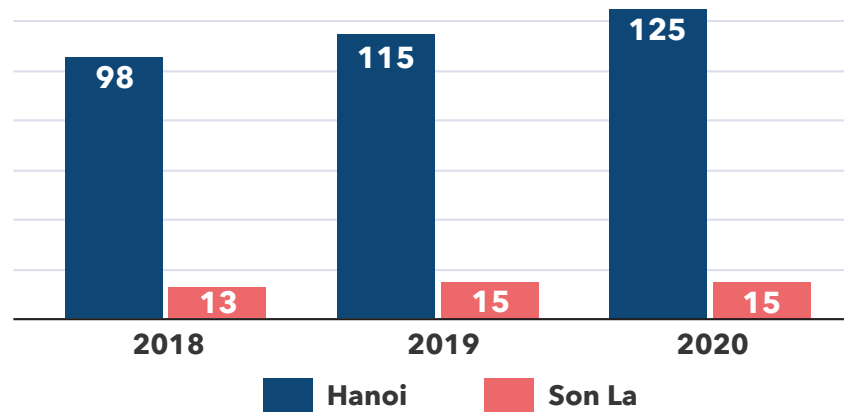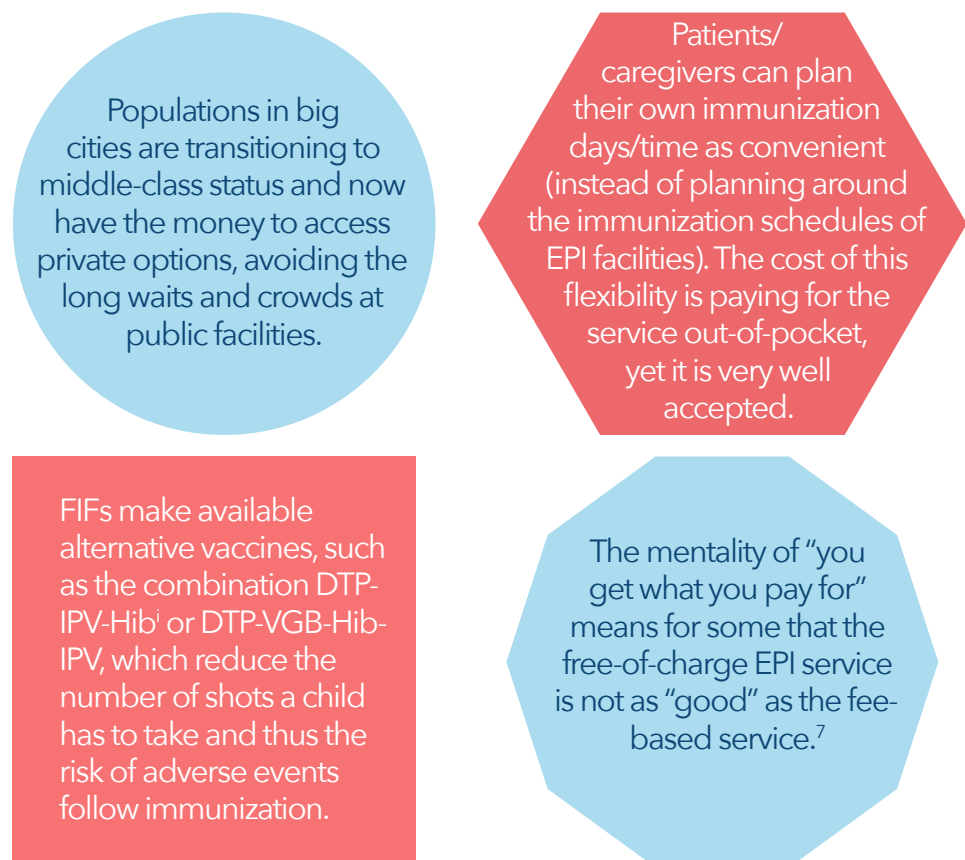
Figure 2. Number of FIFs in the two project provinces of Hanoi and Son La.

Source: Data exported from the NIIS.

With Hanoi Province representing a major urban (capitol) city and Son La a mountainous, far-reaching province, Figure 2 shows a greater increase of FIFs from 2018 to 2020 in the urban area. Therefore, there is a general assumption that the proportion of vaccinations by private providers is higher in urban than in rural areas, but the proportion provided by these agencies has not been documented. The governments are usually unable to regularly monitor the provision of immunization services by the FIFs. Furthermore, with the current system of dual reports, paper-based and NIIS, we are unable to distinguish the immunization coverage from public vs. private facilities.

