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## **E-IMMUNIZATION CARD**

Empowering parents and caregivers to take charge of their children's immunization



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# ABBREVIATIONS

CDC	Center for Disease Control and Prevention
IDEAL	Introducing Digital immunization information systems - Exchange And Learning
NEPI	National Expanded Program on Immunization
NIIS	National Immunization Information System
SS	Supportive supervision
STCDT	E-Immunization card (sổ tiêm chủng điện tử)

This case study was developed by the IDEAL-Vietnam project, a collaboration of PATH, the Vietnam Ministry of Health, the Vietnam National Expanded Program on Immunization, and Viettel, and authored by team members from PATH and the National Expanded Program on Immunization.

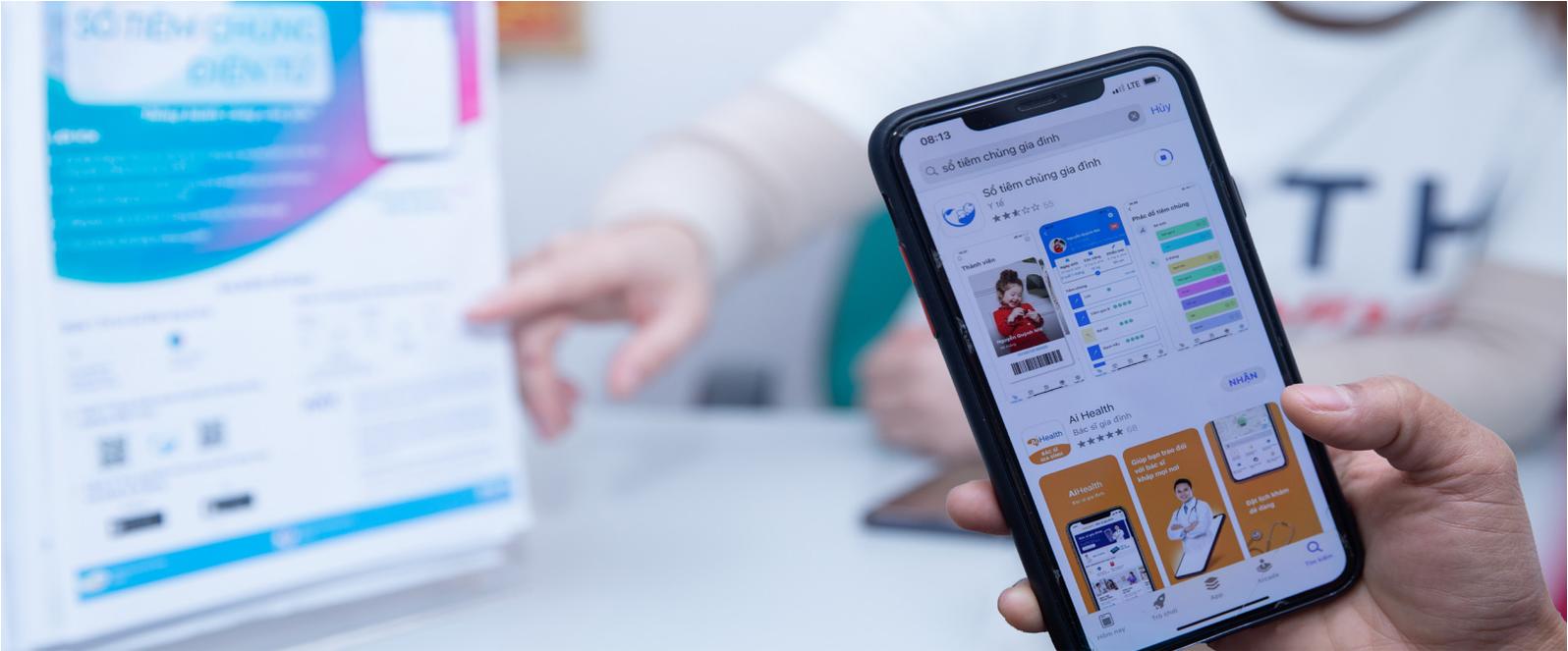
We hope this report will contribute to ongoing discussions about immunization logistics, and we welcome comments from interested parties.

