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Cost-Benefit Analysis (Cba) Of The Home Visit Program For Diabetes Mellitus Patients In The Prolanis Program at Clinics X And Y In Bogor Regency

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Abstract. *Diabetes Mellitus (DM) is a degenerative disease that requires long-term management and poses a significant economic burden, especially on Indonesia's national health insurance system, BPJS Kesehatan. This study aims to evaluate the effectiveness of the home visit program for DM patients in the Chronic Disease Management Program (Prolanis) at Clinics X and Y in Bogor Regency. The analysis focuses on medication adherence, blood sugar control, quality of life, and cost-effectiveness. Using a cross-sectional design, data were collected from 60 type 2 DM patients, equally divided between clinics implementing and not implementing home visits. Data were gathered through the MARS-5 and EQ-5D-5L questionnaires, as well as medical records and financial reports. The results showed no significant differences between the two groups in terms of adherence, glycemic control, or quality of life. However, the Cost-Benefit Analysis revealed a benefit-cost ratio of 1.73, indicating that every unit of investment in the home visit program generated 1.73 units of monetary savings—primarily through reduced readmissions and referrals. These findings suggest that while the clinical outcomes may not differ significantly, the home visit program offers notable economic benefits and should be considered a viable strategy for enhancing service efficiency within Prolanis and BPJS-K.*

Keywords: CBA, Diabetes Mellitus prolanis, medication adherence, blood sugar control and quality of life.

INTRODUCTION

Health is a state of well-being, both physically, mentally, spiritually, and socially, that allows everyone to live socially and economically productive lives, making a healthy life the hope and dream of every human being. With modernization, globalization, and the development of science and technology, these factors contribute to the epidemiological transition. The epidemiological transition is characterized by a shift in mortality and morbidity from infectious diseases to non-communicable diseases (NCDs) and degenerative diseases. One of the degenerative diseases that many people suffer from is *Diabetic Mellitus* (DM) (Boutayeb, 2006; Budreviciute et al., 2020; Kitole et al., 2024; Waris et al., 2018). The prevalence of DM worldwide has almost doubled since 1980, rising from 4.7% to 8.5% in the adult population. It is estimated that by 2030, Indonesia will rank 4th in the number of DM sufferers, following India, China, and the United States. *Riskesdas* 2018 data shows an increase in the prevalence of DM nationally among people aged 15 and above, from 6.9% in 2013 to 10.9% in 2018. Based on age groups, the prevalence of DM is highest in the 55-64 years category, at 6.3%. Given the increasing number of patients and the high cost of treating DM patients, particularly those suffering from complications, the best effort is prevention. DM is a disease that is difficult to cure but can be controlled. The condition for controlling DM and preventing complications is to keep blood glucose levels close to normal throughout the year.

One factor that causes the failure of blood glucose control in DM patients is the patient's non-compliance with treatment. Patient non-compliance is often due to DM sufferers feeling healthy (50.4%), irregular visits to health facilities (30.2%), often forgetting to take medication (18.8%), inability to withstand medication side effects (12.6%), inability to afford medication regularly (8.5%), and lack of medication availability at health facilities (2.1%). The government provides basic protection for public health at a temporary cost for the poor, with the cost borne by the government through the *JKN* (Health Insurance for the Poor) program as an effort to improve public health. However, the implementation of *JKN* by the *Social Security – Health Administration Agency* (BPJS-K) has been experiencing a deficit. Since its implementation in 2014, BPJS-K has recorded a deficit of Rp 1.9 trillion, and by 2019, this deficit had increased to Rp 13 trillion. This deficit burden affects BPJS-K's

ability to provide health services for the community. DM and its complications bring great economic losses to DM sufferers, their families, the healthcare system, and the national economy through direct medical costs, loss of jobs, and income.

One of the programs developed by BPJS Kesehatan to reduce the deficit is the *Chronic Disease Management Program* (*Prolanis*). The chronic diseases targeted by *Prolanis* include Type 2 DM and Hypertension. *Prolanis* is a preventive and promotive activity carried out at First Level Health Facilities (*FKTP*) with a proactive approach, involving Participants, Health Facilities, and BPJS-K in an integrated manner. The implementation of *Prolanis* aims to maintain health for BPJS-K participants, especially those with chronic diseases, to achieve an optimal quality of life with effective and efficient health costs.

