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Situation Assessment of the Management of Mercury-Containing Medical Measuring Devices in Indonesia

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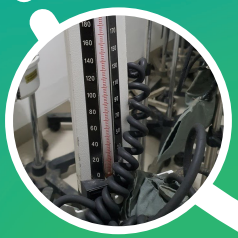

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MINISTRY OF ENVIRONMENT AND FORESTRY
REPUBLIC OF INDONESIA

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From
the People of Japan

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Foreword

Praise and gratitude we pray to the presence of God Almighty for His blessings and grace, that the "*Situation Assessment of the Management of Mercury-Containing Medical Measuring Devices in Indonesia*" can finally be completed.

The Government of Indonesia through Law Number 11 Year 2017 concerning Ratification of the Minamata Convention on Mercury has ratified the Minamata Convention on Mercury. Furthermore, the Presidential Regulation Number 21 Year 2019 concerning the National Action Plan for Reduction and Elimination of Mercury was stipulated as a form of the Government of Indonesia's commitment as a State Party to the Minamata Convention, which contains action plan in 4 (four) priority sectors to reduce and eliminate mercury. One of the priority sectors listed in the national action plan as well as having the nearest elimination target is the health priority sector.

In order to achieve the elimination target in the health priority sector, the cooperation of various stakeholders is required. An integrated mercury-containing medical devices management system is also required to accelerate the implementation of the elimination of mercury-containing medical devices and ensuring that the responsibilities of each stakeholder are fulfilled. For this reason, the "*Situation Assessment of the Management of Mercury-Containing Medical Measuring Devices in Indonesia*" was prepared, which is useful for determining the condition and status of the implementation of an inventory of mercury-containing medical measuring devices in order to support the acceleration of their elimination.

This report includes a brief national profile of Indonesia, assessment design and methodology, data collection and analysis results with inventory development, gap analysis between existing policy framework and actual practices in the field and requirements of the relevant conventions, as well as conclusions and recommendations.

We would like to express our gratitude to the Japan-ASEAN Integration Fund (JAIF) for funding the project "Development of Capacity for the Substitution and the Environmentally Sound Management (ESM) of Mercury-Containing Medical Measuring Devices" and for selecting Indonesia for the project implementation. Hopefully, this report will provide information on the current situation and a comparison of the Government of Indonesia's achievements in eliminating mercury-containing medical measuring devices against the achievement target, as well as providing practical technical guidelines for users and other relevant stakeholders regarding the management of mercury-containing medical measuring devices in an environmentally sound manner.

Mr. Sayid Muhadhar
Acting Director of Hazardous Substances Management
Directorate General of Solid Waste, Hazardous Waste
and Hazardous Substances Management
Ministry of Environment and Forestry
Republic of Indonesia

Foreword

Praise and gratitude we should convey to God Almighty for His blessings and grace that we were able to complete the "*Situation Assessment of the Management of Mercury-Containing Medical Measuring Devices in Indonesia*".

This report provides an overview of the conditions and status of the implementation of Presidential Regulation No. 21 year 2019 concerning the National Action Plan for Mercury Reduction and Elimination, particularly in the priority areas of health sector. In addition, this report can also measure the performance of Healthcare Facilities in implementing the Minister of Health Regulation Number 41 Year 2019 concerning the Elimination and Withdrawal of Mercury-Containing Medical Devices in Healthcare Facilities. The mandate of the regulation is that mercury-containing medical devices will no longer be used by the end of 2020.

Stakeholders, especially the Central and Local Governments, are expected to benefit from this report to determine the follow-up steps that must be taken. In particular, Healthcare Facilities as the main actors, of course, must be able to increase their efforts so that the target for the elimination of mercury-containing medical measuring devices can be carried out as expected.

We would like to express our gratitude to the Japan-ASEAN Integration Fund (JAIF) for funding this "Development of Capacity for the Substitution and the Environmentally Sound Management (ESM) of Mercury-containing Medical Measuring Devices" project. In addition, our highest appreciation and gratitude for the contributions of relevant parties both at the central and local levels, especially the management of Healthcare Facilities.

Ms. R. Vensya Sitohang
Director of Environmental Health
Directorate General of Public Health
Ministry of Health
Republic of Indonesia

Message from Mission of Japan to ASEAN

On behalf of the Government of Japan, I would like to congratulate upon the publication of "Situation Analysis of the Management of Mercury-Containing Medical Measuring Devices in Indonesia". The Government of Japan has actively supported projects that contribute to the principles and objectives of the ASEAN Outlook on the Indo-Pacific, in which public health is one of the priority areas.

Mercury is a global pollutant, and its adverse impacts on human health and the environment are a threat to public health and sustainable development of countries in ASEAN. The Government of Japan recognises the capacity and technological gaps that exist in the ASEAN region and is pleased to support various projects to bridge these gaps by the Japan ASEAN Integration Fund (JAIF). By supporting these efforts, governments across the region can improve their knowledge and capacities for lessening anthropogenic emission and the release of mercury into the environment, particularly via inappropriate management including the disposal of mercury added products.

The Government of Japan is also pleased to support activities and efforts to fulfil requirements under the Minamata Convention. This situation assessment report brings the gaps and challenges faced by the Government of Indonesia to the fore and assists in meeting the phase-out targets of the mercury containing medical measuring devices (MCMMD's) from health care facilities across the country. The report underscores the need for even more effective coordination and engagement with stakeholders, particularly at local levels, to promote policy implementation, increase technological support, improve knowledge sharing as well as raise awareness on mercury at all levels.

KODAMA Yoshinori

Minister, Mission of Japan to ASEAN

In support of the Situation Assessment of MCMMD's Management from Healthcare Facilities in Indonesia

The Regional Resource Centre for Asia and the Pacific remains committed to supporting countries in the implementation of interventions aimed at building capacity to sustainably manage all forms of waste, including safe handling of chemical waste. The sustainable management of hazardous wastes is a most urgent agendum for the ASEAN Member States to prevent adverse impacts of heavy metals and chemicals. Country level situation assessment of mercury-added products such as mercury-containing medical measuring devices (MCMMD's) provide insight into MCMMD's management's true situation. The situation assessment also affords us a unique appreciation of contextual challenges and opportunities to support planning, the design of policies, and actions to limit the use and guide safe handling and transport, storage, and disposal of mercury. We welcome this report as a great step forward for Indonesia towards fulfilling the provisions under Articles 4 &11 of the Minamata Convention.

Dr. Naoya Tsukamoto, *Director, Asian Institute of Technology, Regional Resource Centre for Asia and the Pacific (AIT RRC.AP, Thailand)*

On behalf of the Basel and Stockholm Conventions Regional Centre for Southeast Asia in Indonesia, we are proud to take part on the development of the situation assessment report on mercury-containing medical measuring devices management in Indonesia. Despite of only few field surveys conducted and the rest are canceled due to the covid-19 pandemic, questionnaire responses from a total of 5,865 respondents were collected from healthcare facilities to illustrate the situation in the field. In addition, national stakeholder consultations were conducted to accommodate more information which may be missing in the questionnaire. This information data is useful for the central and local government to develop regulation and action for the management of existing MCMMD's as a step to phase them out.

Dr. Anton Purnomo, *Director of the Basel and Stockholm Conventions Regional Centre for Southeast Asia*

The Indonesian government has a strong commitment in efforts to eliminate mercury in the health sector. In the Presidential Decree (Perpres) No. 21 of 2019 concerning the National Action Plan for the Reduction and Elimination of Mercury, the elimination of mercury in the health sector, especially medical devices containing mercury, is a top priority. For this aim, good situation assessment and technical guidelines are needed in efforts to manage the mercury contained in both intact and damaged medical devices. As a part of the Indonesian government, The Agency for the Assessment and Application of Technology (BPPT) has supported the action, namely "Development of Capacity for the Substitution and the Environmentally Sound Management (ESM) of Mercury-containing Medical Measuring Devices", organized by JAIF. BPPT also appreciates that the mercury storage containers which were developed by BPPT have taken part in this action. The publication of the results of this action is expected to provide comprehensive guidelines so that the realization and target of mercury elimination in the health sector can be managed properly.

Dr. Rudi Nugroho, *Director, Center for Mineral Resources Development Technology, Agency for the Assessment and Application of Technology/BPPT, Indonesia.*

Mercury has been gaining global attention for its toxicity since the Minamata disease outbreak in Japan. Pertamina Hospital is very concerned about this environmental issue and fully supports the elimination of the mercury-containing medical devices usage. This is a form of commitment, responsibility and support for the government initiative to accomplish "Indonesia Bebas Merkuri 2030"(a Mercury-Free Indonesia 2030) and to manage the impact of mercury exposure on the environment and health. Pertamina Hospital has also conducted the collection and provided a special room as a temporary storage of mercury-containing medical devices in accordance with applicable regulations. We are now using alternative Non-Mercury Containing Medical Devices and eliminate the use of Medical Devices Containing Mercury in our facility.

Dr. Syamsul Bahri, *MPH, Director of Pertamina Hospital in Jakarta – Indonesia*

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Abbreviations and Acronyms

AIT RRC.AP	Asian institute of Technology-Regional Resource Centre for Asia and the Pacific
AMS	ASEAN Member States
APBD	Regional Budget
APBN	State Budget
ASEAN	Association of Southeast Asian Nations
ASEC	ASEAN Secretariat
ASGM	Artisanal and small-scale gold mining
ASPAK	Application of Facility, Infrastructure and Medical Devices
AWGCW	ASEAN Working Group on Chemicals and Waste
B3	Bahan berbahaya dan beracun
BSCRC-SEA	Basel and Stockholm Conventions Regional Centre for Southeast Asia
Cd	Cadmium
Covid-19	Corona virus disease-19
Csv	Comma-separated values
Discarded mercury-containing medical devices	Mercury-containing medical devices which are discarded in broken and/or intact/good condition form
DPP	Doctor private practice
E-Monev	Electronic Monitoring and Evaluation
ESM	Environmentally sound management
GDP	Gross Domestic Product
GEF	Global Environment Facility
GRDP	Gross Regional Domestic Product
HCWH	Health Care Without Harm
HEAL	Health and Environment Alliance
Hg	Mercury
HS	Harmonized System
IA	Implementing Agency
JAIF	Japan-ASEAN Integration Fund
MoDA	Ministry of Domestic Affairs
MoEF	Ministry of Environment and Forestry of Indonesia
MOEJ	Ministry of the Environment of Japan

MoH	Ministry of Health of Indonesia
MSDS	Material Safety Data Sheet
PP	Government Regulation
Permenkes	Minister of Health Regulation
Permen LHK	Minister of Environment and Forestry Regulation
POLRI	Indonesian National Police
PPE	Personal protective equipment
PTSP	One-stop integrated service
Puskesmas	Public health centre
q-to-q	Quarter-to quarter
RAD-PPM	Local Action Plan for Reduction and Elimination of Mercury
RAN-PPM	National Action Plan for Reduction and Elimination of Mercury
RaKerKesNas Tahun 2020	National Health Working Meeting of 2020
SBC	Secretariat of the Basel Convention
SOP	Standard operating procedures
TNI	Indonesian Army
TSD	Treatment, storage and disposal
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
US EPA	United States Environmental Protection Agency
WHO	World Health Organization
WIB	Western Indonesian Time
y-to-y	Year-to-year

INTRODUCTION

1.1. Background

Mercury is a global pollutant and its negative impacts on human health and the environment are one of the major public health concern concerns in the Southeast Asia region. The Minamata Convention on Mercury, adopted in October 2013 (entered into force on August 16, 2017), contains mechanism for the control of mercury throughout its entire lifecycle. Article 4 of the Convention requires its Parties to phase out the manufacture, export, import and trade of a number of mercury-added products, including mercury containing medical measuring devices (e.g., thermometers and sphygmomanometers) by 2020, while Article 11 requires its Parties to ensure environmentally sound management (ESM) of mercury wastes.

Indonesia has many regulations on mercury for a wide range of processes and products such as cosmetics, air emission, drinking water,

Box 1 **Mercury waste definitions under the MC.**

Mercury wastes under the Minamata Convention: Art. 11, Para 2.

"For purposes of this Convention, mercury wastes means substances or objects:

1. Consisting or mercury or mercury compounds;
2. Containing mercury or mercury compounds; or
3. Contaminated mercury or mercury compounds,

in a quantity above the relevant thresholds defined by the Conference of the Parties, in collaboration with the relevant bodies of the Basel Convention in a harmonized manner, that are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law or this Convention. This definition excludes overburden, waste rock and tailings from mining, except from primary mercury mining, unless they contain mercury or mercury or mercury compounds above thresholds defined by the Conference of the Parties."

wastewater quality and artisanal and small-scale gold mining (ASGM). Although Indonesia has ratified the Minamata Convention through Law Number 11 Year 2017, there is still a need for effective implementation of the regulations. The Presidential Regulation Number 21 Year 2019 regarding national action plan for reduction and elimination of mercury (Rencana Aksi Nasional Pengurangan dan Penghapusan Merkuri, RAN-PPM) has been issued as a basis for implementation framework. The presidential regulation sets out the target for 100 percentage of mercury elimination in the health priority sector by 2020, an action far beyond the phase-out of the devices under Article 4 of the Minamata Convention.

Considering the ratification of the Minamata Convention and the Presidential Regulation on RAN-PPM, the Ministry of Environment and Forestry of Indonesia (MoEF) has further issued a Ministerial Regulation Number P.81/Menlhk/Setjen/Kum.1/10/2019 for the implementation of the Presidential Regulation. Ministry of Health of Indonesia (MoH) has also issued Ministerial Regulation Number 41 Year 2019 concerning the Elimination and Withdrawal of Mercury-Containing Medical Devices in Healthcare Facilities. However, the regulation does not provide any technical guidelines for collection, transportation, storage, treatment, and substitution potential for the mercury-containing medical measuring devices.

Indonesia has the first integrated treatment, storage, and disposal (TSD) facility in Southeast Asia but it still lacks mercury recycling and disposal facility for mercury wastes with high concentration. Similarly, there is no final disposal plan or any identified existing disposal site for mercury wastes. Indonesia still needs to address the usage, collection, transportation, storage, treatment, and substitution potential for the mercury-containing medical measuring devices, especially on how to accommodate best environmental practices in a challenging archipelagic country like Indonesia.

The project “Development of Capacity for the Substitution and the Environmentally Sound Management (ESM) of Mercury-containing Medical Measuring Devices” was endorsed and approved by the Association of Southeast Asian Nations (ASEAN) Secretariat and funded through the Japan-ASEAN integration Fund (JAIF). This Japan-ASEAN integration Fund (JAIF) project aims to bridge the abovementioned gaps for Indonesia by developing an inventory and ESM guidelines, and to contribute towards the overall implementation of the Minamata Convention. Therefore, the establishment and promotion of good practices in the countries covered under the project will become an important model or reference for future replication in the region and beyond.

The overall goal of the project is to contribute to the prevention of the adverse impacts of mercury on health and the environment through the ESM of used thermometers and sphygmomanometers in the ASEAN Member States. The project’s main activities comprises;

- the development of inventory on the use, substitution, storage, collection and disposal of mercury-containing medical measuring devices in each target country: Indonesia and the Philippines;
- development of guidelines on the ESM of mercury wastes from medical measuring devices; and
- dissemination of the results of the above mentioned activities to raise awareness of stakeholders through knowledge sharing in-country and among stakeholders in the ten ASEAN Members States (AMS).

1.2. Objective

The objectives of situation assessment and inventory activity are:

- To provide information on the current situation and status of achievement/progress of the Government of Indonesia in eliminating the mercury-containing medical measurement devices of concern (thermometers and sphygmomanometers) against the specified target, including the safety, health and

environmental aspects of the elimination implementation.

- To serve as a basis in providing a set of practical technical guidelines to the users on the environmentally sound management of discarded mercury-containing medical measuring devices of concern.

1.3. Scope of Assessment

The scope of the situation assessment covers the legal and institutional frameworks for the ESM of mercury-containing thermometers and sphygmomanometers in the health sector; the use, substitution, storage, collection, and disposal of mercury-containing thermometers and sphygmomanometers from both public and private healthcare facilities in Indonesia.The timeframe considered starts from the distribution of Circular Letter Number KL.03.01/I/0215/2020 concerning Reporting Form of Mercury Containing Medical Devices Elimination by Ministry of Health on 28 January, 2020 to 31 August 2020 which was the deadline for online form/questionnaire submission. Initially, due to resources limitation for this project, the target group of healthcare facilities for sampling was the large-sized hospitals, e.g., those with >200 bed count. However, during the course of the project implementation it was decided that an online form/questionnaire be used as survey instrument. The trial use of the online form/questionnaires proved the instrument has made the distribution and responses/data collection easier. Therefore, based on agreement among the national project team, the sampling was extended to include smaller hospitals, public health centres, laboratories and private clinics, in addition to the large-sized hospitals.

The overall information and data collection period was set to be 4 (four) months; starting from April 2020 to July 2020. However, due to the unexpected impacts of the pandemic which was publicly revealed in Indonesia in March 2020, the information and data collection period was extended to 31 August 2020 by agreement of the national project team and the implementing agency of the project.

1.4. Implementation Arrangements

The stakeholders for the implementation of the inventory development and their roles and main tasks are listed in the table below.

Table 1.1 **Project Implementation Stakeholders for the Inventory Development and Their Role and Involvement/Main Tasks**

Institution	Role	Involvement/Main Task
Japan ASEAN Integration Fund (JAIF)	Funding institution	▪ Provide funding for the project.
Asian institute of Technology-Regional Resource Centre for Asia and the Pacific (AIT RRC.AP), Thailand	Implementing Agency (IA)	▪ Direct reporting and coordination with Environment Division of the ASEAN Secretariat, the Steering Committee of this project and the Ministry of Environment and Forestry of Indonesia (MoEF) and the Ministry of Health of Indonesia (MoH); ▪ Implement the project; ▪ Provide inputs and guidance to MoEF and MoH.
Proponent, IA, Environment Division of ASEAN Secretariat (ASEC), representative of ASEAN Working Group on Chemicals and Waste (AWGCW), Japan Mission to ASEAN, Ministry of the Environment of Japan (MOEJ)	Project Steering Committee	Review and provide inputs.

Institution	Role	Involvement/Main Task
Ministry of Environment and Forestry of Indonesia (MoEF)	Project Proponent National focal point of the project Government Partner	▪ Propose for the project implementation for Indonesia; ▪ Direct reporting and coordination with IA; ▪ Provide and validate information and data; ▪ Provide inputs and guidance at national level.
Ministry of Health of Indonesia (MoH)	Government Partner	▪ Direct reporting and coordination with IA; ▪ Provide and validate information and data; ▪ Provide inputs and guidance at national level.
Basel and Stockholm Conventions Regional Centre for Southeast Asia (BSCRC-SEA)	National/ institutional consultant for Indonesia	▪ Direct reporting and coordination with MoEF and MoH; ▪ Support and assist MoEF and MoH in the project execution at national level.
International Consultant	Programme advisor	▪ Advise the core team (IA and national teams) in the project execution, review all project documentation and outputs, attend the capacity building seminar and workshops as a resource person, and advises in the planning of Phase 2 of the project.
Pool of international experts	Resource person	▪ Review the project outputs, and attend the capacity building seminars and workshops as resource persons.

NATIONAL BACKGROUND INFORMATION

Brief national profile of Indonesia

The brief descriptions of geography, climate, population, economy and healthcare profile of Indonesia are presented in the following subchapters.

2.1. Geography

Indonesia is strategically located off the coast south of the mainland southeast Asia, between two continents of Asia and Australia, and two great oceans of Pacific Oceans and Indian Oceans. Its territory spans almost one-eight of earth circumference. Indonesia is the largest archipelago country in the world with over 16,056 Islands[1] with total landmass spanning 1,916.906,77 km^2. Astronomically, Indonesia is located between 6° 04' 30'' north and 11° 00' 36'' south, and 94° 58' 21'' west and 141° 01' 10'' east in between equatorial line on 00 latitude[1] as shown also in the Indonesian Map2 below.

According to The Coordinating Ministry for Maritime and Investment Affairs, Indonesia's total water body is 6,400,000 km2 and 3,000,000 km2 Exclusive Economic Zone,3 which makes Indonesia's water body larger than its land and makes it one of the largest maritime nations with huge deposit of natural resources. Indonesia's also highly rich and fertile soil derived from volcanic material. Located between four tectonic plates, the geography of Indonesia is disaster-prone having earthquakes and tsunamis as two of the most frequent disasters in Indonesia. Indonesia is ranked as the country with the highest potential of tsunami.[4]

2.2 Climate

The climate of Indonesia is almost entirely tropical. The uniformly warm waters that make up 81% of Indonesia's area ensures that temperatures on land remain fairly constant, with the coastal plains averaging 28 °C, the inland and mountain areas averaging 26°C, and the higher mountain regions, 23 °C. Temperature varies little from season to season, and Indonesia experiences relatively little change in the length of daylight hours from one season to the next.[5]

The main variable of Indonesia's climate is not temperature or air pressure, but rainfall. The relative humidity ranges between 70% and 90%. Although air temperature changes slightly from season to season or from one region to the next, cooler temperatures prevail at higher elevations. In general, temperatures drop approximately 1°C

Figure 1.1 **Map of Indonesia**

Source: Geospatial Information Agency of Indonesia, 2017

per 90-meter increase in elevation from sea level with some high-altitude interior mountain regions experiencing night frosts.[5]

In 2019, average temperature in Indonesia ranged between 25.10°-30.04° C and average humidity ranged between 70.30-87.73%. Average annual precipitation in the lowlands range between 637.60 mm to 3,200 mm and up to a maximum of 4,072.70 mm in the mountainous regions. Number of rainy days ranged between 84 to 243 days with duration of sunlight ranging between 33.69%-84.32%. Average atmospheric pressure ranged between 900.20 mbar to 1,004.40 mbar.[1]

Being a tropical country, Indonesia does not have spring, summer, autumn, or winter, instead of just the two seasons of rainy and dry, both of which are relative. While there is significant regional variation, in most of the country (including Java and Bali) the dry season is April to October, while the wet season is November to March. However, global warming has made the seasons less predictable.[5]

2.3. Population

Indonesia is the fourth most populous country in the world.[6] In 2019, the total population of Indonesia reached about 268.1 million with annual population growth rate of 1.15% and life expectancy of 71.3 years.[1] It is also projected that by 2035, children between 0 to 14 years old will constitute only 21.5% of overall population, age 15-64 around 67.9% and age 65 above is 10.6%.[7]

In the 2020-2024 National Medium-Term Development Plan, one of the seven agendas is to increase human resources quality and competitiveness through: 1) population control and demographic governance strengthening;

2) strengthening of social protection implementation; 3) improve health service toward universal health coverage; 4) increase distribution of good education service quality; 5) increase quality of children, women, and youth; 6) poverty eradication; 7) increase productivity and competitiveness.

2.4. Economy

Indonesia is the world's tenth largest economy in terms of purchasing power parity, the largest economy in southeast Asia and a member of the G-20.6 Indonesia's economic growth in Quarter I-2020 was 2.97% (year on year) and -2.41% (quarter-to-quarter). Gross Domestic Product (GDP) at 2020 market prices were 3,922.6 trillion rupiahs. GDP growth by economic activities for agriculture is 0.02%, mining and excavation 0.43%, processing industry 2.06%, construction 2.90%, trade and reparation 1.60%, and others 5.62% in 2020. Furthermore, Java Island recorded the highest growth (~3.42%)and Gross Regional Domestic Product (GRDP) by region (~59.14%) contribution to Indonesia's economy in 2020.8

Some notes of events in Q1-2020 are as follows:

- The global economy is expected to contract during Q1-2020 after the spread of corona virus disease-19 (Covid-19) which started in Wuhan, China, at the end of 2019 throughout the world;
- Prices of oil and gas and mining products on the international market in Quarter I-2020 decreased in general (q-to-q) and (y-on-y), while prices of food commodities (coconut oil, palm oil, wheat and sugar) increased both (q-to-q) and (y-on-y);
- The economies of several Indonesian trading partners contracted as a result of activity restrictions and lockdown to control the spread of Covid-19.9

2.5. Healthcare profile

Economically, efforts are taken in Indonesia to ultimately increase human development index, namely basic public services such as schools and healthcare facilities.[10] In 2019, there are 2,877 hospitals in Indonesia (with total of 316,996 beds), 10,134 public health centres, 9,205 health clinics and 1,293 health laboratories. As of 2019, The ratio of hospital bed number to 1,000 population in Indonesia meets the WHO minimum standard of 1 bed for 1,000 population except for eight provinces which are yet to meet this standard.

In 2019, there are 3,685 pharmaceutical and medical devices production facilities in Indonesia. The province with the most production facilities is West Java with 1,025 production facilities, which may be due to its large population and area.

The number of health human resources in 2019 is 1,182,204 officers consisting of 864,410 health officers (73.13%) and 317,614 health supporting officers (26.87%). The largest health officer proportion is nurse which is 29.23 % from total health officers. Most of the health human resources are distributed in Java Island.

The largest proportion of medical officers is general doctors which is 53.16% (51,398 persons). 57.2% medical officers are located in Java Island with the most number in DKI Jakarta province (13,887 persons), East Java (13,034 persons), and Central Java (11,305 persons). Provinces with the least medical officers are West Papua (342 persons), North Maluku (376 persons) and North Kalimantan (400 persons).

Nationally, the percentage of hospitals conducting wastes management according to standard in 2019 is 42.64%. This number increases in comparison with the previous year which is 33.63% and already fulfils the Strategic Plan target for 2019 which is 36%. The percentage of regencies/cities fulfilling environmental health quality in Indonesia in 2019 is 78.02%. This number has fulfilled the Strategic Plan target for 2019 which is 40%. There are 17 provinces already achieving 100% of regencies/cities which have fulfilled environmental health quality.[11]

ASSESSMENT DESIGN AND METHODOLOGY

3.1. Assessment design

Based on the objectives and scope of the project, the situation assessment is interpreted as an effort to answer three main questions as formulated and listed hereunder.

- What is the Government's preparedness toward the mercury-containing medical measuring devices elimination target achievement?
- What is the current achievement or progress towards the elimination target?
- What happens to the discarded mercury-containing medical measuring devices (how are they managed)?

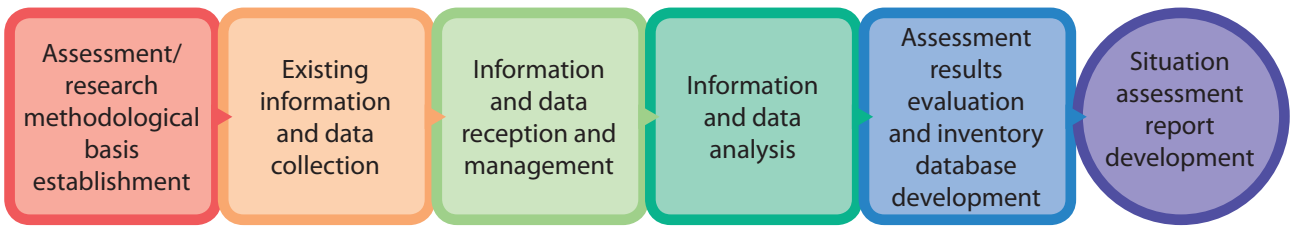
Therefore, the situation assessment has been designed to be a descriptive and conclusive research directed to obtain and analyse the relevant information and data pertaining to the answers to the above mentioned questions. The overall design of the situation assessment is presented in Figure 3.1.

3.2. Research Methodology

3.2.1. Identification of information and data needed to answer the main questions and their sources

Each of the main questions need a conclusive answer encompassing some parameters of the situation. The project team has set out the parameters as detailed questions which, in line with the overall research design, serve as the basis of the methodology for the assessment to ultimately answer the main questions. The more

Figure 3.1 Situation Assessment Design



Source: DanWHS, 2020

specific and detailed questions are listed with brief description hereunder.

3.2.1.1. What is the government's preparedness towards the mercury-containing medical measuring devices elimination target achievement?

(Policy and legal framework, institutional roles, campaign/dissemination of information on elimination target, management tools provision, essential public services and infrastructure provision).

- Are there any legal basis established (policies and legal instruments, e.g., obligations, elimination mechanisms/procedures)?

  This question is aimed at identifying if the Government has laid down a strong basis for mercury-containing medical measuring devices elimination and assessing its adequacy. The information and data needed to answer the question were obtained from the web and interviews with the key persons from the relevant government agencies.

- Have institutional roles been defined for operation?

  This question is aimed at identifying if the Government has defined institutional roles to ensure that the mercury-containing medical measuring devices elimination is done including assessing its adequacy. The information and data needed to answer the question were obtained from the web and interviews with the key persons from the relevant government agencies.

- Has the information on elimination target been disseminated?

  This question is aimed at identifying if all users of the mercury-containing medical measuring devices of concern have received the necessary information or instruction for them to participate in meeting their obligations and the elimination target. The information and data needed to answer the question were obtained from the web (document review), interviews with key persons from the relevant government agencies and the mercury-containing medical measuring devices users.

- Are essential management tools provided to the mercury-containing medical measuring devices users?

  This question is aimed at identifying if the mercury-containing medical measuring devices users are provided with a documented guidance or any similar management tools to help them undertake their obligation in meeting the elimination target and observe the health, safety, and environment protection. The information and data needed to answer the question were obtained from the web, interviews with the key persons from the relevant government agencies and the mercury-containing medical measuring devices users.

- Are needed/supporting public services/ infrastructure available?

  This question is aimed at identifying if the necessary public services/infrastructure to support the implementation of mercury-containing medical measuring devices elimination are available. The necessary public services/infrastructure may include environmentally sound collection, transportation, interim storage, treatment and disposal. The information and data needed to answer the question were obtained from the web, interviews with the key persons from the relevant government agencies and the Mercury-containing medical measuring devices users as well as verifying with field visits and crosschecking with questionnaires.

3.2.1.2. What is the current achievement in eliminating mercury-containing medical measuring devices and likelihood to meet the target?

(Total quantities of mercury-containing medical measuring devices in existence, already substituted, remain in use, stored and the likelihood of meeting the target).

- What are the total quantities of mercury-containing medical measuring devices in existence?

  The answer to the question was obtained by collecting data of imported and distributed/ sold mercury-containing medical measuring devices of concern during the last 5 (five) years prior to 2019 (the date of the decree on mercury-containing medical measuring devices import ban). The obtained data were also included in the establishment of the baseline for assessing the elimination target achievement and estimation of the quantities of mercury and mercury wastes to be managed by the responsible government agency. The information and data needed to answer the question may be obtained from the importers, distributors, Ministry of Trade and other relevant sources. In addition, the relevant data obtained from the questionnaires were also taken into account in the abovementioned baseline establishment.

- What are the total quantities or the portion of mercury-containing medical measuring devices already substituted?

  The question is aimed at identifying the quantities of the non-mercury substitutes of the mercury-containing medical measuring devices of concern which, together with the total quantities of the mercury-containing medical measuring devices of concern in existence, could be used to estimate the substitution rate. The data needed to answer the question were obtained from the responses to the questionnaires.

- What are the quantities of the mercury-containing medical measuring devices still in use?

  This question is aimed at identifying the remaining portions of the mercury-containing medical measuring devices of concern that the responsible authorities need to pay attention to. The data may be further broken down by ownership categories, administrative divisions, etc. as necessary. The data needed to answer the question were obtained from the responses to the questionnaires.

- What are the total quantities of the mercury-containing medical measuring devices no longer in use and are stored in good condition?

  This question is aimed at identifying the quantities of the stored or eliminated mercury-containing medical measuring devices of concern which, together with the total quantities of the mercury-containing medical measuring devices of concern in existence, also used to estimate the level of elimination rate. The data needed to answer the question were obtained from the responses to the questionnaires.

- What are the total quantities or the portion of the broken mercury-containing medical measuring devices?

  This question was aimed at identifying the quantities of the broken mercury-containing medical measuring devices of concern which be managed by the healthcare facilities according to relevant national regulations. The data needed to answer the question were obtained from the responses to the questionnaires.

- Are the substitutes already available in market?

  This question is aimed at identifying the availability of mercury-free substitutes to the mercury-containing medical measuring devices as pre-requisite or essential support to the implementation of mercury-containing medical measuring devices elimination policy and target achievement.

- What are users' responses to the elimination policy and target?

  This question is aimed at identifying the users' responses to the elimination policy and target. The feedback from users will help gauge requisite user supports needed for the implementation of the mercury-containing medical measuring devices elimination policy and target achievement.

- What constraints were encountered by mercury-containing medical measuring devices users in substituting them?

  The question is aimed at identifying the constraints the users may have encountered in meeting the elimination policy and target. The information was also used in gauging the likelihood of full achievement of elimination and providing the feedback to the Government for consideration in taking corrective and or improvement actions.

- What is the year of substitution set out by users?

  The responses to the question will be analyzed to identify the latest year targeted by users to substitute the mercury-containing medical measuring devices of concern as one of the factors affecting the likelihood of full achievement of the elimination.

3.2.1.3. What happened to the discarded mercury-containing medical measuring devices?

The abovementioned main question was further developed into several specific secondary questions to help describe the situation. The responses were also used to justify the need for a new or modified technical guidelines for the ESM of discarded mercury-containing medical measuring devices as well as to identify the most needed elements of the technical guidelines.

- What are the users' individual practices in the management of discarded mercury-containing medical measuring devices?

  The question is aimed at identifying the mercury-containing medical measuring devices' users' practices in the management of discarded mercury-containing medical measuring devices, in particular, in the packaging, temporary storage, disposal or transfer to the third party.

- Are there available disposal destinations?

  The question is aimed at identifying various disposal destinations at the present time. The answers to the question were obtained from the results of interviews and responses to the questionnaires.

- What are the encountered problems in discarded mercury-containing medical measuring devices management?

  The question is aimed at identifying the constraints or problems the users might have encountered in the discarded mercury-containing medical measuring devices. The information derived from the responses analysis results is taken into account in developing the technical guidelines. In addition, it is also provided as feedback to the government for consideration in taking corrective and or improvement actions.

- Is there a need for technical guidance to support the elimination and preventing its negative implications on public health and the environment?

  The answers to the question were obtained from a gap analysis, interviews and analysis of responses to the questionnaires.

- What are the most needed aspects of technical guidelines?

- The question is aimed at identifying the most needed elements of the technical guidelines. The answers to the question were acquired from the results of interviews and document review. The responses to the questionnaires were also analyzed to confirm the answers to the question.

- What aspects of guidance which are needed and not covered or lacking from the existing guidance?

  The question is aimed at identifying the other elements of technical guidelines which are needed and not covered in the existing ones. The answers to the question were obtained from the results of interviews and document review. The responses to the questionnaires were also analyzed to satisfy the question.

3.2.1.4. List of the identified information and data to be collected

Based on the above mentioned specific questions, a list of the needed information and data together with the respective collection methods and sources are presented in Table 3.1.

Table 3.1 **Data collection matrix**

No.	Main and detailed questions	Data and information required	Collection method	Data and information sources
1.	**What is the Government's preparedness towards the mercury-containing medical measuring devices elimination target achievement?**			
a.	Is there any legal basis established (policies and legal instruments, e.g., obligations, elimination mechanisms/ procedures)?	Information on policies and legal instruments e.g., obligations, elimination mechanisms/ Procedures.	Desk study	Web sites (e.g., articles, documents).
			Interview, workshop and meeting participation	Key persons from MoEF and MoH
b.	Have institutional roles been defined for operation?	Role and responsibilities of relevant governmental institutions/officials.	Desk study	Websites
			Interview	Key persons from MoEF and MoH
c.	Has the information on elimination target been disseminated?	Information on dissemination of elimination target to healthcare facilities.	Desk study	Web sites (e.g., articles, documents, videos)
			Interview, workshop and meetings participation	Key persons from MoEF and MoH
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no. E.4, E.5 and E.6 and online questionnaire no. 10.1, 10.2. and 10.3.
d.	Are essential management tools provided to the mercury-containing medical measuring devices users?	Information on provision of documented guidance or any similar management tools to healthcare facilities.	Desk study	Websites (e.g., presentation materials, videos)
			Interview, workshop and meetings participation	Interviews with key persons from MoEF and MoH
e.	Are needed/ supporting public services/ infrastructure available?	Information on availability of needed/supporting public services/ Infrastructure.	Desk study	Website (e.g., articles, official website of MoEF, video)
			Interview	Key persons from MoEF
			Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution.	Responses of off-line questionnaire no. E.2 and online questionnaire no. 10.5 and 10.7.

No.	Main and detailed questions	Data and information required	Collection method	Data and information sources
2.	**What is the current achievement in eliminating mercury-containing medical measuring devices and likelihood to meet the target?**			
a.	What are the total quantities of mercury-containing medical measuring devices in existence?	Data on imported and distributed/sold mercury-containing medical measuring devices of concern during the last 5 (five) years prior to 2019 (the date of the decree on mercury-containing medical measuring devices import ban).	Questionnaire	Importer, distributor, Ministry of Trade, other sources.
		Data on the total quantities of the mercury-containing medical measuring devices in existence or the initial number.	Off-line and online questionnaires distribution	Responses of off-line questionnaire no. C.2 and online questionnaire no. 8.1.1., 8.2.1., 8.3.1.
		Mercury content in discarded mercury-containing medical measuring devices.	Desk study	Website (e.g., documents)
			Interview	Key persons from MoH, other source
b.	What are the total quantities or the portion of mercury-containing medical measuring devices already substituted?	Data on the total quantities of mercury-containing medical measuring devices already substituted.	Off-line and online questionnaires distribution	Responses of off-line questionnaire no. C.2 and online questionnaire no. 8.1.2., 8.2.2., 8.3.2.
c	What is the portion of the mercury-containing medical measuring devices remain in use?	Data on the total mercury-containing medical measuring devices remain in use.	Off-line and online questionnaires distribution	Responses of off-line questionnaire no. B.1 and online questionnaire no. 2.1., 4.1., and 4.2.
d.	What are the total quantities or the portion of the mercury-containing medical measuring devices no longer used and stored in good condition/ intact?	Data on the total quantities or the portion of the mercury-containing medical measuring devices no longer used and stored in good condition/ intact.	Off-line and online questionnaire distribution	Responses of off-line questionnaire no. B.2 and online questionnaire no. 2.2., 4.3., and 4.4.
e.	What are the total quantities or the portion of the broken mercury-containing medical measuring devices?	Data on the total quantities or the portion of the broken mercury-containing medical measuring devices.	Off-line and online questionnaires distribution	Responses of off-line questionnaire no. B.3 and online questionnaire no. 3.1 and 5.1.

No.	Main and detailed questions	Data and information required	Collection method	Data and information sources
f.	Are the substitutes already available in market?	Information on availability of mercury-free substitutes.	Desk study	Website
			Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no. C.2 and online questionnaire no. 8.1.3., 8.2.3., and 8.3.3.
g.	What are users' responses to the elimination policy and target?	Information on users' responses to the elimination policy and target.	Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Online questionnaire distribution	Responses of online questionnaire no. 10.4.
h.	What constraints encountered by mercury-containing medical measuring devices users in substituting them?	Information on constraints encountered by mercury-containing medical measuring devices users in substituting them.	Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no. E.2 and online questionnaire no. 10.5.
i.	What is the year of substitution set out by users?	Information on the year of substitution set out by users.	Off-line and online questionnaires distribution	Responses of off-line questionnaire no. C.1 and online questionnaire no. 8.1.4., 8.2.4 and 8.3.4.
3. What happened to the discarded mercury-containing medical measuring devices?				
a.	What are the users' individual practices in the management of discarded mercury-containing medical measuring devices?	Information on the users' individual practices in the management of discarded mercury-containing medical measuring devices.	Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no C.3 and D.2 and online questionnaire no. 3.3, 5.4, 9.1, 9.3, 9.4 and 9.6
b	Are there available disposal destinations?	Information on availability of disposal destinations.	Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no C.3 and online questionnaire no. 3.3, 5.4 and 9.6
c.	What are the encountered problems in discarded mercury-containing medical measuring devices management?	Information on the encountered problems in discarded mercury-containing medical measuring devices management.	Desk study	Websites (e.g., videos)
			Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no. E.2 and online questionnaire no. 10.5.

No.	Main and detailed questions	Data and information required	Collection method	Data and information sources
d.	Is there a need for technical guidance to support the elimination and preventing its negative implications on public health and the environment?	Information on need for technical guidance to support the elimination and preventing its negative implications on public health and the environment.	Desk study	Websites (e.g., videos)
			Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no. E.2, E.4, E.5 and E.6 and online questionnaire no. 10.1, 10.2,10.3 and 10.5.
e.	What are the most needed aspects of technical guidelines?	Information on the most needed aspects of technical guidelines	Desk study	Websites (e.g., documents)
			Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no. E.2, E.4, E.5 and E.6 and online questionnaire no. 10.1, 10.2,10.3, 10.5 and 10.7
f.	What aspects of guidance which are needed and not covered or lacking from the existing guidance?	Information on the aspects of guidance which are needed and not covered or lacking from the existing guidance	Desk study	Web sites (e.g. documents, videos)
			Field visit observation and interview	Key persons from selected healthcare facilities and local health agency
			Off-line and online questionnaires distribution	Responses of off-line questionnaire no. E.2, E.4, E.5 and E.6 and online questionnaire no. 10.1, 10.2,10.3, 10.5 and 10.7

3.2.2. Information and data collection methods

Information and data were collected using secondary data retrieval (document review) method, field observations and survey instruments comprising questionnaires and interviews. Document review was used during mapping of existing guidelines, best practices, and gap analysis between:

- the existing policy framework and actual practices in the field; and
- the requirements of the Convention, technical guidelines of the Basel Convention and other relevant internationally recognized guidelines.

In addition, information on various actual practices in the management of discarded mercury-containing medical measuring devices of concern were also obtained by interviews and field observations during project team's visits to several healthcare facilities in the West Java area.

3.2.2.1. Literature/Secondary data retrieval

The identified sources for collecting the data and information include documents, workshop presentations, publications, etc. from official websites of national authorities and relevant organizations e.g., MoEF, MoH, Bureau Statistics of Indonesia, etc.

3.2.2.2. Interviews

Interviews were chosen as one of the survey instruments to obtain a deeper information on certain aspects of the situation being assessed. They were carried out with competent institutions,

e.g., relevant national authorities (ministries and local environmental agency), hospital and public health centre's authorities.

3.2.2.3. Questionnaires

A set of questionnaires was designed to collect the information and data in a more structured and uniformized manner from a much larger number of sources. The initially designed questionnaires are presented in Appendix 1. They were distributed in off-line form (in Bahasa Indonesia) to all categories of healthcare facilities via e-mail by the Ministry of Health. After the evaluation of the initial implementation of the off-line questionnaire's distribution and responses, an online questionnaire form was then developed and introduced to the same target population/groups. The use of a free online form application was intended to improve the questionnaire design, distribution, and collection methods, increase the response rate and to better manage the responses. The on-line questionnaire form is presented as Appendix 2. The online form was distributed to all categories of healthcare facilities by the Ministry of Health using its messaging application and social media. It was also proven that, during the pandemic outbreak in Indonesia, the use of on-line form was more appropriate than the off-line one.

Off-line questionnaire (filled by the respondents off-line)

The recording and reporting form for elimination and withdrawal of mercury-containing medical devices according to Permenkes 41/2019 was sent out electronically on 28 January 2020 through the letter from the Directorate General of Health Service, Ministry of Health, as part of inventory work under the RAN-PPM. The questionnaires were sent to the head of local health agencies at provincial and regency/city level, directors of hospital and healthcare facilities and the Red Cross Indonesia in all over Indonesia. Prior to being sent out, international consultant/programme advisor appointed by AIT RRC.AP provided inputs and suggestion to the questionnaire.

The MoH developed the questionnaire in compliance with their obligation as mandated in the Presidential Regulation Number 21 Year 2019, which states that for the purpose of mercury elimination, MoH are to oversee nationwide inventory of mercury-containing mercury devices in health sector. As such both in the off-line and online questionnaire has questions about dental amalgam even though it was outside of this project scope.

MoH distributed the hard copies of the letter and questionnaire during participants' registration at the National Health Working Meeting of 2020 (Rapat Kerja Kesehatan Nasional, RaKerKesNas Tahun 2020) organized by MoH in February 2020 in Jakarta International Expo. This RaKerKesNas 2020 was participated by around 3,000 (three thousand) participants including representatives of local and health agencies at provincial level and regency/city level as well as healthcare facilities from all over Indonesia, hence this event was considered as a good opportunity for the distribution of the hard copies of the letter and questionnaires.

BSCRC-SEA was also given the opportunity by MoH to assist in the letter and questionnaire distribution in one of the 9 (nine) locations of participants' registration which was the Best Western Kemayoran Hotel. This hotel accommodated participant representatives from 4 (four) provinces namely North Sumatra, East Kalimantan, West Nusa Tenggara and Maluku.

On-line questionnaire (filled by the respondents online)

It was further recommended by the international consultant/programme advisor of AIT to distribute the questionnaire in an online form (Google Form). This online questionnaire served as a follow-up to the previous letter by the Directorate General of Health Service regarding Delivery of Reporting Form on Mercury-Containing Medical Devices Elimination. The online questionnaire form had been discussed among the project core team and designed and adjusted to facilitate filling of the questionnaire in an easier and faster manner, hence more returned questionnaires responses were expected. The link to the online

questionnaire form can be accessed from https://bit.ly/borangalkesbermerkuri.

The online questionnaire form was distributed together with the letter from the Director of Environmental Health, Ministry of Health to all local health agencies to be further distributed to all healthcare facilities in Indonesia and Indonesian Red Cross in June 2020, mainly through a messaging application (WhatsApp). Data used for processing and analyzing were data collected until end of August 2020.

Initially, data and information on quantity of mercury-containing medical devices were expected to be also retrieved from MoH's Application of Facility, Infrastructure and Medical Devices (ASPAK) and Electronic Monitoring and Evaluation (E-Monev). However, due to the global Covid-19 pandemic that started in Wuhan, China on 2019, the authorized personnel expected to be able to retrieve the data from ASPAK was highly occupied with handling of the Covid-19 issue and therefore did not have adequate time. Meanwhile, data from E-Monev is also considered lacking due to many healthcare facilities have not yet entered their data relevant to mercury-containing medical devices to the E-Monev System.

3.2.2.4. Field observations (site visits)

Field visits were made to 3 health facilities in Jakarta on 19 November 2019 to observe and interact with key stakeholders in these facilities. In addition to obtaining some information through interviews with the representatives of the visited facilities, the project team was given an opportunity to observe the existing practices in the use, collection, transportation, storage, and substitution of the mercury-containing medical measuring devices of concern at each of the selected health facilities. The name and addresses of the visited facilities are listed hereunder.

- Puskesmas Kecamatan Cilandak (Public Health Center)
  Jl. Komplek BNI 46 No.57, Cilandak Barat, Cilandak, RT. 4/RW. 5,
  Kota Jakarta Selatan,
  Daerah Khusus Ibukota
  Jakarta 12430, Indonesia

- Puskesmas Kelurahan Lebak Bulus (Public Health Center)
  JL. Karang Tengah No. 16 RT.0001/03,
  Kel. Lebak Bulus, Kec. Cilandak,
  Jakarta Selatan

- Pertamina Central Hospital
  Jl. Kyai Maja No.43, RT.4/RW.8,
  Gunung, Kec. Kby. Baru,
  Kota Jakarta Selatan,
  Daerah Khusus Ibukota
  Jakarta 12120, Indonesia

Field visits were also made to 2 (two) healthcare facilities in Bekasi City namely:

- Hermina Bekasi Hospital
  Jl. Kemakmuran No 39, Margajaya
  Sub-District of South Bekasi
  Bekasi, 17141
  West Java, Indonesia

- Puskesmas Perumnas 2 (Public Health Center)
  Jl. Belut Raya no 1 RT 01 RW 06 Puskesmas Perumnas 2
  Kayuringin Jaya, City of Bekasi
  West Java, Indonesia

Other field visits to healthcare facilities in several provinces in Indonesia were also planned in conjunction with awareness raising workshops by MoH to be started at the end of May 2020. However, due to the unexpected Covid-19 pandemic situation, the field visit plan was cancelled as there were too many areas in Indonesia undergoing large-scale social restrictions.

3.2.3. Data reception and management

3.2.3.1. Literature/secondary data

Both on-line and off-line literatures have been collected, reviewed and examined to draw the following data and information:

- National policy, laws and regulations relevant to mercury-containing medical devices management;

- Stakeholders/key players involved:

- Distributors of mercury-containing medical devices;
- Healthcare facilities;
- Hazardous wastes transporters who have received recommendation from MoEF;
- Licensed hazardous wastes collectors;
- Licensed hazardous wastes treatment and/or disposal facilities for mercury wastes

3.2.3.2. Interview

Interviews have been conducted with:

- National authorities i.e., MoEF and MoH and local health agency to gather information on, among others, national policy, laws and regulations relevant to mercury-containing medical devices management and overview of existing and future plan for management of mercury-containing medical measuring devices in Indonesia;
- Healthcare authorities to gather information on current practice of management of mercury-containing medical measuring devices in the field and challenges in fulfilling the requirements for elimination and substitution of mercury-containing medical measuring devices.