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Photo credit: PATH



## INTRODUCTION

As electronic medical records have come into more general use, medical information has become increasingly portable, personalized, and participatory. This has begun to stimulate patients to become more involved in their own health care. Immunization is an area for which a mobile solution could be very useful. Studies<sup>i,ii,iii</sup> have suggested that mobile immunization records are feasible and may be an acceptable complement to existing paper methods.

In this time of growing mobile applications (apps), many independent developers are bringing immunization information system solutions to market, providing them directly to the consumer. While these stand-alone mobile apps can be developed rapidly to address an immediate need, their added value will often only be realized through connection to the wider health system. Integration of a mobile app into servers or platforms at the regional or national level can slow the diffusion of the app in the short term, but in the longer term, such integration yields benefit through the flow and exchange of data across systems. The extensive use of such a tool can increase the chances for its longevity.<sup>iv</sup>

Under the Introducing Digital Immunization information systems: Exchange and Learning from Vietnam (IDEAL-Vietnam) project funded by the Bill & Melinda Gates Foundation, PATH worked closely with the National Expanded Program on Immunization (NEPI) in Vietnam to facilitate a successful transition to an entirely paperless immunization system. This was the continuation of a decade-long effort to develop and scale a national electronic immunization registry, the National Immunization Information System (NIIS). As the country prepares to close its paper logbooks for the final time, NIIS is ready to stand alone with its full-fledged functionalities and some add-on perks, including the e-Immunization card, known as Sổ Tiêm Chủng Điện Tử (STCDT)—a mobile app for parents/caregivers and clients to access their children’s or their own immunization records.

This case study references evaluation of immunization mobile apps and caregivers’ perspectives in Ontario, Canada,<sup>i</sup> and Karachi, Pakistan,<sup>ii</sup> as well as technical report from the European Centre for Disease Prevention and Control on designing and implementing an immunization information system<sup>iv</sup> to shine a light on the development and deployment of STCDT in Vietnam.

# WHY IS A MOBILE APPLICATION FOR IMMUNIZATION NECESSARY?

The current method of tracking pediatric routine immunizations is based on paper immunization records given to caregivers the first time the child comes in for vaccination. If the paper record is forgotten at the next immunization encounter, a new one is given, and the information is updated with the original record. Caregivers are encouraged to maintain these paper records on behalf of their children until they reach adulthood. Because immunizations are increasingly delivered at multiple health care locations (e.g., at hospitals, commune health centers, and fee-based immunization facilities) and people are increasingly mobile, these records can become disorganized and fragmented. Paper records can also be easily misplaced, prone to hand-writing errors, and lacking information if not brought to every immunization session. In addition, there is no digital backup of the data and no real-time transfer of vaccination status to public health officials.



Photo - Immunization staff are pasting tracking codes on paper immunization . *Source: PATH*

A survey in Ontario in 2014 revealed that by the time a child was seven years old, 30 percent of parents had misplaced their child's paper immunization record. Fifteen percent of cards had incomplete records, and at least 24 percent of cards contained data entry errors.<sup>i</sup> The current system therefore leaves room for improvement.

To enhance the uptake of childhood vaccines and overall vaccination rates as well as overcome barriers related to vaccination coverage, cost-effective and user-friendly mobile apps are required to raise awareness regarding the continuation of vaccination services and the importance of timely vaccination. In Ontario, the solution was a mobile app, which provided a simple, mobile mechanism to help people keep their own and all of their family's immunization information in one place. The app contained the recommended provincial immunization schedule, which interacted with user demographic information to provide a customized schedule. The app created a virtual immunization record similar to the existing paper record.



Photo - Two mothers are tracking their child's vaccination information through the app. *Source: PATH*

In a more recent Karachi, Pakistan, survey, most participants agreed that immunization serves an important role in protecting children from illnesses that cause morbidity and mortality. Yet the majority of participants identified forgetfulness as a significant contributor to irregular immunization. Almost all emphasized the importance of using a pre-appointment method at vaccination centers to reduce waiting times.<sup>ii</sup>

The survey in Karachi identified the following as important considerations when designing and evaluating the efficacy of a mobile app.<sup>iii</sup>



**Acceptability-** as determined by current use of smartphone-based, health-related apps among caregivers. In Karachi, the participants were quite familiar with apps related to pregnancy, fitness, growth monitoring, medication, and reproductive health.