The implementation of the *Prolanis* program has proven effective in controlling blood glucose levels, but there are still obstacles related to the routine of visiting *FKTP* for participation in *Prolanis* activities, especially among elderly patients. This is due to a lack of family support to deliver patients to *FKTP*. Another study by Mulfianda R stated that the *Prolanis* gymnastics program is not effective enough in lowering blood sugar levels in the elderly and needs to be improved through a home visit program. Home visits, as one of the *Prolanis* activities, play a crucial role in providing direct education to increase patient knowledge and compliance with treatment therapy, especially for patients with severe DM conditions, thereby preventing disease complications. Research by Rokhman MR shows that home visits can improve compliance, total quality of life, and reduce blood sugar levels during *GDS*. This is because home visits provide direct communication at the patient's home, improving communication and service quality, particularly for chronic disease patients. Research by Al-Qudah RA shows that pharmacist intervention through home visits can reduce unwanted drug side effects and treatment-related problems (*TRPs*) in outpatients with chronic diseases, resulting in savings in hospital treatment costs.

The home visit program is one of the indicators of *Commitment-Based Kinerja* (KBK) at *FKTP*, as it can increase the number of visits for both sick and healthy visits for DM patients. The number of contacts in *FKTP* affects capitation receipts, making it necessary to achieve the KBK indicator.

In West Java, the number of primary clinics collaborating with BPJS-K is 1,354, the highest in Indonesia, out of a total of 6,766 clinics spread across the country. Several studies show that the implementation of the home visit program as part of the *Prolanis* program has not been widely implemented at *FKTP* due to challenges such as costs, human resources, inadequate facilities, and shortcomings in the implementation of training programs to improve the knowledge and communication skills of health workers.

A cost analysis of home visit activities for *Prolanis* Type 2 patients is necessary to determine the costs incurred and the benefits obtained, allowing for the identification, measurement, and comparison of the costs and consequences of these pharmaceutical services. Intervening in the home visit program would benefit patients, BPJS, and clinics. However, the implementation of home visits is still constrained by resources, facilities, and infrastructure. This research was conducted in primary clinics collaborating with BPJS-K that have conducted home visits (*clinic X*) and those that have not (*clinic Y*) in patients with *Prolanis* Type 2 diabetes in Bogor Regency. Preliminary studies indicated that the number of *Prolanis* patients at *Pratama X* clinic with home visits was 132, with 53 DM patients, and 46 of these received home visits. At *Y* primary clinic, which has not implemented home visits, there were 161 *Prolanis* patients, including 68 Type 2 DM patients.

The average operational cost incurred by the *Pratama X* clinic to carry out the home visit program is Rp 5,500,000 per year for monthly visits for each patient. Currently, the implementation of home visits at *Pratama X* clinic is still using independent funding. No research has been conducted on the costs and benefits between clinics that implement home visits and those that do not in patients with *Prolanis* Type 2 DM. Therefore, research on costs and benefits is necessary to assess whether the costs incurred are proportional to the benefits obtained for patients, clinics, and BPJS-K.

BPJS-K's efforts to control Type 2 *Diabetes Mellitus* (DM) are implemented through preventive and promotive activities, such as the *Prolanis* program at *FKTP* (First-Level Health Facilities). This program can be enhanced with a home visit initiative, which has proven effective in preventing complications by providing direct education to patients, improving medication adherence, controlling blood sugar, and enhancing quality of life. Previous studies have shown that home visits not only reduce the incidence of complications but also lower healthcare costs, including readmissions, medication, and

treatment at healthcare facilities. However, the implementation of home visits has been inconsistent across *FKTP* due to challenges such as funding, human resources, and infrastructure. *Klinik Pratama X* currently funds home visits privately, making it essential to analyze the cost-effectiveness of the home visit program for patients, clinics, and BPJS-K. This research aims to explore whether the benefits (in monetary terms) of home visits at *Klinik Pratama X* outweigh the costs, compared to *Klinik Y*, which does not implement home visits for *Prolanis* Type 2 DM patients. The research will also investigate sociodemographic characteristics, medication adherence, blood sugar control, quality of life, and direct healthcare costs associated with home visits, providing valuable insights for future policy decisions by BPJS-K and other *FKTP*.