There are many reasons that patients/caregivers have been driven toward FIFs, including the following:

Populations in big cities are transitioning to middle-class status and now have the money to access private options, avoiding the long waits and crowds at public facilities.

Patients/caregivers can plan their own immunization days/time as convenient (instead of planning around the immunization schedules of EPI facilities). The cost of this flexibility is paying for the service out-of-pocket, yet it is very well accepted.

FIFs make available alternative vaccines, such as the combination DTP-IPV-Hib[i] or DTP-VGB-Hib-IPV, which reduce the number of shots a child has to take and thus the risk of adverse events follow immunization.

The mentality of "you get what you pay for" means for some that the free-of-charge EPI service is not as "good" as the fee-based service.[7]

Within this landscape, private immunization services in Vietnam are growing.

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i   *Diphtheria, tetanus, acellular pertussis, polio, and Haemophilus influenzae type b.*

Policies in place for fee-based immunization services

Currently, Vietnam has policies on the provision of immunization services at FIFs. Important legal documents regarding FIFs include the following: (1) Decision No. 23/2008/QD-BYT, (2) Decree 104/2016/ND-CP, (3) Decree 155/2018/ND-CP, and (4) Circular 34/2018/TT-BYT.

Some of the policy requirements/procedures for FIF services are as follows:

- **Establishing a new FIF:** Each new FIF has to submit an application to the PHD to request an immunization license, with a commitment to meeting all the standards and requirements set forth by NEPI regarding physical facilities, equipment, and human resources. Within three days of receiving the application, the PHD will populate the facility's information on the PHD's website (name, address, phone number, in-charge person, etc.). The facility may then start to provide immunization services (without the prequalified certification) and will be subject to regular supportive supervision.

- **Submitting to supportive supervision:** FIFs will receive regular supervisory visits to ensure that the quality of standards are met. If an FIF has been found not meeting the quality of standards as per regulations, its license will be suspended till further adjustment.

- **Reporting:** Private providers must comply with the national regulation requirement to submit monthly reports to the area District Health Center (DHC).

- **Sharing data in the NIIS:** The government also issued some policies on using the NIIS, including the role and responsibility of FIFs. During the time of NIIS implementation in 2017, the MOH started requiring that FIFs exchange information from their own information systems to the NIIS by application program interface (API).[ii]

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ii   *An API is an interface that allows unrelated software programs to communicate with one another, acting as a bridge between two applications and allowing data to follow regardless of how each application was originally designed.*

Use of the NIIS at FIFs in Hanoi and Son La

Status of entering data into the NIIS at FIFs

Immunization paper-based record systems are no doubt time-consuming, burdensome, and prone to errors. An assessment in Vietnam[1] has clearly demonstrated the improvements that moving to a digital system can provide to health facilities.

For small-sized facilities with few client visits per day, adopting the NIIS has been helpful in their clients/data systemization and management. They simply input the client information and vaccination directly into the NIIS. However, many larger-sized FIFs had already invested in their own software and client database systems, which typically would serve similar functions (and more, especially with the finance/accounting functionality) within each facility:

- Tracking their clients with a type of ID generated by their own system.

- Sending SMS reminders to their clients when they are due for vaccination.

- Linking internal departments together to track the client vaccination process for each visit (e.g., linking with the Accounting Department and generating their own billing template after a client's examination, after which the client would proceed to the vaccination room).

- Generating their own business reporting templates.

Thus, to comply with regulations on NIIS use, these larger facilities have two options: (1) entering data into both the NIIS and their own software or (2) entering data into their own systems, then using an API to transfer data to the NIIS.

Many FIFs are choosing the second option. This path requires, by government mandate, that they share their internal data with the NIIS through use of an API. The idea is that an API allows FIFs to use their own systems, while still maintaining an accurate and up-to-date national database.