**Usability-** for example, local, language-based apps with details about the benefits of immunization, information on childhood nutrition guided by a pediatrician, growth monitoring charts, and the facilitation of appointment scheduling. The Karachi participants recommended the app interface be more flexible and aesthetically attractive with better functionality.



**Facilitators-** includes factors such as general willingness to download a routine immunization-based smartphone app, perceptions of vaccination reminders as beneficial to vaccination adherence, caregivers' attitudes toward vaccination, and caregivers' literacy rates and ownership of smartphones.



**Perceived barriers-** issues related to downloading the mobile app, app performance (e.g., crashing), billing issues, hanging issues, network problems, privacy concerns, functions not supported by the smartphone, and more.



# VIETNAM SMARTPHONE AND MOBILE DATA COVERAGE LANDSCAPE

Vietnam is a mobile-first market, with nearly all internet users owning a smartphone and three-fourths of these users citing it as their preferred connection device. In 2021, the number of mobile internet users in Vietnam was estimated at 71.54 million, covering 84 percent of the population and ranking the country in the top ten globally. This number is projected to reach 82.15 million users by 2025<sup>v</sup> (Fig. 1). Whereas personal computers are the more likely primary connection device in urban areas, rural users prefer their smartphones.

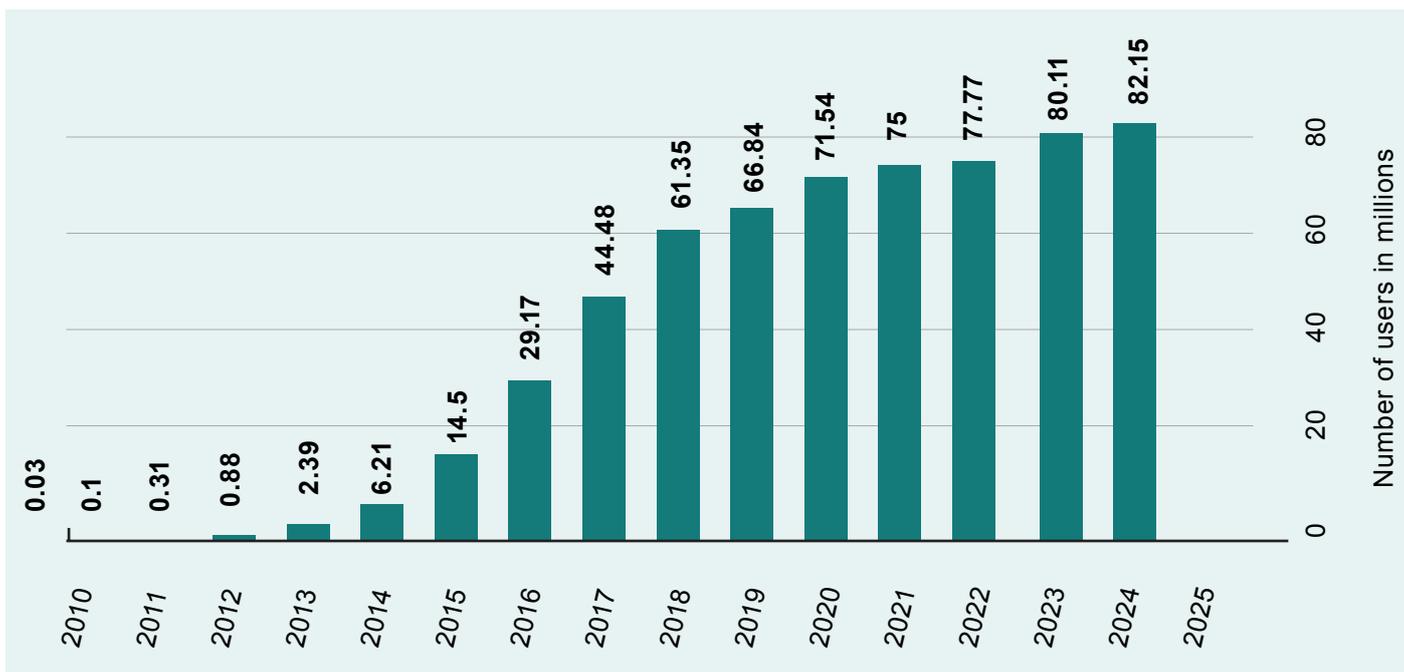
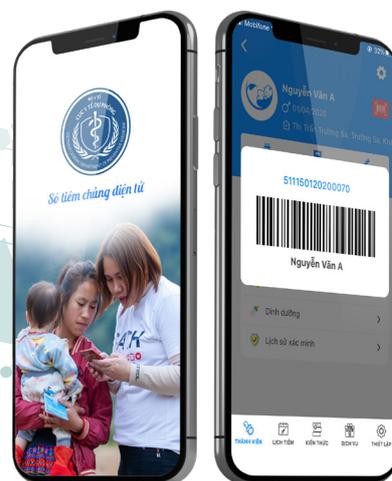


Figure 1 - Forecast of the number of mobile internet users in Vietnam from 2010 to 2025. Source: Statista 2022.

