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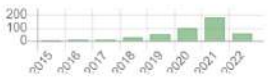

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Cost of Illness Type 2 Diabetes Mellitus Outpatient BPJS on Malang City Health Center

Ika Ratna Hidayati[1], Aniza Oktaviana[1]*, Liza Pristianty[2]
[1]Departement of Pharmacy, Faculty Health of Science, University of Muhammadiyah Malang
[2]Department of Phamacy Practice, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia

*Corresponding author: anizaoktaviana@gmail.com

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Abstract

Background*: Type 2 diabetes mellitus is a progressive illness that impacts the costs borne by patients. The Cost of Illness method can be used further to analyze the medical expenses for type 2 diabetes mellitus.* ***Objective****: Determine the annual total cost of type 2 diabetes mellitus outpatients in Indonesia Health Insurance (BPJS) participants and treated with metformin-glibenclamide.* ***Methods****: This study applied the non-probability sampling technique and the purposive sampling method to the cross-sectional approach. The research was conducted in the Mulyorejo Health Care of Malang City, using 58 patients as samples. The research instrument involves a systematic interview that has been tested for its validity. The data were analyzed using Microsoft Excel.* ***Results****: The direct medical cost per patient is IDR 173,560.00 – IDR 1,266,240.00. Non-medical direct cost is IDR 0.00 – IDR 240,000,00. The indirect cost is IDR 0.00 – IDR 1,920.000,00.* ***Conclusion****: The estimated annual total medical expenses of diabetes mellitus type 2 Indonesia Health Insurance (BPJS) outpatients employing metformin-glibenclamide therapy at Mulyorejo Health Center in Malang is IDR 173,560.00 – IDR 3,426,240.00.*

Keywords*: cost of illness, direct medical cost, direct non-medical cost, indirect cost, type 2 diabetes mellitus*

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INTRODUCTION

Diabetes Mellitus (DM) is a heterogeneous metabolic disorder characterized by hyperglycemia caused by impaired insulin secretion, impaired insulin action, or both (Punthakee *et al*., 2018). DM is a chronic disease that requires long-term medical care. The DM classification consists of type 1 diabetes, type 2 diabetes, gestational diabetes mellitus (GDM), and other types of diabetes (American Diabetes Association, 2017). The therapy used in type 2 DM is pharmacological and non-pharmacological. The pharmacological treatment uses oral antidiabetic drugs and insulin, while non-pharmacological treatment involves healthy lifestyles changes (PERKENI, 2019). Based on the results of Riskesdas in 2018, the prevalence of DM in Indonesia was 10.9% in which 2.6%, in East Java and 1.9% in Malang, (Kementrian Kesehatan Republik Indonesia, 2018).

According to the International Diabetes Federation (IDF), in 2019, the total health expenditure related to diabetes mellitus in the world in 2017 was USD 727 billion, and in 2019 IDF estimated that the total price was USD 760 billion an increase of 45%. Treatment costs in developed countries range from 1500 - 9000 USD/DM patient/year, treatment costs in developing countries are between 50 – 2000 USD/DM patient/year, and in Indonesia, 80.22 USD/DM patient/year (International Diabetes Federation, 2019). The average annual cost (both direct and indirect) of type 2 DM in low and middle-income countries ranges from 29.91 USD/patient to 237.38 USD/patient (Afroz *et al*., 2018)

Cost is an essential factor in health services. According to Rascati (2013) in Essentials of Pharmacoeconomics, the cost of illness includes direct and indirect costs. The direct costs are divided into direct medical and direct non-medical costs. Direct medical costs include drug costs, patient counselling and consultation, inpatient, outpatient, emergency, ambulance services, and nursing services. Meanwhile, direct non-medical costs include transportation, food, and lodging costs during treatment. Indirect costs are costs due to the loss of productivity caused by a disease.

Mursalin & Soewondo (2016) stated that the average direct medical cost of type 2 DM outpatients at RSUD Dr Abdul Aziz Singkawang in one year amounted to Rp. 2,406,325.00. The largest cost type is medicine at 75.65%. At the same time, costs other than drugs are 24.35%, which include laboratory costs and additional costs (Mursalin & Soewondo, 2017). Research by Baroroh *et al*. (2016) showed that the average total cost of outpatient type 2 DM at PKU Muhammadiyah Bantul Hospital Yogyakarta without complications ranged from Rp. 247,309.00 - Rp. 686,753.00 per month. The average cost of outpatient type 2 DM with complications ranges from Rp 128,143.00 – Rp 1,174,342.00 per month due to the type of therapy and the cost of antidiabetic drugs well as the price of drug complications (Baroroh *et al*., 2016).

