ORIGINAL ARTICLE

Costing Study of Wheelchair Service Provision in Yogyakarta

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ABSTRACT

Introduction: Around 10% of the disabled population require wheelchairs globally, and according to the National Socio-economic Survey Indonesia, 2.5% of the population is disabled. Wheelchair, as important tools but relatively expensive mobility support is not yet covered by the national health insurance scheme, deterring community from rights of wheelchair due to relatively high costs. To date, there has been no study to estimate costs of wheelchair services under guidelines proposed by the World Health Organization's (WHO) 8-Step Program. This study aims to estimate the costs of wheelchair provision in Indonesia through the WHO 8-steps approach. **Methods:** We developed a normative costing model using bottom-up costing analysis. A normative WHO 8-Step approach was utilized to determine the costs of adaptive wheelchair service per client in Yogyakarta. At each step, we included the costs of labour, supplies, and equipment of the chairs. We collected information from documents and focus group discussions for the model development and assumptions. **Results:** In 2016, there were 371 clients of wheelchair services in Yogyakarta. The cost was an average of IDR 5,340,240 per client. Sixty-nine per cent of the cost was for wheelchair equipment, 19% was for human resources, and 12% was for supplies. Step 6, the wheelchair equipment, accounted for the largest proportion of cost (81%). **Conclusion:** This study estimates the cost of establishing a supplemental benefit package for national health insurance schemes and evidence of the financial sustainability of wheelchair services according to the WHO guidelines.

Keywords: Cost analysis, Wheelchairs, Insurance

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INTRODUCTION

According to the World Health Organization (WHO), 10% of the population with disabilities need wheelchairs (1). The Indonesian National Socioeconomics Survey (SUSENAS) findings indicate that 2.5% and just below 4% of the Indonesian and Yogyakarta province populations, respectively, are disabled –all types- (2). The Convention on the Rights of Persons here have committed to ensure personal mobility for the disable. Thus, the availability of wheelchairs as one of the aids is crucial for mobility-impaired people to support their daily life activities, recover, and remain productive (3,4). Particularly in a diverse and middle-income country such as Indonesia, wheelchair access can become problematic. Wheelchairs can be expensive to afford by households, leaving the disabled with unsuitable donated wheelchairs which are not adjusted to their need, or worse leaving them with no access to wheelchair (5). Thus, ensuring coverage of wheelchair in the national health insurance benefit package is imperative to facilitates rights to wheelchair for the disabled as one of their basic needs.

Since 2014, Indonesia has implemented a national health insurance scheme named Jaminan Kesehatan Nasional (JKN), administered by the Social Security Administrator for Health (BPJS-kesehatan). JKN offers comprehensive benefit packages including preventive, curative and rehabilitative care for all Indonesians and foreigners living in Indonesia for at least six months. However, wheelchair provision is currently not covered under the scheme. According to The Ministry of Health decree number 28 year 2014:guidelines for national health insurance program health insurance, the benefit packages for mobility aids are limited to crutches, corsets, and mobility prostheses (6). However, Indonesia also has local health insurances, and one of them in Yogyakarta administered by Social Health Security Agency (Bapel Jamkesos), who has provided wheelchair benefit package for the poor. The scheme called The Disability Health Insurance (Jamkesus Disabilitas) and UCP Wheels for Humanity (UCP-RUK), as the

wheelchair supplier in Yogyakarta. Therefore, this study provides lesson learn from Yogyakarta health insurance scheme to estimate the wheelchair services relevant to the Indonesian setting, and possible incorporation within the JKN.

To the best of our knowledge, no research related to the study of wheelchair-related costs through WHO 8-Step in Indonesia is available (7–9). We analyzed unit costs of wheelchair services following the WHO 8-Step approach, including the costs of products and modification, labor, and other charges as applied of the wheelchair. The information will be important for policy maker and the national insurance agency about the approximate cost of incorporating wheelchair into the scheme.

MATERIALS AND METHODS

Approach to Costing Study

The normative bottom-up analysis was performed to estimate the cost of wheelchair service provisions for the disabled population under Jamkesus Disabilitas scheme in Yogyakarta (10). The bottom-up approach, also known as micro-costing or detailed costing, aims to measure the actual resources consumed by patients and services. A value is assigned to each of the resources, and unit costs are added to the total (11).The normative costing method has been widely used by other studies to estimate the unit and total cost of health services (12–15). The baseline scenario applied to the costing calculation that has been implemented in Yogyakarta is a modified version of the WHO 8-Step wheelchair service delivery model. Steps in the modified model consist of 1) outreach and referral by social workers; 2) health check-ups by primary care physicians; 3) wheelchair prescriptions by hospital specialists; 4) funding screening for eligibility; 5) assessment for appropriate wheelchairs by wheelchair service providers; 6) product preparation by wheelchair suppliers; 7) wheelchair fittings by providers; 8) wheelchair user training by providers; and 9) follow-up maintenance and repairs.