All of the FIFs in the two provinces are currently using internal software systems to enter immunization data; however, those systems are not standardized. For example, in Son La, there are 15 FIFs: 12 FIFs under 12 different DHCs that provide the rabies vaccine only and 3 other FIFs that provide many kinds of vaccines. The 12 FIFs
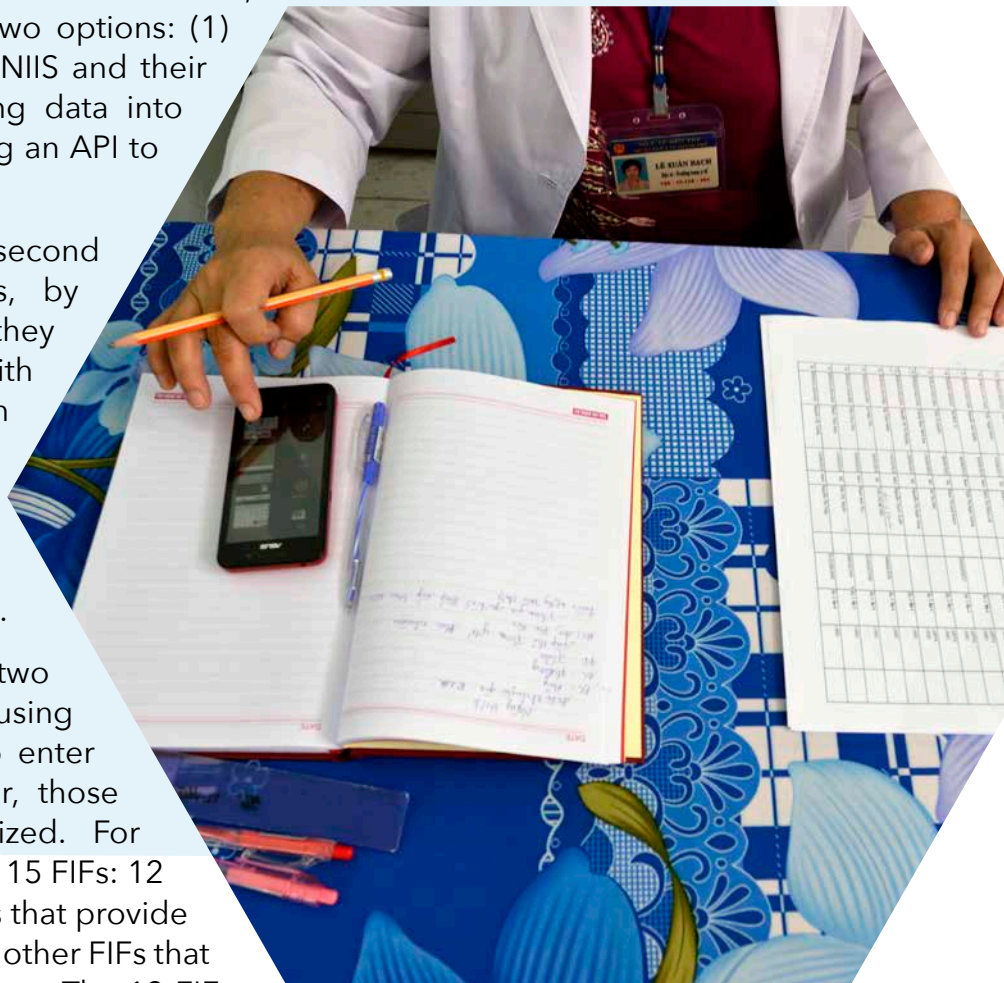
at the DHC level enter immunization data directly into the NIIS, while the other 3 facilities enter the data both into the NIIS and into their own systems. However, among the 125 FIFs in Hanoi, about 80 percent are using both the NIIS and their own systems to enter and track immunization data, while 10 percent are using the NIIS solely and the same proportion (10 percent) is using internal software solely, with an API to exchange the data.

