The Potential of M-health for Improved Data Use: Workshop Report

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1   What is M-health?

The Institute of Development Studies (IDS), in partnership with World Vision Indonesia, are exploring whether a recently implemented nutrition surveillance intervention, known as M-health, is being used to improve community-based data collection on nutrition.[1] The M-health mobile phone application has been integrated into the Indonesian national nutrition service delivery through the community-based health service called 'posyandu'.[2] Established in 1986, the posyandu is Indonesia's main national community nutrition programme. It functions at the village level, enabling communities to access primary health care.

The aim of the intervention is to reduce maternal, infant and child (under five) mortality rates (Ministry of Health 2011). The posyandu involves five priority programmes: maternal and child health, which includes the 'weighing post' (growth monitoring); family planning; immunisation; nutrition, which includes nutrition counselling; and diarrhoea prevention and treatment. The programme works by the mobile phone application (M-health) automatically sending a referral to health workers at the sub-district-level in cases where a child does not meet the required growth targets. The application also provides the health community-based cadres with reminders and steps to accurately plan follow-up visits. These data are then sent to the community health centres at the sub-district-level, known in Indonesia as the puskesmas. In the past, important health information was not shared by the posyandu with the relevant midwives and so information was lost. The M-health application has real potential for data collection, transfer and analysis during the monthly growth monitoring sessions at the posyandus (Barnett and Befani 2015).

In the period 2013–15, researchers at IDS worked with World Vision Indonesia to assess whether data produced through mobile phone technology might trigger faster response by nutrition stakeholders. This short report supports ongoing work and focuses on how posyandu-level data might be used by different stakeholders.

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[1] The term M-health literally means mobile health. This refers to the use of mobile phone software to monitor improvements in health.

[2] Posyandu stands for *Pos Pelayanan Terpadu* in Bahasa Indonesia; it is defined in English in various ways: Integrated Health Service Unit (UNICEF, BAPPENAS and Gajah Mada University 2011), Integrated Services Post (UNICEF Indonesia 2012), Integrated Community Service Post (British Council 2006) and Integrated Health Post (WHO 2010).

2 Method

Stakeholder interviews were conducted with programme and evaluation specialists at World Vision Indonesia. Interviews were used to consider how M-health data are used by different stakeholders. The interviews were designed to address the context in which data are collected or transferred. In this short report we apply a realist approach to examine 'what works, for whom, how, and in what circumstances' (Pawson 2013).

A realist approach can be used to look at the types and quantities of services delivered, the beneficiaries of those services, and the practical problems encountered, as well as the ways in which problems may have been overcome. It can also be used to look at the processes of the programme management and the capacity to deliver on expected goals and outcomes (see Westhorp 2014). Realist approaches start with an initial middle-range theory. Merton (1949) was the first to define 'theories of the middle range' as,

> theories that lie between the minor but necessary working hypotheses that evolve in abundance during the day-to-day research and the all-inclusive systematic efforts to develop a unified theory that will explain all the observed uniformities of social behaviour, social organisation, and social change.
> (Merton 1949: 448)

Middle-range theories are developed to offer a general theory of data use at the different administrative levels. These general theories are used to describe the M-health programme. For example, why is it thought that real-time data have the potential to improve service delivery and timely responses? And why is it thought that M-health technology promotes better use of data?

Mechanisms are used to:

> hypothesise *why* the programme might result in the expected outcomes (and why it might not) through opening up the black box and identifying the *mechanisms* (causal forces or powers) that link an intervention with an outcome. In realist evaluation, mechanisms are 'real' – they really exist in the world and explain why one thing causes another. Context-Mechanism-Outcomes or CMOs are an analytical tool for the researcher to attempt to identify and explain these really existing causal forces.
> (based on Westhorp 2014: 6)

> Ideally, the evaluator hypothesises in advance the mechanisms that are likely to operate, the contexts in which they might operate and the outcomes that will be observed if they operate as expected. This is known as developing Context-Mechanism-Outcome hypotheses.
> (Westhorp 2014: 6)

3   Programme theory

At the most abstract level, applications such as M-health involve the systematic and periodic collection of information on nutrition. These types of applications are generally considered as vital to the capacity of governments and other agencies to track progress towards reducing undernutrition, to promote accountability of actions, and to improve ability to respond promptly to rapid changes in nutrition conditions brought about by food price volatility and other shocks (see Barnett and Edwards 2014). But as existing literature shows,

> far less is known about what happens to the data once they are generated. How can real-time data be aggregated, presented and disseminated most effectively and appropriately to trigger rapid responses and increase accountability and commitment to addressing undernutrition? What are the potential challenges and barriers to the effective use of real-time surveillance data?
> (Barnett and Edwards 2014: 3)

Understanding exact patterns of data use requires us to know what factors are important in efforts to shape the actions and behaviours of different nutrition stakeholders. The figure in the Annexe (see page 9) shows the different levels of government in Indonesia (civil society organisation (CSO), sub-district, district, national). The issue is that different mechanisms are 'fired' (or blocked from firing) in different contexts. So the M-health intervention will work differently depending on a variety of contextual factors, including individual-level factors, relationships, institutional factors and other known factors.