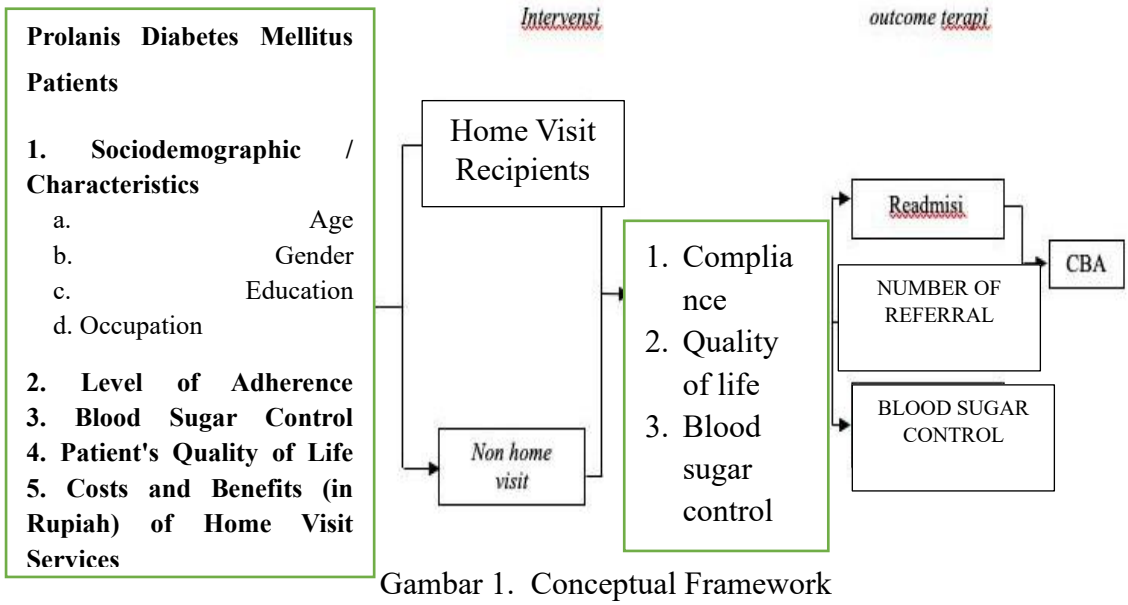
Previous research has demonstrated the effectiveness of the *Prolanis* (Program Pengelolaan Penyakit Kronis) program in managing chronic diseases like DM and hypertension at the primary care level. Studies by Rokhman et al. and Al-Qudah et al. highlight how home visit interventions can improve medication adherence, reduce treatment-related problems, and lower referral rates. However, gaps remain regarding the economic feasibility and cost-benefit comparison between clinics that implement home visit programs and those that do not. While clinical outcomes have been studied, limited research has quantified these interventions in monetary terms to inform health policy decisions.

The novelty of this study lies in conducting a comprehensive *Cost-Benefit Analysis* (*CBA*) of the home visit program for *Prolanis* DM patients, focusing on both economic and clinical outcomes. The study compares two clinics in Bogor Regency—one that implements home visits and one that does not—providing evidence on differences in medication adherence, blood sugar control, quality of life, and healthcare costs.

The benefits of this study are twofold. Practically, it offers strategic insights for BPJS-K and health clinics in optimizing chronic disease management through cost-effective interventions. Theoretically, it adds to the limited body of knowledge on the economic evaluation of community-based DM interventions in Indonesia, encouraging evidence-based policy improvements in primary care systems.