However, there are still many challenges that exist that need to be addressed to make this a well-oiled machine and to create an accurate data-exchange relationship. Also, almost all the FIFs that are currently using an API to exchange the data between the two systems are big facilities with information technology teams to support development and deployment of an API.
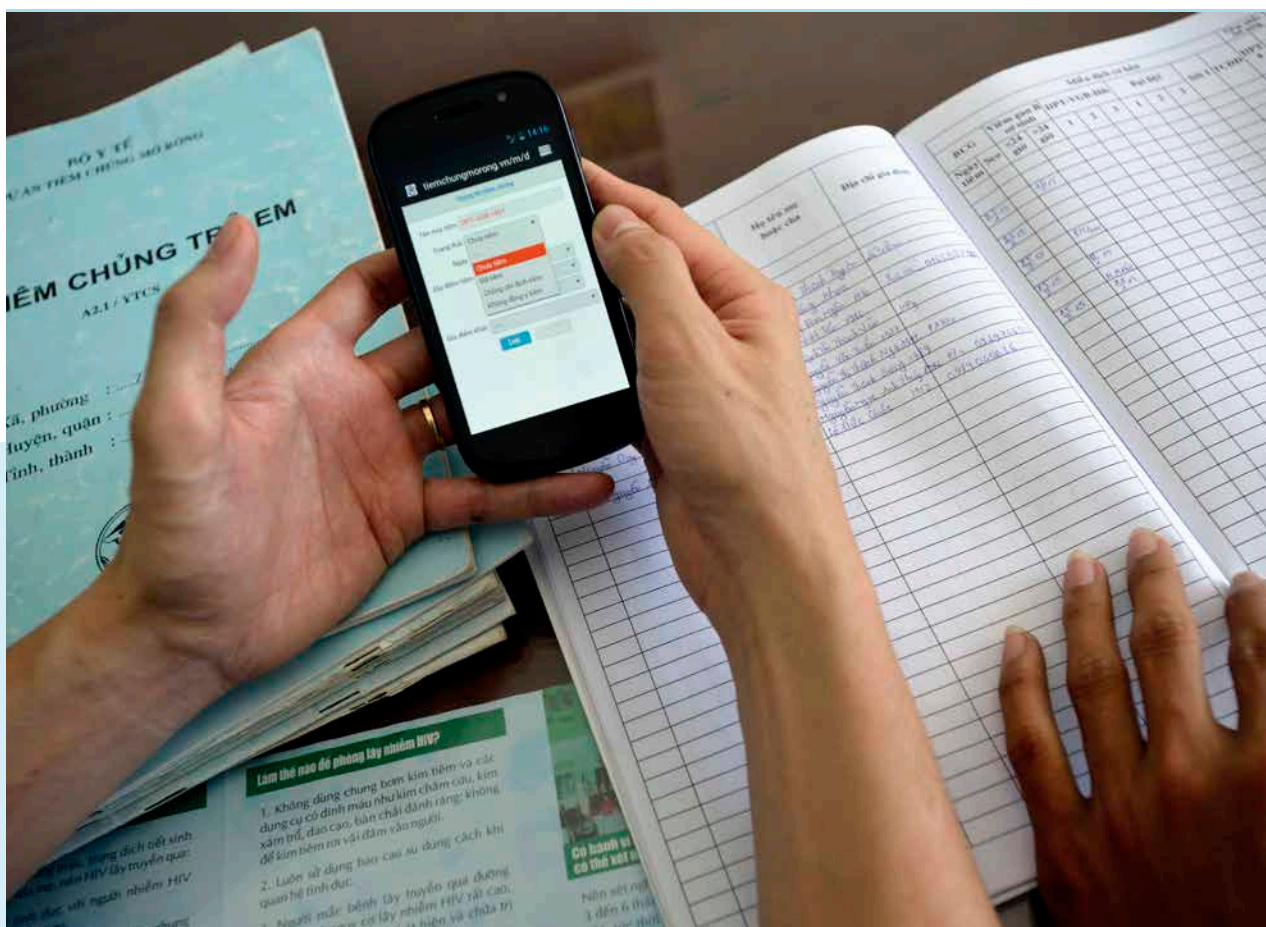
Quality of data in the NIIS

The quality of data in the NIIS appears to have improved significantly, especially following the two training sessions for FIFs and frequent supportive supervision visits. However, high-volume FIFs still struggle to ensure the data quality.

> I'm the one working directly with these numbers, if exported reports have good quality, it would be [a] great help for us. Currently, the data quality is not yet sufficient, [and] I myself don't trust the generated numbers, so I always have to use another channel to double-check the reports.
>
> *[CDC staffer]*

The reasons for major problems in the data quality of FIFs are as follows:

- Facilities which have many clients and enter immunization data into both systems are more likely to have worse data quality, because of a lack of time and personnel for the double entry of data, than clinics that have fewer clients. Some heavily trafficked FIFs have a designated person to enter the data into the NIIS and a different individual to enter data into the FIF's stand-alone software. These FIFs understood this is a temporary solution till they can use an API to exchange the data.