Primary and secondary data included were collected from various sources. The calculation was based on actual healthcare services provided to Jamkesus Disabilitas beneficiaries, that is, the poor, disabled population in Yogyakarta Special Region Province during 2016 and several cost estimates. The analysis was conducted by developing costing tools in Microsoft Excel 2016 to simulate the calculation of the average cost per patient and overall cost of delivery. The health care perspective was used in the costing analysis to provide inputs to policy makers such as those responsible for JKN and Jamkesus policy and implementation.

Data Analysis

The bottom-up costing approach focused on the cost of providing wheelchair services in Yogyakarta Special Region. To determine the cost of delivering different wheelchair service models, step-specific sheets were linked to the proportion of population suffering, treated and receiving certain services at specific facilities. A user-friendly interface to enter data and undertake simulations was constructed based on Microsoft Excel.

Total cost of wheelchair service provision is given as:

$$TC = t \times n \times c$$

Where *TC* is the total cost of wheelchair service provision, t is proportion of the total population that potentially may suffer from a disability condition, n is the proportion of the target group expected to present with the condition. Unit cost (*c*) for services used in the analysis reflected the 2016 values. The unit cost is established normatively and is assumed to not vary across health providers.

The cost of wheelchair service provision in each step was composed of human resources (h), supplies (s), equipment (e). The general formula is as follows,

$$c = h + s + e$$

Where the cost elements *h* (human resources), *s* (supply), and *e* (equipment) were derived through a process of consultation and group discussion with various stakeholders relevant to wheelchair service provision. For this analysis, the disabled population size was assumed to be similar to the number of clients served by the wheelchair supplier in 2016, i.e. 371 clients. Nevertheless, the costing tool was designed to estimate the cost and budget of providing the wheelchair service to the larger population. Variable items included listing the human resources, supplies and equipment associated with the service, provided in each step together with quantities and values per unit and the proportion of population undergoing or receiving the corresponding item. Unit costs were assigned to each item in each activity.

Data Collection Methods and Source of Data

There were two sources of information used for data collection 1) secondary data were documents and reports collected from Bapel Jamkesos and UCP-RUK in Yogyakarta; 2) primary data came through group discussions at the corresponding institutions conducted with a series of open-ended questions to explore participants' opinions at each step of the wheelchair service. Invited to the group interview were three representatives from Bapel Jamkesos, two representatives from UCP-RUK, one representative from Primary care facility, one representative from hospital, one social worker from the Social Affairs Office, and two wheelchair clients. The meetings lasted for approximately six hours. The qualifications of the selected professionals were their knowledge and expertise in managing every step of

wheelchair service provision.

RESULTS

In this section we describe the cost of each step according to WHO 8-steps of wheelchair service delivery. All detail of cost can be seen in Tables in Annex.

Step 1: Outreach and Referral by Social Workers

Activities in step one included outreach and patient referral to the District Social Affairs Office (Dinsos), primary health care clinics (Puskesmas), hospitals, Bapel Jamkesos, and finally assessment, fitting and training by social health workers. The objectives of the first step are to ensure the equitable and efficiency in accessing to wheelchair, and to reduce the waiting list.

Human resource costs mainly consist of time spent by social workers for each activity. The unit costs are determined by cost-per-hour as proportion of the monthly salary. Meanwhile, supply costs consisted of transportation to offices and health providers as well as communications. The sub-district social welfare workers are employed by the Social Affairs Office and receive monthly salaries of IDR 2,050,000 plus a monthly allowance of IDR 1,125,000. In total, the monthly take-home pay for sub-district social workers (TKSK) was IDR 3,175,000. The total cost per client in step one was IDR 405,708.

Step 2: Health Check-up by Primary Care Physicians at Primary Health Care providers

Activities in step two included registration in Puskesmas (Supplies) and health assessment by a primary care general physician (GP) as human resources. Upon performing the health assessment, a GP typically spends 10 minutes per patient. Assuming that the GPs in the Puskesmas were Group IIIB civil servants, the total cost of the 10-minute patient assessment would be IDR 2,134 per patient. Every patient visiting Puskesmas usually paid IDR 5,500 for registration. This cost was inclusive of medicine. Therefore, the total cost of activities in step two was IDR 7,634.

