



Original article

Valuing community health workers (CHWs): Opportunity costs and out-of-pocket spending among CHWs in the Indonesian stunting prevention program

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ABSTRACT

Introduction: In the Indonesian stunting prevention program, the often non-salaried community health workers (CHWs) are responsible for monthly monitoring, counseling, and home visits. Understanding the importance of their roles from an economic perspective may inform a more sustainable and improved program delivery.

Aim: To estimate the opportunity costs and out-of-pocket spending incurred by the CHWs in the Indonesian stunting prevention program.

Methods: This cross-sectional study was conducted in two rural villages in Lombok, Indonesia. We interviewed 130 CHWs with a pre-validated, structured questionnaire. Opportunity costs were assessed using two valuation models: calculating their working time valuation based on regional minimum wage and the CHWs' self-reported earnings outside of their community health work.

Results: We found that 52.31% of the CHWs were not satisfied with the current incentivization scheme. Opportunity cost calculation shows that these CHWs were underpaid: reported monthly workload is valued at USD 46.54 according to the valuation model based on regional minimum wage and USD 13.81 based on CHWs self-reported income. Furthermore, out-of-pocket spending reached almost one-third of the received incentives (median USD 2.90 (IQR 0.87–4.95)).

Conclusion: Appropriately incentivizing CHWs working on stunting prevention programs in Indonesia is one of the main priorities to ensure better program delivery.

1. Introduction

The Indonesian stunting prevention program heavily relies on community health workers (CHWs), also known as *Kader*, who play a crucial role in the frontline.¹ CHWs, although non-professionally trained and often recruited on a voluntary basis, provide essential services within their villages.^{2,3} These tasks are conducted in a monthly program called *Posyandu* (*pos pelayanan terpadu*, or integrated healthcare posts).^{1,3} Additionally, CHWs are occasionally assigned the responsibility of conducting home visits for children who have not attended the *Posyandu* sessions, and when necessary, they accompany them to clinics or hospitals at the request of parents.²

The integral role of CHWs warrants further attention to their value, particularly as globally and in Indonesia, CHWs attrition is an increasing

issue. The annual dropout rate of CHWs in Indonesia is reported to reach 20–30%.^{3,4} This is concerning as human resources losses disrupt healthcare services, and recruiting new personnel requires re-training, necessitating high investments. Previous studies have shown that the major drivers of CHWs attrition are the insufficient incentives and high workload.^{5,6} Understanding the value of CHWs may inform better incentivization schemes and help with CHWs retention in the Indonesian stunting prevention program and globally. Hence, this study aims to estimate the opportunity costs incurred by community health workers. To provide more comprehensive information on CHWs opportunity costs in Indonesia, we also described the out-of-pocket spending incurred by the CHWs.

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2. Methods

2.1. Study setting

Indonesian CHWs are not only in charge of stunting monitoring, but also for the monitoring of other health aspects. In this study, however, we focus on CHWs conducting stunting prevention programs. These CHWs work year-round to conduct monthly growth monitoring and counseling (in *Posyandu*), home visits, and other community health work. To be elected as a CHW by the village office, one must have the ability to write, the willingness to help, knowledge about the local habits and customs, and be accepted by the community. They receive minimal training, often for less than a week. A *Posyandu* usually comprises at least five CHWs. These *Posyandu* are located below the primary care level within the Indonesian healthcare system, thus receiving supervisions from the government-owned primary healthcare facilities (*pusat kesehatan masyarakat/Puskesmas*).³

This study was conducted in two rural villages of the Bayan Sub-district, Lombok Island, Indonesia. Combined, the two villages have the largest network of CHWs (175 CHWs across 15 *Posyandu*) in the Bayan Subdistrict. These villages are the locations of our quality improvement intervention (training for CHWs and smart chart dissemination), which has been conducted since August 2022. These two villages have regulations to incentivize CHWs through monthly monetary payments. Reimbursement for transportation costs is included in this monetary incentive. Other types of incentives, i.e., non-monetary incentives, were also provided.

