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# Mini Health Technology Assessment (HTA) of Urban and Rural Health Care in Indonesia



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Ferdy Iskandar,<sup>1\*</sup> Fabianto Santoso,<sup>2\*</sup> Angela Franzeska,<sup>3\*</sup>  
Yenna Tasia,<sup>1</sup> Kamajaya Mulyana<sup>4</sup>

## ABSTRACT

**Background:** Health Technology Assessment (HTA) is a program to evaluate the use of technology in healthcare. HTA proposed by World Health Organization (WHO) will affect the government's decision-making in the development of healthcare technology. The use of technology should assess from its cost-effectiveness to its potential ethical problems. HTA Unit – a division who organizes HTA in government in Indonesia – has emerged in the ministry of health in 2003 and focused on drugs and vaccines problems. However, HTA in Indonesia has not been formally valid until today. This study aimed to evaluate the usage, supply, and demand of the health technology and the spread of health technology in urban and rural areas.

**Methods:** This study is a cross-sectional study using a questionnaire to gather quantitative and qualitative data. The respondents of this study are medical doctors in Indonesia, and the selection of the respondents is made consecutively. We divide respondents' area into urban and rural areas and health practitioners as field executors (general practitioners or GP and specialists) and head of healthcare facilities.

**Results:** The total samples are 48 health practitioners and 14 head of healthcare facilities. Statistical analysis shows that the two settings (urban and rural) are not significantly different ( $p=0.478$ ), while descriptive analysis shows that the inadequacy of health technology is higher in rural than that in urban areas (70% VS 52.63%). The relationship between the field of health practitioners (GP and specialist) and the adequacy of health technology is not significant. More GP than specialists complain about the inadequacy of health technology in giving the health service to the patients. About 92.8% head of health facility said that technology is needed to support the health service, while only 35.71% agreed that their health facilities still have low health technology.

**Conclusion:** The use of health technology in Indonesia is still inadequate. The spread of health technology is not equal in urban and rural areas. The lack of health technology in rural areas, especially for GP, affect in diagnosing and giving therapy to patients. The poor spread of technology in healthcare also make a gap between health research and health clinical practice.

**Key Words:** health technology assessment, urban, rural, Indonesia

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<sup>1</sup>Universitas Katolik Indonesia Atma Jaya, Jakarta, Indonesia

<sup>2</sup>Universitas Indonesia, Jakarta, Indonesia

<sup>3</sup>Universitas Airlangga, Surabaya, Indonesia

<sup>4</sup>Maranatha Christian University, Bandung, Indonesia

\*Correspondence to: Ferdy Iskandar, Fabianto Santoso, Angela Franzeska, Universitas Katolik Indonesia Atma Jaya, Jakarta, Indonesia Universitas Indonesia, Jakarta, Indonesia Universitas Airlangga, Surabaya, Indonesia  
[iskandar.ferdy@gmail.com](mailto:iskandar.ferdy@gmail.com)

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## INTRODUCTION

Health Technology Assessment (HTA) is a program that has been used to evaluate the use of technology in healthcare. HTA, which first proposed by the World Health Organization (WHO), affects governmental decision-making with regards to the development of healthcare technology in a country. The use of technology should be assessed based on its cost-effectiveness to any ethical problems that may arise from its use. Hopefully, the proper use of technology will be able to enhance various aspects of the health service sector.<sup>1</sup>

HTA has been used by numerous countries including the Asia-Pacific, where it was first introduced in 1997 by the South East Asia Regional Office (SEARO).<sup>1</sup> South Korea was the first country to apply HTA to pharmacoeconomics, followed by Taiwan and Thailand thereafter.<sup>2</sup> A study reviewing HTA in Asia-Pacific has found that several other countries already had a useful HTA in place.<sup>3,4,5</sup>

HTA has been used in Indonesia for decades, beginning in 1995 where the Indonesian

government appointed a team to supervise healthcare technology. The ineffective implementation of HTA before 2003 led to the official formation of a HTA Unit, a division that implements HTA in Indonesia, by Indonesia's Ministry of Health.<sup>1</sup>

Indonesia consists of numerous islands, each with their own urban and rural areas that face different healthcare issues. This condition results in differing usage of the same technology depending on location. The effect of this condition on the supply and demand of healthcare technology in various parts of Indonesia has yet to be studied. The study of these results will be included in the HTA program.