- Duplication and omission of data also occur, stemming mostly from the lack of a skill set in data entry personnel. As clients come into the facilities, immunization staff would need to first search the NIIS database of existing clients and then only input data for new ones. However, searching by name, date of birth, parents' names, etc. can be troublesome and lead to duplication or omission of clients in the database. Barcode scanning was implemented and additional supportive supervision was scheduled to eliminate these problems. Also, Viettel, our technical partner developed the NIIS, blocked the "delete client" function at the CHC level, to be replaced with a "merge client" function, and now has tighter control of client data management.

Poor data quality leads to incorrect calculations of immunization rates so that the actual situation for immunization and for disease risks cannot be estimated. Even worse, the incorrect immunization history of children leads to a waste of vaccines, as well as an increased risk of disease for children who miss the immunizations they are due to receive.

Use of NIIS data and its benefits

The relationship between data quality and NIIS use is dynamic and cyclical—one informs and inspires the other. The more that NIIS data are used, the more likely data quality improves; and as data quality improves, health care workers are more confident about using the NIIS to guide their actions.[8]

FIFs can use the NIIS to export their daily client data for rapid assessment of the immunization status in their facilities. In addition, with the data on vaccine and supplies entered into the NIIS, they can also know about the actual vaccine stocks to inform what kind of vaccines are needed. In addition, they can use the information on past immunizations and on the most popular vaccines used at the same time in the previous year to make a vaccine stocking plan for the year and to avoid the under- or overestimation of vaccines.[iii]

Another benefit of the digital system is its ability to track children as they move from commune to commune. The lack of this function was a major problem with the paper-based system. In addition, FIFs are becoming more and more popular in Vietnam, and more and more people are intending on using the fee-based immunization services instead of EPI services. The digital system can track children's immunization status regardless of where they go to get the vaccination; the data only need to be entered into the NIIS.

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iii   *Interview with immunization staff at Vinmec hospital.*

> The most obvious benefit of the NIIS is the ability to track clients who frequent[ly] move from place to place. They now can get vaccination at any facility. This is almost impossible with paper system. There are also more and more FIFs in our area, especially in the urban [area]. There are also trends to use more FIFs in the community. NIIS helps with following the vaccination history of the child.
>
> *[Immunization officer at district/provincial level]*

Some of the facilities use the NIIS data to check the immunization histories of new clients. Having the child in the NIIS and using that system in every facility means that, even if the caregiver forgets to bring the child's immunization card, the child's records can still be found. This leads to accurate immunization information, reducing repeat and unnecessary vaccinations and leading to an increase in on-time and up-to-date immunizations.
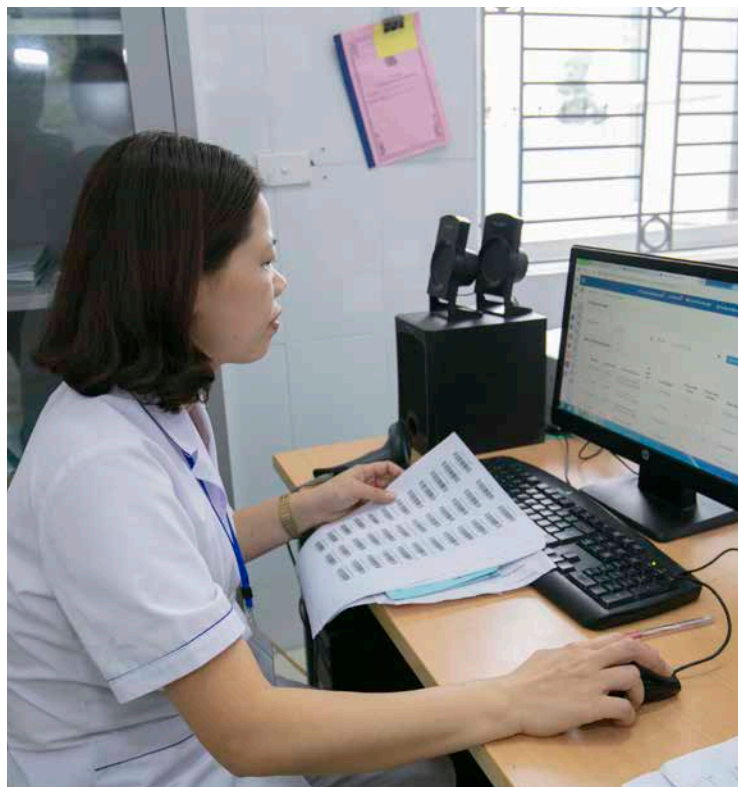
Facilitators and existing challenges of engaging FIFs in the NIIS

Facilitators

Facilitators for using the NIIS are as follows:

- A government regulation on mandatory input of FIF immunization data into the NIIS makes clear the role and responsibility of FIFs in entering the immunization data into the NIIS.

