Comparative Country Studies
Volume 6, Number 2 2023

Use of routine health information systems for policy-making towards universal health coverage in decentralized countries:

a comparative analysis of strategies used in Indonesia and Philippines

Editor: Karen Ann Grépin

Asia Pacific Observatory
on Health Systems and Policies

Comparative Country Studies
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Asia Pacific Observatory
on Health Systems and Policies

World Health Organization Regional Office for South-East Asia
Use of routine health information systems for policy-making towards universal health coverage in decentralized countries: a comparative analysis of strategies used in Indonesia and Philippines
Comparative Country Studies. Vol. 6, Number 2
ISBN 978-92-9021-104-4

Suggested citation: Grepin K, Song M, Lazuardi L, Marthias T, Sarmiento RFR et al. Use of routine health information systems for policy-making towards universal health coverage in decentralized countries: a comparative analysis of strategies used in Indonesia and Philippines. New Delhi: World Health Organization Regional Office for South-East Asia; 2023.

Cataloguing-in-publication (CIP) data. CIP data are available at http://apps.who.int/iris/.

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Acknowledgements

This report was produced by a core team of 11 people from the University of Hong Kong, University of the Philippines Manila, and Universitas Gadjah Mada, Indonesia: Karen A. Grépin, Mingqi Song, Raymond Francis R. Sarmiento, Razel G. Custodio, Romeo Luis A. Macabasag, Monica B. Sunga, Lutfan Lazuardi, Tiara Marthias, Brian Sahar Afifah, Gabi Ceria, and Zahrotul Kamilah. Dr Karen A. Grépin coordinated the study.

We gratefully acknowledge the contributions of national health ministries, subnational government officials, and other key informants from Indonesia and Philippines, who helped us with data collection. Country teams also provided important inputs for Chapter 3 (Landscape analysis), especially for the Health Metrics Network (HMN) assessment.

We are grateful for funding support from the Asia Pacific Observatory on Health Systems and Policies (APO). We also thank Dr Nima Asgari-Jirhandeh, Director of the APO, for providing guidance and comments on the report. We also thank the two peer-reviewers who provided useful inputs to the report.

Acronyms and abbreviations

APO	Asia Pacific Obersevatory
APBN	Anggaran Pendapatan dan Belanja Negara (Central Government budget)
APR	Asia-Pacific Region
Askeskin	*Asuransi Kesehatan untuk Keluarga Miskin* (health insurance for poor families)
Bappenas	Ministry for National Development Planning/ National Development Planning Agency BHS barangay health station
BPJS	Social Security Providers Law of Indonesia
CHD	Centre for Health Development
CHED	Commission on Higher Education
CHITS	Community Health Information Tracking System
DALY	disability-adjusted life year
DDU/DDIU	Data Demand and (Information) Use
DHIS2	District Health Information Software 2
DHO	district health office
DJSN	*Dewan Jaminan Sosial Nasional* (National Social Security Council)
DoH	Department of Health (Philippines)
DPD	*Dewan Perwakilan Daerah* (Regional Representative Council)
DPR	*Dewan Perwakilan Rakyat* (People's Representative Council)
DVAS	DICT Vaccine Administration System
EA	Enterprise Architecture
EB	Epidemiology Bureau
EHR	electronic health record
EMR	electronic medical record
ESU	Epidemiology Surveillance Unit
F1 Plus	FOURmula One Plus for Health (Philippines)

FHSIS	Field Health Service Information System
GDP	gross domestic product
HDI	Human Development Index
HFEP	Health Facilities Enhancement Program (Philippines)
HIS	health information system(s)
HMN	Health Metrics Network
HRH	human resources for health
iClinicSys	Integrated Clinical Information System
ICNDRS	Integrated Chronic Non-Communicable Diseases Registry Systems
ICT	information and communication technology
IDHIS	Indonesian Health Information Architecture
IHA	Indonesian Health Act
IHME	Institute for Health Metrics and Evaluation
ILHZ	inter-local health zones
ILIS	Integrated Leprosy Information System
iPNIDMS	Integrated Philippine Network for Injury Data Management System
ITIS	Integrated Tuberculosis Information System
ISSP	Information Systems Strategic Plan 2018–2020 (Philippines)
JKN	*Jaminan Kesehatan Nasional* (national health insurance)
JPKM	*Jaminan Pemeliharaan Kesehatan Masyarakat* (community health insurance programme)
KMITS	Knowledge Management and Information Technology Service
LCE	local chief executive
LGU	local government unit
LHB	local health board
LMICs	low and middle-income countries
M&E	monitoring and evaluation
MoH	Ministry of Health

MPR	Majelis Permusyawaratan Rakyat (People's Consultative Assembly)
NaRIS	National Rabies Information System
NCD	noncommunicable disease
NHIP	National Health Insurance Program
NHTS-PR	National Household Targeting Survey for Poverty Reduction (Philippines)
NOH	National Objectives for Health (Philippines)
ONEISS	Online National Electronic Injury Surveillance System
PeHSFP	Philippine eHealth Strategic Framework and Plan 2014–2020
PHIE	Philippine Health Information Exchange
PhilHealth	Philippine Health Insurance Corporation
PHIN	Philippine Health Information Network
PhilMIS	Integrated Tuberculosis Information System
PHO	provincial health office
PIDSR	Philippine Integrated Disease Surveillance and Response
PIMS	Patient Information Management System
PRISM	Performance of Routine Information System Management (framework)
PRPWD	Philippine Registry for Persons with Disabilities
PSA	Philippine Statistics Authority
Puskesmas	community health centre
RHIS	routine health information system(s)
RHU	routine health unit
RKP	Rencana Kerja Pemerintah (Indonesia's annual work plan)
RPJP	Rencana Pembangunan Jangka Panjang (Indonesia's long-term development plan)
RPJMN	Rencana Pembangunan Jangka Menengah Nasional (Indonesia's medium-term development plan)
RPJPN	Rencana Pembangunan Jangka Panjang Nasional (Indonesia's national long-term development plan)

RS Khusus	specialist hospital (Indonesia)
RSUD	public district hospital (Indonesia)
RSUP	public provincial hospitals (Indonesia)
SCORE	Survey, Count, Optimize, Review, and Enable
SHINE OS+	Secured Health Information Network and Exchange Open-Source plus
SJSN	National Social Security System (Indonesia)
SKPD	Satuan Kerja Perangkat Daerah (Indonesia's regional working unit)
SPM	*Standar Pelayanan Minimum Bidang Kesehatan* (Standards Minimum of Health Services)
SSN	social safety net (*Jaringan Pengaman Sosial*)
UGM	Universitas Gadjah Mada
UHC	universal health coverage
VAWCRS	Violence Against Women and Children Registry System
VIMS-IR	Vaccine Information Management System-Immunization Registry
WAH	Wireless Access for Health
WBG	World Bank Group
WHO	World Health Organization

Definition of terms

Data use

For this report, *data use* is defined as the analysis, synthesis, interpretation, review, and use of data as part of the decision-making process, which includes, but is not limited to, programme review, planning and management, monitoring and evaluation, advocacy, policy development, and delivery of services.

Human resources for health

Human resources for health (HRH) include individuals working in both the private and public health sectors, those employed full-time or part-time, working one job or holding jobs at two or more locations, and those who are paid or provide services on a volunteer basis. The term covers workers from different domains of the health system, including curative, preventive, and rehabilitative care services, as well as health education, promotion, and research. This may also include people with the education and training to deliver health services but who are not engaged in the national health labour market (e.g. if they are unemployed or have migrated or withdrawn from the labour force for personal reasons) (WHO, 2009).

Interoperability

We defined *interoperability* as "the ability of different information systems, devices, and applications (systems) to access, exchange, integrate, and cooperatively use data in a coordinated manner, within and across organizational, regional, and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally" (HIMSS, n.d.).

Routine health information system

In this report, the term *routine health information system* refers to a system that collects data at regular intervals (no longer than a year) at health facilities and institutions, as well as at community-level health-care posts and clinics (MEASURE evaluation, 2017). Data from other types of facilities that also deliver health services (e.g. schools) may also be entered into the

routine health information system (RHIS). Private health facilities often report into these databases; however, coverage of private providers can be poor in many countries. Most of the data that document health status, health services provided, and health resources are gathered by health-care providers as they go about their regular work activities, but supervisors and ongoing health facility surveys also contribute information. Data are typically first collected in aggregate monthly reports, which can be either paper-based, electronic, or a hybrid of both system types, and then are entered into an electronic database (WHO, 2021b). Data entry may occur at different levels of the health system, e.g. directly by community health workers, at health facilities, or at district health offices. In some cases, data from multiple health programmes may be entered into a single database while in other cases, specific disease control programmes may have their own data entry processes and databases.

Universal health coverage

Universal health coverage (UHC) means that all people have access to the health services they need, when and where they need them, without experiencing undue financial hardship. It covers the full range of essential health services, from health promotion to prevention, treatment, rehabilitation, and palliative care (WHO, n.d.a).

Executive summary

As one of the six key building blocks of every health system, health information systems (HISs) provide health system planners and managers with the data required to make informed decisions across the health system. Thus, the importance of a HIS lies in supporting other building blocks and strengthening overall health system performance. Among the diverse components of HIS, the routine health information system (RHIS) focuses only on data for services provided by health facilities. A robust and reliable RHIS is essential for disease surveillance, health service quality control, and effective resource mobilization, especially for health systems that have become more decentralized, an emerging theme in health system reforms since the 1980s.

The past decade has witnessed the rapid development of health information systems in many low- and middle-income countries (LMICs). However, a broad perception is that RHIS data are largely underutilized in these contexts, triggering growing interest in understanding the key barriers to greater data use. Although the major obstacles identified in present studies can vary depending on the context, a group of researchers has pointed out how behavioural (e.g. limited RHIS knowledge and skills), technical (e.g. suboptimal system design), and organizational factors (e.g. delayed feedback from the central government) can hinder the utilization of RHIS data in LMICs. Despite this, there is a general lack of research on how RHIS data is utilized in practice to inform decision-making in health systems of LMICs. The extent to which decentralization and the limited reach of the health system further affect decision-making is less well understood. Conversely, a few studies have also demonstrated examples in which RHIS are able to bridge important gaps in expanding the reach of health systems into more remote contexts.

The COVID-19 pandemic has been a perfect storm for the health systems of LMICs. Evidence from the existing literature shows that the pandemic has not only increased the demand for more disaggregated data but has also changed the way in which health system managers have relied on the health system for decision-making and delivery of quality health services.

Using the Performance of Routine Information System Management (PRISM) Framework and the Data Demand and (Information) Use (DDU/DDIU) model, this qualitative study examined how policy-makers in two LMICs in the Asia-Pacific region use RHIS data to inform their decisions and the limiting factors that interfere with its utilization and implementation. We chose Indonesia and Philippines for this comparative analysis. Apart from similar health profiles, levels of health system development, and socioeconomic features, both countries are making significant strides towards health system decentralization and achieving universal health coverage (UHC). Foremost, little is known about how decentralized decision-making and progress towards UHC could be limited or supported by RHIS in these two countries, not to mention the impact of the COVID-19 pandemic on RHIS and how policy-makers used them for COVID-19 responses.

Interviews conducted in both countries revealed that RHIS data are widely used for planning and implementing health programmes. Data from RHIS also played an essential role in monitoring and evaluation (M&E) activities, priority-setting, and advocacy efforts, at times in combination with data generated from other sources.

Regarding barriers facing RHIS data users, technical problems and the lack of equipment were found to compromise the accessibility of RHIS data in both countries. The lack of interoperability of different RHIS, incoherent data use policies, and weak cross-sectoral coordination make it difficult for decision-makers to use RHIS data. At both the national and subnational levels, primary behavioural factors, such as lack of competency and unwillingness to use RHIS, may have resulted from a lack of data use culture, low trust in data quality, and lack of RHIS-related training among its users. Some of these challenges were exacerbated during the COVID-19 pandemic, as financial and non-financial resources were allocated predominantly to COVID-19, leading to disruptions in the collection, validation, and analysis of RHIS data. However, RHIS was also reported to be used for crisis response (e.g. contact tracing and vaccination), and the value of RHIS was recognized more by health policy-makers, which could facilitate better utilization of RHIS in the long term.

Our findings also point to ways in which the use of data derived from RHIS could be strengthened in both countries. Despite the growing influence of RHIS, there is still scope to fortify the underlying data collection system to improve data availability. There is also the need to further integrate and promote the interoperability of RHIS with other components of the HIS. Additionally, there are benefits to increasing trust in RHIS by data users, which may be achieved through more regular and expanded data quality assurance activities. Finally, there is a necessity to further build capacity among the health workforce in both countries to use data and to promote a more conducive culture of data use.

Chapter 1: Introduction

According to the World Health Organization (WHO), the health information system (HIS) is a key building block of every health system (WHO, 2010). It also plays an important role in supporting others by supplying health system planners and managers with the data needed to make informed decisions across the health system. A HIS usually comprises several components, including a routine health information system (RHIS), which collects data at regular intervals from health facilities (Hotchkiss et al., 2012). RHISs are not only essential for monitoring and evaluation (M&E) purposes, but are also crucial for resource planning, supporting patient care practices and health system management, as well as providing early warnings of outbreaks or other public health emergencies. Moreover, it allows for the analysis of the latest health situations and trends, stimulates research, and supports cross-sector communication of health challenges (WHO, 2008a). All these functions can help health systems perform more effectively, ultimately resulting in better health outcomes. In low- and middle-income countries (LMICs), a well-functioning RHIS can provide timely information on disease incidence, preventive intervention, and treatment coverage, along with risk factors that help determine resource mobilization and donor funding priorities (Lee et al., 2021).

Despite the instrumental role of RHIS, it is commonly believed that the full potential of these systems has not been totally exploited in many LMICs. As argued by Jamison et al. (2006, p.1017), data alone have no inherent meaning and do not automatically lead to improved health outcomes. The collected data must be analysed to identify patterns and generate useful information, which can then be used to draw inferences and create the knowledge and insights necessary to inform decision-making. However, relatively little research has been conducted to better understand how RHIS data are used in practice to inform decision-makers in the health systems of LMICs. A recent scoping review by Byrne and Saebø (2021) investigated the use of data sourced from the District Health Information Software 2 (DHIS2), a widely used RHIS data platform, in LMICs. They found that the DHIS2 data were most commonly used for planning, performance monitoring, programme review, and reporting. In contrast, only a few examples were identified in which the DHIS2 data were employed for advocacy and policy development. It was also found that the culture of data use at lower levels of the health system was not as prevalent as at the higher

levels. However, the studies included in this review were predominantly from Africa, with only five case studies from the Asia-Pacific Region (APR). Another extensive review of studies from LMICs also found limited or inadequate use of data, especially routine health data (Lemma et al., 2020); although most of the studies identified were from sub-Saharan Africa.

Reassuringly, there is growing interest in understanding the factors that affect the use of RHIS data by decision-makers. Focusing on HIS in low-income settings, Wickremasinghe et al. (2017) identified three barriers to greater use of RHIS data at the district level: the degree of autonomy of local decision-makers in making and implementing decisions, the quality and availability of data, and the low ability of decision-makers to utilize RHIS data. Kumar et al. (2018) investigated how health system design factors (e.g. user involvement, workflow, human–computer interactions, and user experience) influence HIS data quality and the use of data for decision-making in LMICs. It was concluded that inadequately designed systems contributed to the failure of HIS to fulfil the information needs of decision-makers. Rendell et al. (2020) in a review of 12 studies grouped all potentially influential factors into three categories: governance, information production, and HIS resources and subsequently reported similar findings. In a study by Mekonnen and Gebeyehu (2021), the authors summarized four determinants of RHIS utilization. The importance of regular feedback from the government as well as the availability of standard indicators and guidelines were highlighted as being the most important. Another study by Scott and Gilson (2017) examined the use of data by primary health-care facility managers in Cape Town, South Africa, and found that the Central Government shaped what information was valued, generated, and used at lower levels of the health system.

In 2009, the Performance of Routine Information System Management (PRISM) Framework was developed to examine the factors associated with the performance and utilization of RHIS data. Since its inception, many qualitative and mixed-methods studies have used this framework to assess the performance and use of RHIS data in various international contexts. Nicol et al. (2017) demonstrated that the inadequate use of information in selected areas of South Africa resulted mainly from organizational determinants, such as the lack of a culture of information

use, low trust in the data, and limited competency to analyse, interpret, and use data. Using another framework based on focus group discussions with health-care providers in Iran, a different study found that other than the resources for HIS use and information processes, the delivery model of health services also affected whether HIS data were employed (Yazdi-Feyzabadi et al., 2015). According to Hoxha et al. (2020), more than half of the 60 studies included in a systematic review of the challenges associated with RHIS data highlighted organizational or environmental challenges connected with RHIS performance, including resource shortages, lack of training and management, and insufficient communication between administrative levels.

Promoted by major international development agencies, health system decentralization emerged as a common theme in the policy agendas of many LMICs in the 1980s and the 1990s (Dwicaksono & Fox, 2018). Since then, many countries, particularly in Asia and Africa, have promoted decentralization of their health systems. As a complex multilevel process, many studies have sought to better understand the decentralization process. Despite divergent ideas about its defining characteristics (Saltman et al., 2007, p.10), the typology developed by Rondinell et al. (1983) has become widely used. It categorizes decentralization into four major actions: the transfer of responsibilities and authority to lower levels within the central government (*de-concentration*), from the centre to local government units (*devolution*) and nongovernmental organizations (*delegation*), or from the government to the private sector (*privatization*). There is an ongoing debate over the effectiveness of decentralization, regarding which activities should be decentralized and under what conditions they can work (Regmi, 2013, p.26). The advantages of decentralization have been widely described in the literature. For instance, Sujarwoto (2017) summarized that as decision-making power is given to local jurisdictions, decentralization should better align citizens' interests with policy preferences and improve accountability. However, other studies have questioned whether decentralization improves government responsiveness (Faguet, 2004), accessibility of public services (Faguet & Sánchez, 2014), and equity (Martinez-Vazquez, 2011, p. 4; Sujarwoto, 2012). The role of information in improving decentralization processes has not yet been widely explored.

Similarly, the role of decentralization in strengthening health systems remains debatable. Empirical evidence on the role of decentralization in improving decision-making and overall health systems is limited and mixed (Martinez-Vazquez, 2011, p. 5). A review of 54 studies in 26 LMICs by Muñoz et al. (2017) found that decentralization of governance, financing, and service delivery had positive effects on health systems. In contrast, decentralization of resource management had been deemed challenging in several settings. Decentralization has also been found to have positive effects on adult, child, and maternal mortality (Muñoz et al., 2017, as cited in Rintani & Wibowo, 2019). Mitchell and Bossert (2010) found that the effects of decentralization on the performance of district-level officials varied and required improved levels of accountability to achieve health system outcomes. A recent systematic review of the district-level effects of decentralization in Indonesia reported that among the six health system building blocks, the efficiency of service delivery, health workforce, and financing domains remained the most problematic post-decentralization (Rakmawati et al., 2019). Abimbola et al. (2019) attempted to explain the varied outcomes of decentralization in health systems. They identified three mechanisms through which decentralization influences health system equity, efficiency, and resilience, each enabled or constrained by a broad range of institutional, socioeconomic, and geographical factors.

Few studies have examined the intersection between health information, decision-making, and decentralization in health systems, although some studies have examined how two of these three factors may interact. The key findings of this literature can be summarized as follows. The first is that the impact of decentralization on data use cuts both ways. Decentralization can obstruct intraorganizational, interorganizational, and interagency data-sharing (Akbulut et al., 2009), which could negatively affect decision-making. However, decentralization can incentivize governments to provide more evidence to justify policy decisions. Thus, a decentralized system is more likely to be open to the sharing and uptake of evidence than a centralized system (Liverani et al., 2013). Second, data-sharing lowers the threshold of involvement for managers in important health system decision-making processes. This may also result in data misinterpretation across agencies (Dawes, 1996), which could impede both the decision-making and decentralization processes. Kimaro and Sahay (2007) argued that to

amend the pre-existing HIS structures prior to decentralization would be rather complex because the political, fiscal, and administrative processes are all closely linked. Third, despite its disadvantages, data-sharing is an essential input to health system decentralization because of its role in informing better decision-making. When discussing the appropriateness of using decentralization as a tool to improve health services, Mitchell and Bossert (2010) emphasized how data constraints may impede decision-making in the health sector: "basic data required for decision-making are usually not available or cannot be used by decision-makers effectively". Therefore, decentralized health systems require both reliable information and appropriate human resources to manage and use information to take action (Byrne & Sahay, 2003).

Apart from health system decentralization, the achievement of universal health coverage (UHC) has also gained momentum in the global health policy agenda, serving as an umbrella for efforts to strengthen health systems and improve the delivery of health services. As of 2014, more than 70 countries had requested policy support and technical guidance from WHO on how to move towards UHC (WHO, 2014). In addition, well-functioning information systems are considered the backbone of UHC (Hussein, 2015).

UHC has also been an important policy focus of the health reforms initiated by both Indonesia and Philippines over the past decade. Achieving UHC requires countries to expand coverage of a wide range of health services to a broader set of beneficiaries while also ensuring financial protection for the populace. The types of decisions that policy-makers are required to make are also more complex, more cross-cutting across different sectors of the health-care system, as well as more diverse than what was previously necessary. The types of data typically preferred for such decisions are sourced from nationally representative household surveys, but these surveys provide limited or minimal data on the full range of health services targeted by UHC reforms. They also offer limited financial protection data. Thus, the surveys are likely to be inadequate for decision-makers to inform the UHC decision-making process.