Although Wi-Fi at home or work is the preferred connection method, Vietnamese users often purchase mobile data plans and package. Lack of 3G and 4G connections may limit rural smartphone users to connecting mainly at home; however, urbanites have more access to these networks and buy mobile data plan and packages more regularly.<sup>vi</sup> (Fig. 2)





Together with the establishment of a fully functional NIIS, increasingly widespread data coverage and smartphone usage created an ideal environment for developing an e-Immunization card in Vietnam.

Figure 2 - Network coverage by Viettel, Vietnam's largest mobile network operator. Source: nperf.com.vii



# THE E-IMMUNIZATION CARD (STCDT)

STCDT is essentially a function of the NIIS. It is a mobile app compatible with both iOS and Android platforms and developed by Viettel Business Solutions Corporation, Vietnam's largest mobile network operator, in collaboration with the Vietnam NEPI and PATH. This partnership and close collaboration also created the NIIS. Families and households are encouraged to download the mobile app, which NEPI hopes will eventually replace paper immunization cards.

STCDT links with the NIIS database, in which individual demographic and vaccination data have been entered by immunization staff at the time of vaccination. All information is accessible on the app through a unique immunization record number combined with verification via a one-time password code sent to the phone number registered on the system for the particular client. Caregivers/clients can check on their immunization history and activities and provide feedback to the immunization staff at their commune health center should there be any mistakes to correct or changes to make in their demographic or immunization information.

Furthermore, when the commune health center immunization staff plan for upcoming immunization sessions with the list of children due for that month, the app will automatically send a pop-up reminder to relevant users with detailed information on the shots due and the time and location of the session.

Parents with multiple children can access each child's immunization record in the same app, as long as they are all registered under a single phone number. This feature is particularly convenient for parents in rural areas who tend to have more than one child. They can keep all the records in one place.

Last, STCDT offers a wealth of information for caregivers/clients on all vaccines in the NEPI, from the schedules, benefits, and risks to what to expect. Caregivers and clients can even use STCDT to report adverse events following immunization should they notice anything of concern. STCDT also provides updates on NEPI policies and guidelines. Through this proactive and constant flow of communication, the NEPI hopes to empower caregivers and parents to take charge of their family's immunization.



Figure 3 - Promotion poster with guidelines on how to install, register, and use the e-Immunization card application.

# STUDY LAUNCHES AND SURVEY

STCDT was launched in the two project provinces of Son La and Hanoi in September 2020. PATH developed and distributed posters to commune health centers once the app was deployed nationwide. Prior to launch, PATH conducted brief introductions and trainings for immunization staff to ensure they fully understand the app, how it functions, and its benefits, as well as how to install and explore all features of the app.

In August 2021, PATH conducted a quick survey and in-depth interviews with immunization staff and caregivers on their experiences and attitudes toward the STCDT app. Interview questions evaluated uptake within the Vietnam context and further explored findings raised by the previous study in Karachi. Questions on the acceptability and usability of STCDT were also integrated into an overall NIIS household survey in the study provinces.

This case study attempts to consolidate key findings from the survey of STCDT to paint a more complete picture of the NIIS and the evolving digital ecosystem within the Vietnam immunization program.



# EVALUATION FINDINGS

Nearly one year after launching STCDT, 168,550 accounts were open and active. As STCDT was still in its pilot stage in the two project provinces, channels for promotion were quite limited, with participants obtaining information mostly through word of mouth or guidelines from immunization staff during immunization sessions. As there was typically a crowd with many children to vaccinate at these sessions, inadequate promotion and instruction were offered.

Out of the 477 surveyed households in Hanoi and Son La, 94 (20 percent) were aware of STCDT, and 50 (10 percent) had downloaded and used STCDT for tracking and following their children’s immunization records and schedules.