RESEARCH METHODS

The method used in this study is a type of observational descriptive analytics with a cross-sectional design. A cross-sectional study is one that is conducted by observing population data or samples at a single point in time (cross-sectional data). The subjects of the study were outpatient patients with Type 2 diabetes at *Klinik Pratama X*, which received home visit services, and *Klinik Y*, which did not receive home visit services, in Bogor District. Data collection was carried out prospectively and retrospectively. Prospective data collection was performed using questionnaires to determine the patient's medication adherence level and quality of life. Retrospective data were obtained from the Clinic Management Information System (*SIM*), BPJS-K primary care (*P Care*) data, financial administration data, and laboratory data. Retrospective data were used to determine the respondent profile, analyze the characteristics of respondents who met the inclusion criteria, assess blood sugar control over the past year, and analyze the cost-effectiveness of the home visit program for patients with *Diabetes Mellitus*. The cost amount was calculated based on the doctor's fee, medication fee, laboratory fee, home visit fee, re-admission fee, and referral fee. The analysis was carried out based on data from the period of September 2019 to December 2020.



Gambar 1. Conceptual Framework
Source : Researcher

The type of research used in this study is descriptive-analytic, with data collection conducted through two methods:

Primary Data: Prospectively obtained through questionnaires from Type 2 DM *Prolanis* patients. **Secondary Data:** Retrospectively obtained from the clinic's *SIM* (clinic information system) and *P-care* BPJS-K from September 2019 to December 2020 for Type 2 DM *Prolanis* patients. The research is conducted at *Klinik Pratama X*, which implements home visits, and *Klinik Pratama Y*, which does not, located in the Kabupaten Bogor region. The data collection process was carried out from December 2020 to March 2021.

The population in this study consists of Type 2 DM *Prolanis* patients at *Klinik Pratama X*, who receive home visits, and Type 2 DM *Prolanis* patients at *Klinik Pratama Y*, which does not implement home visits. The sample is selected using purposive sampling, a non-random sampling technique in which the researcher selects samples based on specific criteria that match the research objectives to answer the research questions. The inclusion criteria for patients receiving home visits include elderly patients, those who have difficulty or do not regularly visit the clinic, and patients recently discharged from the hospital. *Klinik Pratama X*, which provides the home visit program, has a total population of 385 Type 2 DM patients, with 53 registered as *Prolanis* patients. After evaluation, 30 patients meeting the inclusion criteria are selected as the sample. Meanwhile, *Klinik Pratama Y*, which does not provide home visits (the control group), has a total population of 161 *Prolanis* Type 2 DM patients, with 68 patients registered. After review, 30 patients who meet the inclusion criteria are selected as the sample. The sample criteria to be evaluated are:

Inclusion Criteria:

- Diagnosed with Type 2 DM.
- Registered as a *Prolanis* participant for at least one year at the time of the study.
- Willing to participate as a respondent.

Exclusion Criteria:

- Incomplete medical records in *SIM* Clinic and *P-care* BPJS-K.
- Respondents who transfer to other healthcare facilities during the study.
- Patients who pass away during the study period.
- Patients who withdraw during the data collection process.
- Patients who refuse to complete the questionnaire.

- Non-active participants due to premium issues.

Data Collection Techniques

Data collection is done prospectively for primary data and retrospectively for secondary data.

Primary Data

Primary data is obtained prospectively, including patient medication adherence and quality of life, through questionnaires and the latest blood sugar levels measured during home visits. Medication adherence is measured using the *MRAS-5* questionnaire, while quality of life is assessed using the *EQ5D-5L* questionnaire. Validity and reliability testing of the questionnaires are conducted on 30 respondents outside the sample group to ensure accurate variable measurement. The questionnaire results are tested for validity using the *Pearson Product Moment* correlation and reliability using *Cronbach's Alpha* in *SPSS* version 25 for Windows. The validated and reliable questionnaires are then given to eligible Type 2 DM patients who meet the inclusion criteria, and their data is analyzed.

Secondary Data

Secondary data is obtained retrospectively by reviewing medical records (*RM*) and *P-care* (primary care) data to assess patient characteristics (age, gender, comorbidities, blood sugar control, medication name, dosage, interval, number of visits, and referrals) and financial administration data to determine direct and indirect costs. This allows for the evaluation of the benefits (in monetary value) of the home visit program.