As for resource allocation, although most national RHIS have some level of integration with financial, logistic, and human resource management systems, in the context of UHC, the demand for such data has grown (Sahay et al,, 2014). With the expansion of service packages and enrolled populations, the volume of data collected by RHIS is also increasing. HIS are increasingly being used to collect data other than health service data, such as health payments. However, it becomes an important challenge for the existing RHIS infrastructure to ensure that these data are effectively utilized by the relevant stakeholders. Moreover, monitoring the progress of UHC is difficult because many RHIS collect data on the number of services delivered but do not directly measure the coverage of services. In addition, RHIS data cannot be disaggregated to reveal socioeconomic inequalities within a country and support long-term tracking (WHO, 2019c). Thus, as stated by Ng et al. (2014), strengthening the capacity of HIS should be done in tandem with the implementation of health reforms to achieve UHC. To date, no studies have been conducted on UHC's implications for RHIS, the use of RHIS data, or how RHIS data could be used to strengthen or inform UHC.

The COVID-19 pandemic has also significantly increased the demand for real-time health system data. Data sourced from RHIS have been used extensively to track and analyse the dynamics of the pandemic by monitoring the effectiveness of the response and maintaining the delivery of essential health services (WHO, 2020a). The urgency of the pandemic and the challenges associated with the collection of other data sources have forced decision-makers to rely on RHIS data more than ever before. However, it is unclear how these changes may affect the demand and long-term use of RHIS data in the future.

Therefore, this study aims to investigate how policy-makers in Indonesia and Philippines use RHIS data to inform their decisions regarding UHC. In addition, we aim to identify factors that prevent greater implementation of

RHIS data in making such decisions. This study specifically explored the following research questions:

1. How are health system decision-makers currently using data sourced from RHIS to inform decision-making in health systems in Indonesia and Philippines?
2. How are UHC decisions enhanced by RHIS data?
3. What are the key barriers to the greater use of data sourced from RHIS for decision-making in the health systems of Indonesia and Philippines?
4. What are the most promising strategies to overcome these challenges?
5. How has COVID-19 changed how policy-makers use data sourced from RHIS?

Chapter 2: Background

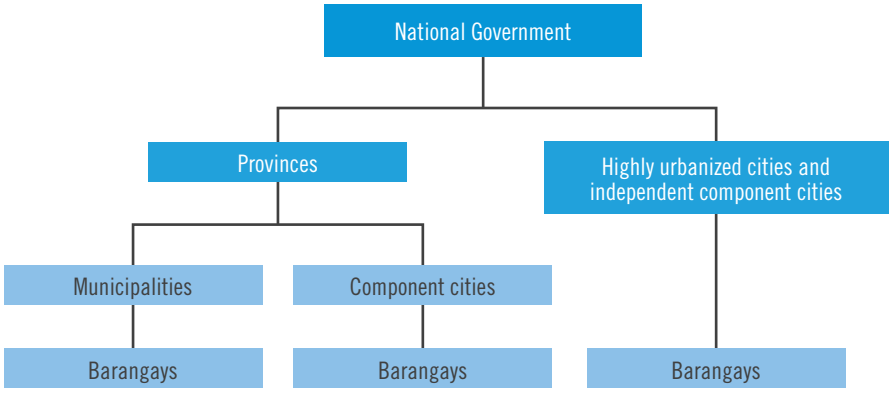
This chapter reviews policy-making processes and advances made toward UHC in both Indonesia and Philippines. For both topics we first provide a brief overview of the current status as well as historical development. To illustrate how policy decisions are made in the two countries, we also introduce the general governance system, along with the specific procedures applied in the health sector. Further, we also attempted to shed light on the process of decentralization and how it shapes policy-making in both contexts.

Process of decision-making and general policy-making in the two countries

Philippines

Philippines is divided into 17 administrative regions. All national government agencies have a regional office in a city designated as the centre of the region. Each region serves to coordinate planning and organizing national government services across a group of local government units (LGUs). The 17 regions are further subdivided into 81 autonomous provinces headed by an elected governor. The provinces are organized into 145 cities and 1490 municipalities (Fig. 2.1).

Fig. 2.1 Structure of local governments in Philippines



Source: Carlos et al. (2010)

Philippine's new Constitution was ratified in 1987, establishing a political system comprising an executive, bicameral legislature, and judiciary branch, including an independent Supreme Court. Ricote recently summarized the policy-making process in Philippines (Table 2.1). All three branches play an important role in implementation of the Philippine health system through various mechanisms. The executive branch exercises administrative or regulatory authority over national government agencies and LGUs within the context of the health system. The legislative system controls the passage of the annual budget of national health agencies and institutions. Congressional members play a role utilizing the "priority development assistance fund" (PDAF) to finance health projects in their local constituencies. The third branch, the judiciary system, also "renders decisions in legal disputes involving health agencies and individuals" (Llanto & Kelekar, 2013).

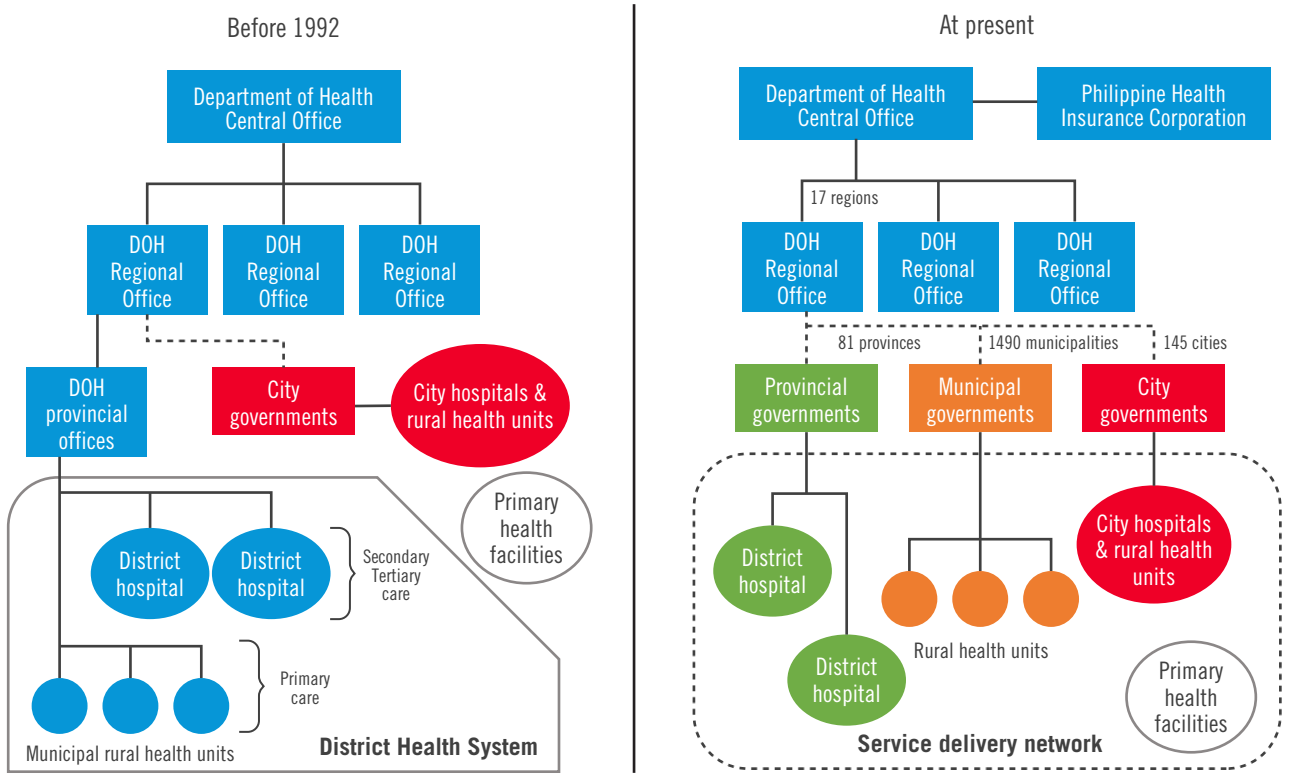
Table 2.1 Public policy process in Philippines

Policy cycle	Policy stages in Philippines	Institutions
Agenda-setting	Public sector's development requirements; amendments to current policies; sectoral advocacies, etc.	State actors: legislators, executive offices; Non-State actors: development agencies, industry, private business, nonprofits, etc.
Policy formulation	Policy-makers in the legislative and executive (national and local) take up the agenda	Congress: Republic Acts (RA); Executive: Implementing rules and regulations, Executive order (EO), Admin order, Department order, Memo circular, etc; LGUs: Council resolutions
Policy adoption **Policy formalization**	Formal enactment of the official and legal policy instrument after a series of dialogues and consultations with State and non-State actors; presentation of options	
Policy implementation	Translation of the policy into programmes and projects at the executive branch – from President to the line agencies and concerned institutions at the national and local levels; Mobilization of resources: funds, personnel, etc.	Executive branch: departments, agencies, LGUs, budget department office, civil service, regulatory and oversight agencies
Policy evaluation	Policy implementation review and evaluation towards agenda-setting	

Source: Ricote, 2019

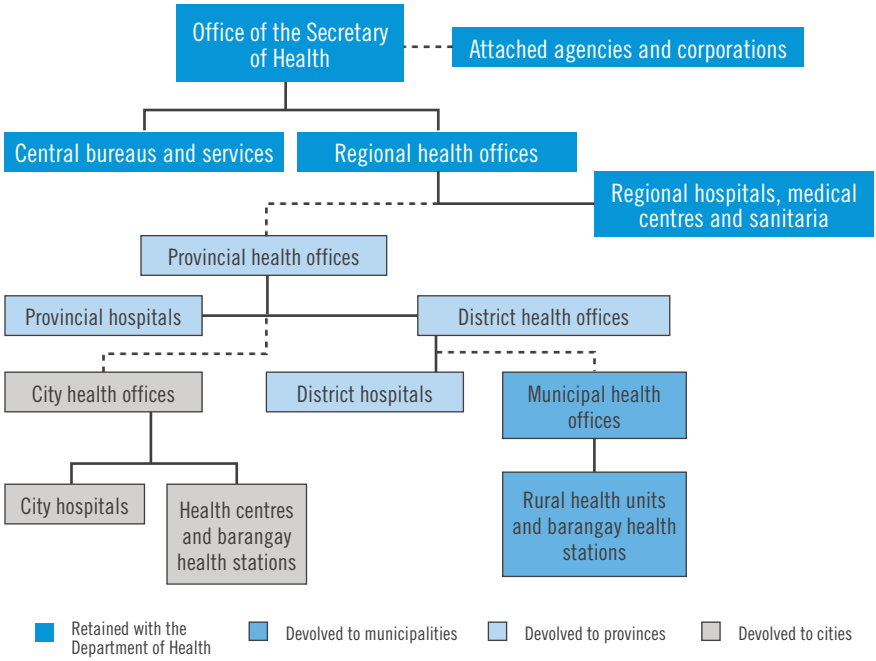
The current health governance structure largely results from the enactment of the Local Government Code of 1991 (Republic Act No. 7160). The Code is considered a landmark piece of legislation but also the most radical and far-reaching one in the history of the Philippine political system (Berman, 2016, p. 356). The provisions of this Code fall into two categories. First, provisions deal with the decentralization of five basic services: health, agriculture, social services, environmental protection, and specified public works. The second deals with the strengthening of LGUs (Langran, 2011). Since January 1992, when the Code went into effect, decentralization has become a centrepiece of Philippines' health system (Seposo, 2019). The health system transformed from a highly centralized delivery service with the Department of Health (DoH) as the sole provider to one that was more devolved, as mandated by the Code, to LGUs with many of the functions previously run and controlled by the DoH. Fig. 2.2 and Fig. 2.3 illustrate the different units retained under the control of the DoH and those delegated to LGUs. Specific functions devoted to different levels of government are listed in Table 2.2.

Fig. 2.2 A comparison of the administration structure of the Philippines health sector before and after devolution



Source: Liwanag & Wyss, 2018

Fig. 2.3 Organizational structure showing the health offices devolved to the LGUs



Source: Dayrit et al., 2018

Table 2.2 Devolved functions by level of government

LGU	Devolved health services
Barangay	Maintenance of barangay health centre
Municipality	Implementation of programmes and projects on primary health care, maternal and child care, and communicable and noncommunicable disease control services
	Access to secondary and tertiary health services
	Purchase of medicines, medical supplies, and equipment needed to carry out the said services
Province	Hospitals and other tertiary health services
City	All the services and facilities of the municipality and province

Source: Cuenca, 2018

Philippines has a mixed multilayered health system consisting of a public sector and a private sector. The public sector is largely financed through a tax-based budgeting system at national and local levels, with public health care generally free at the point of service throughout the country. The health sector comprises the DoH, LGUs, and other national government agencies that provide health services (DoH 2011). The DoH is responsible for providing national policy direction and developing national plans. It also regulates all health services and products, provides special or tertiary health-care services, and provides technical assistance to other health providers, especially LGUs (DoH, n.d.a). This function is largely realized through the regional field office the department has set up in every region, namely, the Centre for Health Development (CHD). CHDs are primarily assigned to implement national health programmes, administer to regional hospitals and medical centres, and support and monitor LGU performance in the health sector (Capuno, 2009). Furthermore, in addition to managing offices within the department, the DoH also oversees eight attached agencies and four specialty hospitals (DoH, 2011). While the DoH shoulders the primary responsibility of formulating standards of health services and determining overall health objectives, LGUs create their own plans for public health programmes. The government has designed strategic five-year plans that focus on the needs assessment, governance, and financing of health programmes. The plans are reviewed and revised based on the feedback received from the DoH. Development partners can review these plans prior to providing grants and technical assistance to some LGU public health programmes that the donor agencies have chosen to help (Llanto & Kelekar, 2013).

Notably, the 1991 Local Government Code incorporates a "participatory, grassroots-driven" process into the Philippine health system by mandating the creation of local health boards (LHBs), a multi-stakeholder board chaired by the governor or mayor that serves as an avenue for discussing local health concerns (Langran, 2011). The DoH also established inter-local health zones (ILHZ) according to Section 33 of the Local Government Code, wherein provincial and municipal governments partner with nonprofit organizations or the private sector to share resources and integrate the health referral system (Llanto & Kelekar, 2013). However, the market-based private sector differs between for-profit and nonprofit providers, where

health care is generally paid for through user fees at the point of service. Although the private sector provides services to only 30% of the country's population (DoH, 2018), it plays an enormous role in the provision of health services because of the proportion of financial and human resources that it controls. In addition, it has bridged gaps in health service delivery in areas where government support is insufficient (DoH, 2018).

There is an ongoing debate in Philippines between those who desire to further expand on this decentralization by granting greater autonomy to local governments and those who advocate for recentralization of the health system (Liwanag & Wyss, 2020). Recent empirical studies have suggested that Philippine decentralization reforms have exacerbated many issues, including the fragmentation of arrangements of accountability, management authority, information flows, and resource allocation (WHO, 2017a, p.18). For example, the overlapping and conflicting mandates of the DoH and LGUs on health issues have led to the disintegration of the integrated referral system (DoH, 2018, p.26). Furthermore, variations in the level of policy implementation and pre-reform health status have led to a wider discrepancy in health outcomes and other development indicators across LGUs.

Indonesia

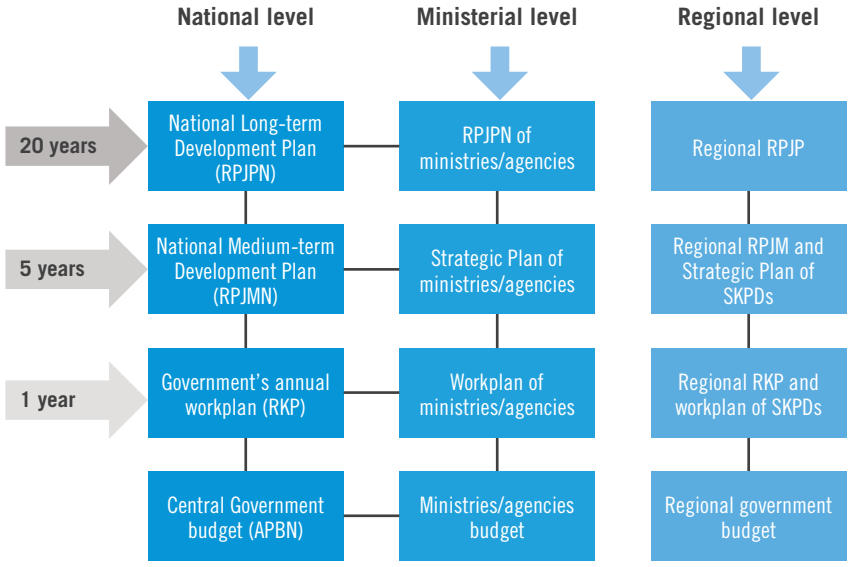
Indonesia's government is a presidential government with a written constitution and three key branches: the executive, legislature, and judiciary. The processes of policy-making vary in these branches at different levels within, as well as among different policy areas (Blomkamp, et al., 2018).

There are five tiers of government below the central level: provincial, *kabupaten* (districts), *kota* (cities), *kecamatan* (subdistricts), and *kelurahan/desa* (villages) (Nasution, 2017). At the national (central) level, the Constitution gives executive power to the President, who has been elected directly by the Indonesian people since 2004. Of the executive branch, the Cabinet is the key body responsible for formulating high-level policies for the 34 ministries within the Indonesian government. Within the legislative branch, the People's Consultative Assembly (Majelis Permusyawaratan Rakyat, MPR) holds power. The MPR is a bicameral parliament consisting of the

People's Representative Council (*Dewan Perwakilan Rakyat*, DPR) and the Regional Representative Council (*Dewan Perwakilan Daerah*, DPD). At the subnational level, there are over 500 provincial, district, and municipal governments in Indonesia (Blomkamp et al. 2018). These subnational government authorities are mandated to implement local policies, establish fiscal regulations, and manage their resources such as personnel, assets, and remuneration systems with the aim of achieving greater efficiency, accountability, and improved performance (Rakmawati et al., 2019).

Indonesia has two major policy processes: (1) regular planning and budgeting, and (2) the development of national and subnational laws and regulations. Two main formal policy processes take place at the national level: long- and medium-term development planning and the development of laws and regulations (Pellini et al., 2018). Regarding the former, the Ministry for National Development Planning/National Development Planning Agency (*Bappenas*) and its subnational counterparts, the *Bappedas*, are key actors. Datta et al. (2011) composed a figure to illustrate how development plans for different time plans at the national, ministerial, and regional levels interact with one another (Fig. 2.4). The Parliament, or MPR, is responsible for the latter function. The process is guided by Law No. 12/2011 regarding the formulation of laws and regulations (Pellini et al., 2018).

Fig. 2.4 The Indonesian development planning hierarchy



APBN - Anggaran Pendapatan dan Belanja Negara (Central Government budget)
RKP - Rencana Kerja Pemerintah (annual workplan)
RPJMN - Rencana Pembangunan Jangka Menengah Nasional (National Medium-term Development Plan)
RPJP - Rencana Pembangunan Jangka Panjang (Long-term Development Plan)
RPJPN - Rencana Pembangunan Jangka Panjang Nasional (National Long-term Development Plan)
SKPD - Satuan Kerja Perangkat Daerah (Regional Working Unit)

Source: Datta et al., 2011

The current divisions of responsibility between the different levels of government has been largely shaped by the Indonesian decentralization processes over the past three decades. Following the 1997 financial crisis and the fall of the Suharto regime (McCollum et al., 2018), the Indonesian Parliament launched a package of institutional reforms that transformed Indonesia into a more democratic and decentralized political system (Fossati, 2016). Shortly after Suharto stepped down in 1998, Law 22/1999 was introduced, which extended the autonomy of local governments to a wide range of areas, with the national level retaining only five functions: foreign affairs, defence and security, the judicial system, fiscal

and monetary policy, and religion. The law granted local governments the prerogative to govern in accordance with the needs and priorities expressed by their constituencies (Fossati, 2016). While local governments were authorized to determine the size and structure of their budget expenditure, the central or national government remained in control of compliance, financial and performance audits on local governments, and the rotation of civil servants as well as senior officials between provinces and sub-provinces (Nasution, 2017). In contrast to many other countries that give autonomy to provincial and state levels of government, Law 22/1999 directly gives autonomy to regencies (*Kabupaten*), an administrative division directly under a province, and municipalities at the sub-provincial level (Nasution, 2017). Further legislation and implementing regulations were passed in 2001, 2004, 2007, and 2014 to enact the devolution of responsibility and resources to local governments (Blomkamp et al., 2018) and to fix the problems that occurred in the early stages of implementation of the law.

