Health information systems in the Pacific: a case study of Vanuatu

Miriam Lum On

Vicki Bennett

Maxine Whittaker

Health Information Systems
Knowledge
Hub

School of Population Health
University of Queensland

*Strengthening health systems
in Asia and the Pacific through
better evidence and practice*

For the PDF version of
this paper and other
related documents, visit

www.uq.edu.au/hishub

About this series

The objective of the Health Information Systems Knowledge Hub's Documentation Note Series is to document in detail the methods and findings of the hub's activities in partner countries. The series also reports on work in progress, particularly for large, complex or longer term initiatives, or on specific components or aspects of such projects that may be of more immediate relevance to stakeholders.

The Documentation Note Series also serves to describe the state of the health information system in a number of Asian and Pacific island countries. This series provides a baseline for comparison of health information systems between countries. It also provides a preliminary diagnostic analysis for use by countries in determining areas requiring improvement. The target audiences for these mappings are stakeholders with an interest in the functioning or development of health information systems, specifically those working in the Pacific and Asia regions.

Many documentation notes have accompanying products such as summaries, key points and action guides. The full range of documents, as well as other resources and tools, is available on the Health Information Systems Knowledge Hub website at www.uq.edu.au/hishub/publication-tools.

The opinions or conclusions expressed in the Documentation Note Series are those of the authors and do not necessarily reflect the views of institutions or governments.

Author details

Miriam Lum On, Vicki Bennett, Maxine Whittaker, Health Information Systems Knowledge Hub, School of Population Health, The University of Queensland

Contents

Health Information Systems Knowledge Hub

Acronyms and abbreviations

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
HISU	Health Information System Unit
ICD-10	*International Statistical Classification of Diseases and Related Health Problems*, 10th revision
MICS	multiple indicator cluster survey
MoH	ministry of health
NSO	National Statistics Office
STI	sexually transmitted infection
UNICEF	United Nations Children's Fund
VanPHIS	Vanuatu Provincial Health Information System

Executive summary

The objective of this documentation note is to describe the current status of the health information system and its activities across the Vanuatu health sector. It is expected that the outcome of this will provide a strategic overview and preliminary diagnostics for use in determining areas requiring improvement and allow planning for future health information system activities.

After a brief description of the Vanuatu context, the six components of the Health Metrics Network *Framework and Standards for Country Health Information Systems* (WHO 2008a) are used to describe the present state and potential of the Vanuatu health information system. To inform this analysis, a review of existing forms and databases was undertaken, as well as a number of consultations held with key stakeholders.

It was found that Vanuatu has some of the foundational building blocks for a successful health information system already in place. The core findings of the analysis were:

- While there has been significant support for improvements to the national health information system from a broad range of international donors and counterparts, health information system support has been irregular over time and this has led to a disjointed system with a lack of coordination and integration of existing elements.

- There is an urgent need to resolve human resourcing issues and health information system governance within the ministry of health (MoH) and provincial offices to ensure sustainability of human or technical resources.

- Current data collection methods are overly complicated and create a burden on clinicians. There is a need to simplify the community health data collection by redesigning the monthly health information system reports for health centres, dispensaries and aid posts, to increase the timeliness and reduce disincentives for completing reports.

- Health data need to be comparable, using the same definitions and methods for collection. There is a need to develop a set of national health information standards (including a health data dictionary, standards for information and communications technology, data analysis and use).

- A health information system strategic action plan is needed to clearly define, prioritise and align future health information system activities into the wider policies of the MoH.

The Vanuatu context

The Republic of Vanuatu is in the South Pacific Ocean, and is made up of 83 islands. It has a population of 243 304, most of whom live in small rural villages (Vanuatu National Statistics Office 2009), living from subsistence agriculture (Cox et al 2007). Due to their geographical position, Vanuatu's islands are at risk of natural disasters, including earthquakes, cyclones and volcanic eruptions (ODE AusAID 2009). The nation became independent in 1980 and has had fluctuating political stability over time (AusAID 2010). In 2008, Vanuatu was rated by the UNDP's human development index to be 123rd out of 179 countries with data (UNDP 2008). Using the World Bank's country classification of economies, Vanuatu ranks as a lower-middle-income country (World Bank 2009). According to WHO (2008b) figures, its population has a life expectancy at birth of 67 years for males and 70 years for females and a child mortality rate of 36 per 1000 live births.
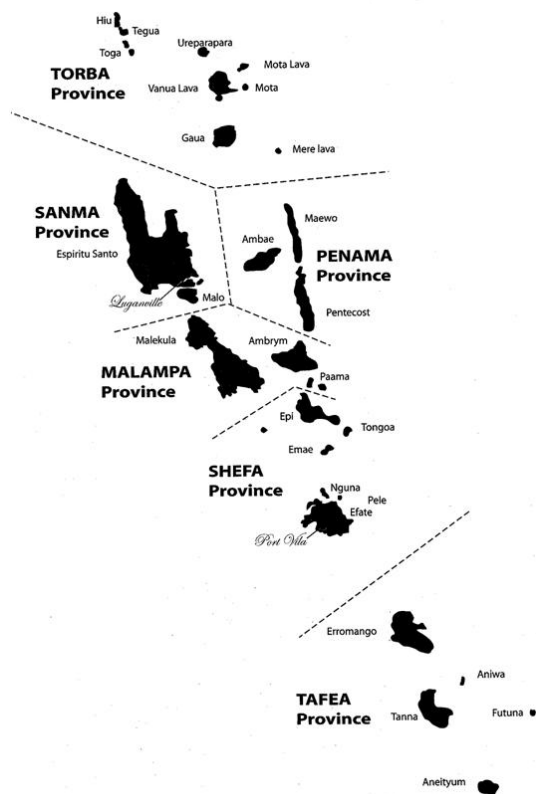

Figure 1 Administrative provinces of Vanuatu

Vanuatu is an independent, democratic republic, headed by a president and an elected 52-member parliament. Health services are mainly funded through the ministry of health (MoH) and a number of external donors (Ministry of Health 2007). In 2005, the country spent 4.1 per cent of gross domestic product on health, which equates to about US$67 per capita (Ministry of Health 2007). The islands are divided into six administrative provinces: Tafea, Shefa, Malampa, Penama, Sanma and Torba (see Figure 1). There are five main hospitals; one in each province. The two key referral hospitals are located in Port Vila (Vila Central Hospital) and Luganville (Northern District Hospital), offering inpatient and outpatient care. A number of health centres and dispensaries also operate in urban areas, and are run by municipal administrations, churches or nongovernment organisations. Beyond urban areas, each province is divided into catchment zones for the purposes of coordinating community health care, including public health programs. Throughout Vanuatu, there are 32 health centres and 89 dispensaries and 181 aid posts (ODE AusAID 2009). Aid posts are community owned, and staffed by a volunteer village health worker with limited first-aid focused training.

The MoH in Vanuatu has had substantial donor support over time for improvements to various components of the health information system, from a range of international counterparts. The MoH identified challenges within the current health information system at the November 2008 National Health Conference. These discussions were led by a reform taskforce, established by the MoH in recognition of the need for good data to track health system performance and outcomes. A 2009 evaluation of Vanuatu's health sector by the Australian Agency for International Development's (AusAID) Office of Development Effectiveness noted that there is an 'overly complex health information system, which has low coverage, lacks management data and gender disaggregation, and does not report to management on key performance indicators' (ODE AusAID 2009, p.7). Recently there has been interest among health information system stakeholders to coordinate their activities and develop an overarching strategic action plan for health information systems. In May 2009, a Vanuatu–Australia Partnership for Development was signed (AusAID 2009). It included commitments from both nations on specific priorities, with a strengthened health information system being listed as one of the four areas under the domain of health. This mapping is an important baseline for informing planning and tracking progress made on improving the Vanuatu health information system over the next few years as this partnership initiative is enacted.