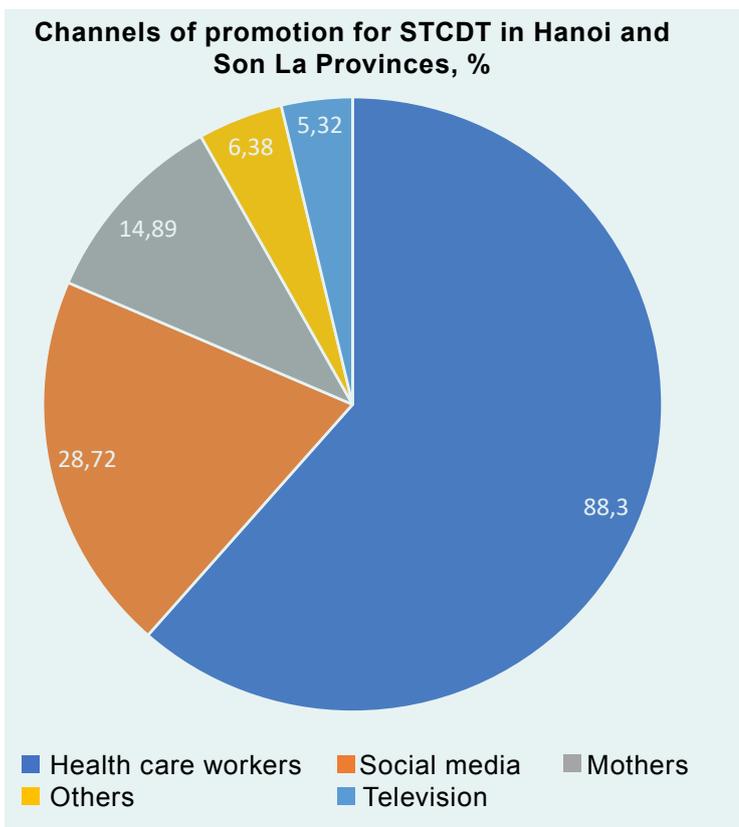


Figure 4 – Percentage distribution of different channels for promotion of STCDT in Hanoi and Son La Provinces, Vietnam.

Our in-depth interviews on perceptions and attitudes of caregivers/parents toward STCDT explored four aspects of the app: acceptability, usability, perceived barriers, and facilitators. The benefits and practicality of STCDT were clearly enjoyed and accepted by the caregivers/parents who had downloaded and used the app.



Photo - Immunization staff are conducting interview with parent on the e-Immunization card. Source: PATH

“I don’t have any problem in downloading, registering, and using Sổ Tiêm Chủng Điện Tử. I can track my child’s immunization record. And the best part is I don’t have to search for the paper every time I have to take her to the commune health center.”

– a mother from Huoi Mot Commune, Song Ma District, Son La



“I have... couple of paper immunization records for each child, and I have two children. It is much easier with the app to follow their schedule.”

– a mother from Thon Da Commune, Ba Vi District, Hanoi

Caregivers/parents also expressed confidence in their children’s immunization status—what shots they have received and what shots they will need and when those shots are due.