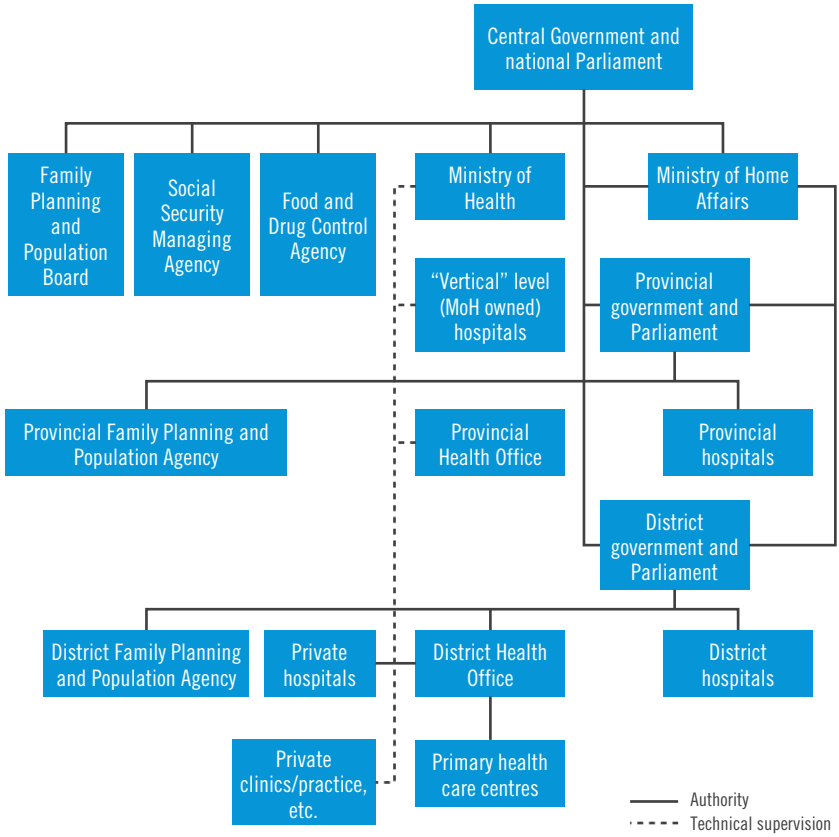
The impact of decentralization is reflected in the decision-making process of the Indonesian health system. Article 11 of Law 22/1999 explicitly states that health policy is one of the "obligatory" functions of the district/city government. In 2004, decentralization laws were revised with Law 32, making health care a mandatory government function not only for districts but also for provinces. Law 23/2014 further strengthened the position of provincial governors as representatives of the central government in districts (Rintani & Wibowo, 2019). Decentralization reforms greatly expanded the scope for policy experimentation and innovation in health policy, while also changing the incentives of local policy actors who are directly accountable for the decisions made and the demands of the local population (Holzhacker et al., 2016, p.65).

Currently, the Indonesian health system comprises three tiers (Mahendradhata, 2017). The Ministry of Health (MoH) is the overarching technical authority on health, providing national policy direction and developing national plans, technical standards, and guidelines on health. In addition, provincial and district health offices (DHO) are authorized to customize their health planning, financing, and health-care services according to regional needs, whereas provincial health offices (PHOs) are responsible for the coordination of district programmes within their

provinces. First-tier health providers mostly consist of community health centres (*Puskesmas*), maternal and child health posts (*Balai Kesehatan Ibu dan Anak*), medical centres (*Balai Pengobatan*), individual public and private practitioners (midwives, nurses, and pharmacists), and private general practitioners. Health providers in the second tier are owned by the government and services are delivered through public district hospitals (RSUD). The third tier is solely supported by the government with the tier composed of specialist hospitals (*RS Khusus*) and public provincial hospitals (RSUP) (Rakmawati et al., 2019) (Fig. 2.5).

Law 23/2014 enables the central government to assume the role of equalizer and maintain the quality of health services across the country. In 2016, Health Minister Decree No. 43/2016 on Minimum Standards of Health Services/*Standar Pelayanan Minimum Bidang Kesehatan (SPM*) was enacted. As stated in the law, local governments prepare an SPM achievement plan by setting annual targets and the deadline for achieving SPM per ministerial regulations. If the Head District falls short of meeting the standards, sanctions are imposed. Moreover, the central government allocates fund transfers to regions based on their ability to achieve SPM targets. Consequently, regions with limited resource capacity are prioritized during the allocation of fund transfers (Rintani & Wibowo, 2019).

Fig. 2.5 Structure of the Indonesian health system



Source: WHO, 2017b

Universal health coverage and health service provision

Philippines

Health is a basic human right guaranteed by the 1987 Philippine Constitution. The country's journey to achieve UHC can be traced back to 1995 when the National Health Insurance Act (Republic Act 7875) established the National Health Insurance Program (NHIP) and created the Philippine Health Insurance Corporation (PhilHealth) to manage the

social health insurance programme (Paterno, 2013). This precedent-setting piece of legislation marked a turning point in expanding health insurance coverage to key vulnerable communities, such as indigent people, as well as self-employed, and informal-sector employees. The Act sets the target of gradually achieving UHC in the country within 15 years, or by 2020 (Dredge et al., 2021).

Since its edict, the Philippine government has repeatedly endorsed the use of the NHIP as the main driver for achieving UHC (Obermann et al., 2018). In 1997, PhilHealth introduced an indigent or sponsored programme, where the premiums of select beneficiaries were paid for by the national government, LGUs, or the private sector. To tackle the challenges that have emerged since the launch of the programme (e.g. unsustainable funding and uneven enrolment) and later in 2008, a conditional cash transfer programme called the *Pantawid Pamilyang Pilipino* Programme was created. The beneficiaries of the programme were identified through the National Household Targeting Survey for Poverty Reduction (NHTS-PR) (Angela et al., 2021). In 2010, the government began to fully subsidize the PhilHealth premiums of the poor according to the NHTS-PR results.

In the same year, the DoH signed the *Aquino Health Agenda for Achieving Universal Health Care for All Filipinos* (Cabalfin, 2016). Subsequently, the "sin tax" legislation was passed in 2012, allowing tax revenue generated from the sale of tobacco and alcohol products to become an important source of funding for the DoH and pushing the UHC agenda forward (Uyheng, 2019). Furthermore, the amendments to Act 7875 made in 2013 expanded the NHIP beyond formal employment by including underprivileged populations, such as people with disabilities, women, and the elderly (DoH, 2018, p.19). In 2016, the *Philippine Health Agenda 2016–2022* clearly stated that "universal health insurance" is a required pillar to create the kind of health system that the country aspires to build (DoH, 2017). In 2018, with the *FOURmula One Plus for Health* (F1 Plus), the DoH introduced a new strategic framework with the vision of healthier Filipinos that could be attained through UHC. Based on this framework, the DoH developed a national health M&E system to ensure that the health system would be responsive to the needs of Filipinos (WHO, 2019a). Simultaneously, the Philippine government started addressing major obstacles to achieving

UHC. Another important initiative is the Health Facilities Enhancement Program (HFEP), initiated in 2007, a nationwide programme by the DoH that aims to improve the supply of health services (Table 2.3).

Table 2.3 Summary of policies and programmes that have affected PhiHealth's population coverage over the years

Year	Policies and programmes	Effects on PhilHealth population coverage
1995	RA No. 7875: National Health Insurance Act of 1995	Mandated to provide social health insurance coverage to all Filippinos
1997	Indigent Program	Covered indigents whose premiums were funded by national and local governments
1999	Individually Paying Program	Covered the informal sector
2003	Partnerships with organized groups	Aimed to encourage enrolment of informal households
2010	RA No. 9994: Expanded Senior Citizen's Act	Covered all indigent senior citizens
2012	RA No. 10351: Sin Tax Law of 2012	Covered the subsidies of the bottom 40% of the population identified by the NHTS-PR, as well as indigent senior citizens
2012	RA No. 10606: Amendment of the National Health Insurance Act of 1995	Covered those identified as poor by the NHTS-PR
2013	Point-of-Care Enrolment Program	Mandated government health facilities to identify those who can be enrolled into PhilHealth sponsored by the facility; transitioned into the POS Program in 2018
2018	Point-of-Service (POS) Program	Mandated the national government to subsidize the premium of financially incapable and unregistered Filipinos who access services through government health facilities

Source: Angela et al., 2021

Building on the aforementioned reforms, the Universal Health Care Bill (Republic Act No. 11332) was signed into law in February 2019. This is regarded as the first UHC Act of its type in the Western Pacific

Region (WHO, 2019b). As mandated in the Act, all Filipino citizens are automatically enrolled in PhilHealth. It further specifies that PhilHealth shall become a key purchaser of health services and is responsible for ensuring that all Filipinos are protected from financial risk when accessing essential health services (Apostol et al., 2019). At the same time, the membership scheme will be streamlined as direct (contributory) or indirect (subsidized). This translates to 110 million eligible enrollees based on the Philippine Statistics Authority (PSA) Census (DoH, 2020a). Looking ahead, the DoH laid out a catch-up plan in the *UHC Medium-Term Expenditure Program 2020–2023* published in February 2021, which underscores health systems resiliency and shifts towards the new normal (DoH, 2020b).

To summarize, the approach to achieving UHC in Philippines has been centred around the expansion of the health insurance plan and has undergone radical changes over the past three decades. With further devolution of the health system and the impact of the COVID-19 pandemic, strategies to attain UHC in the country may be subject to reorientation in the near future.

Indonesia

Similar to many LMICs, Indonesia's adoption of UHC policies is the result of a long historical process, with an increasing proportion of the population gradually being integrated into the health system over time (Fossati, 2017). The foundation of the policies in place today dates back to the colonial period, when organizations such as labour unions established mutual health insurance plans for their members, while middle-income earners were generally covered by private insurance companies (Vidyattama et al., 2014). The first major attempt to ensure access to health care for the poorest Indonesians was the launch of the community health insurance programme Jaminan Pemeliharaan Kesehatan Masyarakat (JPKM) in the mid-1970s. Subsequently, a major social security policy reform took place in 1992. This involved the creation of two main agencies, *PT Askes* for civil servants as well as the military and *Jamsostek* for formal-sector employees and employers, to manage health insurance plans (Fossati, 2016). Although a large proportion of the Indonesian population was excluded from these

schemes, lower-income Indonesians benefited from other health policies implemented during this period (1990s).

To address the internal and external pressures that emerged from the 1997 Asian financial crisis, the Indonesian government instituted a major social safety net (SSN) programme, otherwise known as *Jaringan Pengaman Sosial* in 1998. This programme entailed the large-scale provision of SSN health cards to the poor so that they could receive free health treatment from governmental health centres (Vidyattama et al., 2014). In 2004, historic Law No. 40/2004 proposed the establishment of the National Social Security System (SJSN) that would provide comprehensive health protection and services for all Indonesian citizens, which was passed after multiple revisions. This law mandated that all wage earners contribute a portion of their earnings to the National Health Insurance Scheme (Agustina et al., 2019). In accordance with this law, the MoH launched a health insurance programme for the poor in 2007. While every district has the authority to design and implement its own health insurance plans for communities in its area, the district government is obligated to execute this policy according to the decree (Silitonga et al., 2016, p.72). The National Social Security Council (*Dewan Jaminan Sosial Nasional*, DJSN) was established in June 2008, shortly after the promulgation of the SJSN Law (WHO, 2017b). It was not until 2011, however, when the Social Security Providers (BPJS) Law No. 24/11 was enforced, that the country began to enact Law No. 40/2004. Even though this was the case, the country still made strides towards UHC during the seven-year interval period, and progress was not stagnant. In 2005, the Government of Indonesia introduced *Askeskin* (*Asuransi Kesehatan untuk Keluarga Miskin*, Health Insurance for Poor Families), aiming to cover informal workers and economically disadvantaged individuals. In 2008, the *Askeskin* scheme evolved into a programme known as *Jamkesmas* (*Jaminan Kesehatan Masyarakat*), which offered broader coverage (Herawati et al., 2020). Although there is evidence that the programme was instrumental in increasing access to health care among low-income Indonesians, the implementation of *Jamkesmas* suffered from major limitations such as low awareness of its benefits among beneficiaries, inconsistent targeting criteria across the region, and insufficient quotas in many districts (Fossati, 2017).

All these health policy reforms culminated in the implementation of the National Health Insurance (*Jaminan Kesehatan Nasional*, JKN) programme put forward in 2014, which is seen as a crucial step toward achieving UHC (Gani & Budiharsana, 2019). Under the JKN, the MoH is responsible for setting clinical guidelines and technical norms with the task of health-care delivery given to a mix of public and private providers. The programme is managed by a third party called BPJS Health (Mboi, 2015). As stated in the 2004 SJSN Law, other than health care provided by employers (self-insured), all of the five schemes[1] operating in Indonesia will be merged into the JKN or *BPJS Kesehatan* (Dartanto et al., 2015).

In addition to vigorous reforms at the central level, many innovative policies have been introduced at the local level as decentralization deepens. According to a study published in 2008, 24 districts and cities had been carrying out their own health insurance programmes for at least one year in 2007 and 22 others had already approved similar initiatives (Fossati, 2017). In fact, many of these programmes went beyond the "minimal standards" set by the national policies. The *Jembrana* programme in Bali is the most well-known case, in which a district became the first to abolish the out-of-pocket system and implement a universal health insurance scheme that rendered free basic health care to local residents (Silitonga et al., 2016, p.69).

The COVID-19 pandemic

The COVID-19 pandemic has had significant health, health system, economic, and social effects in both Philippines and Indonesia. Here we provide context to this report by describing the pandemic's main features, government response, and overall impact in each of the case study countries.

Philippines

In late January, Philippines became one of the first countries outside of China to detect and the second to record a death from the virus (Philippine Statistics Authority, 2021). Immediately, the government adopted targeted travel restrictions against travellers from high-risk

[1] Note: The five schemes are health insurance for the poor (*Jamkesmas*), social health insurance schemes for civil servants (*Askes*), health insurance for private employees (*JPK Jamsostek*), traditional commercial health insurance schemes, and managed care schemes (JPKM).

locations and quarantine for inbound travellers. After a month with no detected cases, local transmission was established in early March, prompting the government to adopt widespread additional measures to mitigate the virus's impact. Philippines' response featured a "community quarantine" system that determined the intensity of restrictions on movement, gatherings, and government services based on the risk of transmission. High-risk areas faced strict stay-at-home orders, school closures, and work-from-home policies. Vaccination campaigns began in March 2021 after the arrival of donated Chinese-made vaccines, which were initially targeted to health workers and military personnel. Vaccines were made available to the general public a few months later. By February 2023, about 70% of the total population was fully vaccinated.

The pandemic and response measures led to important reductions in the use of essential health services as a result of hesitancy among patients to seek care, a shift in priority away from routine health services towards the COVID-19 response, and health workforce issues (Maravilla et al., 2023; Ulep et al., 2021). The Philippine economy also contracted sharply during the COVID-19 pandemic with an estimated 14.5% decline in the gross domestic product (GDP) of the country in the second quarter of 2020 (Pascasio et al., 2022).

Indonesia

Indonesia confirmed its first case of COVID-19 on 2 March 2020 and, as of June 2023, had recorded almost 7 million cases and over 160 000 official deaths (World Health Organization, 2023). Early in the pandemic, the government established a task force for handling the COVID-19 response. The government introduced two sets of physical distancing measures, including large-scale social restrictions (PSBB) and enforcement of limitations on community activities (PPKM) (Mahendradhata et al., 2021a). PSSB was introduced at the end of March 2020 and it included the closure of schools and workplaces, restrictions on religious activities, and other important restrictions on the movement of people. PPKM superseded PSSB in early 2021 and measures were also intensified in the summer of 2021 due to another surge in cases. The implementation of these measures has

had a significant impact on the country, including important economic and social effects.

The pandemic overwhelmed the capacity of the Indonesian health-care system to respond to COVID-19 and it experienced important disruptions in the delivery of essential health services (Mahendradhata et al., 2021b). The government vaccination programme was officially launched in early 2021 and over 447 million vaccine doses had been administered as of June 2023. The vaccination programme initially prioritized health workers, people working in public sectors, and the elderly, with a focus on Java and Bali.

Chapter 3: Methods

Case selection: why focus on Indonesia and Philippines?

The two health systems selected for this study (Indonesia and Philippines) were chosen for several reasons. First, the two health systems share many common features regarding their health profile and the level of health system development. With increasing life expectancies, noncommunicable diseases (NCDs) are becoming a major burden in both countries. Both countries initiated important health system decentralization reforms in the 1990s. They share many common demographics and geographical features, and both saw high levels of economic growth prior to the pandemic. Philippines and Indonesia are both densely populated countries, spread over many geographically dispersed islands, with relatively young populations. Located in the Pacific Ring of Fire, the two countries experience regular natural disasters, which contribute to their mortality and morbidity rates, as well as the growing size of their displaced population. In terms of economic profile, both Indonesia and Philippines are major labour exporters and are classified as LMICs by the World Bank Group (WBG). The annual GDP of both economies grew at approximately the same rate from 2000 to 2019. Annex A provides more details on the development and health status of these two countries.

Second, Indonesia and Philippines are making significant strides towards realizing UHC. Philippines officially signed their landmark Universal Health Care Bill in 2019, whereas Indonesia began to implement its National Health Insurance (JKN) programme in 2014. Despite the extensive body of literature that has analysed the progress and challenges of achieving UHC, few studies have investigated the interplay between RHIS and UHC in these countries or in any other international context. Moreover, the importance of HIS has been highlighted in UHC-related strategic plans and policy documents in both countries, providing a rationale for investigating how data sourced from RHIS influences the policy-making process in these contexts.

Third, while decentralization has been a centrepiece of government and health-sector reforms in both countries over the past couple of decades, little is known about how decentralized decision-making may be limited by the availability of subnational data from RHIS, yet another reason

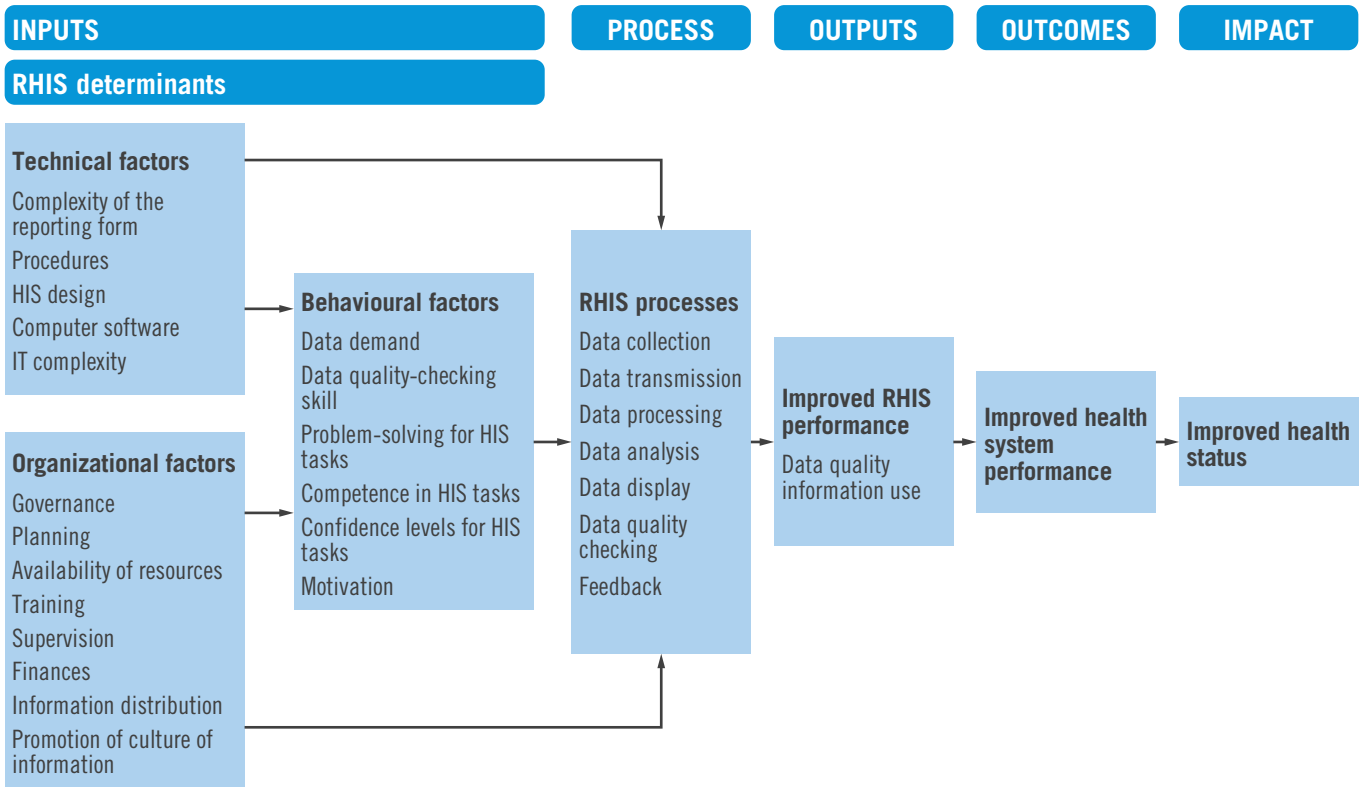
to explore this question. Finally, the Asia Pacific Observatory (APO) consortium members in the two countries had strong research teams on both RHIS and UHC to undertake this study.

Analytical framework

Numerous frameworks have been developed to evaluate the performance of HISs. The usefulness of a framework depends on many factors, including who conducts the evaluation, what is being evaluated, how and when the evaluation will be conducted, and why the evaluation is being conducted. In this study, we used the PRISM Framework and related tools initially developed by Aqil et al. (2009) to specifically evaluate RHIS performance. The framework was recently updated by MEASURE Evaluation (2018) to expand the usefulness of the original framework.

The PRISM Framework conceptualizes data use as an output of RHIS, which is a direct function of the way in which data are used, and performance depends on several critical determinants (Fig. 3.1). Technical determinants refer to factors related to technologies and specialized knowledge used to develop, improve, and manage RHIS performance. Behavioural determinants include user-focused factors, such as user demand, motivation, confidence, and competence to perform RHIS tasks. Finally, organizational determinants include organizational processes and structures, such as human and financial resources, management, leadership, and supervision. Additionally, each of these challenges can be further categorized according to the stage of the RHIS data process at which they occur: information needs, data collection, data transmission, data processing or analysis, and dissemination of processed information. Although this framework has been criticized for overlooking many useful outcomes of HIS performance, it is by far the most commonly employed framework in RHIS studies globally.