2.2. Study design

This is a sub-study of a cross-sectional study on a quality improvement model conducted on 22–27 May 2023. A questionnaire was developed in the local language (Indonesian) to ask about CHWs demographic characteristics, working history, incentives, and out-of-pocket spending related to their activities in the stunting prevention program. Additionally, we developed questions on the costs incurred by the CHW treasury (to be answered by CHWs team leaders and treasurers). Content validity was assured by interviewing 17 CHWs and field officers in both villages. Consenting participants were structurally interviewed using the pre-validated questionnaire. We recruited local enumerators who were at least high school graduates and trained prior to data collection.

2.3. Study participants

To calculate our sample size, we used the Cochran's formula. Assuming a 5 % margin of error and 95 % confidence interval, a minimum sample size of 121 CHWs was required. Considering a 5 % non-response rate, we consecutively recruited 130 CHWs (74.2 % of the whole CHWs workforce in the villages). As this study is a sub-study of a quality improvement model, the inclusion criteria followed that of the study: we included active CHWs who were registered in the *Posyandu* program across the two villages; received an intervention package consisting of training and smart chart dissemination; and, to reduce potential recall bias, had been actively working in the *Posyandu* post-intervention for a minimum working duration of 1 month. The recruitment followed the proportion of CHWs working in the two villages (approximately 70 % in Senaru and 30 % in Bayan).

2.4. Definitions

We defined incentives as monetary or non-monetary payment provided by the healthcare system and/or village offices. Non-monetary incentives included training, supervision by healthcare workers, certifications, and competitions, among others. We did not count the training received from our intervention package as one of the non-monetary

incentives, as the study aims to illustrate the incentives CHWs received from the current government-led stunting prevention program. In this study, we consider CHWs to receive a type of incentive if they received it within the last ten months.

Opportunity cost was calculated with two different models (Fig. 1). The opportunity cost was calculated by multiplying the supposed CHWs income per hour by the number of hours spent on community health work per month. The first model counted the opportunity cost based on the 2023 regional minimum wage in the Bayan Subdistrict. This approach is similar to a previous study that assigned CHWs' work-time value with the lowest possible salary in the healthcare system.⁷ The second model of our calculation counted the opportunity cost based on self-reported monetary income received by CHWs not related to community health work. In-kind income (i.e., goods produced from labor) was also self-reported, as the data on the average local market price of these goods were unavailable. As in-kind income is not obtained monthly but rather on every sale, we calculated its monthly value by dividing the self-reported income by the total working duration (from the start of labor work until its sale/purchase). The second model was adapted from a previous study on CHWs opportunity cost in Rwanda,⁸ considering the different activities conducted by the Indonesian CHWs. The reasoning behind the employment of these two models is because as most of the CHWs did not have any income aside from their CHWs-related incentives, the opportunity costs calculated by the second model (using self-reported income) may underestimate the actual value of community health work. However, the second model remains crucial to illustrate the opportunity cost incurred by CHWs within the current context in the study setting.

In calculating out-of-pocket (OOP) spending, we included routine/monthly individual out-of-pocket spending that was self-reported by the CHWs. Treasury payment was defined as monthly payments for the CHWs treasury. Preparation costs were defined as the costs related to activities conducted in preparation for the monthly *Posyandu* program, e.g., room and tools preparation. *Posyandu* and home visit-related costs included costs that were incurred during the program, including supplies and indirect costs such as transportation, communication, and meals the CHWs purchased to support the activities. The costs for other events were defined as the expenses incurred while conducting other community health work not included in the prior listed activities, such as accompanying patients to visit a health facility. Treasury spending was also categorized based on these activities.

