“Too many books to write”
- an evaluation of administration for health workers before and after MyChild Card in Uganda
This report is written by

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Glossary

**Smart Paper Technology**™ (SPT): Internet-based software that supports a range of processes including data capture and recognition, verification, archiving and exporting, widely used in banking and travel industries. Shifo is the first organisation to apply SPT to child health services delivery in low- and middle-income countries.

**eHealth**: the term has been used since the early 2000s to denote an increasingly broad concept with no single, clear definition. An inter-disciplinary field that lies at the intersection between health, information and communications technology (ICT), computer science, and mobile and web applications, it loosely refers to the ICT tools and services used in the healthcare sector.

**Interoperability**: the ability of applications to communicate seamlessly with each other. Levels include cross-border, semantic, technical, legal and organisational interoperability.

Abbreviations

**DHIS2**: District Health Information Software, version 2, an open source web-based health management information system for the reporting, analysis and dissemination of health programmes data.

**EPI**: Expanded Programme on Immunisation developed by the World Health Organisation in 1974 with the goal of reducing child morbidity and mortality by making immunisation services available for all children. First implemented in Uganda in 1975.

**FHW**: Frontline health worker. The term as used here encompasses nurses, nursing assistants, volunteers working as vaccinators, and health information assistants who work within the delivery of preventive child health services.

**HC (II-IV)**: Health centres ranging from village health teams (level I) to health sub-districts (level IV) providing a range of health services including EPI.

**HMIS**: Health management information system

**HSD**: Health sub-district
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Summary

Objective: To evaluate efficiency gains by reducing administration and reporting time for health workers with MyChild Card. This impact evaluation forms part of a series of reports within ongoing implementation research being conducted on MyChild Card developed by Shifo Foundation. The purpose of this evaluation is to measure the difference on time spent for administration and reporting for frontline health workers before and after implementation of MyChild Card in Mukono and Dokolo districts in Uganda.

Intervention: MyChild Card based on Smart Paper Technology™. MyChild Card is a child health card and a system with a digital component based on Smart Paper Technology™ that can be used in settings without electricity or computers to document key data about a child’s health at the point of care. It is designed to be used by health workers in health centres or during outreach sessions, after which the data captured in specially designed “smart paper” vouchers from the sessions is scanned and digitised on a district or health sub district level which has access to electricity.

Design: A case control study comprised of on-site observations of time spent on administrative tasks related to the delivery of child health services, as well as semi-structured interviews with health workers was carried out. Evaluation was conducted in Mukono and Dokolo Districts before and after implementation of MyChild Card.

Main results: With currently-used administrative procedures, health workers spend 5.5 minutes per child on administration for newborns or first visits; with MyChild Card they spend 2.8 minutes. This is the equivalent of 49% reduction in administration per newborn child. For follow up visits, the average time spent is 2.6 minutes, whereas with MyChild Card it is 0.4 minutes. This is about 85% reduction in administration per follow up visit. We have conservatively estimated that 672 minutes or 11.2 hours are spent per month on after care administrative tasks, compared with an average of 26 minutes using MyChild Card. This amounts to a saving of 10.8 hours, or about 96% reduction in administration per health centre and month.

Per child fully immunised there is a 72% reduction in administration and reporting with 4.4 minutes spent with MyChild Card compared to 15.9 minutes spent before with HMIS forms.

Per health centre with 100 children and 20 EPI sessions, more than 90 hours are saved with MyChild Card which is approximately a month of EPI sessions or one extra person into each health centre respectively, which is an important gain in the settings with extreme scarcity of human resources.
1. Introduction

This impact evaluation forms part of a series of reports within ongoing implementation research being conducted on MyChild Card which is developed by Shifo Foundation. The purpose of this evaluation is to measure the difference on time spent for administration and reporting for frontline health workers before and after implementation of MyChild Card. This report focuses on evaluation conducted in two districts of Uganda - Mukono and Dokolo - where MyChild Card was implemented in 2015 and 2016 respectively.

MyChild Card

MyChild Card is the first child health card to make use of Smart Paper Technology™. Designed to be kept by families and used by health workers during child health service delivery, it is used to capture data about a child’s health at the point of care using only one tool - MyChild Card - thus circumventing the need to record children’s information in multiple forms such as registers, tally sheets etc.