Information above was also gathered through discussion during meetings, workshop and field visits.

3.2.3.3. Field observation notes/records

Notes/records of field observation on the existing storage of the discarded mercury-containing medical measuring devices at selected healthcare facilities were taken and used to conduct gap analysis between the existing policy framework and actual practices in the field.

3.2.3.4. Off-line questionnaire

The process of collection and compilation started with healthcare facilities filling and submitting their responses to the local the health agencies at city/regency level, who then compiled the filled questionnaires into a matrix with a format provided by MoH. Then, the matrices of the compiled responses from the healthcare facilities at city/regency level were submitted to the local health agencies at provincial level to be further coordinated, checked, compiled and submitted to MoH. On 6 May 2020, MoH shared the compilation of data collected in the form of excel spreadsheet. The data contained responses from 849 participating healthcare facilities who submitted the questionnaires up to 30 April 2020. Initially, the submitted data would be validated along with field survey to selected health care facilities throughout Indonesia. This was part of the original plan designed before the Covid-19 pandemic, since field survey was virtually impossible at this point in time. All verification and validation process were done only by MoH, since the collection of submission and compilation were also done by MoH, specifically by Sub Directorate of Safeguarding of Waste and Radiation, Directorate of Environmental Health, Ministry of Health.

The compiled responses was then processed to draw a descriptive statistic by first preparing the data. Data preparation including as follows:

- Uniformizing answers in the ownership status of healthcare facility row. Following the discussion with MoH, all answer outside of Government, Private and Army/police needed to be adjusted, for example, city owned or state-owned corporation were changed to Government, private practice to private owned.
- Categorizing answers based on feedback given by respondents, for example, abbreviated Doctor Private Practice or DPP. On question that requires number, empty answer was changed into “Not Answering”, “-“, “*” and “_” to “0”, and invalid answers such answer for number of mercury-containing medical measuring devices that are on decimal to “0”
- Many respondents were also answering “other” and proceeded with writing their own answers while the exact answer they wanted to pick was actually available the multiple choices. Those

kinds of answers were then re-categorized, while many "other" answers that could not be categorized into new category was categorized into new ones.

- Response on questions that were not related to their preceding questions but invalid were also deleted, for example, the respondent answer "0" in substitution but answering the next question on what type of substitution.

- Responding other type of mercury-containing medical measuring devices in a question on a particular type of mercury-containing medical measuring devices were also deleted, for example, responding about sphygmomanometer to a question about thermometer.

- Not including unnecessary data such as data of dental amalgam, responses to supporting questions, etc.

The finalized processed raw data then extracted for combination with finalized processed raw data of the online questionnaire, the preparation is as follows:

- Using a lookup function in Ms. Excel to determine double submission, which were healthcare facilities submitting both the off-line and online questionnaires. The result was that there were 618 respondents that only submitted the off-line questionnaires.

- Determining the data which should be combined, for example, address was not necessary for analyzing but province does, so only province data was combined to online spreadsheet, etc.

Population and Sampling

- Target population/groups

Initially, the main target population or groups are the large sized hospital (> 200 bed count) due to resources limitation for this project. However, with the use of online form (google form) for the questionnaire which makes data collection easier, the target population or group also includes public health centres, laboratories and private clinics.

- Sampling (target minimum size) using Yamani's formular;

n= N/ (1+N.e2)

n=23,509/ (1+23,509* 0.052) *margin of error* 2% data quality 98%

n= 2,259.699 ≈ 2,260.

After the preparation of the questionnaire's responses collected until 31 August 2020, the total number of combined responses to the off-line and online questionnaires is 5,865 respondents, more than the target minimum size of 2,260 respondents.

3.2.3.5. Online questionnaire

The online application saves each response and updates in real-time as people answer questions. All submitted responses are automatically stored on the Google server under the developer's Google account. The project team agreed on taking the responses accumulated by 31 August 2020 as the basis for data analysis under the project scope. The file of the accumulated responses was retrieved in the early morning of 1 September 2020 in order to include the responses received by the end of the target day (e.g., by midnight). It was verified that the latest response on that day was received by midnight (protocol: during the period of receiving/accepting responses, all collaborators were disconnected in order to prevent any accidental changes to the questionnaire).

The developer may retrieve all responses received and stored up to a specified time, e.g., on the target date. The received responses were monitored almost every day in order to see the average rate of received responses against time units. In order to enable data analysis in other programs, the accumulated responses by the target date were downloaded as a spreadsheet file (by default, Google Forms exports the data in csv format). The downloaded file was then converted into a Microsoft Excel format for data checking

against quality, data preparation and statistical analysis.

The online questionnaire are fundamentally similar in questions since the online questionnaire are developed using the off-line questionnaire as basis with only minor re-categorizing to ensure seamless transition between questions in online based questionnaire. However, since submitted data amounting 5,303, and many of respondent answer need to be coded manually because of the diversity in answers, this process is taking more time than initially estimated. The data collected are only until deadline on 31 August 2020. Additional information that may be added is up until 31 December 2020. MoH is still collecting submission in which 8.223 responses are submitted (by 31 December 2020 at 12:00 AM WIB).

Data verification and validation are automatic since it is an online form and the link to the form is only available to certain circle. MoH is also helping to ensure and follow up on both local health agency at provincial and regency/city level to monitor and coordinate with healthcare facilities to fill the questionnaire, while some areas in Indonesia even conducted a coordinated questionnaire filling meeting monitored by local health agency in their respective areas. This is because the questionnaire is still in compiling process for MoH for their own inventory.

Data processing are following same pattern as the off-line questionnaire with only minor addition to the addition of numbering since google spreadsheet does not automatically number them. This is for the sorting of data, other than that the process is a mirror.

3.2.4. Data analysis methods

The data was analyzed by categorizing the qualitative and quantity data into main and supporting data and data used for basic or descriptive statistics and inferential statistics.

3.2.4.1. Data categorizations for main and supporting data

3.2.4.1.1. Main data

Data categorized as main data are as follows:

- General information on Health-Care Facility (ownership status, category of healthcare facilities, inpatient care capacity (number of beds), province).
- Mercury-Containing Thermometers
  - Number of mercury-containing thermometers still used in healthcare facilities.
  - Number of mercury-containing thermometers which are no longer used and stored in good condition/intact in healthcare facilities.
  - Mercury content (in gram) in the thermometers.
- Broken Mercury-Containing Thermometers
  - Number of broken mercury-containing thermometers.
  - Handling of broken mercury-containing thermometers and mercury spills.
- Mercury-Containing Sphygmomanometers
  - Number of desk mercury-containing sphygmomanometers still used in healthcare facilities.
  - Number of floor-standing mercury-containing sphygmomanometers still used in healthcare facilities.
  - Number of desk mercury-containing sphygmomanometers which are no longer used and stored in good condition/intact in healthcare facilities.
  - Number of floor-standing mercury-containing thermometers which are no

longer used and stored in good condition/ intact in healthcare facilities.

- Mercury content (in gram) in the desk sphygmomanometers.
- Mercury content (in gram) in the floor-standing sphygmomanometers.

- Substitution of Mercury-Containing Medical Devices
  - Substitution of mercury-containing thermometers.
    - The initial number of mercury-containing thermometers.
    - Number of non-mercury thermometers replacing those which contain mercury.
    - Type of non-mercury thermometers
      - Thermometer containing non-toxic organic liquid.
      - Thermometer containing toxic organic liquid.
      - Electronic thermometer (digital).
    - The earliest, the latest and the most common year in in which the substitution of mercury-containing thermometers with non-mercury-containing thermometers took place or is planned to take place.
  - Substitution of mercury-containing desk sphygmomanometers
    - The initial number of mercury-containing desk sphygmomanometers.
    - Number of substitute desk sphygmomanometers that do not contain mercury.
    - Type of substitute desk sphygmomanometers that do not contain mercury
      - Aneroid
      - Electronic (digital).
  - Substitution of mercury-containing floor-standing sphygmomanometers.
    - The initial number of mercury-containing floor-standing sphygmomanometers.
    - Number of substitute floor-standing sphygmomanometers that do not contain mercury.
    - Type of substitute floor-standing sphygmomanometers that do not contain mercury
      - Aneroid
      - Electronic (digital)
    - The earliest, the latest and the most common year in in which the substitution of mercury-containing sphygmomanometers (both desk and floor-standing) with non-mercury-containing sphygmomanometers (both desk and floor-standing) took place or is planned to take place.
  - Management of discarded mercury-containing medical devices and remaining mercury stock
    - Handling of an incident of any broken mercury-containing medical device incidences or mercury spills.
    - Management of replaced/substituted mercury-containing medical devices and dental amalgam.
  - Other information
    - Obstacles in implementing the substitution of mercury-containing medical devices and dental amalgam in healthcare facilities that must be completed by the end of 2020.

- Specific guidelines or information needed by healthcare facilities in managing mercury and mercury-containing medical devices in order to fulfill the target of eliminating mercury in the health sector before/by the end of 2020.

3.2.4.1.2. Supporting data

Data categorized as supporting data are as follows:

- Brand names of mercury-containing medical measuring devices products used.
- Availability of standard operating procedures (SOP) for handling mercury spills from broken medical devices or from mercury containers in healthcare facilities (yes or no).
- Availability of standard operating procedures (SOP) for the management of mercury-containing medical devices and remaining mercury stock (yes or no).
- Guidance received by healthcare facilities from the relevant local agency in the elimination and withdrawal of mercury-containing medical devices (sphygmomanometer and thermometer) and dental amalgam by the end of 2020 (yes/no).

3.2.4.2. Data categorizations for basic/ descriptive and inferential statistics

3.2.4.2.1. Basic/Descriptive statistics

Data used for basic/descriptive statistics are as follows:

- General information on healthcare facility

Number and percentage of respondents according to ownership status, type and inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.

- Mercury-containing thermometers
  - Number and percentage of mercury-containing thermometers still used according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
  - Number and percentage of mercury-containing thermometers which are no longer used and stored in good condition/ intact according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
  - Brand names of the mercury-containing thermometers.
  - Average of mercury content (in gram) in the thermometers.
- Broken mercury-containing thermometers
  - Number of broken mercury-containing thermometers according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
  - Handling of broken mercury-containing thermometers and mercury spills conducted according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
- Mercury-containing sphygmomanometers
  - Number and percentage of mercury-containing sphygmomanometers still used according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
  - Number and percentage of mercury-containing sphygmomanometers which are no longer used and stored in good condition/intact according to ownership status, type, inpatient care capacity

(number of bed count) and province of domicile of healthcare facilities.

- Brand names of the mercury-containing sphygmomanometers.
- Average of mercury content (in gram) in the sphygmomanometers.

- Broken mercury-containing sphygmomanometers
  - Number of broken mercury-containing sphygmomanometers according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
  - Handling of broken mercury-containing sphygmomanometers and mercury spills conducted according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
- Substitution of mercury-containing medical devices
  - Substitution of mercury-containing thermometers
    - Number and percentage of the initial number of mercury-containing thermometers according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
    - Number and percentage of substitute non-mercury thermometers replacing those which contain mercury according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
    - Type of substitute non-mercury thermometers replacing those which contain mercury.
    - The earliest, the latest and the most common year in in which the substitution of mercury-containing thermometers with non-mercury-containing thermometers took place or is planned to take place (grouped together with the desk and floor-standing sphygmomanometers).
  - Substitution of mercury-containing desk sphygmomanometers
    - Number and percentage of the initial number of mercury-containing desk sphygmomanometers according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
    - Number and percentage of substitute non-mercury desk sphygmomanometers replacing those which contain mercury according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.
    - Type of substitute non-mercury desk sphygmomanometers replacing those which contain mercury.
    - The earliest, the latest and the most common year in in which the substitution of mercury-containing desk sphygmomanometers with non-mercury-containing desk sphygmomanometers took place or is planned to take place (grouped together with the thermometers and floor-standing sphygmomanometers).
  - Substitution of mercury-containing floor-standing sphygmomanometers
    - Number and percentage of the initial number of mercury-containing floor-standing sphygmomanometers according to ownership status, type, inpatient care capacity (number of bed count)

and province of domicile of healthcare facilities.

- Number and percentage of substitute non-mercury floor-standing sphygmomanometers replacing those which contain mercury according to ownership status, type, inpatient care capacity (number of bed count) and province of domicile of healthcare facilities.

- Type of substitute non-mercury floor-standing sphygmomanometers replacing those which contain mercury.

- The earliest, the latest and the most common year in which the substitution of mercury-containing floor-standing sphygmomanometers with non-mercury-containing floor-standing sphygmomanometers took place or is planned to take place (grouped together with the thermometers and desk sphygmomanometers).

- Management of discarded mercury-containing medical devices and remaining mercury stock

  - Availability of standard operating procedures (SOP) for handling mercury spills from broken medical devices or from mercury containers in healthcare facilities

  - Handling of an incident of any broken mercury-containing medical device incidences or mercury spills conducted by healthcare facilities (hospital, public health centre, private) in number and percentage

  - Availability of standard operating procedures (SOP) for the management of mercury-containing medical devices and remaining mercury stock in healthcare facilities

  - Management of replaced/substituted mercury-containing medical devices conducted by healthcare facilities

- Other information

  - Guidance received by healthcare facilities from the relevant local agency in the elimination and withdrawal of mercury-containing medical devices (sphygmomanometer and thermometer) and dental amalgam by the end of 2020.

  - Obstacles in implementing the substitution of mercury-containing medical devices and dental amalgam in healthcare facilities that must be completed by the end of 2020.

  - Specific guidelines or information needed by healthcare facilities in managing mercury and mercury-containing medical devices in order to fulfill the target of eliminating mercury in the health sector before/by the end of 2020 in number and percentage.

3.2.4.2.2. Inferential statistics

In order to estimate the number of mercury-containing medical measuring devices that need to be withdrawn for the whole healthcare facilities population, a data analysis tool for descriptive statistic from Microsoft Excel was used to produce the following data for the number of initial, already substituted, remain in use and broken mercury-containing medical measuring devices: (a) mean; (b) standard error; (c) median; (d) mode; (e) standard deviation; (f) sample variance; (g) kurtosis; (h) skewness; (i) range; (j) minimum; (k) maximum, (l) sum; (m) count; (n) largest(1); (o) smallest(1); (p) confidence interval with confidence level (95,0%).

The minimum and maximum value of the estimation was determined by the following formula:

- Minimum value = (a) – (p) x total population of healthcare facilities

  = (Mean – confidence interval) x 23,509

- Maximum value = (a) + (p) x total population of healthcare facilities

  = (Mean + confidence interval) x 23,509

Based on the formula above, the estimation of the number of mercury-containing medical measuring devices to be withdrawn from each ownership status, type and inpatient care capacity (number of bed count) of healthcare facilities for the whole population could be approached using the percentage of the number of mercury-containing medical measuring devices from each ownership status, type and inpatient care capacity determined from this study.

3.2.5. Data analysis results evaluation, conclusion, and inventory database development

Results of data analysis were evaluated and combined, if and as necessary, to justify their appropriateness to answer each relevant/respective specific question. Based on the answers to the specific questions, descriptions of the current situation were developed and relevant conclusions were made.

DATA COLLECTION AND ANALYSIS RESULTS WITH INVENTORY DEVELOPMENT

4.1. Overview of data collection and analysis

All of the data and information which were collected up to 31 August 2020 from various primary and secondary sources were analysed based on the methods as specified in Section 3.2.4. The analysis results were then evaluated, concluded and used to answer the main research questions as mentioned in Subchapter 3.2. The information and data acquired from the responses to the questionnaires were also used to cross-check the information obtained from the other sources.

Figure 4.1 Number of respondents by type

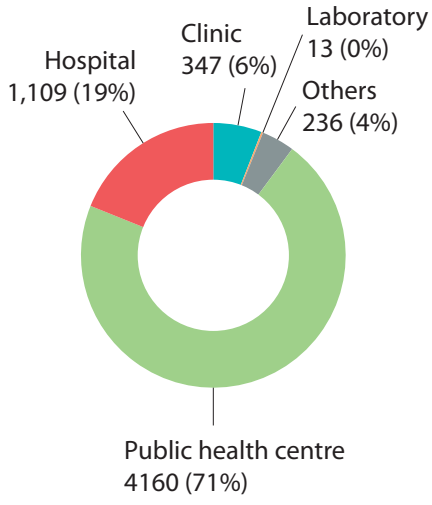


Figure 4.2 Number of respondents by ownership status

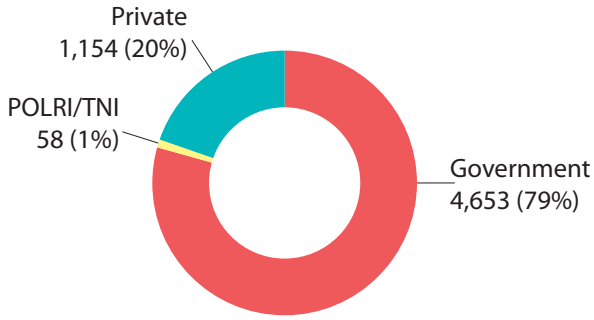
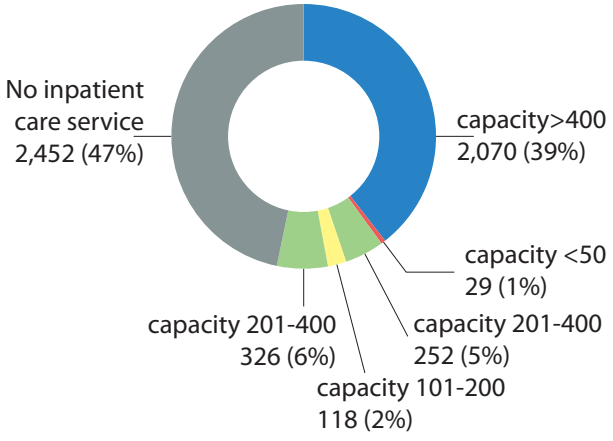


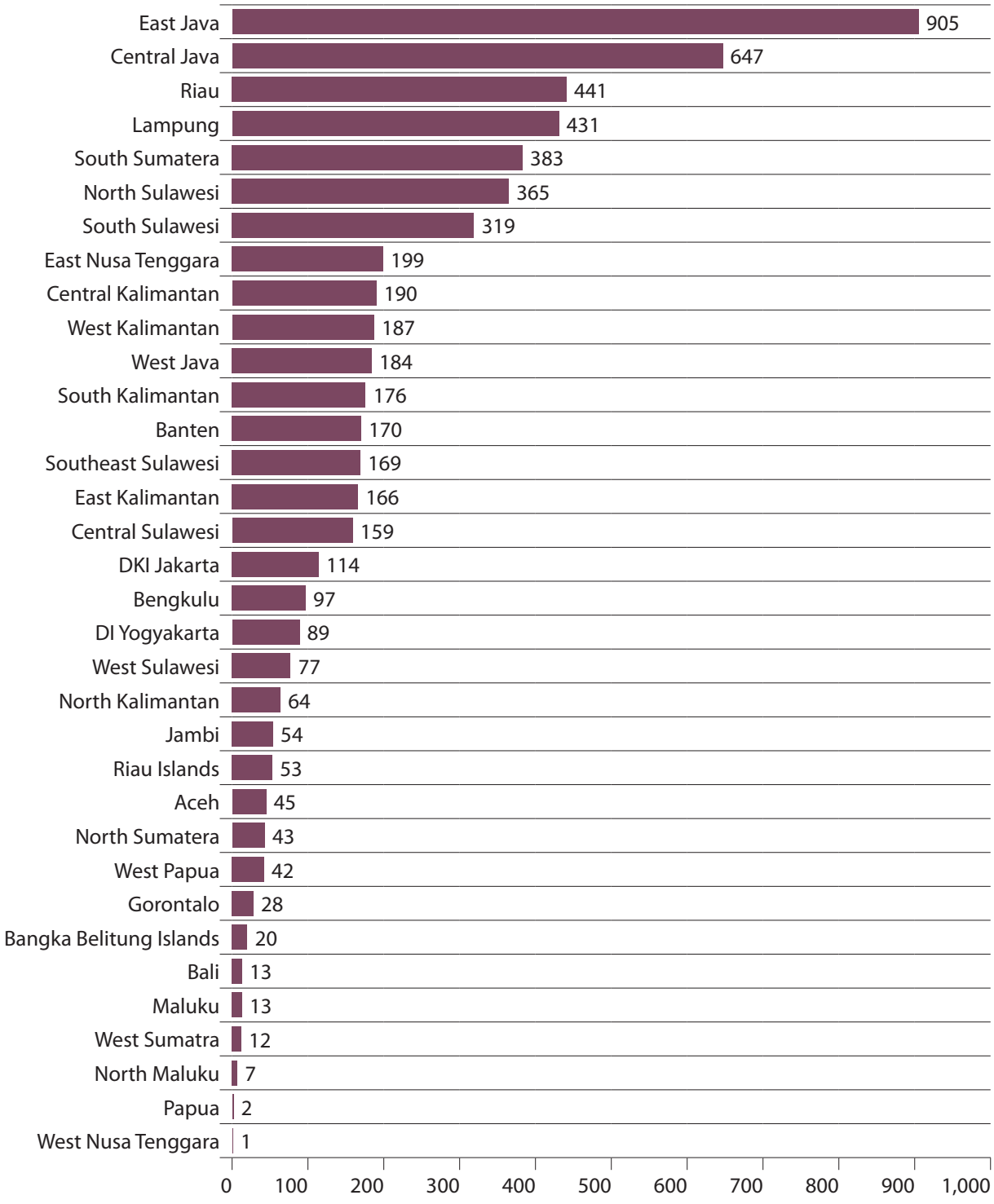
Figure 4.3 Number of Respondents by Inpatient Care Capacity



After data from questionnaires responses preparation, the total number of combined responses to the off-line and online questionnaires is 5,865 respondents. However, there are some questions that are included in the online questionnaire but not in the off-line questionnaire. For these particular questions, the total number of the respondents is 5,247 respondents and this information is indicated for the data and information using responses to these questions.

Public health centres were the largest respondents (71%), followed by hospitals (19%),

Figure 4.4 **Number of respondents by province of domicile**



clinics (6%), others (4%) and laboratories (0.2%), as can be seen in Figure 4.1. It indicates that public health centres are the major participants of the survey. This could be since public health centres are the largest type of healthcare facilities in Indonesia.

Other healthcare facilities were the types of healthcare facilities that were not listed as options in the questionnaires and hence grouped together such as pharmacies, midwifery practises, health technical service units, health and safety service, etc.

The most significant respondents by ownership status were government-owned healthcare facilities (79%), and by inpatient care capacity were the healthcare facilities with no inpatient care capacity (47%) and < 50 beds (39%). This is since public health centres are government-owned and have no inpatient care capacity or < 50 beds (Figure 4.2 and Figure 4.3).

By province of domicile of the healthcare facilities as shown in Figure 4.4., East Java, Central Java and Riau had the greatest number of respondents while the least number of respondents were from West Nusa Tenggara, Papua and North Maluku. This could be due to the different total number of healthcare facilities in the respective provinces with provinces having the larger number of healthcare facilities and highernumber of respondents. However, it might not be the case for other provinces. The number of health care facilities per province in Indonesia can be seen in Appendix 3 to Appendix 7.

In order to answer the main questions, tables and graphics were prepared based on the questionnaires responses to assist in providing a general overview of the situation. Tables and graphics presented in this report were limited to those relevant to the objectives and scope of the assessment, e.g., those presenting the mercury-containing medical measuring devices substitution rate by types of healthcare facility and province. More detailed graphical information, e.g., the remaining mercury-containing medical measuring devices in use by ownership status and province of domicile of the healthcare facilities can be seen in Appendix 8.

4.2. The government's preparedness toward the mercury-containing medical measuring devices elimination target achievement

As mentioned in Subsection 3.2.1.1, the main research question 1 is about the Government's preparedness towards the mercury-containing medical measuring devices elimination target achievement. The collected data and analysis result to answer this question are discussed in the following sections.

4.2.1. Legal Framework (policies and legal instruments, e.g., obligations, elimination mechanisms/procedures)

The policies, laws and regulations relevant to managing of mercury and mercury wastes from healthcare facilities in Indonesia are listed in Table 4.1.

Measures for phase out of mercury-containing medical devices from healthcare facilities are outlined in Chapter III of Annex. Guidelines of

Table 4.1 Policies, laws, and regulations relevant to management of mercury and mercury wastes from healthcare facilities in Indonesia

No	Policies, Laws and Regulations	Relevant topic regulated
1.	Law Number 32 Year 2009 concerning Environmental Protection and Management	Chapter VII of the Law regulates on management of hazardous substances and hazardous wastes.
2.	Law Number 36 Year 2009 concerning Health	Part Fifteen regulates on safeguarding and utilization of pharmaceutical preparations and medical devices.

No	Policies, Laws and Regulations	Relevant topic regulated
3.	Law Number 44 Year 2009 concerning Hospitals	Article 11 (1) : Facilities in hospitals may include, among others, wastes management facility.
4.	Law Number 11 Year 2017 concerning Ratification of the Minamata Convention on Mercury	Ratification of the Minamata Convention on Mercury.
5.	Government Regulation Number 74 Year 2014 concerning Road Transport	Requirements for motor vehicle transporting hazardous goods including hazardous substances.
6.	Law Number 11 Year 2020 concerning Job Creation	Amend several provisions in Law No. 32/2009, Law No. 36/2009, Law No. 44/2009.
7.	Government Regulation Number 47 Year 2016 concerning Healthcare Facility	Healthcare facilities include, among others, public health centres (puskesmas), health clinics, hospitals.
8.	Presidential Regulation Number 21 Year 2019 concerning National Action Plan for Reduction and Elimination of Mercury	Target achievement for elimination of mercury-containing medical devices is 100% by 2020. The health priority sector is one of the 4 (four) priority sectors in RAN-PPM. Activities for mercury elimination for the health priority sector include, among others, development of guidelines, inventory, substitution, provision of a storage depot in each province in Indonesia and storing of mercury-containing medical devices in the storage depots.
9.	Government Regulation Number 22 Year 2021 concerning Hazardous Wastes Management (PP 22/2021)	Management of hazardous wastes from determination until disposal. Mercury wastes, wastes contaminated with mercury and medical devices containing mercury is included in Annex IX of this regulation.
10.	Government Regulation Number 30 Year 2021 concerning Implementation of Traffic Field and Road Transport	Amend several provisions in Government Regulation Number 74 Year 2014.
11.	Presidential Decree Number 61 Year 1993 concerning Ratification of the Basel Convention on The Control of Transboundary Movements of Hazardous Wastes And Their Disposal	Ratification of the Basel Convention.
12.	Minister of Environment and Forestry Regulation Number 14 Year 2013 concerning Symbol and Label of Hazardous Wastes	Procedures and technical requirements for symbol and label of hazardous wastes including shape, colour, size, material and attachment of the symbol and label.
13.	Minister of Transportation Regulation Number PM. 90 Year 2013 concerning Safety of Transportation of Dangerous Goods By Airplane as amended by Minister of Transportation Regulation Number 58 Year 2016	Ministry of Transportation enacts provisions for safety of dangerous good transport with airplanes and the Director General of Civil Aviation supervises the implementation. The provisions cover, among others, airplane operators, classification, restriction of dangerous goods transport, packaging, labelling and marking, education and training for personnel handling transport of dangerous goods, and monitoring
14.	Minister of Transportation Regulation Number 29 Year 2014 concerning Maritime Environment Pollution Prevention	The Director General of Sea Transportation issued an approval letter of hazardous wastes transportation for ships already complying with hazardous wastes transportation requirements.
15.	Minister of Transportation Regulation Number PM. 48 Year 2014 concerning Procedures for Loading, Arranging, Transporting and Unloading Goods by Train as amended by Minister of Transportation Regulation Number PM. 52 Year 2016	In Article 7, specific for transportation of hazardous substances and hazardous wastes, transporters must have license from the Ministry of Transportation after receiving recommendation from competent institution. Article 43 regulates requirements for transportation of hazardous substances and/or hazardous wastes with train.

No	Policies, Laws and Regulations	Relevant topic regulated
16.	Minister of Environment and Forestry Regulation Number P.56/Menlhk-Setjen/2015 concerning Procedure and Technical Requirement for Hazardous Wastes Management from Healthcare Facilities (Permen LHK P.56/2015)	Procedure and technical requirement for reduction, segregation, storage, treatment and landfilling of hazardous wastes. Article 23 : Mercury wastes should not be incinerated.
17.	Minister of Health Regulation Number 57 Year 2016 concerning the National Action Plan for Control on Health Impact from Mercury Exposure Year 2016-2020	Article 2 : Scope of the national action plan covers; 1. situation analysis; 2. policy and strategy; and 3. activity and target achievement
18.	Minister of Environment and Forestry Regulation Number P.81/Menlhk/ Setjen/Kum.1/10/2019 concerning Implementation of Presidential Regulation Number 21 Year 2019 concerning National Action Plan for Reduction and Elimination of Mercury	1. Procedures for development of local action plan for reduction and elimination of mercury (RAD-PPM); 2. Monitoring and evaluation of RAN-PPM and RAD-PPM; 3. Reporting of RAN-PPM and RAD-PPM; and 4. System for integrated monitoring and evaluation of reduction and elimination of mercury.
19.	Minister of Environment and Forestry Regulation Number P.74/MENLHK/ SETJEN/ KUM.1/10/2019 concerning Hazardous Substances and/or Hazardous Wastes Emergency Response Program	1. Development of hazardous substances and/or hazardous wastes management emergency program; 2. Training and rehearsal of hazardous substances and/or hazardous wastes management emergency; 3. Handling of hazardous substances and/or hazardous wastes emergency; 4. Establishment of hazardous substances and/or hazardous wastes Emergency Centre; 5. Guidance.
20.	Minister of Health Regulation Number 7 Year 2019 concerning Environmental Health in Hospitals	Annex 1. of this Regulation includes safeguarding hazardous wastes starting from containers, transportation, temporary storage and treatment. Wastes containing mercury should not be incinerated due to risk of its toxic vapour release. Treatment can be conducted by transporting the wastes to a hazardous wastes treatment facility. Prior to disposal, wastes are stored in a hazardous wastes temporary storage facility with strict monitoring.
21.	Minister of Health Regulation Number 41 Year 2019 concerning Elimination and Withdrawal of Mercury-Containing Medical Devices in Healthcare Facilities (Permenkes 41/2019)	Article 3 : In order to implement RAN-PPM for the health priority sector, elimination of mercury-containing medical devices namely thermometers, sphygmomanometers and dental amalgams is conducted by 31 December 2020 at the latest. Article 4: Elimination of mercury-containing medical devices is conducted through: 1. preparation of policy or written commitment from the director of healthcare facility; 2. assessment and inventory of mercury-containing medical devices; 3. substitution with non-mercury-containing medical devices; and 4. temporary storage of mercury-containing medical devices.
22.	Minister of Transportation Regulation Number PM. 60 Year 2019 concerning Implementation of Transportation of Goods By Motor Vehicle on the Road	Ministry of Transportation regulates the requirements for motor vehicle transporting dangerous goods and procedures for transportation.

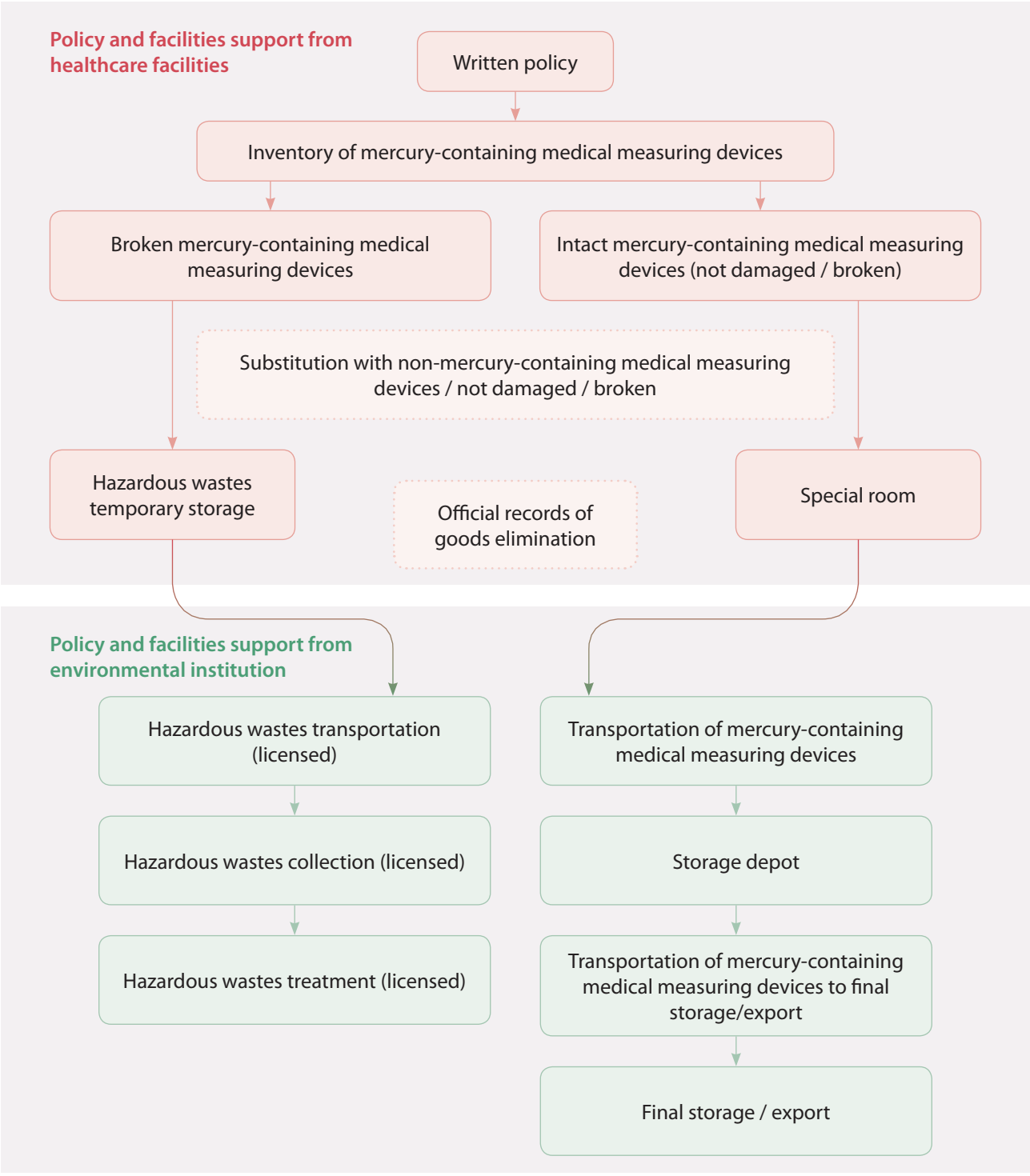
No	Policies, Laws and Regulations	Relevant topic regulated
23.	Minister of Environment and Forestry Regulation Number P.4/MenLHK/ Setjen/Kum.1/1/2020 concerning Transportation of Hazardous Wastes (Permen LHK P.4/2020)	Article 2 : Transportation of hazardous wastes should be conducted by a hazardous wastes transporter already having permit for hazardous wastes management for transporting hazardous wastes activities. To conduct the hazardous wastes transportation, the hazardous wastes transporter should fulfill provisions of: 1. hazardous wastes vehicle; 2. hazardous wastes transportation recommendation; 3. hazardous wastes transportation manifest electronic.
24.	Minister or Environment and Forestry Regulation Number P.12/MENLHK/ SETJEN/PLB.3/5/2020 Concerning Hazardous Wastes Storage	Requirements, procedures, monitoring and reporting of hazardous wastes storage activities.
25.	Minister of Transportation Decree Number KM. 17 Year 2000 concerning Guidelines for Handling Dangerous Material/Goods in Shipping Activities in Indonesia as amended by Minister of Transportation Regulation Number: KM. 02 Year 2010	Minister of Transportation enforces the "International Maritime Dangerous Goods (IMDG) Code" and its supplement as guidelines for handling dangerous materials/goods in shipping activities in Indonesia.
26.	Director General of Land Transportation Decision Letter No. SK.725/AJ-302 DRJD/2004 concerning Transportation of Hazardous Substances on the Road	Scope of the decision covers requirements of vehicle transporting hazardous substances, driver and driver assistant of vehicle transporting hazardous substances, trajectory of hazardous substances transportation, operation of hazardous substances transportation.
27.	Head of Bapedal Decision Number Kep-03/BAPEDAL/09/1995.	Requirements of hazardous wastes treatment covering requirements of location of treatment, treatment facility, handling prior to treatment, treatment and treatment results.
28.	Circular Letter of Director General of Sea Transportation Number UM. 003/1/2/ DK-15	Director General of Sea Transportation regulates hazardous wastes transportation for ship carrying Indonesian flag.
29.	Circular Letter of Director General of Pharmacy and Medical Devices Number HK.02.02/V/0720/2018	Determination of validity period of distribution license and distribution of mercury-containing medical devices. Mercury-containing medical devices can only be distributed or traded in Indonesia until 31 December 2018. If distributors still have the products at their warehouse after 31 December 2018, the products should be destroyed in ways according to MoEF or re-exported.
30.	Circular Letter of Director General of Health Service Number HK.02.02/V/0361/2019	Each healthcare facility, owned by government or private must: Have hazardous wastes temporary storage; ▲ Have license for hazardous wastes temporary storage from local environmental agency at regency/city level. ▲ Comply with design criteria for the hazardous wastes temporary storage according to PP 101/2014 and Permen LHK P.56/2015. ▲ Stop purchasing and use of mercury-containing medical devices ▲ Collect mercury-containing medical devices and store them in a safe and protected container and separated from other hazardous wastes in a hazardous wastes temporary storage prior to withdrawal notice from the competent institution.
31.	Circular Letter of Director General of Health Service Number HK.02.02/I/2899/2019	Following Circular Letter of Director General of Health Service Number HK.02.02/V/0361/2019, each healthcare facility must eliminate mercury-containing medical devices as soon as possible and no later than end of 2020 with measures as determined in the Circular Letter of Director General of Health Service Number HK.02.02/I/2899/2019.

Elimination and Withdrawal of Mercury-Containing Medical Devices in Healthcare Facilities of the Minister of Health Regulation Number 41 Year 2019 (Permenkes 41/2019) as shown in Figure 4.5.

4.2.2. Institutional Framework

For hazardous wastes management, under PP 22/2021, the prominent institutions involved

Figure 4.5 **Elimination and withdrawal of mercury-containing medical devices from healthcare facilities in Indonesia**



Source: Adapted from MoH, 2019

are MoEF, Ministry of Transportation (MoTransp), and Ministry of Trade (MoT).

Under RAN-PPM, the main responsible and supporting institutions for the health priority sector, particularly for mercury-containing medical devices from healthcare facilities are MoEF and MoH. In carrying out their activities, MoEF and MoH are supporting each other. In some of its activities, MoH is also supported by Ministry of Domestic Affairs (MoDA). For tackling illegal trade of mercury-containing medical devices, the responsible institution is Indonesian National Police supported by MoH and Attorney General's office.

Under Permenkes 41/2019, the institution responsible for eliminating mercury-containing medical devices is each respective healthcare facility, while withdrawal of the discarded mercury-containing medical devices is conducted by central or local government through MoH or local health in coordination with MoEF or local environmental agency.

The role and responsibilities of various relevant institutions/officials in management of mercury-containing medical devices and mercury wastes from healthcare facilities are described in Table 4.2

Table 4.2 **Relevant Governmental Institutions/Officials and Their Role and Responsibilities in Management of Mercury-containing Medical Devices and Mercury Wastes from Healthcare Facilities**

No.	Governmental institutions/officials	Role and Responsibilities
1.	Ministry of Environment and Forestry	▲ National Focal Point of the Minamata Convention; ▲ National Focal Point of the Basel Convention; PP 22/2021 ▲ Issue hazardous waste management technical approval for hazardous waste collection activity at national scale; ▲ Receive hazardous waste collection report from collectors at national scale according to the technical approval; ▲ Receive report on hazardous waste collection facility construction at national scale for hazardous waste collectors who are still constructing their facility; ▲ Issue Letter of Operational Feasibility for hazardous waste collection activity at national scale for hazardous waste collectors who are still constructing their facility; ▲ Issue recommendation for hazardous waste transportation; ▲ Issue hazardous waste management technical approval for hazardous waste treatment activity and Letter of Operational Feasibility; ▲ Issue hazardous waste management technical approval for hazardous waste disposal activity and Letter of Operational Feasibility; ▲ Send notification to competent authority of export destination country and transit country based on notification request; ▲ Issue hazardous wastes export recommendation. RAN-PPM ▲ Develop guidelines for management of mercury-containing medical devices management from healthcare facilities; ▲ Conduct storage of mercury-containing medical devices in storage depot in each province; ▲ Provide storage depot in each province for mercury-containing medical devices; ▲ Provide technical guidelines for handling mercury-containing medical devices from healthcare facilities and for storage depot; Permenkes 41/2019 ▲ Provide storage depots for the discarded mercury-containing medical devices.

No.	Governmental institutions/officials	Role and Responsibilities
2.	Ministry of Health	RAN-PPM ▲ Formulate policy or regulation for substitution of mercury-containing medical devices in healthcare facilities; ▲ Conduct data collection, processing and analysis; ▲ Coordinate with ministries/institutions and local governments; ▲ Develop inventory of mercury use in products and processes in mercury-containing medical devices; ▲ Develop counselling and awareness raising programme to medical personnel on substitution of mercury-containing medical devices and mercury exposure risks in healthcare facilities; ▲ Conduct awareness raising to medical personnel on health risks and handling of mercury; ▲ Supervise domestic distribution of mercury-containing medical devices; Permenkes 41/2019 ▲ Raise awareness and provide capacity building to healthcare facilities on exposure impact of mercury and substitution of mercury-containing medical devices; ▲ Withdraw mercury-containing medical devices from temporary storage at healthcare facilities in coordination with MoEF; ▲ Guide and supervise the implementation of elimination and withdrawal of mercury-containing medical devices from healthcare facilities through awareness raising, education, monitoring, education, human resources capacity building and/or giving award; ▲ Giving administrative sanctions in form of written warning to healthcare facilities not conduction obligation of elimination of mercury-containing medical devices.
3.	Ministry of Transportation	PP 22/2021 Issue business license in hazardous waste transportation field.
4.	Ministry of Trade	PP 22/2021 Issue hazardous wastes export permit.
5.	Relevant ministries/ institutions	Permenkes 41/2019 ▲ Guide and supervise the implementation of elimination and withdrawal of mercury-containing medical devices from healthcare facilities through awareness raising, education, monitoring, education, human resources capacity building and/or giving award; ▲ Giving administrative sanctions in form of written warning to healthcare facilities not conduction obligation of elimination of mercury-containing medical devices.
7.	Central or local government	Permenkes 41/2019 ▲ Withdraw mercury-containing medical devices from temporary storage at healthcare facilities through MoH or local health agencies in coordination with MoEF or local environmental agencies; ▲ Conduct communication, information, education to health care facilities community and public through campaign or stop mercury promotion in various communication media.

4.2.3. Dissemination of Information on Elimination Target

Information obtained from workshops participation, interviews with relevant national authorities and from the web in forms of articles, documents and video showed that information on elimination target and relevant requirements for its achievement had been disseminated to nationwide relevant stakeholders including local government agencies and healthcare facilities, among others, through the following:

No.	Governmental institutions/officials	Role and Responsibilities
8.	Governor	PP 22/2021 ▲ Issue hazardous waste management technical approval for hazardous waste collection activity at provincial scale; ▲ Receive hazardous waste collection report from collectors at provincial scale according to the technical approval; ▲ Receive report on hazardous waste collection facility construction at provincial scale for hazardous waste collectors who are still constructing their facility; ▲ Issue Letter of Operational Feasibility for hazardous waste collection activity at provincial scale for hazardous waste collectors who are still constructing their facility. Permenkes 41/2019 ▲ Guide and supervise the implementation of elimination and withdrawal of mercury-containing medical devices from healthcare facilities through awareness raising, education, monitoring, education, human resources capacity building and/or giving award; ▲ Giving administrative sanctions in form of written warning to healthcare facilities not conduction obligation of elimination of mercury-containing medical devices.
9.	Regent/mayor	PP 22/2021 ▲ Receive report on implementation of hazardous waste storage activity at regency/city level as a part of environmental document reporting; ▲ Issue hazardous waste management technical approval for hazardous waste collection activity at regency/city scale; ▲ Receive hazardous waste collection report from collectors at regency/city scale according to the technical approval; ▲ Receive report on hazardous waste collection facility construction at regency/city scale for hazardous waste collectors who are still constructing their facility; ▲ Issue Letter of Operational Feasibility for hazardous waste collection activity at regency/city scale for hazardous waste collectors who are still constructing their facility. Permenkes 41/2019 ▲ Guide and supervise the implementation of elimination and withdrawal of mercury-containing medical devices from healthcare facilities through awareness raising, education, monitoring, education, human resources capacity building and/or giving award; ▲ Giving administrative sanctions in form of written warning to healthcare facilities not conduction obligation of elimination of mercury-containing medical devices.

- MoEF conducted the Technical Meeting on Implementation of Presidential Regulation Number 21 Year 2019 concerning RAN-PPM in Jakarta, 22 July 2019. The technical meeting was attended by more than 500 participants from 7 (seven) ministries/agencies, local environmental agencies at provincial/regency/city level, non-governmental organisations, academia, public figure, etc. The meeting agreed and committed to support RAN-PPM for mercury-free Indonesia by 2030.
- MoH conducted the Workshop on Stakeholders' Synergy and Collaboration in the Implementation of Elimination and Withdrawal of Mercury-Containing Medical Devices in Healthcare Facilities in Jakarta, 30 July 2019. The meeting was attended by ministries/agencies, selected local health agencies at provincial and regency/city level, healthcare facilities (e.g., hospitals, national health laboratories, public health centres, clinics), professional organisations, universities,

hospital associations, non-governmental organisations, mercury experts and press.

- During 2019, MoH conducted awareness raising in forms of workshops and focus group discussions in several provinces in Indonesia attended by local health agencies at provincial and regency/city level, healthcare facilities, professional organisations, etc.

- Since March 2020, due to the global Covid-19 pandemic, awareness raising were conducted by MoH through video conference and live streaming, attended by around 1,000 participants online, 2,000 participants through live streaming and have been viewed by more than 10,000 viewers.

During the online awareness raising, MoH presented guidance overview to fill the online questionnaire and urged the participants to fill and submit the online questionnaire. MoH also informed that there would be more awareness raising carried out online and awards will be given to healthcare facilities (hospitals, public health centres, clinics) which have conducted 100% percent of elimination of their mercury-containing medical measuring devices. The local health agency and the local environmental agency at regency/city level and provincial level, using verification instruments from MoH in the form of the filled online questionnaire and ASPAK. MoH will further determine the award recipients through a verification mechanism.

In addition, MoH had prepared and distributed communication, information and education in the form of posters, banners brochures, leaflets, etc to relevant stakeholders on the harmful impact of mercury to human health and information on the elimination target. These communication media are also available in soft copy and can be sent to the local health agencies or healthcare facilities upon request.

As shown in Figure 4.6, Figure 4.7, to the off-line questionnaire particularly questions number E.4 and E.5 and the online questionnaire, questions 10.1 and 10.2, 63% of the respondents said that they had never received information through awareness raising events (training/workshop) or other media about the risk of human exposure/exposure to mercury from medical devices and dental amalgam.

The respondents that received the information said that they received it through awareness raising/training/workshop or provided the media for the information from local health agencies (51%), MoH (21%), local environmental agencies (10%), MoEF (7%) and other (college, social media, professional organisation, internal of healthcare facility, local manpower and transmigration agency, etc).

However, there were 3,726 responses considered invalid out of the total 5,865 respondents, namely those who responded they had never received information through awareness raising/training/workshop to the question 10.1, but responded to the question 10.2, and vice versa. Considering this large number of responses considered as invalid data, it is possible that the number of healthcare facilities having received information could actually be higher.