Methodology

The main data collection for this descriptive mapping was undertaken through an in-country visit over two weeks in February 2009. The methodology used included undertaking a series of qualitative consultations with key stakeholders to obtain information about the current status of various aspects of the health information system (Appendix 1); this used a semi-structured interview sheet (Appendix 2). Reports and papers, where available, were also used to understand the current situation as well as past activities (see references). A subsequent review has also been done of a number of the data collection tools, including forms and databases, to observe the actual data items captured.

This mapping uses the Health Metrics Network *Framework and Standards for Country Health Information Systems* (WHO 2008a) to identify areas of strengths and weaknesses within the Vanuatu health information system. A number of detailed consultations were undertaken with stakeholders at all levels of the MoH. In addition, consultations were conducted with several United Nations (UN) agencies and nongovernment organisations such as the World Health Organization, UNICEF, Save the Children Australia, and a visiting public health legislation review team from La Trobe University. Site visits to a number of health centres, dispensaries and Vila Central Hospital were also undertaken, to view firsthand the information collection methods at the various levels of the health system.

The mapping is not an exhaustive list of all health information system activities, and it is therefore acknowledged that its components, as described in this report, may not be the same in all locations and represent a single point in time only.

Health information system resources

Resources include the legislative, regulatory and planning frameworks required for a fully functioning health information system, and the resources required for such a system to be functional. Such resources involve personnel, financing, logistics support, information and communications technology, and coordinating mechanisms within and between the six components (WHO 2008a, p.16).

Coordination, planning and policies

The Health Information System Unit (HISU) and its activities fall under the responsibility of the public health directorate of the MoH. Its stated goal is to 'provide reliable and timely statistical and epidemiological data to monitor health status and guide programmatic interventions, decision-making and policy formulation' (Takoa 2009). The governance of the health information system is complex, as reporting responsibilities are not clearly defined at each level of the health care system. The key data collectors are health providers (eg village health workers, nurses, clinicians) who report to the provincial health managers or the hospital superintendent. The data is collated and entered into the Vanuatu Provincial Health Information System (VanPHIS) database at the provincial health manager's office, which has no direct reporting responsibility to the HISU, but to the northern and southern directors. Further, the information technology services that underpin the activities of the health information system are within the corporate services secretariat and report directly to the Director-General.
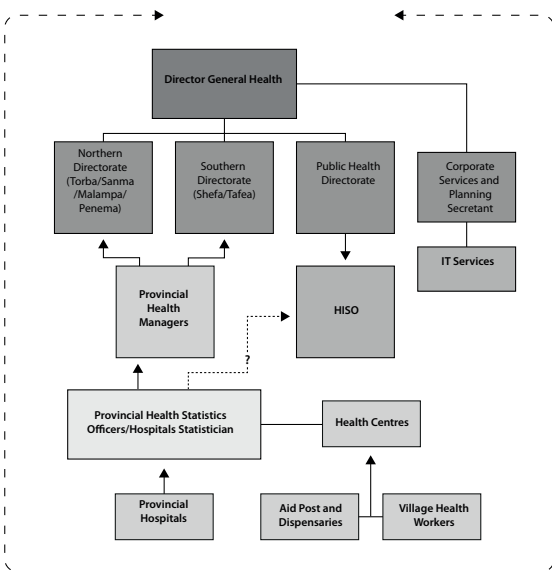
Figure 2 Current organisational structure of Vanuatu health information system (broken line indicates queried line of responsibility)

Each public health and disease-specific program has its own requirements for monitoring and evaluation, with policies and definitions for cases and indicators. This complicates collection of data by adding data items for these programs, and by the need to collect them differently to those routinely reported for the management of the MoH. For example, the United Nations Population Fund (UNFPA) introduced evidence guidelines for management of sexually transmitted infections (STIs) with its own collection form and data standards for reporting in 2007.

There are currently no nationally endorsed policies or data standards in Vanuatu for either community or facility data collection. In the absence of a policy, in April 2006 national and provincial staff members attended a health information system workshop in Port Vila to discuss data collection forms and development of a manual on data collection from community health settings, which led to the creation of the current monthly health information system report.

During the health reform planning activities undertaken in 2008 and 2009, a number of changes were proposed to the governance of the HISU (Ministry of Health 2009). During the visit in February 2009, there was some confusion regarding the location of the HISU within the proposed new structure—one document detailed the creation of a 'Health, Information, Surveillance,

Emergencies and Disaster Preparedness and Response Unit' under the Department of Public Health to 'take the main role in information, research and surveillance of all health issues as well as coordinate emergency and disaster issues'. At the same time, a separate reform plan reviewed allocated health information system responsibilities to the Policy and Planning Unit under the Department of Corporate Service and Planning. Clarity around these governance issues will be vital to the successful future operation of the health information system.

Vanuatu has a number of health-related legislations (eg Public Health Act 1994, Health Committees Act 2005, Health Practitioners Act 1984). However, there is no legislative framework that specifically provides guidelines on the analysis, collection, storage or management of health information, apart from the mandated collection of notifiable diseases. This is particularly important in the context of a growing private health care sector and concerns for privacy and confidentiality. A research study being undertaken by La Trobe University is investigating public health law throughout the Pacific. It is hoped that this project will lead to a fuller investigation and creation of new health service delivery legislation in Vanuatu that mandates processes surrounding the creation, storage and appropriate use of health information, including that collected by the nongovernment sector.

Financial and human resources

For a considerable length of time, a single senior officer managed the national HISU, and this officer had significant experience, skills and knowledge regarding the collection of health information. However, overall the office has had a chronic shortage of human resources, with a second post within the HISU only being filled intermittently. With the retirement in 2009 of the senior health information system officer, a succession plan to fill the vacancy remains in question. A replacement for the national health information officer has been identified, but the officer in question is also currently responsible for Vila Central Hospital's statistics. There have been identified 'statistician' posts at the provincial level, but over time the role of, and accountability for, these staff have become unclear. It is clear that some provinces do not have an official post; in other cases the post is vacant, and there is no formal reporting accountability to the national HISU. For example, Shefa Provincial Office

currently contracts a nurse to enter data into the health information system; however, it is acknowledged that no analysis of the data is done, nor is the information fed back to the communities where it is collected.

There are two posts in Information Technology Services (ITS) based in Port Vila at the MoH. They currently fall under the direct responsibility of the Director-General and are tasked with the maintenance of all hardware and software, and some connectivity tasks across all health facilities nationally. Information technology (IT) is used throughout the country in all provincial health offices, at the referral hospitals and in many other health facilities, which means that these two IT staff are required to spend much of their time travelling to provide general maintenance support. Coupled with a general lack of IT-related knowledge, this means that the current staffing is grossly insufficient for the volume of activity and current IT infrastructure.

The budgets for the functioning of the HISU or ITS were not specifically investigated during this mapping review. It was, however, evident that funding for health information activities was limited and often based on the generosity of donors. An example of the lack of resourcing is that no money was allocated to the HISU for ongoing maintenance and replacement of hardware or for contracting the services of programmers to update the software.

Infrastructure

The MoH has made limited investment in IT infrastructure, which includes hardware, software and networking. The management responsibility of the network connections for all government departments lies with the Ministry of Finance, which controls the Information Systems Services Unit (ISSU). The ISSU supports the government's financial system and manages all email and internet facilities.

Hardware

Computers, printers and associated hardware are in common usage at Vila Central Hospital and in the provincial health manager's office, and power supply is relatively stable (although it was mentioned that Lolowai Hospital often uses generator power). A register of all hardware is kept with corporate services, and documents

that more than 150 computers and laptops are in use. The review was not able to definitively determine how accurate this register is, and what processes are in place to record new hardware or remove equipment that is no longer in place. There are no standardised hardware procurement procedures, with much of the existing equipment being provided by donors, leading to a wide variety of hardware types being in use. This creates a greater burden to maintain and supply consumables, with many different disjointed parts.