MyChild Cards are given to families with children in health centres, during outreach sessions or by community health workers in the communities. Health workers enter information about the services provided to each child using ballpoint pens on ‘Smart Paper Vouchers’ in MyChild Cards just as would be normally done with regular child health cards. All the vouchers from the MyChild Card are compiled and brought to the Scanning Station, which are situated on a central level e.g. District Health Office which have reliable source of electricity, using the same delivery channels which are used today to deliver the monthly reports. At the Scanning Stations vouchers are scanned and automatically digitised.

Once the vouchers are digitised the following actions are done automatically by MyChild system:

- Every child is registered and an individual medical record is created
- Families receive automatic SMS reminders notifying them about the due date
- Reports are automatically generated, supplied to DHIS2
- Follow up list of children who missed their visit is created to be given to community health workers
- Accurate data with information about coverage, progress, and gaps per facility is automatically generated and shared with key stakeholders for results-based resource mobilisation and to close the gaps in service delivery

The result is that the delivery of preventive child health services is streamlined through the reduction and/or elimination of currently used procedures that may be inefficient, and the time spent by health workers on paper work and administration is reduced, meaning that families and children spend less time waiting to receive health services. Through the use of SMS messages to remind families about due date, and follow-up lists to community health workers, MyChild Card enables every child to be registered and followed up.

With MyChild Card delivery of preventive child health services is streamlined through the elimination of the following HMIS tools that today constitute the bulk of the paper work or administration for health workers, and which have become inefficient due to population growth and limited human resources.

With MyChild Card every child can be registered and followed up; health workers only work with one tool thus reducing the time spent on administration during and after care delivery, and at the same time the system provides automatically generated data and insights for decision making. The time saved for health workers means less waiting time in queue for families, more time per child to deliver health services and less attrition. MyChild Card is the first solution which bypasses the need for electricity and network coverage on health facility level, yet delivering on all the anticipated values of electronic medical records.
This is key to reach every child no matter where they live, scale the solution nationally without being constrained by the infrastructural limitations taking into account that in sub-Saharan Africa more than 30% of health facilities, serving approximately 255 million people, do not have a reliable source of electricity (1). In Uganda only 42% of health facilities have access to a stable power supply (1).

MyChild Card is interoperable with health information systems such as DHIS2, currently used to report aggregated statistics in a number of low- and middle-income countries. With MyChild Card reports can automatically be sent to the DHIS2 system on a district and national level. By foregoing the need for electricity or internet connectivity during patient interaction, MyChild Card is less vulnerable to infrastructural constraints that can hamper the performance of eHealth solutions.

MyChild Card was integrated into the workflow in Mukono Health Centre IV, and each of the 74 health service delivery points (including facility- and outreach-based) in Dokolo District delivering preventive child services. All children visiting the selected health centres to receive preventive health services including vaccination, received MyChild cards. Scanning stations were deployed at health sub-districts at Mukono HC IV, Dokolo HC IV and Dokolo District Health Office which have electricity, internet connectivity and security.

During the current period of transition, health workers first transfer data from existing Child Health Cards into MyChild Card and continue working with MyChild Card at all subsequent visits. Despite the fact that with MyChild Card HMIS reports such as tally sheets, monthly HMIS reports are automatically generated, it was suggested that during the first six months, tallying and manual generation of monthly reports would be done. This was suggested as a means to compare monthly HMIS reports generated manually with those by MyChild System, as well as to have a gradual transition to MyChild Card based on agreed change management processes.

In the evaluation, only tasks which are done with MyChild Card were considered in order to assess the effects of the MyChild card on time reduction for health workers. The time reduction is achieved through the automatic generation of reports such as:

1. Child Register - HMIS Form 073
2. Child Tally Sheet - HMIS Form 073a
3. Health unit daily attendance summary (static/community based) - Table 3a
4. Health unit outpatient monthly report (Child health services) - HMIS Form105
5. Health unit annual report (child health services) - HMIS Form 107
6. Deworming register - HMIS Form 075

Other reports which are not part of routine reporting standards are not mentioned in the paper such as RED Strategy Categorisation, data about the gaps etc. but can be automatically generated by MyChild Card and Reporting system accordingly.
2. Background

The way in which information is collected about immunisation services in low-income countries has in large measure, remained unchanged since the introduction of the expanded programme on immunisation (EPI) by the World Health Organisation in 1974. Health workers at the point of care delivery - in health centres or community outreach sessions - still use paper registers in which they enter the details of the vaccines and other services provided to children, as well as chronicle the resources used in the provision of these services; after which the data is then sent to district and national levels on a monthly basis through aggregated reports (2).