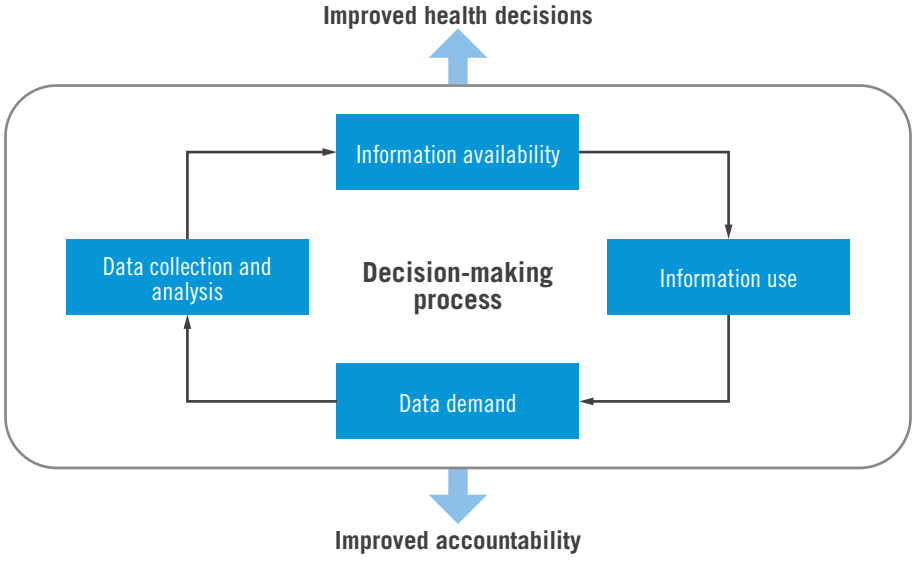
Fig. 3.1 PRISM Framework



Source: Aqil et al., 2009

Since the objective of this study is to explore how data are being used by decision-makers, not necessarily to evaluate the performance of RHIS, the PRISM Framework alone was not suitable for all of our research questions. The Data Demand and (Information) Use (DDU/DDIU) model (MEASURE Evaluation, 2006), developed by Foreit et al., was used as a supplement to the PRISM Framework. The model has several characteristics that make it a good fit for this study. First, the DDU was exclusively designed for the health sector in developing countries. Second, it assumes that evidence-based decision-making is the principal function of the national HIS. As such, the model highlights the importance of the demand for data, the value placed on data and information, and how it would ultimately improve data use. Finally, the DDU model is built on the three determinants of RHIS performance specified in the PRISM Framework. Using the same terminology, the three determinants have been used to identify constraints on data use as well as strategies to boost the performance of this area (Fig. 3.2).

Fig. 3.2 Data Demand and Information Use model



Source: MEASURE Evaluation, 2006.

Data collection and analysis

Qualitative data were gathered through key informant interviews using a semi-structured interview guide with open-ended questions based on the PRISM and DDU models. The full interview guide consisted of 26 questions and was organized around five research questions. After conducting 19 pilot interviews in June 2021, research team members in both countries modified the questions based on the feedback collected during this stage. Data collection officially started in early July 2021 and was completed in October 2021.

Interviewees in Philippines were recruited through email invitations via the CHD network. We identified 49 respondents, including a mix of administrators, policy-makers, and decision-makers at the national and subnational levels. Purposive sampling was used to target decision-makers at different levels. At the national level, we recruited directors and programme officers directly involved in RHIS implementation and use, health governance, and health financing from various departments of the MoH and Philippine Health Insurance Corporation. For subnational participants, we prioritized health workers and regional health officers from several municipal classes, CHD offices, and policy actors from the pilot sites of the UHC Law who were actively engaged in RHIS data use.

In Indonesia, 83 key informants were recruited and interviewed over a period of three months. Sampling was performed using a purposive sampling method. The selected informants were policy-makers and technical staff directly involved in managing health data from the health sector as well as other sectors related to health policy. The research team identified these informants based on the organizational structure and description of positions published on the official website of each relevant agency (Table 3.1). Invitation letters were then sent to these agencies mentioning the positions of potential interviewees. At the national level, the Ministry of National Development Planning, National Family Planning Coordinating Board, and MoH were identified as key decision-makers. At the regional level, the team selected three provinces in Indonesia, with each representing a different region. North Sumatra Province represented the northern area of one of the country's largest islands, the Special Region of Yogyakarta (DI Yogyakarta) was identified as the central region, and East Nusa Tenggara represented the eastern part of Indonesia. These three

regions also rank differently in the Human Development Index (HDI), a good proxy for health service quality. Furthermore, the Universitas Gadjah Mada (UGM) is located in DI Yogyakarta and has collaborations with local universities in North Sumatra (i.e. North Sumatra University) and East Nusa Tenggara (i.e. Nusa Cendana University). Both partner universities were involved in the interviews.

Table 3.1 Demographic and professional background of participants of the semi-structured interviews in Philippines and Indonesia

	Philippines	Indonesia	Total
Levels of government			
National	11	20	31
Regional	10	NA	10
Provincial	1	12	13
City	11	25	36
Municipal	16	26	42
	49	83	
Sex			
Female	34	47	81
Male	15	36	51
	49	83	
Role category			
Policy-maker	12	63	75
Policy implementer	37	20	57
Health-related[1]	36	56	92
Information system-related[2]	5	3	8
Other	8	24	32
Total no. of participants	49	83	

Note:

1. Health-related informants refer to those who are directly involved in decision-making, service delivery, and other functions of national and local health systems.
2. Information system-related informants refer to informants responsible for the development, maintenance, and upgrade of information systems or the provision of technical support for users of information systems.

Due to the ongoing COVID-19 pandemic, the majority of interviews were conducted remotely through Zoom or Google Meet. We collected informed consent from all interviewees along with the demographic information of the informants (e.g. gender, age, job title, and institution) via email. For

each interview, the questions were tailored to the informant's professional background, taking into account their role in the health system and health policy-making, as well as their familiarity with the country's RHIS.

In Indonesia, all interviews were conducted in the local languages. All interview transcripts were read in their entirety and then entered into a matrix based on the research questions. Quotes from the matrix were sorted and cleaned. In Philippines, all interviews were conducted in a mix of English and Filipino. After each interview, the researchers convened to discuss reflections and interview notes as a form of initial analysis. For the secondary analysis, verbatim accounts of the respondents were transcribed by a third party to avoid bias. Subsequently, the researchers cross-checked the transcripts against the original video recordings to ensure accuracy before translating the text from Filipino to English.

In mid-October, a codebook based on the PRISM and DDU frameworks was created for the integration and thematic analysis of selected quotes from the transcripts. This step entailed the Indonesian team translating parts of the data into English for cross-country comparison. All similar codes were then combined and indexed to form concluding analyses to elucidate the findings and key characteristics of clustered themes and datasets.

In addition to the interview data, we also collected policy documents, academic papers, and technical reports to (1) understand the historical development and current state of RHIS in each health system, (2) review what is known about the use of RHIS data in the APR and globally, and (3) triangulate findings from interviews based on country contexts. All interview data were stored securely in an online file hosting service accessible only to members of the research team.

Ethics approval

Ethical approval for this study was granted by the Human Ethics Research Committee, University of Hong Kong (EA210326), the Single Joint Research Ethics Board, Department of Health, Republic of the Philippines (SJREB-2021-42), Directorate General, Ministry of Internal Affairs, Malaysia (440.02/3338/Polpum), and the Ethics Commission of the Faculty of Medicine, Public Health and Nursing, Gadjah Mada University (KE/FK/0734/EC/2021).

Chapter 4: HIS landscape: history and present status

This chapter focuses on a historical review of key policy developments of HIS (including RHIS) and other themes pertaining to Indonesia and Philippines. Building upon a brief summary of the Health Metrics Network (HMN) assessment results as of 2007, this study further provides a comparison of the current situation of RHIS in both countries using the modified HMN framework. It also discusses the most recent SCORE (Survey, Count, Optimize, Review, and Enable) assessments for each country, which is a new package that was published in 2020 to assess the ability of a health system to generate, analyse, and use health data, including data from RHIS.

The Health Metrics Network (HMN) framework

In 2005, the HMN developed a comprehensive framework to assess the performance of national-level HIS. According to the HMN guidelines, there are six components of an HIS that must function optimally to achieve an effective and efficient HIS: resources, indicators, data sources, data management, information products, dissemination and use of data (WHO, 2008a).

Before the HMN was dissolved in 2013 (WHO, 2013), the framework was used by over 85 countries to assess the performance of their HIS, including both Philippines and Indonesia. After 2013, researchers applied the framework to evaluate the performance of the HIS in additional contexts. Considering the availability of the results of previous assessments and the nature of our study, we believe that HMN is a suitable framework for comparing RHIS in Philippines and Indonesia. However, to meet the objectives of the project better, we made several modifications to the original HMN framework:

The scope of the analysis was narrowed to look only at the RHIS, not the entire HIS.

The last component “dissemination and use of data” was excluded for this report as it is centred around data use, and will be discussed based on our research findings.

The "Assessment of Information Products", the fifth component of HMN framework, was also removed to better serve the purposes of this study and match the granularity of the landscape analysis.

Instead of assigning scores for each item of the four remaining HMN components, both country teams filled in the tables with "Yes" or "No" and brief descriptive sentences to present the rationale of a judgement.

The Routine Health Information System Mapping tool (Aqil et al., 2009), an instrument developed by MEASURE Evaluation based on the PRISM Framework, was merged with the HMN Framework to set out all RHIS in both nations and types of health sector information included (or excluded) by the information systems.

Summary of the 2007 HMN assessment

Philippine participation in the HMN was spearheaded by the Philippine Health Information Network (PHIN) and launched in 2005 with the DoH as the lead agency. The assessment of the Philippine HIS involved 51 key informants at the national and subnational levels (HMN, 2007a). Of the six components of the HMN framework, Indicators received the highest score (82%), whereas Data Management received the lowest score (17%). With a score of 69%, Information Products were rated as "Adequate". Other components, namely Dissemination and Use of data (59%), Data Source (58%), and Resources (48%), were all graded as "Present but Not Adequate". The results shed light on many problems with the Philippines' HIS at that time. Although indicators were identified through a scientific approach, varied understanding of these indicators, insufficient support for stakeholders, and lack of coordination across sectors compromised data quality, interoperability, and dissemination and use.

In Indonesia, the HIS was never systematically assessed by the Indonesian government before 2007. With support from the WHO and the launch of the HMN tool, the MoH coordinated relevant stakeholders to complete the first extensive assessment of the Indonesian HIS. From March to April 2017, data were collected from four institutions of the Central Government and seven provinces in West, Central, and East Indonesia. The HIS assessment results showed that all components were either "Present but

not Adequate" or "Not Adequate at all", leading to an overall score of 51%. Indicators (61%), Dissemination and Use (57%), and HIS Resources (47%) slightly outperformed the other three components. The interviewees who participated in the assessment generally agreed that adequate health infrastructure was in place and that the HIS units were functional, from the central level to the district and village levels. However, the strategic plan for HIS should be better defined with the need to standardize the data and optimize the flow of information (HMN, 2007b).

Table 4.1 compares the scores of each HMN component and the assessment results of the subcategories for the Philippines and Indonesia. For both countries, Indicators were the top-rated component and Data Management was ranked the lowest. This indicates that the HIS in the two countries have similar strengths and weaknesses. Regarding HIS Resources, the HIS infrastructure was relatively sufficient compared to other non-physical resources. In terms of Dissemination and Use, the rates of the two countries approximated each other, whereas the outcomes of the subthemes were mixed. Overall, the scores of the six components for Indonesia's HIS were more balanced than those for Philippines.

Table 4.1 Summary of the HIS assessments results in Philippines and Indonesia (2007)

Components	Subcategories	Score	
		Philippines	Indonesia
HIS Resources	**Overall**	48%	47%
	Policy and planning	35%	48%
	HIS institutions, human resources, and financing	46%	41%
	HIS infrastructure	71%	55%
Indicators	N/A	82%	61%
Data Sources	N/A	58%	51%
Data Management	N/A	17%	35%
Information Products	N/A	69%	55%

Components	Subcategories	Score	
		Philippines	Indonesia
Dissemination and Use	Overall	59%	57%
	Analysis and use of Information	50%	67%
	Policy and advocacy	56%	56%
	Planning and priority-setting	72%	55%
	Resource allocation	54%	47%
	Implementation/action	75%	52%
Overall		NA	51%

Compiled by the authors

Source: HMN assessment reports of Indonesia and Philippines

Overview: HIS and beyond

Philippines

As early as the 1960s, the Philippine DoH reported an operational national health information system. The system was not substantially revamped until 1989, the year in which the Field Health Service Information System (FHSIS) was established (Marcelo & Ramos, 2010). According to Executive Order 352, FHSIS is the official HIS of the DoH for generating national health statistics (DoH, 2012). With decentralization and other contextual developments, FHSIS has undergone five major revisions since 1996 (most recently in 2018) to address entrenched and emerging issues in the system (DoH, 2012). Most FHSIS data come from health facilities, such as routine health units (RHUs), health centres, and barangay health stations (BHSs). Both for policy analysis and planning, as well as the management of the DoH programmes, FHSIS data are utilized at all levels of the health system (Legaspi & Mohammed, 2010). Through the Knowledge Management and Information Technology Service (KMITS), the DoH has rolled out at least 15 disease-specific RHIS, such as the Integrated Leprosy Information System (ILIS), the National Rabies Information System (NaRIS), the Integrated Tuberculosis Information System (ITIS), and the Philippine Malaria Management Information System (PhilMIS), to enhance disease

surveillance and epidemiology. In addition to FHSIS and other homegrown HIS, various government agencies, hospitals, and academic institutions have created electronic medical records (EMRs) to collect routine health data. The most notable are the Community Health Information Tracking System (CHITS) of UP Manila, the Integrated Clinical Information System (iClinicSys) of the DoH, and the Secured Health Information Network and Exchange Open-Source plus (SHINE OS+) of Ateneo University (Lu & Marcelo, 2021). The advent of COVID-19 has led to the emergence of state-of-the-art technologies to model disease spread, monitor mobility, and manage big data.

Simultaneously, the DoH has continuously developed or built networks for cross-sectoral collaboration and integration across systems (DoH, 2013). For example, the DoH has established the PHIN with the intention of ensuring timely and quality health information systems and promoting capacity-building and continuing education through information and communication technologies (ICT). Notable gains were observed in establishing the National Health Data Dictionary, Unified Health Management Information System, Interoperability Standards (National Health Data Standards Expert Group, 2016), and the move to web services in a service-oriented architecture (Dayrit et al., 2018, p. 84). In 2016, the Philippine Health Information Exchange (PHIE) was institutionalized by the signing of Administrative Order 20016-0001 (DoH, 2016). The PHIE is a platform for securing electronic access and efficient exchange of health data or information among health facilities, health-care providers, health information organizations, and government agencies in accordance with national standards in the interest of public health. It is envisioned to be an integral component of the health-care delivery system to support the attainment of UHC in the country (GOVPH, n.d.).

In terms of law and policy, the Philippine government has promulgated laws, codes, and orders that serve as the foundation for processing routine health data. Salisi et al. (2016) summarized relevant e-health policies and programmes in Philippines by policy domain (Table 4.2).

Table 4.2 Summary of e-health-related policies and programmes in Philippines

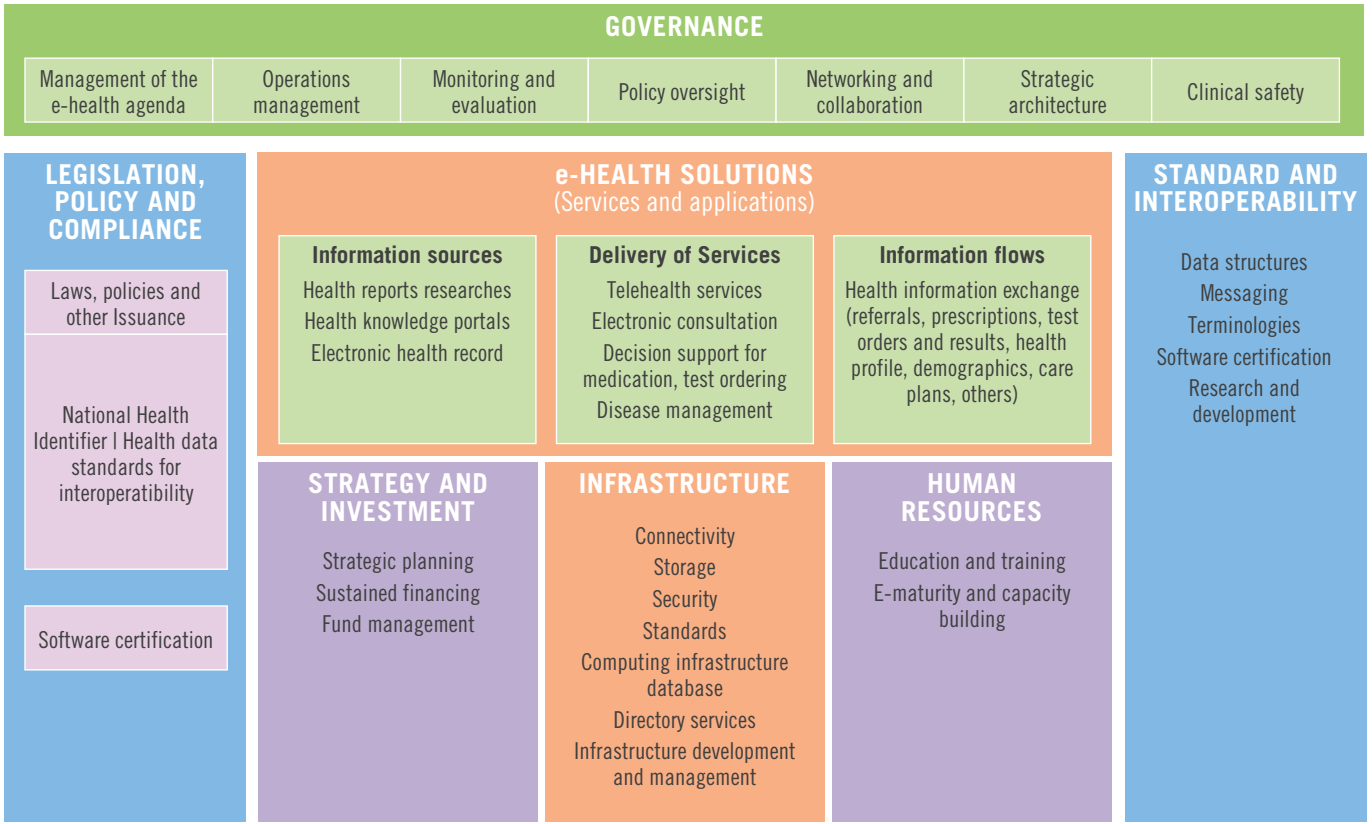
Policy domain	Relevant policies/programmes
Networked care	Information Systems Strategic Plan (ISSP) 2011–2023
	RA 10173: Data Privacy Act of 2012
Interjurisdictional practice	RA 2382: The Medical Act of 1959
	RA 7392: Philippine Midwifery Act of 1992
	RA 7164: Philippine Nursing Act of 1991
	RA 8344: Hospital doctors to treat emergency cases referred to treatment
	AO 114: Revised/updated the roles and functions of the MHOs, Public Health Nurses and Rural Midwives, Philippine Medical Association, Medical Society by-laws
Diffusion of e-health	Free and open source software
Addressing the digital divide	Community e-centres
	Deped: Gearing up Internet Literacy and Access for Students
	DoH: Universal health care
Integration into existing systems	DoH: Enterprise Architecture (EA), ISSP
	Philippine Government Interoperability Framework
	ICT4H: Standards and Interoperability
Handling innovations at different levels	DoH: UHC
	EO 269: Creating the Commission on Information and Communication Technology
Policy goal-setting	DoH: UHC, EA, ISSP, National eHealth Strategic Framework
	ICT4H: Standards and Interoperability
Evaluation and research investment	Philippine Health Research Act of 2008 PHIC: policies on financing health workers in remote areas, Primary care benefit packages
Ethical issues	Philippine Medical Association Code of Ethics
	RA 6713: Code of Conduct and Ethical Standards for Public Officials and Employees

Remark: The authors have edited the original table to present the most relevant policies and programmes.

Source: Salisi et al., 2016

Among these policies, the development of DoH Enterprise Architecture (DoH EA) is one of the most prominent achievements, as it goes beyond the scope of the DoH and covers the entire Philippine health sector. DoH EA would enable the formulation of standards-based and interoperable health information systems and e-health solutions in Philippines (DoH, 2011). Another noteworthy document is the Philippine eHealth Strategic Framework and Plan 2014–2020 (PeHSFP). The PeHSFP mapped out the eight key e-health components of Philippines: governance, strategy and investment, e-health solutions (services and applications), standards and interoperability, infrastructure, legislation/policy and compliance, and human resources (Fig. 4.1). The structure then served as a conceptual framework to support the development of the DoH Information Systems Strategic Plan 2018–2020 (ISSP). In the 2019 UHC Act, the importance of the HIS was once again highlighted. The Act specifically mandates the maintenance of interoperable information systems and standardizes the necessary health data for collection from providers, which are required in licensing and contracting agreements (Sigua et al., 2020).