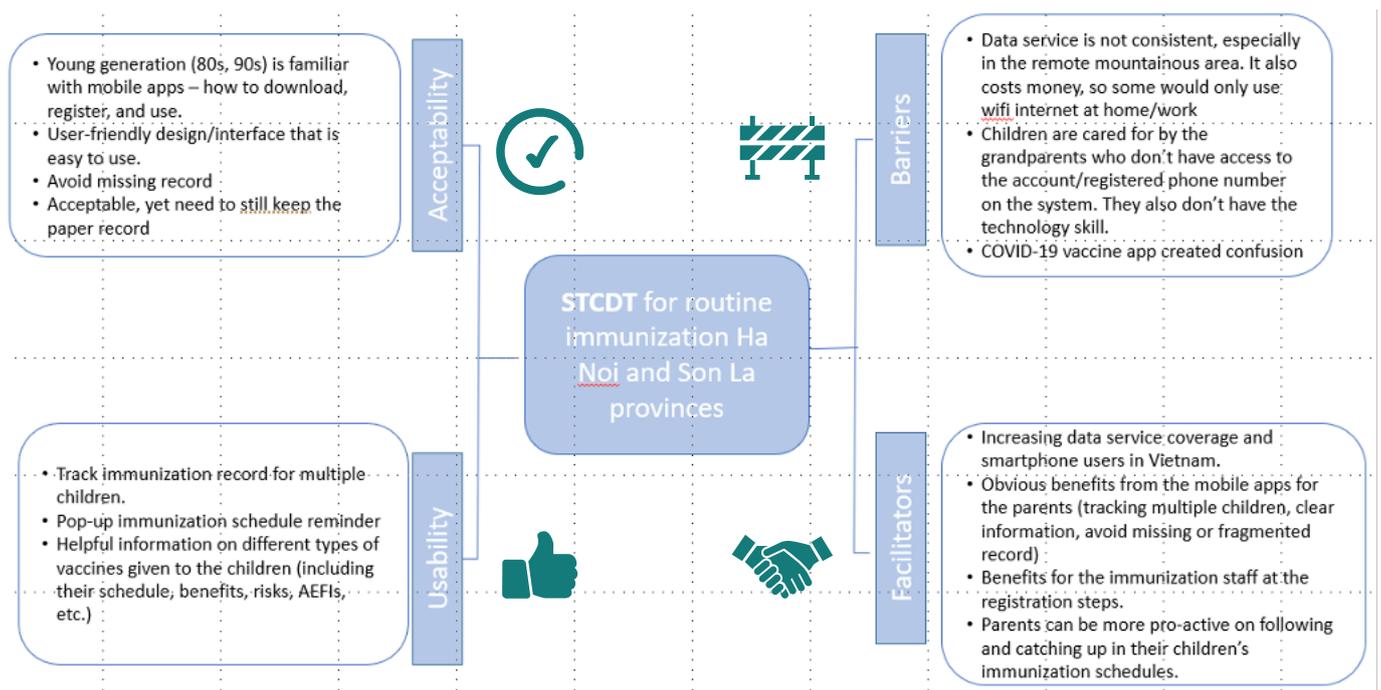


Figure 5 – Parents'/caregivers' overall perceptions of STCDT in Son La and Hanoi Provinces, Vietnam.

However, rolling out STCDT was not without barriers and challenges, many of which are unique to Son La and Hanoi. In the remote, mountainous areas of Son La province, mobile data service is inconsistent, and smartphone usage is lower than in Hanoi. Children are often cared for by the grandmothers (while their parents work in the fields), and these caregivers have limited technology skills and interest. Participants in Hanoi, on the other hand, have been overwhelmed with mobile apps, especially during the time of COVID-19. Multiple health apps have been introduced there, and STCDT has been indistinctively confused with other vaccine tracking apps (e.g., for COVID-19 vaccine) by both parents/caregivers and even immunization staff.



Photo - PATH staff instructing a mother to use STCDT. Source: PATH

# LESSONS LEARNED AND MOVING FORWARD

Although the evaluation size was quite minimal, the overall consensus and positive attitude of both health care workers and caregivers toward the app was an encouraging result. Challenges remain; ample effort and commitment are needed to further disperse the app throughout the population. Learning from the initial stage of app dissemination, the next phase of implementation needs to focus on:



1. Increasing communication to parents on STCDT's benefits through mass media such as television, radio, and social media (e.g., Facebook and Zalo) in concert with on-site communication at immunization sessions (e.g., posters, loudspeakers).



2. Encouraging health care workers to proactively engage parents, such as instructing and guiding them on how to install and explore all features of the app; further engaging with staff at hospitals or clinics with delivery rooms. (As soon as a child is born and vaccinated with the hepatitis B birth dose, an account is created in NIIS and thus registered on STCDT. The earlier the caregivers/clients have access to information on the immunization schedule, the better their engagement.)



3. For upper managers at district and province level, closely monitoring the implementation of STCDT at commune health centers, hospitals, and fee-based immunization facilities to evaluate and encourage uptake from the community.



4. Developing clear branding for the app in multiple app stores to distinguish STCDT from the many other apps on the market—emphasizing its uniquely beneficial link with the NIIS. (Immunization and demographic data are synced via an application programming interface, following international standards and Ministry of Health regulations to ensure interoperability.)



5. Considering including information on nutrition, diet plans, and growth charts to help caregivers and parents monitor and track their children's health.