RESULTS AND DISCUSSION

Sociodemographic Characteristics of Respondents

The distribution of frequencies and tests of different characteristics of respondents in the form of a table consisting of characteristics of gender, age, education, occupation, income per month, length of time of prolanis, length of diagnosis of diabetes mellitus, comorbidities and drugs used from the respondent group who received *home visits* and *non-home visits*.

Table 2. Frequency distribution of respondents based on Characteristics and Mann Whitney Differentiation Tests

Source : Researcher

Characteristic	Home Visit (n=30)		Non Home Visit (n=30)		p
	f	%	f	%	
Gender					
Male	7	23,33%	11	36,67%	0.264
Female	23	76,67%	19	63,33%	
Age	55,77±8,74		59,10±11,07		
33-45 years	4	13,33%	5	16,67%	
46-55 years	10	33,33%	6	20,00%	0,159
56-65 years	13	43,33%	8	26,67%	
> 65 years	3	10,00%	11	36,67%	
Education					
Elementary school or equivalent	13	43,33%	2	6,67%	
Junior high school or equivalent	9	30,00%	1	3,33%	0,000
Senior high school or equivalent	7	23,33%	9	30,00%	
College/University	1	3,33%	18	60,00%	

Characteristic	Home Visit (n=30)		Non Home Visit (n=30)		p
	f	%	f	%	
Employment Status					
Employed	13	43,33%	10	33,33%	0,430
Unemployed	17	56,67%	20	66,67%	
Monthly Income					
≤Rp 2.000.000	4	13,33%	5	16,67%	
>2.000.000 – 3.000.000	12	40,00%	4	13,33%	0,165
≥3.000.000	14	46,67%	21	70,00%	
Duration of Prolanis Participation	3,27±1,86		5,06±4,55		
≥ 1 years - 2 years	11	36,67%	10	33,33%	0,873
> 2 years - 3 years	7	23,33%	4	13,33%	
> 3 years	12	40,00%	16	53,33%	
Duration Diagnosed with DM	4,23±3,31		8,73±6,28		
≥ 1 years - 2 years	11	36,67%	3	10,00%	
> 2 years - 3 years	5	16,67%	4	13,33%	0,026
> 3 years	14	46,67%	23	76,67%	
Comorbidities					
None	19	63,33%	17	56,67%	0,601
Present	11	36,67%	13	43,33%	
Type of Medication Used					
Single	5	16,67%	6	20,00%	0,741
Combination	25	83,33%	24	80,00%	

Remarks: Table V.2 shows significant differences (P < 0.05) for three education (P=0.000), length of diagnosis of DM (p=0.026) and no significant difference (P > 0.05) for gender, age, occupation, monthly income, length of prolanis follow-up, comorbidities, drugs used.

MEDICATION ADHERENCE

Medication adherence to prolanis mellitus patients receiving *home visits* and *non-home visits* is calculated based on the distribution of frequencies. The level of compliance of *home visiting* and *non-home visit patients* was measured using questionnaires, patients were categorized as compliant if the compliance score was > 25 and were categorized as non-compliant if the compliance score was < 25. Medication compliance of home *visiting patients was* 50.00% while non-home visit patient compliance was 46.67%. The normality test of medication adherence data is based on the difference in scores, if the data is distributed normally, then the test uses *the Independent t test* while if the data is not distributed normally, the test uses *the Mann Whitney* test.

Tabel 3. Results of the normality test of compliance data (MARS 5)

Source : By Researcher

Data	Patient	p value	α	Decision
Kepatuhan (MARS 5)	Non *Home Visit*	0,000	0,05	Abnormal
	Home Visit	0,000		Abnormal

The results of the normality test of the compliance score show that patients receiving *home visits* and *non-home visits* have a value of P (0.000) < 0.05, meaning that the data is not distributed normally. Thus, the statistical test used to determine the difference in compliance score between patients receiving *home visits* and *non-home visits* uses *the Mann Whitney* test.

Table 4. The results of the Mann Whitney Test on medication adherence to taking drugs for patients receiving home visits and non-home visits.