In response to the question number E.6 of the off-line questionnaire and number 10.3 of the online questionnaire, 44% of the respondents said that they had received guidance from the relevant local agency in the elimination and

Figure 4.6 **Information received by healthcare facilities on the risk of human exposure/exposure to mercury from medical devices and dental amalgam**

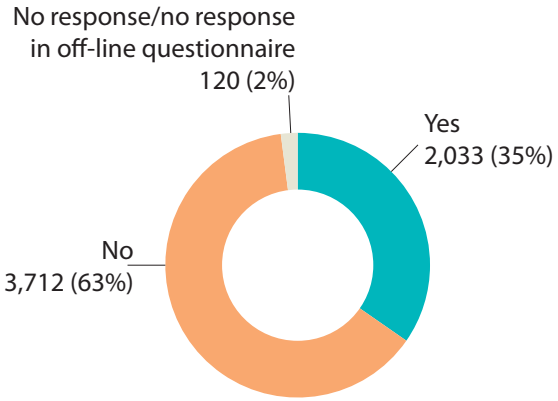


Figure 4.7 **Party providing the awareness raising/training/workshop or the media for the information to healthcare facilities**

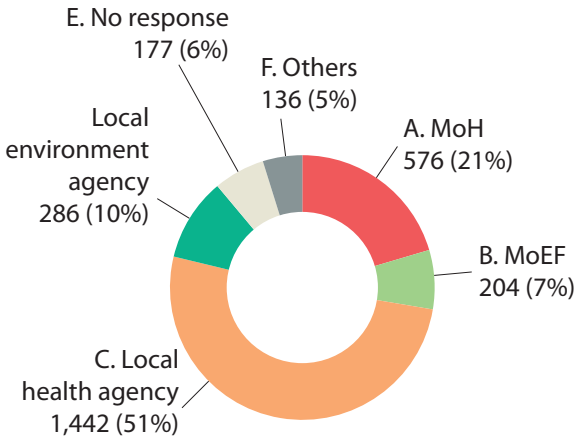
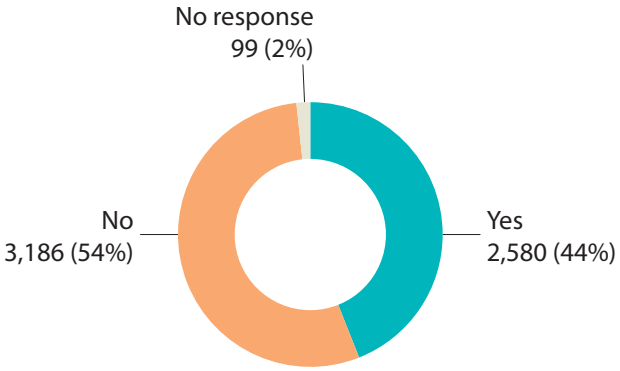


Figure 4.8 **Guidance received by healthcare facilities from the relevant local agency**



withdrawal of mercury-containing medical devices (sphygmomanometer and thermometer) and dental amalgam by the end of 2020, while 54% said that they had never received the guidance (Figure 4.8).

The questionnaires responses were collected and analysed until the end of August 2020. Since then, MoH had carried out online awareness raising workshops which were participated by large number of representatives from local government agencies and healthcare facilities. Therefore, it is expected that the number of healthcare facilities receiving information have increased since then.

4.2.4. Essential management tools provided to the mercury-containing medical measuring devices users

Interviews with key persons from the relevant government authorities, participation during workshop and information obtained from the web such as presentation materials and video during face-to-face workshops and online awareness raising workshops showed that the healthcare facilities had been provided with a documented guidance to help them undertaking their obligation in meeting the elimination target and observing the safety, health and environmental protection. The guidance is the Permenkes 41/2019 which contains guidance on the elimination and withdrawal of mercury-containing medical measuring devices in healthcare facilities in its annex.

MoEF, MoH and local government agencies had also organised workshops and disseminate information on the management of hazardous wastes from healthcare facilities which will help healthcare facilities ideal with their broken mercury-containing medical measuring devices.

In addition, during the Virtual National Stakeholder Consultation Workshop of Mercury-Containing Medical Devices Management Project in Indonesia that was held on 12 January 2021, a representative of the Agency for the Assessment and Application of Technology (BPPT), Indonesia, informed that as an initiative to respond to the need for proper mercury management as indicated in RAN-PPM, BPPT has developed some prototypes of containers as primary and secondary packaging for mercury-containing thermometers and sphygmomanometers. BPPT has also developed a website and android-based platform system of mercury monitoring named SIPAMER to monitor the mercury collection process from the health sector and ASGM sector. The main features of the system are reporting of the existence or ownership of the reported mercury-containing medical measuring devices, monitoring of the collection of the devices from a user to any storage depots and warehouse management system (WMS) with radio-frequency identification (RFID).

At the time of the development of this situation assessment report, the information system concept was under discussion with MoEF for adjustment with the requirements under the latest Ministerial Regulation.

4.2.5. Available public services/infrastructure

As outlined in Figure 4.5, under Permenkes 41/2019, discarded mercury-containing medical devices from healthcare facilities are divided into 2 (two) categories with separate management, namely the unbroken/still intact mercury-containing medical devices and the broken mercury-containing medical devices.

Unbroken Mercury-Containing Medical Devices Management

Unbroken or still intact mercury-containing medical devices are regarded as unused assets and will be treated as medical devices and not regarded as hazardous wastes. While the broken mercury-containing medical devices fall under the regime of hazardous wastes and follow the national regulations, the unbroken mercury-containing medical devices are specifically regulated under Permenkes 41/2019. Therefore, the national regulations on hazardous wastes do not apply to unbroken mercury-containing medical devices.

Healthcare facilities are obliged to store their unbroken mercury-containing medical devices in a container and/or special room which is safe from damage and leaking, closed and only accessible to authorized personnel. Technical requirements for the container and the special room are set out in Permenkes 41/2019. As mentioned in Section 4.2.2., mercury-containing medical devices stored in the temporary storage must be withdrawn.

The withdrawal will be carried out by central or local government through MoH or local health agency in coordination with MoEF or local environmental agency. The withdrawal will be conducted from the temporary storage of mercury-containing medical devices at healthcare facilities to storage depots to be provided by MoEF. It should be conducted by personnel with competence and authority according to provisions of the regulation. Transportation of the unbroken mercury-containing medical devices from the temporary storage at healthcare facilities to the storage depot should be carried out with a motor vehicle and in safe containers and do not break easily.

Permenkes 41/2019 provides for final storage or export as the final step of measures for elimination and withdrawal of mercury-containing medical devices from healthcare facilities, however it does not provide provisions for technical requirements or mechanisms for the final storage or export of the unbroken mercury-containing medical devices. A ministerial regulation is currently being drafted to address further mechanism and processes for the withdrawal of the unbroken mercury-containing medical devices.

Broken Mercury-Containing Medical Devices Management

Broken mercury-containing medical devices must be stored at a hazardous wastes' temporary storage according to the relevant national regulations. The broken medical devices should not be mixed with other hazardous wastes and not be burned or incinerated to prevent the release of mercury vapor. Handling of the broken devices is the same as handling of hazardous wastes according to the provisions of national regulations. For spill of mercury from the broken medical devices, special handling is required which is not the same as handling hazardous wastes from healthcare facilities. Permenkes 41/2019 provides for procedures for clean-up of mercury spills from broken medical devices. Further understanding of their handling must be possessed by managers and personnel of healthcare facilities.

For hazardous wastes transporters, the available information is those who have received a recommendation from MoEF (Ministry of Transportation).

For licensed hazardous wastes collectors, treatment and/or disposal facility, with the recent national regulations concerning Online Single Submission, the licenses for hazardous wastes

collectors, treatment and/or disposal facilities are integrated into one license which is hazardous wastes management license for business service or hazardous wastes management operational license for generator.

Information on hazardous wastes transporters, licensed hazardous wastes collectors and hazardous wastes treaters and/or disposers can be found in the official website of the one-stop integrated service (pelayanan terpadu satu pintu, PTSP) of MoEF : http://pelayananterpadu.menlhk.go.id./index.php/2020-01-29-12-23-53/rekap-perizinan-ptsp

Currently, there is no treatment facility for discarded mercury-containing medical measuring devices in Indonesia, only a facility to dismantle and separate the devices and the mercury inside them. The devices were then encapsulated and sent to a landfill. However, there is no treatment facility for mercury wastes.

During the field visit, the selected healthcare facilities had collected and stored their discarded mercury-containing medical measuring devices in a container in a separate room or a secured storage unit pending further withdrawal from the government. However, there is concern regarding disposal of the devices.

To the questionnaires particularly questions number E.2 of the off-line questionnaire and number 10.5 and 10.7 of the online questionnaire, 14% of the questionnaire's respondents said that there were no official/licensed service providers for collecting mercury and/or mercury-containing medical devices. Ten percent (10%) of the respondents also said that they needed information on official temporary storage places that were available outside the site of healthcare facilities and the utilization of their services, while 6% of the respondents needed information on official services available specifically for the collection or transportation of the remaining mercury and mercury-containing medical devices.

4.3. What is the current achievement or progress towards the elimination target?

The main research question 2 is on the current achievement in phasing-out mercury-containing medical measuring devices and the likelihood to meet the target. As an intermediate basis for answering the abovementioned main question, a national device inventory was first established. Based on the data collection and analysis results, the inventory is presented in the next section, while the evaluation of the government target achievement is presented in the last section.

4.3.1. National inventory of mercury-containing medical measurement devices

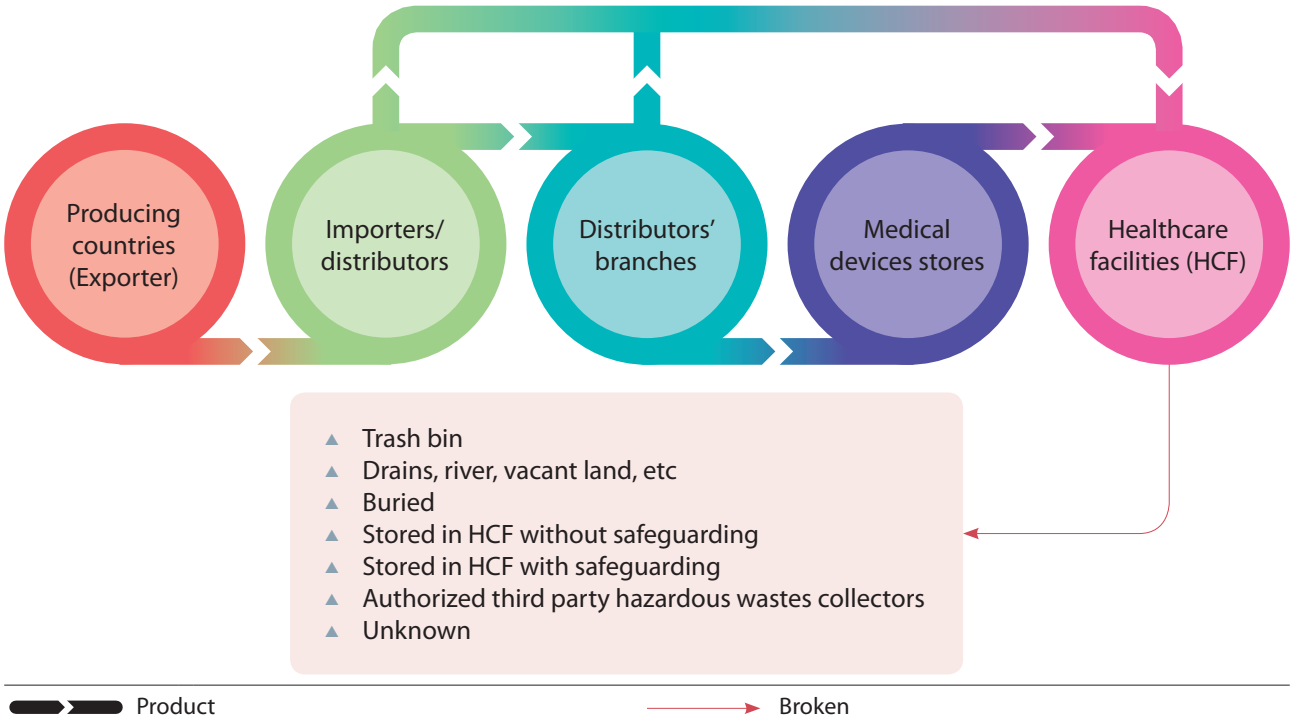
4.3.1.1. General information and mercury material flow overview

To begin the inventory, it is important to understand the flow of mercury-containing thermometers and sphygmomanometers in Indonesia, as shown in Figure 4.9a and 4.9b. At the same time, the figures also describe the mercury material flow related to those medical measuring devices.

Figure 4.9a shows the flow of mercury-containing thermometers and sphygmomanometers in Indonesia from distributors as importers to healthcare facilities prior to the prohibition which started in 2018 (see Section 4.2.1). Mercury-containing thermometers and sphygmomanometers were imported into Indonesia. The imported mercury devices must have distribution permit and imported by licensed distributors as the holders of the distribution permit (Permenkes 60/2017). In Indonesia, the imported mercury devices can only be distributed by licensed distributors, distributors' branches and medical devices stores. These medical devices stores can only distribute certain medical devices in limited quantities, including thermometers and sphygmomanometers (Permenkes 1191/2010).

The responses of the off-line and online questionnaires do not include the fate of the broken thermometers and sphygmomanometers prior to the prohibition, however, it is likely

Figure 4.9a **Flow of mercury thermometers and sphygmomanometers in Indonesia prior to the prohibition in 2018**



that treatment of those devices is similar to the treatment after the prohibition (see Figure 4.9a and Section 4.4.1).

The flow of mercury-containing thermometers and sphygmomanometers after the prohibition in 2018 is shown in Figure 4.9b. Distributors owning the distribution licence should withdraw the products in the market and the products remaining in their warehouses should be destroyed in ways according to MoEF or re-exported (see Section 4.2.1).

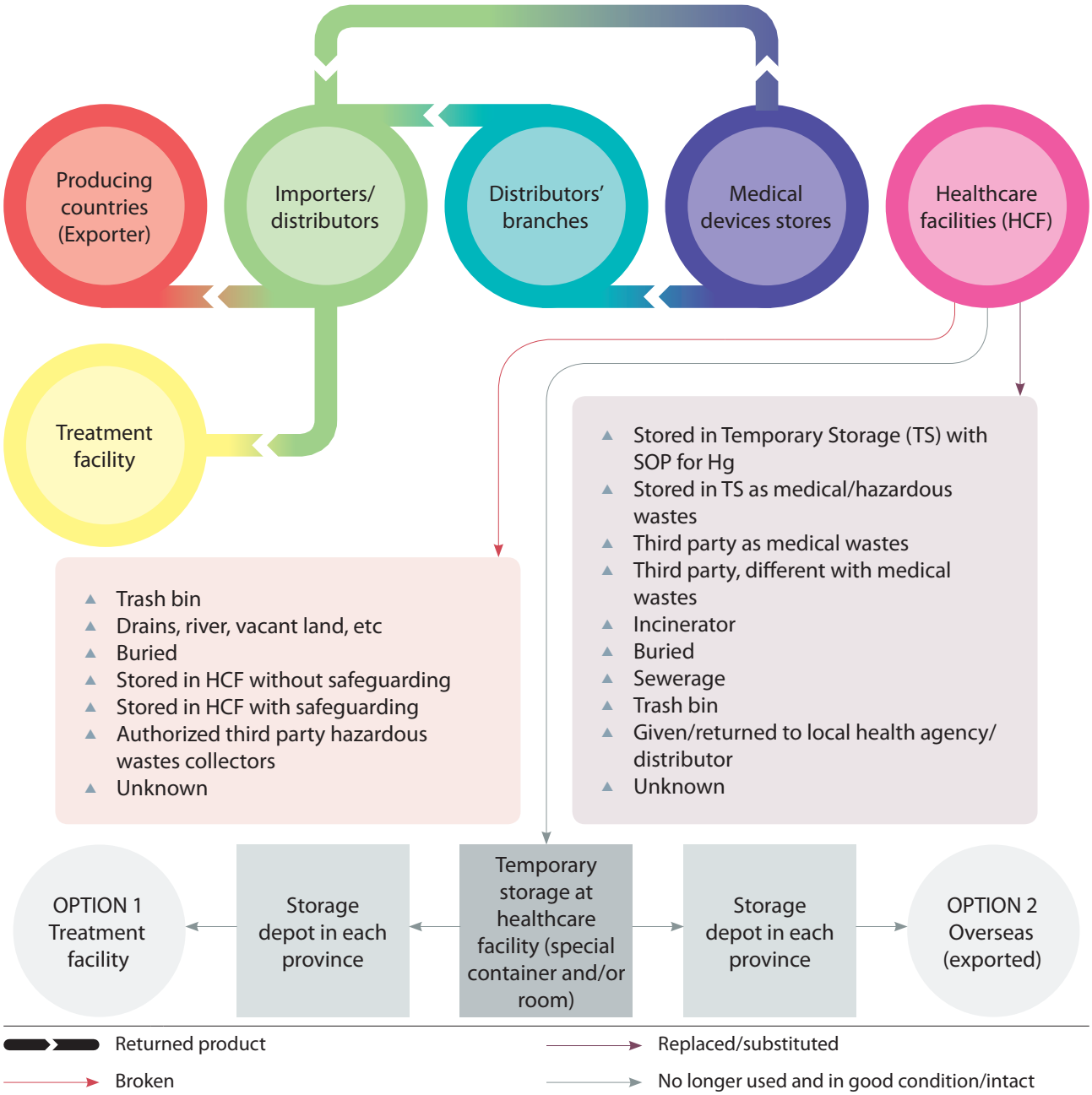
The offline and online questionnaire responses show the various conditions of mercury-containing thermometers and sphygmomanometers in healthcare facilities that are broken, replaced/substituted, remain in use, and no longer used and stored in good condition at healthcare facilities. The questionnaire results also reveal the fate of the broken and replaced/substituted mercury-containing thermometers and sphygmomanometers, as shown in Figure 4.9b and further described in Section 4.4.1.

The mercury-containing thermometers and sphygmomanometers remaining in use must be eliminated, which means to be no longer used and stored in good condition at healthcare facilities. These eliminated mercury-containing medical measuring devices will then be transported to the storage depot to be provided by MoEF in each province. There are 2 (two) options for further disposal of these mercury-containing thermometers and sphygmomanometers. The first option is domestic treatment and the second option is export if such facility is unavailable domestically.

4.3.1.2. The Total Quantities of Mercury-Containing Medical Measuring Devices in Existence

Since the data on mercury-containing medical measuring devices imported to Indonesia prior to the regulatory restriction could not be obtained, the total quantities of the mercury-containing medical measuring devices in existence at healthcare facilities or the initial number were also estimated using the data obtained from the responses to the off-line questionnaire, question

Figure 4.9b **Flow of mercury thermometers and sphygmomanometers in Indonesia after the prohibition in 2018**



number C.2 and to the online questionnaire, questions number 8.1.1 for thermometers, number 8.2.1 for desk sphygmomanometers and number 8.3.1 for floor-standing sphygmomanometers.

The total number is 75,907 units, comprises 38,295 desk sphygmomanometers (50%), 25,050 thermometers (33%) and 12,562 floor-standing sphygmomanometers (17%) as can be seen in Table 4.3 and Figure 4.10. All healthcare facilities by types and province of domicile reported more initial number of sphygmomanometers compared to thermometers (Figure 4.11). More detailed information on the number of initial mercury-containing medical measuring devices by province of domicile of healthcare facilities shown in Appendix 8.

Data of the total quantities of mercury-containing medical measuring devices in existence could also be approached by collecting data of imported and distributed/sold mercury-containing medical

Table 4.3 **Number of initial mercury-containing medical measuring devices by type of healthcare facilities**

Type of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
Laboratory	21	10	0	31
Other	79	101	35	215
Clinic	280	424	147	851
Hospital	9,419	13,765	5,934	29,118
Public Health Centre	15,251	23,995	6,446	45,692
Grand Total	25,050	38,295	12,562	75,907

measuring devices of concern during the last 5 (five) years prior to 2019 (the date of the decree on mercury-containing medical measuring devices import ban). For this approach, obtaining information on the Harmonized System (HS) code for the products of the mercury-containing medical devices would be required. HS codes for mercury-containing thermometers and sphygmomanometers in Indonesia are listed under the Minister of Trade Regulation Number 12 Year 2020 concerning Goods Prohibited for Import under Ex 9025.11.00 for mercury-containing thermometers and Ex 9018.90.90 for mercury-containing sphygmomanometers

Using the formula as described in Subsection 3.2.4.2.2., the total number of mercury-containing medical measuring devices in existence or the initial number for the total whole population of healthcare facilities in Indonesia (hospitals, public health centres, health clinics and health laboratories) is estimated to be 280,177 to 328,347 units, comprises thermometers (88,887 to 111,931 units), desk sphygmomanometers (145,563 to 161,437 units) and floor-standing sphygmomanometers (45,727 to 54,979 units).

The percentage distribution of the number of mercury-containing medical measuring devices by ownership status, type and inpatient care capacity of healthcare facilities is as depicted in the figures below.

Figure 4.10 **Number of initial mercury-containing medical measuring devices by type of healthcare facilities**

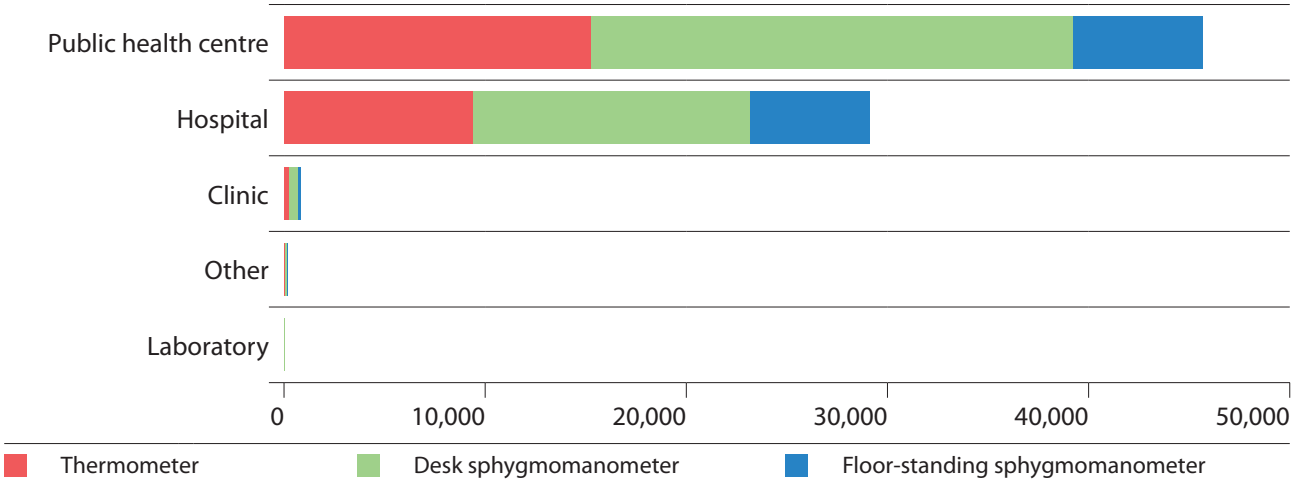
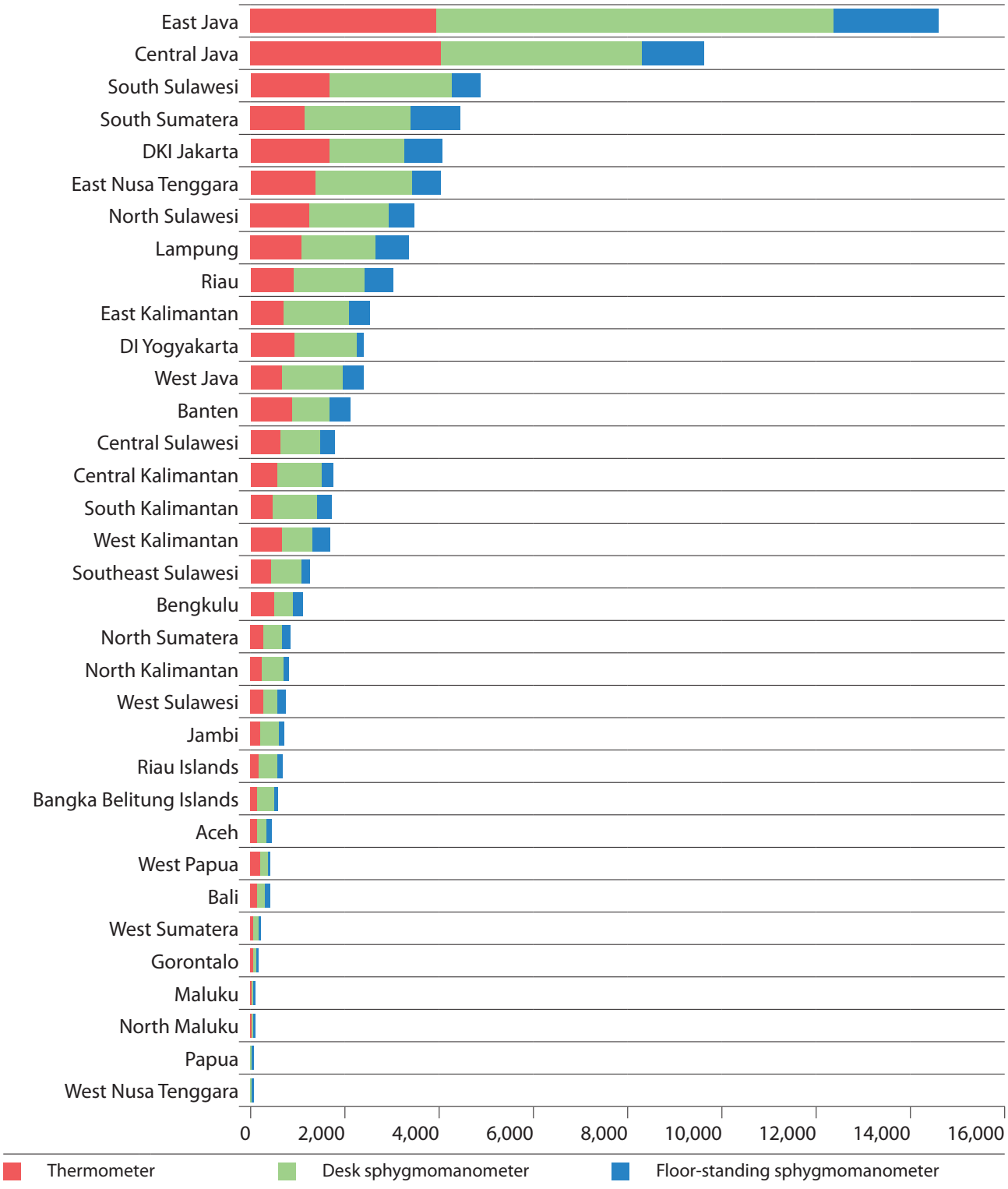


Figure 4.11 **Number of Initial Mercury-Containing Medical Measuring Devices by Province of Domicile of Healthcare Facilities**



Brand names

Information on brand names was collected to estimate the mercury content in the mercury-containing medical measuring devices to be withdrawn from the healthcare facilities, to assist in providing the government with the necessary information in dealing with the mercury wastes from the discarded mercury-containing medical measuring devices.

Figure 4.12 **Percentage of the initial number of mercury-containing medical measuring devices by ownership status of healthcare facilities**

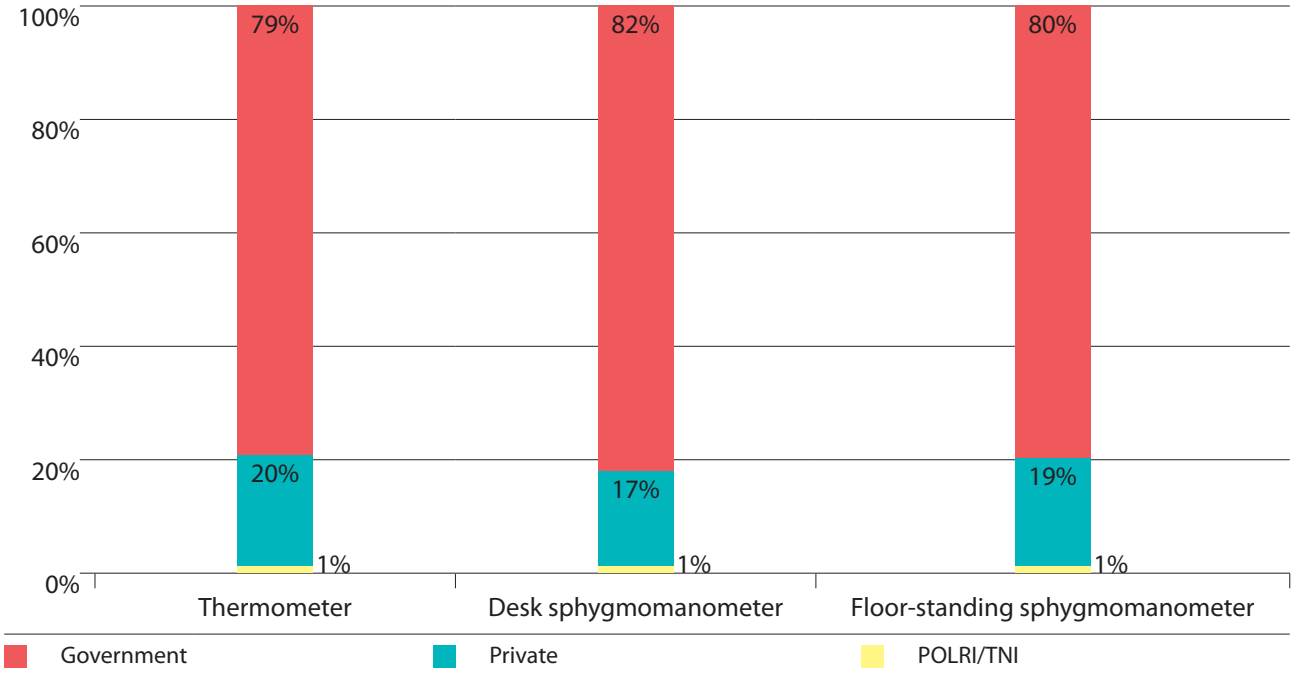


Figure 4.13 **Percentage of The Initial Number of Mercury-Containing Medical Measuring Devices by Type of Healthcare Facilities**

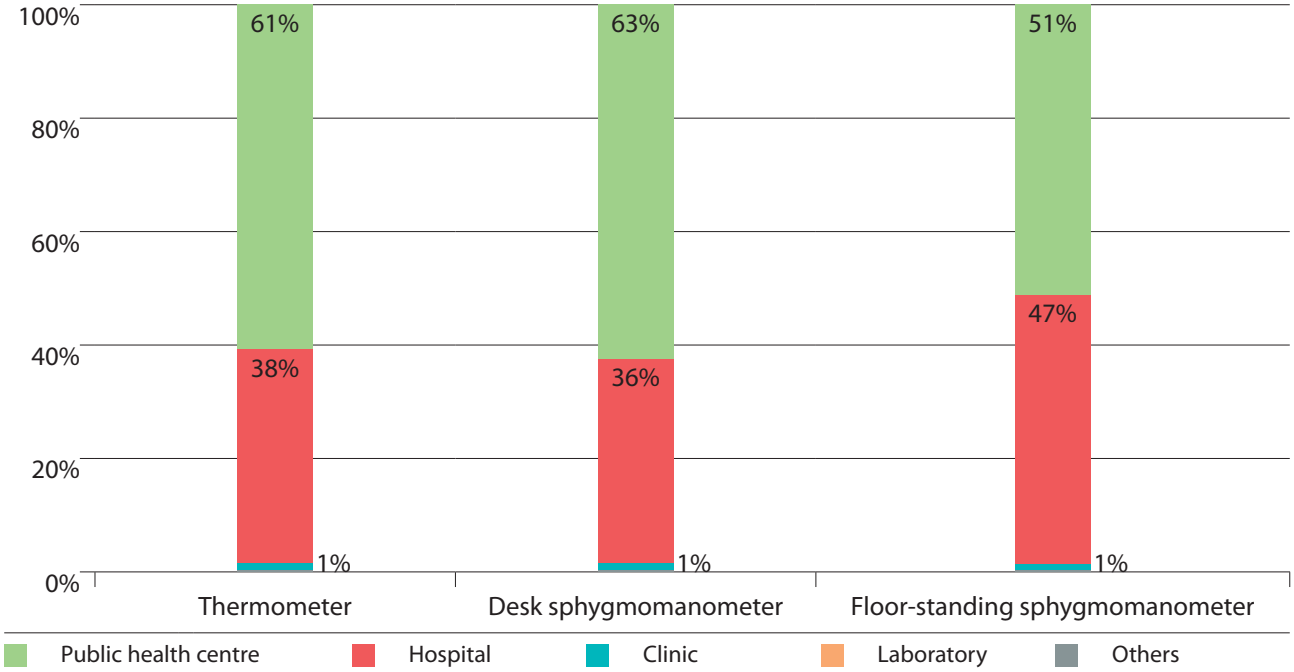
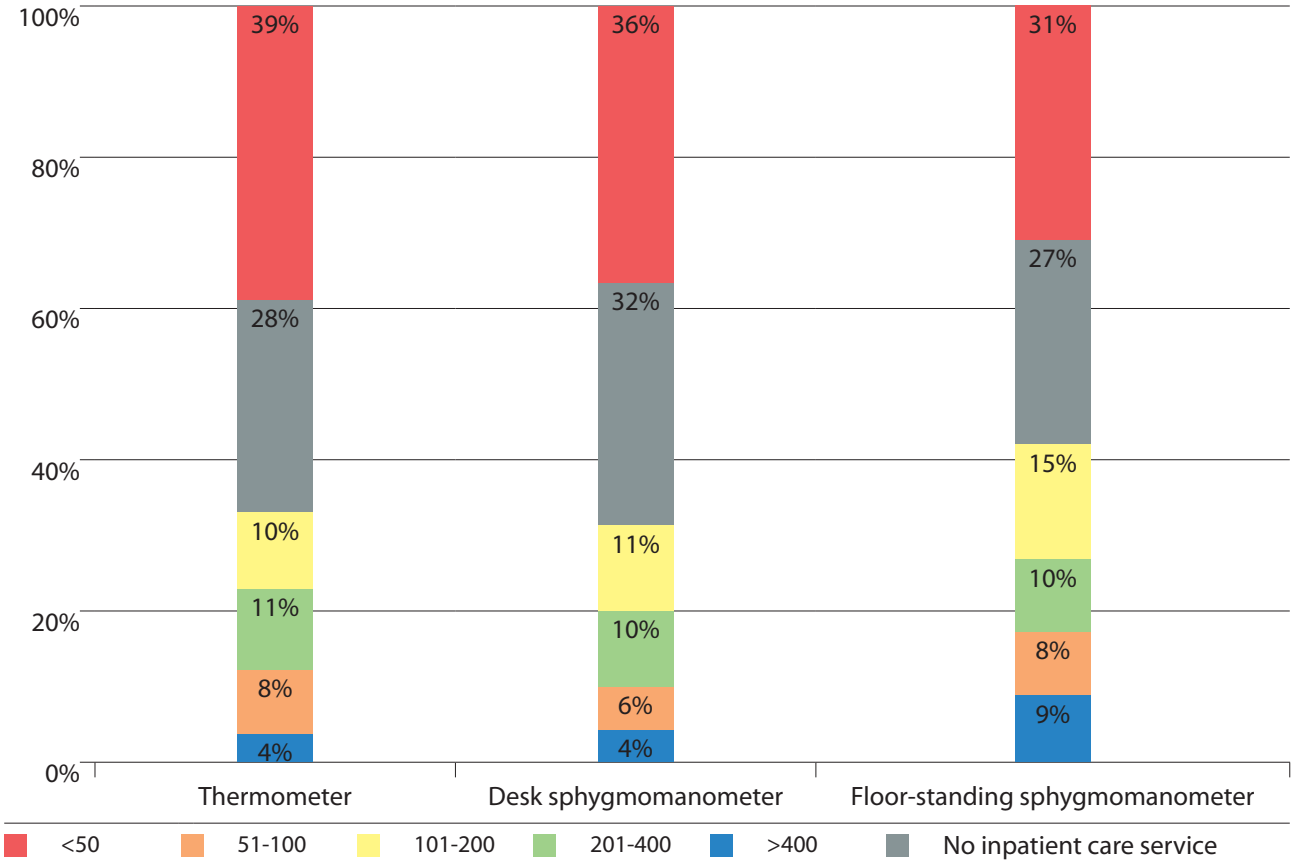


Figure 4.14 **Percentage of the initial number of mercury-containing medical measuring devices by inpatient care capacity of healthcare facilities**



This information was obtained from questions number 2.3., 4.5., and 4.6.

Data from MoH showed that a total of 12 (twelve) distribution permits for distributors of mercury-containing medical devices had been revoked.

The 12 distribution permits of the above product names are the total of mercury-containing medical devices distribution permits in Indonesia. If there are still mercury-containing medical devices distributed, then the products are illegal.

However, in the best interest of confidentiality as per direction from government partner, brand names will not be shown both in the report and appendices.

Mercury content in mercury-containing medical measuring devices

Data on the mercury content in mercury-containing medical measuring devices was to be obtained from relevant institutions/organisations or available material safety data sheet (MSDS) and the information on the brand names. However, published MSDS for the mentioned brand names could not be found. BSCRC-SEA had formally contacted an organisation of medical and laboratories companies in Indonesia to obtain the information, however the request had so far not been responded.

Another approach that could be used is by referring to available internationally recognized guidelines or MSDS of mercury-containing medical devices of other brands which provided such information. According to UNDP-GEF Guidance12, the amount of mercury in a thermometer is

about 1 gram (range: 0.5 - 1.5 grams) and in a sphygmomanometer ranged from 80 - 200 grams.

4.3.1.3. Total quantities or the portion of mercury-containing medical measuring devices already substituted

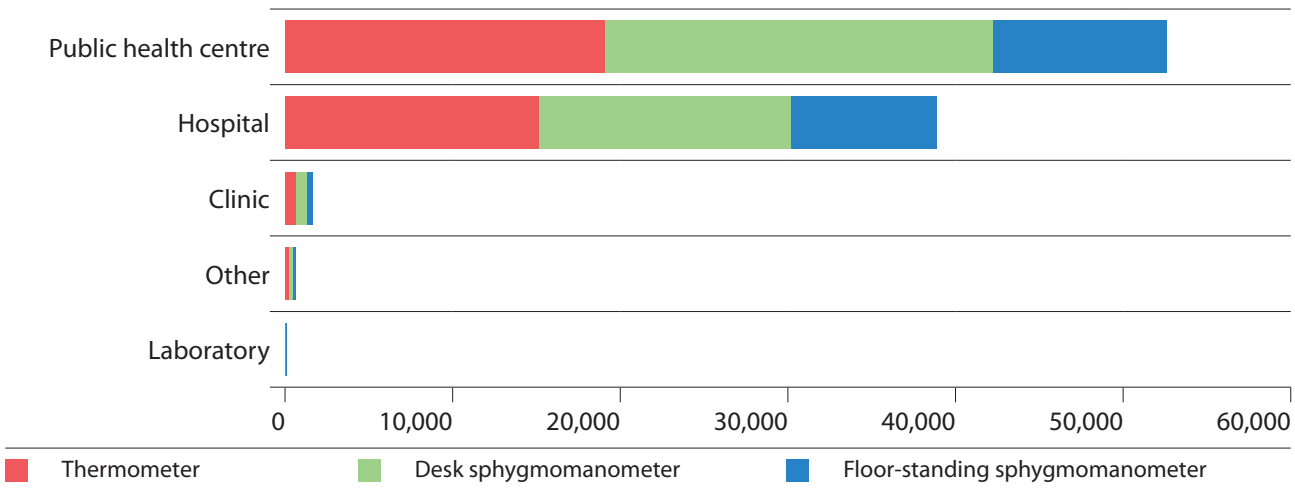
Data for total quantities of mercury-containing medical measuring devices already substituted was obtained from the questionnaires' responses to question number C.2 of the off-line questionnaire and questions number 8.1.2 for thermometers, number 8.2.2 for desk sphygmomanometers and number 8.3.2 for floor-standing sphygmomanometers of the online questionnaire.

The total number of the non-mercury containing medical measuring devices replacing those containing mercury is 93,880 units, comprises 39,038 desk sphygmomanometers (42%), 35,273 thermometers (37%) and 19,569 floor-standing sphygmomanometers (21%) as can be seen in Table 4.4 and Figure 4.15. All healthcare facilities by types and province of domicile reported a greater number of non-mercury containing sphygmomanometers as substitutes compared to non-mercury containing thermometers, except Maluku province (Figure 4.16). More detailed information on the number of non-mercury-containing medical measuring devices replacing those containing mercury by the province of domicile of healthcare facilities as illustrated in Appendix 8.

Table 4.4 **Number of non-mercury-containing medical measuring devices replacing those containing mercury by type of healthcare facilities**

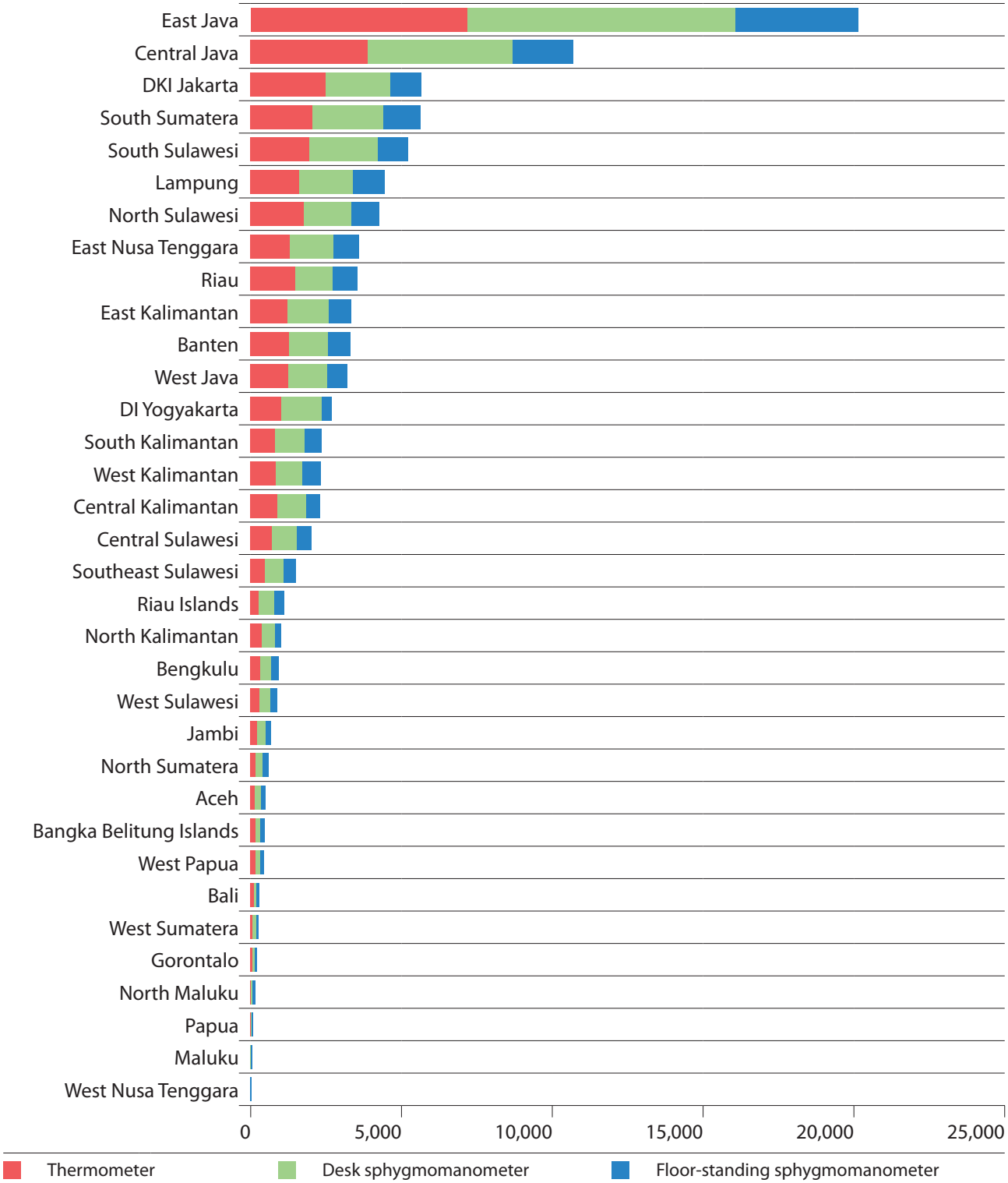
Type of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
Laboratory	35	12	13	60
Other	281	240	143	664
Clinic	706	614	349	1669
Hospital	15,160	15,026	8,712	38,898
Public Health Centre	19,091	23,146	10,352	52,589
Grand Total	35,273	39,038	19,569	93,880

Figure 4.15 **Number of non-mercury-containing medical measuring devices replacing those containing mercury by type of healthcare facilities**



Ideally, the total number of the non-mercury containing medical measuring devices replacing those containing mercury is the same as the number of mercury-containing medical measuring devices being substituted. This number is also expected to be the same as the number of mercury-containing medical measuring devices stored or eliminated. The substituted mercury-

Figure 4.16 **Number of non-mercury-containing medical measuring devices replacing those containing mercury by province of domicile of healthcare facilities**



containing medical measuring devices are expected to be stored in a special room in good condition or eliminated. However, the total number of the substituted mercury-containing medical measuring devices (93,880 units) far exceeds the number of mercury-containing medical measuring devices being stored or eliminated (46,136 units).

As further discussed in Subsection 4.4.1.2, only 30% out of 5,247 respondents reported that they stored their replaced or substituted mercury-containing medical measuring devices in temporary storage by meeting the requirements according to the SOP for mercury storage. In contrast, other respondents chose other handling methods such as storing them in temporary storage such as medical/hazardous wastes in general with no special treatment, sent to a third party like ordinary medical wastes with no special treatment, burnt in the incinerator, buried, disposed of into sewerage, thrown in the trash bin, etc.

Due to the related questions in the online questionnaire which inquired number of non-mercury-containing medical measuring devices replacing those which contain mercury, the respondents reported the non-mercury-containing medical measuring devices that they purchased or procured rather than they substituted, which could be higher than the number of mercury-containing medical measuring devices that was actually being substituted. In the off-line questionnaire, some respondents reported higher number of non-mercury containing medical measuring devices as substitutes than the mercury-containing medical measuring devices being substituted.

Using the formula as described in Subsection 3.2.4.2.2, the total number of non-mercury-containing medical measuring devices replacing those containing mercury for the total whole population of healthcare facilities in Indonesia (hospitals, public health centres, health clinics and health laboratories) is estimated to be 352,222 to 400,386 units, comprises thermometers (132,058 to 150,715 units), desk sphygmomanometers (147,894 to 165,062 units) and floor-standing sphygmomanometers (72,270 to 84,609 units). The percentages of the number of mercury-containing medical measuring devices already substituted from each ownership status, type and inpatient care capacity of healthcare facilities is as depicted in Figures 4.19.