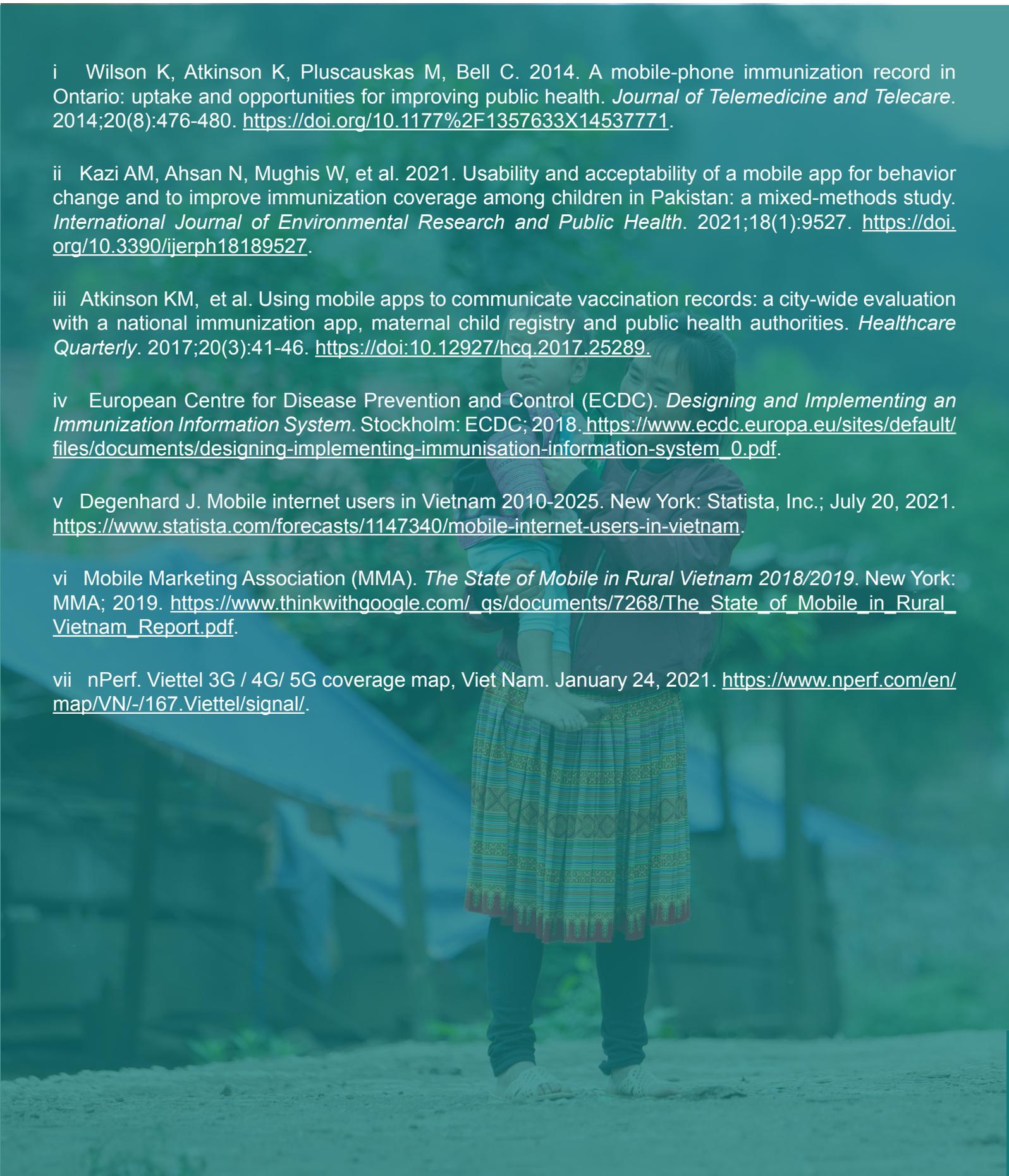
“The percentage of users among clients is still low. If every mother came in with the application, it would be so much easier for us to scan the app than manually search their handwritten names on the paper card.”

– immunization staff at commune health center



While the NIIS has been successfully implemented nationwide, STCDT should be amplified throughout the country. Our findings show that the mobile app can contribute to the continuity of care for each child throughout the immunization schedule. Empowering caregivers/parents with knowledge and useful tools will help improve overall immunization coverage.

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