Software

There appears to be no requirement for any central control over the versions of software installed at facilities. This has led to a range of versions being used, which has implications for data transmission and use. A standard operating environment, with consistent use of applications and their versions, would provide a basic platform for improving data collection, transmission and analysis.

The main databases that are currently in use to specifically support the health information system are all designed in Microsoft Access (MS Access). The review team could not ascertain if a full implementation program, with appropriate change management processes, was undertaken when these were implemented, or if any training was provided to health information system staff on how to maintain them. The current IT staff have limited programming knowledge and struggle with the complexity of their maintenance. It was apparent from observation that most of the staff undertaking the data entry into these applications also had a very limited knowledge of MS Access. TrendMicro Office Scan™ software is also used for virus management purposes.

The key databases currently in use are:

• Vanuatu Hospital Morbidity Database—this application was originally designed by an Australian programmer as part of the AusAID-funded Health Sector Planning and Management Development Project (1999–2004) and its successor, the Health Sector Post Project Support (2004–2005) (ODE AusAID 2009, p.31). It is an MS Access database that captures information about individual patient admissions to hospital, which is entered after discharge. This database links with the Patient Master

Index (PMI) database for patient numbers at Vila Central Hospital and the Northern District Hospital. It is used to search for patient record numbers to locate patient records for admissions and outpatient attendances. It has a very good search function designed on the local forms of identification, such as 'Island', and helps to match admissions with individual patient records. The service delivery data is then exported from the database and sent to the national HISU, where data from all hospitals are consolidated into one database for production of national hospital information. Further enhancements and modifications have been made by the original programmer since the project was finalised, at the request of the MoH, as no local capacity exists nationally to maintain the system.

- Provincial Health Information System (VanPHIS)— the VanPHIS was designed by a Voluntary Service Overseas volunteer following the redesign of the community health monthly report. VanPHIS is also an MS Access database with entry form screens that match the data collected manually on the forms.

were disconnected in 2006. The decision to disconnect was made by the ISSU at the ministry of finance. The reason given was concern about increased computer virus infections into the WAN, which services the broader linkages of ministries. There are dial-up network connections to the provincial health offices via Telecom Vanuatu Ltd (TVL). However, it was noted by the review team that these connections are being used for both phone and email purposes, leading to difficulties in managing the cost and availability of access to the phone line. The Vanuatu Government has recently entered into an agreement with the Chinese Government for a loan to fund an e-Government initiative to roll out a WAN to all provincial offices. This will provide important infrastructure for the health information system, as well as for the whole of government. This initiative includes the installation of receiver towers in all provinces, except Tafea and Torba, which will be connected via satellite. This should strengthen the bandwidth available through the WAN through a Citrix™ application. This will provide an important infrastructure platform for future health information system investments.
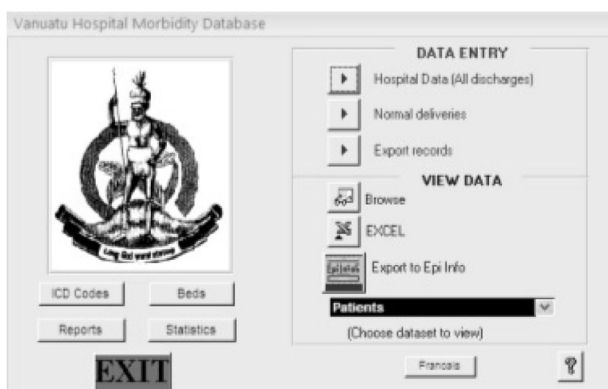

Figure 3 Main entry screen of the Vanuatu hospital database

Networking

Although a wide area network (WAN) was established as part of the AusAID-funded Health Reform Project, the network connections for the health information system data transmission between Vila Central Hospital, the Shefa Provincial Health Managers Office and the MoH

Indicators

A core set of indicators and related targets is the basis for a health information system plan and strategy (WHO 2008a, p.16).

There are currently no nationally endorsed health data standards, minimum datasets or data definitions relating to indicators collected in Vanuatu. There is also no defined set of core health indicators for overall system performance and management. However, there are many indicators in use to measure the various public health programs' performance (eg malaria program, human immunodeficiency virus, etc), which are the requirements of the funding agreements with donors.

Without national standardisation of data collection, miscounting and duplicate reporting of instances of service delivery and diseases is occurring. There has been considerable effort to align to international standards for reporting to major donors and global initiatives such as the Millennium Development Goals. However, conformance to these reporting standards at all levels of the health information system cannot be guaranteed if data collection at the lowest levels (aid post) is not standardised. Comparability between datasets from different health settings is vital for the production of robust national datasets. A good example of the need for comparability is demonstrated through the need to understand national immunisation coverage information from both referral hospitals and provincial health centres, to assess surveillance of vaccine preventable diseases. In 2008, the MoH and UNICEF found that different denominators were used by the provincial health facilities to those being used at the national level. Further, the health centre register books were underenumerating eligible children (less than 100 per cent of children under one year old in the catchment were reported in the denominator). They also found limited, if any, analysis of data collected at provincial and zone level, nor use of this data for decision-making at the local level. This created bottlenecks in the Expanded Program on Immunization data collection system and coverage estimates were not reliable for decision-making (WHO 2008c).

Data sources

These can be divided into two main categories: (1) population-based approaches (censuses, civil registration and population surveys) and (2) institution-based data (individual, service and resource records). A number of data collection approaches and sources do not fit neatly into either of the above main categories but can provide important information that may not be available elsewhere. These include occasional health surveys, research and information produced by community-based organisations (WHO 2008a, p.16).

Population-based data sources

Surveys

A number of surveys have been, or are being planned to be, conducted in Vanuatu, which will provide essential population-based data. Some of these include:

- Household Income and Expenditure Survey (HIES): Vanuatu's first HIES was completed by the National Statistics Office (NSO) in 2006. It surveyed population numbers in each province by household, showing the breakdown between rural (77.9 per cent) and urban areas (22.1 per cent), as well as between income levels and household expenditures. It revealed that 90 per cent of the poor live in rural locations, though there are also pockets of severe poverty in Port Vila. A quality audit on the success indicators from the HIES was conducted in 2007 to assess the methodology and results of the survey. Some of the recommendations of the audit were that further work was needed to

  – define a poverty line in Vanuatu

  – undertake corrections to allow for changes in the value of Vatu[1] over the period of the survey from collection to analysis (Strode 2008).

- Demographic and health survey (DHS): The NSO plans to undertake its first DHS in 2011–2012 (Vanuatu National Statistics Office 2008). Regionally, the Asian Development Bank (ADB), with Macro and the Secretariat of the Pacific Community (SPC), are leading a project to undertake a Pacific-wide DHS (ADB 2009), piloting it in three countries in 2009. The project will focus on establishing a solid baseline for regional indicators and capacity developing of in-country statistical officers.

1 Vatu is the currency of Vanuatu

- UNICEF multiple indicator cluster survey (MICS): The Vanuatu MICS, conducted in 2007, is the first to be completed in the Pacific region (Ministry of Health 2008). Its goal was to establish a strong baseline for future population-based surveys. The results of the MICS were released by UNICEF in late 2008 and focused on child mortality, nutrition, immunisation, environment, development, education and protection.