Figure 4.17 **Percentage of The Number of Non-Mercury-Containing Medical Measuring Devices Replacing Those Containing Mercury by Ownership Status of Healthcare Facilities**

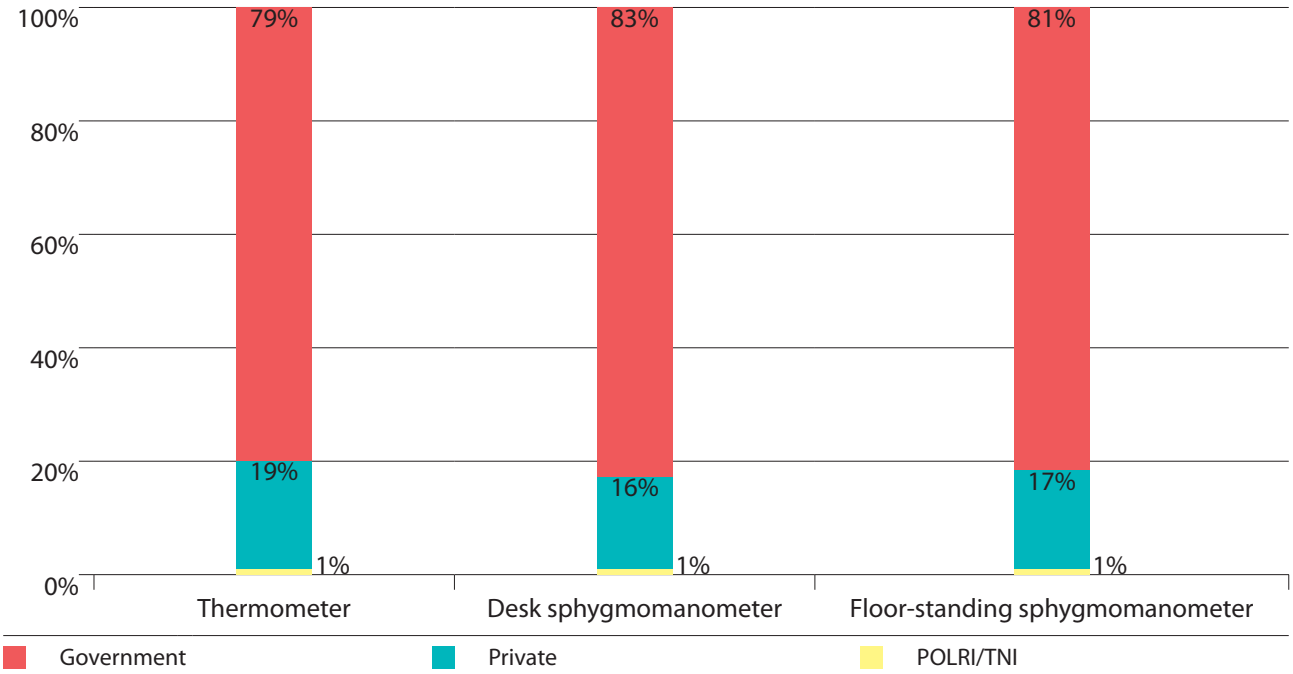


Figure 4.18 **Percentage of the number of non-mercury-containing medical measuring devices replacing those containing mercury by type of healthcare facilities**

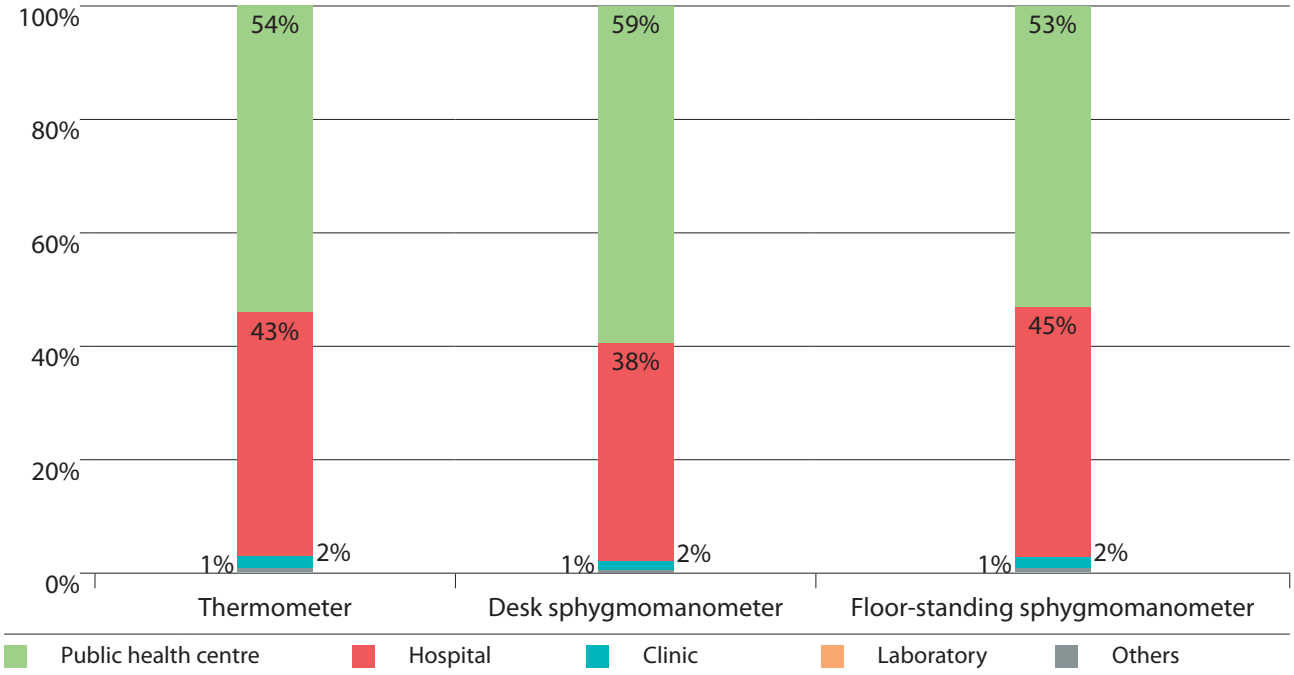
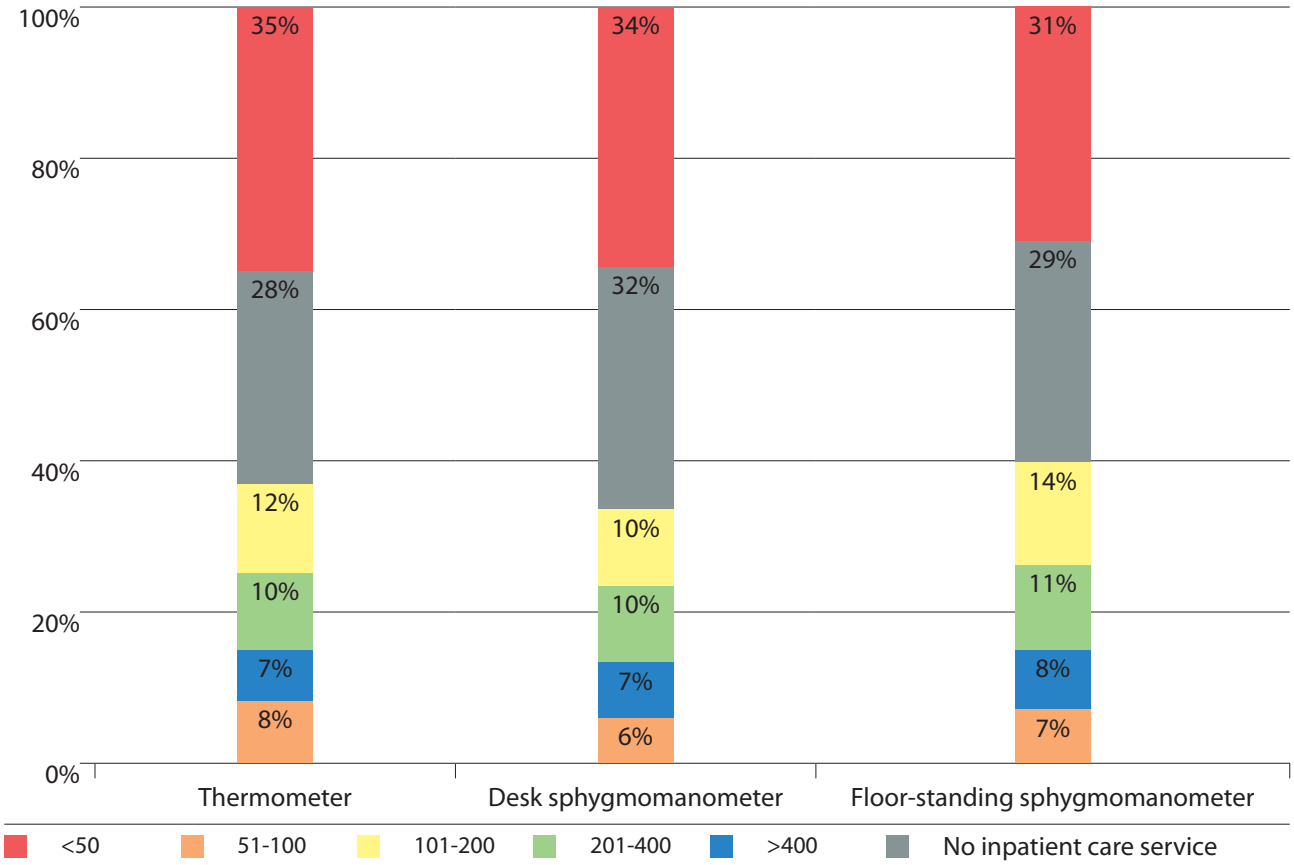


Figure 4.19 **Percentage of the number of non-mercury-containing medical measuring devices replacing those containing mercury by inpatient care capacity of healthcare facilities**



4.3.1.4. Total quantities or the portion of the mercury-containing medical measuring devices remain in use

Table 4.5 showed that the total mercury-containing medical measuring devices still used by the healthcare facilities respondents were 18,062 units, comprises 9,953 desk sphygmomanometers (55%), 4,498 thermometers (25%) and 3,611 floor-standing sphygmomanometers (20%).

Public health centres, hospitals and clinics still used the desk sphygmomanometers the most compared to the floor-standing sphygmomanometers and thermometers. In contract, laboratories and others still used thermometers the most, compared to the sphygmomanometers. All types of healthcare facilities by ownership status still used the desk sphygmomanometer the most but varied between the floor-standing sphygmomanometers and thermometers (Figure 4.20)

Almost all provinces still used the desk sphygmomanometers the most and varied between the floor-standing sphygmomanometers and thermometers (Figure 4.21). More detailed information on the number of mercury-containing medical measuring devices that remain in use by the province of domicile of healthcare facilities can be seen in Appendix 8.

Using the formula as described in Subsection 3.2.4.2.2, the total number of mercury-containing medical measuring devices remain in use for the total whole population of healthcare facilities in Indonesia (hospitals, public health

Table 4.5 **Number of mercury-containing medical measuring devices remain in use by type of healthcare facilities**

Type of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
Laboratory	12	2	0	14
Other	53	44	18	115
Clinic	50	106	62	218
Hospital	1,220	3,990	1,575	6,785
Public Health Centre	3,163	5,811	1,956	10,930
Grand Total	4,498	9,953	3,611	18,062

Figure 4.20 **Number of mercury-containing medical measuring devices remain in use by type of healthcare facilities**

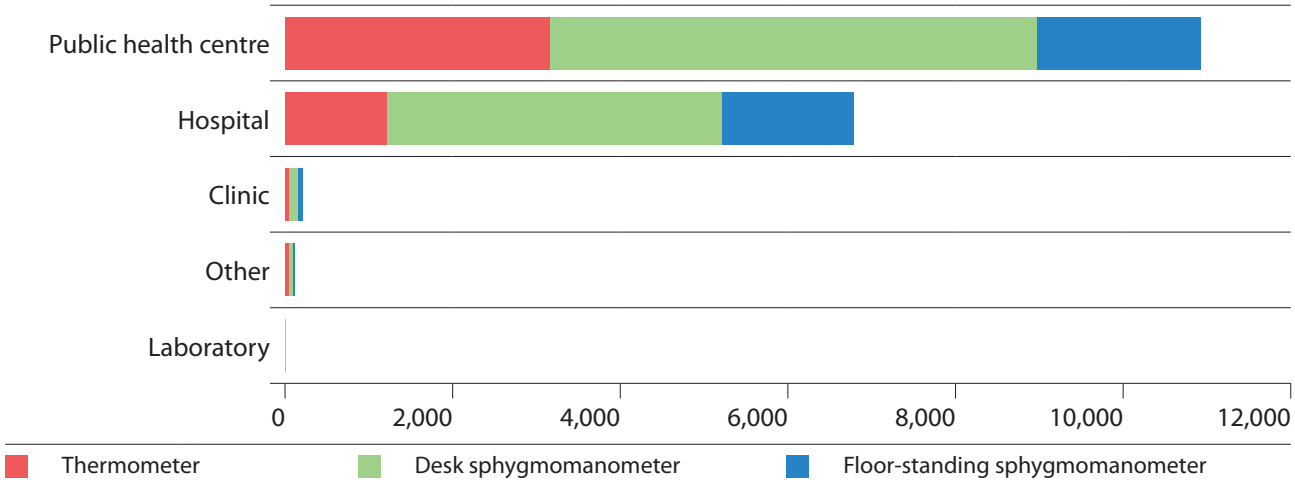
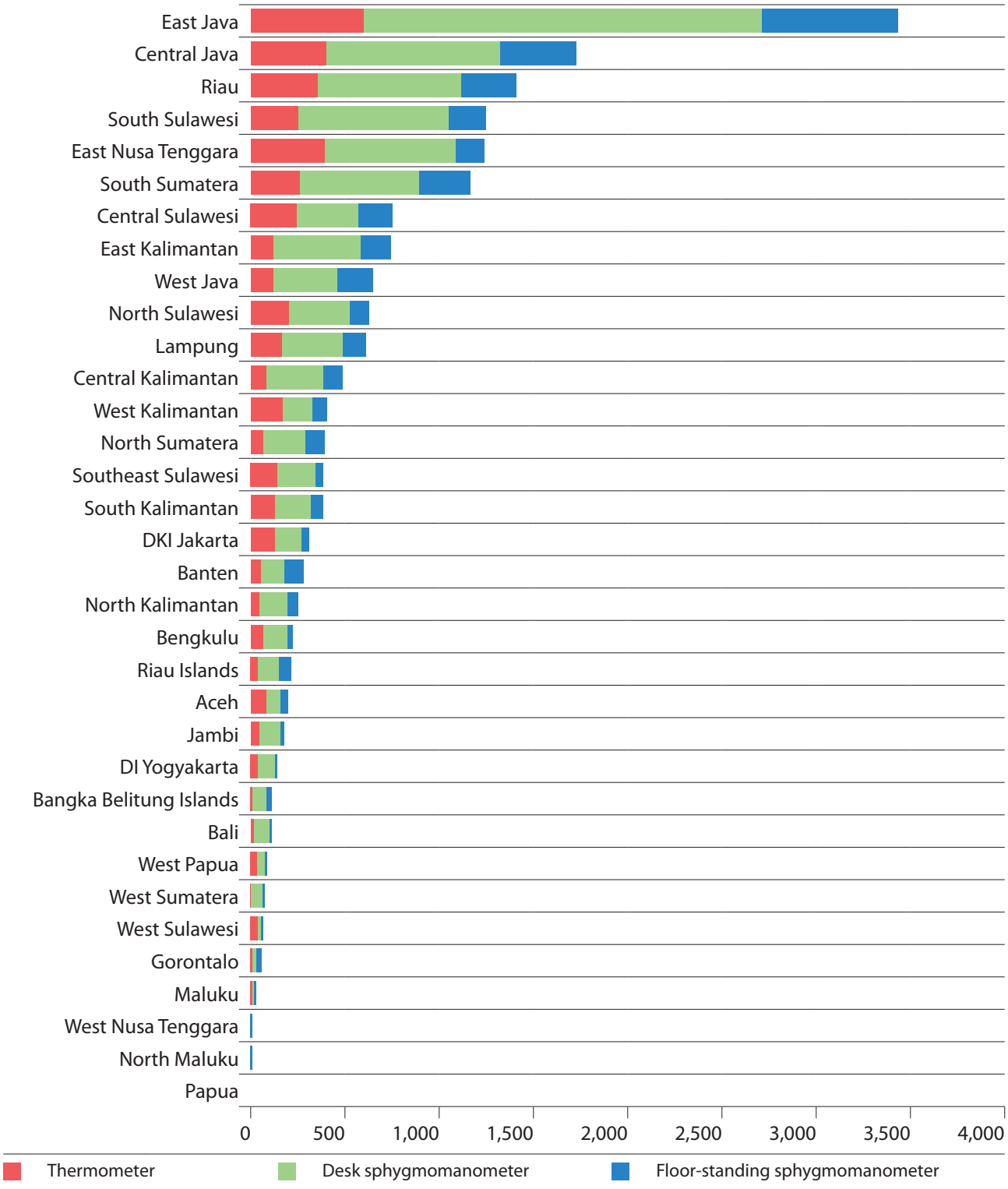


Figure 4.21 **Number of mercury-containing medical measuring devices remain in use by province of domicile of healthcare facilities**



centres, health clinics and health laboratories) is estimated to be 64,474 to 80,325 units, comprises thermometers (16,020 to 20,040 units), desk sphygmomanometers (35,786 to 44,005 units) and floor-standing sphygmomanometers (12,668 to 16,280 units). The percentage of mercury-containing medical measuring devices remain in use from each ownership status, type and inpatient care capacity of healthcare facilities is as depicted in Figure 4.24.

Figure 4.22 **Percentage of the number of mercury-containing medical measuring devices remain in use by ownership status of healthcare facilities**

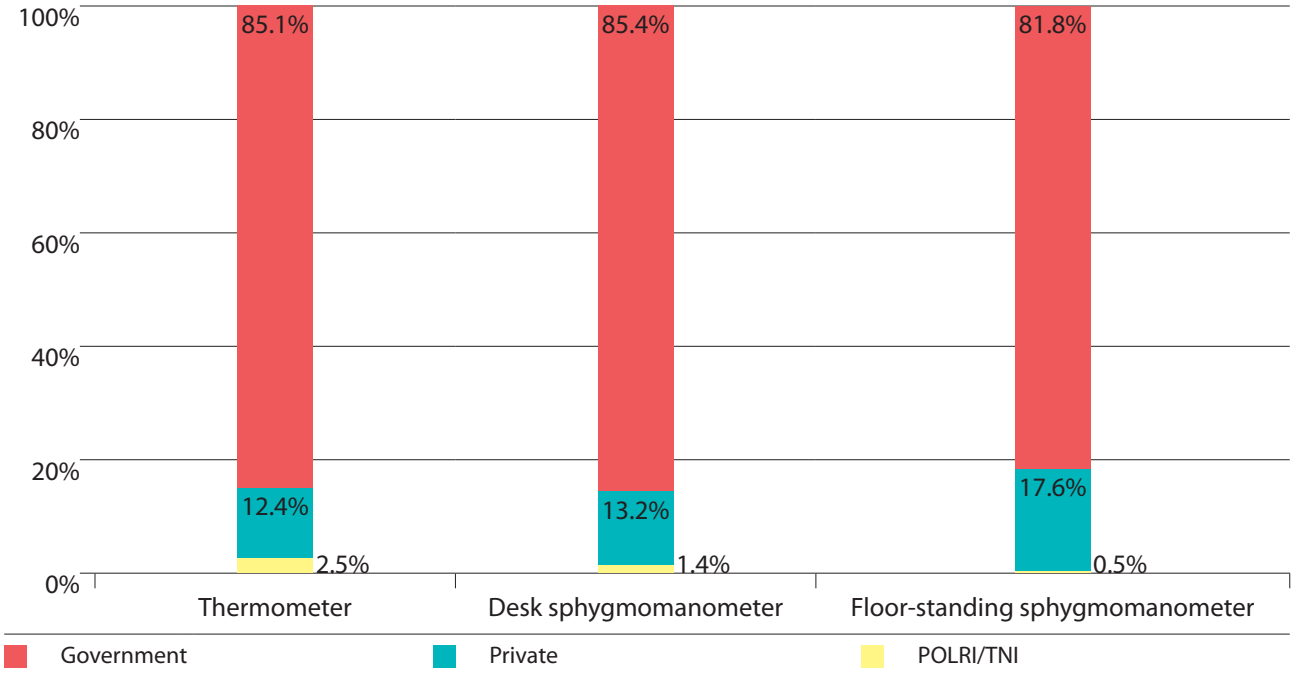


Figure 4.23 **Percentage of the number of mercury-containing medical measuring remain in use by type of healthcare facilities**

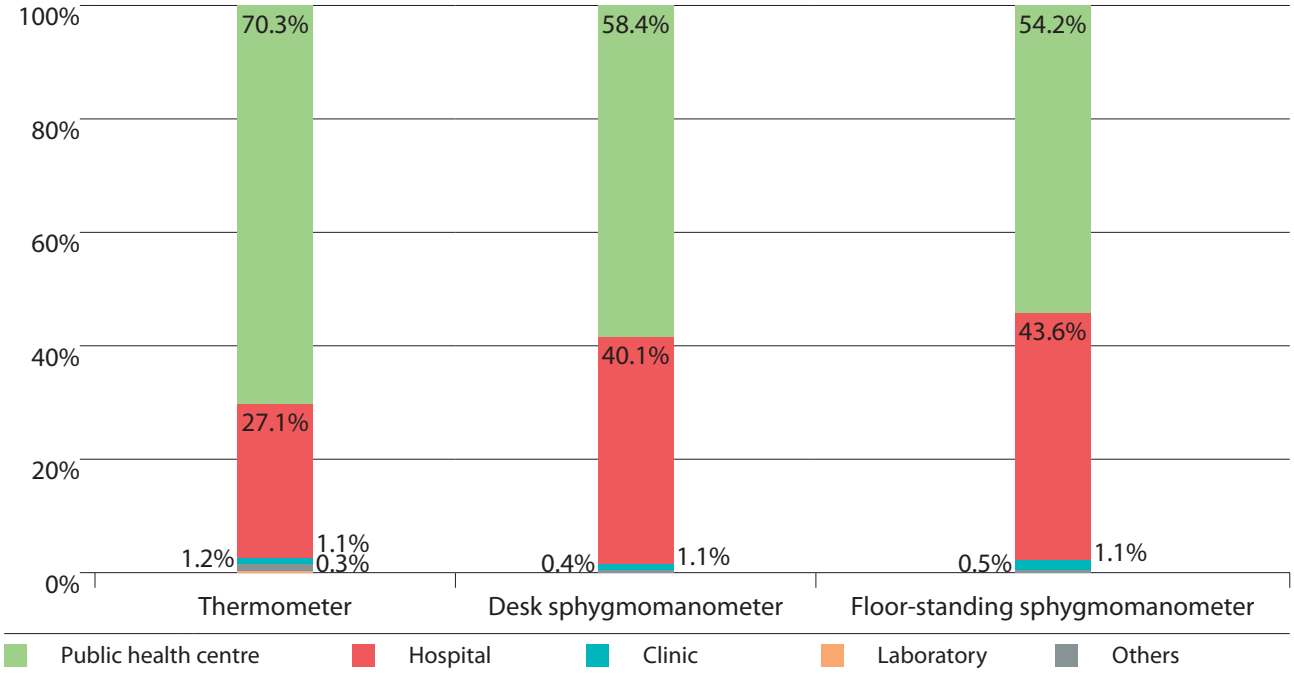
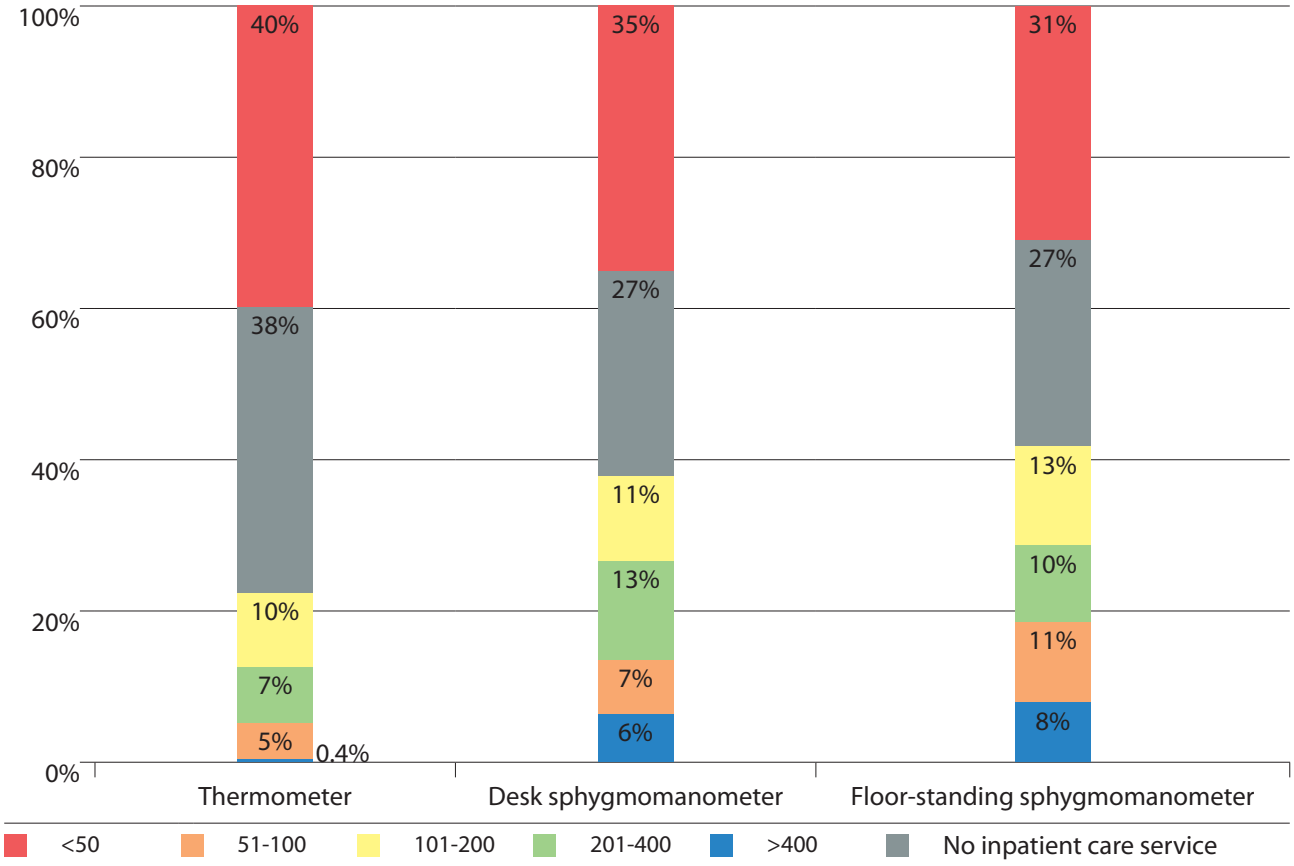


Figure 4.24 **Percentage of the number of mercury-containing medical measuring remain in use by inpatient care capacity of healthcare facilities**



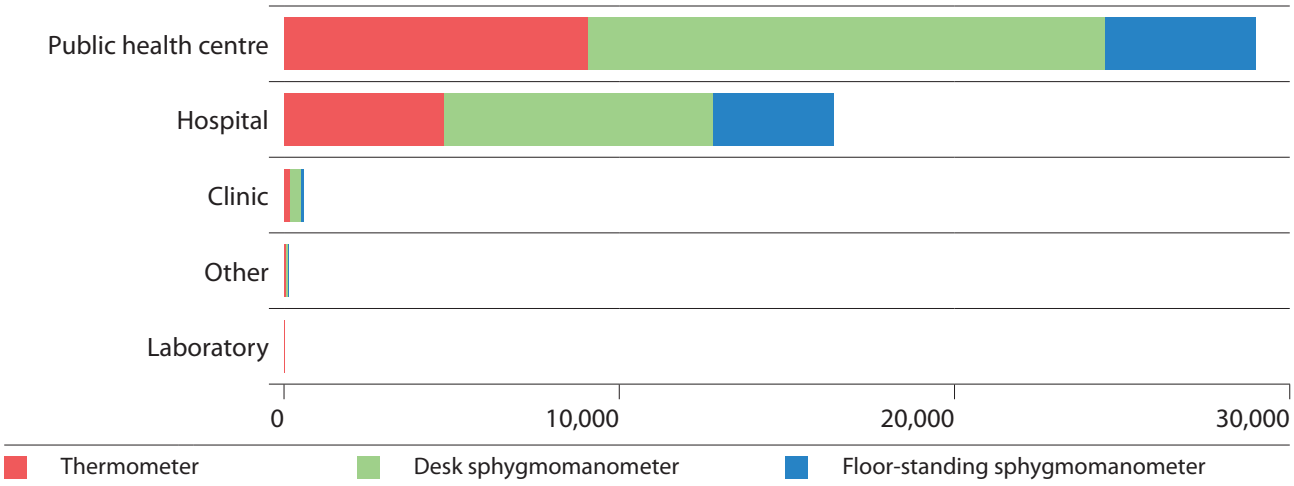
4.3.1.5. Total quantities or the portion of the mercury-containing medical measuring no longer used and stored in good condition/intact

The total mercury-containing medical measuring devices which are no longer used and stored in good condition, thus eliminated by the healthcare facilities respondents are 46,136 units, comprises 23,827 desk sphygmomanometers (51%), 14,140 thermometers (31%) and 8,169 floor-standing sphygmomanometers (18%) (Table 4.6).

Table 4.6 **Number of mercury-containing medical measuring devices stored or eliminated by type of healthcare facilities**

Type of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
Laboratory	12	0	0	12
Other	61	61	17	139
Clinic	204	302	83	589
Hospital	4,791	8,026	3,597	16,414
Public Health Centre	9,072	15,438	4,472	28,982
Grand Total	14,140	23,827	8,169	46,136

Figure 4.25 **Number of mercury-containing medical measuring devices stored or eliminated by type of healthcare facilities**



Public health centres, hospitals and clinics have eliminated the desk sphygmomanometers the most compared to the thermometers and floor-standing sphygmomanometers, while laboratories have eliminated only the thermometers and none of the sphygmomanometers. Other types of healthcare facilities have eliminated more thermometers and desk sphygmomanometers in the same number compared to the floor-standing sphygmomanometers (Figure 4.25).

By province of domicile, almost all healthcare facilities have eliminated the desk sphygmomanometers the most but varied between the floor-standing sphygmomanometers and thermometers (Figure 4.26). More detailed information on the number of mercury-containing medical measuring devices stored or eliminated by province of domicile of healthcare facilities can be seen in Appendix 8.

Using the formula as described in Subsection 3.2.4.2.2, the total number of mercury-containing medical measuring devices stored or eliminated for the total whole population of healthcare facilities in Indonesia (hospitals, public health centres, health clinics and health laboratories) is estimated to be 169,527 to 200,332 units, comprises thermometers (51,148 to 62,208 units), desk sphygmomanometers (89,615 to 101,400 units) and floor-standing sphygmomanometers (28,764 to 36,724 units). The percentage of mercury-containing medical measuring devices stored or eliminated from each ownership status, type and inpatient care capacity of health care facilities is as depicted in Figure 4.29.

Figure 4.26 **Number of mercury-containing medical measuring devices stored or eliminated by province of domicile**

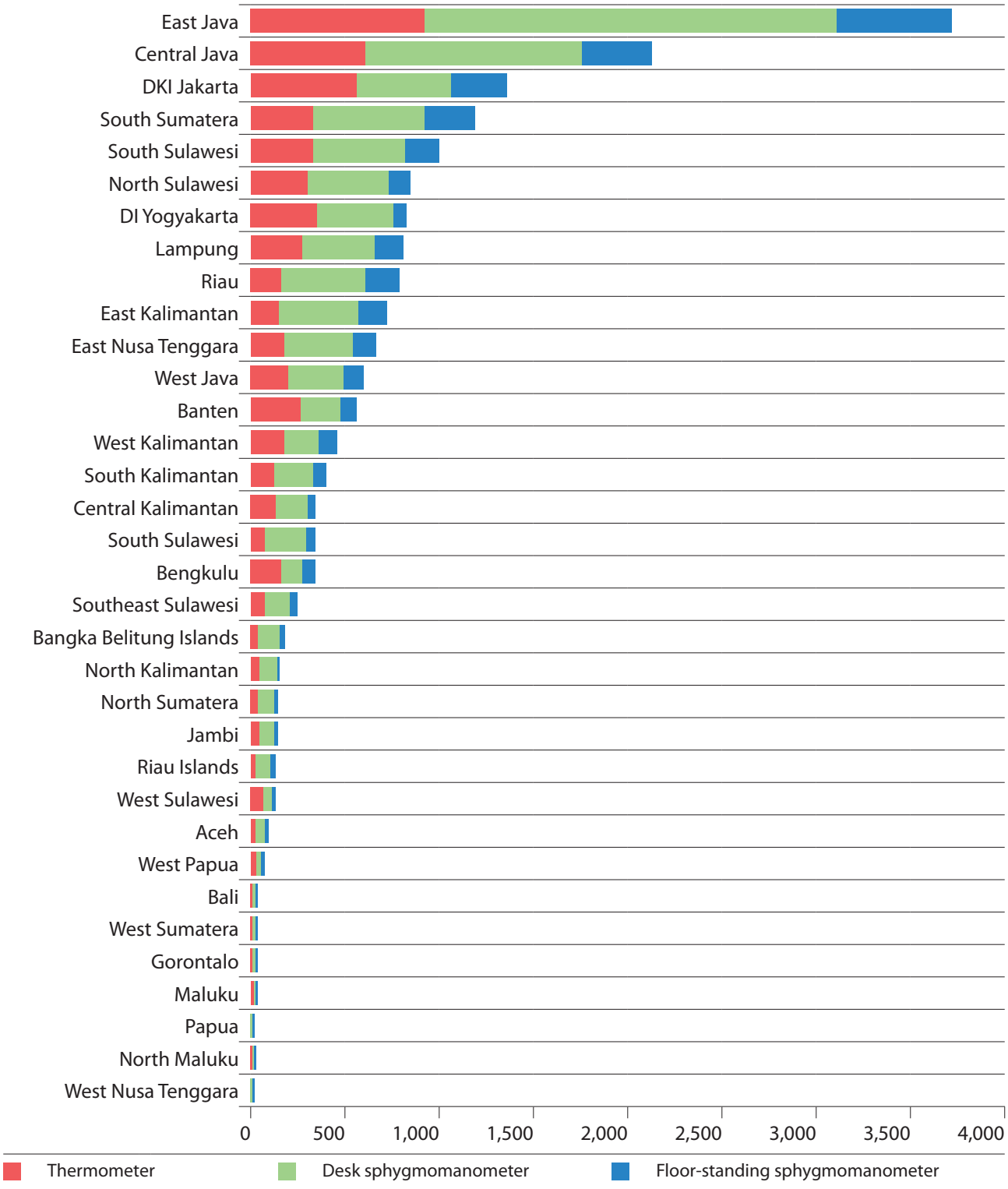


Figure 4.27 **Percentage of the number of mercury-containing medical measuring devices stored or eliminated by ownership status of healthcare facilities**

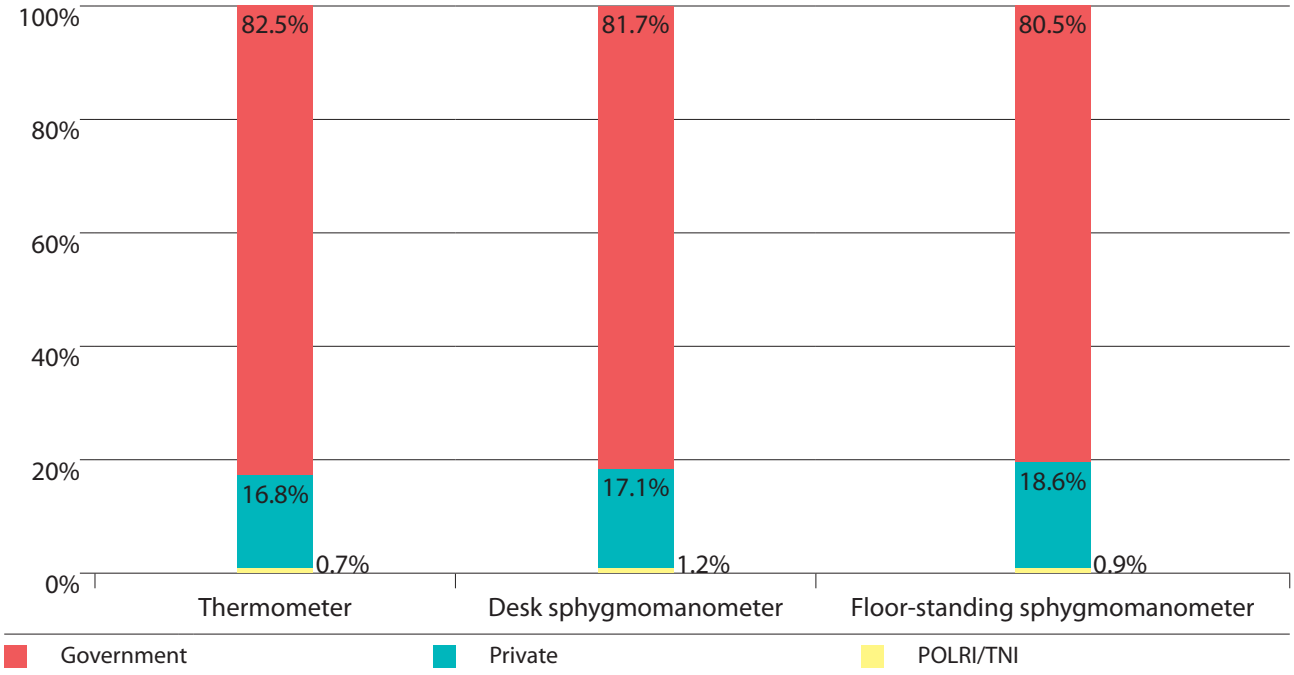


Figure 4.28 **Percentage of the number of mercury-containing medical measuring devices stored or eliminated by type of healthcare facilities**

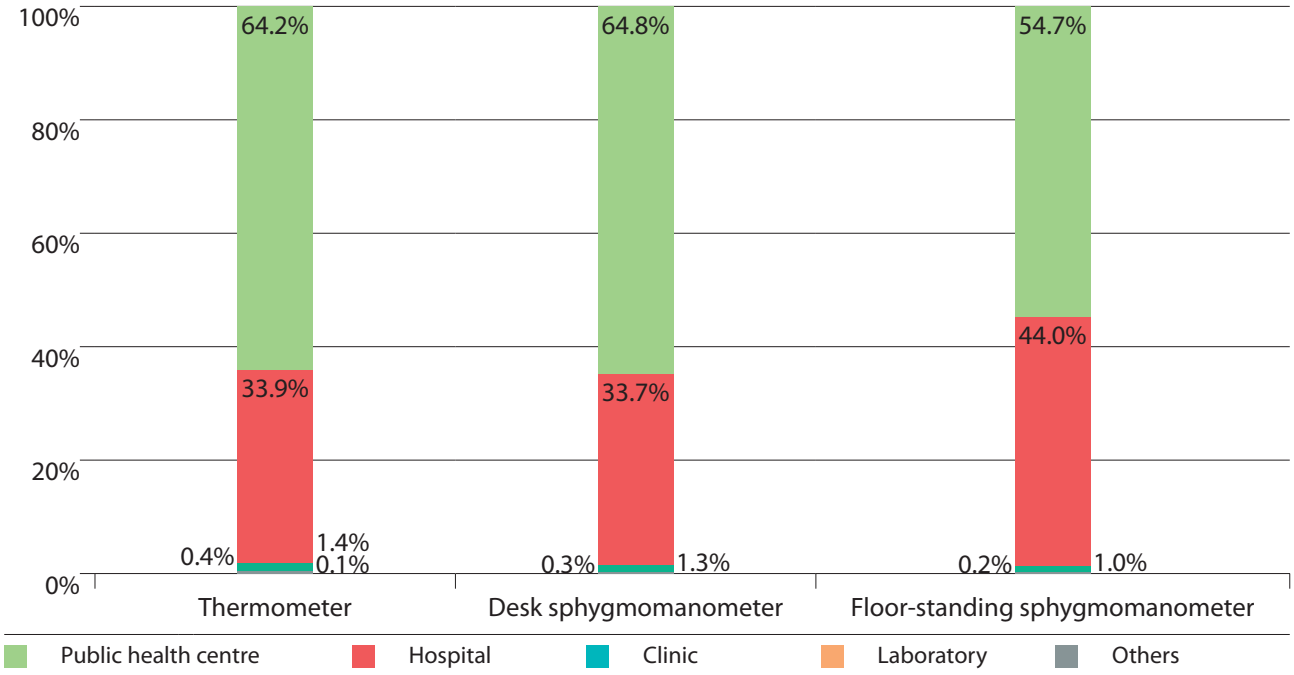
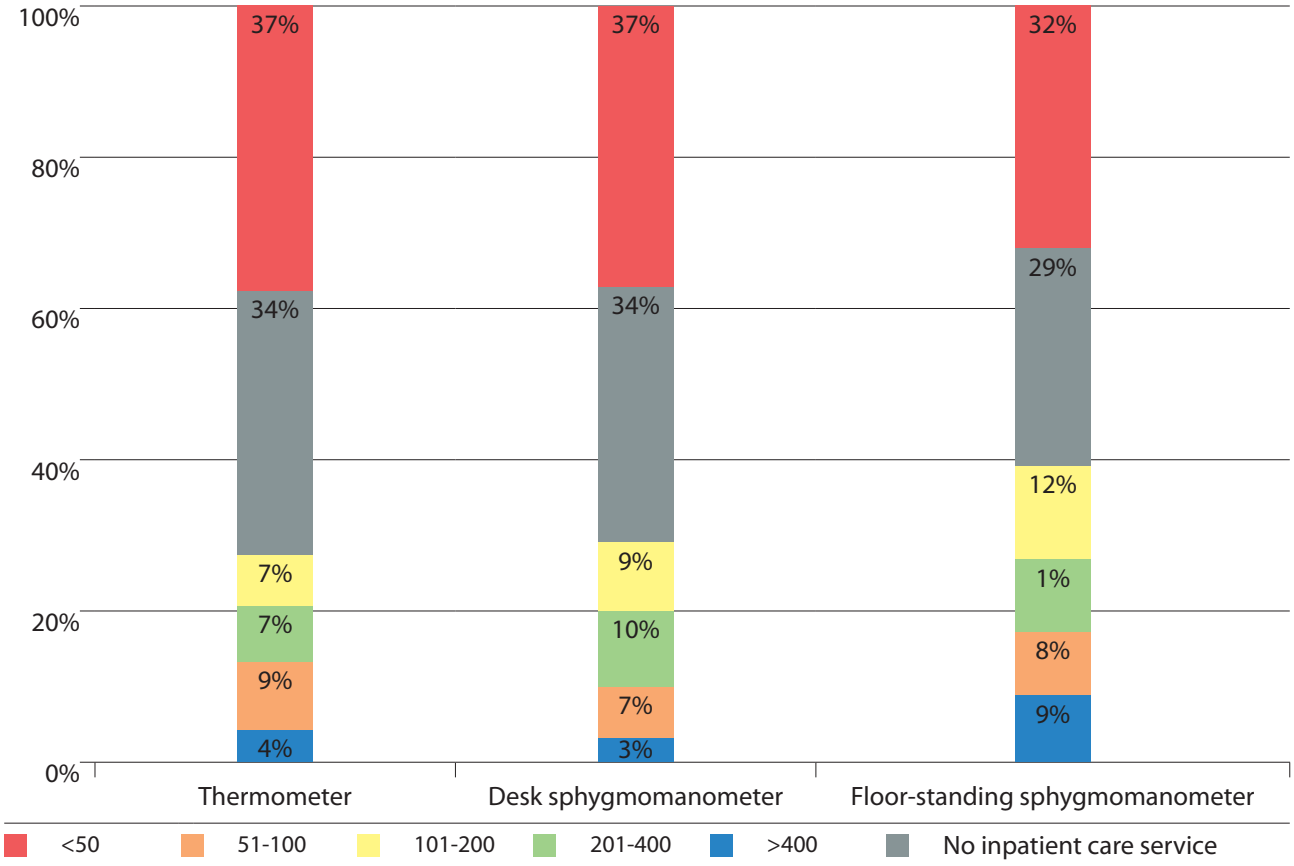


Figure 4.29 **Percentage of the number of mercury-containing medical measuring devices stored or eliminated by inpatient care capacity of healthcare facilities**



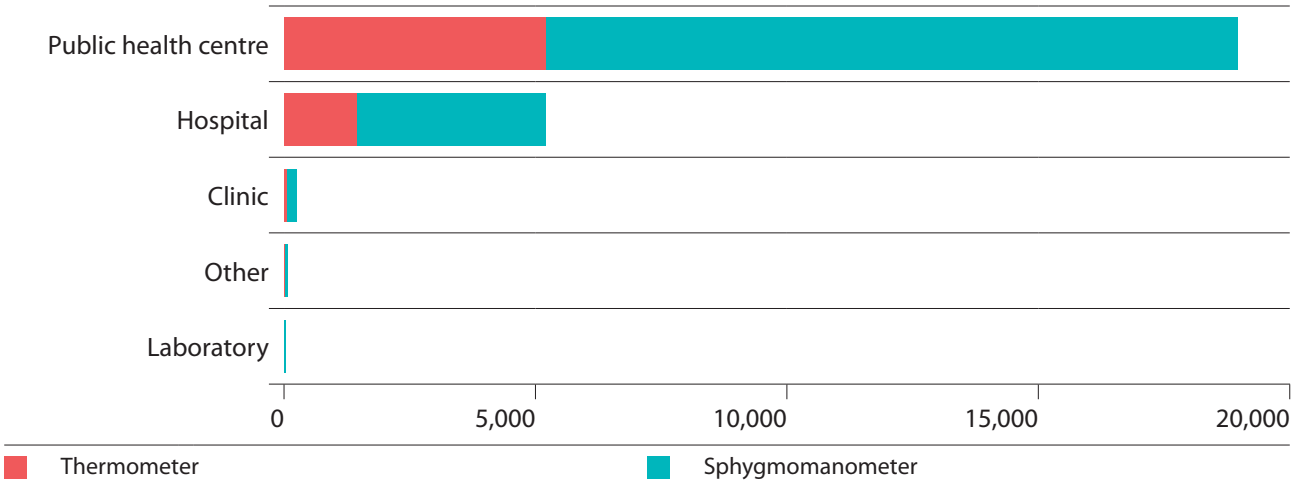
4.3.1.6. Total quantities or the portion of broken mercury-containing medical measuring devices

Table 4.7, Figure 4.30 and 4.31 below described the number of broken mercury-containing medical measuring devices reported by healthcare facilities through responses to the questionnaires, question number B.3 of the off-line questionnaire and questions number 3.1 and number 5.1 of the online questionnaire. The total number of the broken mercury-containing medical measuring devices is 22,041 units, comprises 6,080 thermometers and 15,961 desk sphygmomanometers. There is no question on the number of broken floor-standing sphygmomanometers in the questionnaire.

Table 4.7 **Number of broken mercury-containing medical measuring devices by type of healthcare facilities**

Type of Healthcare Facilities	Thermometer (Unit)	Sphygmomanometer (Unit)	Total (Unit)
Laboratory	0	8	8
Other	18	42	60
Clinic	58	162	220
Hospital	1,307	3,379	4,686
Public Health Centre	4,697	12,370	17,067
Grand Total	6,080	15,961	22,041

Figure 4.30 **Number of broken mercury-containing medical measuring devices by type of healthcare facilities**



The total number of the broken mercury-containing medical measuring devices (22,041 units), together with the total number of mercury-containing medical measuring devices still used (18,062 units) and stored in good condition (46,136 units) exceeds the total number of the initial number of existing mercury-containing medical measuring devices at the healthcare facilities (75,907 units). There is a possibility that this might be due to some of the broken mercury-containing medical measuring devices are not recorded as part of the initial number, hence making the total initial number lower. In the section below, most respondents did not respond or did not have information on the fate of the broken mercury-containing medical measuring devices at their facilities.

More detailed information on the number of broken mercury-containing medical measuring devices by the province of domicile of healthcare facilities can be seen in Appendix 8.

Using the formula as described in Subsection 3.2.4.2.2, the total number of broken mercury-containing medical measuring devices for the total whole population of healthcare facilities in Indonesia (hospitals, public health centres, health clinics and health laboratories) is estimated to be 80,792 to 95,905 units, comprises thermometers (21,450 to 27,292 units) and desk sphygmomanometers (59,342 to 68,613 units). There is no information on the number of broken floor-standing sphygmomanometers as it is not inquired in the questionnaire. The percentage of broken mercury-containing medical measuring devices from each ownership status, type and inpatient care capacity of healthcare facilities is depicted in Figure 4.34.