The high cost of health care and the prevalence of diabetes mellitus impairs a country's economy and productivity. Through the Ministry of Health of the Republic of Indonesia, the Government of Indonesia has made several programs to control diabetes mellitus, one of which is the National Health Insurance (JKN) program by the Health Social Security Administering Body (BPJS). Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 52 of 2016 concerning Health Service Tariffs in the Implementation of the Health Insurance Program, BPJS fees are divided into capitation costs and non-capitation costs. The capitation fee is paid in advance by BPJS Health every month to the First-Tier Facility, which considers the number of registered participants without considering the type and amount of health services provided. In contrast, the non-capitation fee is a fee that is claimed by BPJS Health to the First Level Health Facility every month, considering the type and amount of health services provided. When the claims submitted for DM surpass the claim ceiling, it is frequently found that there is a disparity between the actual expenditures spent for therapy and the capitation rate.

Cost of Illness (COI) estimation plays an essential role in decision-making in a chronic disease such as diabetes mellitus because it can estimate the cost of illness (Darmawan *et al*., 2019). Therefore, research on the total cost of treatment for type 2 DM is necessary for making a policy in this JKN era.

This study aims to determine the total cost of treating type 2 DM patients with outpatient metformin-glibenclamide therapy for BPJS participants at the Mulyorejo Health Center in Malang City.

MATERIALS AND METHODS

This research is an observational study that uses a cross-sectional approach with data collection in a specific period (Masturoh & Anggita, 2018).

The sampling technique used is non-probability sampling in the form of consecutive selection. The

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population in this study was all type 2 DM patients with outpatient metformin-glibenclamide therapy for BPJS participants at the Mulyorejo Health Center in Malang City. The research sample is a population that meets the following inclusion criteria:

1. Type 2 DM patients with metformin-glibenclamide therapy at the Mulyorejo Health Center Malang City
2. Patients aged 18 years and over
3. BPJS participant patients
4. Patients who are willing to be research respondents

The location of this research is in Public Health Center Mulyorejo Malang City. The study was carried out from July 29 to August 22, 2020. This research was ethically compliant with the ethics number No.E.5.a/188/KEPK-UMM/VII/2020, published on July 27, 2020, by the Health Research Ethics Commission University of Muhammadiyah Malang.

The variables in this study are direct medical costs, including registration fees, laboratory fees, costs for doctor examinations, costs for drugs obtained from health centers, and costs for purchasing drugs themselves. Transportation costs are an example of direct non-medical costs. In addition, there are indirect costs such as lost patient income and lost patient companion income.

Data collection

A structured interview was used to collect data, including a list of approved questions. Prior to collect data, the researcher obtained informed consent from the respondent by filling out a consent form, and then proceeded with the interview.

Validity test

The validity test used is in the form of content validity, which is to see the suitability of the contents of the interview guide with the variables you want to know. In this study, interview questions were derived from a literature review conducted by researchers, who then had experts test the validity of the interview questions.

Data analysis

After processing the data, they will be analyzed using Microsoft Excel. Based on the following calculations:

COI = (Direct medical costs × frequency of treatment in one year) + (Direct non-medical costs × frequency of treatment in one year) + (Indirect costs × frequency of treatment in one year).

The estimated total cost of treating type 2 DM patients BPJS outpatients with metformin-glibenclamide therapy in one year is obtained.

RESULTS AND DISCUSSION

Patient demographic data

A total of 58 patients met the inclusion criteria and participated in the interview. More than 70% (Table 1) of the subjects are female, and, based on previous research, this gender has a greater risk (71.2%) of suffering from DM than men because they have a less active lifestyle. On the other hand, women are more at risk of suffering from type 2 diabetes mellitus because women have a larger body mass (Rantung *et al*., 2015).

Most types of work are housewives 22 (38%), this is because the activities of homemakers are more often at home, and lack of exercise can cause obesity. The effects are significant changes in metabolic function and endocrine function, which can stimulate obesity (Wijaya *et al*., 2015). These effects can be a triggering factor for DM.

The highest education level was an elementary school with 25 patients (43%). Low education level affects the incidence of DM because a lower level of education can affect thinking patterns related to health awareness (Wijaya *et al*., 2015).