All costs were reported in the local currency (Indonesian Rupiah/IDR) and converted to US dollars. According to the latest World Bank exchange rate (2022), 1 USD equals IDR 14,849.85.⁹

2.5. Analysis

Descriptive analyses were performed to summarize the data on demographic characteristics, opportunity costs, and out-of-pocket spending incurred by the CHWs. Out-of-pocket spending was presented as median and interquartile range (IQR). Statistical analyses were conducted using R version 4.2.1 (R Foundation for Statistical Computing, Vienna, Austria) and RStudio version 2023.03.1 + 446

$$\begin{aligned} & \text{Equation 1. In-kind income calculation} \\ \text{In-kind income per month} &= \frac{\text{Total in-kind income from the start of labor work until the sale of goods}}{\text{Number of months during the total working period}} \\ & \text{Equation 2. Hourly salary calculation} \\ & \text{Model 1. Based on regional minimum wage} \\ \text{Hourly salary} &= \frac{\text{Regional minimum wage (monthly)}}{\text{Hours of required work according to national regulation}} \\ & \text{Model 2. Based on self-reported monetary income} \\ \text{Hourly salary} &= \frac{\text{Self-reported CHWs income per week}}{\text{CHWs working hours per week (outside community health work)}} \\ & \text{Equation 3. Opportunity cost calculation} \\ \text{Opportunity cost per month} &= \\ \text{Hourly salary} \times \text{Number of reported hours spent on community health work} & \end{aligned}$$

Fig. 1. CHWs opportunity cost calculation models.

(Posit Software, Boston, MX).

Ethical approval

Ethical approval was obtained from the Ethical Committee of the Faculty of Medicine, Universitas Mataram (No: 143/UN18.F8/ETIK/2023).

3. Results

3.1. Sociodemographic characteristics

We recruited 130 participants in this study. Table 1 showed their sociodemographic characteristics. The majority of the participants were women (92.3 %). This can be explained with the fact that most of CHWs in the area were women, similar to the overall Indonesian context.³ The mean age of the participants was 30.4 ± 6.41 years. Most participants were senior high school graduates (51.5 %), followed by junior high school graduates (26.2 %). The median working time for these participants was 4.21 years, mostly as team members (84.6 %). Over half of these participants (55 %) did not have an occupation aside from being a CHW. Of those with occupations, most worked as farmers (34.48 %) and entrepreneurs (32.76 %).

3.2. CHWs working hours and incentives

CHWs reported a median of 26 h (IQR 16–59) of time allocated for community health work per month (Table 2). Per week, this translates to a median of 6.5 h (IQR 4–14.75). It is known that several CHWs (n = 7) only worked once a month during the actual Posyandu program. The CHWs who have occupations reported working for a mean of 36.19 ± 24.70 h.

The monetary incentives were received by most of the CHWs (n = 122, 93.84 %). Half of the CHWs reported receiving training from the local Puskesmas, the local District Health Office, and village offices (n = 65, 50 %). Most CHWs received supervision from the local Puskesmas or village offices (n = 97, 74.6 %). Few CHWs (n = 16, 12.3 %) received other non-monetary incentives in the form of certificates and

Table 1
Sociodemographic characteristics of included participants.

Demographic Characteristics	CHWs (n = 130)
Age (mean (SD))	30.40 (6.41)
Gender (%)	
Women	120 (92.3)
Men	10 (7.7)
Highest education level (%)	
No schooling	1 (0.8)
Primary level	20 (15.4)
Junior high school	34 (26.2)
Senior high school	67 (51.5)
Associate degree	1 (0.8)
Bachelor's degree or higher	7 (5.4)
Working time as CHWs (in year, median [IQR])	4.21 [1.67, 8.92]
Role within the Posyandu structure	
Lead	19 (14.6)
Treasurer	1 (0.8)
Member	110 (84.6)
Occupation status aside from community health work	
Yes	58 (45.0)
No	71 (55.0)
Occupation type (n = 58) (%)	
Entrepreneur	19 (32.76)
Farmer	20 (34.48)
Farmworker	2 (3.45)
Government/private employee	6 (10.34)
Husbandry	3 (5.17)
Low-skilled worker	4 (6.89)
Teacher	4 (6.89)

Table 2
CHWs working hours and incentives.