Figure 4.31 **Number of broken mercury-containing medical measuring devices by province of domicile of healthcare facilities**

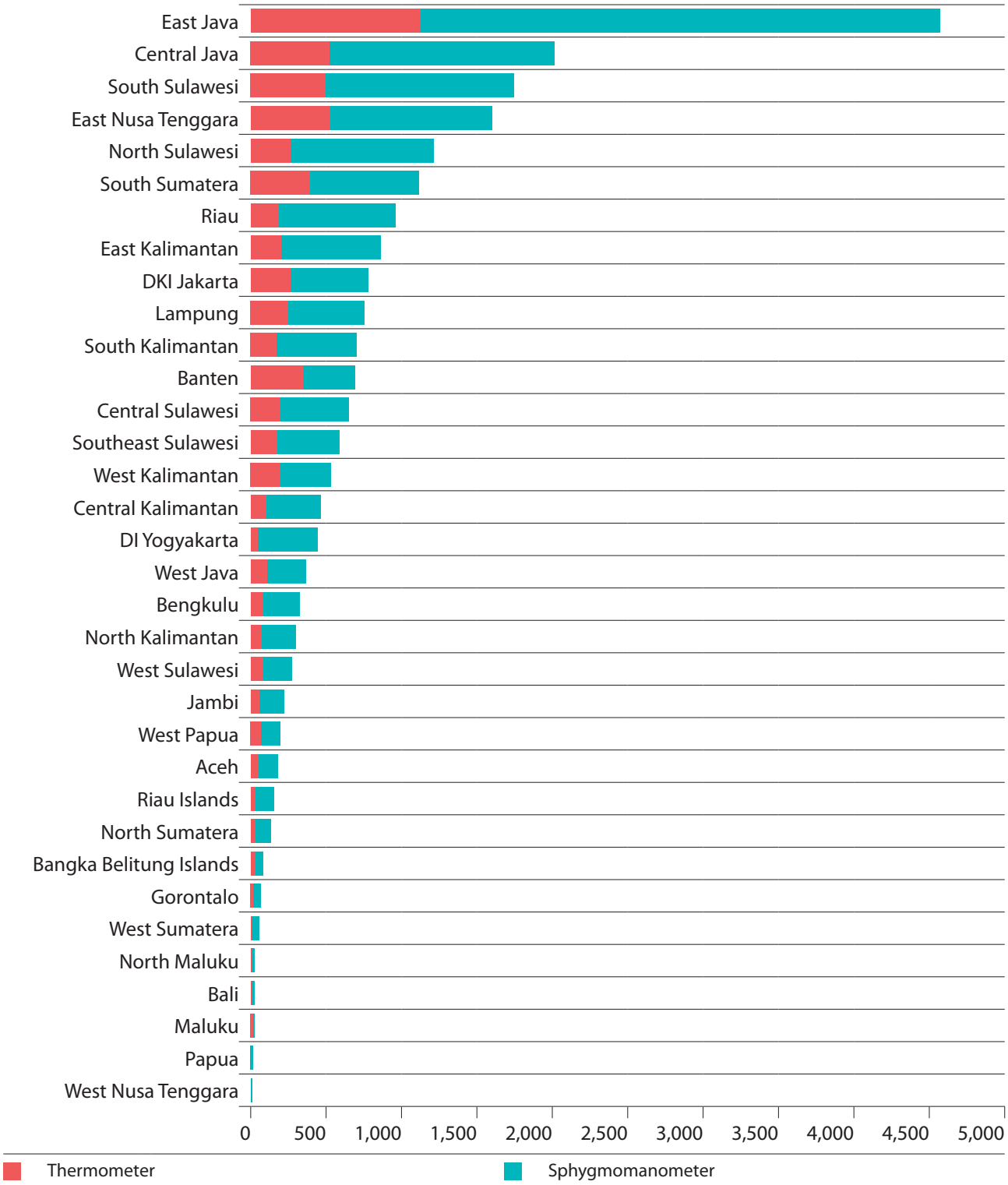


Figure 4.32 Percentage of the number of broken mercury-containing medical measuring devices by ownership status of healthcare facilities

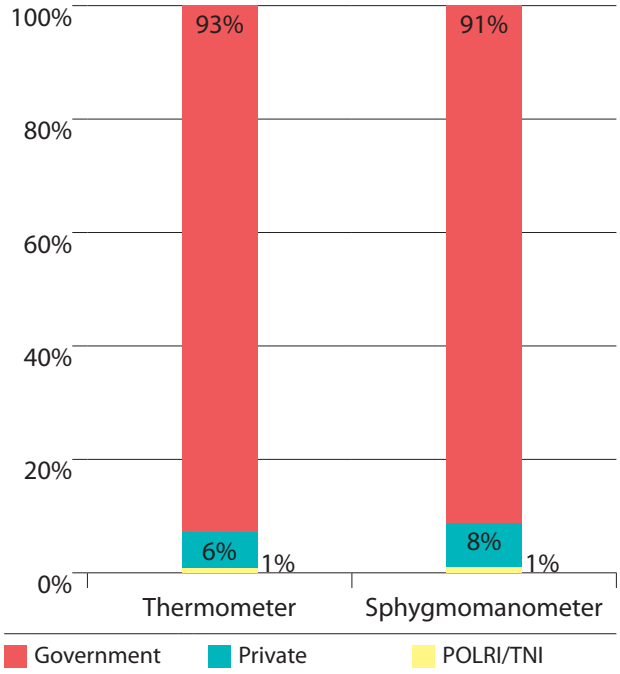


Figure 4.33 Percentage of the number of broken mercury-containing medical measuring devices by type of healthcare facilities

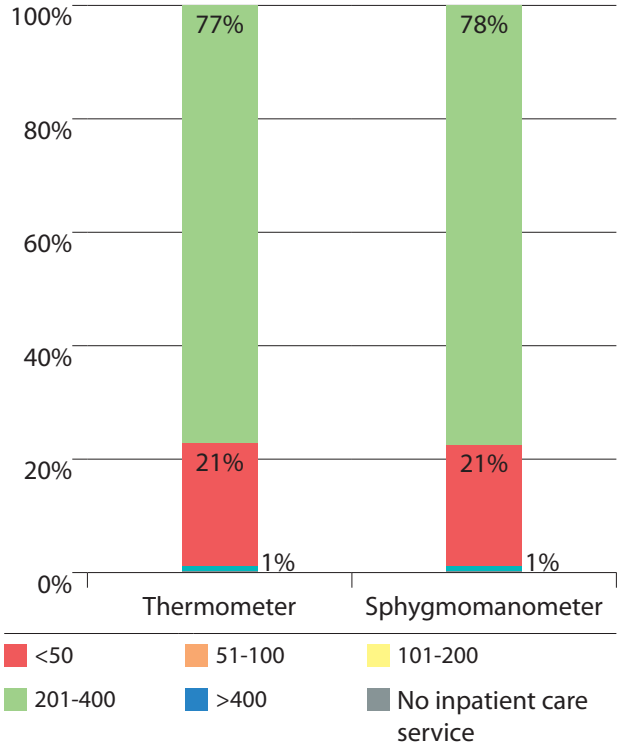
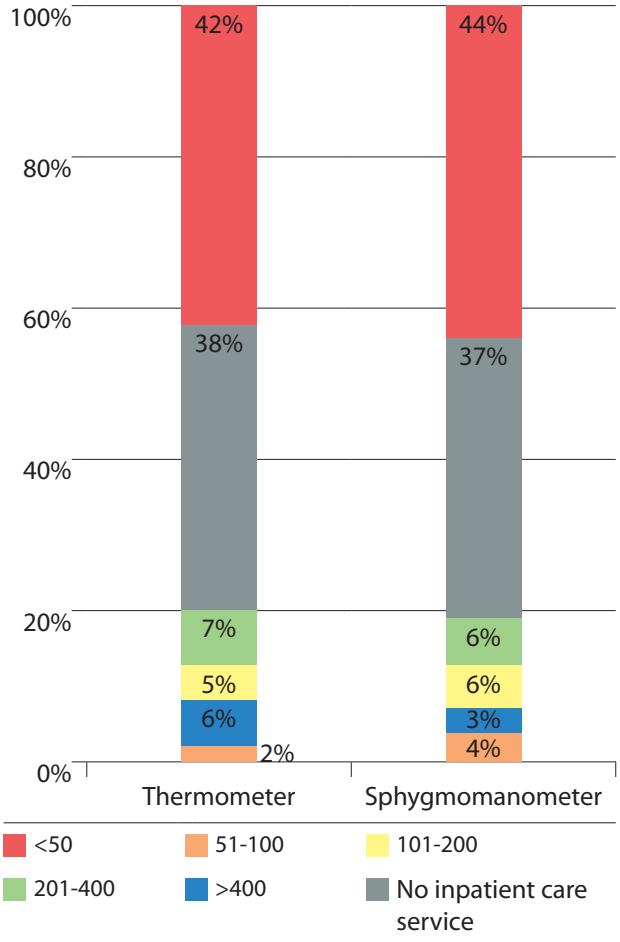


Figure 4.34 Percentage of the number of broken mercury-containing medical measuring devices by inpatient care capacity of healthcare facilities



4.3.2. Supporting information for the evaluation of the government's target achievement

In addition to the inventory as discussed in the previous section, supporting information evaluating of the Government's target achievement is described in the following subsections.

4.3.2.1. Availability of substitutes in market

Substitutes to the mercury-containing medical measuring devices which are mercury-free are already available in the market and can be purchased through e-catalogue (https://e-katalog.lkpp.go.id/) or directly from distributors. Examples

of alternatives registered in e-catalogue, among others, are as follows:

- digital thermometer
- aneroid sphygmomanometer
- digital sphygmomanometer

The healthcare facilities visited during the field visit had substituted all their mercury-containing medical measuring devices with non-mercury devices. The questionnaires responses for questions number C.2 of the off-line questionnaire and number 8.1.3., 8.2.3 and 8.3.3 of the online questionnaire as depicted in Figure 4.35, 4.36 and 4.37 also showed that most healthcare facilities had substituted their mercury-containing thermometers with electronic/digital ones and their sphygmomanometers with aneroid and/or digital ones.

As shown in Figure 4.35, the type selected by most respondents (66%) to replace their mercury-containing thermometers is the electronic/digital thermometer. A few respondents also preferred non-toxic organic liquid thermometer containing toxic organic liquid (1%). There were 33% of the respondents who did not respond to the question. There were also responses such as aneroid thermometers, hence considered invalid response and not included in the graphic (57 respondents).

To substitute their desk mercury-containing sphygmomanometers, most respondents (38%) selected electronic/digital type, and 32% of the respondents selected the aneroid type. There were 30% of the respondents who did not respond to the question (Figure 4.36). Most respondents substituted their floor-standing sphygmomanometers with the electronic type (27%), followed by the aneroid type (18%). However, 55% of the respondents did not provide answers to this question (Figure 4.37).

Figure 4.35 **Type of non-mercury-containing thermometers selected by healthcare facilities as substitutes**

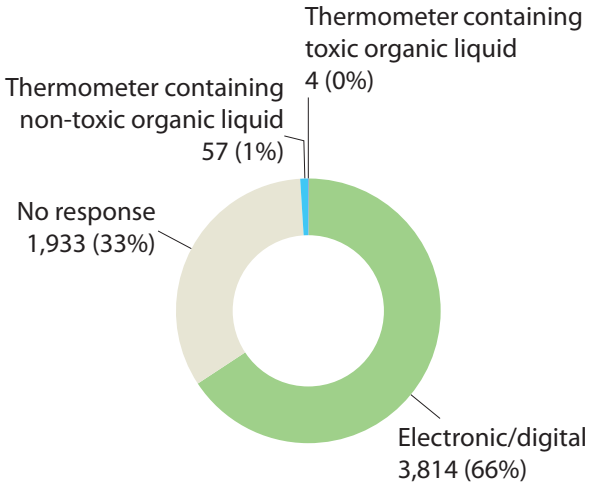


Figure 4.36 **Type of non-mercury-containing desk sphygmomanometers selected by healthcare facilities as substitutes**

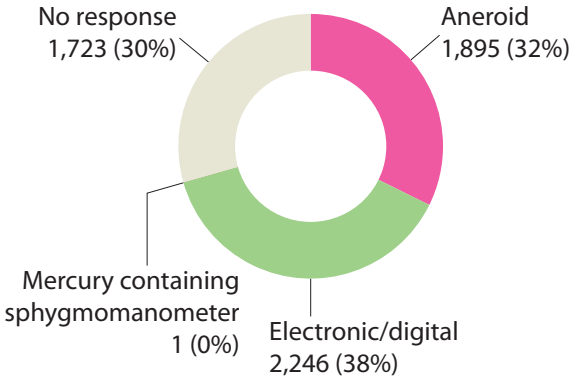
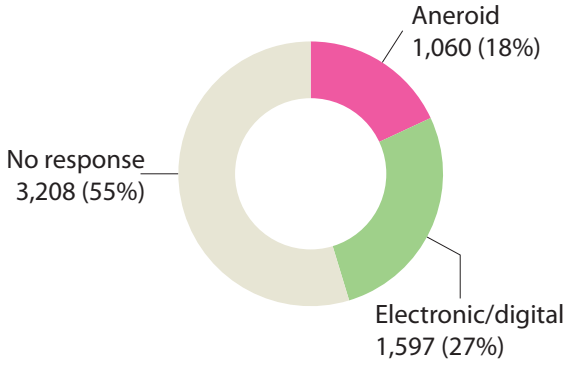


Figure 4.37 **Type of non-mercury-containing floor-standing sphygmomanometers selected by healthcare facilities as substitutes**



4.3.2.2. Users' responses to the elimination policy and target

The information for this topic was obtained from the question number 10.4 of the questionnaire.

Figure 4.38 showed the respondents' responses to the elimination policy and target as in the following:

- Substitute all medical devices and materials containing mercury with those that do not contain mercury (26%).
- Stop the purchase/procurement of medical devices and materials that contain mercury (20%).
- Provide information to all healthcare facilities staff about mercury elimination policies in the health sector (16%).
- Conduct an inventory of mercury-containing medical devices and mercury as dental amalgam materials (13%).
- Establish a written policy on stopping the purchase of medical devices and materials containing mercury (12%).
- Provide training/information to all healthcare facilities staff on the use of medical devices and materials that do not contain mercury (12%).

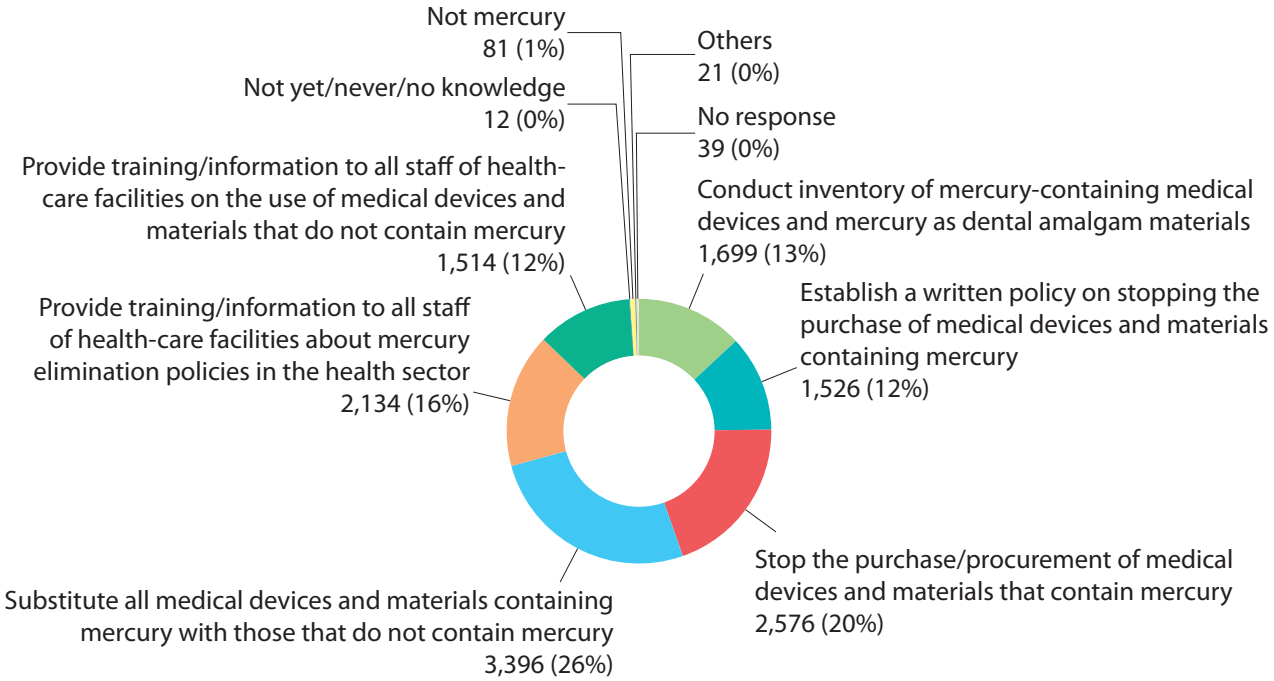
Less than 1% of the respondents mentioned that they had not/never responded to the elimination policy and target. They did not know about it, had no mercury-containing medical measuring devices in their facilities or other constraints related to dental amalgam.

The selected healthcare facilities visited during the field visit had responded to the elimination policy and target by substituting their mercury-containing medical measuring devices with non-mercury devices and collected and stored the replaced/substituted mercury devices in a container in a separate room or in a secured storage unit.

4.3.2.3. Constraints encountered by healthcare facilities in substituting their mercury-containing medical measuring devices

The healthcare facilities visited during field the visit mentioned that they did not have constraints in substituting their mercury-containing medical measuring devices.

Figure 4.38 **Users' Responses to the elimination policy and target**



From the responses of the off-line questionnaire, particularly question number E.2 and the online questionnaire, question number 10.5 as depicted in Figure 4.39, most healthcare facilities (20%) responded that they did not encounter any problem in substituting their mercury-containing medical measuring devices. The remaining healthcare facilities responded that the problems were as follows:

- Have not found official guidelines for managing of the discarded medical devices and materials containing mercury (19%).
- Technical constraints related to containers, storage places for mercury-containing medical devices and spill kits that are not yet available (16%).
- No official/licensed service providers for collecting mercury and/or mercury-containing medical devices (14%).
- There are no funds for to purchase substitute medical devices and or materials (11%).
- Have never received any notification or warning about substituting medical devices and materials containing mercury (10%).

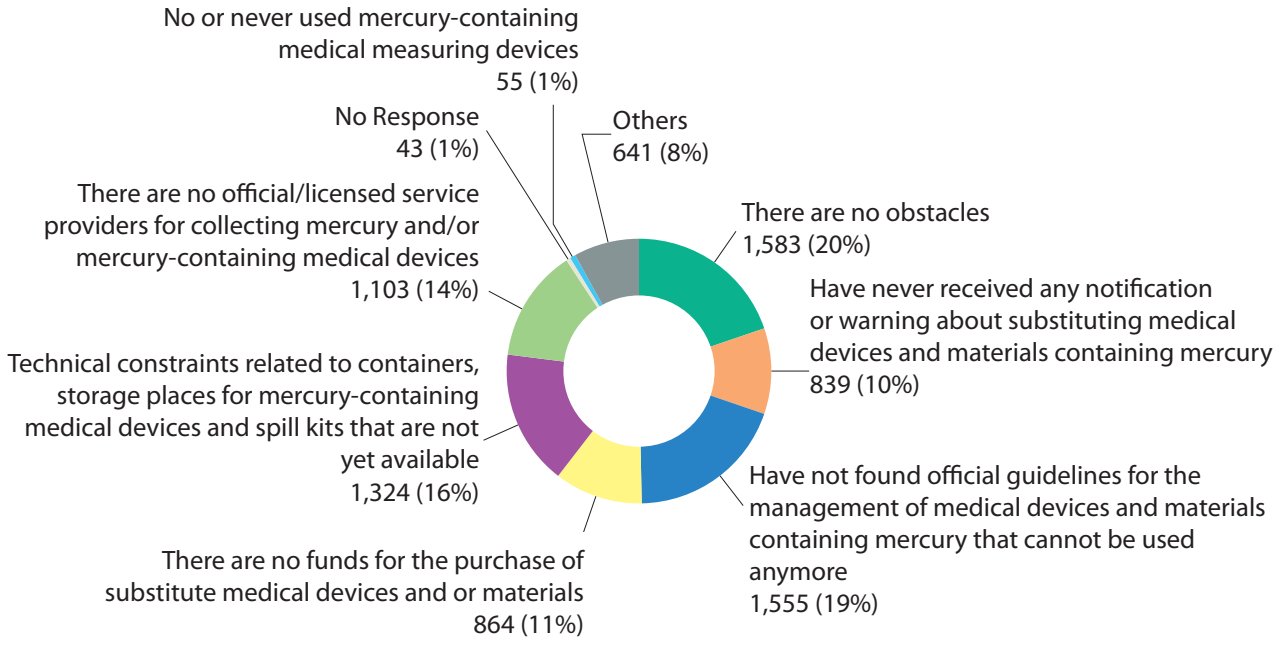
Several respondents (8%) mentioned other problems such as availability of alternative non-mercury-containing medical devices in the market, coordination with the government, etc.

A few respondents, mostly public health centres, did not answer or responded that they had never used or had no mercury-containing medical measuring devices in their facilities.

4.3.2.4. The Year of substitution set out by users

Figure 4.40 showed the respondents' responses to the questionnaires, particularly questions number C.1 of the offline questionnaire and questions number 8.1.4., 8.2.4, and 8.3.4 of the online questionnaire. From 1983 until 2019, the year on the issuance of Permenkes 41/2019, which obligated healthcare facilities to substitute their mercury-containing medical measuring devices by 31 December 2020, 36% of the respondents had substituted their mercury-containing

Figure 4.39 **Constraints encountered by healthcare facilities in substituting their mercury-containing medical measuring devices**



medical measuring devices. Whereas, 16% of the respondents had or planned to conduct the substitution by 2020, according to the deadline set by the government. There were 1% of the respondents planning to conduct the substitution by 2025, which was beyond the deadline. However, most respondents (47%) did not response to the question.

4.3.3. Evaluation of the government's target achievement as of august 2020

As shown in Figures 4.10 and 4.11, the initial total number of mercury-containing medical measuring devices is 75,907 units. This number has far exceeded the total national baseline in 2018 as set out in the Permen LHK 81/2019 as the baseline for target achievement, which is 21,663 units. Hence, in this study, the initial total number of mercury-containing medical measuring devices which will be used is 75,907 units.

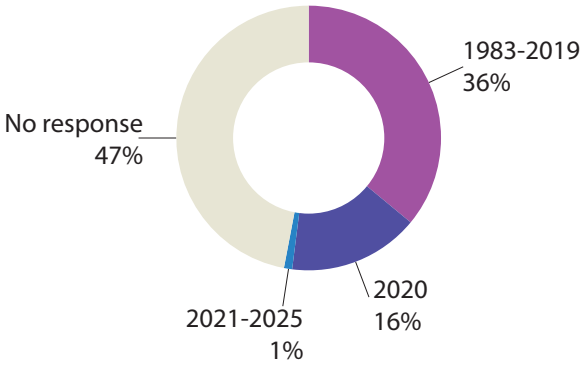
The target achievement of mercury-containing medical measuring devices elimination in this study is calculated using a similar formula for calculating the target achievement in the regulation, as follows:

- Target achievement percentage = a total number of mercury-containing medical measuring devices which have been eliminated/baseline x 100%.
- The target achievement percentage estimation based on the total number of questionnaires responses at the end of August 2020 = 46,136/75,907 X 100% = 60.78%

By using the estimation of total numbers of the initial and the eliminated mercury-containing medical measuring devices for the whole population (minimum and maximum values) in Subsections 4.3.1.2 and 4.3.1.5. The target achievement percentage for the whole healthcare facilities population (hospitals, public health centres, health clinics, health laboratories) at the end of August 2020 is estimated as follows:

- 169,527/280,177 x 100% = 60.51% (minimum)
- 200,332/328,347 x 100% = 61.01% (maximum)

Figure 4.40 Year of substitution set out by users



Hence, the remaining percentage of mercury-containing medical measuring devices to be eliminated is estimated to be 39.49%-38.99%.

Supporting information to evaluate the government's target achievement as described in Section 4.3.2 shows that non-mercury substitutes are available in the market. Most respondents had replaced their mercury-containing thermometers with electronic/digital type and mercury-containing sphygmomanometers with aneroid and electronic/digital types. Most respondents also showed positive responses to the elimination policy and target such as total substitution and stopped purchasing mercury-containing medical devices and materials. There were several constraints in substitution faced by healthcare facilities. However, most respondents (20%) responded not encountering problems. Regarding the year of substitution, 36% of the respondents had conducted substitution by 2019. And 16% had or planned to conduct substitution by 31 December 2020. Considering the above information, there is likelihood that the government can achieve their elimination target according to the deadline as set out by Permenkes 41/2019.

4.4. What happened to the discarded mercury-containing medical measuring devices (how are they managed)?

The main research question 3 is on the fate of the discarded mercury-containing medical measuring devices or their existing management.

Data collection and analysis result to answer this question is discussed in the following sections.

4.4.1. The users' individual practices in the management of discarded mercury-containing medical measuring devices

The healthcare facilities' practises in the management of their discarded mercury-containing medical measuring devices which are broken and which have been replaced or substituted are discussed in Subsections 4.4.1.1. and 4.4.1.2 below.

4.4.1.1. Standard operating procedures and handling of broken mercury-containing medical measuring devices or mercury spills

Information on the handling of broken mercury-containing medical measuring devices or mercury spills was obtained from the online questionnaire responses, question number 3.3 for thermometers and question number 5.4 for both desk and floor-standing sphygmomanometers, as shown in Figure 4.41.

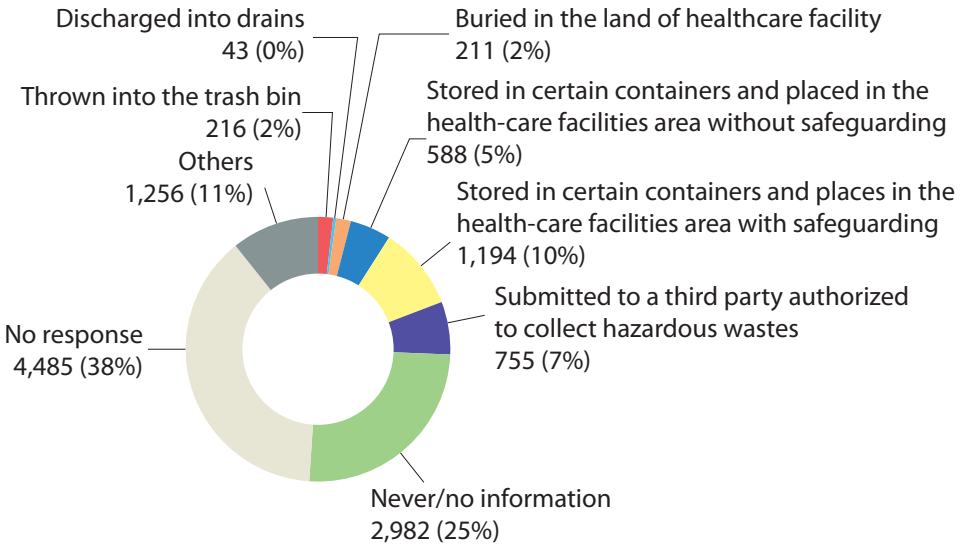
The figure showed that most respondents (63%) did not respond or responded that they never handled broken mercury-containing medical measuring devices or mercury spills or did not have any information. The reason could be that incidents of broken mercury-containing medical measuring devices or mercury spills were not well-recorded or well-informed to the respondents.

For the handling method, most respondents (11%) provided various responses which were not listed as options in the questionnaire, hence categorized as others. These included handling according to SOP, incinerated, returned to government, sent for repair, cooperated with other hospitals having treatment permit, etc.

Broken mercury-containing medical measuring devices and mercury spills were also stored in a certain container and place in the healthcare facility area with safeguarding by 10% of respondents and without safeguarding by 5% of the respondents. Seven percent (7%) of the respondents sent their broken mercury-containing medical measuring devices and mercury spills to a third party authorized to collect hazardous wastes. In contrast, 4% of the respondents mentioned that broken mercury-containing medical measuring devices and mercury spills are thrown into the trash bin, buried in the land of a healthcare facility, or discharged into drains.

To the online questionnaire number 9.1., 64% of the respondents answered that they did not have standard operating procedures (SOP) for handling mercury spills from broken medical devices or from mercury container. This question was

Figure 4.41 **Handling of broken mercury-containing medical measuring devices and mercury spills**



evaluated based on a total of 5,247 respondents from the online survey.

Furthermore, to question number D.2 of the offline questionnaire and question number 9.3 of the online questionnaire, most respondents (28%) did not answer. Only 23% of the respondents answered that they used a special mercury spill kit with handling by an SOP for broken mercury-containing medical devices pieces, stored them in a safe and leak-proof container and stored in temporary storage. Other responses were that they used a special mercury spill kit with handling by an SOP, disposed of in the hazardous wastes container, and other medical wastes and destroyed in an incinerator or brought to a third party (22%). Treated the broken mercury-containing medical measuring devices or mercury spills like ordinary wastes spill with SOP for handling wastes spills and disposed of in hazardous wastes container along with other medical wastes and destroyed in an incinerator or brought to a third party (20%).

Seven (7%) respondents said that they treated broken mercury-containing medical measuring devices or mercury spills without following specific SOP, and mercury was disposed of in domestic wastes containers or disposed of into the environment (e.g., rivers, sewers, vacant land, etc.) (Figure 4.42).

4.4.1.2. Standard operating procedures and handling of the replaced/substituted mercury-containing medical measuring devices

As mentioned in Subsection 4.3.2.2, the selected healthcare facilities visited during the field visit had collected and stored the replaced/substituted mercury devices in a container in a separate room or a secured storage unit.

To question number 9.4 of the online questionnaire, most respondents (74%) answered that they did not have SOP to manage mercury-containing medical devices and remaining mercury. Due to the exclusion of these question from the offline survey, only 5,247 responses from the online survey were utilised in the analysis of response to this question.

To the off-line questionnaire, question number C.3 and the online questionnaire, question number 9.6, 30% of the respondents mentioned that their replaced or substituted mercury-containing medical measuring devices were stored in temporary storage by meeting the

Figure 4.42 **Handling of incident of broken mercury-containing medical measuring devices or mercury spills**

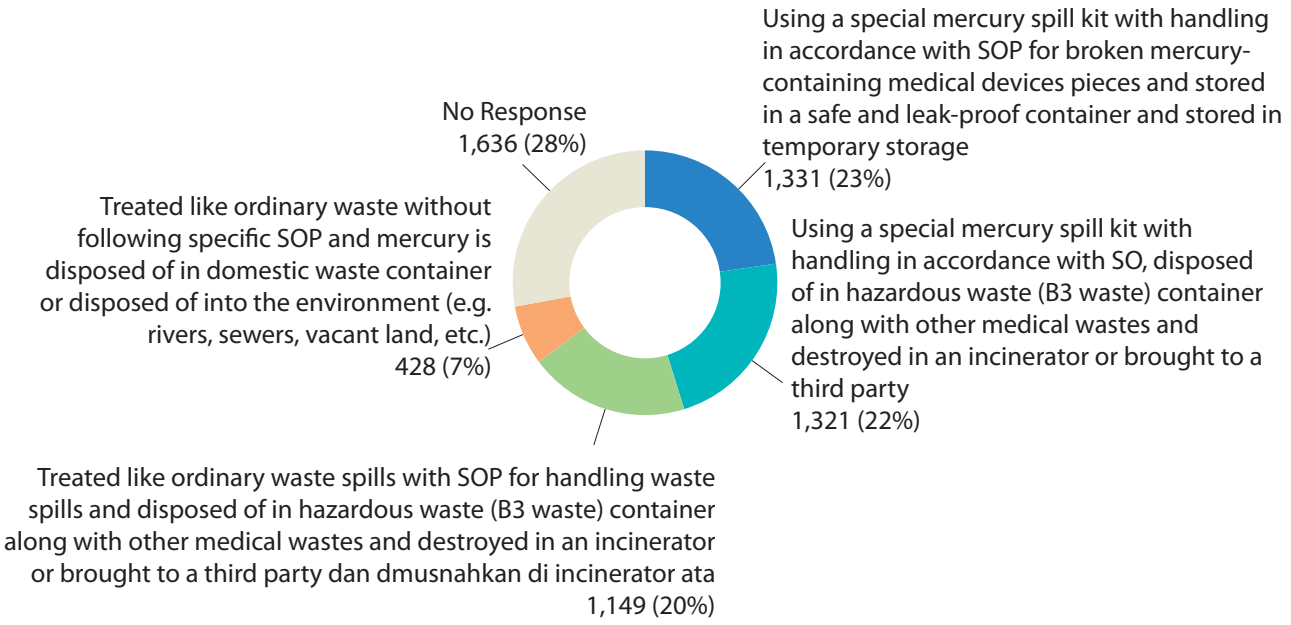
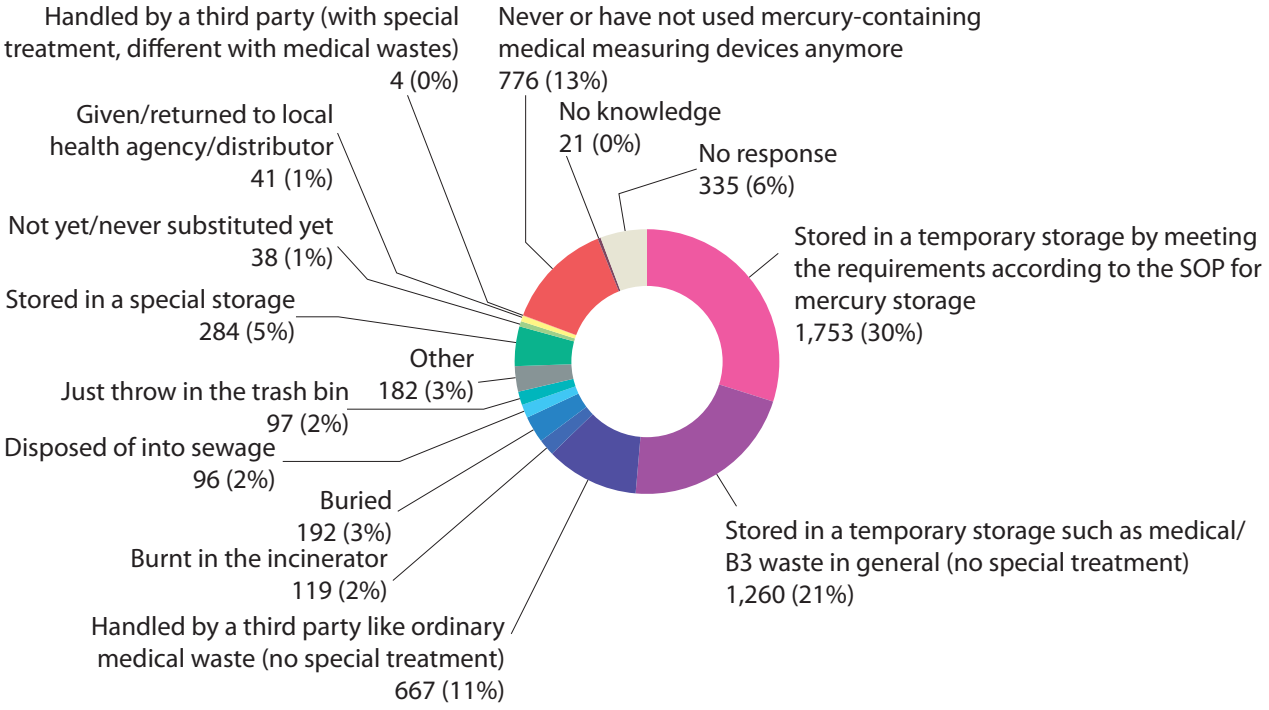


Figure 4.43 **Handling of replaced/substituted mercury-containing medical measuring devices**



requirements according to the SOP for mercury storage (Figure 4.43).

Figure 4.43 showed that the second most conducted handling of replaced/substituted mercury-containing medical measuring devices was storing them in a temporary storage such as medical/hazardous wastes in general with no special treatment (21%). Other responses included the mercury-containing medical measuring devices being stored in special storage but without further explanation, handled by a third party like ordinary medical wastes with or without special treatment, burnt in the incinerator, buried, disposed of into sewerage, thrown in the trash bin or given or returned to local health agency or distributor (26%). Thirteen percent (13%) of the respondents never used mercury-containing medical measuring devices anymore.

4.4.2. Disposal Destinations

During field visit, all the healthcare facilities mentioned that they had not used mercury-containing medical measuring devices anymore. The replaced/substituted mercury-containing medical measuring devices were stored in a container or special room pending further withdrawal from the government.

From the questionnaire responses as in Figure 4.42, other than being stored in a temporary storage at healthcare facilities, the broken mercury-containing medical measuring devices or mercury spills were also incinerated, brought to a third party, disposed of in domestic wastes container or disposed of into the environment (e.g., rivers, sewers, vacant land, etc.)

Figure 4.43 showed that other than being stored in a temporary storage for mercury or in a medical/general hazardous waste, the replaced/substitutes mercury-containing medical measuring devices are also handled by third party as general medical wastes with no special treatment, incinerated, buried, disposed of into sewerage or thrown in the trash bin, etc.

4.4.3. Encountered Problems in Discarded Mercury-Containing Medical Measuring Devices Management

During the kick-off meeting on 18 November 2019 in Jakarta, Mr. Dadan Wardhana Hasanuddin, the international consultant/programme advisor,

presented the methodological checklist and observation results from his rapid survey in health facilities in the Provinces of Banten and West Java.

From his field observation, current management gaps and constraints faced are identified as mentioned in the Summary Report of the Kick-off Meeting of this project. The gaps and constraints, among others, are as follows:

- Some facilities reported total replacement of mercury-based medical measuring devices. While some hospital and clinics sampled are aware of the ministerial decree and has started replacement of mercury-based medical measuring devices with aneroid sphygmomanometers and electronic sphygmomanometers, small facilities claimed lack of awareness of the Ministerial Decree to discontinue the use of mercury-based medical measuring devices;

- No collection service available and no knowledge on legal/proper disposal designation;

- Considerable additional investment needed for new devices procurement;

- Health practitioners reported various measurement deviation/inaccuracies with substituted devices (aneroid and digital sphygmomanometers) compared to mercury-based medical measuring devices.

During one meeting between MoH and BSCRC-SEA on 23 January 2020 in MoH building, international consultant appointed by AIT RRC.AP also joined the meeting. He presented the elements of the mercury-based medical devices situation assessments chart and spoke of the gaps and constraints faced by healthcare facilities as the result from his rapid survey. An MoH official mentioned that these gaps and constraints represented gaps and constraints faced by other healthcare facilities in provinces and regencies/cities in Indonesia.

During the kick-off meeting of this project, field visits were carried out on 19 November 2019 to three healthcare facilities in Jakarta to observe and interact with the key stakeholders in these facilities. Second field visit were carried out on 12 March 2020 to two healthcare facilities in Bekasi, a city surrounding Jakarta. Three of the total healthcare facilities were public health centres (puskesmas), which are relatively small in size compared to the hospitals.

All the healthcare facilities visited had stopped using mercury-containing thermometers and sphygmomanometers. The facilities had collected and stored the devices on site in a container in a separate room or a secured storage unit. However, there is concern regarding what to do after temporary storage, and authorities are unsure how to dispose of the devices in an environmentally sound manner.

As mentioned in Subsection 4.3.2.3, the three problems most faced by the questionnaire respondents were that they had not found official guidelines for the management of the discarded medical devices and materials containing mercury. Other problems were technical constraints related to containers, storage places for mercury-containing medical devices and spill kits that were not yet available, and unavailability of official/licensed service providers for collecting mercury and or mercury-containing medical devices.

In August and October 2020, MoH also conducted awareness raising on mercury-containing medical measuring devices elimination through video conference and live streaming, attended by a large number of participants from local health agencies and healthcare facilities where participants could interact and ask questions to MoH and MoEF. Local health agencies from various provinces presented the mercury-containing medical measuring devices elimination status and problems faced by the healthcare facilities related to discarded mercury-containing medical measuring devices management. The problems more or less are similar to the problems as having been identified above.

To address these healthcare facilities' concern, during the online awareness raising workshops, MoH elaborated on the regulations relevant to elimination and discarded mercury-containing medical measuring devices management at

healthcare facilities. And healthcare facilities' role and responsibilities in accelerating the elimination of mercury-containing medical measuring devices. MoH also highlighted the accuracy of non-mercury-containing medical measuring devices since the substitutes had permits before their distribution, and their prices were also relatively low. MoEF presented its policy and strategies in mercury elimination in the health sector.

4.4.4. Need for technical guidance to support the elimination and preventing its negative implications on public health and the environment

From desk study results, field visit observation and interview to selected healthcare facilities and the awareness raising workshops carried out by MoH as described in the above sections. There is a need for respondents in healthcare facilities to be provided with technical guidance to support the elimination and prevent its negative implications on public health and the environment. It is also confirmed by the responses to questionnaires, particularly questions number E.2, E.4, E.5 and E.6 of the offline questionnaire and questions number 10.1., 10.2.,10.3., and 10.5 of the online questionnaire discussed in the above sections.

4.4.5. The Most Needed Aspects of Technical Guidelines

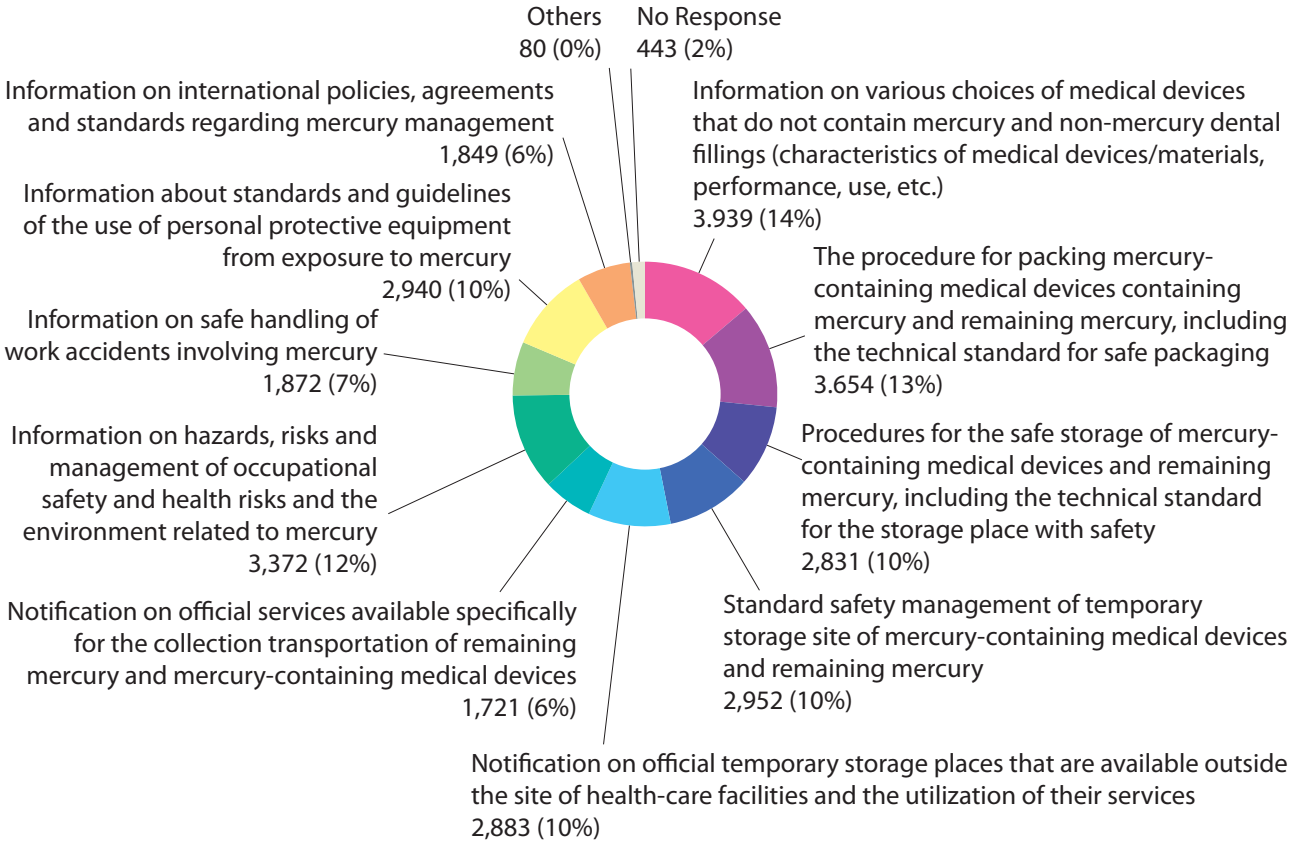
From desk study results, field visit observation, interview and responses to the off-line questionnaire, questions number E.2, E.4, E.5 and E.6 and the online questionnaire, questions number 10.1., 10.2., 10.3., and 10.5. as discussed in the sections above, it can be identified that the most needed aspects of technical guidelines, among others, are the risk of human exposure/exposure to mercury from medical devices and dental amalgam, the management of discarded medical devices and materials containing mercury, information on substitutes, etc.

Information on the aspects needed of technical guidelines was also obtained from the online questionnaire responses, particularly question number 10.7.

As can be seen in the Figure below, respondents said that the needed aspects were as follows:

- Information on various choices of medical devices that do not contain mercury and non-mercury dental fillings (characteristics of medical devices/materials, performance, use, etc.) (14%).
- The procedure for packing mercury-containing medical devices containing mercury and remaining mercury, including the technical standard for safe packaging (13%).
- Information on hazards, risks and management of occupational safety and health risks and the environment related to mercury (12%).
- Standard safety management of temporary storage site of mercury-containing medical devices and remaining mercury (10%).
- Information about standards and guidelines for using personal protective equipment from exposure to mercury (10%).
- Notification on official temporary storage places that are available outside the site of healthcare facilities and the utilization of their services (10%).
- Procedures for the safe storage of mercury-containing medical devices and remaining mercury, including the technical standard for the storage place with safety (10%).
- Information on safe handling of work accidents involving mercury (7%).
- Information on international policies, agreements, and standards regarding mercury management (6%).
- Notification on official services available specifically for the collection/transportation of remaining mercury and mercury-containing medical devices (6%).
- Other (government initiative, no knowledge, etc.) (0.3%).

Figure 4.44 **The Needed Aspects of Technical Guidelines**



Only 5,247 responses from the online survey questions were utilised for this question.

4.4.6. Aspects of guidance which are needed and not covered or lacking from the existing guidances

Based on information of needed aspects of guidance above, review on policies, laws, and regulations relevant to management of mercury and mercury wastes from healthcare facilities in Indonesia as (listed in Table 4.1), interviews with national authorities as well as with healthcare facilities during site visit and information from the online awareness raising workshops by MoH., The aspects which are not covered or lacking from the existing guidelines are as follows:

- The procedure for packing mercury-containing medical devices containing mercury and remaining mercury, including the technical standard for safe packaging.
- Notification on official services available specifically for the collection/transportation of remaining mercury and mercury-containing medical devices.
- Notification on official temporary storage places that are available outside the site of healthcare facilities and the utilization of their services.
- Information on international policies, agreements and standards regarding mercury management.

Other aspects have been covered in the existing regulations, e-catalogue by National Public Procurement Agency or covered in the existing regulations as general hazardous wastes. However, these aspects will also be covered in the technical guidelines to be developed focusing on mercury wastes.

4.5. Encountered problems and comments

The project indicates a variety of problems and constraints and limitations in several phases of the inventory. Some that can be pointed out early have been addressed while others might be categorized as a lesson learnt. Early identifiable problems are as follows:

- The onset of the Covid-19 pandemic has affected movement and conduct of project activities including participation in field visits by key project team members and experts from outside of Indonesia. Presidential directive which made the containment of the pandemic affected the level of participation and involvement of some stakeholders including the DOH in the field exercises. These challenges were particularly encountered at the regional health facilities.

- These unfortunate events stalled the process of compilation, preparation, and processing of the already sent questionnaire by 18 February 2020. Up until the end of April, from more than 23,000 health care facility all over Indonesia, only 849 submitted their responses and these was compiled by representative from MoH then sent and received by the executing agency on 6 May 2020.

- During the regular meetings between the core team of the project, the International Consultant raised an idea to help increase response number in this unfortunate event by sending an online questionnaire, particularly Google Form for better familiarity and accessibility.

- Other non-technical problems and constraint front onto executing agency are listed hereunder for consideration for other project bearers considering or wishing to conduct the same inventory of mercury-containing medical devices.

- Timing constraint from public holiday, during the end of 2019 there are quite a lot of public holiday as well as many other in Q2 of 2020 such as the holy month of Ramadhan and Hari Raya

- Communication flow between Executing Agency, Implementing Agency, International Consultant, Government Partner and other respective agency or organization are also hampered during the pandemic since time is of essence in some occasion.

- Since the presidential called out to all civil service staff to focus on the combat to pandemic and the Large-Scale Social Restriction, initial plan to have a field visit, validation of submitted response, and understanding the situation first hand is not possible. This made the need to accept that some tasks and milestones have a more lenient reception. Complete detail on this matter is reported separately in technical problems.

Technical problems, constraint and limitation encountered during the project are also listed hereunder for consideration.

- The most important lesson learnt from using google form is that it is recommended to use google sheet to process raw data since the extension are commonly not the same between .xls and .xlsx to the native format of google form, which is .csv. The first time preparing and processing the raw data, all the data is literally unreadable and was in code when processing using different data processing software. By copying one row of data from google sheet to Ms Excel for example, if by some means is successful and the program responding, copied data is missing a lot of information. In this case, if using MS Excel is the more preferable, than before doing anything else, install the newer version of MS excel for better compatibility and ensure the data is valid so that data processing is not done several occasions.

- During data preparation, it was understood that open ended questions required more time and resources to work with. A closed question with multiple choices is preferable since there will be less need to uniformize all questions.

- A lot of respondents answer “other” in many questions and proceeded by writing their own version of what is virtually and essentially the same as the multiple choices already provided. In this matter, questions that are not urgent to have “other” as one of the choices are preferable.

- A lot of respondents are answering many invalid answers such as answering “not having SOP” but answered that they followed certain guidelines for their SOP.

- Direct detailed instruction needs to be put in a question to ensure no miscommunications or respondents that decide to answer haphazardly. For example, in the question of the name of a healthcare facility, there should be an instruction to write the Health Care Facility as noted in their operational permit, practice permit, etc., so the chance that respondents were answering only “Hospital” or “Private Practice” is minimized.

- Putting general information mentioned in the international guidelines in the questions requiring specific data such as “mercury content”. For example, an international guideline mentions that in general, mercury content in thermometer ranges from 0.5-1.5 grams. This is to ensure there are no extreme answers that will ruin the validity of statistical standard deviation.

- This project questionnaire is a joint questionnaire with MoH for their obligation to conduct an inventory nationwide as mandated in the Presidential Decree. Hence, many of the questions are outside of the scope of this project such as the inventory of dental amalgam. This created another problem for general questions for all mercury containing medical devices such as the question of “substitution time”. Many respondents answer “no dental amalgam”, “no dental practice” etc.

All of this possibly makes the invalidity of the data relatively high, so understanding the time constraint, is made understood the need to accept the data as it is and the executing agency more lenient in reading the data.

GAP ANALYSIS BETWEEN EXISTING POLICY FRAMEWORK AND ACTUAL PRACTICES IN THE FIELD AND REQUIREMENTS OF THE RELEVANT CONVENTIONS, TECHNICAL GUIDELINES OF THE BASEL CONVENTION AND OTHER RELEVANT INTERNATIONALLY RECOGNIZED GUIDELINES

5.1. Objective

The objective of this activity is to identify and analyse gaps between existing policy framework and actual practices in the field and requirements of the relevant conventions, technical guidelines of the Basel Convention and other relevant internationally recognized guidelines to support the development of the guidelines on ESM of mercury wastes.