Census

The NSO in Vanuatu is located within the Ministry of Finance and Economic Management. The NSO coordinated the latest national census in 2009, with some expert advice from the SPC. It used global positioning system (GPS) technology for the first time to map the location of households. Various revisions to the previous tool were proposed for the 2009 census, but it remained largely unchanged from the 1999 questionnaire, to ensure comparability of the data over time. Specific health questions included will provide data on infant mortality, crude birth rate, fertility rate and environmental living conditions. The preliminary results are already available on the NSO website (Vanuatu National Statistics Office 2009).[2]

Civil registration

The Vanuatu Civil Registration Department operates under the Civil Status (Registration) Act (cap 61) 1971 and the Marriage Act (cap 60) 1971 and is located within the Ministry of Internal Affairs. Its functions include the acknowledgment of parenthood, and registration of births, deaths and marriage for the people of Vanuatu. The main office is in Port Vila, with six provincial subregistration offices. The use of databases or similar technologies is not recognised in the legislation, which requires entries to be handwritten in ballpoint pen in paper registers. Despite this, a database was created in 2000 to store all register entries, but until the legislation is changed, duplicate recording will need to continue.

Figure 4 Health facility birth certificate

Birth registration

After delivery, health facilities issue mothers with documentary evidence of their births (see Figure 4) and maintain a register. It is then the responsibility of the mother to register the birth with the Civil Registration Department within 21 days of birth. It is free to register; however, late registrations require a fee to be paid. The department estimates that less than 20 per cent of all births are registered within a year (UNICEF 2005), while the findings of the MICS in 2008 state that only 25.9 per cent of children under five years old were registered (Vanuatu National Statistics Office 2009).

Many children delivered by traditional birth attendants or in remote communities are not captured in the register. The most commonly stated reason for low registration statistics is a lack of urgency for mothers to register the birth, although it is mandatory for the child's attendance at school. This puts a burden on the health facilities to produce a 'proof of birth' certificate for late registrations, which are often requested when it is time for the child to commence school. To address these issues, UNICEF's Child Protection Programme aims to increase coverage of birth registration to 80 per cent in 2009–2010 (UNICEF

---

2   Vanuatu National Statistics Office census results 2009 are available at: www.vnso.gov.au

Health Information Systems Knowledge Hub

2009), in an effort to improve information for planning on providing services adequately for all children.

Death registration

There are several mechanisms for collecting information on deaths in Vanuatu. These include:

- a health facility reporting to the national HISU

- through the local representative of the Civil Registration Department

- through surveys such as census or MICS.

According to the Civil Status Registration Act, death should be declared within a period of seven days by either a member of the family of the deceased, who was present at the time of death, or anyone with knowledge of the death and full and accurate particulars of the civil status of the deceased. The Act states that each death registered should have recorded the:

- civil status of the deceased

- date, time and place of death

- civil status of the declarant.

If a death is thought to be from a notifiable disease it is mandated through the Public Health Act 1994 (Vanuatu Government 1994) and the Civil Status Registration Act to supply an immediate death certificate. Likewise, if a death was medically attended or suspicious, then a death certificate is mandatory. Medical certificates of death are currently being completed by the provincial hospitals, where there are doctors available. The original certificate is provided to the family, with a copy kept on site. At Vila Central Hospital, this information is entered into a spreadsheet maintained by the Medical Records Office. Data collected by the health information system is, however, based on the primary diagnosis from the medical record (Taylor and Carter 2009).

Health facilities also keep their own register of deaths, including data on name, village, date of death, age at death, sex, cause of death, whether it was a maternal death and whether it was medically attended. There is also a separate register for suicides, including the method, year, sex and outcome. For deaths that occur at a health facility, but outside the major hospitals, this information is included in the monthly health information system report. The report is sent initially to the provincial level before being collated at national level. Data entry into the health information system may

occur at either level (or both), although the sites are not networked and data transfer must be done manually. Deaths at health facilities are also reported on a 'notice of death' form that is collected with the monthly report and includes demographic details as well as a free text field for cause of death (Taylor and Carter 2009), which is later classified by the HISU staff.

Very few deaths are reported through the Civil Registration Department mechanisms (estimated at 5–10 per cent, based on expected numbers). Despite a legislative penalty that is unenforceable, there are no real incentives for registering death in a timely manner. Recording of deaths even at health facilities is also significantly underreported. A comprehensive cause of death mortality review was undertaken by the University of Queensland in 2008. Preliminary results show significant loss of information, with tracking from several health facilities indicating that up to 50 per cent of rural deaths may not be reported (Taylor and Carter 2009). Other problems identified in the health system collection were that death certificates did not follow a standard order of causality, leading to deaths being classified by the immediate cause or mechanism, rather than the underlying cause. There was also significant confusion regarding the recording of fetal deaths and stillbirths, which may affect infant and child mortality estimates. At a broader level, there is also no analysis nationally to compare data from different sources, or identify trends.

Preliminary recommendations from the mortality review included (Taylor and Carter 2009):

- strengthening the health data collection as the primary source of death data through actions such as: centralising capture of death certificate records; training doctors in death certification; strengthening analytical skills and support at the both the central government and provincial level; and identifying data sharing options between relevant organisations

- clarifying forms and procedures to separate infant and fetal deaths, which are critical for Millennium Development Goal measurement, including training for field staff.

Institution-based data sources

There are three kinds of institution-based health data sources: facility-based records, individual records and resource records.

Facility-based records

Facility-based records include information collected at government-run hospitals, health centres, dispensaries and aid posts. In addition, there are a number of municipal government and church-run dispensaries around Port Vila, which cater for the expanding urban population as well as an expanding private sector, including ambulatory services (Promedical), the Vila Bay Health Centre and other private practitioners.

Health centres and dispensaries maintain a number of registers that do not leave the facility. The list of registers maintained includes, but is not limited to, the following:

- Under 5 Register

- Stillbirth Register

- Maternity Report Book

- Antenatal Report Book

- Delivery Register and Birth Register

- Inpatient Register

- Pharmacy Ordering Forms

- Deaths and Suicides Register

- Outpatient Register

- Home and School Visits Registers

- Transfers to Other Facilities Register.

There are also specialty forms used for notifiable diseases and the National Cancer Registry. However, these have no defined frequency for submission to the national HISU. Among the records that are submitted are the health centre and dispensaries monthly health information system report, the aid post monthly report, and the hospital registers and monthly statistics.

Health centre and dispensaries monthly health information system report

The central instrument of provincial-level health information collation is the monthly health information system report. The current form was finalised in April 2007, with help from WHO consultants, and has been implemented in health centres and dispensaries. It is eight pages in length, in both English and French, and contains over 600 data fields. The form is not carbon copied, and so the nurses are required to complete three copies of the report: one copy to be kept at the health facility, one for the provincial office and one is sent to the HISU. Due to the complexity of the form, some nurses keep an additional copy to tally the data on a daily basis, and then collate this to a clean copy at the end of the month.

The report is structured into five sections, with 25 boxes to complete in each, as well as a short free text area at the end to record any further information. It is extremely complicated, with inconsistent formatting and does not provide clear definitions for any of the data items. Some examples of this include:

- outpatient first visits versus followup visits—it is not clear whether 'first visit' means the patient is new to the clinic that month, regardless of the reason for attendance, or whether this is the first time that the patient has presented for a specified condition.

- inconsistent use of multiple age breakdowns—multiple age groupings are used for a variety of different diseases; for example, diarrhoeal disease in children is grouped as 0–2 months, 2–12 months and 1–5 years; but breastfeeding is grouped as 0–6 months, 7–12 months and 13–24 months. Family planning for adults is grouped as <20 years, 20–24 years, >24 years; but for STIs the groups are 15–24 years, >25 years and age unknown.

- duplication of data elements—there is a tally for acute diarrhoea under environmental health diseases for all ages, as well as a tally for diarrhoeal disease under five years.

