

# The economic impacts of wheelchair use: Evidence from Central Java, Indonesia

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**ABSTRACT** An estimated 10% of the global population has disabilities, and 1 out of 10 require wheelchairs. Although imperative, the provision of wheelchair services remains challenging, especially in low resource settings. Interacting barriers in availability of wheelchair services and healthcare access can negatively affect households of people with disabilities in productivity and obtaining income. The availability of wheelchair services can potentially lessen the related economic burden. However, to date there is limited evidence concerning the economic gain of the wheelchair users in Indonesia. This study aims to analyze the economic impact of using wheelchairs on households in rural Central Java Province, Indonesia. Economic gains of wheelchair users were measured using a cross-sectional survey in Central Java, Indonesia during 2017. The questionnaires consisted of three main sections, namely general information, socio-economic information before and after using adaptive wheelchair, and income and spending related information. A total of 60 adaptive wheelchair users and parent proxy completed the questionnaires. More than half (55%) of the respondents were male, became impaired in 1998, and used an adaptive wheelchair starting in 2009. Medical conditions of the respondents related to need for a wheelchair are cerebral palsy (29%), paraplegia (29%), and polio (15.5%). Three-fourths of the respondents were working in the informal sector. On average, there is a significant increase of Rp. 217,662 in monthly household income between before and after using a wheelchair. However, there was no significant difference in spending before and after using a wheelchair. Respondents feel that using a wheelchair is beneficial particularly in mobility and helping in their activities. Wheelchair use can increase the income of households with disability. Clients responded that there have been several aspects which need further support, including skills improvement, employment generation for people with disabilities, and adequate public transportation facilities.

**KEYWORDS** disability; economic impact; household income; Indonesia; wheelchair

## 1. Introduction

The World Health Organization (WHO) estimated around 10% of the global population has disabilities and 10% of this disabled population requires wheelchairs.<sup>1</sup> In 2012, The National

Socioeconomics Survey (*SUSENAS*) found 2.45% of the Indonesia population has a disability in various aspects, while in Yogyakarta province, 3.89% of the population has some disability.<sup>2</sup> The Convention on

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the Rights of Persons with Disabilities emphasizes the commitment of signatory countries to ensure personal mobility for persons with disabilities and enable their independence.<sup>3</sup> Providing mobility aids, such as wheelchairs, would fulfill the commitment as well as support people with disabilities to engage in their daily activities and social activities.<sup>1,4,5</sup>

However, the provision of appropriate wheelchair and adequate wheelchair services remains challenging, especially in low resource setting.<sup>1,6,7</sup> The WHO has established The Guideline on the Provision of Manual Wheelchairs in Less Resourced Settings to increase appropriate wheelchair provision and services which is known as the 8-Step approach.<sup>1,8,9</sup> Wheelchair provision is defined as the supply of wheelchair intervention to a disabled person by any private, state or Not for Profit Organization (NFPO) which provides services supplying wheelchairs based upon assessment of mobility needs by a professional.<sup>10</sup>

Wheelchair services are provisioned according to the needs and related medical condition of the wheelchair user. A study in West Bengal, India in 2005 showed a lack of appropriate wheelchair provision causing wheelchair abandonment by the recipients due to pain, fatigue, discomfort and lack of habitat ability.<sup>4,11</sup> Evidently, the provision of wheelchairs according to the WHO 8-Step in Indonesia improved satisfaction with mobility significantly for children with proxies and adults with proxies.<sup>8</sup>

Although studies on impact of wheelchair provision on quality of life and satisfaction on wheelchair use have been conducted in Indonesia,<sup>8</sup> to our knowledge, studies on the economic benefits of wheelchair in Indonesia have not been conducted. This study aimed to investigate the economic benefits of providing wheelchair services for people with disabilities in Central Java. In particular, this study examined changes in productivity of wheelchair users and careers of people with disabilities in terms of income, household expenses, and the number of days absent from work. The results of this study will be beneficial to inform stakeholders whether wheelchair use can

impact on households' economy.