- Some managers at FIFs, especially at public FIFs, are able to understand clearly their role and responsibility when using the system and understand the government requirements on providing immunization information and reporting.

> Some facilities' heads, especially [at] public ones such as District Health Centers, know that the data they provide are the immunization history of the child, and that child would be using those data for the rest of their lives; thus, they try to do it carefully. When they understand the benefits of the system, they do it well. Other facilities where staff is obligated to use the system just use it for the supervision visit; then the data quality is not as good as [it is for] the ones [who] understand their roles as well as use the system with great attention.
>
> *[Interview with Son La CDC staffer]*

- Health workers at the public FIFs are more familiar with the NIIS, so they understand the importance of having the data on the NIIS and obtain better skills and knowledge on NIIS use. Therefore, any issues with understanding the NIIS and using the data in the NIIS are minimal.

- FIFs have supportive supervision from the DHCs: each FIF gets on-time technical support from the area DHC as needed during implementation. For example, if one has a new staff member, a staff member from the DHC will come to provide quick on-the-job training. All FIF end users were trained by the provincial CDCs and the DHCs to ensure each facility has at least two people who can use the NIIS.

Challenges and barriers

Existing challenges include the following:

- FIFs are where loopholes in governance and regulation show. FIFs' licenses are issued by the PHDs, and they are therefore under the PHDs', and thus the MOH's, management. Yet, their vaccination and immunization data are reported to the DHCs and Provincial CDCs and then aggregated at NEPI—all the layers under the General Department of Preventive Medicine (GDPM). As Figure 1 shows, these two parts—the PHDs and the GDPM—are separate branches under the MOH umbrella, with separate policies on FIF data reporting to the NIIS; thus, there is no clear penalty for noncompliance and execution. This is the reason many facilities still have incomplete or inaccurate data after many supervision visits without any solution for increasing the quality of data.

- The MOH has produced a document for the FIFs on data management while using the NIIS and reporting mechanisms; but not all the managers and end users understand the importance of inputting FIF immunization data into the NIIS, so their implementation only minimally follows the MOH requirements. This is one of the reasons poor-quality data being entered into the NIIS.

- FIFs use immunization data to follow their client's immunization history and remind clients of upcoming immunizations, but most of the facilities that use both systems use these data from their own systems and not the NIIS, creating confusion. Some functions in the NIIS do not function as well as they should, so there are differences between the data in the NIIS and FIFs systems. This leads to FIF mistrust in the quality of NIIS data and a preference to mostly use their own systems' data.

> Now I don't really trust the number on the system; the input data [don't] seem to match between NIIS and our own system. Numbers on the NIIS are still lower; other facilities might have deleted data, or created duplication due to unthorough search[es]. Furthermore, the formulas for reports are still incorrect and unreliable. Therefore, I use data on our system because customers have paid and vaccinated accordingly.
>
> *[Interview with immunization officer at Hanoi FIF]*

> We've always encountered problems every time we come visit this facility, the system [either] freezes or has issues. Reports generated are incorrect, [and] report quality is not guaranteed; thus, this function is not used. The generated numbers are only for reference, and not for report to the upper level since they might not be correct.
>
> *[Interview with Hanoi CDC staff]*

- There is a lack of official detailed guidelines on data analysis and data guide for FIFs on monitoring and reporting. In addition, FIF staff knowledge of and skills in data analyzation and use are limited.

- FIFs are more likely to use internal software to enter the data because their own software has functions that the NIIS does not have, especially in regard to finance/money transactions (needed for fee-based but not public facilities).

However, each option has its own barriers:

FIFs that enter data onto both the NIIS and internal software: Workload burdens are one of the top indicated barriers from FIF end users. These facilities need to enter data into two systems, wasting a lot of time, especially in high-traffic facilities. Many of these facilities are understaffed and do not have the capacity to enter these data in a timely and accurate fashion. Frequent rollover of staff makes allocating time and resources for a learning curve an additional challenge. Interestingly, FIF user feedback indicated that a major barrier to NIIS use was having data frequently deleted by other facilities, creating an extra workload burden with the need to re-enter the deleted data.