The report tries to collect two different types of data, namely health service activity data and population health data, which adds to the confusion of this instrument. The data items for family planning are particularly unclear and not mutually exclusive—for example, a woman might be on the pill and use condoms, and it is unclear what is required when reporting tubal ligation

Health Information Systems Knowledge Hub

and vasectomies, as these are not performed at health centres. Data items that are disaggregated by sex are also rare, apart from the obvious maternity-related items. Sex breakdowns are only required for STIs, suspected anaemia and noncommunicable disease reporting. The current monthly report also does not facilitate reporting of certain infectious diseases in a timely manner, for example epidemics such as a recent outbreak of yaws.

Transmission of the forms to the provincial health office or directly to the national HISU is problematic and suffers from a lack of standardised methods for delivery. Some forms are sent with the medications order form, others are delivered by hand by any person travelling to Port Vila from the village. Health centres are technically responsible for ensuring that the dispensaries and aid posts in their zone have completed their reports; however, in many cases this is not practical due to geographic and other barriers. The VanPHIS database maintained at each provincial health office can be used to track the receipt of monthly reports; however, it must be regularly updated to show the completeness of the collection, which in practice is not regularly monitored at all offices and followup of nonsubmitted reports is not common.

Remoteness is often stated as the main barrier for lack of report submission. However, there is no strong evidence to support this argument as the medications ordering form and other reports are being received. It appears to be more a case of a poor information culture which undervalues the information collected, and a lack of understanding of what the monthly reports are used for. To address the timeliness and transmission issues, submission of the monthly reports could be linked to of the bimonthly data supply for the medications ordering and receipt process from central medical stores.

The national HISU identified some weaknesses in its own system (Taga 2008), providing further insight into the situation. For example, it estimated that the response rate for the monthly health information system report is only 35 to 45 per cent, which in turn lowers its validity. This has been anecdotally attributed to the view that nurses are overloaded with work and do not see data collection as important. It was also noted that nurses sometimes copy the previous month's data when time poor rather than tally accurate figures. The HISU and others in the MoH acknowledged that the current system is too centralised, leading to poor coordination, and that the new form is overly complicated. Some of the

efforts taken by the HISU to improve the completeness of data collection include the use of reminder letters and supervision visits.

Aid post monthly report

Save the Children Australia (SCA) is contracted by the MoH to supervise the Village Health Workers (VHWs) program. VHWs are often volunteers with a low level of education, and are the primary data collectors of health information from aid posts. In 2008, SCA revised the aid post monthly report, but it still notes that many VHWs find it difficult to complete. This may be due in part to issues related to nonstandardisation of definitions, such as age breakdowns (eg collecting common conditions for 5 years +', but then asks for 'malaria <4 years'). There is also no sex disaggregation on this form, except in the mortality section. The report is in Bislama[3] only and contains 15 sections over two pages. Most of the data items collected relate to health service activities, including:

- number of patients seen in last month
- supervisory visits
- medicine supply dates
- type of preventative work in community
- tally for other common conditions.

One specific problem with the form noted was the duplication of malaria and neonatal deaths collection. SCA monitors the activities of the VHWs through six-monthly supervisory visits; however, their current checklist does not include any questions on the completion of the aid post monthly reports.

Hospital registers and monthly statistics

The Vanuatu hospitals collect service delivery data in a number of registers at various times and places within the hospital system. These are tallies of health care interventions, and use a mix of English and French language.

The midnight report records the daily admissions, transfers between wards, and discharges. The name of each patient and a provisional diagnosis is recorded, and on discharge an outcome is noted (ie alive, dead, absconded). At Vila Central Hospital, this information is

---

3   Bislama is the most commonly spoken language in Vanuatu and is a form of Melanesian pidgin.

collated into an Excel spreadsheet each month, which forms the basis of the hospital annual reports. There is a monthly summary of inpatients that calculates available beds, the number of admissions and the bed occupancy and death rates.

The outpatient register is a two-page table which collects a tally of first visits only for a number of broad morbidities and is broken down into age groups. There are many categories, including: digestive; respiratory; nervous and sense organs; genitourinary; maternity; infective and parasitic disease; and a number of other conditions, including injuries, allergies, rheumatism, cancer and diabetes. There are a couple of instances when it specifies that the register is for followup cases also—for heart disease and high blood pressure—which contradicts the title of the form titled as 'first visits only'. There are also forms for capturing more specific reasons for attendance; for example, ear, nose and throat clinic and maternity ward statistics. A limited amount of time was spent at Vila Central Hospital, and no other hospitals were visited, so it is recognised that this area of the mapping is not exhaustive and further review could be warranted.

Additionally, hospital data has been used to develop specialised disease-based registries. An example is the National Cancer Registry, which was set up in 1998–1999. The review found limited knowledge or use of this register (WPRO WHO 1999).

Individual records

There are a large number of individual records in use at facilities that are tracked using hospital numbers and other patient identifiers. Some of these include:

- referral hospital records—there are four admission forms in use as individual records, depending on the age and type of admission (paediatric, antenatal and delivery, surgical, and medical). Even between these similar forms there is inconsistency in their layout and data definitions (eg inconsistent use of family name, first name, or married name). They have been designed as a pseudo-discharge summary and diagnosis recording tool, with the doctor required to tick a diagnosis box at discharge. This collection of structured information is extremely helpful for use by the hospital statisticians to classify the admission using the *International Statistical Classification of Diseases and Related Health Problems*, 10th revision (ICD-10).

- antenatal/women's care record—women who receive antenatal care in the health centre or dispensary are provided with a hand-held antenatal/women's care record. This is the woman's individual patient record for a single pregnancy. If she is admitted to hospital, a similar but different form is used by the hospital. It summarises previous pregnancies, tracks observations over time (weight, blood pressure, haemoglobin, estimated gestation, urine tests), and records the outcome of labour. This is especially important to document any complications or interventions received throughout delivery (induction, augmentation, haemorrhage, lacerations, etc). However, because it is only used for one pregnancy, the value of it as a longitudinal record of the individual's reproductive care is minimised.

- child health record—newly delivered women receive this card at their child's birth and it is used to track immunisations and the child's weight over time. This provides a visual monitor of the child's development and ensures healthy weight gain is achieved and maintained. The use of this record gives mothers insight and control over their children's health status.

The use of these two 'patient-held' individual records, for both mothers and children, demonstrates that there could be some capacity for their implementation for the broader population, where patients take responsibility for keeping and managing their own personal health records, to supplement facility-held records and provide continuity of care over time and locations. On a global level, there are many studies continuing to demonstrate the use of patient-held records, through the active empowerment of patients to strengthen the availability of their own health information.

Resource records

Resource records are those that document system functioning, such as: human resources (distribution, education and migration patterns); budget and expenditure; national health accounts; health facilities; medications and stores; and all key health services. In Vanuatu, these are largely controlled by the Corporate Services of the MoH. The ability to map MoH resources over time can give insight into the variables affecting functioning of health facilities and would be of great benefit to managers. The broader source of these resources must also be considered, due to the growing private sector in Port Vila. Limited information was

collected on this aspect of the health information system during the data collection process in Vanuatu, and further analysis should be undertaken to ascertain the current status of these collections.

Among the resource records collected are:

- National health accounts (NHA)—Health financing information is complex and is important policy-making knowledge for all decision-makers within a health system (ADB 2008). The ADB, conjoint with WHO, is conducting a Pacific NHA Project that aims to develop regional resources and templates for assessing NHAs. The project piloted its assessment in three countries, including Vanuatu (WHO 2009). An NHA assessment took place in Vanuatu in 2007 over 6 months, looking at data from 2005. The assessment was led by the finance unit of the MoH with guidance from a WHO specialist. The assessment analysed the source of funds, the share of total health expenditure (THE) and the distribution of THE by providers and by functional service classifications (Ministry of Health 2007a).

- Human resources information systems—Some evidence of human resource tracking was observed at Vila Central Hospital, where hospital management reports provide a tally of staff employed, both full-time and part-time, and tracks those on leave.