4 How might stakeholders use M-health?

The data from the stakeholder interviews are used to suggest why M-health technology might promote better data use. The different levels of administration discussed in the stakeholder interviews include the mothers, community-based volunteers, women's group (PKK), CSO (World Vision Indonesia), sub-district (puskesmas) and district (Ministry of Social Affairs).

World Vision experts are key informants because their work is integral to the functioning of the M-health intervention. Interviewing different World Vision offices allows us to consider differences in understandings of the programme. Some of the main conditions and contexts that are thought to facilitate increased data use amongst these actors are discussed below. This list is by no means exhaustive.

4.1 Theory 1: Mothers

The mothers attend the monthly weigh-ins at which their respective child's weight and height are taken and the data entered using the M-health technology. The mothers are provided with growth and weight targets. This should influence the mothers to return to the posyandu weigh-in sessions on a monthly basis.

Context	Mechanisms	Outcomes
Mothers attend the monthly weigh-in sessions with the community volunteer health workers	Mothers see the monthly weigh-in session as a routine activity where they return for frequent visits	The number of mothers and children attending the community-based health service increases. Data are built over time of each child's weight and height
Barriers: Mothers have reported feeling anxious about attending monthly weigh-in sessions. Feelings of comparison and meeting targets is an intimidating process to be part of. It is also thought that the mothers are quite distant from the data analysis and may not yet see the real, tangible benefits of their efforts to attend the monthly weigh-ins.		

4.2 Theory 2: Community-based volunteers (cadres)

Volunteer health workers input growth and weight data using the M-health technology. The data are entered via the CommCare platform (part of the M-health application) and stored on the Cloud. The community-based volunteers then provide the basic health and nutrition services to the mothers. The confidence of the volunteer health workers and access to the mobile phone technology are thought to be key conditions influencing data collection. In addition, the ability of cadres in understanding and utilising the technology is often cited by respondents as a condition that influences data collection.

Context	Mechanisms	Outcomes
The volunteer health workers collect data routinely and upload the data using the M-health application. Despite the abundance of other surveillance tools the volunteer health workers select the M-health application	The community cadres are thought to increase data entry accuracy and timeliness if they are able to see immediate benefits and realise the potentials of the data	A database starts to form with nutrition information, which helps understand 'at risk' households with malnourished children at the village level

The volunteer health workers provide feedback to the mothers and, if required, also offer nutrition counselling to the mothers |

Barriers: The collection of M-health data is jeopardised without the buy-in of the community health workers. For example, there are cases where the community midwife is so busy that she does not attend the posyandu. Community health staff are volunteers and they receive little training on how to use the technology. Signal is limited in the posyandus and electricity for charging the mobile phones is problematic at times. Mothers frequently do not attend the monthly weigh-ins regularly. Incentives for the mothers who do attend are also thought to be limited.	

4.3   Theory 3: Family Welfare Movement (PKK)

In an advisory role to the government, the PKK is a women's group that uses M-health posyandu data in working group discussions on resource allocation and design of policies at the district level. The group is dependent on the puskesmas and/or District Health Office sending this data. The PKK then uses the data to inform decisions and uses the reports to inform working group discussions. The data are also considered to be useful for networking and have proved influential when inviting higher-level stakeholders to talk about resource budgets.

Context	Mechanisms	Outcomes
Family Welfare Movement (PKK) uses the data for advocacy purposes, but depends on puskesmas sending the data in time	The data are available for use by the PKK in the form of accessible and easy-to-understand reports	PKK more consistently uses the M-health data to influence decision-making at the district level through quarterly working groups Posyandu data are used for networking and discussions with respective government departments
Barriers: Timeliness has been a barrier; the PKK is dependent on the puskesmas sending the data.		

4.4   Theory 4: World Vision Indonesia and other civil society organisations

World Vision staff use the M-health posyandu data to inform their Area Development Programs and the *Child Wellbeing Report*. The mobile phone data are believed to create higher quality data due to the automatic calculation. Through innovations in Indonesia such as 'Smart City', 'Open Data Kit' and 'Child Friendly City',[3] World Vision Indonesia sees an opportunity to use the data to influence the cadres to complain via these crowdsourcing mechanisms and to advocate for posyandu-related issues at Musrenbang, the annual multi-stakeholder forum at the village level.