Step 3: Prescription of Wheelchair by Hospital Specialist

The costs incurred were primarily for human resources. In the hospital, a wheelchair is prescribed by a rehabilitation specialist. Typically, the rehabilitation specialist spends 30 minutes to assess and write the prescription. In JKN, patients are required to go first to the primary health care clinic before receiving a referral letter to the hospital. At the hospital, they are assessed by the primary physician before seeing an intermediate specialist. For instance, patients suffering from cerebral palsy must first consult with a neurologist prior to seeing the rehabilitation specialist. Primary physicians usually spend 10 minutes, at a cost of approximately IDR 2,224, to assess a patient. In addition to the time cost, the primary physician also receives a medical fee of IDR 13,000 per patient consultation. This makes the total primary physician consultation cost IDR 15,224. Thus, the total step-three cost was IDR 34,896 for clients who are JKN members.

Step 4. Eligibility for Funding from Bapel Jamkesos

Costs attributable to activities in this step are mainly for human resources, e.g. a Bapel Jamkesos officer for accessing documents for eligibility screening and supplies like printing and copies. An officer typically needs ten minutes for screening and assessment. With their salary of IDR 2,000,000 per month, this makes their hourly cost IDR 10,000, or IDR 1,667 for 10 minutes of assessment. Printing and copying cost approximately IDR 240 per client, bringing the total cost for conducting activities IDR 1,907.

Step 5. Assessment for Appropriate Wheelchairs by Wheelchair Service Providers

Items in this step consist of human resources and supplies. Human resources include providers for activities such as basic and intermediate assessment. It also includes reviewers to conduct assessments for each type of chair, such as Standard, Expression, Rough Rider, and Kids Wheelchairs. Human resources costs include the service providers' time, assessment fees, and reviewer costs per appointment. Meanwhile, supplies include assessment and order forms.

In terms of wheelchair assessment, a provider needs approximately thirty minutes to carry out a basic assessment and an hour for intermediate assessment. Assuming that the provider personnel are Group IIB civil servants, their hourly cost is IDR 10,517. So 30 minutes of basic assessment costs IDR 5,528 plus IDR 10,517 for one hour of intermediate assessment. As previously mentioned, approximately 73 % of clients underwent basic assessment and 27 % underwent intermediate assessment. Therefore, the costs for 30 minutes of basic assessment and one hour of intermediate assessment were IDR 3,839 and IDR 2,839 respectively. The total cost per client in step 5 was IDR 76,692.

Step 6. Product Preparation and Assembly by Wheelchair Supplier

In this step, cost components consist of human resources, supplies and equipment. The cost for each component was broken down based on the wheelchair type (Standard, Expression, Rough Rider and Kids Wheelchair) with a cost for one unit, or wheelchair.

The human resources cost for wheelchairs include chair modification and quality control. That cost is determined by proportioning the monthly salaries of supplier personnel with the output capacity per month for each wheelchair type. As a result, the unit cost for human resources in Step 6 for each Standard, Expression, or Rough Rider wheelchair was IDR 57,386. The human resources cost per Kids wheelchair was IDR 65,341. Taking into account the proportions of clients

using each wheelchair type, the overall cost of human resources became IDR 59,429. The average cost per client for Step 6 was IDR 4,331,567.

Step 7 and 8. Fitting and User Training by Wheelchair Service Providers

Activities in Steps 7 and 8 were estimated together in this analysis since in actual practice these are done at the same time and place. The cost components consist of human resources and supplies. In terms of human resources, the cost includes the provider's time cost and incentive for undertaking fitting and training for each wheelchair type. Assuming that the provider's personnel undertaking these activities are Group IIB civil servants with less than a year of service, their hourly cost was IDR 10,517. This makes the average total cost for fitting and training for basic and intermediate clients IDR 6,717 and 5,679, respectively. As for incentive, personnel are given incentives for each client for whom they perform fitting and user training. In general, the amount of incentive is IDR 25,000 for clients using Standard, Expression and Rough Rider wheelchairs, while for Kids wheelchairs, personnel received IDR 75,000 incentive. Thus, by taking into account the proportions of each wheelchair type user, the average total cost for human resources in these steps was IDR 50,204.

Supplies include prints, copies and delivery. In general, prints and copies cost IDR 1,000 per client while each inner-city delivery costs IDR 25,000. This makes the average total cost for supplies IDR 26,000. Therefore, the overall costs for Steps 7 and 8 were IDR 76,204.