This method continues to be widely used despite the fact that not only is paper-based data collection and recovery a time-consuming process, prone to errors that detracts from time spent delivering quality care (3), and for health systems struggling with the twin concerns of health worker shortages and population growth, it is an inefficient use of resources. This not only leads to unreliable and fragmented data along the healthcare chain, but has a knock-on effect of intensifying the workload of health workers, about which nurses have continuously complained (4). One notable impact of this is that policy and decision-makers, and key stakeholders do not have reliable and relevant information on which to base decisions, ascertain gaps in service delivery, or implement appropriate interventions (5).

The shortage (6), and unequal distribution (7) of human resources are additional major constraints. Sub-Saharan Africa has only 4% of the health workers but 25% of the global burden of disease (8), and there are 2 doctors and 11 nurses, compared with 19 doctors and 49 nurses for the Americas, and in Europe 32 doctors and 78 nurses per 10,000 population, respectively (9). For example, as a result of the nurse shortage affecting the Ugandan health sector (7), the nurse-patient ratio can be one nurse to a population of more than 3000 (5).

Despite this, little attention seems to be paid to adopting practical measures to alleviate the work burden. Thus for instance, it is possible to see that for every well-intentioned initiative for instance, mosquito nets for families, an additional form or register is required to be completed by health workers (10) as part of accountability to donors, thereby adding to the work load, and reducing the time with children and their parents, who would have walked a significant distance to get to the health centre especially in the rural areas.

Moreover, because work processes are not fully integrated across departments and the immunisation process is structured around paper administration, it is not unusual for a mother who has given birth mere hours previously to have to make her way to the immunisation department, where she may wait for as long as four hours for her child to receive BCG and polio vaccinations and complete all administration during care. The health workers complete as much of the administration as possible before administering vaccines. It takes about four hours because the health workers are required to document all patient data, much of it duplicated in several registers. Lengthy waiting times (11) is one of the main reasons why parents don’t complete their child's vaccination schedule.

eHealth applications - a double-edged sword

Electronic immunisation registries have been suggested as an alternative means to counter the issues plaguing effective delivery of preventive child health services (2; 12), with the capacity to automate administrative functions and eliminate paper processes (13), and provide a single data collection point for health workers to follow patients along the care delivery chain and across levels of care providers; and facilitate individual follow-up (11; 14).

In sub-Saharan Africa, many point-of-care eHealth applications "remain at a small scale" (15). This is as a result of several factors, such as the significant resources required for implementation and maintenance,
including skilled human, financial and technical resources (16); the high cost of set-up and maintenance, due to poor existing infrastructure (17;18); frequent power outages and network failure; the lack of security in health facilities (19; 20; 21); and the low level of computer literacy/readiness for frontline health workers (22).

The lack of a robust eco-system along with the inequitable distribution of human resources has affected the realisation of the full benefits of eHealth systems in sub-Saharan Africa (19). While the Ugandan Government has stated that, “data connectivity and networking in Uganda covers almost 100% of the whole country including urban, district, rural and remote areas” (23), it concedes that the "cost of internet is still high, compounded by unreliable or unavailable power supply especially in lower health units and rural communities" (23). In addition hardware such as computers are few, poorly maintained and under-utilised particularly in rural and remote health facilities (23).

Moreover, it is uncertain if electronic systems provide a more efficient alternative to paper-based systems by enabling better care quality to patients and less administration to health workers. It has been suggested that the expected benefits of eHealth applications will not accrue if they are not "user-centric, user-friendly, and universally available so as to avoid the danger of health inequalities resulting from the 'digital divide' "(24).