Financial limitations can limit patients from seeking information about their illness and affect their motivation to carry out treatment (Musdalifah & Nugroho, 2020). In this study, the highest significant patient income was < Rp 500,000.00, with 24 patients (41%). This is because socioeconomic status and knowledge about diabetes can affect self-care management with DM.

Demographic data based on BPJS participation obtained the highest BPJS class, namely BPJS class 3, with 24 patients (41%). Following previous research, BPJS class 3 is one of the most frequently used insurances (Nur *et al.*, 2018). Other researchers also stated that the BPJS class chosen by the most respondents was class 3, including PBI, which is generally included in class 3 payments (Lesmana & Sugiman, 2020).

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Table 1. Demographic data of type 2 diabetes mellitus patients with metformin-glibenclamide therapy outpatient BPJS participants

Demographic Data	Number of Respondents (%)
Sex	
Male	17(29)
Female	41(71)
Age	
18 - 25 years	0(0)
26 - 35 years	0(0)
36 - 45 years	4(7)
46 - 55 years	16(28)
56 - 65 years	21(36)
> 65 years	17(29)
Education	
No education	7(12)
Elementary school	25(43)
Junior high school	8(14)
High school	14(24)
College	4(7)
Occupation	
Student	0(0)
Civil servant	0(0)
Employee	6(10)
Entrepreneur	19(33)
Housemaker	22(38)
Unemployed	11(19)
Income	
< Rp 500,000.00	24(41)
Rp.500,000.00 – Rp 1000,000.00	14(24)
Rp 1000,000.00 – Rp 2000,000.00	7(12)
> Rp 2000,000.00	14(22)
BPJS Participant	
Contribution Assistance Recipients (PBI)*	18(31)
Independent Class 1	7(12)
Independent Class 2	9(16)
Independent Class 3	24(41)

*PBI: Penerima Bantuan Iuran

Table 2. Medical direct cost

Cost component	Cost Range Within 1 Year (IDR)	Average Range Per Patient (IDR)
Registration	120,000.00 – 5,760,000.00	40,000.00 – 120,000.00
Laboratory	120,000.00 – 5,760,000.00	40,000.00 – 120,000.00
Doctor's Examination	42,000.00 – 2,016,000.00	14,000.00 – 42,000,00
Drugs Obtained from the Health Center	79,560.00 – 7,399,080.00	79,560.00 – 318,240.00
Self-bought medicine	0.00 – 666,000.00	0.00 – 666,000.00
Medical Direct Cost Total Range	361,560.00 – 21,601,080.00	173,560.00 – 1,266,240.00

Medical direct cost

In this study, direct medical costs include registration fees, laboratory fees, charges for examinations by doctors, prices for drugs obtained from the public health center and the cost of self-bought medicine.

In this study, the average range of direct medical costs per patient in one year based on patient visits in Table 2 was 173,560.00 IDR - 1,266,240.00 IDR.

The components of registration fees and laboratory fees based on the health service retribution at the Mulyorejo Health Center are 10,000.00 IDR, so the range of registration fees per patient in one year based on the frequency of patient visits is 40,000.00 IDR – 120,000.00 IDR. The cost range is due to the different frequency of patient visits to the public health centre, namely four times, six times, and 12 times in one year.

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Examination fees by doctors were referring to BPJS Health Regulation Number 2 of 2015 concerning Norms for Determining Capitation Amounts and Capitation Payments Based on Fulfillment of Service Commitments at First Level Health Facilities, for doctor services fees with the number of patients registered with BPJS 15,000.00 IDR – 20,000.00 IDR with 24-hour service time which is 3,500.00 IDR per patient. As a result, the cost of a doctor's examination per patient in a year ranges from 14,000.00 IDR to 42,000.00 IDR. There is a range in these costs due to the different frequency of patient visits to the public health center.

In the component of drug costs obtained from the public health center, namely metformin and glibenclamide, the cost per patient in one year is 79,560.00 IDR – 318,240.00 IDR. In one year, the range of costs per patient is 0.00 IDR – 666,000.00 IDR. This cost component is the most significant because the cost of herbal medicines is quite expensive, and the price of treatment when the patient buys it himself is higher than the medicine obtained from the public health center. Patients buy drugs independently for metformin and glibenclamide drugs because of the pandemic, so there are restrictions on going to the public health center (Puskesmas).