Fig. 4.1 National e-health component map in Philippines

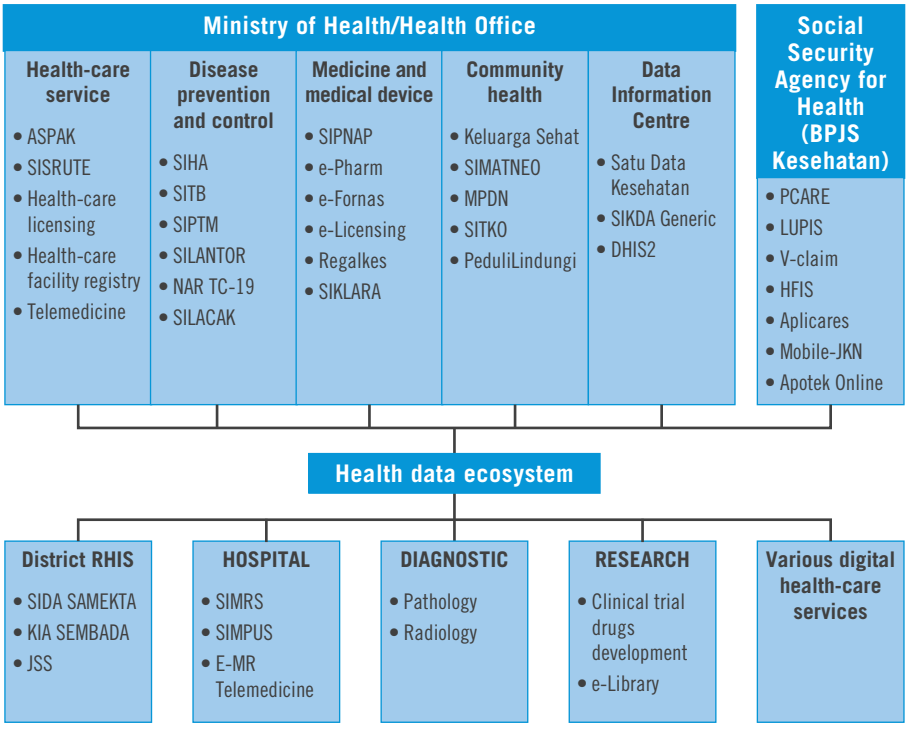


Source: DoH, 2014

Indonesia

Health information in Indonesia is managed in vertical health programme-specific systems with minimal horizontal sharing (Braa et al., 2017). At the national level, the information systems of each health programme are separate, many of which are web-based (e.g. TB, HIV/AIDS), but also Excel-based (e.g. malaria), and involve manual data collection procedures (Braa et al., 2017). Fig. 4.2 maps all the health data systems that are now implemented in Indonesia.

Fig. 4.2 The ecosystem of RHIS in Indonesia



Source: Compiled by the authors based on public information

While there is a notable political commitment to rearranging various aspects of policies, activities, and assignments, the challenges faced by the Indonesian HIS are plenty. For example, the utilization of information technology in the health sector is expanding rapidly, which has resulted in a large increase in the volume of data and information collected

but with varied quality and standards. Reliable integration of systems and applications has become essential for the proliferation of health technologies and information systems across the country. The fundamental basis of the HIS is Articles 167 and 168 of Indonesian Health Act No. 36, 2009 (IHA) on health management and information. This is operationalized through an HIS that covers various sectors. To carry out the IHA, the then president of Indonesia delegated the responsibility of arranging the required organization and work procedures to the MoH through Presidential Decree no. 47, 2009 (Faridah et al., 2020). At present, there are 12 implementing regulations on e-health covering aspects of health, development of information systems/information technology, and HIS in Indonesia (Fig. 4.3).

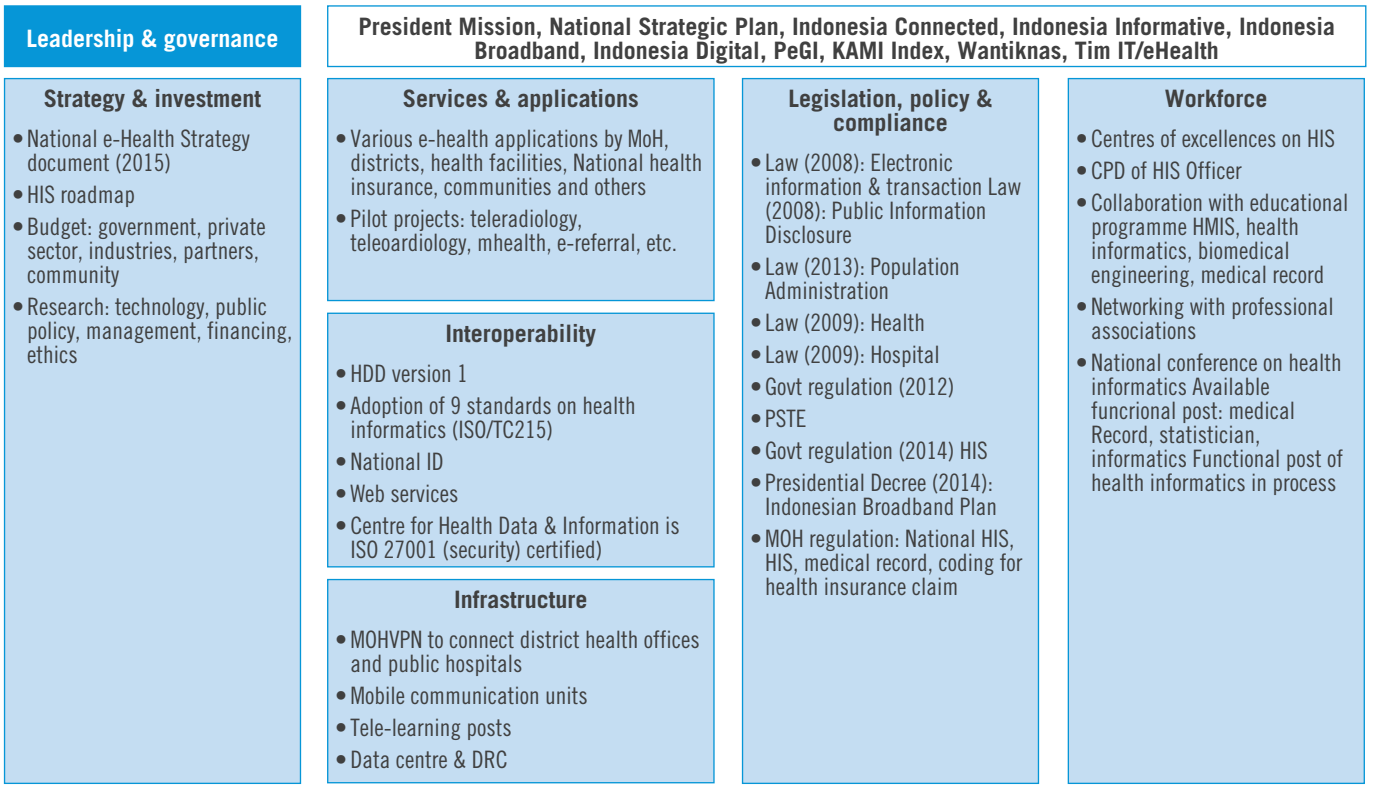
Fig. 4.3 Indonesian regulations related to the health and information system/information technology

Health regulations	Information Systems/Information Technology regulations	Health Information System Regulations
• Preseidential Regulation No. 72 of 2012 on the National Health System • Minister of Health Regulation No. 269 of 2008 on Medical Records • Regulation of the Minister of Health No. 73 of 2016 on Pharmaceutical Services Standards at Pharmacies	• Law No. 11 of 2008 on Information and Electronic Transactions • Law No. 14 of 2008 on Openess of Public Information • Government Regulation No. 82 of 2012 on the Implementation of Electronic Transactions and Systems	• Minister of Health Regulation No. 46 of 2017 on the National e-health Strategy • Minister of Health Regulation No. 92 of 2014 on the Implementation of Data Communications in the Integrated Health Information System • Minister of Health Regulation No. 82 of 2013 on the Hospital Management Information System • Regulation of the Minister of Health No. 1171/Menkes/Per/VI/2011 on Hospital Information Systems • Minister of Health Regulation No. 31 of 2019 on Community Health Cntre Information System • Regulation of the Minister of Health No. 20 of 2019 on the Implementation of Telemedicine Services between Health Care Facilities

Source: Handayani et al., 2020

In addition to the abovementioned regulations, several important official documents have been published in recent years, making the e-health roadmap clearer for planners, policy-makers, decision-makers, and all relevant stakeholders. In the MoH Strategic Planning 2015–2019, three steps of enhancing an integrated HIS were laid out, which are (1) develop "real-time monitoring" for all programme performance indicators and activity performance indicators of the MoH; (2) improve the capacity of information specialists at district/city and provincial level; and (3) excellently manage the internal strategic process in the MoH (MoH, 2015). The Indonesian Health Information Architecture (IDHIS) was published in 2016 and designed by the MoH to achieve two primary goals. First, the design and implementation of subsystems must factor in the integration of each other and the availability of resources. Second, electronic health records (EHRs) should be interoperable with the IDHIS (MoH, 2016). Since then, the e-health landscape of Indonesia has gradually come into shape (Fig. 4.4).

Fig. 4.4 e-health landscape in Indonesia



DRC - Disaster Recovery Centre
CPD - continuing professional development

Source: Soemitro (n.d.)

An updated HMN assessment

This section summarizes the key findings of the HMN assessment conducted by country teams, based on the status quo of the national RHIS of Indonesia and Philippines. The details of each assessment item for the four HMN components can be found in Appendix A.

RHIS resources

For both countries, among the three categories of *RHIS Resources*, "RHIS institutions, human resources, and financing" are relatively weak compared with "Policy and Planning" and "RHIS Infrastructure". For Indonesia, the results are similar to those of the 2007 assessment, in which "HIS institutions, human resources, and financing" had the lowest score. At present, the management and use of RHIS data in Indonesia have been systematically legislated, as stated in the written policies and strategic plans at both the national and subnational levels. Besides infrastructure support, the MoH has also collaborated with educational institutions to conduct research in the area of health information sciences. However, some health-care facilities do not own computers and maintenance of IT equipment is inadequate. In terms of HRH, designated full-time health information officers are lacking, with midwives or nurses usually being assigned these responsibilities in addition to health service delivery. Irregular and outdated RHIS capacity-building activities for RHIS staff were also identified. Further, although Government Regulation No. 46/2014 mandated broadly regular M&E and reporting on HIS data, regular meetings at facilities, districts, and other levels to review RHIS data and act upon such data were not mentioned in this regulation.

For Philippines, nationwide capacity-building through education and training in the core health information sciences, RHIS management, infrastructure, and financing is a pillar of *RHIS Resources*. The University of the Philippines, Manila, offers a four-year graduate course leading to a Master of Science in Health Informatics. On the other hand, the Commission on Higher Education (CHED) published CHED Memorandum No. 14 in 2009, which instituted the integration of health informatics into the nursing curriculum. Other short courses and training programmes for health workers are being implemented by the National Telehealth

Center (NTHC), DoH, Department of Science and Technology (DOST), and Department of Information and Communications Technology (DICT). "Policy and Planning" is an area that has been strengthened since 2007. Landmark policies and laws to push forward the RHIS agenda, as detailed in the previous section, are available, while the Philippine Government appropriated a significant budget for health information technology initiatives and epidemiology and surveillance programmes. Moreover, a national agency oversees all matters regarding routine health information collection, management, analysis, and dissemination through the Epidemiology Bureau (EB) at the central DoH. There is also a complete list of public and private sector health facilities in the National Health Facility Registry that provides basic information regarding health facilities in the country. Meanwhile, the computer ratio among management and technical staff at central and regional offices is 1:1, but it already needs replacement in most places. Internet connectivity remains a challenge, particularly in peripheral parts of the country.

RHIS indicators and data sources

In accordance with the results of the 2017 assessment, *RHIS Indicators* outperformed the other HMN components with country teams stating "Yes" to all criteria and statements provided by the HMN tool.

In Indonesia, the major sources of health data: (1) population census (vital statistics building is still in process according to President Regulation Number 62 year 2019) ; (2) health and disease records (including medical records, PCare[2] data, SIMPUS data at *Puskesmas* level, the hospital information system, and various disease surveillance information systems such SITB [tuberculosis], SIHA [HIV/AIDS], and SILACAK [COVID-19]); (3) routine health services records; (4) health accounts (the latest version of the national health accounts (NHA) was 2010–2016 and only a few districts created and published their DHA or NHA); and (5) survey data (such as the Indonesia Demographic and Health Survey, Indonesian Family and Life Survey, and National Socioeconomic Survey). To improve health services towards UHC, especially strengthening primary health care, national

[2] An application to access BPJS Kesehatan (https://www.ksatria.io/en/government-healthcare-systems/pcare-an-application-to-access-bpjs-kesehatan/, accessed 23 November 2023).

minimum core indicators are defined with relevant ministries (such as the Ministry of Health, Ministry of National Development Planning, and Central Bureau) aligned with Indonesia's long-term development plan (RPJPN), Indonesia's medium-term development plan (RPJMN), WHO, and the SDGs.

For Philippines, the FHSIS is the primary RHIS data source, consisting of core health indicators defined by key agencies to target the SDGs. FHSIS alone has 126 indicators covering health-care services, disease prevention and control services, lifestyle-related diseases, morbidity and mortality rates, natality, and demographics. These indicators were aligned with the National Objectives for Health (NOH 2017–2022). The NOH serves as Philippines' medium-term roadmap to achieve UHC, with ten indicators covering the strategic goals and 55 indicators for strategic pillars. Additionally, the DoH publishes annual reports to assess whether indicators have been met. The FHSIS Manual, which indicates strategies for measuring FHSIS-specific indicators, is also updated annually. FHSIS reporting from grassroots to the central-level DoH occurs monthly, quarterly, and annually. Additionally, there are other data sources from various government and nongovernment agencies that cover special programme-reporting systems. Epidemiological surveillance of notifiable infectious diseases[3] has been reported through the Philippine Integrated Disease Surveillance and Response (PIDSR). Flagship COVID-19 systems include COVIDKaya, FASSSTER, and the COVID Data Repository System. For a complete list of indicators included in the RHISs of both countries, please see Appendix A.

RHIS data management

RHIS data management remains problematic in Indonesia as four of the five assessment questions were given an answer of "No" by the country team. Even for the only item that was assigned with "Yes", it was noted that the application of each RHIS has its own procedures for data management, but not all procedures are accessible and fully understood by its users.

[3] Note: According to Philippines' R.A. 11332, "notifiable disease" refers to a disease that, by legal requirements, must be reported to the public health authorities.

Regarding the situation in Philippines, RHIS has a clear set of definitions and other information concerning data collection. However, interoperability remains a challenge in RHIS implementation and management. The databases at the subnational level are not yet fully interoperable with the national database, and the submission of reports must be performed manually. The development and implementation of national health data standards to facilitate communication between different HIS providers is ongoing, in addition to technological and infrastructural developments being conducted to increase interoperability. The DoH EB aggregates all RHIS data from the municipal, city, and regional health offices. With a meta-dictionary and standardized forms for reporting, the ICD-10 is used for morbidity disease reports and to generate vital events in FHSIS.

SCORE health data assessments for Philippines and Indonesia

The SCORE Health Data Technical Package was developed by WHO and external partners in 2020 to strengthen HIS as well as country capacity to generate, analyse, and use health data (World Health Organization, 2020c). Both Philippines and Indonesia participated in this global assessment and, in 2021, country-level assessments were published for each country. The SCORE assessment covers the entire health information system, including the RHIS. It recommends interventions to survey ("S") population-level data on health and risks, accurately count ("C") all births and deaths, optimize ("O") health service data, review ("R") progress and performance, and enable ("E") data use for policy and action. Most relevant to this report is the ability of countries to use RHIS data to optimize health service data and enable the use of RHIS data among policy-makers. We briefly describe the assessments of each of the case study countries and then compare and contrast the individual country-level assessments.

Philippines

The SCORE assessment of the HIS in Philippines reveals several key findings (World Health Organization, 2021d). Philippines scored the lowest in the "Optimize" category largely due to its need to improve its routine health facility reporting and patient monitoring system. However, Philippines performed comparatively better regarding its health financing and health workforce data. The country scored relatively well

in the "Enable" category, including data and evidence-driven policy and planning, data access and sharing, and strong country-led governance of data. However, Philippines needs to improve its routine facility reporting system with patient monitoring system in areas such as hospital deaths by ICD category, institutional maternal mortality ratio data, low birth-weight prevalence among institutional births, surgery by type, severe mental health disorders, and new cancer diagnosis by type.

Data quality checks for both primary care facility data and hospital data in Philippines were graded as partial. The completeness of reporting for public primary care facilities and hospitals was assessed as being between 25% and 75%, while it was less than 25% for all private health facilities. The country lacks a unique patient identifier system, and there is only a partial cancer registry in place. However, the country has a complete master facility list. There were partial systems in place for data quality assurance and data management standard operating practices. Philippines'' ability to capture patient-level data at primary care and hospital facilities into a system that was fully interoperable with aggregate routine data was considered only partial. Interoperability between systems was considered only partially complete. The assessment of data quality was considered ad hoc and based on the metrics of availability and readiness.

Indonesia

The SCORE assessment of the health information system in Indonesia shows a mixed performance (World Health Organization, 2021e). The country scored relatively high on its ability to "Survey and Review" health data but lower on its ability to "Optimize" and "Enable". Indonesia scored very low on its ability to "Count births and deaths". With regard to the availability of data for selected indicators derived from facility data, Indonesia scored relatively well on the availability of outpatient visit data but lower for hospital admission or discharge data by diagnosis and hospital deaths by major ICD code. The country needs to improve its data completeness and accuracy, particularly for TB treatment success rates and severe mental health disorders. Additionally, Indonesia needs to work on improving data quality checks, which were partially documented for primary care facilities but incomplete for hospitals.

Indonesia has a nascent unique patient identifier system and a relatively complete cancer registry. The country also has a master facility list, institutional data quality assurance, data management standard operating practices, and an electronic data entry system at the district level. However, the electronic capture of individual-level health data at both primary- and hospital-level health facilities is only partially complete, as is the interoperability of data between health information systems. Indonesia has a regular and established system to conduct independent assessments of quality-of-care data in hospitals and other types of health facilities. Finally, there is restricted access to the HMIS data.

Comparison of SCORE assessments in Philippines and Indonesia

The HIS in Philippines and Indonesia have different strengths and weaknesses. Philippines scored lowest in the "Optimize" category, particularly in routine HIS data. This suggests that the country needs to improve its routine facility reporting system along with the patient monitoring system. On the other hand, Indonesia scored relatively high in the ability to survey and review but scored very low in the ability to count births and deaths.

In both countries, important gaps in data quality assessment were observed, suggesting that there is room for improvement in ensuring the accuracy and completeness of health data. Both countries also have challenges in capturing patient-level data and ensuring interoperability between health information systems. However, Indonesia has a more established system for conducting independent assessments of quality-of-care data in hospitals and other types of health facilities.

Chapter 5: How are RHIS data being used to inform decision-making in Indonesia and Philippines?

This chapter summarizes the key findings of the interviews conducted in Indonesia and Philippines. We first present how RHIS data are used in different stages of the policy process and their role in improving decision-making. We then discuss the key factors that hinder the greater use of RHIS data, as well as strategies to tackle these barriers following the PRISM and DDIU models.

How RHIS data are being used to inform decision-making

Interviews with key informants revealed that RHIS data were extensively used in the decision-making process across all levels of government in both countries. Concerning the types of decisions for which RHIS data were employed, there were noticeable differences between the central and local governments, according to key informants.

In Indonesia, RHIS data are mainly used for planning and budgeting, programme implementation, and monitoring and evaluation activities. In particular, informants from national planning agencies often utilized RHIS data to develop proposals for different health programmes. In contrast, other ministries and district health officers use RHIS data more regularly for general planning and budgeting purposes. Furthermore, this encompasses (1) situation analysis, (2) calculation of population targets, (3) equity-related health services (e.g. coverage of JKN), (4) prioritization of programmes and funding allocation, (5) developing relevant health indicators, and (6) reviewing subnational planning proposals. As reiterated by a DHO informant, *"RHIS data were indeed the basis for planning. The use of this integrated data in our work is very helpful, especially in synchronizing several programmes"* (KI51[4], city level).

Similarly, in Philippines, data from major RHIS (e.g. FHSIS and iClinicSys) have been used for priority programmes such as child health, TB, NCDs, family planning, dental services, and immunization. The RHIS from which the data were extracted and synthesized relied on a particular programme. For example, the number of cases of immunization needed by primary health-care delivery could be found in the FHSIS, while if there was a

[4] We used "KI" and "DM" to represent interviewees from Indonesia and Philippines, respectively.

request for statistics on TB patients to implement TB-related policies, decision-makers would visit iDOTS, ITIIS, or the Integrated TB information system (DM16, municipal level). Even though some data were not used immediately, health officers may have saved them for the next stage of health programming. For example, local health officers may retrieve the data of patients with comorbidities from RHIS and use these data when these patients return for follow-up checks (DM21, city level).

In terms of the decision categories that used RHIS data, identifying a problem and selecting the best possible solutions suitable for the local context were the most common purposes. In a municipality, the RHIS data on dengue (e.g. the number of cases) triggered an informant to reflect on the effectiveness and efficiency of the previous interventions implemented by the municipality. Subsequently, his team investigated the case and found that water storage and sanitation problems might be a significant contributor to the persistence of dengue in that particular *barangay*. As a member of their local health board, the informant raised this problem at one of their board meetings (DM12, municipal level).

It should be noted that routine health data are only one of the many sources used by policy-makers in both countries. Apart from RHIS data, the following types of data were also consulted when designing national health policies and programmes, according to national-level informants from Philippines: (1) population Census from the Philippine Statistics Authority, (2) civil registration and vital statistics from the Philippine Statistics Authority, (3) public health surveillance from the DoH Epidemiology Bureau, (4) genomic surveillance from the Philippine Genome Center, (5) data from other government agencies (e.g. social welfare and development), and (6) national health accounts from the National Economic and Development Authority (DM46, national level). In Indonesia, data from recipients of donations were shared with the Health Social Security Administration Office to aid officers in managing the implementation of the National Health Insurance Programme (KI11, national level). Other non-HIS data and information were also helpful according to the informant. *"When we make a policy, […]there is also a need for qualitative data because sometimes we do not know why the data went down or up. This can only be explained by using qualitative data or research. Sometimes, we take them from journals. Mass media*

also became an input for us. Now there is big data that can process data from mass media. It is alsoI an input to strengthen justification for recommendations" (KI3, national level).