FIFs that use internal software and then transfer the data to NIIS via an API:

- ***Lack of guidance.*** During the establishment of an FIF there is neither official introduction to / instruction on using an API to transfer data nor a standard operating procedure (SOP) for developing an API and exchanging data between different systems. Therefore, FIFs choose their own software without any guidance or standardized document, developing APIs through their own internal IT teams and creating errors and differences in quality due to the lack of any standards. The consequence is that facilities who use an API need to export data from their own systems and then compare these with the data in the NIIS by the end of each day to ensure accuracy, which obviously wastes precious time. Fortunately, the quality is better recently, but some errors/differences still exist.

- ***Lack of a communication mechanism.*** The system lacks a standard communication mechanism among the MOH, Viettel, and FIFs for requesting and providing an API and for providing feedback when the data exchange has failed or there is poor-quality data synced from the FIFs' systems. FIFs who use an internal system and API to exchange data have trouble understanding why data exchange may take a long time (some data need seven days to export to the NIIS from an FIF system).

- ***Cost burden.*** The additional cost for API development is not supported by the government, so FIFs need to bear the cost of working with their own software developers to create an API to connect with the NIIS.

- ***Privacy concerns.*** FIFs are afraid of private information being disclosed when using the API to exchange data since their internal data will be transferred to the NIIS, after which the use of these data would be beyond their control. End users argue that the fear is due to having not received clear guidance and definition on which part of information will be exchanged with the NIIS.

Lessons learned in Hanoi and Son La Province: Moving forward

Through understanding the current status of FIFs and their contributions to the national immunization coverage, as well as the facilitators and challenges they encounter in implementing the NIIS, this study can highlight key lessons learned from Hanoi and Son La Provinces, which can be categorized under two gaps and subsequential needs: (1) data quality improvement and (2) increased data use.

Recommendations for improving data collection and data quality in Vietnam:
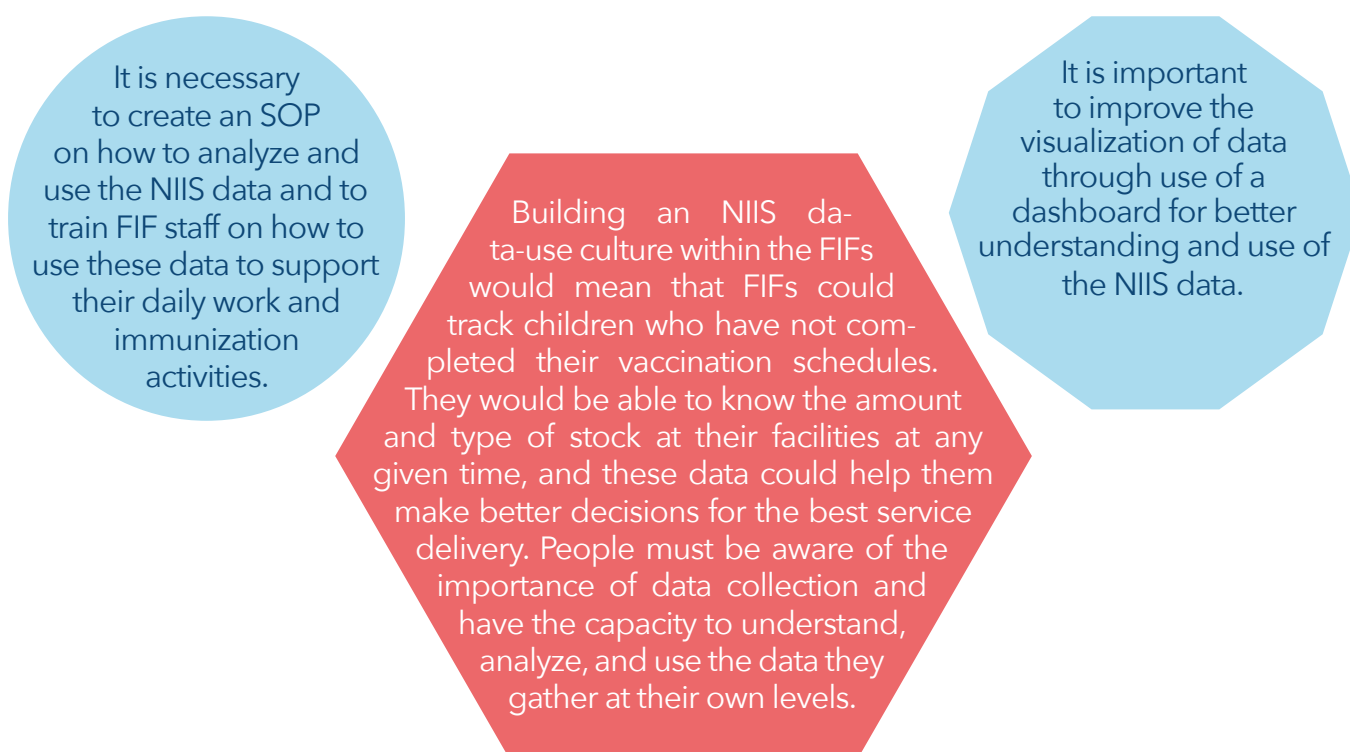
- In parallel with encouraging FIF use of the system, a strong legal obligation is needed to compel FIFs to use the NIIS. For example, data entry into the NIIS should be one of the prerequisites for FIF formation and operation, and strict punishment should be inflicted on facilities that violate this requirement.