Non-medical direct costs

Non-medical direct costs include transportation costs. In this study, the average range of non-medical direct costs per patient in one year based on the frequency of patient visits in Table 3 is 0.00 IDR – 240,000.00 IDR. There are variations in transportation costs because the transportation used by patients varies, ranging from motorbikes, motorcycle taxis, and public transportation. However, some patients walk to the public health center because the distance from their homes to the public health center is not too far. Furthermore, the variation in transportation costs is due to the distance to the public health center and the frequency of visits.

Indirect cost

Indirect costs include lost patient income and lost patient companion income. In this study, the average range of indirect costs per patient in one year based on the frequency of patient visits in Table 4 is 0.00 IDR – 3,600,000.00 IDR.

In the cost component of income for patients lost due to illness, the cost range per patient in one year is 0.00 IDR – 2,400,000.00 IDR, and in the cost component of the income of the companion of patients lost due to illness, the cost range per patient in one year is 0.00 IDR – 1,200,000.00 IDR. There is a range of costs in these cost components because the amount of income and patient visits to the public health center vary.

The total *cost of illness*

From the data on direct medical costs, direct non-medical costs, and indirect costs that have been calculated and processed previously, the total cost of illness for type 2 diabetes mellitus patients can be seen in one year.

In this study, the average cost of illness per patient in one year based on the frequency of patient visits in Table 5 obtained 173,560.00 IDR – 5,106,240.00 IDR.

Table 3. Indirect cost

Cost Component	Cost Range Within 1 Year (IDR)	Average Range Per Patient (IDR)
Lost Patient Income	0.00 – 1,600,000.00	0.00 – 2,400,000.00
Lost Patient Companion Income	0.00 – 1,200,000.00	0.00 – 1,200,000.00
Total Indirect Cost Range	0.00 – 4,800,000.00	0.00 – 3,600,000.00

Table 4. Total *cost of illness*

Cost Component	Cost Range Within 1 Year (IDR)	Average Range Per Patient (IDR)
Medical Direct Cost	361,560.00 – 21,601,080.00	173,560.00 – 1,266,240.00
Non-Medical Direct Costs	0.00 – 720,000.00	0.00 – 240,000.00
Indirect Cost	0.00 – 3,600,000.00	0.00 – 3,600,000.00
Total Range Cost of Illness	361,650.00 – 25,921,080.00	173,560.00 – 5,106,240.00

Table 5. Non-medical direct costs

Total Non-Medical Direct Cost Range	Cost Range Within 1 Year (IDR)	Average Range Per Patient (IDR)
Transportation	0.00 – 720,000.00	0.00 – 240,000.00

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The results of this study indicate that indirect costs are more significant than direct costs because the indirect costs consist of loss of patient income and loss of income for patient companions, which, based on the study results, show that in a day, the lost income can reach 100,000.00 IDR so that when multiplied by the frequency of visits in one year yields a value greater than the total direct costs. In addition, patients do not incur charges for immediate medical expenses because they are registered as BPJS participants. These results are following research by Lebbe & Rinosha (2018) in Sri Lanka that indirect costs are more significant at $68.94 (1,021,346.00 IDR) per month than direct costs, which are $19 (281,485.00 IDR) per month.

Because BPJS bears several variable costs, it may help alleviate the burden on the economy of patients undergoing treatment. This study had some limitations, including the fact that it was conducted on a single public health center, the conditions of which could differ from those of other public health centers, so the results could not be generalized directly. Interviews were also conducted during the COVID-19 pandemic, impacting the difference in visits between one patient and another.

CONCLUSION

The research shows that the total cost of treating type 2 DM patients with outpatient metformin-glibenclamide therapy for BPJS participants at the Mulyorejo Health Center Malang City for one year is 173,560.00 IDR – 5,106,240.00 IDR. Direct medical costs per patient are 173,560.00 IDR – 1,266,240.00 IDR. Direct non-medical costs per patient are 0.00 IDR – 240,000.00 IDR. And the indirect costs per patient are 0.00 IDR – 3,600,000.00 IDR. Indirect costs are more significant than direct costs.

AUTHOR CONTRIBUTIONS

Conceptualization, L.P.; Methodology, I.R.H., L.P., A.O.; Software, A.O.; Validation, A.O., L.P., I.R.H.; Formal Analysis, A.O.; Investigation, A.O.; Resources, A.O.; Data Curation, A.O., L.P., I.R.H.; Writing - Original Draft, I.R.H., A.O., L.P.; Writing - Review & Editing, A.O., I.R.H.; Visualization, I.R.H., A.O.; Supervision, I.R.H.; Project Administration, I.R.H., A.O., L.P.; Funding Acquisition, I.R.H.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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