5.2. Mapping the existing guidelines and best practices on esm of mercury wastes from medical measuring devices

Mapping the existing guidelines and best practices on ESM of mercury wastes from medical measuring devices is conducted to identify the guidelines and best practices to be used for the gap analysis. The result of the mapping can be seen in Appendix 9.

5.3. Gap analysis between existing policy framework and actual practices in the field

The gap analysis between existing policy framework and actual practices in the field can be seen from Subchapter 4.4.

5.4. Gap analysis between existing policy framework and requirements of the relevant convention, technical guidelines of the basel convention and other relevant internationally recognized guidelines

Gap identification is conducted through developing a checklist between main provisions for elimination and withdrawal of mercury-containing medical devices in healthcare facilities and coverage in relevant conventions, technical guidelines of the Basel Convention and other relevant internationally recognized guidelines. The main provisions follow the measures for elimination and withdrawal of mercury-containing medical devices in healthcare facilities as set out in Annex of the Minister of Health Regulation Number 41 Year 2019. The checklist tables are provided in Appendix 10.

The relevant conventions compared for the gap identification are the Minamata Convention on Mercury and the Basel Convention on The Control of Transboundary Movements of Hazardous Wastes and Their Disposal. The Minamata Convention covers provisions for mercury as hazardous substances and the Basel Convention for mercury wastes. As the nature of conventions, their coverage is general, and they further refer to international guidelines or standards. Hence, although included in the checklist table, the gap analysis will compare mostly the national regulations and the technical guidelines.

The relevant national regulations identified for the fulfillment of the main provisions are as follow:

- Government Regulation Number 22 Year 2021 concerning Implementation of Environmental Protection and Management (PP 22/2021);
- Minister of Environment and Forestry Regulation Number 14 Year 2013 concerning Symbol and Label of Hazardous Wastes (Permen LHK 14/2013);
- Minister of Environment and Forestry Regulation Number P.56/MENLHK-SETJEN/2015 concerning Procedure and Technical Requirement for Hazardous Wastes Management from Healthcare Facilities (Permen LHK P.56/2015);
- Minister of Environment and Forestry Regulation Number P.74/MENLHK/SETJEN/KUM.1/10/2019 concerning Hazardous Substances and/or Hazardous Wastes Emergency Response Program (Permen LHK P.74/2019);
- Minister of Health Regulation Number 7 Year 2019 concerning Environmental Health in Hospitals (Permenkes 7/2019);
- Minister of Health Regulation Number 41 Year 2019 concerning the Elimination and Withdrawal of Mercury-Containing Medical Devices in Healthcare Facilities (Permenkes 41/2019);
- Minister of Environment and Forestry Regulation Number P.12/MENLHK/ SETJEN/PLB.3/5/2020 concerning Storage of Hazardous Wastes (Permen LHK P.12/2020);
- National regulations for hazardous wastes transportation are listed in Subsection 5.4.2.3.

Except the Permenkes 41/2019, the national regulations cover hazardous wastes in general and not specific on mercury wastes as they are categorized under hazardous wastes. Therefore, some provisions of these national regulations cover generally or only partially the provisions as set out under the international technical guidelines.

The technical guidelines identified for the gap analysis are as follow:

- Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with mercury or mercury compounds (Adopted by the Basel Convention COP 12, Decision BC-12/4, May 2015);
- Guidance on the cleanup, temporary or intermediate storage, and transport of mercury wastes from healthcare facilities (UNDP-GEF Global Healthcare Wastes Project, 2010).

The UNEP technical guidelines are selected as they are the internationally recognized guidelines on managing of mercury wastes from various mercury sources. The UNEP technical guidelines refer to the UNDP-GEF Guidance for mercury wastes management specific from healthcare facilities. However, the UNDP-GEF Guidance do not cover provisions for treatment and disposal of the mercury wastes from healthcare facilities as the topics are covered under the UNEP technical guidelines. The detail provisions in the checklist table in Appendix 10 of this document follow the provisions as set out in the UNDP-GEF Guidance.

5.4.1. General provision

5.4.1.1. Terminology (wastes definition)

The Basel Convention defines wastes as “substances or objects which are disposed of or

are intended to be disposed of or are required to be disposed of by the provisions of national law." Mercury wastes are defined as hazardous wastes under the scope of the Convention in Article 1.

The Minamata Convention defines mercury wastes in Article 11 as follows:

> 4. The relevant definitions of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal shall apply to wastes covered under this Convention for Parties to the Basel Convention. Parties to this Convention that are not Parties to the Basel Convention shall use those definitions as guidance as applied to wastes covered under this Convention.
>
> 5. For the purposes of this Convention, mercury wastes mean substances or objects:
>
>   - Consisting of mercury or mercury compounds;
>
>   - Containing mercury or mercury compounds; or
>
>   - Contaminated with mercury or mercury compounds,
>
> in a quantity above the relevant thresholds defined by the Conference of the Parties, in collaboration with the relevant bodies of the Basel Convention in a harmonized manner, that are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law or this Convention. This definition excludes overburden, wastes rock and tailings from mining, except from primary mercury mining, unless they contain mercury or mercury compounds above thresholds defined by the Conference of the Parties.

PP 22/2021 defines hazardous wastes as the wastes from a venture and/or activity that contains hazardous substance. Hazardous substance is defined as any substance, energy, and/or other component which due to its nature, concentration, and/or quantity can directly or indirectly, contaminate, damage the environment, and/or endanger the environment, health, and lives of man and other living creatures (Indonesia uses the term Bahan Berbahaya dan Beracun, abbreviated as B3, for hazardous substances). Mercury-containing medical devices are categorized as hazardous wastes in Annex IX, Table 3 of PP 22/2021 as medical devices containing heavy metals, including mercury (Hg), cadmium (Cd), and its kind (wastes code A337-5, danger category 1).

5.4.1.2. Written policy from healthcare facilities

The requirement for written policy for elimination and withdrawal of mercury-containing medical devices from healthcare facilities is specified only in Permenkes 41/2019 and UNDP-GEF Guidance.

5.4.1.3. Inventory of mercury-containing medical devices by healthcare facilities

The provision of conducting inventory of mercury-containing medical devices by healthcare facilities is set out under Permenkes 41/2019, while both the international technical guidelines mention it but not in detail.

5.4.1.4. Substitution of mercury-containing medical devices with non-mercury-containing medical devices

Substitution of mercury-containing medical devices with non-mercury-containing medical devices is covered under both the international technical guidelines and all the national regulations except the Permen LHK P.74/2019 since it is specific for hazardous substances and/or hazardous wastes management emergency program and Permen LHK P.12/2020 for technical requirements for storage and collection of hazardous wastes. The coverage in some of the national regulations is general for reduction of hazardous wastes through avoiding use of material containing hazardous substances while

others are specific for the substitution of mercury-containing medical devices.

5.4.1.5. Mercury wastes packaging

Provisions for mercury wastes packaging are covered generally as hazardous wastes or hazardous medical wastes in all national regulations, except Permenkes 41/2019 which is specific for medical wastes from healthcare facilities. However, specific requirements of using original case or box in good condition and packing material options for unbroken devices are mentioned only in the international technical guidelines and not in the national regulations. These packaging requirements could be addressed in the Guidelines on ESM of mercury wastes to be developed.

5.4.1.6. Mercury wastes identification (symbol and labeling)

The provisions for mercury wastes symbol and labeling are covered in all national regulations as hazardous wastes or hazardous medical wastes in general, except Permenkes 41/2019 which mentions specifically mercury wastes from healthcare facilities. There is a specific national regulation for the provision of hazardous wastes symbol and labeling, namely Permen LHK 14/2013. Other national regulations refer to this regulation for hazardous wastes symbol and labeling requirements.

Permen LHK 14/2013 obliges each person managing hazardous wastes to give symbol and label to the hazardous wastes. The symbol is given based on the hazardous wastes' characteristics. The characteristics are explosive, flammable, reactive, toxic, infectious, corrosive and dangerous to environment. Procedures of attaching and printing the symbol and labeling procedures are further regulated in the annex of the regulation.

The UNDP-GEF Guidance outlines provisions for giving both symbol and label to the containers, on-site storage facility and intermediate storage facility. In Article 2, Permen LHK 14/2013 regulates that symbols are given to containers and/or packaging, storage facility and transporters of hazardous wastes while label is given only to containers and/or packaging of hazardous wastes.

5.4.2. Broken mercury-containing medical devices management

Under Permenkes 41/2019, mercury-containing medical devices from healthcare facilities are divided into 2 (two) categories with separate management, namely the broken mercury-containing medical devices and the non-broken/still intact mercury-containing medical devices. For broken mercury-containing medical devices, Permenkes 41/2019 regards them as hazardous wastes and their management refers to existing national regulations on hazardous wastes.

5.4.2.1. Clean-up of mercury spill

This provision is explicitly covered in Permenkes 7/2019 and Permenkes 41/2019. The UNEP technical guidelines also cover this provision but not in detail while the UNDP-GEF Guidance covers it in detail for small spills only, not mentioning large spills. However, it provides more detailed step-by-step instructions for the clean-up procedure of small spills than Permenkes 41/2019.

Under Permenkes 41/2019, after the clean-up of a mercury spill, there will be three containers, namely container of broken glass pieces of mercury-containing medical devices, container of mercury and container of contaminated powder. The broken glass pieces of mercury-containing medical devices can be treated with hazardous wastes treatment; however, mercury and contaminated powder will be stored safely.

In the Guidelines on ESM of mercury wastes to be developed, several step-by-step instructions in the UNDP-GEF Guidance that which are considered applicable can be included to elaborate or provide more information or reference for the clean-up of mercury spills in Permenkes 41/2019.

5.4.2.2. Mercury wastes on-site temporary storage

All the national regulations cover this provision as hazardous wastes or hazardous medical wastes in

general. Hence, specific requirements for mercury wastes as set out in the UNDP-GEF Guidance are not all or partially covered in the national regulations.

Permen LHK P.12/2020 and Permenkes 7/2019 require for an adequate air ventilation system to prevent gas accumulation in the storage facility, but do not specifically mention that the exhaust fan should not direct air towards crowded areas and should be far from any air intake vents.

There is a requirement for the provision of a drain in storage space in the national regulations but not to mention the detailed specification of an easily accessible and replaceable drain trap to capture mercury in the event of a spill. Specific temperature and humidity for the storage facility are also not regulated in the national regulations.

According to UNDP GEF Guidance, mercury-contaminated wastes that include broken glass or other items with sharp edges or points (e.g., broken thermometers) should be placed in a primary container that is puncture-resistant and air-tight. As a redundant safety measure, the primary container should be placed in a secondary container that further prevents the release of mercury vapor.

Permenkes 41/2019 requires that broken glass pieces of devices from the clean-up of mercury spills are contained in a puncture-resistant container (broken glasses safeguarding). Requirements for a container in Permen LHK P.12/2020 mention that one of the requirements for packaging/containing hazardous wastes is that containers should secure the contained wastes.

However, the national regulations do not mention as in the guidelines that mercury-contaminated wastes should be placed in an airtight primary container and as a redundant safety measure, the primary container should be placed in a secondary container that further prevents the release of mercury vapor.

There is also a requirement for inspection for hazardous wastes containers and housekeeping, but not specifically mentioned as in the guidelines, which are inspection on ventilation, the condition of personal protective equipment (PPE) and wash area, spill kit contents, and updated records.

As mentioned in Subsection 5.4.2.1, only broken glass pieces of devices will be stored as hazardous wastes while the mercury and contaminated powder will be stored safely. Hence, the risk of these broken device's pieces being contaminated with mercury, is not considered very high.

In this regard, the provisions in the national regulations on hazardous wastes and hazardous medical wastes from healthcare facilities for on-site hazardous wastes temporary storage may be considered sufficient and not need to be as stringent for the mercury wastes from healthcare facilities as in the guidelines. For example, the requirement for detailed specification of drain trap to capture mercury in the event of the spill may not be required.

However, certain provisions in the UNDP-GEF Guidance could apply and be included in the Guidelines on ESM of mercury wastes to be developed as follows:

- Mercury-contaminated wastes that include broken glass or other items with sharp edges or points (e.g., broken thermometers) should be placed in a primary container that is puncture-resistant and air-tight. As a redundant safety measure, the primary container should be placed in a secondary container that further prevents the release of mercury vapor.

- The primary container should be marked with the type of mercury wastes, the estimated amount, the date the material was placed in the container, and additional description if necessary. If the secondary container is not transparent or the label on the primary container cannot be seen, a label should also be placed outside the secondary container;

- Inspection to check for leaks, corroded or broken containers, improper storage methods, ventilation, the condition of the PPE and wash area, and updated records every month.

5.4.2.3. Off-site transportation

Under Permenkes 41/2019, transportation of broken mercury-containing medical devices is carried out as follows:

- Withdrawal of broken mercury-containing medical devices and mercury escaped from medical devices uses hazardous wastes transporters according to regulatory framework;
- Transportation of mercury wastes from healthcare facilities must be carried out by licensed hazardous wastes transporters according to regulatory framework.

The environmental national regulations cover the provisions for mercury wastes transportation as hazardous wastes or hazardous medical wastes in general. Specific vehicle and their operational requirements are covered under national transportation regulations for hazardous substances or dangerous goods as follows:

- Government Regulation Number 74 Year 2014 concerning Road Transport
- Government Regulation Number 30 Year 2021 concerning Implementation of Traffic Field and Road Transport;
- Minister of Transportation Regulation Number PM 90 Year 2013 concerning Safety of Transportation of Dangerous Goods by Airplane as amended by Minister of Transportation Regulation Number 58 Year 2016;
- Minister of Transportation Regulation Number 29 Year 2014 concerning Maritime Environment Pollution Prevention;
- Minister of Transportation Regulation Number PM. 48 Year 2014 concerning Procedures for Loading, Arranging, Transporting and Unloading of Goods by Train as amended by Minister of Transportation Regulation Number PM. 52 Year 2016;
- Minister of Transportation Regulation Number PM. 60 Year 2019 concerning Implementation of Transportation of Goods By Motor Vehicle on the Road;
- Minister of Environment and Forestry Regulation Number P.4/ MenLHK/ Setjen/ Kum.1/1/2020 concerning Transportation of Hazardous Wastes;
- Minister of Transportation Decree Number KM. 17 Year 2000 concerning Guidelines for Handling of Dangerous Material/Goods In Shipping Activities in Indonesia as amended by Minister of Transportation Regulation Number: KM. 02 Year 2010.
- Director General of Land Transportation Decision Letter No. SK.725/AJ-302 DRJD/2004 concerning Transportation of Hazardous Substances on the Road;
- Circular Letter of Director General of Sea Transportation Number UM. 003/1/2/DK-15 concerning Hazardous Wastes Transportation for Ship Carrying Indonesian Flag.

As the relevant national regulations regulate transportation of hazardous wastes in general and not specific on mercury wastes, there are some requirements in the guidelines that are not specified in the national regulations., Such as provision that empty air-tight containers, plastic bags, spill kits, cleaning equipment, and decontaminating agents should be carried in a separate compartment in the vehicle, as well as requirements that containers should not be stacked more than 1.5 meters high to avoid crushing items.

The current national regulations for hazardous wastes and hazardous medical wastes transportation are considered already sufficient for the mercury wastes from healthcare facilities to be treated as hazardous wastes according to Permenkes 41/2019 (broken glass pieces of devices from clean-up of mercury spill). However, provision from the UNDP-GEF Guidance could apply and be included in the Guidelines on ESM of mercury wastes to be developed, which is provision that empty air-tight containers, plastic bags, PPE, cleaning equipment, and

DanWHS, 2019

DanWHS, 2020

decontaminating agents should be carried in a separate compartment in the vehicle.

5.4.2.4. Manifest system

The manifest system is required in the national regulations under PP 22/2021, Permen LHK P.56/2015, Permen LHK 01/2020. The regulations oblige that the generator and the licensed transporter should keep a copy of the manifest or consignment note, however there is no specific requirement that it should be kept for at least five years from the date of shipment as set out in the technical guidelines.

In the Guidelines on ESM of mercury wastes to be developed, a requirement for minimum period of keeping a copy of manifest for generator and the licensed transporter could be suggested.

5.4.2.5. Collection facility/intermediate storage

The national regulations cover the provision of collection of mercury wastes as hazardous wastes or hazardous medical wastes in general, hence, specific requirements for mercury wastes collection as set out in the guidelines are not all or only partially covered under the national regulations. PP 22/2021 mentions in general that hazardous wastes storage facility should be compatible with amount and characteristics of hazardous wastes, but does not specify that the estimated maximum volume should account for different types of mercury wastes (Appendix 10, point 4.2.a of Table 1).

Permen LHK P.12/2020 regulates that collection facility should have fire extinguisher equipment and system and emergency door and alarm but does not specify for inspection of the fire extinguishers and selection of kinds of fire extinguisher consistent with classes of fires that may be possible in the facility and taking into account specific safety consideration for mercury wastes (Appendix 10, point 4.2.e of Table 1).

Requirements for provision of PPE, first aid medical supplies, wash areas, cleaning equipment and spill handling equipment are regulated in Permen LHK P.56/2015 and Permen LHK P.12/2020, but the national regulations do not specify spill cleanup kits and their contents (Appendix 10, point 4.2.g of Table 1).

Permen LHK P.12/2020 sets out provision for drainage system connected to a separate collection tank, but as the regulation is not specific for mercury wastes, it does not require for accessible and replaceable drain trap to capture mercury in the event of spill (Appendix 10, point 4.2.h of Table 1).

Regarding the provision of receiving area as in the guidelines, there is a requirement for loading and unloading facility in Permen LHK P.12/2020. The regulation does not provide specific requirements for receiving and inspection areas as outlined in the guidelines (Appendix 10, point 4.3 and 4.4 of Table 1). However, the regulation has a requirement that if a hazardous wastes container starts to degrade (for example, corroded or permanent damage) or leaking, the hazardous wastes should be transferred to other containers fulfilling requirements as containers for hazardous wastes. Permen LHK P.56/2015 covers provision for PPE for staff (Appendix 10, point 4.4.f of Table 1).

Permen LHK P.12/2020 and Permen LHK P.56/2015 have requirements for storage area as outlined in the guidelines. Permen LHK P.56/2015 requires that the storage location should have warning sign that says it is for storage of medical wastes and only for authorized persons. Warning signs are also regulated under Permen LHK 14/2013. However, the national regulations do not specify that copies of the spill response and emergency procedures should be on display in the storage area and kept with the spill cleanup kits and PPE (Appendix 10, point 4.5.a of Table 1).

As the national regulations are not specific for mercury wastes, there is no provision for periodic monitoring of mercury levels in ambient air (Appendix 10, point 4.5.b of Table 1). Permen LHK P.56/2015 regulates that the storage area should have an impermeable floor, concrete or cement floor with good, easily cleaned, and disinfected drainage system. Permen LHK P.12/2020 also regulates that floor of the collection storage facility should be waterproof and not bumpy, resistant to corrosion and fire (point 4.5.c of Table 1). The national regulations do not provide

for specification for shelving and storage racks to support the weight of mercury wastes (Appendix 10, point 4.5.e of Table 1).

Permen LHK P.12/2020 regulates that hazardous wastes container should be able to safeguard the wastes in it and Permen LHK P.12/2020 and Permen LHK P.56/2015 regulate that location of hazardous medical wastes storage should be flood-free and not prone to natural disaster, or can be engineered with technology for environmental protection and management, if not flood-free and prone to natural disaster. The national regulations do not specify for additional bracing, straps, and cushioning of containers to prevent movement and breakage of containers in area of seismic activity. Permen LHK P.12/2020 requires recording the hazardous wastes collection activity at storage facility but does not specifically mention the detailed requirements for the administrative area as in the guidelines (Appendix 10, point 4.6 of Table 1).

For the collection storage facility, the guidelines outline specific procedures to fulfill. The national regulations cover most of the procedures, however, as mentioned above, the national regulations are not specific for mercury wastes, hence specific requirements are not covered or covered in general.

For example, the national regulations do not specifically mention the following requirements in the guidelines:

- When receiving the wastes, the containers should go through an initial visual inspection to determine the condition of the packaging and containers without opening the primary and secondary containers. If a leak or breakage is suspected, the wastes should be brought immediately to the inspection area (Appendix 10, point 4.7.2.e of Table 1);

- After the initial inspection, the wastes should be brought to the inspection area for a more detailed inspection of the physical integrity and seal of the primary and secondary containers, to check for possible breakage of contents and proper labeling, and to validate the amount of mercury wastes (e.g., weight of containers, number of bags, number of fluorescent lamps, etc.). If outer containers have to be opened to test for suspected leaks, this should be done under the fume hood (local exhaust ventilation). Mercury probes or detector tubes could also be used to verify suspected leaks (Appendix 10, point 4.7.2.f of Table1);

- The storage area for mercury wastes should be routinely monitored, including daily readings of mercury levels in ambient air; weekly inspections for leaks and corroded or broken containers, and improper methods of storage, as well as routine tests of the burglar alarms, fire alarms, fire suppression systems, and exhaust ventilation; and monthly inspections of the condition of the PPE and wash units, spill kit contents, flooring (to check for cracks), and files. inspection logs including the inspection dates, observations, name, and signature of the inspector should be kept and made available to regulatory authority as may be required by law.

As the on-site hazardous wastes' temporary storage, the provisions in the national regulations on hazardous wastes and hazardous medical wastes from healthcare facilities for hazardous wastes collection facility may be considered sufficient and not need to be as stringent for the mercury wastes from healthcare facilities as in the guidelines. However, certain provisions in the UNDP-GEF The Guidance could apply and be included in the Guidelines on ESM of mercury wastes to be developed, such as an initial visual inspection to determine the condition of the packaging and containers, weekly inspections, and other requirements as applicable.

5.4.2.6. Treatment and/or disposal facility

The final treatment of mercury wastes is detailed in the UNEP technical guidelines and not covered in the UNDP-GEF Guidance. Permenkes 41/2019 requires that the treatment of broken mercury-containing medical devices follows the national regulations for treatment of hazardous wastes.

Treatment of hazardous wastes and medical wastes from healthcare facilities is already is covered in the national regulations and procedure requirements for export of hazardous wastes.

5.4.3. Unbroken mercury-containing medical devices management

Under Permenkes 41/2019, unbroken or still intact mercury-containing medical devices are regarded as unused assets and will be treated as medical devices and not regarded as hazardous wastes. While the broken mercury-containing medical devices fall under the regime of hazardous wastes and follow the national regulations of hazardous wastes, the unbroken mercury-containing medical devices are specifically regulated under Permenkes 41/2019. Therefore, the national regulations on hazardous wastes do not to unbroken mercury-containing medical devices.

5.4.3.1. Temporary storage at healthcare facilities (special room)

According to Permenkes 41/2019, unbroken mercury-containing medical devices should be stored in a special room as temporary on-site storage before further withdrawal process to storage depot. In the UNDP-GEF Guidance, the specific requirements for siting and preparation, space design, labeling and signage and general procedures are the same as for broken mercury-containing medical devices, unbroken mercury-containing medical devices and elemental mercury from healthcare facilities since they are all categorized as hazardous wastes under the guidelines. Hence, comparison between the requirements for the special room in Permenkes 41/2019 and temporary on-site storage in the guidelines may not be suitable since in the Permenkes 41/2019, unbroken mercury-containing medical devices are not regarded as hazardous wastes and therefore the requirements for the special room are not as stringent as in the guidelines. However, Permenkes 41/2019 also covers some requirements of the temporary on-site storage as in the guidelines.

The requirements for container for unbroken mercury-containing medical devices are as follows:

- The container must be distinguished based on types of mercury-containing medical devices
- The container must be strong, not easily leak or crack, and sealed;
- The container must have good lid and not damaged;
- The container must protect mercury-containing medical devices so that they will not bump and break inside the container;
- The size of the container according to needs;
- The container must be attached with label/ sign with information on types and number of mercury-containing medical devices;
- The container is placed in a location not easily reached.

The requirements for the special room for the temporary storage of unbroken mercury-containing medical devices are as follows:

- The room should have adequate space;
- The room must be safe from possibility of damage and leak which may cause mercury spills from medical devices;
- The room can be locked and only accessed by authorities designated by the healthcare facility management (not easily access by public);
- The room should have adequate lighting and ventilation;
- The room should have record of the stored mercury-containing medical devices.
- The temporarily stored mercury-containing medical devices must be given label or sign for easy identification.

5.4.3.2. Elimination of state-owned assets for government-owned healthcare facilities

The elimination of state-owned assets for government-owned healthcare facilities is among the requirements prior to withdrawal of mercury-containing medical devices under Permenkes 41/2019. Procedures for elimination of state-owned mercury-containing medical devices which are procured through State Budget (APBN) are carried out according to regulatory framework concerning procedures for elimination of state-owned goods. As for mercury-containing medical devices which are procured through Regional Budget (APBD), the procedures are carried out according to regulatory framework concerning elimination of regional-owned goods. The mercury-containing medical devices eliminated according to provisions of elimination of state/regional-owned goods and collected in a special room in healthcare facilities, will gradually be withdrawn. Technical guidelines do not cover this provision.

5.4.3.3. Off-site transportation

As the discussion result of the Inception Workshop of Mercury-Containing Medical Devices Management Project in Indonesia on 11 March 2020 in Jakarta, Indonesia, transportation for the unbroken mercury-containing medical devices will not follow the transportation for hazardous wastes regime. Hence, comparison between the transportation requirements in Permenkes 41/2019 and the technical guidelines may not be suitable. Under Permenkes 41/2019, transportation of unbroken mercury-containing medical devices is carried out with a motor vehicle transporter and in containers which are safe and do not break easily.

A Ministerial Regulation is currently being drafted to address the transportation requirements for these unbroken mercury-containing medical devices. During the Inception workshop, it was also expected that the Guidelines on ESM of mercury wastes included:

- Standard for packaging of unbroken mercury-containing medical devices which is feasible for Indonesia but still fulfill safety requirements to prevent them from damage during transportation. Current scheme is to use primary and secondary containers and further wrapped with plastic;
- Technical requirements for transportation of unbroken mercury-containing medical devices but not using licensed transporter for hazardous wastes.

5.4.3.4. Collection facility (storage depot)

Permenkes 41/2019 provides for collection mechanism of unbroken mercury-containing medical devices from the temporary on-site storage or special room in healthcare facilities, however, it does not provide provisions for the technical requirements for the collection facility since by the Ministry of Environment and Forestry will provide it. A Ministerial Regulation is currently being drafted to provide technical requirements for this activity.

Since unbroken devices will not be treated as hazardous wastes, the requirements for the collection facility may not be as stringent, but still fulfill safety requirements to prevent the stored devices from any damage. In addition, the withdrawal process of unbroken devices from healthcare facilities and their collection will be one time only since it is expected that there will be no mercury-containing medical devices in healthcare facilities in the future. Therefore, some of the specific provisions in the UNDP-GEF Guidance may not be considered required.

However, some provisions in the UNDP-GEF Guidance could apply and be included in the Guidelines on ESM of mercury wastes to be developed, such as siting and preparation requirements (location, access, security) and overall design requirements (adequate size, provision of ventilation, fire extinguisher, PPE, spill cleanup kits, first-aid medical supplies, wash areas, warning signs, periodic monitoring of mercury levels in ambient air, segregation of mercury wastes based on types, other requirements as applicable), administrative and record-keeping, manifest system and storage facility procedures (trained storage facility staff, initial visual inspection of packaging,

routine monitoring and weekly inspections, other requirements as applicable).

5.4.3.5. Treatment Facility

Permenkes 41/2019 provides for final storage or export as the final step of measures for elimination and withdrawal of mercury-containing medical devices from healthcare facilities, however it does not provide provisions for technical requirements or mechanisms for the final storage or export of the unbroken mercury-containing medical devices. A ministerial regulation is currently being drafted to address this issue.

5.5. Conclusion— gap analysis

- Following initial design to pursue other source of primary data other than questionnaires to acquire information concerning total quantities of mercury-containing medical measuring devices in existence, obtaining importation data was attempted by sending letter of request of data to Directorate General of Custom and Excise Ministry of Finance, in addition to letter to Directorate General of Pharmacy and Medical Devices, Ministry of Health, with assistance from MoEF. However, until this document draft finalization, there are no significant responses where needed data delivered.

- The selected healthcare facilities visited did not have difficulties in the elimination process of mercury-containing medical devices, but there is concern regarding withdrawal process and mechanism or what to do after temporary storage.

- From the questionnaire results, most respondents (63%) did not response or responded that they never handled broken mercury-containing medical measuring devices or mercury spills or did not have any information. Other than handling methods according to the national regulations for hazardous wastes, the broken mercury-containing medical measuring devices or mercury spills were also stored in certain containers and places in the healthcare facilities area without safeguarding, buried in the land of healthcare facilities, discharged into drains, or thrown into the trash bin by 9% of the respondents. Eleven (11%) of the respondents provided various responses such as handling according to SOP, incinerated, returned to government, sent for repair, cooperated with other hospitals having treatment permit, etc.

- For handling of an incident of broken medical device or mercury spills, only 23% of the respondents answered that they used a special mercury spill kit with handling in accordance with an SOP for broken mercury-containing medical devices pieces, stored them in a safe and leak-proof container and stored in temporary storage and 30% of the respondents mentioned that their replaced or substituted mercury-containing medical measuring devices were stored in a temporary storage by meeting the requirements according to the SOP for mercury storage.

- The three problems most faced by questionnaires respondents are that they had not found official guidelines for the management of the discarded medical devices and materials containing mercury. Other problems were technical constraints related to containers, storage places for mercury-containing medical devices and spill kits that were not yet available, and unavailability of official/licensed service providers for collecting mercury and/or mercury-containing medical devices.

- From field observation and awareness raising workshops conducted by MoH, the gaps and constraints faced by healthcare facilities, among others, are as follows:

  - Lack of awareness of the Ministerial Regulation to discontinue the use of mercury-based medical measuring devices;

  - No collection service available and no knowledge on legal/proper disposal designation;

- Considerable additional investment needed for new devices procurement;
- Health practitioners reported various levels of measurement deviation/inaccuracies with substituted devices (aneroid and digital sphygmomanometers) compared to mercury-based medical measuring devices.

- Except for Permenkes 41/2019, currently there is no national regulation in Indonesia specific for management of mercury wastes from healthcare facilities. Mercury wastes are categorized as hazardous wastes and their regulations follow the national regulations for hazardous wastes. Permen LHK P.56/2015 regulates the hazardous medical wastes specific from healthcare facilities, but not specific on mercury wastes. The UNEP technical guidelines cover provisions specific for mercury wastes from various sources and the UNDP-GEF Guidance covers provisions specific for mercury wastes from healthcare facilities. Hence, not all specific provisions for mercury wastes in the guidelines are regulated by the national regulations, but covered generally or partially.

- Broken mercury-containing medical devices falls under the regime of hazardous wastes and their management from temporary on-site storage at healthcare facilities until final treatment should follow the national regulations of hazardous wastes. According to Permenkes 41/2019, only broken glass pieces of devices will be stored as hazardous wastes while the mercury and contaminated powder will be stored safely.

- The provisions in the national regulations on hazardous wastes and hazardous medical wastes from healthcare facilities may be considered sufficient for broken devices and not need to be as stringent as the provisions for mercury wastes from healthcare facilities as in the guidelines. However, certain provisions in the UNDP-GEF Guidance could apply and be included in the Guidelines on ESM of mercury wastes to be developed.

- Unbroken or still intact mercury-containing medical devices are regarded as unused assets which will be treated as medical devices and not regarded as hazardous wastes. Therefore, the national regulations on hazardous wastes do not apply for the unbroken mercury-containing medical devices.

- Since unbroken devices will not be treated as hazardous wastes, the requirements for the transportation and collection facility may not be as stringent as in the guidelines, but still fulfill safety requirements to prevent them from any damage. In addition, the withdrawal process of unbroken devices from healthcare facilities and their collection will be one time only since it is expected that there will be no mercury-containing medical devices in healthcare facilities in the future. Therefore, some of the specific provisions in the UNDP-GEF Guidance may not be considered required. However, some provisions in the UNDP-GEF Guidance could apply and be included in the Guidelines on ESM of mercury wastes to be developed.

- Permenkes 41/2019 provides provision of procedures and mechanisms for elimination and withdrawal of both broken and unbroken mercury-containing medical devices with focus on elimination process until their storage in hazardous wastes on-site temporary storage for broken mercury-containing medical devices and special room for unbroken mercury-containing medical devices. It also provides technical requirements for the special room and containers for the unbroken mercury-containing medical devices. However, more details are required on the withdrawal process such as procedures, mechanisms and technical requirements for the transportation, collection (storage depot) and final treatment. A ministerial regulation is currently being drafted to address this issue.

CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

- In order to achieve the 100% elimination target of mercury-containing medical measuring devices by the 31 December 2020, the Government of Indonesia has established the legal basis, namely Presidential Regulation Number 21 Year 2019 concerning RAN-PPM, Minister of Environment and Forestry Regulation Number P.81/Menlhk/Setjen/Kum.1/10/2019 for the implementation of the Presidential Regulation and the Ministry of Health Regulation Number 41 Year 2019 concerning the Elimination and Withdrawal of Mercury-Containing Medical Devices in Healthcare Facilities. The legal basis defines the role and responsibility of institutions involved in achieving the target. The government, particularly MoH and MoEF have conducted awareness raising and information dissemination to the healthcare facilities as the mercury-containing medical measuring devices users and provided them with the essential management tools to help them undertake their obligation in meeting the elimination target and observing the safety, health and environmental protection. Currently, supporting public services or infrastructure have not yet been available, but there are plans to build storage depots in each province to collect the discarded mercury-containing medical measuring devices from healthcare facilities as mandated in the RAN-PPM. If there is no recovery or encapsulation facility, the discarded mercury-containing medical devices will be exported.

- As of 31 August 2020, which is the deadline for the questionnaire submission from the healthcare facilities in Indonesia, the estimated target achievement percentage for the whole population of healthcare facilities (hospitals, public health centres, health clinics and health laboratories) was 60%. Non-mercury-containing medical measuring devices substitutes are available in the market with affordable prices. The healthcare facilities have responded to the elimination policy target with various activities required under the relevant regulation such as conduct substitution with non-mercury-containing medical measuring devices, stop purchasing mercury-containing medical measuring devices, etc.

- Twenty percent (20%) of the healthcare facilities respondents reported that they did not encounter any problem in substituting the mercury-containing medical measuring devices with the non-mercury-containing devices. Other reported problems such as no official guidelines for the management of the discarded medical devices and materials containing mercury, technical constraints related to containers, storage places for

mercury-containing medical devices and spill kits that are not yet available, etc. However, with the awareness raising workshops which have been carried out by the government since August 2020, it is hoped that the healthcare facilities can overcome their obstacles in achieving the elimination target.

- Most respondents did not report on the year of substitution of their mercury-containing medical measuring devices. However, 36% of the respondents reported that they had substituted their mercury-containing medical measuring devices from year 1983 until 2019, and 16% had or planned to conduct substitution by 2020. It is expected that more healthcare facilities will update or report their elimination activities through the online questionnaire since August until December 2020.

- Considering the above situations, it is likely that the Government can achieve the elimination target by the end of December 2020 according to Permenkes 41/2019. Withdrawal of the discarded mercury-containing medical measuring devices will be carried out when the healthcare facilities are ready and the storage depots have been provided by MoEF.

- Based on the results of gap analysis between the existing policy framework and actual practices in the field and the requirements of the Convention, technical guidelines of the Basel Convention and other relevant internationally recognized guidelines, the Technical Guidelines on ESM of mercury wastes will be developed with focuse on topics identified as the most aspects needed and are not covered or lacking from the existing guidelines are as follows:

  - The procedure for packing mercury-containing medical devices containing mercury and remaining mercury, including the technical standard for safe packaging;

  - Notification on official services available specifically for the collection or transportation of remaining mercury and mercury-containing medical devices;

  - Notification on official temporary storage places that are available outside the site of healthcare facilities and the utilization of their services;

  - Information on international policies, agreements and standards regarding mercury management.

Additional supporting information or other aspects which have been covered in the existing regulations as general hazardous wastes or general medical wastes will also be covered in the technical guidelines to be developed with particular focus on mercury wastes.

6.2. Recommendation

- Continued awareness raising are recommended to be carried out by the local and national authorities particularly online due to the pandemic situations, to urge healthcare facilities to report or update the elimination status of their mercury-containing medical measuring devices. This will help the local and national authorities to better estimate the elimination target achievement region-wide and nationwide, as well as understanding the current handling and constraints faced by healthcare facilities in managing their mercury-containing medical measuring devices. More collected and updated data and information from online reporting or questionnaire responses will also contribute to better estimation of the size and volume of the storage depots to be provided by MoEF to store the withdrawn mercury-containing medical measuring devices from healthcare facilities.

- Continued guidance and awareness raising from the local and national authorities are also recommended to assist healthcare facilities in overcoming their constraints in the elimination of their mercury-containing medical measuring

devices. Most of the constraints faced by the healthcare facilities are due to the lack of awareness of the relevant regulations' provisions, national policy and strategy for the withdrawal process, lack of awareness on accuracy of substitutes, etc.

- Guidance to the healthcare facilities in how to fill the reporting forms is important to ensure their understanding of the format and hence the result is expected to better reflect the actual situation at their respective healthcare facilities.

- It is recommended to conduct validation to the healthcare facilities on their reported data and information, particularly those with discrepancies, extreme numbers, unrelated answers, etc., to ensure better quality of the collected data and information on the elimination status of the mercury-containing medical measuring devices.

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APPENDICES

APPENDIX 1.

REPORTING INSTRUMENTS: ELIMINATION OF MERCURY CONTAINING MEDICAL DEVICES IN HEALTHCARE FACILITY

A. GENERAL DATA

A1 Facilities Name : Hospital / Public Health Centre / Clinic / Lab .....
A2 Status : Government / Private / TNI / POLRI
A3 PIC : .....
A4 Address : .....
A5 Regency / City : .....
A6 Province : .....
A7 Date of completion : .....
A8 E-mail address : .....

B. MERCURY CONTAINING MEDICAL DEVICES DATA:

B1 Total quantity of mercury containing medical devices still in use:

Type of Devices	Amount
Mercury-containing thermometer	Unit
Mercury-containing sphygmomanometers	
▪ Usual sphygmomanometers	Unit
▪ Floor-standing sphygmomanometers	Unit
Dental mercury amalgam	Gram

B2 Number of mercury-containing medical devices that are still intact but not in use and stored at the Facility:

Type of Devices	Amount
Mercury-containing thermometer	Unit
Mercury-containing sphygmomanometers	
▪ Usual Sphygmomanometers	Unit
▪ Floor-standing Sphygmomanometers	Unit
Dental mercury amalgam (active stock)	Gram

B3 Number of mercury-containing medical devices which are broken, the mercury spills and stored in the Facility:

Type of Devices	Amount
Mercury-containing thermometer	Unit
Mercury-containing sphygmomanometers	
- Usual Sphygmomanometers	Unit
- Floor-standing Sphygmomanometers	Unit
Dental mercury amalgam	Gram

C. DATA OF MERCURY CONTAINING MEDICAL DEVICES SUBSTITUTION:

C1 Substitution of mercury-containing medical devices and dental mercury amalgams with non-mercury and dental composite devices is carried out in (year): .....

C2 Substitution of mercury-containing medical equipment and dental amalgams:

Type of Devices	Original Amount	Amount substituted	Substitute
Mercury-containing thermometer	Unit	Unit	▪ Digital: ... unit ▪ Other (please specify): ...
Mercury-containing sphygmomanometers			▪
Usual Sphygmomanometers	Unit	Unit	▪ Digital: ... unit ▪ Aneroid: .... unit
Floor-standing Sphygmomanometers	Unit	Unit	▪ Digital: ... unit ▪ Aneroid: .... unit
Dental mercury amalgam	Gram	Gram	▪ Composite: ▪ Other (please specify)

C3 Where are the substituted mercury-containing medical devices and dental amalgam? (select one)

a. Stored at the TSF by fulfilling the requirements in accordance with the SOP of mercury storage
b. Stored in TFS like general medical/B3 waste (no special treatment)
c. Handled by a third party like ordinary medical waste (no special treatment)
d. Burned in an incinerator
e. Buried
f. Disposed into sewage
g. Disposed into trash bin
h. Others (please specify): .....

D. INFORMATION ON MERCURY SPILL HANDLING:

D1 Cases of mercury spills from medical devices and dental amalgams in one year:

Type of Devices	2018	2019	2020
Mercury-containing thermometer			
Mercury-containing sphygmomanometers			
Usual Sphygmomanometers			
Floor-standing Sphygmomanometers			
Dental Amalgam			

D2 If there is a broken mercury-containing medical device or spilled dental mercury amalgam, how is it handled?

a. Using a special mercury spill kit with handling instruction in accordance with Mercury Spill handling SOP and stored in a safe and leak-proof container, and stored in a TSF.
b. Using a special mercury spill kit with handling instruction in accordance with Mercury Spill handling SOP and disposed of it into B3 waste container with other medical waste and destroyed in an incinerator or brought to a third party.
c. Treated as an ordinary waste spill with handling of waste spills SOP and disposed of it into B3 waste containers along with other medical waste and destroyed in incinerators or brought to third parties

d. Treated like normal waste without following special SOPs and mercury is disposed of in domestic waste containers or disposed into the environment (e.g.: rivers, gutters, empty land, etc.)

E. OTHER INFORMATIONS:

E1 Is there a written policy in Healthcare Facility to stop the purchase and the use of mercury-containing medical devices and dental mercury amalgam?

a. Yes
b. No

E2 Obstacles in the implementation of Substitution of medical devices and dental amalgams in Healthcare Facility which must be completed until the end of 2020:

a. Provision of funds
b. Information that has not been well received
c. Technical constraints related to the container, storage area for mercury-containing medical devices, spill kits that are not yet available
d. Other (please specify)

E3 Funding sources for the substitution of mercury-containing medical devices and dental mercury amalgams:

a. Central Govt. Budget
b. Local Govt. Budget
c. Healthcare Facility self-subsistent Budget

E4 Is there dissemination/training/workshops or media information available to Healthcare Facility officers regarding the risk of mercury exposure from mercury-containing medical devices and dental mercury amalgams:

a. Yes, there is
b. Never

E5 If yes, who is conducting the dissemination/training/ workshop or providing the information media:

a. Ministry of Health
b. Ministry of Environment and Forestry
c. Local Health Agency
d. Local Environmental and Forestry Agency
e. Other (please specify) .....

E6 Is there guidance from the relevant Local Agency for the elimination and withdrawal of mercury-containing medical devices (sphygmomanometers and thermometers) and dental amalgams until the end of 2020:

a. Yes
b. No

Please send filled questionnaire to the Local Regency/City Health Agency for compilation. Thank you.

APPENDIX 2.

Section 1 of 11

HEALTH-CARE FACILITIES REPORT ON MERCURY-CONTAINING MEDICAL DEVICES PHASE-OUT

The Government of the Republic of Indonesia has set a target of reducing mercury in health sector, in particular the sphygmomanometer (blood pressure measuring device), thermometer (body temperature measuring device) and dental amalgam by 100% before or by the end of 2020. The Ministry of Health distributes this online form to all health-care facilities as a survey instrument to estimate the level of achievement of these targets.

This online form acts as a report prepared based on an offline questionnaire file that has been previously distributed by the Ministry of Health to all health-care facilities together with a letter from the Director General of Health Services regarding the Submission of Reporting Form for the Elimination of Mercury-Containing Medical Devices Number : KL.03.01/I/0215/2020 dated 28 January 2020. In addition to modifying or updating the previous questionnaire files, this online form was published with the aim of making it easier for respondents to fill in/respond to and convey the results back to the Ministry of Health research team.

In accordance to the letter from the Director of Environmental Health regarding Submission of Online Form for Reporting the Elimination of Mercury-Containing on Medical Devices No: KL.03.01/4/3541/2020 dated 18 June 2020, health-care facilities that have not had the opportunity to respond to previous questionnaires are expected to take advantage of the ease of use of this online form. Respondents who have submitted the previous questionnaire files to the Ministry of Health are also requested to participate in using this online form to reaffirm and/or update their responses.

After confirming that all of your answers match what you intended, please click/press the “SUBMIT” or “SEND” button at the bottom of this form. You will receive notification from the server regarding the receipt of the form that you have sent. The form that has been sent will immediately be saved and can be seen by the research team so you do not have to send it again by e-mail.

Thank you to all respondents who submit their answers before or on 31.08.2020. Taking into account possible obstacles in some areas, health-care facility managers who have not responded to this online survey or questionnaire are given the opportunity to respond and send all answers to this form at the latest by:

Tuesday, December 1st 2020.

Prior to that date, if necessary, survey responders still have the opportunity to edit their answers to be sent back. Edits submitted after the above deadline will not be taken into account in data processing.

Thank you for your cooperation.

Note: Some of these survey responders may find a “floating menu” on the bottom right of this page that says “Request edit access”. Please ignore that menu and please fill in this form directly by writing your e-mail address or your commonly used health-care facility’s email address. After that, the “floating menu” will disappear by itself. Please follow the next instructions on this form.

Q. Email Address

.....

Submission of Online Form for Reporting Form for the Elimination of Mercury-Containing Medical Devices No: KL.03.01/4/3541/2020 dated 18 June 2020

Attachment Letter 1

Submission of Online Form for Reporting Form for the Elimination of Mercury-Containing Medical Devices No: KL.03.01/I/0215/2020 dated 28 January 2020

Attachment Letter 2

Section 2 of 11

1. GENERAL INFORMATION ON HEALTH-CARE FACILITY
   1.1 Full name of health-care facility

   1.2 Ownership status (Government/private/Indonesian Army/Indonesian National Police)

   1.3 Category of health-care facility
   - Hospital
   - Public Health Center
   - Clinic
   - Laboratory
   - Other

   1.4 Outpatient care capacity (person/day)
   - <50
   - 50-100
   - 101-150
   - 151-200
   - >200

   1.5 Inpatient care capacity (number of beds)
   - there is no inpatient care service
   - <50
   - 51-100
   - 101-200
   - 201-400
   - >400

   1.6 Province
   Multiple choice of all 34 provinces in Indonesia

   1.7 Address (Name of the street, building number, city name/regency.
   Example: Sudirman street number 01, South Jakarta. Postal code is written separately in the next questionnaire item)

1.8 Postal code

1.9 Name of the respondent (person-in-charge for responding to this online form)

1.10 Name of top manager of health-care facility (Head /Director)

1.11 Date of completion of this form

Section 3 of 11

2. MERCURY-CONTAINING THERMOMETER
Please answer the question about the ownership of mercury-containing thermometers below with the correct information/data. If the question requires a numeric answer, enter a whole number (without commas and periods). Enter the digit "0" if none of these apply)

2.1 How many mercury-containing thermometers are still used in your facility?
2.2 How many mercury-containing thermometers which are no longer used and stored in good condition/intact in your facility?
2.3 What are the brand names of the mercury-containing thermometers that you have?
2.4 How much is the mercury content (in GRAM) in your thermometers? (Please answer if the weight can be known or specified in the user's manual or could be obtained from your suppliers)
2.5 Is there any of your mercury-containing thermometers in broken/damaged state?
- Yes
- No

Section 4 of 11

3. BROKEN MERCURY-CONTAINING TERMOMETER
Please answer the questions regarding the management of broken mercury-containing thermometers below with the correct information/data. If the question requires a numeric answer, enter a whole number (without commas and periods). Enter the digit "0" if none of these apply.

3.1 How many mercury-containing thermometers are broken?
3.2 Has the broken mercury-containing thermometer caused mercury spills/releases from the tube during the period below (choose the appropriate number of spill cases in each year)
- In 2018
- In 2019
- In 2020

3.3 How are the broken mercury-containing thermometers and mercury spills handled?
- Thrown into the trash bin
- Discharged into drains
- Buried in the land of health-care facility
- Stored in certain containers and places in the health-care facilities area without safeguarding
- Stored in a certain container and place in the health-care facility area with safeguarding
- Submitted to a third party whose license status is unknown
- Submitted to a third party authorized to collect hazardous wastes
- Other

Section 5 of 11

4. MERCURY-CONTAINING SPHYGMOMANOMETER
(Please answer the question regarding ownership of the mercury-containing desk Sphygmomanometer below with the correct information/data. If the question requires a numeric answer, enter a whole number (without commas and periods). Enter the digit "0" if none of these apply.)