Based on these limitations, the full potential for the use of eHealth systems cannot be realised today and for some years to come. The development of MyChild Card was led by the fact that while there is great advocacy for the use of point-of-care ICT to address issues with health service delivery in low-resource settings, the reality is that in many areas, particularly rural settings, the infrastructure to support eHealth is weak or does not exist. We contend that the adoption of eHealth applications will remain limited and confined to pilot initiatives or urban areas as long as the solutions are not adapted to work within the existing infrastructural limitations facing health systems in low-income countries.
3. Methods

Evaluation setting

Observation was done in health centres which provide preventive child health services including immunisation; monitoring nutritional status, growth and development; HIV prevention and counselling; provision of mosquito nets and supplements such as Vitamin A and deworming. The EPI nurse administers vaccines and may be assisted by members of the village health team working as vaccinators, as well as health information assistants, whose role it is to enter all information pertaining to the child into HMIS forms such as Child Health Card, Child Register, and Tally Sheet.

Each of these areas of work have different processes and it is the responsibility of the persons working in the EPI department to ensure they are done. At times in a level III or IV health centre, there may be a team of 2-4 persons working together in tandem. In health centre IIs however, there may be one nurse or nursing assistant who would do all these asks - provide health talks, administer vaccines and satisfy paper work requirements.

Mukono and Dokolo Districts

Mukono District is a district in Central Region of Uganda. Baseline data was collected in Mukono HC4 in October-November 2015 before implementation of MyChild Card. Post intervention was conducted in September 2016.

Dokolo District lies in the Northern Region of Uganda, where baseline data was collected in the beginning July 2016, before the introduction of MyChild Card on July 25th in all health service delivery points across the district. Post intervention evaluation was conducted in September and October 2016 after three months of operations of MyChild Card in Dokolo District.

Sampling of the health centres was done to capture results from the different administrative levels of health service delivery including health centre (HC) levels II, III, and IV where preventive child health services, including vaccination are provided. Dokolo District has only one HC IV; therefore, it was automatically included in our evaluation. A level II health centre - Abalang, and a level III health centre - Bata, were randomly selected from the district. In Mukono district, MyChild Card was only implemented in Mukono Health Centre IV therefore included in the study.

Participants

Participants were frontline health workers, including nurses, nursing assistants, and health information assistants, who work in EPI department. Participants were selected based on their presence during care delivery at the time of evaluation.

Involving different levels of health centres and health workers allowed us to get a broad overview of how health information management affects their daily work at health centre and community levels, and how MyChild Card is being used and received. These findings provide cases and evidence we can extrapolate to demonstrate the potential effects of MyChild Card if it is deployed at a larger scale in Uganda and in similar contexts.

Participants were informed that participation was voluntary and that all responses would be kept confidential.
Data collection methods and tools

A comparative intervention mixed-methods study with on-site observations of time spent on administrative tasks related to the delivery of child health services, as well as semi-structured interviews with health workers was carried out.

i) Direct observation - to measure time spent on administration and reporting during and after the end of EPI session.

Data collection tools included observation guide. The observation guide was used to measure time spent on each administrative task in the EPI department during care delivery and at the end of the day/session, and document notes about the observed deviations. Detailed diagrams depicting administrative tasks and tasks eliminated/reduced with MyChild Card in EPI are mentioned elsewhere (25).

The data collected from the observation guide was entered and analysed in a database using Numbers programme.

ii) Semi-structured interviews - to ascertain health worker perceptions and identify time spent on administrative tasks which could not be observed.

Semi-structured interviews with all respondents, using a combination of closed- and open-ended questions, were conducted in order to ascertain their experiences and perceptions of work processes with HMIS forms. Respondents were asked to share general perceptions of the administration during and after EPI sessions.

Interviews were conducted to document time spent on administrative tasks which could not be directly observed, i.e. tasks which are done on a monthly, quarterly and yearly basis such as compiling monthly and annual reports, compiling the defaulter list, etc.

Following the implementation of MyChild Card, health workers were asked to share their perceptions on MyChild Card and if it had had any impact on their work, and whether any changes had been noticed in their daily work flows. All evaluation tools were pre-tested to identify questions that may cause confusion or be misinterpreted by participants; these were revised based on the results of those tests.
4. Results

Results of observations before and after introduction of MyChild Card

Health workers perform administration and reporting during and after care delivery as well as on a monthly, quarterly and yearly basis. Quantitative results include only data on the administrative tasks which were observed, thus documented. For a number of children, tasks were not done completely because of high patient flow, limited number of health workers and/or non-adherence to the standards of administration and reporting.