- Medication and stores ordering—The ordering and supply processes for medicines and medical supplies in Vanuatu has been significantly decentralised, with each provincial pharmacist taking responsibility for the supply and control of all facilities within their province. The provincial pharmacists are also responsible for undertaking periodic audits of the stock at each facility, by doing site visits to identify issues and provide support for local dispensing.

There are two medications ordering forms—one for aid posts and one for health centres and dispensaries—which list predetermined essential medications and other medical supplies. These forms also contain instructions for calculating the amount of stock to order, as well as a section for listing medications required for individuals. There is a timetable for ordering for each health centre, dispensary and aid post. Each facility is allowed to submit an order once every two months. If the order form is not received at the end of the two-month period the central medical store follows up directly with the health facility, to determine if no stocks are required or if the

order was lost in transit or not sent. No supplies are sent without receipt of an order form. Ordered supplies are then sent to the provincial pharmacy, which forwards these to the relevant health facility, except in a limited number of cases where the direct supply from the central medical store is necessary due to geographic transport arrangements. The central medical store uses the accounting software MYOB™ to track and cost its medication supplies and expenditure. The medication supply system was reported by informants to be working well. Informants attributed this to recognition by health staff of the practical needs-based importance of an ordering and supply mechanism.

Data management

This covers all aspects of data handling from collection, storage, quality assurance and flow, to processing, compilation and analysis (WHO 2008a, p.16).

Data storage

Vanuatu's health information system is still predominantly reliant on manual data collection and storage processes for its daily operation. This includes the use of paper-based registers, reports and individual patient records. It is likely to remain paper based in the foreseeable future, until sustainable, cost-effective ways to use technology can be found for the collection, transmission and storage of information electronically. There are no national or facility policies on the storage, retention and maintenance of patient records.

At the provincial health facility level (health centres, dispensaries and aid posts), most data is recorded and stored in bound paper registers. These do not leave the health centre until complete (which takes some time, depending on the size of the population); they are then sent to the provincial office. It was observed that while most of these registers had pre-printed layouts (eg columns for name, village, sex, date of birth, etc) the nurses wrote 'free-form', often ignoring the columns, in the same style as they would use in an individual medical record's progress notes. These registers are data rich and could be used at the local and provincial levels for planning of services and assessing quality of care if their content could be consistently abstracted and analysed.

At Vila Central Hospital, the reliance on a paper-based data management system leads to a need to adequately protect records from the elements (heat, dirt, humidity and vermin). Individual patient records are stored in a clerk-controlled area of the outpatients department, filed by the patient number. Records are secure from general public access. The area is small, crowded and there are broken windows that allow wind and water into the room. Records storage at other hospitals was not observed.

Data management

There are no minimum datasets, defined metadata or standards for existing health data collections in Vanuatu. The design of the VanPHIS database has been created in isolation to the referral hospital morbidity database. This means that data are hard to compare and compile. However, this does not prohibit data quality being assessed by less formal methods. As the front line of health service delivery, health centre and hospital clinical staff know the population in their zone well and can assess a change in quality of routine data at the local level. Despite the cumbersome nature of the monthly health information system report, they should be able to recognise if the statistics collected are a true representation of the general health status of their population and if there is a problem. For example, in June 2008, Lenakel Hospital in Tanna alerted the MoH to a possible outbreak of yaws, as they had observed an increased number of cases through their routine health information system reporting (Bhaskar 2008).

At Vila Central Hospital, after discharge, the records are collected from the ward by the hospital statistician for processing. The statistician codes the records using ICD-10 for mortality and morbidity, and the International Classification of Procedures in Medicine for procedures, and then sends the records to the outpatients area for filing. There is no auditing of ICD-10 code allocation, and there was a backlog to be completed at the time of the visit. The system does not provide a mechanism to determine which discharges might be missing, since all data entry occurs retrospectively. A further problem is when the doctors hand the patients their own records, as some of these are subsequently taken home and thus not available for coding. Superficial data quality checks are undertaken monthly by the hospital statistician, who looks for minor data entry mistakes. An example of this is scanning the admissions to the maternity ward to ensure no males are recorded in the admissions. The hospital morbidity database could play a key role in the data management process; however, this database had not been working at Vila Central Hospital for some months at the time of the review. The database allows simple changes to be made at the local level based on service changes, such as the number of beds per ward or the names of wards.

Health Information Systems Knowledge Hub

Information products

Data transmission

There is no formal process for data transmission between provincial health facilities, the provincial health management offices and the national HISU at the MoH. The manual paper forms from health centres, dispensaries and aid posts are sent into the provincial health management offices in an ad hoc method (eg by hand, with other deliveries, with friends and family). It is here that the manual data is transformed into electronic format in MS Access. It can then exist in more than one location and be downloaded for wider use and analysis. The MS Access downloads from VanPHIS and the hospital morbidity database are sent to the HISU via USB thumb drives or email, if available.

Data must be transformed into information that will become the basis for evidence and knowledge to shape health action (WHO 2008a, p.16)..

For data to be transformed into information that can be used, there needs to be some analysis or knowledge applied to raw output that makes sense of it; for example, comparing coverage of measles vaccination indicators over time. This transformation can simply be presenting data visually or summarising it, and is an area that was found to be extremely weak within the health information system in Vanuatu at all levels.

The hospital morbidity database has some reporting functionality, which can produce reports by year and hospital and export these into MS Word or MS Excel (see Figure 5). VanPHIS also has a number of inbuilt standard reports, which were not seen at the time of the review.

A significant barrier to the creation of information outputs is the format in which the current data tables are stored. The health information system data is published as raw data tables on the MoH intranet, stored as PDF files. This storage method means that the data cannot easily be manipulated for analysis. At the time of the visit, the reports on the intranet had not been updated since 2006 and it was found through review that few MoH staff knew of their existence, thus they are rarely accessed. The data provided externally to the MoH, however, must be specifically requested and approved for release by the MoH management.

The central medical store uses the accounting software MYOB™, to track and cost its medication supplies and expenditure, which has a good inbuilt reporting module, allowing the production of regular reports on the content.

Top 20 principal diagnosis (ICD1) 2005

All Hospitals

Code	Disease	Total	Male					Female					LOS	Deaths
			?	<1	1-4	5-15	>15	?	<1	1-4	5-15	>15		
O80	Single spontaneous delivery	1353	0	0	0	0	0	4	0	0	2	1347	3.0	1
O70	Perineal laceration during delivery	813	0	0	0	0	0	8	0	0	5	799	3.3	0
J18	Pneumonia,organism unspecfied	353	2	61	74	12	56	1	39	42	8	57	5.3	5
L02	Cutaneous abscess, furuncle and carbuncle	304	4	10	25	31	114	0	9	20	26	62	4.2	2
J45	Asthma	254	1	3	41	15	87	0	0	9	12	86	3.0	1
A09	Diarrhoea and gastroenteritis of presumed infectious origin	214	2	8	26	8	70	2	7	19	5	68	3.1	0
B50	Plasmodium falciparum malaria	199	0	4	13	23	59	0	0	11	18	71	3.6	2
O47	False labour	181	0	0	0	0	0	2	0	0	3	176	2.1	0
T61	Toxic effect of noxious sunstances eaten as seafood	133	0	0	3	14	78	0	0	2	1	35	1.5	0
B51	Plasmodium vivax malaria	129	0	3	20	9	43	1	2	3	14	34	2.7	0
R10	Abdominal and pelvic pain	128	0	0	1	4	38	0	0	0	11	74	2.4	0
J21	Acute bronchiolitis	110	2	37	25	1	0	0	28	16	0	0	2.3	0
O03	Spontaneous abortion	108	0	0	0	0	0	0	0	0	0	108	1.7	0
J22	Unspecified acute lower respiratory infection	102	0	21	25	3	15	0	9	20	2	7	2.7	0
B54	Unspecified malaria	101	0	3	14	8	27	0	3	9	7	30	2.4	0
E11	Non-insulin-dependent diabetes mellitus	98	1	0	0	0	51	0	0	0	0	46	12.3	2
J06	Acute upper respiratory infections of multiple and unspecified sites	85	1	13	19	5	9	0	15	14	0	8	2.4	0
I10	Essential (primary) hypertension	84	0	0	0	0	43	0	0	0	0	41	4.1	1
S52	Fracture of forearm	80	1	0	1	26	28	1	0	0	14	8	4.0	0
I11	Hepertensive heart disease	67	0	0	0	0	31	1	0	0	0	35	6.0	1
	Total	4896	14	163	287	159	749	20	112	165	128	3092		15