Opportunity cost calculation	CHWs (n = 130)
Time allocated for CHWs activities	
Per month (median [IQR])	26 [16, 59]
Per week (median [IQR])	6.5 [4, 14.75]
Non-CHW-related working hours for CHWs with occupations, per week (n = 58) (mean (SD))	36.19 (24.70)
Type of incentives received (%)	
Monetary incentives	130 (100)
Non-monetary incentives	
Training	65 (50.0)
Supervision	97 (74.6)
Other	16 (12.3)
Satisfaction with the current incentive scheme (%)	
Yes	62 (47.69)
No	68 (52.31)

competitions. Over half of the CHWs expressed dissatisfaction with the current incentive scheme (n = 68, 52.31 %).

3.3. Opportunity cost calculations

The CHWs reported receiving a median monthly incentive of USD 10.10 (IQR 10.10–13.47). For opportunity cost calculation, we used the mean income of all CHWs (USD 34.86). The CHWs who had occupations aside from their community health work reported a median income of USD 40.40 (IQR 27.78–67.34), lower than the regional minimum wage in the subdistrict. Our analysis found that the opportunity cost of CHWs, when calculated based on the regional minimum wage, is USD 46.54 (Table 3). When the opportunity cost is calculated based on the mean self-reported income of CHWs, it is at USD 13.81. These costs are higher than the actual monetary incentives received by the CHWs.

The total monthly out-of-pocket spending incurred by the CHWs was a median of USD 2.90 (IQR 0.87–4.95), equal to almost one-third of their monthly incentives (Table 4). The highest out-of-pocket spending was for Posyandu-related costs (median USD 0.87 (IQR 0–1.68)), followed by home visits (median USD 0.74 (IQR 0–1.26)) and other community health work (median USD 0.74 (IQR 0–1.14)). When the costs were classified according to the activity type, transportation costs emerged as the highest contributor to CHWs out-of-pocket spending (median USD 1.62 (IQR 0–2.63)).

The median treasury payment is at USD 0 (IQR 0), as most CHWs reported no routine treasury payment (n = 102, 78.46 %). However, some Posyandu created a CHWs-led disincentivization scheme by requiring their CHWs to pay a fine whenever they were unable to attend the Posyandu program. This fine was then saved in the treasury. In other Posyandu, the treasury payment was done as needed, e.g., when there is a need to buy certain tools. Similarly, reported preparation fees were mostly one-time payments instead of monthly costs.

Table 3
Opportunity cost calculation.

Opportunity cost calculation	CHWs (n = 130)	
	In Rupiah (IDR)	In USD
Monthly monetary incentive (median [IQR])	150,000 [150,000, 200,000]	10.10 [10.10, 13.47]
Self-reported income outside CHWs-related incentives	517,615	34.86
All CHWs (mean (SD)) – used in the opportunity cost calculation		
CHWs with occupations (n = 58) (median [IQR])	600,000 [412,500, 1,000,000]	40.40 [27.78, 67.34]
Opportunity cost calculation (per month)		
According to regional minimum wage	691,076.2	46.54
According to self-reported income	205,080.8	13.81

Table 4
Out-of-pocket spending of individual CHWs and treasury.

Out-of-pocket spending	Cost incurred by individual CHWs (n = 130)		Cost incurred by CHWs treasury (n = 20)	
	In Rupiah (IDR)	In USD	In Rupiah	In USD
Total out-of-pocket spending per month (median [IQR])	40,500 [13,000, 71,500]	2.90 [0.87–4.95]	0 [0, 62,000]	0 [0, 4.17]
<i>Breakdown based on type of community health work</i>				
Treasury payment per month (median [IQR])	0 [0, 0]	0 [0,0]	N/A	N/A
Preparation (median [IQR])	0 [0, 0]	0 [0, 0]	0 [0, 3250]	0 [0, 0.22]
Posyandu (median [IQR])	13,000 [0, 25,000]	0.87 [0, 1.68]	0 [0, 16,250]	0 [0, 1.09]
Home visits (median [IQR])	11,000 [0, 18,750]	0.74 [0, 1.26]	0 [0, 0]	0 [0, 0]
Other community health work (median [IQR])	11,000 [0, 17,000]	0.74 [0, 1.14]	0 [0, 0]	0 [0, 0]
<i>Breakdown based on type of funded activities</i>				
Transportation	24,000 [0, 39,000]	1.62 [0, 2.63]	0 [0, 0]	0 [0, 0]
Communication	0 [0, 14,000]	0 [0, 0.94]	0 [0, 0]	0 [0, 0]
Accommodation	0 [0, 0]	0 [0, 0]	0 [0, 0]	0 [0, 0]
Meals	0 [0, 10,000]	0 [0, 0.67]	0 [0, 0]	0 [0, 0]
Office supplies	6500 [0, 10,000]	0.44 [0, 0.67]	0 [0, 0]	0 [0, 0]
Other	0 [0, 3750]	0 [0, 0.25]	0 [0, 3250]	0 [0, 0.22]