Before implementing MyChild Card, the following limitations in the workflow were observed:

- Incomplete or wrong data being entered when filling in Tally Sheet with mistakes in child’s age, sex, antigens administered.
- Families with children spent the majority of their time in the queue waiting to receive vaccination and to be registered in the Child Register. Because health workers were pressed for time, health talks to families were not prioritised during care delivery and the waiting time of families was not utilised to provide the families with relevant information about the preventive health services and their importance.
- Health centre IVs with a high patient flow needed to work with many issues (books) of Child Registers which can go up to more than 12 issues during a year. Therefore it became cumbersome to use them in the health centre to register children and services provided and to carry them to outreach sessions. Searching for children and registering follow up visits was a laborious process, and health workers had difficulty at times to find a child’s entry in the Child Register. The Child Register is the only back up mechanism if the Child Health Card is lost, and given that children may not be registered in the Child Registers, the entire medical history of a child regarding preventive health services may be lost. Due to wear and tear, the cover falls off and subsequently the outermost pages also fall off – which are then placed between the pages of the register. This results in the pages becoming the ‘outer cover’ and getting so tattered and dog-eared that it is impossible to decipher the child registration number and name.
- It was observed that health service delivery process is very slow and not linear – many tasks were either done concurrently by more than one person, or begun by one person and taken over by another. Tally sheets and reporting requirements during care delivery process took nurses’ focus from families and children. Health unit daily EPI Attendance Summary and Deworming Register were not available in the health centres, thus not filled in.
- 30-66% of the families were not registered in the Child Register. A number of reasons were noted and these included, 1) where the registration process was done after the vaccination was administered, families would leave the health centre without waiting for their turn in the queue, 2) if child was not found in the Child Register information about the child was not captured, 3) children who came for follow up visit and were registered in another health centre were also left out from the Child Register, 4) in health centres with high flow of children and too few health workers to provide all health services, registers tended not to be filled for every child.
Time saved per child fully immunised during care delivery

The evaluation results show that on average per fully immunised child, 4,4 minutes are spent on administration and reporting with MyChild Card, compared with 15,9 minutes spent with HMIS forms, this is a 72% reduction. For children to be fully immunised in Uganda they should receive vaccines during at least five visits, thus the calculation assumes one first time visit and four follow up visits.

With the automatic generation of reports by MyChild Card and the elimination of a number of HMIS forms, the processes become more efficient, and save time for health workers. Detailed results of time spent on administration before and after MyChild Card are presented below.

Time saved per newborn or first visit

From the data in Table 1 it is evident that health workers spend an average of 5,5 minutes per child and 2,8 minutes with MyChild Card. This is the equivalent of a 49% reduction in administration per newborn child.

To understand the magnitude of these numbers, with about 100 first time visits the time saving is on average 4,5 hours per day.

Table 1: Administrative tasks during first visit before and after introduction of MyChild Card

<table>
<thead>
<tr>
<th>Task Description</th>
<th>Time spent before MyChild Card</th>
<th>Time spent after MyChild Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>1 Issue, fold and fill in Child Health Card</td>
<td>3,0</td>
<td>2,3</td>
</tr>
<tr>
<td>2 Fill in the Child Register</td>
<td>2,4</td>
<td>1,0</td>
</tr>
<tr>
<td>3 Tally vaccines, other services administered in Tally Sheet</td>
<td>0,1</td>
<td>0,02</td>
</tr>
<tr>
<td>Total time spent per child on all tasks</td>
<td>5,5</td>
<td>3,32</td>
</tr>
<tr>
<td>Time saved per child with MyChild Card (minutes)</td>
<td>2,7</td>
<td>1,32</td>
</tr>
</tbody>
</table>

Time saved per follow up visit

The data in Table 2 shows that health workers spend an average of 2,6 minutes per child before and 0,40 minutes after introduction of MyChild Card. This is an 85% reduction in administration per follow up visit.