Some informants were aware of the limitations of the RHIS data and reported that they were cautious about using these data in the decision-making process. This quote summarizes the rationale of this practice: *"It is related to the very nature of the RHIS. Of course, we want to know the disease burden. Nevertheless, this is not the only type of information that is needed in decision-making. It is not necessarily a flaw. It is just a limitation by design. That is one of the concerns with just relying on RHIS. […] It will not answer all your questions"* (DM13, national level).

For both countries, RHIS data were heavily used in conducting M&E of policies and programmes, including performance measurement, evaluation of insurance claims, and providing feedback and policy recommendations. As shared by a decision-maker from the DoH of Philippines, the Department used the FHSIS to source indicators to report on the health sector's accomplishments in annual budget stability reports. It is also the main source for the LGU Health Scorecard (DM13, national level). In the case of Indonesia, as DHOs are mandated to meet a specific set of minimum service standards (SPM), routine health data (e.g. the data of the maternal and child health programme) were used to report the progress of DHO towards SPM and the obstacles to achieving the planned goals (KI40, municipal level).

Interviewees in Indonesia identified special scenarios when RHIS data were used: DHOs sometimes utilized routine health data to leverage their programmes, advocate for funding, and seek political support from other sectors and upper-level government. For instance, in North Sumatra, the DHO presents the number of poor or near-poor populations that were not enrolled in the JKN in the annual coordination meeting. If the DHO gained support from the cross-sectoral representatives who attended the meeting, the local government would allocate additional funding in the next year's budget (KI55, municipal level). Other examples include advocating village funds for the outreach programmes of primary health centres. In Indonesia, village funds are channelled directly from the Central Government to the

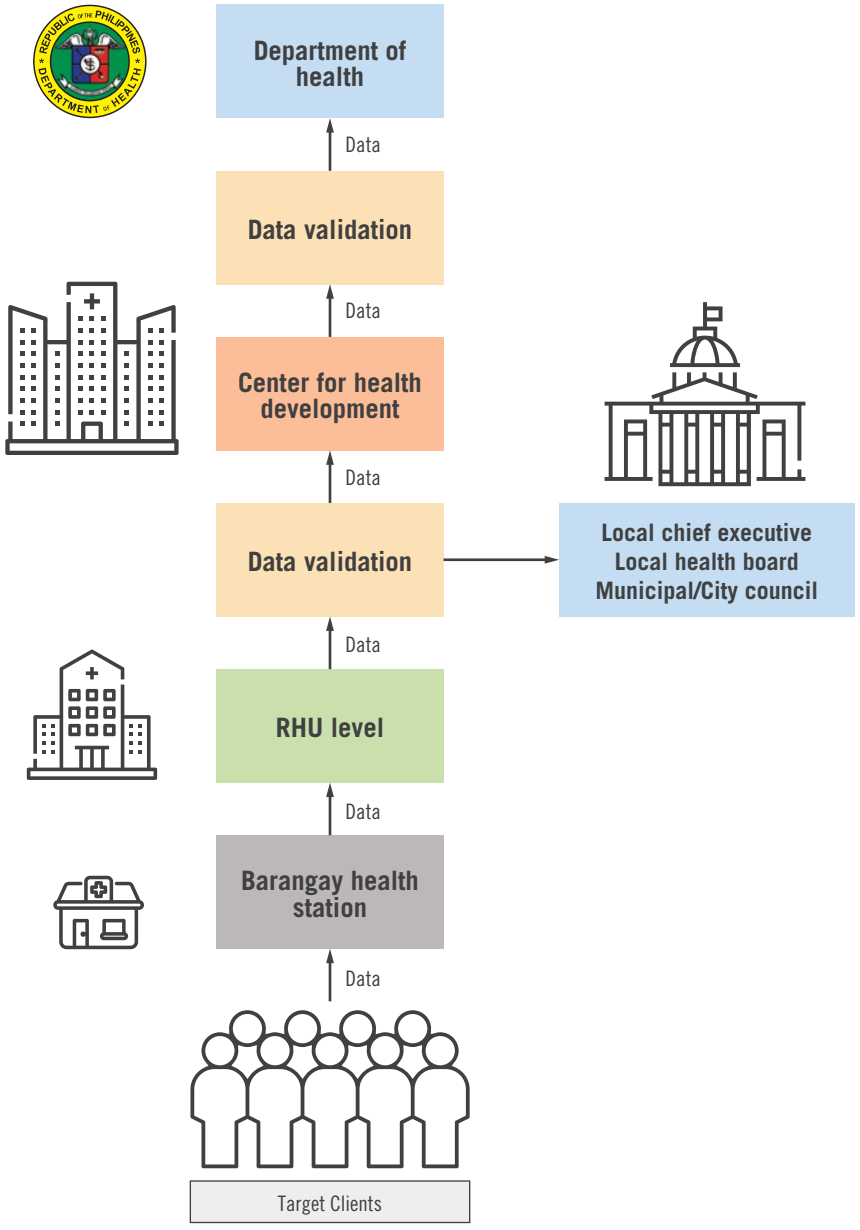
village level so that village authorities can finance their own programmes. As seen from the quotation below, the DHO felt that presenting RHIS data to the village authorities helped them to get the financial support they needed: *"We tried advocating using data as the basis. Oftentimes, when we already present the data and information were sourced from RHIS, they feel more confident and understand (the health problems) and would approve our proposals or our needs for various programmes"* (KI71, city level).

How RHIS inform and enhance decision-making

In line with the existing literature, health system stakeholders and policy-makers in Indonesia and Philippines unanimously felt that RHIS data allowed them to make evidence-based decisions and enabled the optimal mobilization of limited resources. The use of RHIS potentially contributed to better functioning of the overall health system.

In the Philippine context, the value of routine health data is reflected and embedded in the national RHIS data flow. Fig. 5.1 shows the RHIS data flow in Philippines, based on interviews and a review of official documents. RHIS data were collected nationwide at the barangay level. They were then aggregated at the city or municipal level. These aggregated data were transmitted and reaggregated at the provincial and regional levels. Finally, the data were submitted to the DoH. With this structure, the subnational government can access RHIS data to guide them in making informed decisions under a devolved Philippines' health-care system. At the same time, for national-level decision-makers, the aggregation of RHIS data across the country advances their capabilities to craft health policies and programmes that reflect an accurate picture of on-the-ground health-care realities.

Fig. 5.1 Data flow of the national RHIS in Philippines



Source: Drawn by the authors

Access to RHIS data equips local governments with tools that can enhance their capacity to identify the best possible solution to health-care problems, which is crucial, given the limited resources of LGUs. As an informant argued, *"data tell the story of the community and represent problems at the grassroots level. It is difficult to decide if you do not have data"* (DM41, municipal level). Another municipal-level stakeholder recalled a spike in TB, as shown by the national RHIS. In response, the local health authority collaborated with a non-profit organization to identify active cases and visualize the prevalence of TB. By combining this information with RHIS data, they were able to prevent the spread of TB in the municipality (DM9, municipal level).

Other interviewees at the city, provincial, and regional levels shared similar experiences of being capacitated to perform evidence-based decision-making at their respective health system levels. To some extent, the goals of health system decentralization in Philippines, which is "to widen the decision-making space of mid-level managers, enhance resource allocations from central to peripheral areas and to improve the efficiency and effectiveness of health services management." (Grundy et al., 2003) was partially realized through the use of RHIS data according to the value reported by our interviewees.

In parallel, local-level informants in Indonesia provided examples of how specific decisions were enhanced using RHIS data. One informant reported that data from a regional MCH information system (SIM KIA Sembada) supported the identification of high-risk pregnant women. According to the informant, the system would display a warning of which pregnant women were at risk and due to which risk factors. Later, the health service team would know that they had to follow up immediately before it became a real problem (KI36, city level). Another informant from a different municipality detailed how the routine data on mental health helped the local government detect the problems of a health issue and introduced interventions accordingly: *"There are reports on the monthly routine of mental cases. Early detection showed that mental cases had not been handled well. So, we organized training in handling mental disorders. We collaborated with the social services department because people were not handled mostly because they do not have identity cards"* (KI32, municipal level). An informant greatly appreciated the time-saving benefits of RHIS, particularly those related to the digitization

of big health data. It was perceived that without RHIS, manually processing the data from the bottom to the top would be unrealistic and too demanding (KI26, city level). Additionally, in DIY Province, RHIS data helped to improve the accountability of programmes, where the MoH would stress the importance of evidence-based reports on whether DHOs had managed to meet the SPM: *"The ministry not only focuses on our results. They also wanted to know how to calculate their achievements. Our achievements are based on initial calculations. If we just mention 100 achievements, it is not good enough."* (KI38, city level).

In the context of a decentralized health system, the nationwide aggregated RHIS data provided the Philippine DoH with an opportunity to build on the national-level policies and programmes they had developed from the on-the-ground health-care realities of subnational health systems. Although LGUs can craft their health-care policies and programmes, the DoH's access to aggregated RHIS data, which can also be disaggregated if the need arises, allows them to maintain technical oversight of nationwide health-care initiatives. For instance, when there were concerns about immunization targets, one interviewee from the DoH shared that disease data from RHIS informed them of the actions they needed to take. *"The data for the National Immunization Programme tell us when to take charge or maybe when to just trigger a catch-up immunization campaign. It [immunization] should be done by the local government unit. But from our end, it is [RHIS data] that triggers our action."* (DM15, national level).

National-level policy-makers in Indonesia further highlight the added value of leveraging RHIS data to make decisions on health service delivery at the local level. As explained by a national official, when the health authority reviewed the Special Allocation Fund (DAK) proposals at the subnational level, routine data sourced from the MoH were very useful because these data were very detailed and allowed them to assess how conditions would be different if they approved a proposal (KI4, national level). After a decision is made, RHIS data will continue to help policy-makers track the performance of complex programmes and make targeted improvements. For example, *"we monitor the performance of first-rate health facilities for primary health services. One indicator is the number of contacts with patients. Previously, we did not consider indirect contact. Now, we are calculating this*

indicator. So, from the existing data, we will try to see what policies can be adjusted for certain conditions" (KI15, national level).

These findings suggest that while RHIS data could render decision-making more evidence-based in local subnational contexts (Parkhurst et al., 2018), they may also enhance the responsiveness and value of health-care decisions in the context of decentralization. The existence of subnational data may have helped to improve subnational decision-making in terms of empowering local governments and improving their ability to exercise autonomy in governing their health-care system. At the same time, the national-level health authority's access to the aggregated RHIS may have also enhanced their oversight role and thus improved their capacity to provide technical assistance at the subnational level. However, in both countries, there is a need to better coordinate efforts and standards between the subnational and national levels, a need that has become more visible with the deepening of decentralization. From the perspective of frontline health workers and local health officers, there are operational misalignments in terms of the national government's requirement for health programmes and what could be realistically implemented at the grassroots level. Thus, the value of RHIS data lies not only in supporting arguments that a proposed solution to a health problem is scientific and the best possible one, but also in helping the smooth progress of decentralization of the health system.

Barriers to the use of RHIS data

Although our interviews provided evidence of the widespread use and value of RHIS data, we also identified numerous barriers that could offset the potential benefits of RHIS. We categorized these barriers into technical, individual (behavioural), and organizational, as outlined by the PRISM Framework, and examined each of the three categories separately in this section. We also analysed the additional challenges that emerged from interviews with informants in both countries.

Technical barriers

At the subnational level, the main technical barrier was unstable Internet connectivity or limited access to the Internet. Informants from both

countries mentioned that power outages in some areas disrupted RHIS-related tasks. Under such circumstances, data had to be manually collected and stored by the staff and then transferred to the electronic system once the power supply resumed. Necessary equipment, such as computers and laptops, were not functioning or simply lacking. Outdated devices extend the time spent loading the system, validating the data, and downloading the requested data. According to a subnational-level informant in Philippines: "*Internet connections are quite problematic because we are in a mountainous area. Thus, the implementation of an Internet-dependent RHIS may not be feasible. Also, some of our computers are not functional after the relocation of the health-care facility brought about by the municipal hall renovation"* (DM41, municipal level).

The frequent, and sometimes abrupt, modification of indicators by health policy-makers and inconsistencies with data requirements across various agencies also took a toll on frontline health-care workers. End-users were not initially consulted on the proposed modifications and were sometimes not notified after the changes were made. This finding was consistent among the interviewees at the municipal and regional levels. A direct consequence was that the data captured were not aligned with the requirements of the central government.

Furthermore, there were genuine concerns about the completeness, timeliness, and accuracy of RHIS data among users and decision-makers in both countries. From the perspective of policy-makers, they do not want the data to be of low quality, especially when they are going to share the data with the public. The level of trust that policy-makers have over data is important because it is not possible for them to conduct thorough quality checks on the data. In Indonesia, while most provinces and districts use RHIS, the confidence level of the validity of RHIS data was low among national-level stakeholders. Regarding the timeliness of data, decision-makers had a common preference for updated data. However, the availability of updated information is limited. As one Indonesian informant stated, *"at the beginning of 2021, we were planning for 2022. However, the data that was ready for use at that time was the data of 2020. So, there is a two-year gap"* (KI22, provincial level).

Bappenas, which oversees the national planning and development process, including for health, stated that they have little faith in the validity and trustworthiness of RHIS. Instead, they preferred annual national survey data for RPJMN development because they had a good understanding of the data collection process of the survey data and knew that the data were reliable. In contrast, when they reviewed the RHIS data, *"an area may have varied greatly between the Arfak Mountains and South Jakarta. It will be difficult for us to explain why the data look this way."* Thus, the informant believed that the country was yet to have good RHIS, especially for data validity. *"We are still worried that the data pooling process in the area is not standard and varies across regions."* (KI4, national level). The same problem was also found in a recent study that showed that RHIS data in Indonesia lacked validity and could not be used without other complementary sources of evidence (Nugroho et al., 2021).

A participant from Philippines voiced his concerns about a "double-entry" issue caused by fragmented subsystems of the routine RHIS. Moreover, the participant witnessed that some staff were motivated to "manipulate" the data entered the RHISs: *"There is a personal bias of wanting the programme being implemented to look good. Even at the cost of the result's truthfulness, the staff may find ways to make it look good. For example, the staff does not want TB to appear in their end results, so the staff will not encode it into the system. The work ethics, when it is a major matter of compromise, can affect the quality of data reporting"* (DM16, municipal level). Furthermore, a provincial health officer from Philippines complained that when an individual moved to another municipality, the current system would not be able to track this person's health data (DM1, provincial level).

Organizational barriers

As presented in Chapter 2, both countries have launched a number of programme-specific RHIS, each of which has its own data flow, indicators, and technical platforms for data management and reporting. Empirical studies in other settings have shown that a health system structured around vertical disease control programmes is often at odds with an integrated subnational-level HIS (MEASURE Evaluation, 2006). This problem may also occur in countries in the process of decentralization. The remarks of

a national-level decision-maker from Indonesia indicated the existence of this constraint: *"We did a data collection using indicators and operational definitions that we made. Then DKI Jakarta is the only province that has a population database with an application called Carik. They have more than 100 indicators. So, in DKI Jakarta, no more data is collected by many agencies. It is not allowed. Now, while we are collecting data, they cannot use our application because the operational definitions of the variables are different"* (KI1, national level). The organizational barrier was amplified by the fact that different HIS were updated irregularly. For example, an informant from Philippines reported that there is a misalignment between the various RHIS used in the country: "*There are new indicators not yet available in our EMR system"* (DM21, city level).

Cross-sector and interagency coordination remain a major challenge in both countries, even if the national government is pushing for integrated sharing and better exchange of electronic health data records across various health facilities (DoH, 2016). First, informants from both countries unanimously considered that the private sector, subnational units, and the central government had their own agendas, leading to some data being "left out" from RHIS and adding difficulties in data utilization. As argued by a health-care worker from Philippines, "*in the community health centre, we do not get the exact data of some of those born in private hospitals unless the parents go to the health centre [to report the data]*" (DM23, city level). Second, the institutions and departments involved in RHIS adopt different data-sharing policies and processes. In Indonesia, informants were frustrated about the obstacles in coordinating the Population and Civil Registration Service and the Social Service Department (KI29, city level). An officer from PhilHealth also encountered multiple challenges when attempting to use the RHIS data. For one thing, sometimes the data she received were incomplete or inaccurate (e.g. no/mismatched ICD-10 code, missing signatures). Second, some data were not utilized because some data forms were submitted in PDFs and her department did not have the software that could read these data (DM44, national level). Lastly, data transmission for decision-making is hindered by the ambiguity in the responsibilities of different levels of government. Subnational-level information shared this experience: "*It is like our bloodletting. Normally the barangay should spearhead such programmes. There are times when they cannot do it because they ask for data from us, in which*

we should be the ones asking them for data but what is happening is the opposite" (DM23, city level).

Another organizational factor barring the greater use of RHIS data was the tedious administrative process required to obtain data through the information hierarchy. A regional-level informant from Indonesia illustrated this point: *"On our end, we checked the data immediately, calling the attention of the coordinator from where the data originated. We handle it in a way that is not so offensive. Nevertheless, there are times when they ignore us or are unable to reply to our communication for data requests and the latest reports. The first-quarter reports have not reached us by the third quarter"* (DM42, regional level).

The last barrier was inadequate human and non-human resources across health systems to ensure that RHIS data could be used to the fullest extent. Technical standards and guidelines for data use are often lacking. Even if there were some forms of guidelines, respondents indicated a need to align the national guidelines with the realities of the frontlines (DM41, municipal level). On the other hand, subnational respondents identified a shortage of designated staff to perform RHIS-related tasks, such as encoding, analysing data and providing technical support. In this regard, an IT officer from the central government shared her challenge: "*We are unable to receive the support we need. For example, if the policy was not crafted properly, for the parts with grey areas on the system, our outputs may not exactly fit their requirements. Other times, we are left behind after we develop the system. […] The officers in charge of the programme do not join us when conducting the training"* (DM49, national level).

In Philippines, the deficiency of human resources was not just found in local health facilities, but was also identified at higher levels. A context-specific reason for this was that officers were often rotated between institutions. Similarly, at the subnational level, the IT officer was temporarily designated to LGUs, which resulted in unsustainable technical capacity (DM9, municipal level). Hence, it is practically challenging to give them systematic training and monitor their jobs to manage RHIS data. The mobility and turnover of health staff are also problematic in Indonesia. One informant stated that human resource mobilization was a political issue and

that primary health care was an area in which human capital was generally inadequate. Sometimes, persons assigned for this function were suddenly transferred from the original municipality to another place, a decision beyond the control of local health officials (KI43, municipal level).

Individual/behavioural barriers

Enhancing the quality and use of data for decision-making at all levels of the health system requires a favourable attitude towards RHIS (Chilundo & Aanestad, 2004). Our interviews revealed several behavioural determinants that influenced the use of RHIS data in both contexts, including knowledge, data analysis skills, attitude, and motivation of health workers and policy-makers. Informants from Philippines reported that reluctance to use technology (mainly at the local level) affected the likelihood of using RHIS data for decision-making. Some health workers shared that they were intimidated by using computer accessories: "*our older midwives will be intimidated because we really want iClinicSys. So, we bought hardware and desktops. Almost all of the health centres have the mouse cursor, but the adults seem intimidated. I feel them because I really do not like computers too*" (DM 22, city level).

However, when informants were asked why they were hesitant or unwilling to use RHIS, lack of proper training was a widely reported reason. Indeed, a prevalent issue emphasized by many informants was the limited IT or health-related competencies of service providers, managers, and other stakeholders to aggregate, process, and analyse RHIS data for decision-making. For instance, *"additional data requested by the DoH are not provided because the staff does not know how to calculate the required indicator such as Life Expectancy Rate"* (DM9, municipal level). Hence, many interviewees stressed the importance of equipping health system staff with the necessary knowledge and skills to perform assigned RHIS tasks. In a similar manner, in the Indonesian context, an informant recalled: "*Since I joined the health office, I had been training on applications in 2007–2008 more often [than now]. After that, what I experienced from the centre was that 'the application is like this and then learn by yourself'. There were no special meetings to [train us]"* (KI41, municipal level).

Another key barrier was the lack of awareness of the importance of RHIS data. According to the observation of an informant from Indonesia, the relevance of RHIS data was not fully recognized by city governments, and some officers questioned the necessity of collecting or providing these data to other institutions or national-level decision-makers (KI15, national level).

Local-level health workers also reported a less mentioned but noteworthy individual barrier: health workers are not only users of information but also responsible for health service delivery and collecting and inputting RHIS data. Consequently, they may prioritize other tasks over data use when handling heavy workloads even before the COVID-19 pandemic. An interviewee from Indonesia pointed to the complex nature of this issue: *"First, primary health care carries out administration work and services. So, sometimes it handles the administration part after the service. Second, the human resources in primary health care have not been specifically concerned with data. It is just a part-time job. The collectors are usually midwives and nurses"* (KI41, municipal level).

Other barriers

Apart from the three major categories of barriers discussed above, interviewees also expressed concerns about the constraints they faced in using RHIS data. A salient factor reported by both countries is their political environment. According to a national-level informant from Indonesia, despite the fact that the National Planning Agency committed to make "data-informed policy-making" an obligation, it was not always implemented well in reality since *"there could be other considerations from a political or economic perspective as well"* (KI7, national level). It could be deduced that if the political agenda shifted its focus from promoting data-driven decision-making, enforcement of the concept could be weakened (Table 5.1).