## METHODS

### Study Respondents

This study was a cross-sectional study using respondents who are medical doctors. The selection of respondents was made consecutively. The respondents ranged from Western Indonesia, a more urban

**Table 1** The relationship between the Healthcare Facilities' Location and the Adequacy of Health Technology

Type of Health Practitioners			Adequacy of Health Technology		Total	P-value
			Yes	No		
GP	Location	Urban	8	13	21	0.371
		Rural	1	6		
		Total	9	19		
Specialists	Location	Urban	10	7	17	1.000
		Rural	2	1		
		Total	12	8		
Total	Location	Urban	18	20	38	0.478
		Rural	3	7		
		Total	21	27		

**Table 2** The relationship between the Type of Health Practitioners and the Adequacy of Health Technology

Type of Health Practitioners	Adequacy of Health Technology		Total	P-value
	Yes	No		
GP	9	19	28	0.055
Specialist	12	8	20	
Total	21	27	48	

**Table 3** The Need for Health Technology in Diagnostic and Therapeutic Medicine in Various Health Practitioners' Field

Health Practitioners' Field	Health Technology for Diagnostic	Health Technology for Therapy
GP	+	-
Psychiatrist	-	-
Medical Rehabilitation Specialist	+	+
Obstetrician and Gynecologist	+	-
Pediatrician	+	-
Cardiologist	+	+
Internist	+	+
Radiologist	+	-
ENT Specialist	+	+

+ yes - no

area, to Eastern Indonesia, a more rural area. The respondents were divided according to their area, allowing for the differentiation of their perspectives based on a rural or urban setting. Urban areas were big cities in Indonesia such as Jakarta, Surabaya, and Bandung. Rural areas were smaller cities to districts. The respondents involved in this study were either health practitioners active in their field

or heads of healthcare facilities which manage the use of healthcare technology in a healthcare facility. This division aimed to have the perspective of the health practitioners as field executors and head of healthcare facilities which has the policy for the use of healthcare technologies in his healthcare facility.

**Study Design**

This study uses an electronic questionnaire for collecting data from respondents. Respondents who agreed to participate in this study are given a link to fill the questionnaire, which included the agreement of informed consent of this study. Quantitative data included age, experience as a medical doctor, field of work, and the need for technology in diagnostic or therapeutic medicine. The data was processed and presented in tables or quantitative diagrams. Open questions supported quantitative data as qualitative data. Open questions help the respondents to tell the state of health technology in their workplaces freely.

**Statistical Analysis**

Quantitative data processed in categories and numeric using Chi-square (if qualified) and t-test (if parametric requirements are met). The data was processed using Statistical Package for Social Science (SPSS) and presented in tables and diagrams. Qualitative data would be presented to support quantitative data. There were also several quotations from qualitative data presented in this study.

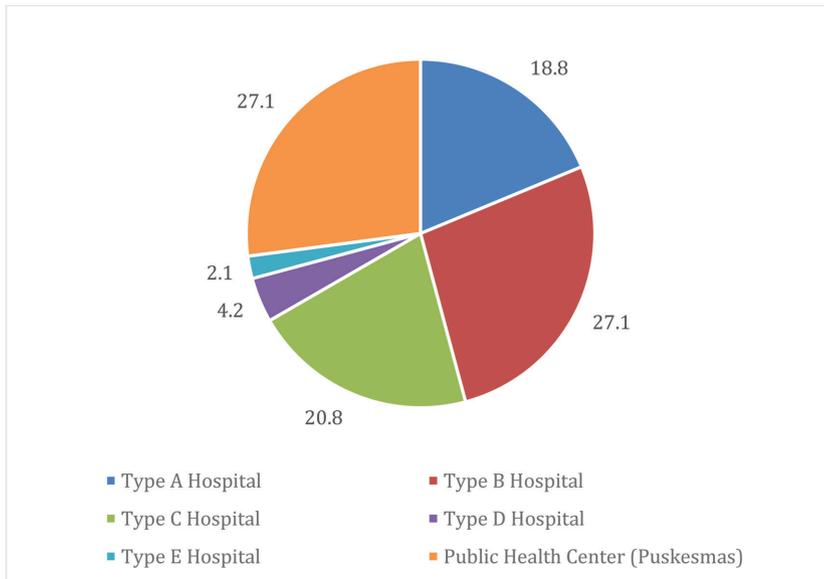
**RESULT**

This study included 48 active practitioners and 14 heads of healthcare facilities spread across Indonesia. The discussion of the results of this study has been separated between the two.