For follow up visit the reduction in administration is 2,2 minutes on average, 0,3 and 12,23 minutes minimum and maximum respectively.
The range between minimum and maximum time spent on tasks before MyChild Card is wide for a number of reasons such as 1) depending on the age of the child and in which issue of Child Register their details are entered, the time it takes to find the entry in the Child Register varies considerably; 2) if the child number is not written on the Child Health Card with a corresponding reference in the Child Register, health workers need to search through many issues of Child Registers; and 3) making mistakes and reworking them such as filling in vaccines for a different child in the Child Register.

For 100 follow up visits health workers would spend about 40 minutes compared with more than 4 hours with HMIS forms.

Table 2: Administrative tasks for follow up visits before and after introduction of MyChild Card

<table>
<thead>
<tr>
<th>Follow up visit</th>
<th>Time spent before MyChild Card</th>
<th>Time spent after MyChild Card</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Minimum</td>
</tr>
<tr>
<td>Find the child in Child Register</td>
<td>1,0</td>
<td>0,15</td>
</tr>
<tr>
<td>Fill in vaccines, other services administered in Child Health Card</td>
<td>0,7</td>
<td>0,10</td>
</tr>
<tr>
<td>Fill in vaccines, other services administered in Child Register</td>
<td>0,7</td>
<td>0,14</td>
</tr>
<tr>
<td>Tally vaccines, other services administered in Tally Sheet</td>
<td>0,20</td>
<td>0,03</td>
</tr>
<tr>
<td>Total time spent per child with all tasks</td>
<td>2,6</td>
<td>0,42</td>
</tr>
<tr>
<td>Time saved per child with MyChild Card (minutes)</td>
<td>2,2</td>
<td>0,30</td>
</tr>
</tbody>
</table>
Time saved for after care delivery tasks on a monthly basis

Once the day’s session of service delivery ends, health workers complete an additional number of administrative tasks, such as preparing data for daily and monthly reports, among others. Table 3 depicts the time spent on the tasks which were obtained during observations and interviews.

Taking into account the conservative estimate of 11,2 hours (the minimum time spent for tasks with HMIS forms), about 646 minutes or 10,8 hours are saved with MyChild Card for after care administrative tasks per month. This is about 96% reduction in administration per health centre and month. It should be noted that the administrative time spent on compiling the defaulter list to follow up on children who missed their vaccination schedule, and other tasks where the amount of time spent is unknown, was not included in the calculation.
Table 3. Administrative tasks after EPI sessions (end of the day) on a monthly basis before and after introduction of MyChild Card

<table>
<thead>
<tr>
<th>Tasks at the end of EPI session</th>
<th>Time spent before MyChild Card</th>
<th>Average/Deviations</th>
<th>Time spent after MyChild Card</th>
<th>Average time</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Complete Tally Sheet at the end of the day</td>
<td>3,6 minutes per session</td>
<td>*with 20 sessions per month, 72 minutes are spent on this task</td>
<td>Fill in Session Voucher. Place Session Voucher on top of all Vouchers from the day's session, wrap with a rubber band</td>
<td>0,7</td>
<td>0,44</td>
<td>1,2</td>
</tr>
<tr>
<td><strong>2</strong> Fill in TABLE 3a: Health unit EPI daily attendance summary</td>
<td>60-120 minutes</td>
<td>*depends on number of children in EPI *depends on if tally was done. If not done, it could take longer or may not be done at all *if form is not available health workers improvise report in exercise books *In two health centres this form was unavailable and not filled in</td>
<td>Scan Session Vouchers</td>
<td>25 minutes</td>
<td>*About 1 minute per session. For health centre with 25 EPI sessions per month, 25 minutes will be spent</td>
<td></td>
</tr>
<tr>
<td><strong>3</strong> Compile TABLE 3b: Health unit EPI monthly attendance summary</td>
<td>60 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4</strong> Compile follow up list with defaulter children</td>
<td>Was not observed in selected health centres</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5</strong> Compile HMIS form 105 on a monthly basis</td>
<td>8-16 hours</td>
<td>*depends on if daily/monthly summaries were done and can be easily found</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6</strong> Compile HMIS form 107 on an annual basis</td>
<td>Unknown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total time spent per child with all tasks</strong></td>
<td>672 minutes or 11,2 hours</td>
<td>*the minimum times spent are considered here</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time saved per child with MyChild Card (minutes/hours)</strong></td>
<td>646 minutes or 10,8 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In order to understand how time saved translates in the real setting, one health centre with twenty sessions a month and 100 children during each session is brought as an example. The assumption is made whereby 50 children come for the first time and 50 for follow up visit. As shown in Table 4, more than 92 hours can be saved per health centre with MyChild Card per month.