## 2. Methods

A cross-sectional survey on economic impact was conducted among wheelchair users who attended a wheelchair service provision organized by UCPRUK (United Cerebral Palsy – Roda Untuk Kemanusiaan) and the Bureau of Social Services in the peri-urban near Yogyakarta, which included Magelang and Klaten between October-November 2017. Samples were purposively selected, and questionnaires were administered to adaptive wheelchair users or parent proxy who attended the event. To avoid mistakes and misunderstanding in filling the questionnaires, trained enumerators were present to assist respondents in administering the informed consent forms and answering questions related to the questionnaires. Respectively, 22 and 38 respondents in Magelang and Klaten participated in the survey. Participants were wheelchair users within the Social Service and UCPRUK network. Inclusion criteria were age more than 17 years old or parent proxy and adaptive wheelchair users for at least 6 months to capture their experience in using the wheelchair. Parent proxies answered the questionnaires for wheelchair users aged less than 17 years old. Exclusion criteria were people on temporary wheelchair.

The questionnaire on economic gain related to the use of adaptive wheelchairs consists of four parts; namely general information about patients, including gender, age, ethnicity, education, insurance status, and the type of adaptive wheelchairs used by patients; socio-economic information before and after using adaptive wheelchairs, including work, breadwinner in the family, the presence of assistants in engaging in daily activities, and caregivers; information regarding income and expenditure, including whether the use of adaptive wheelchairs affects household income and expenditure, food, use of health services, wheelchair repairs, and transportation; and qualitative questions whether adaptive wheelchairs affect income and expenditure in households. The data collected during the survey was entered by

enumerator, operator, and member checks were performed for data validation. Any abnormalities were checked against the original documents. Data were analyzed using software Stata 13.0. Due to the presence of extreme values in the expenditure data, results were reported using means. The T-test was used to assess differences between the means or medians for household expenditure and income between before and after using adaptive wheelchair.

### 3. Results

#### 3.1 Respondents' characteristics

A total of 60 adaptive wheelchair users and parent proxies from Klaten and Magelang completed the questionnaires. Adaptive wheelchair users of interest are those who use either children's wheelchair, rough rider, active, supportive, reclining, or standard adaptive wheelchair. The majority of respondents were standard and children adaptive wheelchair users, with a percentage of 43% and 39%, respectively (Table 1). Not all respondents completed the survey questions. Reasons to leave blank some of the questions were due to difficulties to recall in answering some of the questions and choosing to not answering rather than giving answers that might be inaccurate. Around 88-100% of respondents answered each of the question.

Demographic characteristics of the wheelchair users include ages between 9 and 73 years with a mean of 31 years old (Table 1). More than half

(55%) respondents were male, became impaired in 1998, and used an adaptive wheelchair starting year 2009. Medical conditions of the respondents related to need for a wheelchair are mainly cerebral palsy (29%), paraplegia (29%), and polio (15.5%). On average, wheelchairs users who participated in this study live in a household with four other family members. Among the respondents 53% and 47% were wheelchair users and parent proxy, respectively. Around 90% of respondents are covered by some health insurance and 80% are covered by the National Health Insurance or *Jaminan Kesehatan Nasional* (JKN). Education level for the majority of respondents was high school graduates (48%), elementary school (25%), and bachelor's degree (5%), whereas the rest (22%) have no formal education. Three-fourths of the respondents were working as entrepreneurs (informal sector), whereas a small proportion work as private employees (8%), and the remaining are housewives, civil servants, retired, pastors, or unemployed.

#### 3.2 Economic gain of wheelchair users

Household income was asked from the respondents according to how much the household earns in one month. Fifty-five out of sixty patients completed the questions on economic gain of wheelchair users. Table 2 shows that on average there was a significant increase of Rp. 217,662 in household income before and after using a wheelchair ( $p$ -value

**Table 1.** Wheelchair users' characteristics

Characteristics	n	Mean	SD	Min	Max
Wheelchair user age (years)	60	31.4	17.4	9	73
Number of family member	60	4.1	1.5	1	8
Onset of disability (years)	56	1998	10.2	1972	2011
Year of receiving wheelchair	57	2009	8.1	1973	2017
Duration time between onset of disability and year of receiving wheelchair (years)	53	10.5	9.8	0	36
Time period using adaptive wheelchair (years)	57	7.9	8.1	0	44

SD: standard deviation; min: minimum; max: maximum; n: number of participants answered the questions.