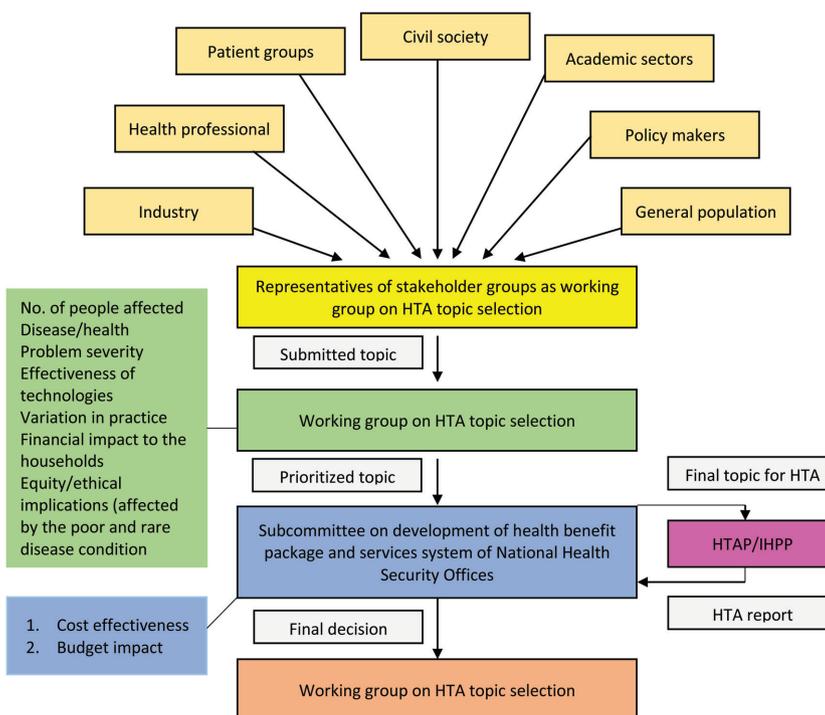
**Healthcare Practitioners**

Healthcare facilities were divided into urban and rural areas. 39 respondents (81.25%) worked in urban areas, and 9 respondents (28.75%) worked in rural areas. Urban regions included Jakarta, Surabaya (East Java), Padalarang (West Java), and Pekanbaru (Riau/Sumatera). Rural regions included Kediri (East Java), Mojokerto (East Java), Lamongan (East Java), Bojonegoro (East Java), Sampang (Madura/East Java), Halmahera (Maluku/Eastern Indonesia), and Ende (Flores/Eastern Indonesia).

We divided healthcare facilities into public health centers (Puskemas) and hospital types A, B, C, D and E based on the number of specialists and inpatient rooms as regulated by the Ministry of Health. The distribution of healthcare facilities can be seen in Figure 1.



**Figure 1** Categories of Health Care Service (in percentage)



**Figure 2** The Health Intervention and Technology Assessment Program (HITAP) Thailand: institutionalizing inclusive and evidence-based decision making using health technology assessments (HTA)<sup>8</sup>

Based on the data in [figure 1](#), the highest numbers of healthcare facilities are type B hospitals and public health centers. This number describes the condition of healthcare facilities in Indonesia, with a total of 9,719 public health centers outnumbering any other type of hospital.

About 56.3% of respondents felt that the health technology in their healthcare facility was inadequate, with 43.7% responding otherwise. We

wanted to find the relationship between the location of the healthcare facility (urban or rural) and the adequacy of the health technology. This data has been illustrated statistically in [table 1](#).

[Table 1](#) shows the relationship between the location of the healthcare facility and the adequacy of the health technology. We also statistically analyzed the health practitioners to observe the spread of general practitioners (GP) and specialists in those areas. Overall statistic analysis, using Fisher test (Chi-square test did not meet the requirements) yielded a p-value of 0.478, showing that the locations were not significantly different. However, the descriptive analysis showed that the inadequacy of health technology was higher in rural areas than in urban areas (70% VS 52.63%).