4. Discussion

Community health workers, despite their crucial roles, remain undervalued. Dissatisfaction with the current incentivization scheme was prevalent among the CHWs. This finding supports our calculation, which found that the opportunity costs incurred by CHWs were higher than the incentives they received. Furthermore, many of these incentives were spent on community health work, rendering them with even less income. These findings highlight the need to improve the current incentivization scheme to maximize the potential of CHWs-led stunting prevention programs.

Considering the opportunity costs of CHWs in Indonesia, it is important to note that over half of these CHWs relied on their CHWs incentives as their sole source of income. Among those with other occupations, their income was lower than the regional minimum wage. Due to their position as CHWs, there is also less time to commit to other income-generating activities. Hence, their crucial roles need to be compensated properly, particularly as both monetary and non-monetary incentives have been reported to increase the retention of CHWs. A study in Kenya showed that non-salaried CHWs experienced a higher attrition rate (13 %) compared to their salaried counterparts (4 %). Furthermore, 80 % of the non-salaried CHWs had ever contemplated dropping out of their roles as CHWs, compared to 66 % among salaried CHWs.¹⁰ These incentives also improve CHWs' performance and satisfaction,^{11–13} as they increased the motivation of these CHWs and led to more family encouragement.¹⁴

Although the CHWs in this study were provided incentives, our study found that over half of the CHWs were dissatisfied with the current incentivization scheme. The dissatisfaction may be related to the increasing community health workload. Upon further discussions, we found that many CHWs felt that the monetary incentives were adequate if the workload consisted of only *Posyandu*-related activities, not including home visits and accompanying patients to healthcare facilities. This finding is consistent with prior studies in Indonesia, India, and

Bangladesh, which found that CHWs prefer incentives that are commensurate with their workload.^{15–17} It is also consistent with the recommendations from the World Health Organization.¹⁸ In a prior study in Malang, Indonesia, low monetary incentives (approximately USD 2 or Rp25,000) were preferred by the CHWs, most of whom (78.8 %) worked for 4 hours or lower per week.¹⁵ The CHWs in this study committed more hours to their community health work (a median of 6.5 h per week), possibly explaining the differences in incentive preferences. There were also reports that some of their monetary incentives were cut due to the COVID-19 pandemic, and their dissatisfaction stemmed from the desire to receive their pre-pandemic incentives.

Non-monetary incentives, although received by over half of the CHWs, were also perceived to be inadequate. Training programs were usually provided only for the CHWs representatives, who were then tasked with relaying the training information to the other CHWs within their *Posyandu*. The model of our quality improvement intervention, which targeted all CHWs, was well-received; the CHWs expressed hope that this model will be replicated in other training programs. Only 74.6 % of our respondents reported receiving supervision; this can possibly be explained by the current model of the local supervision system, in which supervisors often only inform their presence to the CHWs team leader. It is understood that many CHWs are keen to receive performance feedback^{14,15} and that the perceived absence of supervision can be demotivating.^{19,20}