**Table 2.** Household income wheelchair users

Income	Before using adaptive wheelchair			After using adaptive wheelchair			p-value
	n	Mean	CI	n	mean	CI	
Total household income (Rupiah)	55	914,509	762,237 - 1,066,781	55	1,132,171	942,139 - 1,322,202	0.001**
Total per capita income (Rupiah)	55	254,827	201,592 - 308,062	55	311,037	248,373 - 373,701	0.0018***

\*significant at  $p < 0.005$ ; \*\*\*significant at  $p < 0.001$ ; CI: confidence interval; n: number of respondent

**Table 3.** Household expenditure

Spending	Before using adaptive wheelchair			After using adaptive wheelchair			p-value
	n	Mean	CI	n	Mean	CI	
Household (Rupiah)	58	1,025,528	845,655 - 1,205,400	58	1,067,745	871,285 - 1,264,204	0.205

CI: confidence interval

**Table 4.** Days absent from work

Before using adaptive wheelchair (day)			After using adaptive wheelchair (day)			p-value
n	Mean	CI	n	Mean	CI	
11	6.8	-1.1 - 14.7	11	1.5	-0,4 - 3.3	0.0875

CI: confidence interval

= 0.001). Per capita income before and after using adaptive wheelchair showed a significant increase of Rp 56,209 ( $p$ -value = 0.002). While, there was showed no significant differences on household expenditure before and after using adaptive wheelchair.

Table 3 shows that  $p$ -value was 0.205 ( $p < 0.05$ ). The  $p$ -value, obtained by performing  $T$ -test, implied that there was no significant difference in household expenditure between 6 months before using an adaptive wheelchair and 6 months after using an adaptive wheelchair. Interviews were done in October 2017, while most of respondents have used a wheelchair since 2009.

Respondents were asked about days of absence from work in a month. As shown in Table 4, only 11 of 60 respondents responded since nearly 50% of them work independently in informal sector. People who work independently are generally challenged to count their working and absent days from work therefore they could not answer this particular question. Of the samples who responded to the question,  $p$ -value of 0.087

was obtained, which means that there was no significant difference in days of absence from work between 6 months before using an adaptive wheelchair and 6 months afterward. However, the result may not be representative due to the small number of samples.

### 3.3 Qualitative questions' result

The study participants had a variety of responses whether an adaptive wheelchair affects income of the households. Some respondents feel that wheelchair use impacted positively on the household income.

*"I cannot do my activities if there is no wheelchair." (Standard wheelchair user, 40 years)*

Study participants who were wheelchair users felt that it would be difficult to perform their activities without using a wheelchair. Also, those who took the role as a breadwinner in the family could work more comfortably using a wheelchair. In addition, the wheelchair was beneficial in mobility from one place to another.

*“My child becomes much more independent, so I can look for a side job.” (Caregiver, 46 years)*

Respondents who were caregivers or parent proxies stated that they were able to go back to work full time and some for part-time work and were able to do work while taking care of their children.

Other respondents revealed that there was no difference in household income after using their wheelchair, but most participants expressed there is need for vocational training that may affect household income. The reason for this lack of change in income was that the wheelchair user was not the main person who earns money in the household.

Aside from affecting income, wheelchair use could also positively affect the spending of households. As moving becomes easier, wheelchair users can travel further and more often than previously without a wheelchair. Also using a wheelchair, it was easier for people with disabilities to engage in other activities outside their home. This empowerment trend indicates that wheelchair users become less dependent on caregivers or relatives to go from one place to another. In addition, their quality of life increased by having the opportunity to do other activities such as leisure and sightseeing outside their houses.

*“Traveling becomes easier, my kid travels more often. She often goes out to buy snacks she likes; thus, my spending increases than before.” (Caregiver, 46 years)*

*“Before using wheelchair I couldn’t go for shopping, so I spend less.” (Standard wheelchair user, 43 years)*

There were several reasons why respondents report that wheelchair use does not affect household spending, such as, that it is the parents who took care of the disabled child, so that even with the use of wheelchair, there was no effect in household spending. Further, there was little or almost no maintenance cost for the wheelchair and if any, it is regarded as inexpensive.

#### 4. Discussion

Monthly household income of most of the respondents (80%) is less than Rp 1,500,000 which is below the minimum wage (Yogyakarta province minimum wage is between Rp 1,454,200 – Rp 1,709,150). Around 18% of participants have a monthly income between Rp 1,500,000 to Rp 2,499,999, while the rest have more than Rp 2,500,000. This shows that the majority of respondents are middle to lower-income class. Since the majority of respondents are self-employed or informal workers, it may be difficult for them to remember days working and absent, which is possibly the reason not to answer this particular question. Among the respondents who answered, the result was  $p$ -value 0.087 ( $p > 0.05$ ), and there was no significant difference in the number of days spent working between 6 months before using a wheelchair and 6 months after using a wheelchair. Maybe, this result is not representative of all respondents due to the small number of respondents who answered this question.