Table 5.1 A summary of barriers to greater use of RHIS data in Indonesia and Philippines

Technical barriers	Unstable Internet connection
	Lack of (functioning) facilities and equipment
	Data integration across programmes and levels of government
	Changes in data systems or applications being used
	Data quality (e.g. validity, timeliness)
Organizational barriers	Variations and redundancy in data-sharing policies and processes
	Lack of cross-sector and interagency coordination
	Lack of technical standards and data use guidelines
	High turnover of RHIS-related personnel
	Insufficient training of RHIS data users
Individual/behavioural barriers	Lack of awareness of the importance of RHIS data and data use
	Unwillingness to use information systems
	Limited technology competencies
	Prioritizing other tasks over data use
Other barriers	Political dynamics

Decision-making strategies to overcome barriers to RHIS data use

In response to the aforementioned challenges, national and subnational governments and other RHIS stakeholders discussed many strategies to reduce or remove barriers to RHIS data use.

Attempts have been made to improve the competencies of RHIS data users in Philippines. Training in the use and processing of RHIS data is now being provided to newly hired health workers. There are also local training sessions or programmes on how to use RHIS data for municipal health planning targeted at users in management roles. According to the mayor of a municipality, they are currently working on establishing a learning development plan to help health workers access RHIS data and perform RHIS tasks more effectively (DM11, municipal level). The DoH has also realized the importance of training to facilitate the use of RHIS data across the country. At present, the Department collaborates with academic

institutions such as the UP Manila National Telehealth Centre to conduct training activities (DM9, municipal level).

Technical barriers have also gained attention at the local level. Local-level policy actors also initiated interventions to tackle technical barriers to RHIS data use. A health officer working in an RHU stated that he had been proactively upgrading the local health centre (including improving Internet connectivity) to motivate health-care workers to use the RHIS (DM2, municipal level). To relieve the burden resulting from the drawbacks in the design of RHIS, LGUs have introduced "micro-level" innovations. For instance, to avoid inconsistencies and errors in data, an Excel-based system was created in a regional health system in which RHIS data collectors could simply input raw data. Subsequently, "*the system will generate a monthly report. This report will be the one you submit to the province for consolidation. We can at least make our implementers' lives easier"* (DM32, regional level).

Local governments in Philippines were also grappling with barriers to cross-sector coordination for data use. An approach being tested was to engage the private sector and nonprofit organizations in RHIS integration and enhancement. An informant described the efforts made in her municipality: "*We engaged with MyCure, a private company, in helping the municipality to streamline ICT-related solutions for outpatient clinics, telehealth, diagnostics, and booking of clinic schedules. Coalescing Organizations towards locally led actions to Boost Development, a USAID-assisted project, helps the municipality establish data integrity. It also helps in consolidating and analysing data […] for policy-making"* (DM11, municipal level). Moreover, in other municipalities, data validation has been strengthened to improve data quality. In a municipality, health officers verified the data from the target client list before submitting them to the corresponding RHIS at least every two weeks (DM30, municipal level). Similarly, at the national level, the Health Promotion Bureau of the DoH established an M&E unit to handle cross-cutting data issues. According to an informant from the Bureau, *"the system will soon become EMR Business Integration Service so that [users] will have more granular data"* (DM15, national level).

Our study participants also reported the actions they had taken to cultivate a culture of data use. A statistician from Metro Manila introduced their

practice: *"On our end, we have our planning workshops wherein we do the planning or approach the planning strategies based on a data-driven approach. [It was emphasized that] when you do the planning, it should be based on the data of this year and on these documented occurrences. We are able to have some strengthening done in that they really use the FHSIS. […]They do not report simply based on the need to submit or comply [with the basic requirements]"* (DM42, regional level).

In Indonesia, strategies to overcome barriers to data use have been introduced based on several foundational policy frameworks promulgated at the national level. A prominent example is that strengthening RHIS had been a policy priority mentioned in the Indonesian Medium-Term National Development Plan 2020–2024 (KI3, national level). RHIS was also highlighted in the e-government policy (SPBE Presidential Regulation Number 95 Tahun 2018). According to one informant, there was an ongoing digitization process within the MoH. *"The acceleration of routine data and the integration of the system was mentioned in many discussions. We saw that the progress is quite good"* (KI4, national level). Apart from that, after receiving branch office requests for better data management, a series of local government dashboards were initiated (KI10, national level).

The emphasis on RHIS and RHIS data use has catalysed targeted and creative solutions at the subnational level in both countries. In Indonesia, applications have been developed at the provincial and district levels for data integration (e.g. *Dataku* Application and *Sida Samekta*). Local health authorities have also innovatively made minor changes in data processing and sharing procedures. In one municipality, Google forms were used to streamline the data reporting process for private health facilities (KI40, municipal level). In Kupang, the city government continuously enhanced the RHIS workflows. A recent change they made was making health reports accessible to the Kupang city government instead of directly submitting them to the City Health Office. To improve data-reporting efficiency, the government also enhanced its coordination with the Communication and Information Service, as well as the Kupang City Research and Development Service (KI71, city level). In addition, the central government built an application programming interface (API) that compiled links to RHIS and other basic information. With that, health officers from

different municipalities could conveniently read each other's data (KI1, national level).

To resolve Internet connectivity issues in Indonesia, a major technical barrier discussed earlier, the MoH and the Ministry of Information and Technology established a program that has been added to the network for primary health-care facilities in the most remote areas (KI11, national level). In a municipality of the country, health officers tackled the network issue by backing up data (KI72, city level).

Other strategies have been put in place to improve data quality, including developing technical guidance for RHIS operators and end users, upgrading supporting facilities, and strengthening data verification. A program called Routine Data Quality Self-Assessment was launched by the Data and Information Centre of the MoH in Indonesia. This program is to be implemented at the regional level soon: *"Before the pandemic, the data quality was assessed independently. Now, it is by those in the health office and also [officers] at the Puskesmas"* (KI12, national level). Moreover, the Healthcare and Social Security Agency set up a "keyword data team" to ensure that the data used by primary health-care facilities are of good quality (KI15, national level).

Finally, a unique mechanism that became apparent during the interviews with Indonesian participants was the use of data-sharing forums and mini-workshops to improve communication and dissemination. Many informants believed that these mechanisms were useful in breaking barriers across sectors, departments, offices (within a department), and various subnational units. One participant reported that *"in the internal mini-workshop, there is a monthly meeting which is used for programmes to present their achievements. During these meetings, we asked what obstacles were encountered in the field. So, it was not just a cross-check of data"* (KI73, city level). Another informant also reported that cross-sectoral mini-workshops were regular practice at the district level. During these workshops, IT officers described changes made to the existing RHIS and what data should be available so that *"[different] sectors can know we want to make services in that place and [why] we need these data"* (KI81, municipal level). For the provision of BPJS, a data-sharing forum was organized with the

participation of local governments to evaluate the overall progress of JKN, availability of facilities, and performance of facilities under JKN. National-level stakeholders have also initiated similar mechanisms to coordinate local-level policy-makers: *"We have a routine forum with local governments, which will be held at least twice a year later. For primary services, we coordinate with health facilities, health offices, professional associations, and health facility associations across districts or cities. There is indeed an activation mechanism"* (KI15, national level).

Table 5.2 Strategies in place to overcome barriers to RHIS data use in Indonesia and Philippines

	Indonesia	Philippines
Technical	• Enact data integration policies • Provide technical assistance (e.g. helpdesk, training, webinars, and discussion) • Optimize IT • Provide adequate infrastructure • Conduct field visits to validate data • Develop health information system at district level to meet data needs • Recruit additional IT staff	• Upgrade facilities and devices • Improve Internet connectivity and stability • Streamline data reporting and data use procedures • Integrate information systems • Stock data from local systems with EMR • Manually back-up RHIS
Organizational	• Implement the right program according to the conditions • Coordinate sectors for data verification and data exchange • Create a culture to improve data completeness and reporting order • Provide financial incentives (or a form of disincentives)	• Better coordinate with the private sector and NGOs • Build data verification/quality check mechanisms • Create a "one-stop" dashboard • Set up an M&E unit at the Central DoH
Individual/ behavioural	• Provide motivation and support for health facilities to improve the timeliness and adherence to guidelines for data input • Train on IT competency • Remind staff to collect data on time	• Train on RHIS and RHIS data use (capacity-building) • Organize workshops where data use has been emphasized • Launch programmes to enhance information-seeking behaviours

Participants across different levels of government and national health systems came up with the following recommendations on how to enhance the use of RHIS data for decision-making.

At the local level, informants from both countries recommended that staff members tasked with performing RHIS-related tasks should be provided with quality resources (i.e. high-end computers) that can handle massive amounts of data. Technological advancements must be felt at the national and regional levels as well as at the grassroots level, where the majority of data originate. A regional statistician from Philippines emphasized: *"When they talk about advancement, it [should not] stay at the level that it is only felt and noticeable at their[national] level. It should be an advancement in a way that everyone will develop. […] It should go hand-in-hand that when we request for [good] quality data, we will also start to provide for [good] quality resources."* (DM42, regional level).

To address data demand, some informants suggested a centralized source of data that is readily available to local governments. This will not only facilitate data-sharing, but also allow data harmonization. A municipal health officer from Philippines illustrated this suggestion: *"The mayor did a comprehensive survey for health, public safety, and socioeconomic indicators, but it did not process well. I suggest having a centralized data source at the LGUs to have data and information harmonization to meet data demand. Data use would be much easier. We also have to share our vision with the people who are the sources of data"* (DM41, municipal level). To sustain the performance of tasks related to RHIS, permanent government positions should be offered to data managers and IT designates. Moreover, capacity-building activities such as training and workshops should be institutionalized, highlighting the importance of data management and analytics training for health-care workers. Another suggestion is to establish programmes for local policy development for local information systems. One of the municipal health officers from Philippines also requested a review of RHIS indicators every five years to improve the value of the RHIS data. Respondents from Indonesia also stated the need to improve the culture among district offices to help enhance data quality, particularly in terms of completeness of data recording and reporting. On the other hand, financial incentives and disincentives are perceived as promising strategies to address behavioural barriers.

At the national level, calls were made to improve Internet connectivity, not just in urban areas but also in geographically isolated and disadvantaged areas. Although digitalization is not a perfect solution, it is a step in the right direction. Therefore, the submission of RHIS reports should be streamlined through a national reporting system. The national government should put forward an integrated framework of all information systems, as "information is of far greater value, especially when it is integrated with other information" (WHO, 2008b). To achieve this goal, the national government should push forward interoperability across all HIS and create policies that will (1) mandate local governments to allocate funding to support the performance of RHIS tasks, (2) standardize the process of modifying RHIS reporting with an emphasis on participation from the municipality or city, provincial, and regional levels (World Health Organization, 2021c); and (3) standardize data quality checking at all levels (World Health Organization, 2020b). It is also recommended that it be essential to purchase standard statistical software and a platform that can handle data processing and analysis given the amount of data entering RHIS. Data communication mechanisms should continue to be operated and strengthened, ensuring the engagement of cross-sector stakeholders to cultivate a culture of using RHIS data for decision-making. Finally, informants proposed that the government develop and advocate online courses on the fundamentals of data management and analytics, which could serve as a requirement for the certification of health-care providers.

Chapter 6: The impact of COVID-19 on RHIS and data use

This chapter examines how the COVID-19 pandemic has affected RHIS processes, determinants, and the use of RHIS data in policy-making. Our interviews highlighted that the impact of COVID-19 on RHIS and RHIS data use was neither straightforward nor one-sided in the two countries we studied.

Across national health systems, health workers, policy-makers, and relevant stakeholders have had to shift their focus to combating COVID-19. According to an informant from the Epidemiology Bureau of the DoH of Philippines (DM28, national level), fewer data on notifiable diseases were reported as hospitals prioritized COVID-19 patients, resulting in delays in the delivery of other health services. Fewer consultations were registered at the subnational level because of the quarantine measures imposed by the national government. Consequently, fewer data were generated from vertical programmes (e.g. mother and child health [MCH] and the National TB Control Programme), as well as primary and secondary health facilities. A health worker mentioned: *"When the Enhanced Community Quarantine was implemented, we were not permitted to go out of the homes unless it is essential. Thus, there were very few consultations for prenatal care and immunization. The data coming in were not as rich as before the pandemic"* (DM9, municipal level). Local health officers from Indonesia also reported that driven by the fear of contracting the virus, primary health-care services were used less by pregnant women, which led to the reduction of RHIS data on this population (KI34, municipal level). Furthermore, the response to COVID-19 absorbed a large proportion of the government budget, resulting in less funding available for RHIS-related activities, which affected the implementation of strategies to promote data use.

As most health-care workers had been tasked with contact tracing and other COVID-related duties, all RHIS processes were disrupted. In Philippines, the negative impact intensified when COVID-specific information systems were introduced in addition to the existing RHIS. For example, national-level government agencies invested resources and forged partnerships to establish HIS for COVID-19 vaccine administration and management registries. However, these new HIS interfered with data processing from the FHSIS because most of the RHUs were understaffed. In one municipal health office, a public health nurse recognized that their workload had

increased dramatically during the pandemic because they had to fill registries deployed by the national government, such as the Vaccine Information Management System-Immunization Registry (VIMS-IR) and the DICT Vaccine Administration System (DVAS) (DM9, municipal level). These COVID HIS have varied requirements and standards, which are cumbersome for the RHU staff. As stated by a rural health physician, *"different agencies require different datasets, specifically for vaccination activities. They are fragmented and unintegrated health information systems"* (DM27, municipal level).

Measures to control the spread of COVID-19, such as social and physical barriers, also affected other RHIS procedures, such as data quality assurance and technical support for RHIS data users. DM27 mentioned that previously data validation exercises had been conducted quarterly. During the pandemic, they had to make this an annual activity. It is not difficult to surmise that the cross-sector data communication mechanisms operating in both countries (e.g. the Data Forum of Indonesia) could also be interrupted. Thus, to ensure smooth progress of these practices, suitable online communication software may be adopted.

Despite the substantial negative effects of the pandemic, there is a silver lining regarding RHIS and data use. First, COVID-19 created an opportunity to recalibrate national health systems and harness digital technologies to support the formulation of public health responses (Budd et al., 2020). One of the local chief executives from Philippines mentioned that the Epidemiology Surveillance Unit (ESU) was reorganized during the pandemic (DM11, municipal level), which could also be beneficial for RHIS. There is now an increased appreciation for technology use and HIS among decision-makers across the health system. In Philippines, the majority of informants from UHC pilot sites held that COVID-19 prompted them to use social media such as Facebook and SMS and email technologies to submit FHSIS reports to the CHD and the regional offices of the DoH. Similar findings have been reported for Indonesia. A subnational informant mentioned that they had been providing non-face-to-face technical assistance for RHIS data users through WhatsApp groups (KI73, city level), while another informant reported that they recommended midwives to use RHIS to check the data of the pregnant women they served, especially

if they were COVID-positive (KI34, municipal level). This positive aspect was reflected in this quote: "*The handling of COVID-19 has brought us into a new era for ways of thinking and acting. It turns out that the electronic service is actually a very active choice. This is why I want to try to provide online services at the Betun Health Center. It is avoiding people to contact or waiting in line for too long*" (KI82, municipal level).

Meanwhile, RHIS stakeholders attached greater importance to data quality and timely reporting, which may translate into a greater use of RHIS data in the longer term. As one participant emphasized, *"the experience of this pandemic is of extraordinary importance to us. Data interoperability is essential. For example, we have individual data on people who have been vaccinated. We have individual data on people who have tested for COVID. The data are helpful because they are used as a condition for people to fly, travel, and enter the mall. Now, the data can be checked"* (KI11, national level).

RHIS data were used to formulate sets of decisions regarding COVID-specific response programmes. For example, a member of an interagency task force on COVID-19 in Philippines mentioned that routine health data on COVID-19 and other RHIS data helped the task force decide whether they should lift the travel restrictions in their province (DM1, provincial level). On the Indonesian side, a provincial government was reported to use RHIS data to prepare incentives for nurses during the pandemic, which is a component of the Bantuan Langsung Tunai[5] (KI62, provincial level).

The pandemic has also changed the demand for and processes of RHIS in both nations. An informant observed that prior to COVID-19, health data were collected at the barangay level every month. However, owing to quarantine restrictions, it was collected weekly and at the household level. Barangay health workers, midwives, and nurses conducted home visits to collect vital signs and routine health data such as immunization records and demographics (DM11, municipal level). On the other hand, interviewees at the national level stated that the DoH shares routine health and COVID-related data catering to public and mass media demands, which is parallel

[5] Note: Bantuan Langsung Tunai is an unconditional and temporary cash transfer targeted to poor Indonesian households during economic crises.

to the situation in Viet Nam (Le et al., 2020). The need to publish data on multiple online platforms has driven health institutions, both at the ground and central levels, to update and report data daily. This has also triggered an appreciation for data storytelling among researchers and lay people (DM15, national level). Lastly, a shared feeling among informants from both countries was that there was now greater collaboration and communication across sectors and between the national and subnational levels of government. This would serve as a good starting point for removing some organizational barriers to greater RHIS data use.

Chapter 7: Conclusions

This comparative study aimed to explore how policy-makers in Indonesia and Philippines utilize RHIS data to inform decision-making in order to achieve UHC in their contexts. Based on an overview of the policy-making process, as well as the historical and recent developments in the countries' RHIS (Chapter 2), this report describes the present status of RHIS data use, examines the barriers to greater RHIS data use, and investigates the impact of the COVID-19 pandemic on RHIS as well as how policy-makers have employed RHIS (Chapter 5) in both countries.

Our research found that there is genuine interest in data-informed decision-making among policy-makers and implementers in both Indonesia and Philippines. RHIS data were not only used for the planning and implementation of health programmes but also played an important role in M&E activities, priority-setting, and advocacy efforts – at times in combination with data generated from other sources. However, to fully leverage RHIS data for UHC, both countries should work to remove the barriers faced by current and potential users of RHIS. Technical problems and limited functioning equipment were found to compromise the accessibility and quality of RHIS data in both countries. The lack of interoperability of different RHIS, incoherent data use and data-sharing policies, and weak coordination across different departments, institutions, and levels of governments make it more difficult for decision-makers to use RHIS data. Moreover, for both national- and subnational-level decision-makers, unwillingness, and lack of competency in using RHIS were reported as key behavioural factors, which may have resulted from low trust in data quality, lack of a data use culture, and lack of training on RHIS-related skills among human resources. Some of these challenges were exacerbated during the COVID-19 pandemic as response measures were implemented and financial and non-financial resources were prioritized to combat COVID-19. Nevertheless, as e-health gained momentum, RHIS was a widely used tool for crisis response, thus the importance of data for decision-making was significantly enhanced by cross-sector stakeholders.

Our findings also point to ways in which the use of data derived from RHIS could be reinforced in both countries. First, there is scope to improve the underlying data collection systems to improve data availability. This includes upgrading data-related equipment, improving Internet

connectivity, and providing back-up power supplies. Second, there is a need to further integrate and promote the interoperability of RHIS with other components of the HIS. Efforts such as the SCORE Health Data technical package and country assessments have provided international benchmarks and guidance that could be used to better track and report health data in both countries. Third, there is a need to increase trust in RHIS data by data users, which can be done through more regular and expanded data quality assurance and review activities. Finally, many of the challenges to data use pointed to the need to build more capacity among data users in order to make better use of the data, for example, programmes to boost computer literacy among health-care facility staff, enhance data quality checking and performance of other RHIS-related tasks, as well as cultivate a more favourable data use culture.

The quest to achieve UHC and the COVID-19 pandemic have highlighted the need for high-quality and high-frequency data on health service utilization in every health system. The RHIS in both Philippines and Indonesia is increasingly able to supply this demand and play critical roles in informing decision-making in both countries. However, important challenges must be overcome for decision-makers to fully utilize these data at their utmost potential. The findings of this study outline areas and methods to address these challenges in the future.