- Besides instituting regulations on inspecting the implementation of FIFs, the government should also implement the use of e-cards, and soon. This application gives clients/parents the ability to track their children's vaccination histories and upcoming vaccination schedules. Thus, clients can also help with monitoring the data entry of their children's vaccination information and ensuring that it is more timely, complete, and accurate.

- Supportive supervisions should be conducted regularly, and SOPs and a standardized system for data quality monitoring of FIFs need to be established. In addition, the supportive supervision team should include staff from the PHD, which directly manages and governs the FIFs.

- It is important to increase the cooperation between the EPI facilities and FIFs not only in data collection but also in data quality assurance, data analysis, and data use.

- Refresher training on data collection and data use needs to be conducted. With high rates of staff turnover, it is imperative that FIFs conduct refresher training courses with support from provincial CDCs and regional EPI programs. The training must focus on how to ensure the quality and use of the immunization data. Moreover, improving understanding of the importance of immunization data is very essential: Training should be held for FIF managers and staff on the importance of immunization data and data quality in the NIIS (in terms of timeliness, completeness, and accuracy) to encourage them to enter the immunization data into the NIIS.

- Client data management should be tightly controlled at the district level on up in coordination with Viettel

to ensure data quality. CHC immunization officers at the grassroots level of data input and quality management should be well trained and understand their important role as a building block for the NIIS.

- The scalability of the system should be considered. It is important that the NIIS is able to support and sustain a large amount of data that continuously increase to ensure adequate speed of the system when being used by many end users at the same time.

- It is essential to create or establish interoperability standards to govern an exchange between information systems. Interoperability strategies, such as an API, should be considered as early as possible during the development of the system, with an SOP to guide FIFs on how to develop and deploy an API. In addition, technical support from Viettel or higher level should be provided to FIFs in the process of API development and deployment to ensure data quality when exchanging data between the two systems via an API.

Recommendations for data analysis and data use:

It is necessary to create an SOP on how to analyze and use the NIIS data and to train FIF staff on how to use these data to support their daily work and immunization activities.

Building an NIIS data-use culture within the FIFs would mean that FIFs could track children who have not completed their vaccination schedules. They would be able to know the amount and type of stock at their facilities at any given time, and these data could help them make better decisions for the best service delivery. People must be aware of the importance of data collection and have the capacity to understand, analyze, and use the data they gather at their own levels.

It is important to improve the visualization of data through use of a dashboard for better understanding and use of the NIIS data.

Moving forward, FIFs will continue to grow and have significant contribution in immunization coverage nationwide. For the NIIS to be fully functional, with a sufficient database, engaging FIFs is an inevitable mission. Vietnam will have to develop a more coherent NIIS policy, with a particular focus on FIFs' role and responsibility and on a mandatory mechanism to ensure compliance. At the same time, it is essential to create interoperability standards so that FIFs with internal software can exchange data with the NIIS. And finally, building the human resource capacity to understand and use the system is vital to supporting the daily work of immunization and to serving Vietnam's population.

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