A tiered analysis which focused on GP using a Fisher test analysis yielded a p-value of 0.371. However, 85.7% of GP in rural areas claimed that even primary health technology was not available in their area. Statistic tests for specialists based on the urban and rural setting showed that the result did not correspond significantly or that the value was a coincidence. Furthermore, this result cannot be used as the number of respondents who were specialists in rural areas was less than those in urban areas. Nevertheless, specialists and GP can still be compared to the adequacy of health technology, which will be discussed in the next section.

Respondents were divided into a specialist (58.3%) and GP (41.7%) groups. The average experience as a medical doctor was  $76.08 \pm 96.11$  months. The relationship between the type of health practitioner and the adequacy of health technology is presented in [table 2](#) to support [table 1](#).

Based on the p-value (Chi-square test) from [table 2](#), the relationship between the type of health practitioner and the adequacy of health technology was insignificant. Of interest is that more GP, rather than specialists, felt that health technology was inadequate while specialists believed that the available health technology was adequate. This result was inversely proportional to the GP's requirements for less technology as compared to the specialists' requirements for more. The need for health technology in diagnostic and therapeutic medicine in various health practitioners' fields are presented in [table 3](#).

Based on [table 1](#) and [table 2](#), we found that health technology was inadequate in rural areas, especially so for GP. This quantitative data was supported by qualitative data. There were several examples, provided by respondents in open questions, of conditions of GP in rural areas.

One respondent from RSUD Ende, Flores, Eastern Indonesia, said that primary examination

such as blood tests are not available. From her statement:

“In this hospital, we do not have electrolyte and blood gas analysis tests, so we cannot diagnose patients with electrolyte and acid-base balance disturbances.”

Another respondent, a specialist in Lamongan, East Java said that the inadequacy of health technology would affect the patients’ therapy. From his statement:

“If there is no MRI available or the patient could not afford the MRI procedure, the doctor has to diagnose him with the worst case scenario – malignancy. The therapies for malignancy are drugs and radiation, which are not the best option.”

Another respondent said that primary health technology was available in his healthcare facility, but was not used by healthcare practitioners:

“My public health center has adequate health technology facilities, but not all of the facilities are used and well taken care of. For example, ECG and trial lenses in my public health centers are rarely used and are put away in the cupboard. When they are needed, they are usually not functioning or broken.”

There were also a few respondents that took issue with the available internet service, especially in rural areas. Internet inadequacy impedes the access to the latest health-related news, research articles, and guidelines. Several health practitioners also require the internet to access patients’ electronic medical records.

### Head of Healthcare Facilities

We gathered data from 15 heads of healthcare facilities. The average length of work as a head of a healthcare facility was  $145.14 \pm 87.4$  months, which was enough for a head of a health facility. The shortest experience working as a head of the health facility was 36 months or 3 years. However, this study lacked data from rural areas (urban 92.8% VS rural 7.2%). From our study, 92.8% of respondents stated that technology was needed to support health services in healthcare facilities. Only 35.71% heads of healthcare facilities stated that their facilities had inadequate health technology.

Qualitative data support the descriptive data above. Some heads of healthcare facilities said that the shortage was of human resources rather than of available technology. This was due to unequal distribution of technological information in some areas. Several heads of healthcare facilities highlighted the lack of use of computers and other devices for patients’ medical records.

## DISCUSSION

This was a mini HTA study done in Indonesia, and the result of this study cannot be compared to existing HTA as until now there has been no official HTA report from the Indonesian Ministry of Health. HTA in Indonesia has been proposed since 1995 but has progressed slowly since.

In 2014, WHO proposed and introduced HTA in every country. Indonesia is a country with 249 million people with an average life expectancy of 71 years. She is a lower-middle income country with a total healthcare expenditure of 150 US\$ per capita. According to reports from WHO, the Indonesian Ministry of Health has 2 directorates managing health technology, which are the Directorate of Production and Distribution of Medical Devices (DG of Pharmaceutical and Med. Dev, MoH) and the Directorate of Basic Medical Services (DG of Medical Services, MoH). However, Indonesia does not have a HTA-Unit as the WHO recommended every country should have. The Ministry of Health has not reported the current situation on health technology and healthcare facilities in Indonesia to the WHO.<sup>6</sup> With this data, we hope that the results of our mini-study can be used as a stepping stone for the Ministry of Health to take further and faster action.

Table 1 is the primary purpose of this study, which observes the usage and the adequacy of health technology in urban and rural areas. Although statistically, this study does not show a significant result, descriptively there is a significant difference between the rural and urban areas, in which rural areas lack health technology. This difference can be seen in public health development index 2013 which reports that a gap between urban and rural areas.