The calculations do not include the time spent on administration for compiling the defaulter list, which would take a considerable amount of time in each EPI department. This reduction in administration/reporting time therefore, translates to about one month of sessions or one extra person working for about 5 hours per month, which is an important gain in the settings with extreme scarcity of human resources.

### Table 4. Time saved with MyChild Card per month and health centre after introduction of MyChild Card

<table>
<thead>
<tr>
<th>#</th>
<th>Administrative tasks</th>
<th>Current HMIS forms (average time spent)</th>
<th>MyChild Card (average time spent)</th>
<th>Time saved with MyChild Card (20 sessions - 50 new borns and 50 follow up visits per session)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>During first visit, per child</td>
<td>5,5</td>
<td>2,8</td>
<td>2,7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2700</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,7X50X20</td>
</tr>
<tr>
<td>2</td>
<td>During follow up visit, per child</td>
<td>2,6</td>
<td>0,4</td>
<td>2,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2200</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,2X50X20</td>
</tr>
<tr>
<td>3</td>
<td>End of day/monthly</td>
<td>672</td>
<td>25,7</td>
<td>646</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>646</td>
</tr>
<tr>
<td></td>
<td><strong>Total time saved per month (hours)</strong></td>
<td><strong>92,4 hours</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Semi-structured interview results

i) Before MyChild Card

Semi-structured interviews reveal that, not only is administration time-consuming, but certain tasks are often omitted to save time for service delivery. Interviewees described their administration paperwork as so overwhelming that they "are almost afraid to come to work". Specifically, the EPI Daily Attendance Summary, follow-up lists, and certain Child Register entries are often left incomplete due to the intense time-pressure. At least two days a month are also taken up with compiling reports on outreach statistics; it was expressed by interviewees that the time needed to retrieve information varied, with one health worker saying that if she were "alone, it will take three days".

In interviews, staff described a "work overload", where exhaustion and stress make recording errors a serious risk: "…the workload which was in the EPI department was about to demoralise me because there are too many books to write, you have to write the Child Register, you have to write the Child Health Card, you have to update everything..." said one nurse interviewed.

The evidence of errors made had been noted for outside quality control supervisors had noticed inconsistencies regarding data quality in HMIS reports, indicating that errors had been made during data recording at the health centre; the in-charge at one health centre remarked that "they said it was not ok because data from HMIS was not rhyming with Tally Sheets, there was some problem there. The comment was the data in Tally Sheet should really rhyme with HMIS so it means if the one in HMIS is high and Tally Sheet is low, it means that the data was cooked".

These concerns are compounded by the fact that patients often have to travel very long distances to receive care for their child, meaning that the extra hours of admin-related waiting times for patients can be especially frustrating. The lack of structure/linearity in service provision (common to all observed health centres) is also problematic.

Interview responses indicated that child information from EPI sessions is frequently not entered into the Child Register – this can be due to overwork, lost records, error, or lack of motivation. Finding data for children who lost their Child Health Cards, especially for older children, was also described as cumbersome because of the need to go through several issues of Child Registers. Health workers expressed a high degree of frustration with the current system, noting that they “barely managed” to keep up with regulations and care delivery in the context of such burdensome administration/paperwork.

Also troubling was the information that compilation of the follow-up list was often neglected. The follow-up list is a crucial aspect of reducing child mortality and morbidity because it allows health workers to identify the children who have missed scheduled immunisations (26), however the health workers said they didn't do it, "we are supposed to do it but we don't have time".

ii) After MyChild Card

A number of recurring points emerged from the health worker interviews: time taken for administration during and after EPI sessions is reduced; the usability of MyChild Cards; and the satisfaction of both health workers and parents with the new processes. Health workers revealed that "it doesn't take long" to issue a new MyChild Card and that "filling it is very easy".