NOTES: This report gives the top twenty principal (first reported) diagnosis ie it ignores any associated diagnosis
The total number may be greater than the sum of males and females, representing patients of unknown sex

Tuesday, 30 May 2006   Vanuatu MOH - Health Information System   Page 1 of 1

Figure 5 Example report: top 20 principal diagnoses for all hospitals, 2005

Dissemination and use

> The value of health information is enhanced by making it readily accessible to decision-makers and by providing incentives for, or otherwise facilitating, information use (WHO 2008a, p.16).

Demand, analysis, policy and advocacy

There is a critical problem at the national level with the demand and analysis of health information in Vanuatu, which has led to a poor use of information for policy and advocacy. Over time, the aspects of the health information system that had been strengthened by donor investments have not regularly been monitored, evaluated or sustained. This has led to a degradation of infrastructure, and a lack of investment in health information system resources. The outcome of this degradation is weak data quality and incompleteness. This has caused a general mistrust of available information and the development of a poor culture of information use. The underlying success of a health information system is based on the demand from policy-makers and managers for accurate and timely health information, as this impacts the information culture and the value derived from health information activities.

Planning, priority setting and resource allocation, implementation and action

Ideally, information should drive day-to-day management decisions, planning and priority setting for health services delivery. It should be used to provide feedback to data collectors themselves; that is, the clinicians, nurses and village health workers, to show its benefit and value to them. All health managers need to be engaged in, and model the use of, information in making planning and priority-setting decisions. This is an area for urgent attention within the MoH and leadership must come from the most senior levels.

Referral hospital reports

A good example of the use of health information system for planning is the Vila Central Hospital annual report, written by the hospital statistician, which includes basic presentations of the number of beds, staffing, admission and discharges, outpatient attendances, ward occupancy rates, and deaths and births. It was noted by the statistician that although these are available, regular monthly reports are not provided to Vila Central Hospital management. Specific reports are only provided when requested. The statistician notes that in each annual report there are large gaps in the data completeness and that this has reduced the accuracy of the reports. It is repeatedly noted in these reports the difficulty in getting data from the doctors and nurse practitioners. Currently, this report takes approximately a year to collate and produce, and little analysis is done of the statistics contained; in fact, in some instances only the raw data is included.

Ministry of health annual reports

The MoH produces annual reports for parliament, as required under the Parliament (Administration) Act [Cap 306] 2006. These reports have also been used as a key source of information by multilateral donors. The 2007 annual report was produced using descriptive language and survey data only, without the inclusion of information abstracted from the routine health information collections. The reason for this is that the routine data from the preceding year was incomplete and not considered a reliable data source to provide a picture of MoH activities or performance.

Health Information Systems Knowledge Hub

Conclusion

It is evident that Vanuatu has a number of the foundational building blocks for a successful health information system already in place, with dedicated staff and a number of well-designed databases. However, there are clear weaknesses in the system, including human resourcing; a lack of information standards, coordination and integration of the existing elements; and a large burden of data collection at the provincial health facility level. This contributes to a poor culture of use of information at all levels of the health system. It is recommended that these key issues be considered as part of a health information system strategic planning process, and a plan be developed that can guide and direct the health information system improvement in a structured and coordinated way over the coming years, and align donor investments.

References

ADB (Asian Development Bank) (2008). *Regional Technical Assistance Report: Strengthening Evidence-Based Policy-Making in the Pacific: Support for Development of National Health Accounts,* www.adb.org/Documents/TARs/REG/41186-REG-TAR.pdf (accessed 19 December 2009).

ADB (Asian Development Bank) (2009). *Technical Assistance Fund: Demographic and Health Surveys in Pacific Island Countries*, www. adb.org/Documents/Reports/Consultant/39074-REG/39074-REG-TACR.pdf (accessed 21 December 2009).

AusAID (Australian Agency for International Development) (2009). Vanuatu–Australia partnership for development, media release 27 May, www.ausaid.gov.au/hottopics/Australia_Vanuatu_Partnership_for_Development.pdf (accessed 12 June 2009).

AusAID (Australian Agency for International Development) (2010). *Country Program Details Vanuatu*, www.ausaid.gov.au/country/country.cfm?CountryID=17&Region=SouthPacific (accessed 15 January 2010).

Bhaskar R (2008). Yaws prevalence survey, Tanna Island, unpublished.

Cox M, Alatoa H, Kenni L et al (2007). *The Unfinished State Drivers of Change in Vanuatu,* www.ausaid.gov.au/publications/pdf/vanuatu_change.pdf (accessed 21 December 2009).

Ministry of Health (2007). *Vanuatu National Health Accounts 2005*, www.who.int/nha/country/vut/Vanuatu%20NHA05%20draft.pdf (accessed 15 January 2010).

Ministry of Health (2008). *Vanuatu Multiple Indicator Cluster Survey 2007, Final Report*, www.spc.int/prism/Country/vu/Stats/Projects/mics-07.htm (accessed 15 January 2010).

Ministry of Health (2009). Draft health reform plan, Vanuatu Ministry of Health, unpublished.

ODE (Office of Development Effectiveness) and AusAID (Australian Agency for International Development) (2009). *Working Paper 3: Vanuatu Country Report*, www.ode.ausaid.gov.au/publications/pdf/working_paper_3_vanuatu.pdf.

Strode M (2008). *Vanuatu Millennium Challenge Account Data Quality Audit: First Mission*, Oxford Policy Management, www.governmentofvanuatu.gov.vu/development-partners/mca-vanuatu/documents/category/7-audit-reports.html?download=25%3Amca-vanuatu-data-quality-audit-report_fina (accessed 21 December 2009).

Taga Y (2008). 'Vanuatu health information system: an overview', paper presented to the Social Statistics Symposium (location unknown).

Takoa R (2009). 'Vanuatu health information system', paper presented to the Pacific Health Information Network meeting, 29 September – 2 October 2009, Nadi, Fiji, www.uq.edu.au/hishub/docs/vanuatu.pdf (accessed 21 December 2009).

Taylor R, Carter K (2009). Mortality reporting systems in Vanuatu, unpublished.

UNDP (United Nations Development Programme) (2008). *Country Fact Sheet: Vanuatu*, http://hdrstats.undp.org/2008/countries/country_fact_sheets/cty_fs_VUT.html (accessed 21 December 2009).

UNICEF (United Nations Children's Fund) (2005). *Birth Registration in the Pacific*, www.unicef.org/pacificislands/BR_Report_Part2.pdf (accessed 21 December 2009).

UNICEF (United Nations Children's Fund) (2009). *Snapshot of Planned Results for 2009*, www.unicef.org/pacificislands/children_10822.html (accessed 21 December 2009).

Vanuatu Government (1994). *Vanuatu Sessional Legislation Public Health Act 1994*, www.paclii.org/vu/legis/num_act/pha1994126/ (accessed 15 January 2010).

Vanuatu National Statistics Office (2008). *Strategic Plan 2008–2013,* www.paris21.org/documents/2933.pdf (accessed 15 January 2010).