Context	Mechanisms	Outcomes
CSOs such as World Vision Indonesia use the data to think through some of the challenges in programming as well as how to overcome these challenges	The data are trusted because they are considered high quality and efficient. The data are valued above the paper-based system for their timeliness	Data are utilised to influence annual planning and offer evidence to actors lobbying for increased resources for nutrition at the posyandu level
Barriers: There are some concerns about quality and concerns about coordination across World Vision teams and offices. This means that the data are not yet being fully utilised to influence the allocation of nutrition resources.		

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[3] Open Data Kit is an open source data collection software that anybody can use. Smart City, LAPOR, and Child Friendly City are accountability platforms.

4.5   Theory 5: Puskesmas

The puskesmas operate at the sub-district level. Health workers at the puskesmas are in charge of collecting the data from the posyandu. The data are combined into a report format which is then shared. Posyandu data are perceived as important to identify problems in the community.

Context	Mechanisms	Outcomes
Sub-district (puskesmas) trust data quality but doubt data coverage as posyandu attendance is low	Participation of posyandus may increase due to mobile phone and feedback to the community-based cadres. Communication might improve if health workers in the puskesmas better understand the role of the PKK	Increased coverage of puskesmas data in reporting Increased interest in community-level data
Barriers: There are doubts about coverage. Availability of complete data sets from all posyandus has been challenging. Timeliness is a problem. There is uncertainty about what the reports and data collections are used for, which may undermine this process.		

4.6   Theory 6: District (BAPPEDA – Regional Planning Board)

BAPPEDA (or *Badan Perencana Pembangunan Daerah*) is in charge of coordinating with other government agencies, including the District Health Office, on the planning and budgeting required to finalise the annual regional work plan in a district. It is unclear how the posyandu data influences BAPPEDA or the Ministry of Health operating at the district level.

Barriers: Coordination between the different levels of government administration is weak.

4.7   Theory 7: Donors

Donors are also interested in the posyandu data. Collaboration is thought to have begun with actors working on nutrition service delivery in Indonesia. These actors might have an interest in supporting evaluation pilots, like M-health, in the future; for example, the Vice President's Office, the National Task Force for Accelerating Poverty Reduction, the Ministry of Social Affairs and the national cash transfer programme. These actors are influenced by the fact that this type of data is not available via any other source.