4.1 How many mercury-containing desk sphygmomanometers are still used in your facility?
4.2 How many mercury-containing floor-standing sphygmomanometers are still used in your facility?
4.3 How many mercury-containing desk sphygmomanometers which are no longer used and stored in good condition/intact in your facility?
4.4 How many mercury-containing floor-standing sphygmomanometers which are no longer used and stored in good condition/intact in your facility?
4.5 What are the brand names of mercury-containing desk sphygmomanometers that you have?
4.6 What are the brand names of mercury-containing floor-standing sphygmomanometers that you have?
4.7 How much is the mercury content (in GRAM) in mercury-containing desk sphygmomanometers that you have? (Please answer if the weight can be known or specified in the user's manual or could be obtained from your suppliers).
4.8 How much is the mercury content (in GRAM) in mercury-containing floor-standing sphygmomanometers that you have? (Please answer if the weight can be known or specified in the user's manual or could be obtained from your suppliers).
4.9 Is there any of your mercury-containing sphygmomanometers (both desk and floor-standing) in broken/damaged state?
- Yes
- No

Section 6 of 11

5. BROKEN MERCURY-CONTAINING SPHYGMOMANOMETER
Please answer the question about the management of broken mercury Sphygmomanometer below with the correct information/data. If the question requires a numeric answer, enter a whole number (without commas and periods). Enter the digit "0" if none of these apply.

5.1 How many mercury-containing desk sphygmomanometers are broken?
5.2 Has the broken mercury-containing desk sphygmomanometer caused mercury spills/releases from its tube during the period below? (choose the appropriate number of cases of spills per year)
- In 2018
- In 2019
- In 2020

5.3 Has the broken mercury-containing floor-standing sphygmomanometer caused spills/releases from its tube during the period below (choose the number of cases of spills in each of these years)
- In 2018
- In 2019
- In 2020

5.4 How are the broken mercury-containing sphygmomanometer and mercury spills handled?
- Thrown into the trash bin
- Discharged into drains
- Buried in the land of health-care facility

- Stored in certain containers and places in the health-care facilities area without safeguarding
- Stored in a certain container and place in the health-care facility area with safeguarding
- Submitted to a third party whose license status is unknown
- Submitted to a third party authorized to collect hazardous wastes
- Other

Section 7 of 11

Mercury in Dental Amalgam

Section 8 of 11

Mercury Spills/Releases in Dental Amalgam

Section 9 of 10

8. SUBSTITUTION OF MERCURY-CONTAINING MEDICAL DEVICES AND DENTAL AMALGAM
   Please answer the questions about the replacement/substitution data for mercury-containing medical devices below, namely the thermometer, sphygmomanometer (desk and floor-standing) and dental amalgam, with the actual data. If the question requires a numeric answer, enter a whole number (without commas and periods). Enter the digit "0" if none of these apply)

   8.1 Substitution of mercury-containing thermometers
   - 8.1.1 The initial number of mercury-containing thermometers
   - 8.1.2 Number of non-mercury thermometers replacing those which contain mercury
   - 8.1.3 Type of non-mercury thermometers
     - Thermometer containing non-toxic organic liquid
     - Thermometer containing toxic organic liquid
     - Electronic thermometer (digital)
   - 8.1.4 The year in which the substitution of mercury-containing thermometers with non-mercury-containing thermometers took place or is planned to take place.

   8.2 Substitution of mercury-containing desk sphygmomanometers
   - 8.2.1 The initial number of mercury-containing desk sphygmomanometers
   - 8.2.2 Number of non-mercury desk sphygmomanometers replacing those which contain mercury
   - 8.2.3 Type of non-mercury desk sphygmomanometers
     - Aneroid
     - Electronic (digital)
   - 8.2.4 The year in which the substitution of mercury-containing desk sphygmomanometers with non-mercury-containing desk sphygmomanometers took place or is planned to take place.

   8.3 Substitution of mercury-containing floor-standing sphygmomanometers
   - 8.3.1 The initial number of mercury-containing floor-standing sphygmomanometers
   - 8.3.2 Number of non-mercury floor-standing sphygmomanometers replacing those which contain mercury
   - 8.3.3 Type of non-mercury floor-standing sphygmomanometers
     - Aneroid
     - Electronic (digital)

8.3.4 The year in which the substitution of mercury-containing floor-standing sphygmomanometers with non-mercury-containing floor-standing sphygmomanometers took place or is planned to take place.

8.3.5 Dental Amalgam

Section 10 of 11

9. MANAGEMENT OF DISCARDED MERCURY-CONTAINING MEDICAL DEVICES AND REMAINING MERCURY STOCK (Please answer the questions about the governance of the mercury-containing medical devices below, namely thermometers, sphygmomanometers (desk and floor-standing), and dental amalgam, with the actual data. If the question requires a numeric answer, enter a whole number (without commas and periods). Enter the digit "0" if none of these apply)

9.1 Do you have standard operating procedures (SOP) for handling mercury spills from broken medical devices or from mercury containers?
- Yes
- No

9.2 What rules or guidelines do you refer to in dealing with mercury spills from broken medical devices or from mercury containers or in the preparation of the SOP?
- None
- Other

9.3 If there has been an incident of broken medical device or mercury spills, how is it handled? (choose an answer)
a. Using a special mercury spill kit with handling in accordance with SOP for broken mercury-containing medical devices pieces and stored in a safe and leak-proof container and stored in Temporary Storage
b. Using a special mercury spill kit with handling in accordance with SOP, disposed of in the hazardous waste (B3 waste) container along with other medical wastes and destroyed in an incinerator or brought to a third party
c. Treated like ordinary waste spills with SOP for handling waste spills and disposed of in hazardous waste (B3 waste) container along with other medical wastes and destroyed in an incinerator or brought to a third party
d. Treated like ordinary waste swithout following specific SOP and mercury is disposed of in domestic waste container or disposed of into the environment (e.g. rivers, sewers, vacant land, etc.)

9.4 Do you have standard operating procedures (SOP) for the management of mercury-containing medical devices and remaining mercury stock?
- Yes
- No

9.5 What rules or guidelines do you refer to in the management of discarded mercury-containing medical devices and remaining mercury stock or in the preparation of its SOP?
- None
- Other

9.6 How are the replaced/substituted medical devices and dental amalgam (mercury) managed? (select one)
a. Stored in a Temporary Storage by meeting the requirements according to the SOP for mercury storage
b. Stored in a Temporary Storage such as medical /B3 waste in general (no special treatment)
c. Handled by a third party like ordinary medical waste (no special treatment)

d. Burnt in the incinerator
e. Buried
f. Disposed of into sewerage
g. Just throw it in the trash bin
h. Other

Section 11 of 11

10. OTHER INFORMATION

(Please answer questions about other information of mercury-containing medical devices below, namely thermometers, sphygmomanometers (desk and floor-Standing), and dental amalgam, with the actual data. If the question requires a numeric answer, enter a whole number (without commas and periods). Enter the digit "0" if none of these apply)

10.1 Have you (health-care facility officers) received information through socialization events (training/workshop) or other media about the risk of human exposure/exposure to mercury from medical devices and dental amalgam?
- Yes, I have
- No, I have not

10.2 If you have received the information in point 10.1, which party provided the socialization/ training/workshop or provided the media for the information? (Answer may be more than one)
a. Ministry of Health
b. Ministry of Environment and Forestry
c. Local Health Agency
d. Local Environmental Agency
e. Other

10.3 Have you received guidance from the relevant local agency in the elimination and withdrawal of mercury-containing medical devices (sphygmomanometer and thermometer) and dental amalgam by the end of 2020?
- Yes
- No

10.4 How do you respond to and or support the Government's warning about stopping the use of mercury-containing medical devices and dental amalgam and substitute them with medical devices and materials that do not contain mercury? (Please choose the appropriate answer, may be more than one).
- Conduct inventory of mercury-containing medical devices and mercury as dental amalgam materials
- Establish a written policy on stopping the purchase of medical devices and materials containing mercury
- Stop the purchase/procurement of medical devices and materials that contain mercury
- Substitute all medical devices and materials containing mercury with those that do not contain mercury
- Provide information to all staff of health-care facilities about mercury elimination policies in the health sector
- Provide training/information to all staff of health-care facilities on the use of medical devices and materials that do not contain mercury
- Other

10.5 What obstacles do you face in implementing the substitution of mercury-containing medical devices and dental amalgam in health service facilities that must be completed by the end of 2020?

- There are no obstacles
- Have never received any notification or warning about substituting medical devices and materials containing mercury
- Have not found official guidelines for the management of medical devices and materials containing mercury that cannot be used anymore
- There are no funds for the purchase of substitute medical devices and or materials
- Technical constraints related to containers, storage places for mercury-containing medical devices and spill kits that are not yet available
- There are no official/licensed service providers for collecting mercury and/or mercury-containing medical devices
- Other

10.6 Sources of funds for substitution of mercury-containing medical devices and dental amalgam

a. The State Revenue and Expenditure Budget
b. The Local Government Revenue and Expenditure Budget
c. Private funds of health-care facility
d. Other

10.7 hat specific guidelines or information do you need in managing mercury and mercury-containing medical devices in order to fulfill the target of eliminating mercury in the health sector before/by the end of 2020? (Answer may be more than one)

- Information on various choices of medical devices that do not contain mercury and non-mercury dental fillings (characteristics of medical devices/materials, performance, use, etc.)
- The procedure for packing mercury-containing medical devices containing mercury and remaining mercury, including the technical standard for safe packaging
- Procedures for the safe storage of mercury-containing medical devices and remaining mercury, including the technical standard for the storage place with safety
- Standard safety management of temporary storage site of mercury-containing medical devices and remaining mercury
- Notification on official temporary storage places that are available outside the site of health-care facilities and the utilization of their services
- Notification on official services available specifically for the collection transportation of remaining mercury and mercury-containing medical devices
- Information on hazards, risks and management of occupational safety and health risks and the environment related to mercury
- Information on safe handling of work accidents involving mercury
- Information about standard and guidelines of the use of personal protective equipment from exposure to mercury
- Information on international policies, agreements and standards regarding mercury management
- Other

APPENDIX 3.

Number of Public Health Centres Per Province Year 2019

No.	Province	Public Health Centres (2019)
1	Aceh	359
2	North Sumatra	601
3	West Sumatera	275
4	Riau	228
5	Jambi	205
6	South Sumatera	341
7	Bengkulu	179
8	Lampung	310
9	Bangka Belitung Islands	64
10	Riau Islands	86
11	DKI Jakarta	315
12	West Java	1072
13	Central Java	878
14	DI Yogyakarta	121
15	East Java	986
16	Banten	243
17	Bali	120
18	West Nusa Tenggara	169
19	East Nusa Tenggara	402
20	West Kalimantan	246
21	Central Kalimantan	203
22	South Kalimantan	235
23	East Kalimantan	186
24	North Kalimantan	55
25	North Sulawesi	195
26	Central Sulawesi	206
27	South Sulawesi	459
28	Southeast Sulawesi	290
29	Gorontalo	93
30	West Sulawesi	95
31	Maluku	209
32	North Maluku	147
33	West Papua	159
34	Papua	420
Indonesia		**10,134**

Source: Data and Information Centre of Ministry of Health of Republic Indonesia, 2020 as cited in Ministry of Health of Republic Indonesia, 2020[11]

APPENDIX 4.

Number of Hospitals By Type, Ownership Status and Province Year 2019

No	Healthcare Facilities	Ownership					
		Ministry of Health		Provincial Government		Regency /City Government	
		General Hospital	Specialized Hospital	General Hospital	Specialized Hospital	General Hospital	Specialized Hospital
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Aceh	0	0	1	2	24	0
2	North Sumatera	1	0	2	4	34	0
3	West Sumatera	1	1	3	2	20	0
4	Riau	0	0	2	1	16	0
5	Jambi	0	0	1	1	13	0
6	West Sumatera	2	0	1	4	30	0
7	Bengkulu	0	0	1	1	12	0
8	Lampung	0	0	2	1	15	0
9	Bangka Belitung Islands	0	0	1	1	10	0
10	Riau Islands	0	0	2	0	10	0
11	DKI Jakarta	3	7	30	1	0	0
12	West Java	1	4	3	2	46	2
13	Central Java	2	3	4	3	49	1
14	DI Yogyakarta	1	0	0	2	8	0
15	East Java	0	1	8	6	58	0
16	Banten	1	0	2	0	10	0
17	Bali	1	0	1	2	14	0
18	West Nusa Tenggara	0	0	2	2	13	0
19	East Nusa Tenggara	0	0	1	1	22	0
20	West Kalimantan	0	0	1	2	19	0
21	Central Kalimantan	0	0	1	0	16	1
22	South Kalimantan	0	0	2	2	15	0
23	East Kalimantan	0	0	3	1	16	1
24	North Kalimantan	0	0	1	0	7	0
25	North Sulawesi	2	0	3	2	15	0
26	Central Sulawesi	0	0	2	0	21	0
27	South Sulawesi	2	0	3	4	32	0
28	Southeast Sulawesi	0	0	1	1	17	0
29	Gorontalo	0	0	1	0	9	0
30	West Sulawesi	0	0	1	0	6	0
31	Maluku	1	0	2	1	15	0
32	North Maluku	0	0	2	1	11	0
33	West Papua	0	0	0	0	10	0
34	Papua	0	0	2	1	27	0
Indonesia		18	16	92	51	640	5

Source: Directorate General of Health Service, Ministry of Environment of Republic of Indonesia, 2020, as cited in Ministry of Health of Republic Indonesia, 2020[11]

Military/Police		Government-Owned Enterprise		Private		Total	
General Hospital	Specialized Hospital	General Hospital	Specialized Hospital	General Hospital	Specialized Hospital	General Hospital	Specialized Hospital
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
5	0	2	0	32	3	64	5
9	0	10	1	134	22	190	27
4	0	2	0	19	26	49	29
4	0	3	1	35	12	60	14
2	0	0	0	20	3	36	4
4	0	3	0	27	13	67	17
3	0	0	0	6	1	22	2
2	0	0	0	37	21	56	22
0	0	0	0	10	3	21	4
3	0	1	0	12	5	28	5
9	2	8	1	88	41	138	52
14	0	4	1	227	57	295	66
12	0	3	1	189	37	259	45
3	0	0	1	48	20	60	23
23	2	5	2	202	77	296	88
3	0	1	0	65	34	82	34
3	0	1	0	38	8	58	10
2	0	0	0	15	3	32	5
5	0	0	0	21	2	49	3
5	0	1	0	16	7	42	9
2	0	0	0	5	1	24	2
4	0	2	0	14	7	37	9
4	0	1	0	20	9	44	11
1	0	0	0	1	0	10	0
4	0	0	1	17	3	41	6
3	0	1	0	6	5	33	5
7	1	1	1	36	24	81	30
2	0	1	0	14	0	35	1
0	0	0	0	3	1	13	1
1	0	0	0	3	1	11	1
4	0	0	0	7	0	29	1
2	0	0	0	5	0	20	1
5	0	1	0	3	0	19	0
5	0	0	0	9	0	43	1
159	5	51	10	1384	446	2344	533

APPENDIX 5.

Number of Pratama Clinic and Main Clinics* By Ownership Status And Province, Year 2019

No.	Healthcare Facilities	Provincial Government		Military/Police		Total	
		Pratama Clinic	Main Clinic	Pratama Clinic	Main Clinic	Pratama Clinic	Main Clinic
(1)	(2)	(3)	(4)	(7)	(8)	(13)	(14)
1	Aceh	99	3	12	0	111	3
2	North Sumatera	959	60	21	0	980	60
3	West Sumatera	221	19	8	0	229	19
4	Riau	160	16	5	0	165	16
5	Jambi	137	9	2	0	139	9
6	South Sumatera	236	12	7	0	243	12
7	Bengkulu	59	6	1	0	60	6
8	Lampung	278	6	5	0	283	6
9	Bangka Belitung Islands	57	14	5	0	62	14
10	Riau Islands	216	13	18	0	234	13
11	DKI Jakarta	651	207	40	0	691	207
12	West Java	180	109	8	0	188	109
13	Central Java	850	22	30	0	880	22
14	DI Yogyakarta	919	168	15	0	934	168
15	East Java	793	41	73	0	866	41
16	Banten	731	28	3	0	734	28
17	Bali	152	24	5	0	157	24
18	West Nusa Tenggara	98	26	7	0	105	26
19	East Nusa Tenggara	95	4	9	0	104	4
20	West Kalimantan	91	8	3	0	94	8
21	Central Kalimantan	163	14	1	0	164	14
22	South Kalimantan	40	6	3	0	44	6
23	East Kalimantan	271	6	3	0	274	6
24	North Kalimantan	1	0	3	0	4	0
25	North Sulawesi	23	3	8	0	31	3
26	Central Sulawesi	50	16	6	0	56	16
27	South Sulawesi	220	67	14	0	234	67
28	Southeast Sulawesi	59	0	9	0	68	0
29	Gorontalo	2	6	1	0	3	6
30	West Sulawesi	4	0	2	0	6	0
31	Maluku	17	3	9	0	26	3
32	North Maluku	3	0	3	0	6	0
33	West Papua	52	5	16	0	68	5
34	Papua	33	3	5	0	38	3
Indonesia		7,920	924	361	0	8,281	924

Source: Directorate General of Health Service, Ministry of Environment of Republic of Indonesia, 2020, as cited in Ministry of Health of Republic Indonesia, 2020[11]

Note: *Pratama clinic is a clinic which provides basic medical service
* Main clinic is a clinic which provides specialist medical service or basic and specialist medical service

APPENDIX 6.

Number of Health Laboratories By Ownership Status

No.	Province	Ownership/Management				
		Ministry of Health	Provincial Government	Regency/ City Government	Private	Total
(1)	(2)	(3)	(4)	(5)	(8)	(9)
1	Aceh	0	1	7	5	13
2	North Sumatera	0	1	3	39	43
3	West Sumatera	0	1	6	12	19
4	Riau	0	1	5	6	12
5	Jambi	0	1	5	6	12
6	South Sumatera	1	0	8	11	20
7	Bengkulu	0	1	5	18	24
8	Lampung	0	1	2	3	6
9	Bangka Belitung Islands	0	1	3	20	24
10	Riau Islands	0	0	0	12	12
11	DKI Jakarta	1	1	0	220	222
12	West Java	0	1	25	168	194
13	Central Java	0	1	36	151	188
14	DI Yogyakarta	0	1	4	16	21
15	East Java	1	0	29	152	182
16	Banten	0	1	8	71	80
17	Bali	0	1	4	20	25
18	West Nusa Tenggara	0	1	4	26	31
19	East Nusa Tenggara	0	1	5	9	15
20	West Kalimantan	0	1	5	12	18
21	Central Kalimantan	0	1	7	2	10
22	South Kalimantan	0	1	4	11	16
23	East Kalimantan	0	1	5	29	35
24	North Kalimantan	0	0	4	0	4
25	North Sulawesi	0	1	1	6	8
26	Central Sulawesi	0	1	0	1	2
27	South Sulawesi	1	0	10	13	24
28	Southeast Sulawasi	0	1	5	2	8
29	Gorontalo	0	1	2	4	7
30	West Sulawesi	0	1	1	1	3
31	Maluku	0	1	2	1	4
32	North Maluku	0	0	1	1	2
33	West Papua	0	0	0	2	2
34	Papua	0	1	0	6	7
Indonesia		**4**	**27**	**206**	**1,056**	**1,293**

Source: Directorate General of Health Service, Ministry of Environment of Republic of Indonesia, per 2 January 2020, as cited in Ministry of Health of Republic Indonesia, 2020[11]

APPENDIX 7.

Number of Hospital and Hospital Bed By Hospital Class and Province Year 2019.

No.	Province	Class A			Class B		
		Hospital		TT	Hospital		TT
		Number	%		Number	%	
(1)	(2)	(4)	(5)	(6)	(7)	(8)	(9)
1.	Aceh	2	2.90	1.092	10	14.49	2.687
2.	North Sumatera	2	0.92	1.248	30	13.82	6.928
3.	West Sumatera	2	2.56	1.114	6	7.69	960
4.	Riau	1	1.35	230	7	9.46	1.799
5.	Jambi	-	-	-	4	10.00	1.041
6.	South Sumatera	2	2.38	1.169	8	9.52	1.544
7.	Bengkulu	-	-	-	2	8.33	638
8.	Lampung	1	1.28	610	5	6.41	1.152
9.	Bangka Belitung Islands	-	-	-	2	8.00	255
10.	Riau Islands	-	-	-	6	18.18	1.159
11.	DKI Jakarta	17	8.95	6.580	71	37.37	11.440
12.	West Java	7	1.94	2.381	70	19.39	16.666
13.	Central Java	9	2.96	4.173	34	11.18	11.371
14.	DI Yogyakarta	3	3.61	1.106	12	14.46	2.435
15.	East Java	5	1.30	4.134	58	15.10	14.474
16.	Banten	-	-	-	23	19.83	5.027
17.	Bali	3	4.41	1.199	11	16.18	2.015
18.	West Nusa Tenggara	-	-	-	3	8.11	804
19.	East Nusa Tenggara	-	-	-	2	3.85	457
20.	West Kalimantan	-	-	-	5	9.80	1.629
21.	Central Kalimantan	-	-	-	3	11.54	845
22.	South Kalimantan	2	4.35	930	6	13.04	992
23.	East Kalimantan	1	1.82	190	7	12.73	2.351
24.	North Kalimantan	-	-	-	1	10.00	392
25.	North Sulawesi	1	2.13	942	3	6.38	454
26.	Central Sulawesi	-	-	-	3	7.89	1.027
27.	South Sulawesi	2	1.80	1.530	25	22.52	5.272
28.	Southeast Sulawesi	-	-	-	2	5.56	664
29.	Gorontalo	-	-	-	2	14.29	671
30.	West Sulawesi	-	-	-	-	-	-
31.	Maluku	-	-	-	4	13.33	596
32.	North Maluku	-	-	-	1	4.76	243
33.	West Papua	-	-	-	-	-	-
34.	Papua	-	-	-	2	4.55	484
Indonesia		60	2.09	28.628	428	14.88	98.472

Source: Directorate General of Health Service, Ministry of Environment of Republic of Indonesia, per 2 January 2020, as cited in Ministry of Health of Republic Indonesia, 2020[11]

Class C			Class D & Pratama Class D			Class Has Not Been Assigned		
Hospital		TT	Hospital		TT	Hospital		TT
Number	%		Number	%		Number	%	
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
31	44.93	3.378	25	36.23	1.377	1	1.45	42
120	55.30	11.229	55	25.35	2.407	10	4.61	167
50	64.10	4.115	17	21.79	854	3	3.85	-
41	55.41	3.631	24	32.43	1.151	1	1.35	-
25	62.50	2.600	11	27.50	397	-	-	-
41	48.81	4.359	31	36.90	1.883	2	2.38	41
13	54.17	1.491	9	37.50	489	-	-	-
54	69.23	4.902	18	23.08	976	-	-	-
15	60.00	1.481	8	32.00	325	-	-	-
19	57.58	1.557	7	21.21	295	1	3.03	37
72	37.89	4.542	28	14.74	1.091	2	1.05	11
206	57.06	19.596	73	20.22	4.073	5	1.39	326
135	44.41	16.994	126	41.45	8.383	-	-	-
31	37.35	1.638	35	42.17	1.399	2	2.41	-
183	47.66	17.007	134	34.90	8.367	4	1.04	87
82	70.69	5.621	8	6.90	524	3	2.59	50
41	60.29	3.106	13	19.12	593	-	-	-
19	51.35	2.064	15	40.54	899	-	-	-
26	50.00	2.759	23	44.23	1.295	1	1.92	20
31	60.78	3.255	14	27.45	613	1	1.96	10
17	65.38	1.419	6	23.08	292	-	-	-
29	63.04	2.818	9	19.57	390	-	-	-
28	50.91	2.657	18	32.73	893	1	1.82	-
4	40.00	545	5	50.00	148	-	-	-
25	53.19	2.980	16	34.04	971	2	4.26	31
25	65.79	3.007	10	26.32	375	-	-	-
63	56.76	6.528	18	16.22	892	3	2.70	11
14	38.89	1.467	17	47.22	631	3	8.33	60
6	42.86	821	6	42.86	509	-	-	-
6	50.00	1.022	4	33.33	244	2	16.67	-
7	23.33	712	18	60.00	818	1	3.33	-
5	23.81	540	12	57.14	576	3	14.29	59
6	31.58	755	11	57.89	599	2	10.53	48
14	31.82	2.386	22	50.00	989	6	13.64	196
1.484	51.58	142.982	846	29.41	45.718	59	2.05	1.196

Note : Hospitals which already have RS codes

Note:

In Indonesia, hospitals are classified into 2 (two) types based on services provided, namely general hospitals and specialized hospitals. These classifications are in accordance with Ministry of Health Regulation Number 30 Year 2019 concerning Classification and Licensing of Hospitals.

The general hospitals provide healthcare service to all aspects and types of disease. The specialized hospitals provide main service for 1 (one) aspect of one type of disease based on disciplines, age range, organ, type of disease or other specialty.

The general hospitals are classified into 4 (four) classes, namely Class A, B, C and D based on their facilities and capabilities of medical services provided. The Class A general hospitals have facilities and medical service capabilities of minimum 4 (four) basic specialists, 5 (five) supporting medical specialists, 12 (twelve) other specialists other than basic specialists and 13 (thirteen) subspecialists. The Class B general hospitals have facilities and medical service capabilities of minimum 4 (four) basic specialists, 4 (four) supporting medical specialists, 8 (eight) other specialists other than basic specialists and 2 (two) basic subspecialists. The Class C general hospitals have facilities and medical service capabilities of minimum 4 (four) basic specialists and 4 (four) supporting medical specialists. The Class D general hospitals have facilities and medical service capabilities of minimum 2 (two) basic specialists.

The specialized hospitals are classified into 3 (three) classes, namely Class A, B and C. The Class C specialized hospitals are only for specialized hospitals for mothers and children.

APPENDIX 8.

Additional Table and Graphical Information

Table A1 **Number of Initial Mercury-Containing Medical Measuring Devices By Province of Domicile of Healthcare Facilities**

Province	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
West Nusa Tenggara	0	7	17	24
Papua	0	30	10	40
North Maluku	12	24	5	41
Maluku	17	27	3	47
Gorontalo	45	75	27	147
West Sumatera	42	107	10	159
Bali	104	199	85	388
West Papua	171	174	46	391
Aceh	116	201	112	429
Bangka Belitung Islands	120	358	81	559
Riau Islands	161	390	115	666
Jambi	200	386	93	679
West Sulawesi	268	286	157	711
North Kalimantan	212	470	98	780
North Sumatera	256	410	151	817
Bengkulu	498	404	209	1,111
Southeast Sulawesi	422	625	191	1,238
West Kalimantan	643	667	351	1,661
South Kalimantan	452	940	305	1,697
Central Kalimantan	556	954	241	1,751
Central Sulawesi	611	865	306	1,782
Banten	872	794	447	2,113
West Java	657	1,280	430	2,367
DI Yogyakarta	939	1,289	158	2,386
East Kalimantan	707	1,364	454	2,525
Riau	905	1,493	626	3,024
Lampung	1,045	1,601	690	3,336
North Sulawesi	1,227	1,681	537	3,445
East Nusa Tenggara	1,364	2,064	607	4,035
DKI Jakarta	1,671	1,569	816	4,056
South Sumatera	1,120	2,264	1,045	4,429
South Sulawesi	1,676	2,574	607	4,857
Central Java	4,034	4,265	1,332	9,631
East Java	3,927	8,458	2,200	14,585
Grand Total	25,050	38,295	12,562	75,907

Table A2 **Number of Initial Mercury-Containing Medical Measuring Devices By Ownership Status of Healthcare Facilities**

Ownership Status of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
POLRI/TNI	302	438	112	852
Private	4,886	6,444	2,397	13,727
Government	19,862	31,413	10,053	61,328
Grand Total	25,050	38,295	12,562	75,907

Figure A1 **Number of Initial Mercury-Containing Medical Measuring Devices By Ownership Status of Healthcare Facilities**

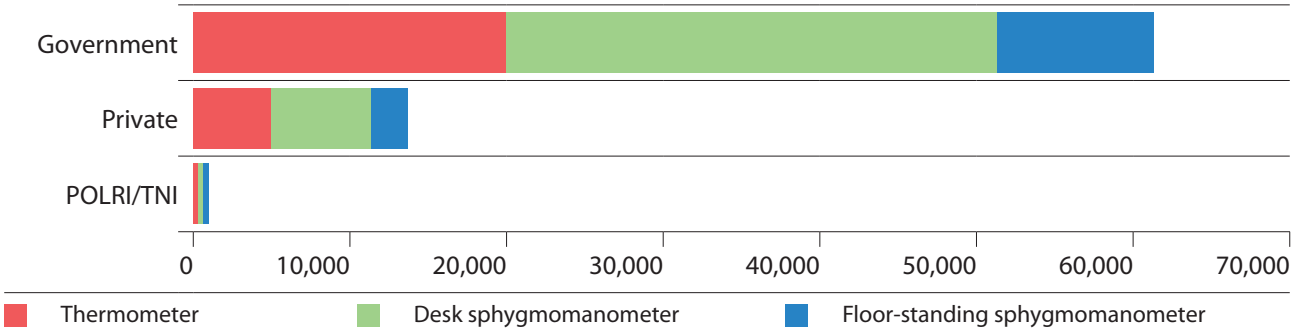


Table A3 **Number of Initial Mercury-Containing Medical Measuring Devices By Inpatient Care Capacity of Healthcare Facilities**

Bed count	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
>400	986	1,388	1,055	3,429
51-100	1,850	2,297	966	5,113
No question in off-line questionnaire	1,465	2,930	842	5,237
201-400	2,572	3,573	1,164	7,309
101-200	2,355	4,049	1,763	8,167
No inpatient care service	6,543	11,271	3,156	20,970
<50	9,279	12,787	3,616	25,682
Grand Total	25,050	38,295	12,562	75,907

Figure A2 **Number of Initial Mercury-Containing Medical Measuring Devices By Inpatient Care Capacity of Healthcare Facilities**

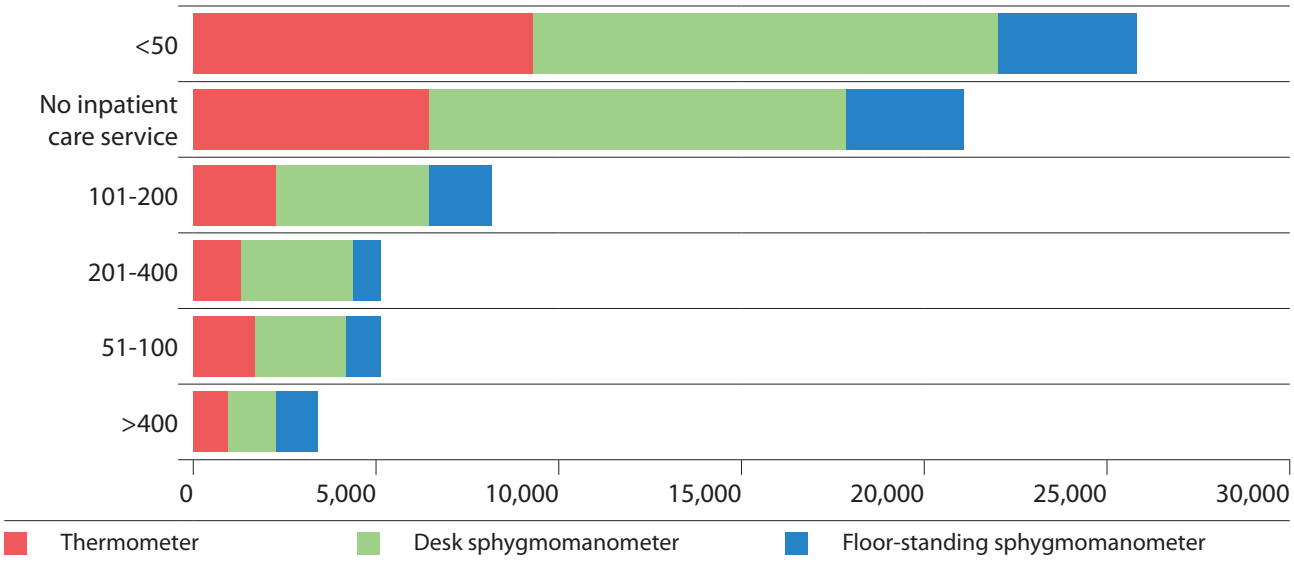


Table A4 **Number of Non-Mercury-Containing Medical Measuring Devices Replacing Those Containing Mercury By Province of Domicile of Healthcare Facilities**

Province	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
West Nusa Tenggara	0	5	4	9
Maluku	15	13	1	29
Papua	30	38	14	82
North Maluku	37	62	57	156
Gorontalo	80	84	55	219
West Sumatera	93	127	56	276
Bali	134	91	71	296
West Papua	185	172	99	456
Bangka Belitung Islands	183	165	125	473
Aceh	161	223	114	498
North Sumatera	184	233	183	600
Jambi	247	275	161	683
West Sulawesi	313	363	217	893
Bengkulu	353	363	237	953
North Kalimantan	413	419	176	1,008
Riau Islands	305	505	302	1,112
Southeast Sulawesi	506	618	383	1,507
Central Sulawesi	731	823	480	2,034
Central Kalimantan	905	981	440	2,326
West Kalimantan	854	881	610	2,345
South Kalimantan	845	984	544	2,373
DI Yogyakarta	1,055	1,298	315	2,668

Province	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
West Java	1,280	1,264	640	3,184
Banten	1,301	1,265	720	3,286
East Kalimantan	1,249	1,349	729	3,327
Riau	1,497	1,242	788	3,527
East Nusa Tenggara	1,329	1,412	847	3,588
North Sulawesi	1,779	1,571	891	4,241
Lampung	1,604	1,791	1,034	4,429
South Sulawesi	1,956	2,276	987	5,219
South Sumatera	2,058	2,337	1,233	5,628
DKI Jakarta	2,498	2,135	1,010	5,643
Central Java	3,903	4,797	1,998	10,698
East Java	7,190	8,876	4,048	20,114
Grand Total	35,273	39,038	19,569	93,880

Table A5 **Number of Non-Mercury-Containing Medical Measuring Devices Replacing Those Containing Mercury By Ownership Status of Healthcare Facilities**

Ownership Status of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
POLRI/TNI	429	437	271	1,137
Private	6,846	6,245	3,382	16,473
Government	27,998	32,356	15,916	76,270
Grand Total	35,273	39,038	19,569	93,880

Figure A3 **Number of Non-Mercury-Containing Medical Measuring Devices Replacing Those Containing Mercury By Ownership Status of Healthcare Facilities**

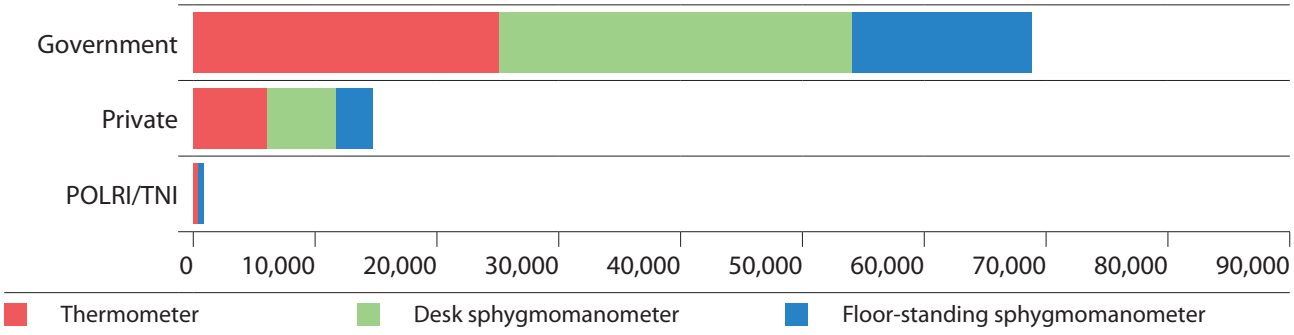


Table A6 **Number of Non-Mercury-Containing Medical Measuring Devices Replacing Those Containing Mercury By Inpatient Care Capacity of Healthcare Facilities**

Bed count	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
No question in off-line questionnaire	1,989	2,165	701	4,855
51-100	2,676	2,381	1,382	6,439
>400	2,222	2,716	1,527	6,465
201-400	3,394	3,597	2,025	9,016
101-200	3,892	3,838	2,604	10,334
No inpatient care service	9,441	11,859	5,414	26,714
<50	11,659	12,482	5,916	30,057
Grand Total	35,273	39,038	19,569	93,880

Figure A4 **Number of Non-Mercury-Containing Medical Measuring Devices Replacing Those Containing Mercury By Inpatient Care Capacity of Healthcare Facilities**

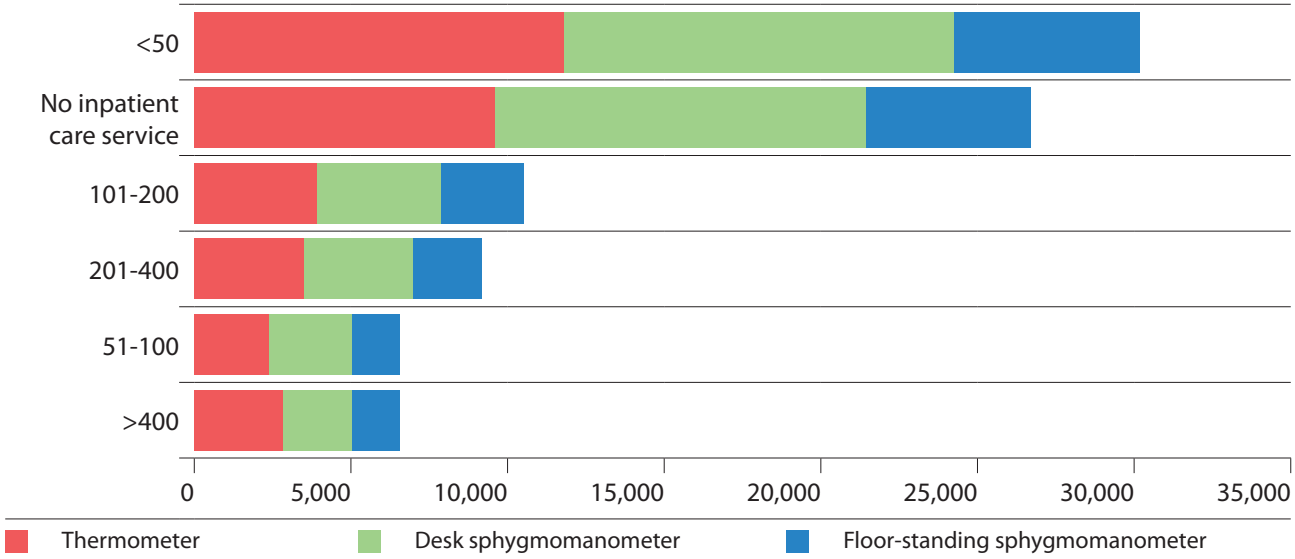


Table A7 **Number of Mercury-Containing Medical Measuring Devices Remain in Use by Province of Domicile of Healthcare Facilities**

Province	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
Papua	0	0	0	0
North Maluku	0	4	4	8
West Nusa Tenggara	0	4	12	16
Maluku	14	6	4	24
Gorontalo	13	22	21	56
West Sulawesi	44	16	8	68
West Sumatera	6	60	16	82

Province	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
West Papua	40	43	3	86
Bali	21	84	10	115
Bangka Belitung Islands	9	80	26	115
DI Yogyakarta	40	91	11	142
Jambi	49	113	16	178
Aceh	92	73	33	198
Riau Islands	42	110	66	218
Bengkulu	70	127	33	230
North Kalimantan	52	149	53	254
Banten	62	119	101	282
DKI Jakarta	134	139	41	314
South Kalimantan	137	186	61	384
Southeast Sulawesi	148	204	36	388
North Sumatera	66	228	107	401
West Kalimantan	175	160	74	409
Central Kalimantan	87	299	105	491
Lampung	173	316	121	610
North Sulawesi	214	311	110	635
West Java	129	338	181	648
East Kalimantan	130	455	155	740
Central Sulawesi	246	328	176	750
South Sumatera	271	627	266	1,164
East Nusa Tenggara	399	692	148	1,239
South Sulawesi	259	793	197	1,249
Riau	361	759	286	1,406
Central Java	407	916	403	1,726
East Java	608	2,101	727	3,436
Grand Total	4,498	9,953	3,611	18,062

Table A8 **Number of Mercury-Containing Medical Measuring Devices Remain in Use By Ownership Status of Healthcare Facilities**

Ownership Status of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
POLRI/TNI	113	144	19	276
Private	556	1,312	637	2,505
Government	3,829	8,497	2,955	15,281
Grand Total	4,498	9,953	3,611	18,062

Figure A5 **Number of Mercury-Containing Medical Measuring Devices Remain in Use By Ownership Status of Healthcare Facilities**

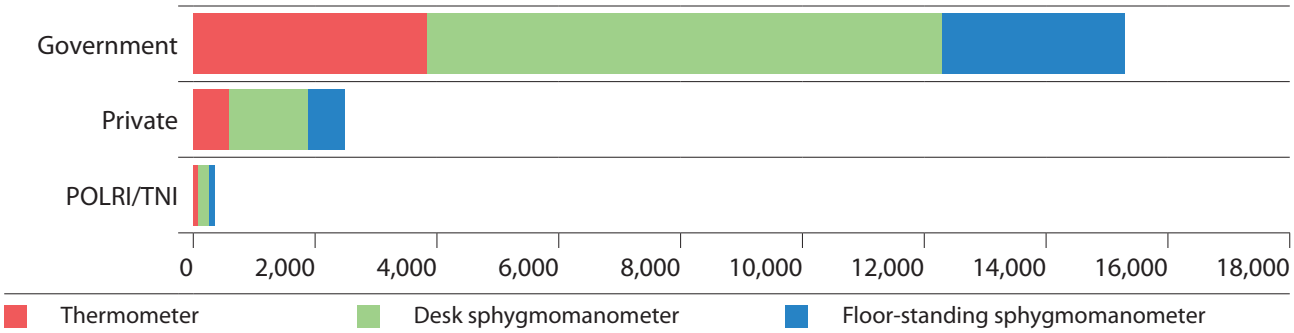


Table A9 **Number of Mercury-Containing Medical Measuring Devices Remain in Use By Inpatient Care Capacity of Healthcare Facilities**

Bed count	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
>400	17	547	241	805
51-100	195	646	339	1,180
201-400	293	1,129	315	1,737
101-200	396	997	401	1,794
No question in off-line questionnaire	481	1,223	506	2,210
No inpatient care service	1,519	2,339	846	4,704
<50	1,597	3,072	963	5,632
Grand Total	4,498	9,953	3,611	18,062

Figure A6 **Number of Mercury-Containing Medical Measuring Devices Remain in Use By Inpatient Care Capacity of Healthcare Facilities**

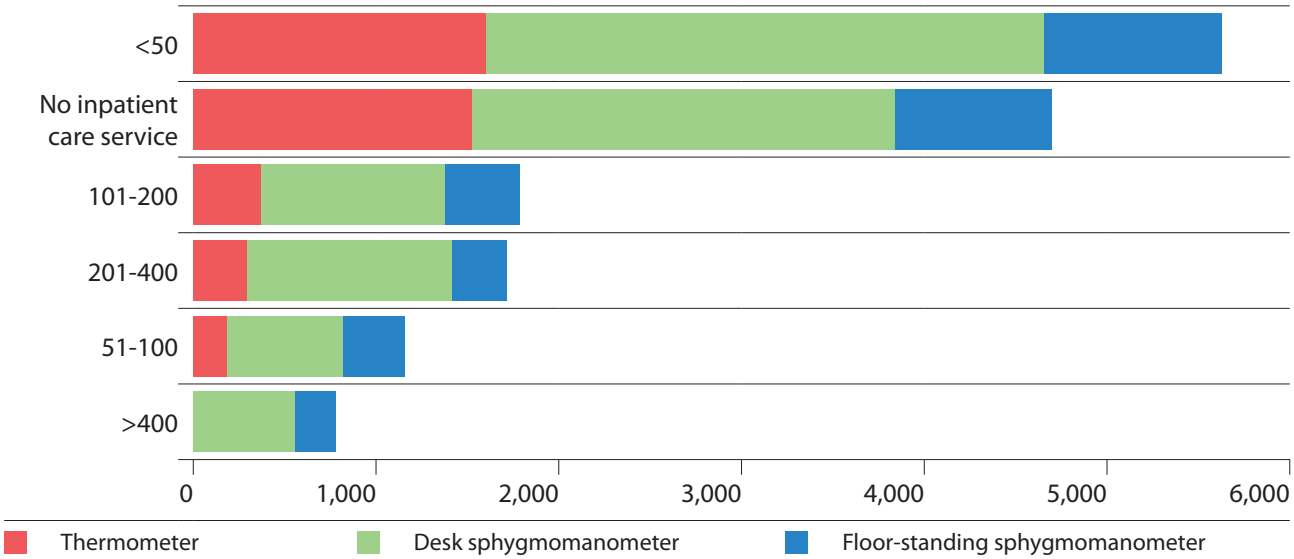


Table A10 **Number of Mercury-Containing Medical Measuring Devices Remain in Use by Province of Domicile of Healthcare Facilities**

Province	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
West Nusa Tenggara	0	2	5	7
North Maluku	8	18	2	28
Papua	0	24	5	29
Maluku	46	17	2	65
Gorontalo	17	34	20	71
West Sumatera	7	63	7	77
Bali	11	51	28	90
West Papua	59	73	47	179
Aceh	50	120	54	224
West Sulawesi	151	132	37	320
Riau Islands	57	183	93	333
Jambi	107	190	40	337
North Sumatera	91	216	31	338
North Kalimantan	104	240	34	378
Bangka Belitung Islands	93	282	75	450
Southeast Sulawesi	175	339	91	605
Bengkulu	391	296	156	843
South Sulawesi	170	564	117	851
Central Kalimantan	334	412	109	855
South Kalimantan	298	517	166	981
West Kalimantan	443	446	232	1,121
Banten	667	501	230	1,398
West Java	495	726	269	1,490
East Nusa Tenggara	449	901	315	1,665
East Kalimantan	377	1,036	389	1,802
Riau	389	1,116	451	1,956
Lampung	686	951	375	2,012
DI Yogyakarta	862	1,026	178	2,066
North Sulawesi	754	1,060	295	2,109
South Sulawesi	815	1,222	445	2,482
South Sumatera	823	1,474	674	2,971
DKI Jakarta	1,399	1,245	745	3,389
Central Java	1,505	2,894	915	5,314
East Java	2,307	5,456	1,537	9,300
Grand Total	14,140	23,827	8,169	46,136

Table A11 **Number of Mercury-Containing Medical Measuring Devices Stored or Eliminated by Ownership Status of Healthcare Facilities**

Ownership Status of Healthcare Facilities	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
POLRI/TNI	94	275	77	446
Private	2,375	4,077	1,516	7,968
Government	11,671	19,475	6,576	37,722
Grand Total	14,140	23,827	8,169	46,136

Figure A7 **Number of Mercury-Containing Medical Measuring Devices Stored or Eliminated by Ownership Status of Healthcare Facilities**

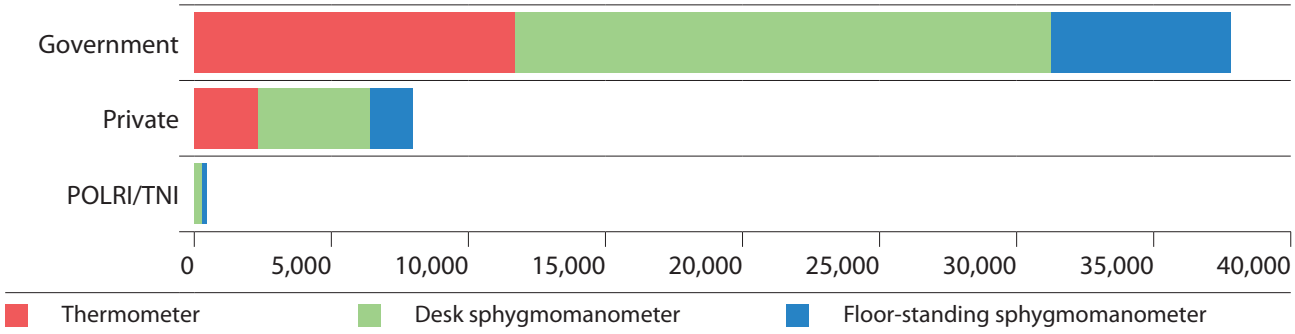


Table A12 **Number of Mercury-Containing Medical Measuring Devices Stored or Eliminated By Inpatient Care Capacity of Healthcare Facilities**

Bed count	Thermometer (Unit)	Desk Sphygmomanometer (Unit)	Floor-standing Sphygmomanometer (Unit)	Total (Unit)
>400	578	752	669	1,999
51-100	1,205	1,440	591	3,236
201-400	943	2,081	718	3,742
101-200	937	2,040	899	3,876
No question in off-line questionnaire	1,174	2,120	772	4,066
No inpatient care service	4,449	7,334	2,130	13,913
<50	4,854	8,060	2,390	15,304
Grand Total	14,140	23,827	8,169	46,136

Figure A8 **Number of Mercury-Containing Medical Measuring Devices Stored or Eliminated By Inpatient Care Capacity of Healthcare Facilities**