Step 9. Follow-Up, Maintenance and Repair

The activities in Step 9 are for clients' follow-up and wheelchair repair. Follow-up is generally done by contacting clients via phone call, which is performed by the wheelchair provider's staff. The cost includes human resources' time cost for providers to contact clients for five minutes (IDR 876) and supplies, a cell phone provider service tariff for the five-minute call (IDR 4,756). Meanwhile, one-time wheelchair repair costs IDR 200,000, including labor and parts. On average, a client requires repair twice in a year, bringing the total repair cost to IDR 400,000 in a year, and the overall Step 9 cost IDR 405,632.

Overhead Cost

Overhead cost in this analysis consists only of training charges for the providers. In 2016, 65.4 % of providers were enrolled in basic training while 34.6 % were enrolled in intermediate training. Unit cost for basic training was approximately IDR 2,705,882 and for intermediate training approximately IDR 7,555,556. This resulted in a total of IDR 46,000,000 for basic training and IDR 68,000,000 for intermediate training. Therefore, the total overhead cost was approximately IDR 114,000,000. We did not allocate the overhead cost to the client because in this study the payer, Bapel Jamkesos, was only interested in estimating the direct medical costs for wheelchair services.

Unit and Total Cost of Wheelchair Service Provision

As mentioned previously, the cost components in each step consist of human resources, supplies and equipment. The total cost of each human resource officer, supplies, and equipment for all steps were IDR 1,000,606 (18.7 %), IDR 623,753 (11.7 %), and IDR 3,715,880 (69.6 %), respectively. Therefore, the unit cost of providing wheelchair service was IDR 5,340,240.

According to Table I, the largest proportion of cost for delivering wheelchair service in Yogyakarta was Step 6 (81%), the product preparation activities. The cost of this step was high due to the expense of wheelchair equipment (IDR 3.7 million per client, 86% of step 6). The smallest proportion was Step 4 (screening for eligibility for funding), which accounted for 0.04% of the cost.

Table I: Unit Cost by Steps and Components per Client

Steps	Human resources	Supplies	Equipment	TOTAL Cost
Step 1	375,708	30,000	-	405,708
Step 2	2,134	5,500	-	7,634
Step 3	34,896	-	-	34,896
Step 4	1,667	240	-	1,907
Step 5	75,692	1,000	-	76,692
Step 6	59,429	556,257	3,715,880	4,331,567
Step 7&8	50,204	26,000	-	76,204
Step 9	400,876	4,756	-	405,632
TOTAL	**1,000,606**	**623,753**	**3,715,880**	**5,340,240**

We then estimated the total cost of wheelchair services for Yogyakarta population. Assuming 3.7 million of population in Yogyakarta, 1.7 million (45.58%) population covered by the health insurance, 66 thousand (3.89%) population were disabled, and 371 population accessing the wheelchair services, we can estimate the total cost of 1.98 billion IDR that need to budgeted (Table II).

DISCUSSION

Affordable wheelchair is important to empower people with disability, and to further impact their productivity (16,17). As an initial step before a more thorough study such as cost-effectiveness, establishing an estimate cost of providing wheelchair is necessary to the policy maker. Using the WHO 8-steps approach with adjustment to the study context, we found that it is possible to provide a relatively low cost wheelchair provision through the primary care systems with only necessary referrals to a higher care level to consult specialists' doctors. The JKN system is using tiered referral system. Where clients

Table II: Total Cost by Steps and Components

Steps	Human resources	Supplies	Equipment	TOTAL Cost
Step 1	139,302,549	11,123,193	0	150,425,743
Step 2	791,168	2,039,252	0	2,830,420
Step 3	12,938,622	0	0	12,938,622
Step 4	617,955	88,986	0	706,941
Step 5	28,064,395	370,773	0	28,435,169
Step 6	22,034,772	206,245,192	1,377,748,495	1,606,028,459
Step 7&8	18,614,228	9,640,101	0	28,254,329
Step 9	148,634,182	1,763,397	0	150,397,579
TOTAL	**370,997,873**	**231,270,894**	**1,377,748,495**	**1,980,017,263**

requires referral letter from the primary care facilities to access secondary level of care (18). Wheelchair prescription also need to be ordered by the rehabilitation specialist. Therefore, the wheelchair service delivery model using the WHO 8-Steps model, can be adopted and integrated to the JKN system with slight modification where additional steps have been applied.