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Appendix A: HMN assessment of HIS in both countries

RHIS resources

Policy and planning

Items	IDN	PHL
The country has up-to-date legislation providing the framework for routine health information	YES	YES
There is a written RHIS strategic plan in active use addressing all RHIS components as in the HMN Framework that is being implemented at the national level	YES	YES
There is a written RHIS strategic plan addressing all RHIS components that is being implemented at the subnational level	YES	YES
There is a representative national committee in charge of coordination of RHIS	YES	YES
Thw Country Statistical Office and Ministry of Health have established coordination mechanisms (e.g. task force on routine health information)	YES	YES
Is there a regular system in place for monitoring the performance of the RHIS and its various subsystems?	YES	YES
There is a written policy (as part of the RHIS strategic plan) to promote the culture of information use throughout the health system	YES	YES
There is an official policy to conduct regular meetings at facility, district, and other levels to review RHIS information and act based upon such information	NO	YES

RHIS institutions, human resources and financing

Items	IDN	PHL
There is national capacity in core health information sciences to meet routine health information needs	YES	YES
There is a functional central RHIS administrative unit in the Ministry of Health for design, development and support of routine health information collection, management, analysis, dissemination and use for planning and management	YES	YES
At subnational levels, there are designated full-time health information officer positions and they are filled	NO	NO

Items	IDN	PHL
RHIS capacity-building activities have occurred over the past year for RHIS staff	NO	NO
RHIS capacity-building activities have occurred over the past year for health facility staff	NO	NO
IT and database support are available to support health and RHIS staff at national and subnational levels	YES	NO
There are written guidelines for the processes of RHIS data collection, management, and analysis	YES	YES
There are specific budget line items within the national budgets for various sectors to provide adequately for a functioning HIS for all data sources	N/A	YES

RHIS infrastructure

Items	IDN	PHL
A complete list of public sector health facilities exists and is updated regularly	YES	YES
A complete list of private sector health facilities exists and is updated regularly	YES	YES
Computers are available at the relevant offices at national, regional, and district levels to permit rapid compilation of subnational data	NO	YES
Basic communication technology infrastructure (telephones, Internet access, email) is in place at national, regional and district levels to ensure rapid compilation of subnational data	YES	YES
IT equipment maintenance support is available at national and subnational levels to ensure data and information reporting requirements are met and on time	N/A	YES

RHIS indicators

Items	IDN	PHL
National minimum core indicators have been identified for national and subnational levels covering all categories of health indicators (determinants of health; health system inputs, outputs, outcomes; health status)	YES	YES
There is a clear and explicit official strategy for measuring each of the country-relevant health-related Millennium Development Goal (MDG) indicators or the other core health indicators	YES	YES

Items	IDN	PHL
Core indicators are defined in collaboration with all key stakeholders, e.g. Ministry of Health, National Statistics Office, other relevant ministries, industry experts, professional organizations, major disease-focused programmes	YES	YES
Have the core indicators been selected to explicit criteria, including usefulness, scientific soundness, reliability, representativeness, feasibility, accessibility?	YES	YES
Reporting on the minimum set of core indicators occurs on a regular basis	YES	YES

Directory of indicators included in RHIS in both countries

	IDN	PHL
Determinants of health	**Socioeconomic** • Gross domestic product (GDP) • Human Development Index • Life expectancy • Literacy rate • Adjusted per capita expenditure • Poverty rate • Gini ratio **Environmental** • Proportion of households that have handwashing facilities • Water Quality Index • Percentage of households by province with toilet facility • Percentage of households by province that have garbage sorting and treatment • Percentage of households by province and presence of watershed area • Percentage of households that have access to decent and sustainable drinking water services • Percentage of households that have access to decent and sustainable sanitation services • Percentage of urban slum households	**Socioconomic indicators** GDP, Gross National Income (GNI) • Poverty incidence / Rural poverty incidence • Subsistence incidence • Food inflation • Human Development Index • Unemployment rate • Employment generated / Youth unemployment rate, Underemployment rate in areas outside National Capital Region (NCR) • Global Innovation Index (rank) **Environmental/Sanitation (NOT in the context of RHIS)** **FHSIS indicators** • Proportion of households with access to basic safe water supply (Level I, II, III) • Proportion of households using safely managed drinking water services • Proportion of households with basic sanitation facility • Proportion of households using safely managed sanitation services • Proportion of industrial establishments issued with sanitary permits

	IDN	PHL
Health system	**Health financing** Government budget allocation for health as percentage of total central government budget Number of technical policy materials for the development of health financing and health insurance Number of *Penerima Bantuan Iuran* members of national health insurance programme **Human resources** Number of health human resources whose competence has been improved Number of registered health workers Percentage of primary health centres (*puskesmas*) without a doctor Number of health human resources whose qualifications have been improved through the health human resources study task programme	**Financial resources/Health financing** **National Objectives for Health indicators** Out-of-pocket health spending as percentage of total health expenditure Percentage of population who have spent less than 10% of their household income on health Domestic general government health expenditure as a percentage of GDP Domestic general government health expenditure per capita Social health insurance as a percentage of total health expenditure (THE) Government financing (national and local) as percentage of THE Percentage of no balance billing (NBB)-eligible patients with zero copayment Expenditure for public health packages as a percentage of national government financing Expenditure for human resources as a percentage of national government financing Expenditure for health infrastructure as a percentage of national government financing **Human resources** **National Objectives for Health indicators** Percentage of provinces with adequate physician-to-population ratio (disaggregated by locality/area Percentage of provinces with adequate nurse-to-population ratio (disaggregated by locality/area Percentage of provinces with adequate midwife-to-population ratio (disaggregated by locality/area)

	IDN	PHL
		Other resources Percentage of provinces with adequate hospital bed-to-population ratio (disaggregated by levels, public and private) Percentage of provinces with adequate rural health unit/health centre-to-population ratio Percentage of provinces with adequate barangay health station-to-population ratio Percentage of provinces/highly urbanized cities (HUCs)/independent component cities (ICCs) with service delivery networks (SDN) established Percentage of households with primary care provider (within an SDN) (disaggregated by region, province, cities and geographically isolated and disadvantaged areas (GIDA)/non-GIDA)[6]
Health status	• Mortality: maternal mortality ratio per 100 000 live births • Infant mortality rate per 100 000 live births • Prevalence of stunting among under-five children • Prevalence of wasting among under-five children • HIV incidence per 1000 population who are not infected • Tuberculosis incidence per 100 000 population • Malaria estimation • Percentage of smoking among 10–18 years' population	**National Objectives for Health indicators** • Average life expectancy • Maternal mortality ratio per 100 00 live births • Infant mortality rate per 1000 live births • Premature mortality attributed to cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases per 100 000 population • Tuberculosis incidence per 100 000 population • Prevalence of stunting among under-five children

[6] Note: The FHSIS as the main RHIS of Philippines is limited only to health service delivery indicators and does not cover the other components of the health system such as health financing, human resources for health, governance, regulation, policy, etc. Other indicators related to the National Objectives for Health (NOH) are listed here https://tinyurl.com/5ae3jzf6 pp 125–9. Note that the data sources are not limited to one information system/agency.

IDN	PHL
• Prevalence of obesity among population >18 years • Percentage of fully immunized children (age 12–23 months) • Percentage of accredited primary health-care facilities • Percentage of accredited hospitals • Percentage of *puskesmas* with standardized health workers • Percentage of *puskesmas* without a doctor • Percentage of *puskesmas* with essential drugs availability	• Modern contraceptive prevalence rate (all women) • Adolescent birth rate • Percentage of fully immunized children • Incidence of low birth weight among newborns • Road traffic deaths per 100 000 population Prevalence of raised blood pressure • Prevalence of current tobacco use • Treatment programme completion rate for people who abuse drugs • Tuberculosis treatment coverage • Percentage of antiretroviral therapy (ART) coverage • Percentage of provinces that are malaria free • Percentage of provinces that are filariasis-free • Proportion of households using safely managed drinking water services • Proportion of households using safely managed sanitation services • Percentage of disaster-affected areas with no reported outbreaks (disaggregated by locus, e.g. within/ outside evacuation centres) **Field Health Services Information System** ~126 indicators covering family health care services, maternal health care services, child care services, oral health care services, infectious disease prevention and control services, noncommunicable disease prevention and control services for lifestyle-related diseases, morbidity, mortality and morbidity rate (by type of disease, sex and age group), natality, and demographics

RHIS data sources

	IDN	PHL
Vital statistics (non-RHIS data source)	Vital registration is not complete, it is supplemented by population Census every 10 years (which is conducted by the Central Bureau of Statistics). The Civil Registry Office (at the district or municipality level) is a place to report birth or death in the family to acquire a birth certificate or death certificate. Currently, President Regulation No. 62 Year 2019 mandates accelerating civil registration and the vital statistics building process.	PSA conducts a nationwide census every five years. Vital statistics is published on PSA's website. PSA also coordinates the the Philippine Statistical System, a government-wide system that provides statistical information and services to the public. Other vital registration systems: Maternal and Neonatal Death Reporting System (MNDRS)
Health and disease records (including disease surveillance systems)	• Manual & electronic health records • PCare BPJS Kesehatan • Puskesmas health information system (SIMPUS: outpatient registration) • RS online **Surveillance information system** • SITB (Tuberculosis) • SIHA (HIV/AIDS) • SISMAL (Malaria) • SILACAK (COVID-19) • SIMUNDU (Immunization)	The National Demographic and Health Survey is being done by the PSA every five years. This survey covers the demographic data on fertility, family planning, and maternal and child health. DoH also publishes its own health statistics yearly.
Routine services-based information	SIKDA (District-level Health Information System) Puskesmas Health Information System (SIP/SP2TP) RS Online Surveillance information system for each disease	Routine Health Services record are documented by the Survey, Evaluation, and Monitoring Division of the Epidemiology Bureau of the DOH. **Other services with information system include:** • Philippine Integrated Disease Surveillance and Response (PIDSR) • Integrated Leprosy Information System (ILIS) • National Rabies Information System (NaRIS) • Integrated Tuberculosis Information System (ITIS); Philippine Malaria Management Information System (PhilMIS)

	IDN	PHL
		• Unified Disease Registry System • Online National Electronic Injury Surveillance System (ONEISS) • Violence Against Women and Children Registry System (VAWCRS) • Philippine Registry for Persons with Disabilities (PRPWD) • Integrated Chronic Non-Communicable Diseases Registry Systems (ICNDRS) • Integrated Philippine Network for Injury Data Management System (iPNIDMS) • COVIDKaya • COVID Data Repository System • FASSSTER • TanodKIRAKontraCOVID • DOH Data Collect Bed Tracker Application
Health Accounts (administrative records)	Latest version of National Health Accounts (NHA) published in 2018 (for 2010–2016 period). Only a few districts create and publish their district health accounts/provincial health accounts Some of the information systems related to health financing are: • ECLAIM • ERENGGAR • SIPD (for public health facility)	The DoH Enterprise Resource Management System, Electronic New Government Accounting System (e-NGAS) Health Care Investment and Performance Monitoring System; Expenditure Tracking System; Integrated Logistics and Financial Management Information System; Human Resource for Health Information System; Personnel Information System; Electronic Job Posting System; National Stock Inventory System; Integrated Logistics and Financial Management Information System; National Health Facility Registry; National Stock Inventory System; Integrated Logistics and Financial Management Information System

	IDN	PHL
Data on community-based health actions	N/A	No data available, although the Community-Based Monitoring System (CBMS) Act (RA 11315) allows local government units to establish and maintain their own CBMS database
Other data sources	Indonesian Demographic and Health Survey (IDHS) Indonesian Family and Life Survey (IFLS)/ Survei Aspek Kehidupan Rumah Tangga Indonesia (SAKERTI) The National Social Economic Survey (SUSENAS) Social Security Administrator for Health (BPJS Kesehatan) Data Sample Medical health record	OPENSTAT (data on demographic and social statistics, economic statistics, and environment and multidomain statistics); Private sector-initiated EMRs coming from public and private institutions such as SHINE OS+ and Wireless Access for Health (WAH); Over departmental data coming from Department of Information Communications Technology, Department of Science and Technology, Department of Education, Department of Environment and Natural Resources, and Department of the Interior and Local Government; NGO-initiated information systems; Data from university-initiated EMRs such as Community Health Information Tracking System (CHITS)

RHIS data management

Items	IDN	PHL
There is a written set of procedures for data management, including data collection, storage, cleaning, quality control, analysis, and presentation for target audiences	YES	YES
The RHIS unit at the national level is running an integrated "data warehouse" containing data from all data sources, and has a user-friendly reporting utility accessible to various user audiences	NO	YES
Subnational levels have a data warehouse equivalent to the national one and have a reporting utility accessible to various audiences	NO	YES
A "metadata dictionary" exists, which provides data on variable definitions as well as their use in indicators, specification of data collection method, periodicity, geographical designations, analysis techniques and possible biases	NO	YES
Identifier codes are available for health facilities and administrative geographical units to facilitate merging of multiple databases from different sources	NO	YES

RHIS mapping Philippines

		Types of information handled by each system								
Type of information system	**Specific name if any**	**Service utilization**	**Occurrence of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive, vaccine, stock**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Routine service-based system	FHSIS	✓	✓	X	X	X	X	X	✓	
	EMR such as but not limited to: • iClinicSys • CHITS	✓	✓	X	X	X	X	X	✓	
Epidemiological surveillance for notifiable infectious diseases	PIDSR	✓	✓	✓	X	X	X	X	✓	
	• FHSIS: Infectious Disease Prevention and Control Services • STH Registry • STI Registry • Filariasis Registry • ILIS • NaRIS	✓	✓	X	X	X	X	X	X	

		Types of information handled by each system								
Type of information system	**Specific name if any**	Service utilization	Occurrence of selected disease(s)	Disease outbreak (immediate report)	Financial information	Drug, contraceptive, vaccine, stock	Human resources	Equipment & building	Vital events	Others
Special programme reporting systems (EPI)	FHSIS: Family Health Care and Services – Childcare and Services	✓	✓	X	X	X	X	X	X	
Special programme reporting systems (TB)	• FHSIS: Infectious Disease Prevention and Control Services • ITIS	✓	✓	X	X	X	X	X	X	
Special programme reporting systems (Malaria)	• FHSIS: Infectious Disease Prevention and Control Services • PhilMIS	✓	✓	X	X	X	X	X	X	
Special programme reporting systems (MCH)	FHSIS: Family Health Care – Maternal Care and Services, Childcare and Services	✓	✓	X	X	X	X	X	X	
Special programme reporting systems (NCD)	FHSIS: Non-Communicable Disease Prevention and Control Services; Lifestyle Related Diseases, Registry about LRD	✓	✓	X	X	X	X	X	X	

		Types of information handled by each system								
Type of information system	**Specific name if any**	**Service utilization**	**Occurrence of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive, vaccine, stock**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Special programme reporting systems (Injury)	Unified Disease Registry System • Online National Electronic Injury Surveillance System (ONEISS) • Violence Against Women and Children Registry System (VAWCRS) • Philippine Registry for Persons with Disabilities (PRPWD) • Integrated Chronic Non-Communicable Diseases Registry Systems (ICNDRS) • Integrated Philippine Network for Injury Data Management System (iPNIDMS)	✓	✓	X	X	X	X	X	X	
Special programme reporting systems (Oral Health)	FHSIS: Family Health Care – Oral Health Care and Services	✓	✓	X	X	X	X	X	X	

		Types of information handled by each system								
Type of information system	**Specific name if any**	**Service utilization**	**Occurrence of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive, vaccine, stock**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Special programme reporting systems (Environmental Health)	FHSIS: Environmental Health and Sanitation Services	✓	✓	X	X	X	X	X	✓	
Special programme reporting systems (COVID-19)	Flagship COVID-19 Systems such as but not limited to: • COVIDKaya • COVID Data Repository System • FASSSTER • TanodKIRAKontraCOVID • DoH Data Collect Bed Tracker Application	✓	✓	X	X	X	X	X	✓	
Community Base Information system	• FHSIS: Demographic data	✓	✓	X	X	X	X	X	✓	

		Types of information handled by each system								
Type of information system	**Specific name if any**	**Service utilization**	**Occurrence of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive, vaccine, stock**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Administrative system (Finance)	• Health Care • Investment and Performance • Monitoring • System • Expenditure • Tracking • System • Integrated Logistics and Financial Management Information System	-	-	-	✓	-	-	-	-	
Administrative system (Human resources)	• Human Resources for Health Information System • Personnel • Information • System • Electronic Job • Posting System	-	-	-	-	-	✓	-	-	

		Types of information handled by each system								
Type of information system	**Specific name if any**	**Service utilization**	**Occurrence of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive, vaccine, stock**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Administrative system (Training)										
Administrative system (Drug, contraceptive, vaccine, logistics)	• National Stock • Inventory • System • Integrated • Logistics and • Financial • Management • Information • System	-	-	-	-	✓	-	-	-	
Administrative system (Infrastructure, equipment, transport)	• National Health Facility Registry • National Stock Inventory System • Integrated Logistics and Financial Management Information System	X	X	X	X	X	X	✓	X	

		Types of information handled by each system								
Type of information system	**Specific name if any**	**Service utilization**	**Occurrence of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive, vaccine, stock**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Vital registration	• FHSIS: Demographic data, Morbidity, mortality and natality report • Maternal and Neonatal Death Reporting System (MNDRS) • Vital statistics published by PSA	✓	✓	X	X	X	X	X	✓	
Other systems	Refer to pages 51–74 http://ehealth.doh.gov.ph/images/eHealthPDF/02HealthEnterpriseArchitecture.pdf									

Indonesia

Type of information system	Specific name, if any	Service utilization	Types of information handled by each system: Occurrence/event of selected disease(s)	Disease outbreak (immediate report)	Financial information	Drug, contraceptive vaccine, stocks	Human resources	Equipment & building	Vital events	Others
	SIKNAS (National Health Information System)		-	-	-	-	-	-	-	-
Routine service-based system	SIMRS (hospital-level management information system)	For recording and reporting all hospital activities	V	V	V	V	V	V	V	There is a system for the management of patient laboratory examination request, features of nursing care
Epidemiological surveillance for notifiable infectious diseases	SIHA	Recording and reporting on HIV/AIDS and PIMS services	V	-	V	V	-	-	V	There is a disease course, patient treatment, and patient referral flow

Type of information system	Specific name, if any	Types of information handled by each system: Service utilization	Occurrence/event of selected disease(s)	Disease outbreak (immediate report)	Financial information	Drug, contraceptive vaccine, stocks	Human resources	Equipment & building	Vital events	Others
	Silacak COVID-19	1) To assist contact-tracing activities for COVID-19 2) Special functions (entering contact-tracing data, e.g. index case, close contacts, daily monitoring results; dashboard, monitoring display showing contact-tracing indicators and index case individual data, and close contact-monitoring results)	V	V	-	-	V	V, using a mobile phone based on Android / IOS	-	-
Special programme reporting systems (EPI)	Sistem Informasi Imunisasi	Recording and reporting immuniza-tion activities	-	Kejadian Ikutan Pasca Imunisasi (KIPI)/ Adverse events following immunization (AEFI)		V	-	-	-	Immuniza-tion coverage

Type of information system	Specific name, if any	Service utilization	Types of information handled by each system							
			Occurrence/event of selected disease(s)	Disease outbreak (immediate report)	Financial information	Drug, contraceptive vaccine, stocks	Human resources	Equipment & building	Vital events	Others
Special programme reporting systems (TB)	SITB for *training version* Sistem Informasi TB Terpadu (SITT)	Provide instructions to TB service providers in implementing mandatory TB notifications in order to increase the number of TB notifications	V	V	-	Drugs & vaccines stock: V	-	V	V	
Special programme reporting systems (Malaria)	SISMAL	Recapping data on malaria patients from all district/ city-central health centres	V	V	-	There are types of drugs, units of drugs, and results of treatment given to patients	There is only the name of the officer responsible for report-ing data	Equipment: V building	(Classi-fication of the trans-mission origin), the condi-tion of the patient	Patient identity, chronol-ogy of disease and treatment history, patient follow up

	Types of information handled by each system									
Type of information system	**Specific name, if any**	**Service utilization**	**Occurrence/event of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive vaccine, stocks**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Special programme reporting systems (MCH)	SIJARIEMAS (Maternal and neonatal referral network information system)	Optimize the process of information exchange and communication of emergency referrals for mothers and newborns	-	-	-	-	V	V	V	ANC counsell-ing for pre-referral of pregnant women, PNC for post-partum, and back-referral manage-ment
*Each province/ district has various/ different systems according to their needs	E-kohort KIA (still a pilot project in 15 provinces)	Data collection on pregnant women, infants, and toddlers. It is also for ANC monitoring, delivery and PNC according to the work area. The system is accessible offline.	V	-	-	V	V	Equipment: – building: V	V	There are health service data on pregnant women, neonates, toddlers, postpartum women
Special programme reporting systems (specify)	-									

		Types of information handled by each system								
Type of information system	Specific name, if any	Service utilization	Occurrence/event of selected disease(s)	Disease outbreak (immediate report)	Financial information	Drug, contraceptive vaccine, stocks	Human resources	Equipment & building	Vital events	Others
Community base information system	SIP	For recording and reporting on all primary health-care centre activities	V	V	V	V	V	V	V	-
Administrative system (Finance)	E-RENGGAR	To report the results of achievements that have been realized from programmes that have been proposed and implemented in the current year by the district/city	-	-	-	V	-	-	-	-
Administrative system (Human resources)	SISDMK (Health Human Resources Information System)	To support recording and reporting on health human resources	-	-	-	-	V	-	-	Distribution, training HRH
Administrative system (Training) ***Each region is different.**	SIPELATDU in Semarang City (containing training schedule), SITANGKAS (in Cikarang), SIMPEL IT (in Ciloto)									

		Types of information handled by each system								
Type of information system	**Specific name, if any**	**Service utilization**	**Occurrence/event of selected disease(s)**	**Disease outbreak (immediate report)**	**Financial information**	**Drug, contraceptive vaccine, stocks**	**Human resources**	**Equipment & building**	**Vital events**	**Others**
Administrative system (drug, contraceptive, vaccine, logistics)	Logistics Management Information System	For the recording of drug logistics	-	-	Only source of funds	V	-	V	-	-
Administrative system (Infrastructure, equipment, transport)	-									
Vital registration	SIAK (Population Administration Information System)	To provide national data and information on population registration and civil registration at various levels								
Other systems	SPGDT (Integrated Emergency Management System)									

Type of information system	Specific name, if any	Types of information handled by each system								
		Service utilization	Occurrence/event of selected disease(s)	Disease outbreak (immediate report)	Financial information	Drug, contraceptive vaccine, stocks	Human resources	Equipment & building	Vital events	Others
	SIPTM (Non-communicable Disease Information System)									
	Inter-Census Population Survey (SUPAS)									
	Primary Health-care Survey (Riskesdas)									
	Demographic and Health Survey (SDKI)									

PIMS - Patient Information Management System

SISDMK - *Sistem Informasi Sumber Daya Manusia Kesehatan,* Health Human Resources Information System

V – the corresponding HIS/RHIS has the indicator

Dashes (-) – the corresponding HIS/RHIS does not have the indicator.

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ISBN-13 978 92 9021 104 4

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