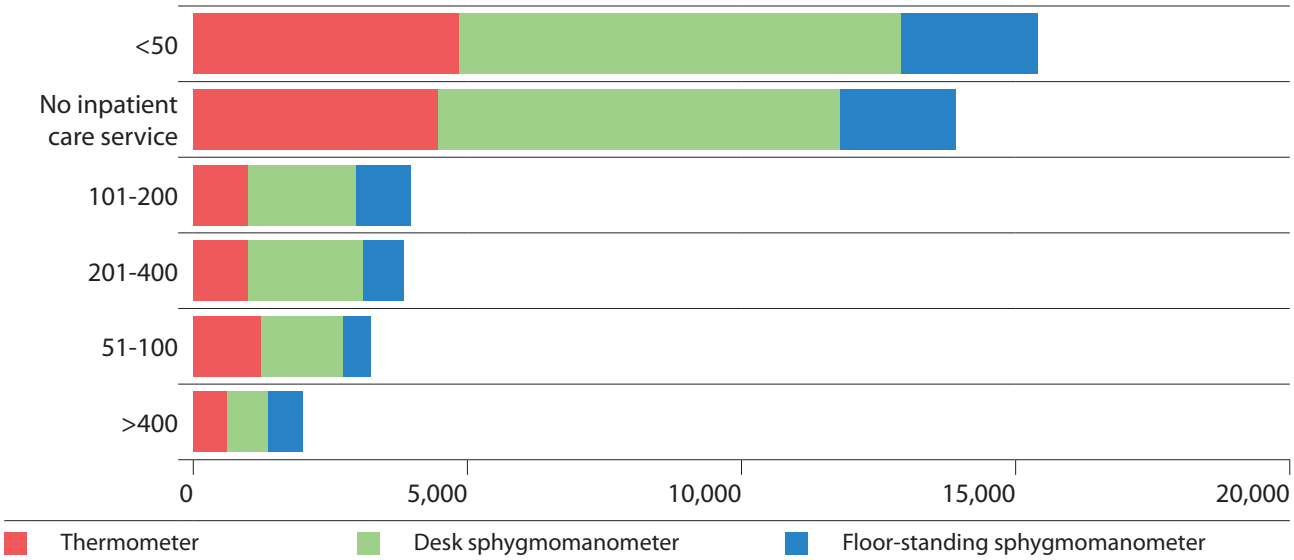


Table A13 **Number of Broken Mercury-Containing Medical Measuring Devices by Province of Domicile of Healthcare Facilities**

Province	Thermometer (Unit)	Sphygmomanometer (Unit)	Total (Unit)
West Nusa Tenggara	0	1	1
Papua	0	15	15
Maluku	10	8	18
Bali	3	17	20
North Maluku	6	16	22
West Sumatera	2	58	60
Gorontalo	14	49	63
Bangka Belitung Islands	31	47	78
North Sumatera	28	103	131
Riau Islands	30	121	151
Aceh	47	133	180
West Papua	69	124	193
Jambi	54	167	221
West Sulawesi	86	181	267
North Kalimantan	75	221	296
Bengkulu	78	244	322
West Java	105	257	362
DI Yogyakarta	45	396	441
Central Kalimantan	100	361	461
West Kalimantan	195	330	525
Southeast Sulawesi	178	412	590
Central Sulawesi	197	452	649
Banten	350	336	686

Province	Thermometer (Unit)	Sphygmomanometer (Unit)	Total(Unit)
South Kalimantan	168	530	698
Lampung	247	506	753
DKI Jakarta	262	510	772
East Kalimantan	206	654	860
Riau	181	776	957
South Sumatera	389	724	1,113
North Sulawesi	258	955	1,213
East Nusa Tenggara	527	1,074	1,601
South Sulawesi	493	1,254	1,747
Central Java	517	1,493	2,010
East Java	1,129	3,436	4,565
Grand Total	6,080	15,961	22,041

Table A14 **Number of Broken Mercury-Containing Medical Measuring Devices By Ownership Status of Healthcare Facilities**

Ownership Status of Healthcare Facilities	Thermometer (Unit)	Sphygmomanometer (Unit)	Total (Unit)
POLRI/TNI	73	169	242
Private	358	1,318	1,676
Government	5,649	14,474	20,123
Grand Total	6,080	15,961	22,041

Figure A9 **Number of Broken Mercury-Containing Medical Measuring Devices By Ownership Status of Healthcare Facilities**

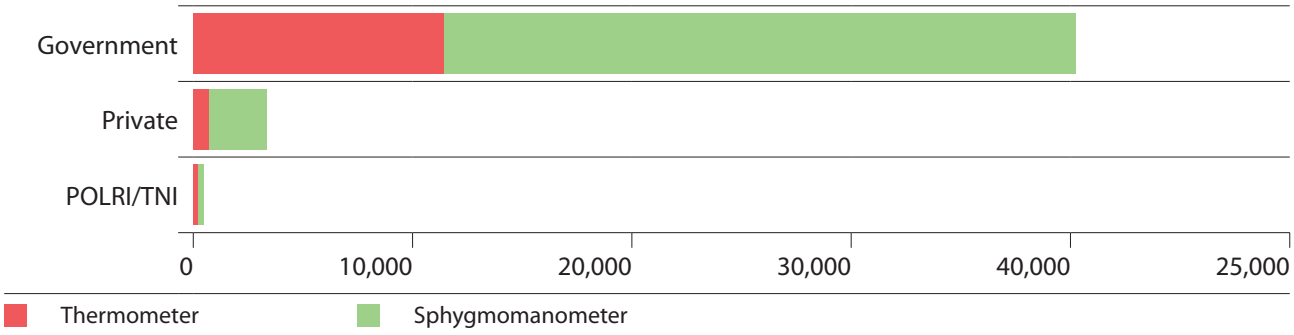
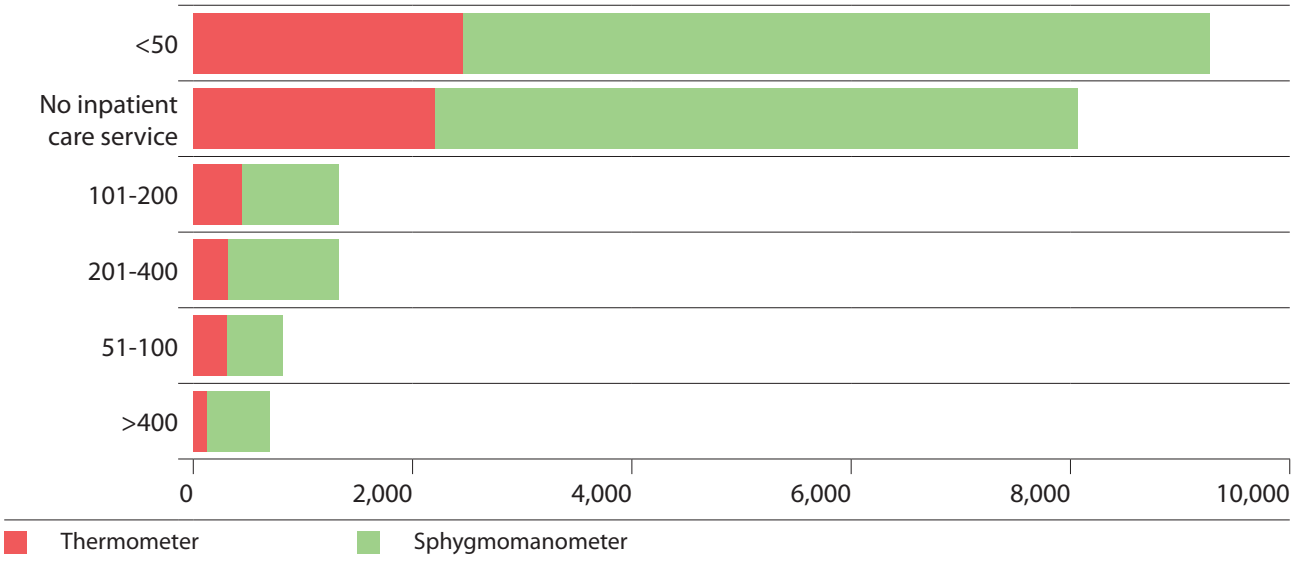


Table A15 **Number of Broken Mercury-Containing Medical Measuring Devices By Inpatient Care Capacity of Healthcare Facilities**

Bed count	Thermometer (Unit)	Sphygmomanometer (Unit)	Total (Unit)
No question in off-line questionnaire	157	340	497
51-100	125	584	709
>400	347	497	844
101-200	305	1,009	1,314
201-400	434	924	1,358
No inpatient care service	2,250	5,797	8,047
<50	2,462	6,810	9,272
Grand Total	6,080	15,961	22,041

Figure A10 **Number of Broken Mercury-Containing Medical Measuring Devices By Inpatient Care Capacity of Healthcare Facilities**



APPENDIX 9.

Mapping Result of The Existing Guidelines And Best Practices on ESM Of Mercury Wastes From Medical Measuring Device

No.	Year	Title	Publisher	Source
1.	2017	Global Mercury Waste Assessment Review Of Current National Measures	UNEP/BRS Secretariat	http://www.basel.int/Portals/4/download.aspx?d=UNEP-CHW-MCWASTE-ASSES-GlobalMercuryWasteAssessment-20170921.English.pdf
2.	2015	Technical Guidelines On The Environmentally Sound Management Of Wastes Consisting Of, Containing Or Contaminated With Mercury Or Mercury Compounds	UNEP/BRS Secretariat	http://www.basel.int/Portals/4/download.aspx?d=UNEP-CHW.12-5-Add.8-Rev.1.English.pdf
3.	2015	Practical Sourcebook On Mercury Waste Storage And Disposal	UNEP	https://wedocs.unep.org/bitstream/handle/20.500.11822/9839/-Practical_Sourcebook_on_Mercury_Waste_Storage_and_Disposal-2015Sourcebook_Mercruy_FINAL_web.pdf.pdf?sequence=3&isAllowed=y
4.	-	Preparation Of Technical Guidelines For The Environmentally Sound Management Of Wastes Subject To The Basel Convention	UNEP/SBC	http://www.basel.int/Implementation/Publications/GuidanceManuals/tabid/2364/lapg-15496/2/Default.aspx
5.	-	Preparation Of National Health-Care Waste Management Plans In Sub-Saharan Countries	UNEP/SBC	http://www.basel.int/Implementation/Publications/GuidanceManuals/tabid/2364/Default.aspx
6.	2018	Guidelines On The Environmentally Sound Interim Storage Of Mercury Other Than Waste Mercury	UNEP/Secretariat of the Minamata Convention	http://www.mercuryconvention.org/Portals/11/documents/forms-guidance/English/Guidelines_Environmentally-sound-interim-storage_Nov2018.pdf
7.	2015	Developing national strategies for phasing out mercury-containing themometers and sphygmomanometers in health care, including in the context of the Minamata Convention on Mercury : key considerations and step-by-step guidance	WHO	http://www.euro.who.int/__data/assets/pdf_file/0006/295611/Phasing-Out-Mercury-containing-thermometers-sphygmomanometers-HC-en.pdf
8.	2011	Replacement Of Mercury Thermometers And Sphygmomanometers In Health Care	WHO	https://apps.who.int/iris/bitstream/handle/10665/44592/9789241548182_eng.pdf?sequence=1
9.	2008	Mercury In Health Care	WHO	https://www.who.int/water_sanitation_health/medicalwaste/mercurypolpap230506.pdf

No.	Year	Title	Publisher	Source
10.	2010	Guidance On The Cleanup, Temporary Or Intermediate Storage, And Transport Of Mercury Waste From Healthcare Facilities	UNDP-GEF	https://www.undp.org/content/undp/en/home/librarypage/environment-energy/chemicals_management/cleanup-storage-and-transport-of-mercury-waste-from-healthcare-facilities.html
11.	2013	Guidelines On Disposing Mercury Containing Sphygmomanometers And Thermometers In Ministry Of Health Hospitals	MoH Malaysia	http://www.moh.gov.my/moh/resources/Penerbitan/Rujukan/Umum/Guideline_on_disposing_Mercury.pdf
12.	-	Health Care Waste Management Manual	Department of Health Manila	https://www.doh.gov.ph/sites/default/files/publications/Health_Care_Waste_Management_Manual.pdf
13.	2012	Mercury Free Health Care: Why And How? Awareness Toolkit	Department of Pharmacology All India Institute of Medical Sciences and MOEF India	https://www.aiims.edu/aiims/departments_17_5_16/pharmacology/NPIC/Booklet%20Aiims.pdf
14.	2010	Environmentally Sound Management Of Mercury Waste In Health Care Facilities	MOEF India	http://164.100.107.13/upload/Latest/Latest_58_Guidelines_For_Mercury.pdf
15.	2011	The Mercury Challenge Handbook "The Opportunity To Become A Mercury-Free Facility"	US EPA Ohio	https://www.epa.ohio.gov/Portals/41/Mercury%20Challenge_Web.pdf
16.	2005	Best Management Practices For Hospital Waste	Washington State Department of Ecology	https://fortress.wa.gov/ecy/publications/publications/0504013.pdf
17.	2003	Reducing Mercury Use In Healthcare Promoting A Healthier Environment : A How-To-Manual	US EPA	https://p2infohouse.org/ref/19/18076.pdf
18.	2002	Eliminating Mercury In Hospitals	US EPA	https://19january2017snapshot.epa.gov/www3/region9/waste/archive/p2/projects/hospital/mercury.pdf
19.	2000	A Guide To Mercury Assessment And Elimination In Healthcare Facilities	California Department of Health Services	https://dtsc.ca.gov/wp-content/uploads/sites/31/2016/01/guide-to-mercury-assessment-in-healthcare-facilities.pdf
20.	2012	Eliminating Mercury In Health Care	University of Massachusetts Lowell	https://www.uml.edu/docs/EliminatingMercuryInHealthCare_English_tcm18-187545.pdf
21.	2011	Medical Waste Management	International Committee of the Red Cross	https://www.icrc.org/en/doc/assets/files/publications/icrc-002-4032.pdf
22.	2007	Best Practices In Health Care Waste Management : Examples From Four Philippines Hospital	HCWH Asia	https://noharm-asia.org/sites/default/files/documents-files/161/Best_Practices_Waste_Mgmt_Philippines.pdf
23.	2006	Mercury In Health Care	HEAL, HCWH Europe	http://www.env-health.org/IMG/pdf/Health_Care_Industry_final.pdf
24.	-	Guide For Eliminating Mercury From Health Care Establishment	HCWH	https://noharm-global.org/sites/default/files/documents-files/2460/Mercury_Elimination_Guide_for_Hospitals.pdf

No.	Year	Title	Publisher	Source
25.	2011	Mercury Use From Health Care System	Youth Round Table Society	https://ipen.org/sites/default/files/documents/YRT%20Mercury%20Use%20from%20Health%20Care%20System%20factsheet.pdf
26.	2016	Best Management Practices For Mercury Waste Management In Hospitals	South Walton Utility Company, Inc.	https://swuci.org/wp-content/uploads/2016/02/Mercury-BMP-Hospitals.pdf

APPENDIX 10.

Checklist of Coverage in International Conventions, National Regulations and International Guidelines for Main Provisions in Elimination and Withdrawal of Mercury-Containing Medical Devices in Indonesia.

Table A16 Main Provisions

No.	Provisions	International Conventions	
		Minamata	Basel
A. General Provision			
1.	Terminology (waste definition)	✓	✓
2.	Written policy from healthcare facilities	-	-
3.	Inventory of mercury-containing medical devices by healthcare facilities	-	-
4.	Substitution of mercury-containing medical devices with non-mercury-containing medical devices	✓ not detail	✓ not detail
5.	Mercury Waste Packaging		
a.	In preparation for transport, mercury waste should be placed in a transport container that is closed, structurally sound, compatible with the contents, and designed to prevent release of mercury. If the original transport case or box in which devices were shipped is still in good condition, it can be used for shipment of unbroken devices.		
b.	The mercury waste should be packed carefully with packing material such as plastic bubble wrap or plastic packing foam to prevent breakage inside the container. Other packing options include bentonite clay (sold as commercial cat litter and found in Fuller's earth), kaolinite (sold for medicinal use, paper production, and farming), and vermiculite (used by gardeners as a soil conditioner, in packaging, and as insulation; note that some old vermiculite products sold before 1990 were contaminated with asbestos). These clay minerals can absorb mercury and act as a barrier to prevent spreading. Commercial mercury absorbent products can also be used.	-	✓ not detail
c	The transport container should be tightly sealed to prevent escape of mercury if breakage occurs.		
6.	Mercury Waste Identification (Symbol and Labeling)		See Table 3.

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/ 2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
	✓	✓ refer to other regulation	-	-	-	✓ refer to Basel Convention	-
	-	-	-	-	✓	-	✓
	-	-	-	-	✓	✓ not detail	✓ not detail
	✓ B3 waste in general	✓	-	✓ B3 waste in general	✓	✓	✓
	✓ B3 waste in general		✓ B3 waste in general		✓	✓ not detail	✓
	✓		✓		✓		✓
	-	✓ B3 medical waste in general, not detail	-	✓ B3 waste in general, not detail	-	✓ not detail	✓
	✓		✓		✓		✓

No.	Provisions	International Conventions	
		Minamata	Basel
B. Broken Mercury-Containing Medical Devices Management			
1.	Clean-up of Mercury Spill		
a.	Spill Kit for Small Mercury Spill	-	-
b.	Clean-up Procedure for Mercury Spills		
2.	Mercury Waste On-Site Temporary Storage	-	✓ not detail
2.1.	Siting and Preparation		
a.	The storage space should be located in a secure, restricted-access area. If the storage space is in a multi-purpose building, it should be a locked room or locked partitioned space.		
b.	The storage space should be readily accessible to personnel who are authorized to collect, store, and transport the waste.		
c.	The exhaust vent from the storage space should not direct air towards crowded areas and should be far from any air intake vents.		
d.	An estimate should be made of the anticipated volume of mercury and mercury waste to be stored and this value should be used to determine the minimum size of the storage space, and the types and sizes of containers.		
e.	Mercury waste should be kept segregated from regular waste, infectious waste, and other types of waste.		
2.2.	Storage space design requirements		
a.	(The storage space should have: ▪ A roof and walls that protect from the weather, insects, and other animals; a sloping roof to drain water away from the site is preferred ▪ Floor made of a material that is smooth and impervious to mercury. ▪ If there is a drain in the storage space, it should have an easily accessible and replaceable drain trap to capture mercury in the event of a spill.		
b.	The storage space should be locked to prevent theft.		
c.	The storage space should have ventilation that can eject air from the space directly to the outside and ventilation controls that can stop air circulation from the storage space to the inside of the facility.		
d.	The storage space should have bunding or barriers on the floor or a spill containment tray directly below the waste containers to prevent spills from spreading. The containment volume inside the bund wall or the containment volume of the tray should be at least 125% of the total volume of liquid mercury stored.		

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
					✓	✓ not detail	✓ (for small spill only)
	-	-	-	✓ not detail	✓	-	✓
					✓	✓ not detail	✓
	✓ B3 waste in general, not detail	✓ B3 medical waste in general	✓ B3 waste in general	✓ B3 waste in general	- refer to other regulation	✓ not detail, refer to UNDP-GEF Guidance	✓
		✓	✓ partially	✓			✓
		✓	✓	✓			✓
		-	✓ partially	✓ partially			✓
		-	✓ partially	-			✓
		✓	✓	✓			✓
		✓ partially	✓ partially	✓ partially			✓
		✓	-	✓			✓
		-	✓ partially	✓			✓
		-	✓ barrier	✓ barrier			✓

No.	Provisions	International Conventions	
		Minamata	Basel
e.	Personnel protection equipment, a spill kit, and wash areas should be located near (but not in) the storage space for easy access by authorized personnel.		
f.	The storage space should be kept cool and dry (ideally below 25°C to minimize volatilization and below 40% relative humidity to minimize corrosion if steel containers and shelves are used).		
2.3.	Labeling and Signage See Table 3		
2.4.		Storage of Mercury Contaminated Waste	
a.	Mercury-contaminated wastes that include broken glass or other items with sharp edges or points (e.g., broken thermometers) should be placed in a primary container that is puncture-resistant and air-tight. As a redundant safety measure, the primary container should be placed in a secondary container that further prevents the release of mercury vapor.		
b.	Mercury-contaminated wastes that do not contain sharp edges or points or that do not result in sharp edges or points when dropped or smashed (e.g., contaminated rags, paper towels, or pieces of carpet) should be placed in an airtight primary container. As a redundant safety measure, the primary container should be placed in a secondary container that further prevents the release of mercury vapor.		
c.	The primary container should be marked with the type of mercury waste, the estimated amount, the date the material was placed in the container, and additional description if necessary. If the secondary container is not transparent or the label on the primary container cannot be seen, a label should also be placed outside the secondary container.		
2.5.	Storage General Procedures		
a.	All personnel involved in collection, storage, transport, and supervision of mercury waste should receive special training on mercury waste management including spill cleanup.		
b.	Material Safety Data Sheets and International Chemical Safety Cards on mercury should be available to the employees and discussed during training sessions.		
c.	The storage space should be inspected every month to check for leaks, corroded or broken containers, improper methods of storage, ventilation, the condition of the PPE and wash area, spill kit contents, and updated records. Special attention should be given to waste that has the potential to generate the highest vapor concentrations (e.g., elemental mercury, sphygmomanometers, etc.).		
d.	There should be no smoking or eating in and around the storage space.		
e.	Inventory records should be kept of the types of mercury waste, descriptions, quantities in storage, and initial dates of storage.		
3.	Off-Site Transportation		
3.1.	Manifest System		
4.	Collection Facility/Intermediate Storage	-	Not detail

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
		✓	✓ partially,not specific	✓ partially, not specific			✓
		-	-	-			✓
		-	✓ partially, not specific	-			✓
		-	✓ partially, not specific	-			✓
		-	✓ partially, not specific	-			✓
		✓	-	-			✓
		✓	-	✓ partially			✓
		-	✓ partially	-			✓
		✓	✓	-			✓
		-	-	✓			✓
			See Table 2				
			See Table 4				
	✓ B3 waste in general, not detail	✓ B3 medical waste in general	✓ B3 waste in general	Not applicable	Not applicable	✓ Not detail	✓

No.	Provisions	International Conventions	
		Minamata	Basel
4.1.	Siting and preparation		
a.	The intermediate storage facility should be at least 150 meters away from schools, healthcare facilities, residences, densely populated areas, food processing facilities, animal feed storage or processing facilities, agricultural operations, bodies of water (lakes, river, ocean, etc.), and environmentally sensitive areas.		
b.	The storage facility should be located in a secure area to prevent theft.		
c.	The storage facility should be accessible to trucks and other vehicles that transport mercury waste		
d.	The storage facility should be located in an area that is not prone to natural disasters, such as flooding, typhoons, hurricanes, brush fires, and earthquakes. If this is not possible, measures should be taken to withstand or ameliorate the effects of natural disasters, such as building an earthquake-resistant structure or conducting seismic retrofitting, building on higher elevations in flood plains, maintaining fire lines and using fire-resistant materials to prevent brush fires, etc.		
e.	Where possible, the location should have a cool climate to minimize mercury volatilization and a dry atmosphere to reduce corrosion.		
4.2.	Overall Design Requirement		
a.	The size of the storage area should be sufficient to hold safely the anticipated volume of mercury waste from the region being served. The estimated maximum volume should account for the different types of waste (elemental mercury, contaminated broken glassware, undamaged mercury thermometers and sphygmomanometers, other mercury-containing medical devices, their respective packaging, and the necessary space needed for shelving or storage racks, aisles, transport carts, etc.		
b.	When using an existing facility, the size of the existing storage space should determine the maximum volume of mercury waste that can be stored safety in the facility taking into consideration the types of mercury waste, their packaging, and other necessary space. Storage facilities should not exceed the maximum limit.		
c.	The storage facility should be very secure with closely controlled access and an intrusion detection and alarm system.		
d.	The facility should have static or natural ventilation. This should be supplemented by air conditioning to control temperature and humidity.		
e.	The storage facility should have a heat, smoke and fire detection and alarm system, and a fire suppression system. It should comply with national building code requirements for fire prevention. Fire extinguishers should be installed, inspected regularly, and recharged when needed. The kinds of fire extinguishers available should be consistent with the classes of fires that may be possible in the facility (e.g., paper, cardboard, or plastic fires; combustible liquid fires; electrical fires; etc.). Furthermore, selection of fire extinguishers should take into consideration the need for personnel safety, limiting the spread of mercury droplets and vapor, mercury cleanup and recovery after the fire, and avoiding stress corrosion of containers and shelves.		

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
		✓	✓				✓
		✓	✓				✓
		✓	✓				✓
		✓	✓ partially				✓
		-	✓				✓
		-	-				✓
		-	-				✓
		✓	-				✓
		✓ partially	✓				✓
		-	✓ not detail				✓

No.	Provisions	International Conventions	
		Minamata	Basel
f.	The storage facility should have at least four distinct and separate functional areas: 1. Receiving area for receiving and presorting waste, re-labeling if necessary, and signing documents. 2. Inspection area for checking for leaks, repackaging, secondary containment, and re-labeling if necessary. 3. Storage area specific) for mercury waste 4. Administrative and record-keeping area.		
g.	PPE, spill cleanup kits, first-aid medical supplies, and wash areas should be located in the receiving area, inspection area, and near but not in the storage area. The PPE, spill kits, first-aid supplies, and wash areas should be easily accessible to personnel. Spill kits should include absorbent pads, plastic liners, vapor suppression and decontamination agents. The PPE should include: 1 Rubber or nitrile gloves 2 Safety goggles 3 Respiratory protection: self-contained breathing apparatus (SCBA) for large spills, fit-tested full- or half-face piece air-purifying respirator with mercury vapor cartridges, face mask with sulfur or iodide impregnated activated carbon, face mask made of sandwiched activated charcoal-impregnated cloth, or other mask designed specifically for mercury 4 Polymer or rubber-based, protective full-body suits for large spills and protective coveralls 5 Disposable shoe covers 6 Helmets.		
h.	The drains in the receiving, inspection, and storage areas should be connected to a separate wastewater collection system and not to the regular sewer system nor to surface water. Drains in the storage facility should have an easily accessible and replaceable drain trap to capture mercury in the event of a spill.		
4.3.	Receiving Area		
a.	The receiving area should have a sign to guide and instruct waste generators and transporters.		
b.	The receiving area should have: a presort table for incoming waste; a cart made of impervious material such as steel, rubber or hard plastic (do not use aluminum carts); spill kits and emergency supplementary containers for leaking containers or broken packaging; PPE for the staff; and a separate table or counter for signing documents.		
c.	A cart should be used to transfer the waste to the inspection area and to move the waste around the facility.		
4.4.	Inspection Area		
a.	The inspection area should be located near the receiving and storage areas. Because of the possibility that leaking containers may be brought in, the inspection area should have engineered spill-control features including containment dikes or bunding on the floor.		
b.	The inspection area should have a mercury vapor detection probe, or other methods to detect leaking mercury containers.		

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
		-	✓				✓
		✓ partially	✓ partially				✓
			-	✓ not specific			✓
			-	✓ not specific			✓
							✓
							✓
							✓
			-	-			✓
			-	-			✓

No.	Provisions	International Conventions	
		Minamata	Basel
c.	The inspection area should have local exhaust ventilation, such as a fume hood or enclosed hood, built in accordance to national guidelines. Ideally, the hood should be connected to an activated carbon filter or other device specific)ally designed to remove mercury before the air is discharged. The minimum average face velocity of the hood, when in use, should be about 0.5 meters per second.		
d.	The exhaust stack should be at least 15 meters away from any fresh air intakes to the building and should extend at least 3 meters above the roof line. When the hood is in use, the exhaust air velocity should be at least 15 meters per second to overcome downdraft effects.		
e.	The inspection area should have a spill control tray or containment device over which the waste should be inspected. The containment volume of the tray should be large enough to hold the maximum amount of liquid mercury expected by the facility to be received for inspection.		
f.	The inspection area should have emergency supplementary containers to be used for leaking containers, packaging to replace broken or inadequate packaging, labels for re-labeling containers, spill kits, and PPE for the staff.		
4.5.	Storage Area		
a.	The storage area specific for mercury waste should be clearly marked with warning signs on all doors leading to the storage area. Copies of the spill response and emergency procedures should be on display in the storage area and kept with the spill cleanup kits and PPE.		
b.	The storage area for mercury waste should have continuous or periodic monitoring of mercury levels in ambient air using mercury vapor monitors. Periodic monitors should sample mercury levels at least daily. The monitoring equipment should be able to detect mercury in air in parts per billion.		
c.	The storage area specific for mercury waste should have engineered spill-control features to prevent mercury spills from exiting the area; these should include: 1. Flooring that does not have cracks, seams, or other openings where mercury could get lodged in 2. A floor sealant system that is impervious to mercury and makes it easy to collect spilled mercury such as a durable (6 mm thick) plastic flooring or seamless epoxy-coated concrete 3. Suitable containment dikes incorporated into the floor sealant on all doors of the storage area.		
d	Mercury waste from health facilities may be segregated according to the following risk categories based on the amounts of available mercury. Risk Level 1 (highest risk): elemental mercury, unbroken sphygmomanometers Risk Level 2: unbroken mercury thermometers.		
e.	Shelving and storage racks should be able to support the weight of mercury waste and have back-and-side cross bracing or back-and-side panels to prevent sway. The shelves and racks should not be above shoulder height		
f.	In areas of seismic activity, additional bracing, straps, and cushioning of containers are necessary to prevent movement and breakage of containers, especially for Risk Levels 1 and 2.		

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
			-	-			
							✓
		-	-				✓
		-	-				✓
		✓ partially	✓ not detail				✓
		✓ partially	✓ partially				✓
		-	-				✓
		-	✓ partially				✓
		-	-				✓
		-	-				✓
		-	✓ Not specific				✓

No.	Provisions	International Conventions	
		Minamata	Basel
g.	In facilities that store other types of hazardous waste, mercury waste should not be stored near incompatible chemicals such as acetylene, alkali metals (lithium, sodium), aluminum, amines, ammonia, calcium, fulminic acid, halogens, hydrogen, nitric acid with ethanol, oxalic acid, and oxidizers.		
h.	Lighting, aisle space, stacking, arrangements of containers, and placement of labels and markings should be designed to facilitate inspection of the storage area.		
i.	The storage area should be designed to facilitate the transfer of mercury waste to a long-term (terminal) storage facility or a treatment and disposal facility in the future.		
4.6.	Administrative and Record Keeping Area		
a.	The administrative and record-keeping area should be separated from the receiving, inspection, and storage areas. Records should be maintained in good order and kept in a secure location		
b.	The administrative and record-keeping area should maintain copies of MSDSs and international chemical safety cards which should be readily available to the staff.		
4.7.	General Procedures for Intermediate Storage		
4.7.1	Manifest System		
a.	Same as a manifest system under off-site transport of mercury waste.		
4.7.2.	Storage Facility Procedures		
a.	Storage facilities should comply with licensing and registration requirements and other provisions under the country's laws and regulations. In order to receive a license, the storage facility may be required to submit an ambient air monitoring plan, proof of liability insurance or guarantee bond, emergency preparedness and emergency response plan, description of waste management practices and other procedural guidelines, personnel training, and overall facility design. The storage facility may be inspected to ensure compliance with building, fire, electrical, and other health and safety codes prior to licensing. The regulatory authority may assign a unique identifier number or code to each storage facility.		
b.	Storage facilities should submit periodic reports regarding safety issues (including accidents and spills), storage conditions, capacity, and monitoring data to the designated government authority, as may be required by the country's laws and regulations.		
c.	Storage facilities should have a hazardous waste management plan which establishes procedures for receiving waste, internal transport, waste inspection, re-labeling, repackaging, supplementary containment, storage, facility inspection, general cleaning (housekeeping), spill control, spill cleanup, emergency procedures, worker safety (including hazard identification, hazard mitigation, proper use of PPE, ergonomic techniques for handling waste, and medical surveillance), reporting, and record-keeping.		
d.	All storage facility staff should be familiar with all aspects of the hazardous waste management plan, receive initial and periodic refresher training, and be equipped to handle spills and other emergencies.		

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
		✓	✓				✓
		-	✓				✓
		✓	✓				✓
		-	✓ Not detail				✓
		-					✓
		-					✓
			See Table 4				
		✓	-	-			✓
		✓	-	✓ Not detail			✓
		✓ Not detail	-	-			✓
		✓	✓	-			✓

No.	Provisions	International Conventions	
		Minamata	Basel
e.	When receiving the waste, the containers should go through an initial visual inspection to determine the condition of the packaging and containers without opening the primary and secondary containers. If a leak or breakage is suspected, the waste should be brought immediately to the inspection area.		
f.	After the initial inspection, the waste should be brought to the inspection area for a more detailed inspection of the physical integrity and seal of the primary and secondary containers, to check for possible breakage of contents and proper labeling, and to validate the amount of mercury waste (e.g., weight of containers, number of bags, number of fluorescent lamps, etc.). If outer containers have to be opened to test for suspected leaks, this should be done under the fume hood (local exhaust ventilation). Mercury probes or detector tubes could also be used to verify suspected leaks.		
g.	The storage facility should have clear guidelines on repackaging and supplementary containment if outside packaging is inadequate or if primary or secondary containers are broken. If there are indications of a leak in the primary and/or secondary container, the waste should be placed in an air-tight supplementary container of the appropriate size and strength.		
h.	The storage area for mercury waste should be routinely monitored, including daily readings of mercury levels in ambient air; weekly inspections for leaks and corroded or broken containers, and improper methods of storage, as well as routine tests of the burglar alarms, fire alarms, fire suppression systems, and exhaust ventilation; and monthly inspections of the condition of the PPE and wash units, spill kit contents, flooring (to check for cracks), and files. Inspection logs including the inspection dates, observations, name, and signature of the inspector should be kept and made available to regulatory authority as may be required by law.		
i.	During facility inspection, if a container is found to show signs of losing its physical integrity, the container should be removed from the shelf, carefully inspected under the fume hood, placed inside a supplementary container, and then re-labeled before being returned to the shelf.		
j.	Records of accidents, spills, worker injuries, and chemical exposure should also be kept by the storage facility and made available to relevant government authorities, as may be required under the country's laws and regulations.		
k.	Due to the significant risk of adverse health effects as a result of exposure to mercury at the facility, a health surveillance or medical monitoring program should be established.		
5.	Treatment and/or Disposal of Mercury Waste	-	not detail

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
			-	-			✓
		-	-				✓
		-	✓ partially				✓
		-	-				✓
		-	✓ not detail				✓
		-	✓				✓
		✓	-				✓
	✓ B3 waste in general	✓ B3 medical waste in general	✓ B3 waste in general	✓ B3 medical waste in general	✓ refer to other regulation	✓	-

No.	Provisions	International Conventions	
		Minamata	Basel
C.	**Unbroken Mercury-Containing Medical Devices Management**		
1.	Temporary On-Site Storage (Special Room)	-	Not applicable
1.1.	Siting and Preparation		
a.	The storage space should be located in a secure, restricted-access area. If the storage space is in a multi-purpose building, it should be a locked room or locked partitioned space.		
b.	The storage space should be readily accessible to personnel who are authorized to collect, store, and transport the waste.		
c.	The exhaust vent from the storage space should not direct air towards crowded areas and should be far from any air intake vents.		
d.	An estimate should be made of the anticipated volume of mercury and mercury waste to be stored and this value should be used to determine the minimum size of the storage space, and the types and sizes of containers.		
e.	Mercury waste should be kept segregated from regular waste, infectious waste, and other types of waste.		
1.2	Storage Space Design Requirement		
a.	The storage space should have: • A roof and walls that protect from the weather, insects, and other animals; a sloping roof to drain water away from the site is preferred • Floor made of a material that is smooth and impervious to mercury • If there is a drain in the storage space, it should have an easily accessible and replaceable drain trap to capture mercury in the event of a spill.		
b.	The storage space should be locked to prevent theft.		
c.	(c) The storage space should have ventilation that can eject air from the space directly to the outside and ventilation controls that can stop air circulation from the storage space to the inside of the facility.		
d.	The storage space should have bunding or barriers on the floor or a spill containment tray directly below the waste containers to prevent spills from spreading. The containment volume inside the bund wall or the containment volume of the tray should be at least 125% of the total volume of liquid mercury stored.		
e.	Personnel protection equipment, a spill kit, and wash areas should be located near (but not in) the storage space for easy access by authorized personnel.		
f.	The storage space should be kept cool and dry (ideally below 25°C to minimize volatilization and below 40% relative humidity to minimize corrosion if steel containers and shelves are used).		
1.3	Labeling and Signage		
a.	The entrance and exit doors of the storage space should be marked with warning signs, such as "Danger: Hazardous Mercury Waste" and the skull and crossbones symbol for toxic or poisonous waste.		
b.	(b) The waste containers should be labeled "Hazardous Mercury Waste" along with a description of the contents and the initial date of storage.		

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
	Not applicable	Not applicable	Not applicable	Not applicable	✓	✓ Refer to UNDP-GEF Guidance	
					✓		✓
					-		✓
					-		✓
					✓ Not specific)		✓
					✓		✓
					✓	✓ partially	✓
					-	✓	✓
					-	✓	✓
					✓ Not specific)	-	✓
					✓	✓	✓
						-	✓
						-	✓
						✓ partially	✓

No.	Provisions	International Conventions	
		Minamata	Basel
1.4	Storage of Mercury Device		
a.	Since unbroken mercury devices (e.g., thermometers and sphygmomanometers) are fragile, they should be stored in a manner that reduces the chance of breakage.		
b.	Since mercury devices may break during storage or transport, the primary container must be puncture-resistant and air-tight unless they are placed in their original portable cases or individual boxes used during shipment.		
c.	The primary container should be marked with the type of mercury device, the quantities inside the container, the initial date of storage, and any additional description if necessary.		
d.	As a redundant safety measure, the primary container should be placed in a secondary container that prevents release of mercury vapor in case the mercury devices break. If the secondary container is not transparent or the label on the primary container cannot be seen, a label should also be placed outside the secondary container.		
1.5	General Procedures		
a.	All personnel involved in collection, storage, transport, and supervision of mercury waste should receive special training on mercury waste management including spill cleanup.		
b.	Material Safety Data Sheets and International Chemical Safety Cards on mercury should be available to the employees and discussed during training sessions.		
c.	The storage space should be inspected every month to check for leaks, corroded or broken containers, improper methods of storage, ventilation, the condition of the PPE and wash area, spill kit contents, and updated records. Special attention should be given to waste that has the potential to generate the highest vapor concentrations (e.g., elemental mercury, sphygmomanometers, etc.).		
d.	There should be no smoking or eating in and around the storage space.		
e.	Inventory records should be kept of the types of mercury waste, descriptions, quantities in storage, and initial dates of storage.		
2.	**Official Records of Goods Elimination**	-	-
3.	**Off-Site Transportation**	-	not detail
4.	**Storage Depot**	-	✓ not detail
5.	**Treatment and/or Export**	-	✓

Coverage in International Conventions, National Regulations and International Guidelines							
	National Regulation					International Guidelines	
	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.12/2020	PMK 7/2019	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
						✓	✓
					-		✓
					✓ partially		✓
					-		✓
					-		✓
					-		✓
					-		✓
					✓ partially		✓
	-	-	-	-	✓		-
	not applicable	not applicable	not applicable	not applicable	✓ not detail		✓ not detail
	Note : Ministerial regulation is being drafted						
	not applicable	not applicable	not applicable	not applicable	not applicable		✓ not detail
	Note : Ministerial regulation is being drafted						
	✓ not detail	✓ partially	-	✓ refer to other regulation	✓ not detail		✓
	Note : Ministerial regulation is being drafted						

Table A17 **Mercury Waste Transportation (Licensed)**

No.	Main Provision	Minamata	Basel
1.	**Mercury Waste Transporter**	-	not detail
1.1	Preparation		
a.	For transport of large amounts of mercury waste, the regulatory authority may issue special permits or licenses to the transporter and a special registration for the vehicle. The licensed transporter may be given a unique identification number or code. To obtain a license to transport mercury waste, the transporter may be required to undergo training specific to mercury waste, submit proof of liability insurance or guarantee bond, and provide copies of an emergency preparedness and emergency response plan. The training could include legal obligations planning, routing, handling, visual inspection, packaging, labeling, loading/ unloading, securing, placarding, manifest or consignment forms, occupational safety, hazard recognition, hazard mitigation (including ways to minimize the possibility and the consequences of accidents), use of PPE, spill response planning, use of spill kits, emergency procedures, and accident reporting. The vehicle may be inspected and certified prior to obtaining a special vehicle registration		
b.	The regulatory authority may specify the maximum amounts above which a registered transporter is required. For example, the regulatory authority may allow a generator (hospital, clinic or other health facility) transporting less than 100 kilograms of mercury-containing waste, less than 300 fluorescent lamps, and less than 0.45 kilogram of elemental mercury to transport the mercury waste by ground transportation to the storage facility in the generator's own vehicle; waste quantities above this limit would require a licensed transporter and a registered vehicle.		
1.2	Vehicle		
a.	The registered vehicle should be a closed vehicle.		
b.	The body of the vehicle should be of a suitable size commensurate with the design of the vehicle and the load to be transported.		
c.	There should be a bulkhead between the driver's cabin and the vehicle body, which is designed to retain the load if the vehicle is involved in a collision.		
d.	There should be a suitable system for securing the load during transport.		
e.	Empty air-tight containers, plastic bags, PPE, spill kits, cleaning equipment, and decontaminating agents should be carried in a separate compartment in the vehicle.		
f.	The registered vehicle should be marked with the name and address of the waste carrier.		

	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.4/2020	- PP 74/2014 - Permen hub - SK Dirjen	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
	✓ B3 waste in general	✓ specific for healthcare facilities only using 3-wheel vehicle	✓ B3 waste in general	✓ hazardous substances or dangerous goods	- refer to other regulation	✓ not detail	✓
	✓	✓	✓	✓			✓
	-	-	-	-			✓
	✓		-	✓			✓
	-		-	✓			✓
	-		-	✓			✓
	-	Not applicable	✓	✓			✓
	-		✓ general, not detail	✓ partially			✓
	-		✓ (name and phone)	✓			✓

No.	Main Provision	Minamata	Basel
1.3	Off-site Transport of Mercury Waste		
a.	Before transporting the waste, the transporter should inspect all the waste containers to ensure that they are packed and labeled properly.		
b.	Whether transporting the mercury waste in a registered vehicle or in the generator's own vehicle, the waste containers should be placed in the back of the vehicle (cargo compartment of a truck or lorry, back trunk or boot of a car) and not in the passenger section.		
c.	All waste containers should be firmly secured such that the containers do not tip over, slide, or shift during accelerations, stops, turns, and driving over bumps and holes on the road.		
d.	Containers should not be stacked more than 1.5 meters high to avoid crushing items.		
e.	The transport vehicle should be kept locked whenever there is waste in the vehicle except during inspection, loading, and unloading.		
f.	The transporter should transport the waste as soon as possible using the safest or most direct route to the storage facility. If the transporter collects mercury waste from multiple facilities, the routing plan should reflect the shortest and safest route to minimize time and distances traveled. The transporter should transfer the waste only to the storage facility or to another licensed transporter		
g.	The transport vehicle should be kept clean and maintained in good running condition.		
h.	Ideally, the registered vehicle should be used to transport mercury and other hazardous wastes only. However, if the vehicle is used to transport other types of wastes, the vehicle should have a sealed, bulk container that is used only for mercury and other hazardous wastes and that can be removed from or lifted on to the vehicle chassis.		

Table A18 **Mercury Waste Identification (Symbol and Labeling) for Container, Storage Facility and Mercury Waste Transporter**

No.	Mercury Waste Identification (Labeling)	Minamata	Basel	PP 22/2021
1.	Symbol and Labeling for Containers	-	✓ refer to international rule and standards	✓ B3 waste in general, refer to other regulation
a.	The waste containers should be labeled "Hazardous Mercury Waste" along with a description of the contents and the initial date of storage.			

	PP 22/2021	Permen LHK P.56/2015	Permen LHK P.4/2020	- PP 74/2014 - Permen hub - SK Dirjen	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
	-		✓	✓			✓
	-	✓	-	✓			✓
		-	-	✓			✓
		-	-	-			✓
		-	-	✓			✓
		-	-	✓			✓
		-	-	✓			✓
		✓ partially	✓ partially	✓			

	Permen LHK P.56/2015	Permen LHK P.4/2020	- PP 74/2014 - Permen hub - SK Dirjen	Permen LHK 14/2013	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
	✓ B3 medical waste in general	Not applicable	✓	✓	✓ refer to other national regulation	✓ not detail	✓
	✓ B3 waste, not specific mercury waste		B3 waste, not specific mercury waste	✓ B3 waste, not specific mercury waste	-		✓

8	Mercury Waste Identification (Labeling)	Minamata	Basel	PP 22/2021
b.	The label should also include content (chemical composition or description of the waste), warnings, special handling procedures if necessary, emergency contact numbers, and the name and contact information of the generator.			
2.	Symbol and Label for On-Site Storage Facility			
a.	The entrance and exit doors of the storage space should be marked with warning signs, such as "Danger: Hazardous Mercury Waste" and the skull and crossbones symbol for toxic or poisonous waste.	-	-	refer to other regulation
3.	Symbol and Label for Collection of B3 Waste (Licensed)/ Intermediate Storage at Central Facility	-	refer to international rule and standards	refer to other regulation
a.	The storage facility should have clear labeling guidelines that describe when a label should be replaced. The labels should say "Hazardous Mercury Waste" and include the content (chemical form, composition, or description of the waste), warnings, special handling procedures if necessary, emergency numbers, and the name and contact information of the generator. The storage facility should add the following information to the existing label or in an additional label: UN number or hazardous substance identification number used by the country for mercury, hazardous waste description (toxic, corrosive for elemental mercury), date that the waste was received, and an identification code that links to a specific) record with additional details about the waste, measured quantity, the transporter, and the generator.			
4.	Symbol and Label for Mercury Waste Transporter	-		refer to other regulation
a.	The licensed transporter should have appropriate warning signs and placards displayed on the registered vehicle in accordance to national or international regulations. Mercury compounds are generally categorized under Class 6.1 (toxic substances) and elemental mercury (UN number 2809) under Class 8 (corrosive substances). In countries that require Emergency Action Codes, elemental mercury is a 2X (fine water spray, liquid tight chemical protective clothing).			

	Permen LHK P.56/2015	Permen LHK P.4/2020	- PP 74/2014 - Permen hub - SK Dirjen	Permen LHK 14/2013	PMK 41/2019	UNEP Guidelines	UNDP-GEF Guidance
	✓		✓	✓			✓
	✓ partially, only symbol	Not applicable	Not applicable	✓ partially only symbol	✓ refer to other regulation	✓ refer to national regulation or international guidelines	✓
	✓ partially, only label	Not applicable	Not applicable	✓ partially only symbol	✓ refer to other regulation	✓ refer to national regulation or international guidelines	✓
				-			
	✓ refer to other regulation	✓ refer to other regulation	✓	✓ partially only symbol	✓ refer to other regulation	✓ refer to national regulation or international guidelines	✓
			✓				

Table A19 **Manifest System and Records**

No.	Manifest System and Records	Minamata	Basel
1.	**Manifest System**	-	✓
a.	A manifest form or consignment note must accompany the movement of mercury waste.		✓
b.	The manifest or consignment note should identify the source of the waste, the transporter, the storage facility, and the relevant government authority.		✓
c.	The generator, transporter, and storage facility should each have copies of the manifest or consignment note. Each copy should contain the signatures of the persons handling the waste from the generator to the storage facility, as well as the names of the responsible persons representing the generator, transporter, and storage facility. Copies of the manifest or consignment note should be kept by the generator, transporter, and storage facility.		✓
d.	The generator should keep a copy of the manifest or consignment note for at least five years from the date of shipment. The licensed transporter should keep a copy of the manifest and other records of each shipment for at least five years from the date of shipment, and these records should be made available to the regulatory authority as may be required by law.		-
2.	**Manifest**	-	✓
a.	Records should be kept until such time that the mercury waste is transferred to a long-term (terminal) storage facility or to a treatment and disposal facility. The records should be linked to an identifier number or code on the mercury waste labels.		✓ partially
b.	The records should include the name and contact information of the source of mercury waste (including generator identification number if available), the quantities (number of containers, weights, approximate volumes) and descriptions of the waste (including composition and information on how the mercury waste was generated), special handling procedures or warnings if appropriate, the date when the waste was received, name and contact information of the transporter (including transporter identification number if available), the name of the person receiving and inspecting the waste, any notes or observations on the condition of the waste when received, any corrective actions taken (e.g., repackaging or re-labeling), the manifest or consignment note, and appropriate signatures.		✓

	PP 22/2021	PermenLHK P.56/2015	Permen LHK 01/ 2020	PMK 41/2019	PMK 7/2019	UNEP Guidelines	UNDP-GEF Guidance
	Not detail	specific for healthcare facilities only using 3-wheel vehicle		Not applicable	Not detail	Refer to UNDP-GEF Guidance	
					-		
					partially		
		-	-		-		
	Not detail	-		Not applicable	-	Refer to UNDP- GEF Guidance	
		-	partially		-		
		-			-		