In the modified steps, the wheelchair prescription precedes the assessment. By contrast, in the WHO 8-Steps model, the assessment is conducted prior to the prescription, since the prescription depends on information gained from the assessment. In the case of the Jamkesus Disabilitas model, the purpose of having the rehabilitation specialist write the prescription is only to determine whether a client needs a wheelchair or another type of assistive device. Afterwards, assessment is conducted by wheelchair service providers, whereas in Yogyakarta, it is performed by trained personnel—a nurse or physiotherapist—in Puskesmas or a hospital.
There are several suggested alternatives to shorten the process and create a more efficient system. Firstly, allowing task-shifting for wheelchair prescriptions from a specialist to a GP or a primary care physician would eliminate one unnecessary step. This would reduce some costs, although the direct reduction is insignificant from the healthcare perspective (IDR 34,896). The real benefit would come from time and cost savings. As previously reported, a client accompanied by a social worker needs approximately eight hours in Puskesmas and another eight hours in hospital, even though the client only spends 10 to 30 minutes for each consultation. The extended wait time is usually due to administration delays. The client will also spend at least IDR 100,000 for transportation for each visit to Puskesmas and the hospital. Thus, the shifting the referral to the physician would save the client travel time and costs, as well as wait time at the hospital. This would minimize their stress and burden considerably.

Secondly, the wheelchair delivery system can be made more efficient by simplifying the eligibility referrals. The role of the social workers can be expanded to allow them to screen clients for basic funding eligibility. They could follow a designed checklist, for instance. The advantages include time and transportation cost savings. As for going to Balai Desa, Sub-district office, Dinsos and Bapel Jamkesos, approximately IDR 25,000 to 50,000 was spent on transportation and approximately 5.5 to 8.5 hours to obtain referral letters, including travelling time. To make the referral system more efficient, required investment includes establishing an integrated electronic IT system in all offices and health care providers. Notification for successful or unsuccessful applications can also be done via SMS notification system to clients or social worker.

Thirdly, the most significant cost in the wheelchair provision service is the cost of the chair itself. This is probably due to the wheelchairs being imported, despite the modifications done by local staff. If the wheelchair materials can be produced locally, it is possible that costs can be lowered. To allow this to take place, necessary investments, including manpower recruitment, training, and material procurement need to be considered. Currently, however, the quality of products manufactured in-country do not meet international standards. There needs to be a demand for local manufacturing to satisfy the criteria necessary for a manufacturer to start production of a variety of necessary products. Hence, there will always be a demand for products sourced globally.

Finally, to improve access to wheelchair services, it is vital for all stakeholders to recognize the wheelchair as a tool to realize basic human rights—a means to access health care services, provide dignity, alleviate the burden of care, and allow equal access to opportunities for education, employment, community, and social life (1,8,9). To improve service delivery, access to services, and efficiency, a wheelchair delivery service inclusive of all the steps and standards might be integrated into the JKN system. This could be accomplished, with some adjustments, by expanding the coverage and benefits from existing resources and IT systems.

Policy Implications

The average cost of wheelchair service provision in Yogyakarta is IDR 5.3 million per year. An additional estimate of the ability to pay (ATP) for health service in Yogyakarta was performed by using 2016 Survei Sosial Ekonomi Nasional (SUSENAS) data. It was estimated that the ATP was IDR 1.6 million per household per year. This means that there are patients who clearly face financial barriers to access the wheelchair service, where 15.2% of disabled were in the poorest quintile and another 12.8% were in the 2nd poorest quintile (2). Similar issues are confronted by patients residing around Yogyakarta such as Magelang and Klaten (Central Java). According to estimates using SUSENAS 2016 data, the ATP for health service in Central Java (IDR 1.2 million per household per year) is even lower than that in Yogyakarta. Therefore, health protection, in particular the wheelchair services, should be essential

within national programs, such as the national health insurance or JKN, in the hope that this will improve users' productivity and economy (16,19). A qualitative study suggest that wheelchair have a positive impact on the household income, and have a significant increase quality of life by having the opportunity to do activities and leisure outside their houses (16).

Limitations

This study is subject to limitations. First, we used qualitative data as the main sources of cost and assumption, because of limitation in accessing financial secondary data. However, this was overcome by data provided by UCP-RUK financial information and number of clients. Therefore, further study is needed to collect large survey and do robust analytical analysis. Second, the costing analysis did not consider the cost incurred by the patients and the overhead limited to training and cost.

CONCLUSION

In conclusion, the average cost of individual wheelchair service provision in Yogyakarta is just above IDR 5 million. Considering that the ability to pay for health service in Yogyakarta is less than half the cost of wheelchair services, formidable financial barriers exist to accessing service. Therefore, protections to access wheelchair services should be provided by the government through national programs such as JKN in the hope that this will improve users' productivity and economy.

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