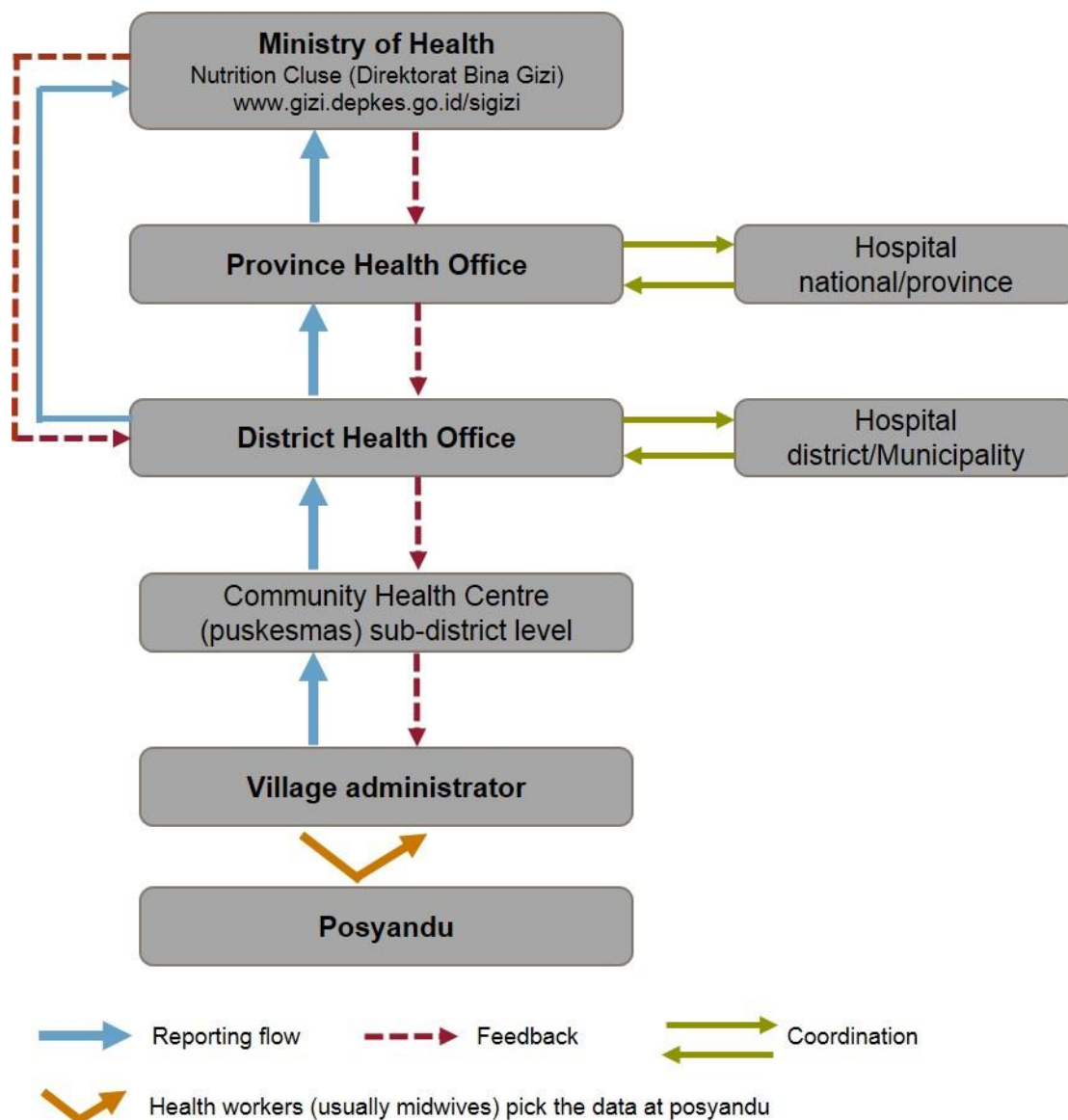| Context	Mechanisms	Outcomes
Donors, and other actors, are interested in the posyandu-level data. They consider M-health data to offer a solution to the issue of malnutrition in Indonesia	A mixture of public and private actors have an interest in supporting evaluation pilots, like M-health, in the future	Opportunity to bring the data to the attention of the Governor of Jakarta or other high-level actors
Barriers: There is a mixture of corporate and public interest groups; this could lead to a conflict of interests. There is also a growing interest in alternative data platforms; for example, the Governor of Jakarta, Basuki Tjahaja Purnama, is interested in e-budgeting.		

5 Conclusion: What do the CMO configurations tell us?

This report has looked at the contextual factors that promote or deter the collection and transfer of data via mobile phones for improved nutrition. We have found that mobile phones have the potential to improve data uptake and utilisations at different levels of government administration. But the evidence is inconclusive as to whether the M-health technology facilitates better coordination between posyandu (at the village level) and puskesmas (at the sub-district level) and/or national-level authorities. And it is yet to be determined whether M-health can improve the behaviours of nutrition stakeholders and the actions of those in positions of authority. An evidence-based policy grant supplied by the Department for International Development supports the development of programme theory and evaluation in this area. Evaluation approaches that focus on the process of data production and use rather than only focusing on outcomes are thought to have value in understanding and promoting better delivery of complex programmes. A recently published report by Inka Barnett *et al.* (2016) explores some of these issues.

However it is clear that a realist approach has potential to unpack some of the complexities around data use. It is no secret that programme implementation is complex, and without further research it is very difficult to predict how the interest in M-health will develop. Subsequent research is required to better understand the interests and agendas that affect quality service delivery at the posyandu level. However, some developments seem likely:

- Undernutrition at the posyandu level will be framed as a priority issue in long-term programming of World Vision and other donors and this will lead to an increase in public and private funding at the posyandu level.
- Coordination amongst key actors and levels of government is thought to affect the quality of data, which in turn influences whether or not data are used for decision-making. There is also a need to strengthen the capacity of the cadres to use weight and height data for nutrition counselling. But under the right conditions, and through targeting important nutrition actors, there are likely to be opportunities to increase government resource and budgets towards the posyandu.

Annexe   Levels of government in Indonesia

Ministry of Health
Nutrition Cluse (Direktorat Bina Gizi)
www.gizi.depkes.go.id/sigizi

Province Health Office

Hospital national/province

District Health Office

Hospital district/Municipality

Community Health Centre (puskesmas) sub-district level

Village administrator

Posyandu

→ Reporting flow   ---→ Feedback   ⇄ Coordination

⌄→ Health workers (usually midwives) pick the data at posyandu

Source: Adapted from Ministry of Health (2015: 23).

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