One EPI nurse said "...MyChild Card is better than the...old card we were using. Because if you change the old card to MyChild Card and a mother comes back it does not even take for you two minutes to write what is inside and give the appointment date for the mother to come back. And also we are no longer using Child Register because before that you needed to write the Child Register, you would write the Child Health Card and then you fill in the Tally Sheet, you balance the vaccine control book. It [MyChild Card] has reduced the workload. However when you are starting to change [transition from MoH card to MyChild Card] it takes
some few minutes though not much time. [MyChild Card] has really helped us, we are always finishing our work a bit earlier”.

A key change was the impact that MyChild Card has had on the scarce human resources. As stated earlier, the health workers felt that insufficient personnel was an issue that impacted on the perceived work burden: staff shortages led to tasks being omitted or incomplete, and health centre performance suffered as a result. After using MyChild Card for some time, one EPI focal person said, "Change number 1 is that even if the manpower is less, still you can handle the programme satisfactorily. But with the other one [old HMIS forms], if the manpower is less it becomes very difficult....sometimes you cannot handle everything."

According to one EPI nurse, they had received positive feedback from parents: "...the comments which I have got from them, some of them told me physically, that this card is easy to handle, it does not require some folding like the other one, because the other one even they don't know to fold it, sometimes they bring it back to me and say can you fold it for me so that task with folding is no longer there with MyChild Card, and it is very easy to handle, yeah, that is what the mothers have told me".

One additional feature newly introduced to families is the SMS reminder they receive before their next expected visit. "What is amazing them so much is reminding them to come back using SMS, they are very happy that now they will not forget because for them they have much work and at times they forget to bring their children back", explained one nursing officer.

5. Limitations

More observers will likely be necessary during subsequent studies taking into account the non-linearity of service delivery. Tasks which cannot be measured during EPI sessions and are done on a monthly basis, could be observed to document the actual time spent to minimise recall bias.

For tasks which could not be observed or were not done, such as generating the defaulter list, simulation can be done using the actual Child Register to document time spent. More health centres can be included in the evaluation with repetitive observations with major possible scenarios during EPI sessions.

6. Conclusion

The results show the benefit of using MyChild Card compared to HMIS forms. With currently-used HMIS tools, health workers spend 5.5 minutes per child on administration for newborns or first visits; with MyChild Card they spend 2.8 minutes. For follow up visits, the average time spent is 2.6 minutes, whereas with MyChild Card it is 0.4 minutes. This is a 49% reduction in administration during care on the first visit, and approximately 85% reduction per follow-up visit. We conservatively estimated that 672 minutes or approximately 11 hours are spent per month on after care administrative tasks, compared with an average of 26 minutes using MyChild Card. This amounts to a saving of about 96% reduction in administration per health centre and month.

On average per child fully immunised there is a 72% reduction in administration and reporting with MyChild Card or 4.4 minutes compared with 15.9 minutes spent with HMIS forms. For children to be fully immunised in Uganda they should receive vaccines during at least five visits, thus the calculations assume one first time visit and four follow-up visits.
What are some of the lessons that can be drawn from this study and applied to other low-resource settings? There's an element of cross-border similarity to some of the challenges faced by health workers in resource-poor areas. The workload burden, data discrepancies, the difficulties in making sure every child is followed up, and insufficient time to provide individual counselling to families are some of the concerns shared by many health workers.

In order to tackle these issues as well as some of the far-reaching problems such as scarce health human resources, infrastructural constraints such as unreliable supply of electricity, and the inequitable distribution and availability of health workers, it is evident that new approaches of delivering child health services and gathering data at the point of care are needed in low-resource settings. These new approaches must be structured in ways that enhance effectiveness, efficiency, financial viability, and applicability to multiple settings.

MyChild Card does not require heavy infrastructural input, so it could be implemented on a national level in a relatively short time. The results show the benefit of using MyChild Card compared to currently used HMIS forms. One of the most promising gains of MyChild Card is that with it, countries can truly aim to reach every child and close the gaps which are causing high child mortality and morbidity from preventable diseases.
7 References