Despite the dissatisfaction towards the incentives, the participants in this study repeatedly mentioned that the desire to help the community is their major driving force and that they will continue serving their community nevertheless. This finding is consistent with previous studies in seven countries.^{8,21,22} The strong motivation of the CHWs can be traced back to a local principle called '*gotong royong*' (literally translated to 'mutual cooperation'), which promotes communal service and volunteering.^{15,23} Their commitment towards the stunting prevention program is also evident from the findings that some CHWs teams created their own incentives and disincentives scheme (i.e. fines for not attending *Posyandu*). Furthermore, they were willing to spend out-of-pocket to conduct their work; however, this situation is concerning as the study in Rwanda found that some CHWs, mostly from socioeconomically-challenged backgrounds, became even poorer due to out-of-pocket spending.⁸ While most of the spending was for transportation, which is indeed a component of their incentives according to the local regulation, a significant proportion of their spending was also for the tools and consumables of the program. If this situation persists, in the future, it may become a strong disincentive that leads to CHWs attrition.

Incentivization is not without challenges. Stakeholders have previously reported concerns over the motivation of salaried CHWs.²⁴ In a WHO study, it is further noted that almost half of the respondents felt that benchmarking CHW salary to minimum wage, as suggested by one of our opportunity cost models, had either uncertain feasibility or was not feasible.²⁵ However, our findings clearly illustrated that the government needs to create a better CHW incentivization scheme that combines both monetary and non-monetary benefits. This scheme should be regulated clearly to ensure CHWs retention, good performance and satisfaction: in our study, most CHWs have less than five years of experience, suggesting a high attrition rate. Furthermore, to reduce out-of-pocket spending of these CHWs, there is a need for more thorough needs assessments to fund the stunting prevention program adequately. Although the current CHW system highly relies on the communal service or '*gotong royong*' principle, local policymakers should carefully find a balance between enacting the principle and adequately compensating the CHWs for their work, particularly as this may pose a threat to future CHWs attrition.

4.1. Strengths and limitations

To our knowledge, this is the first study that examined the

opportunity costs and out-of-pocket spending incurred by CHWs in Indonesia. We also recruited over 70% CHWs working in the study location, improving the generalizability of the results for the whole CHW workforce in the two villages. The results supported the growing evidence on CHWs opportunity costs and the need to value their work.

However, this study also has several limitations. First, this study used self-reported data, which can potentially be inaccurate due to recall bias. However, the bias is expected to be negligible as the Indonesian CHWs program requires routine community health work (year-round programs). We also recruited CHWs who were still actively involved in community health work during the data collection process. Second, our study used consecutive sampling, increasing the risk of selection bias. However, we included 74.2 % of the CHWs in the two villages, minimizing the possibility of this bias. Lastly, this study was conducted in two rural villages in Indonesia, potentially lowering the generalizability of the results across Indonesia and globally. Yet, these villages are unique as incentives are mandatory for the local CHWs—a regulation not present in all parts of Indonesia—allowing for clearer comparison between the opportunity costs and the available incentivization regulation.

5. Conclusion

Community health workers incurred high opportunity costs and out-of-pocket spending, which is reflected in their dissatisfaction towards the current incentivization scheme. To enable better retention rate, higher performance and satisfaction, a better incentivization scheme which combines monetary and non-monetary benefits should be created. Better considerations towards CHWs working conditions and incentives will lead to better stunting prevention program delivery in Indonesia and globally.

Ethics approval statement

The ethical approval for this study was obtained from the Ethical Committee of the Faculty of Medicine, Universitas Mataram (No: 143/UN18.F8/ETIK/2023).

Data sharing statement

Data are available upon request to the corresponding author.

CRedit authorship contribution statement

Adriana Viola Miranda: Conceptualization, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Ryan Rachmad Nugraha:** Conceptualization, Writing – review & editing. **Trio Sirmareza:** Conceptualization, Supervision, Data curation, Writing – review & editing. **Maritta Rastuti:** Writing – review & editing. **Rizky Deco Praha:** Writing – review & editing. **Rindang Asmara:** Writing – review & editing. **Zack Petersen:** Writing – review & editing.

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Declaration of competing interest

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