Our study found that there was time gap with an average of 10.5 years from the first-time respondents become disabled and needing a wheelchair, with the year they actually received the wheelchair. On average, respondents received the wheelchair in year 2009. It indicates that unaffordability, unavailability or lack of wheelchair provision services in the past have hindered the respondents to receive the wheelchair they needed.<sup>12,13</sup> Possible barriers to healthcare access were considerably greater for the people with disabilities.<sup>14</sup> Thus, this can potentially hamper them to attain a better health outcome.<sup>15,16</sup> In addition, without the appropriate wheelchair, mobility outside their homes becomes more difficult or not possible. This will lead to a poorer quality of life—possibly related to lack of opportunities and access to social activities, education, and employment. Further, while wheelchair services are not within their reach, the downstream costs related to illness such as decubitus and deterioration in physical function, potentially increases household

medical expenditures related to disability.<sup>17</sup> Those interacting barriers are hypothetically affecting households with people with disabilities in the way that alters households' potential for obtaining income, spending time in employment, as well as household spending while allocating more proportion on health care use. Therefore, cumulatively, the availability of wheelchairs potentially lessens the related economic burdens.

In this study, income before and after using adaptive wheelchair showed a significant difference, with an increased income after using an adaptive wheelchair. According to one study conducted by Shore,<sup>18</sup> there is an increased opportunity regarding employment of wheelchair users in Peru and Uganda, followed by an increase in income with time duration for follow-up observation of 30 months. However, the increase was not seen in Vietnam, which is possible because the data collection includes part-time employment and self-employment. Another study on impact of wheelchair provision in Ethiopia, comparing wheelchair users and non-wheelchair users, revealed a 6.7 US dollar higher income per week among wheelchair users.<sup>19</sup> However, household spending, and days absent from work showed no significant difference. The respondents' employment characteristics are mainly working as entrepreneur, which suggests that days of work can be flexible which is different from the nature of office work, where an employee is expected to be present at office during their working days. Household spending may affect households in terms of more spending on medical-related needs, repairs related to the wheelchair, or in terms of transportation costs.<sup>17</sup> As public transportation facilities for people with disabilities are not adequate presently, people mainly travel with their own vehicles. For wheelchair users, it can mean limited access to transportation, which usually means a modified motorcycle to carry the wheelchair, or a car with modification becomes the main type of vehicles that can be used by wheelchair users. Nevertheless, with the barriers related to transportation, it is likely that even with the wheelchair use, it was not followed by an

increase in transportation costs. Furthermore, for medical needs related to the disability condition, more than 80% of the respondents are covered by health insurance, which possibly covers most of their spending on health care, including the cost of wheelchair services.

According to the qualitative results from the respondents, we found that although not directly increasing the income of some households, wheelchair use increases a person's mobility inside and outside their house from one place to another, and participation in social activities. These findings are in line with the study that wheelchair use improved participation, integration, and independence.<sup>20,21</sup> In contrast, another study revealed that with wheelchair use, there is relatively no change in the travel distance overtime for 30 months. An increased traveling distance was observed in the first year, however not until the end of the study period.<sup>18</sup>

One limitation of this study was that the interviews were conducted in October 2017, while the average respondents began using a wheelchair in 2009, which might cause some recall bias to occur. Another limitation related to time constraints was the short six months period after using wheelchair may not show significant change in household income. Further studies need to be conducted with communities from more diverse socio-economic groups, and with different criteria for the year of starting wheelchair use to minimize the possibility of recall bias.

## 5. Conclusion

Wheelchair use can positively impact on household income for persons with disabilities in rural areas in Central Java. This finding is indicated by the increase in household income in the span of six months from before to after obtaining wheelchair service.

In addition, given the significant benefits of wheelchair service for empowering people with disabilities, policymakers need to consider the existence of a comprehensive supplying and



financing structure to ensure the availability and accessibility of wheelchair services and to provide equal opportunities for persons with disabilities to get appropriate wheelchair services.

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### Conflict of interest

There is no conflict of interest.

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