People will first seek GP in primary healthcare facilities when suffering health problems. According to this study, as many as 85.7% GP have problems handling their patients due to the inadequacy of health technology. This review is supported by the qualitative data gathered. Blood gas analysis, acid-base analysis, and even electrocardiogram are primary examinations that can and should be done in primary healthcare settings. In reality, however, these observations cannot be done in rural areas due to their lack of availability, thus impeding the diagnostic and therapeutic process. Specialists also have trouble diagnosing patients without adequate health technology, and therefore cannot provide the optimal therapies for their patients.

Data from [Table 3](#) showed that GP felt the inadequacy of the health technology lead to problems in diagnosing patients, while specialists felt that the low health technology disrupted the diagnosing and provision of therapy to the patients. With this data, we could say that the distribution of health technology affects not only the diagnostic but also therapeutic process.

From the qualitative and quantitative data that we have gathered, we can conclude that there are two main problems. Firstly, the supply of the medical devices and other health technology in rural areas is inadequate. This supply highly depends on the government's policy to distribute health technologies equally among the different rural and urban areas in Indonesia. Second is the development and training of human resource in learning how to use and utilize the health technology available properly. This is further supported by the data gathered from the head of healthcare facilities which stated that human resources training on health technology were inadequate. This reasoning is based on qualitative data which indicated the presence of the ECG machine but lacked maintenance leading to machine breakdown, which was due to the incompetent human resource. The government should also provide training with regards to the use of medical devices and health technology.

Health technology will not only improve the medical devices used to serve patients, but also the development of research and medicine. Both depend on research and their application in the field. The Ministry of Health Strategic Plan 2015-2019 has included the field of technology and research, although only a few targets and applied researches are written in this plan.<sup>7</sup>

Based on the results of this study the inadequacy of internet affects the health practitioners' ability to provide better health services, such as making electronic medical records or looking for the latest guidelines and research articles. According to WHO, the use of internet in Indonesia is only at 15%. Therefore, there is still a significant gap between health research and clinical practice in Indonesia. Many results of the study end in journals without inpatients, because there lacks a smooth bridge between the two.

### **Multidisciplinary Planning for the Use of Health Technology**

The lack of health technology usage problem in Indonesia not only burdens the government as the policy maker, as it takes a multidisciplinary and multifactorial approach to solve this problem.

For example, the medical device industry can aim to manufacture devices that can be distributed efficiently and used in rural areas. We as medical students also play an essential role in the academic field to do research which is specific, measurable, applicable, relevant, and time-bound in the community with many resource limitations in rural areas. WHO has proposed this multidisciplinary planning in HTA improvement in [figure 2](#).

### **CONCLUSION**

This Mini HTA shows that overall, the use of health technology in Indonesia is still inadequate. The spread of health technology is not equal between urban and rural areas. The lack of health technology in rural areas, especially for GP, affects diagnosing and provision of therapy to patients. The poor spread of technology in healthcare also causes a gap between health research and clinical practice.

HTA should be done comprehensively so that new and effective policies can be developed and implemented to overcome health technology problems in Indonesia. More studies should also be conducted with more respondents, preferably equally distributed between the urban and rural areas.

We hope that the results of our mini-study can be used as a stepping stone for the Ministry of Health to take further and faster action. For a more comprehensive result, this mini HTA can be followed up by conducting the research equally distributed in all provinces in Indonesia. The research can be completed with the help of medical students all over Indonesia. Our country has more than seventy medical faculties and a huge number of medical students which is a great potential to reach primary health care in rural areas. Medical students who volunteered to participate in this research can conduct the survey and give the questionnaire to health practitioners and head of healthcare facilities in primary health care facilities, government hospitals, and public hospitals in the cities where they live (as the urban health care facilities), and also to the satellite cities/villages (as the rural health care facilities). With the advancement of technology nowadays, the questionnaires which have been filled by doctors and head of healthcare facilities then can be easily gathered to the head-quarter team via email or other media. The head-quarter team analyzes and concludes the data, then give the result to the Ministry of Health. This national-scale study will be much more applicable if the Ministry of Health can support by providing a recommendation letter for the research team through Health Department in every city which the research is conducted.

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## CONFLICT OF INTEREST

All authors declare there is no conflict of interest regarding publication of this manuscript

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