Vanuatu National Statistics Office (2009). *Census 2009: Household Listing Counts*, www.spc.int/prism/country/vu/stats/P_releases/Adhoc/HH%20listing%20count%20release%20-%20071009.pdf (accessed 15 January 2010).

WHO (World Health Organization) (2008a). *Framework and Standards for Country Health Information Systems*, 2nd edn, Health Metrics Network, www.who.int/healthmetrics/documents/hmn_framework200803.pdf (accessed 15 January 2010).

WHO (World Health Organization) (2008b). *World Health Statistics Vanuatu*, www.who.int/countries/vut/en/ (accessed 15 January 2010).

WHO (World Health Organization) (2008c). *Proceedings from the Third National EPI Program Review Workshop*, 9–11 December 2008, Port Vila, Vanuatu, WHO, Geneva.

WHO (World Health Organization) (2009). Consultation on support for the development of National Health Accounts in the Pacific, Nadi, Fiji, 1–3 September 2009, www.wpro.who.int/NR/rdonlyres/6A37652A-C704-4798-8615-855355866CA1/0/FINALREPORT.pdf (accessed 15 January 2010).

World Bank (2009). *Data: How We Classify Countries*, http://data.worldbank.org/about/country-classifications (accessed 15 January 2010).

WPRO (Western Pacific Regional Office) WHO (World Health Organization) (1999). *The Work of WHO in the Western Pacific Region 1998–1999*, www.wpro.who.int/NR/rdonlyres/3969FDAB-F790-4AC4-8DA5-4DA449F5F6A1/0/chapter5_53.pdf (accessed 15 January 2010).

Appendix 1 Health information system component summary table

Criteria for success	Present	Functioning	Adequate	Sustainable
HIS resources				
Coordination, planning and policies				
Is there a national cross-sectoral HIS committee?	N	N/A	N/A	N
Is there a written national HIS policy?	N	N/A	N/A	N
Is there HIS-related legislation to measure:				
• vital statistics?	Y	Y	N	N
• service delivery?	N	N/A	N/A	N
• notifiable disease reporting?	Y	Y	Y	N
Financial and human resources				
Are there human resources uniquely identified as HIS?	Y	N	N	N
Are there clear lines of responsibility for HIS?	N	N	N	N
Is there an allocated budget within the MOH?	N	N	N	N
Infrastructure				
Is there hardware available for HIS use?	Y	Y	N	N
Is there software available for HIS use?	Y	N	N	N
Is there networking infrastructure available for HIS use?	Y	N	N	N
Indicators				
Are there national core indicators to measure:				
• health determinants?	N	N	N	N
• health system inputs and outputs?	Y	N	N	N
• health outcomes and status?	Y	N	N	N
Is there a national strategy for collection of MDG indicators?	Y	Y	N	N
Data sources				
Population based				
Is there a timely and complete census undertaken every 10 years?	Y	Y	N	N
Is there an appropriate civil registration process in place?	Y	N	N	N
Are surveys undertaken for specific health policy questions?	Y	Y	N	N
Institution based				
Are there appropriate individual record processes in place?	Y	Y	N	Y
Are there appropriate service record processes in place?	Y	Y	N	Y
Are there appropriate resource record processes in place?	Y	N	N	N
Data management				
Data storage, management and transmission				
Is there a written set of procedures for data storage?	N	N	N	N
Is there a centralised database for all data collections?	N	N	N	N
Is there a procedure for data transmission?	N	N	N	N

Criteria for success				
Information products				
Are staff appropriately skilled to transform data into information at the:				
• national level?	Y	N	N	N
• divisional/provincial/local level?	N	N	N	N
Are there tools and procedures available to assess quality of data?	N	N	N	N
Is there a set of national data standards and metadata available?	N	N	N	N
Dissemination and use				
Demand, analysis, policy and advocay				
Are managers demanding information for policy and advocacy use?	Y	N	N	N
Are clinicians demanding information for policy and advocacy use?	Y	N	N	N
Planning, priority setting, and resource allocation, implementation and action				
Is an annual report submitted to parliament each year?	N	Y	N	N
Are health managers using information for planning, priority setting, or resource allocation and action?	N	N	N	N
Are clinicians using information for planning, priority setting, or resource allocation and action?	Y	N	N	N

Health Information Systems Knowledge Hub

Appendix 2 Interview form

Name	
Position	
Department/unit	
Facility	
Number of years in position	Level of education

Health information system resources

- Tell us about who is in charge? (governance structure)
- Who is your boss? (reporting structures and coordination mechanisms)
- Determine funding structures
- Are you aware of any legislation that applies to your job? (ie privacy)
- Is your job included in any 'strategy'?
- Financial and HR—adequate staffing and capacity in statistics
- Describe any hardware and software
- Describe any manual and collect sample forms

Health information system indicators

- Are you involved at all with MDG's indicators?
- What is your understanding of core indicators?

Health information system data sources

Contents

- Population based/institution based (circle one)
- What does the data source measure?
- What kind of data source are you involved in? (Census, Civil Reg, Pop Survey, Indiv record, service record, Resource record)

Capacity and practice

- Tell us exactly what and how you do it (implement, process and analyse)
- Are you aware of any data standards/definitions that apply?

- What training was provided to you to collect this data?
- Do you ever check or validate the data? What process do you use?

Dissemination and use

- Do you know what happens to the data once you have finished your part?
- Are you involved with any reports? How are these submitted?
- Does the data ever come back to you?

Health information system data quality and data management

- Do you have any policy on storage/collection/ processing?
- Do you have any policy on quality methods?
- Timeliness—how often do you report?

Representativeness

- Disaggregation—how datum is uniquely identified?
- Data security and confidentiality

Staff perceptions

- What are some of the important aspects of your job?
- What are the strengths and weaknesses of data collection?
- What could be improved?

Health Information Systems Knowledge Hub

The Knowledge Hubs for Health Initiative

The Health Information Systems Knowledge Hub is one of four hubs established by AusAID in 2008 as part of the Australian Government's commitment to meeting the Millennium Development Goals and improving health in the Asia and Pacific regions. All four hubs share the common goal of expanding the expertise and knowledge base to help inform and guide health policy.

The Knowledge Hubs are funded by AusAID's Strategic Partnership for Health Initiative.

Health Information Systems Knowledge Hub

The University of Queensland

Aims to facilitate the development and integration of health information systems into the broader health system strengthening agenda, and increase local capacity to ensure that cost-effective, timely, reliable and relevant information is available. The Health Information Systems Knowledge Hub also aims to better inform health information systems policies across Asia and the Pacific. www.uq.edu.au/hishub

Human Resources for Health Knowledge Hub

The University of New South Wales

Aims to contribute to the quality and effectiveness of Australia's engagement in the health sector in the Asia–Pacific region by developing innovative policy options for strengthening human resources for health systems. The hub supports regional, national and international partners to develop effective evidence-informed national policy-making in the field of human resources for health. www.hrhhub.unsw.edu.au

Health Finance and Health Policy Knowledge Hub

The Nossal Institute for Global Health
(University of Melbourne)

Aims to support regional, national and international partners to develop effective evidence-informed national policy-making, particularly in the field of health finance and health systems. Key thematic areas for this hub include comparative analysis of health finance interventions and health system outcomes; the role of non-state providers of health care; and health policy development in the Pacific. www.ni.unimelb.edu.au

Compass: Women's and Children's Health Knowledge Hub

Compass is a partnership between the Centre for International Child Health, The University of Melbourne, Menzies School of Health Research and Burnet Institute's Centre for International Health.

Aims to enhance the quality and effectiveness of women's and children's health interventions and focuses on supporting the Millennium Development Goals 4 and 5—improved maternal and child health, and universal access to reproductive health. Key thematic areas for this hub include regional strategies for child survival; strengthening health systems for maternal and newborn health; adolescent reproductive health; and nutrition. www.wchknowledgehub.com.au