Source : By Researcher

Patient	N	Mean±SD	Median	p-value	□	Decision
Home Visit	30	21,23±5,24	25	0,566	0,05	No Difference
Non Home Visit	30	22,57±2,75	25			

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The table above shows the compliance score of patients receiving *home visits* (21.23±5.24) while *non-home visit patients* (22.57±2.75). The results of the calculation of *the Mann Whitney test* showed a value of p (0.566) > 0.05, meaning that there was no significant difference in the patient's medication adherence. The absence of significant differences in the medication adherence of *home visit* patients and *non-home visited* patients is due to several factors. *Non-home visit* patients have a higher level of education, with higher education a person has high awareness to behave well in implementing a healthy lifestyle and maintaining a diet so that patients become more independent to carry out treatment Health. While *the majority of home visit* patients have low education, but the existence of *home visite* activities has a positive impact, namely that patients become more educated so as to increase the knowledge and understanding of patients related to diabetes mellitus, patients are more motivated to live *a lifestyle* balanced and better monitoring of patient health. This is in line with research conducted by Gustawi where patients with good knowledge of diabetes mellitus tend to have a healthier lifestyle(Gustawi et al., 2020). The results of the research conducted by Nazriati Elda show that 75% of the knowledge of type 2 DM patients is at a moderate level and 50% is at a high level. There was a significant relationship between the knowledge of type 2 DM patients and medication adherence with a P value of 0.022(Nazriati et al., 2018).

In addition, the absence of a difference in medication adherence between *home visite* patients and *non-home visite* patients can be caused by the majority of the time of diagnosis of dm > 3 years in *non-home visite* patients is more proportional than home *visit* patients. A person who has been suffering from chronic illnesses for a long time will affect their experience and knowledge in carrying out treatment therapy. The length of time you have DM is one of the factors that affect medication adherence. The longer a person suffers from DM, the higher the non-compliance due to complex and complex management programs (Bulu et al., 2019). Although the *non-home visite* patient group does not receive *home visite* services, the group routinely receives education related to diabetes mellitus through the wats up prolanis group short message and is encouraged to do a routine blood sugar check once a month to better

control blood sugar. Research conducted by Silalahi Wanto J stated that 90% of respondents with diabetes mellitus who were given short messages via mobile phone had an effect on medication adherence. Short messaging via mobile phone is effective because it removes time, place constraints and fosters good relationships between patients and health workers(Silalahi, 2021). The use of technology for the elderly and low-educated patients as an information medium in providing education may be an obstacle due to limitations in using this technology.

The results of the chi-square test in table V.8 showed a p value of 0.796 > 0.05 there was no compliance relationship between patients receiving *home visits* and non-home *visit patients with the* home visit *program*. However, the *Odds* Ratio (OR) value shows that *home visit* patients have a tendency to be 1,143 times more compliant in carrying out diabetes mellitus treatment therapy compared to *non-home visit* patients despite lower education. The *home visite* program at the primary clinic involves health workers, doctors, nurses, pharmacists and other health workers. The *home visite* program is an effort to provide optimal service for patients. Through *home visits*, patients are given counseling about diseases and medications so that blood sugar is more controlled and reduces the risk of complications. Based on Nurul Chilmia's research, a P value of 0.000 < 0.05 was obtained, where pharmacist counseling had a significant influence on patients' medication adherence and kept blood sugar levels stable. Patients who have received counseling have a good diet, increased knowledge about diabetes mellitus, good stress management and the use of appropriate medications. The patient's non-compliance with taking medication is caused by the patient traveling, uncomfortable with the side effects of the drug, feeling that the condition is getting worse, bored because he has to take medication regularly, the patient already feels that blood sugar levels are normal and a combination of drugs(Fatiha & Sabiti, 2021). Research conducted by Muthia Okta S showed factors that significantly affected medication adherence including work with P = 0.02, frequency of taking medication with P = 0.04 and the number of drugs taken in a day with P = 0.03. Research in Indonesia shows that non-compliance in antidiabetic drugs ranges from 50%-67%. Many studies have been conducted to measure factors related to medication adherence with varying results. Other research shows that to be able to increase compliance, efforts can be made, for example, to reduce the complexity of therapy, including reducing the frequency of taking medication by using a combination of medications in one drug (fixed dose combination pill), education about diseases and drugs. Pharmacists have a role in improving medication adherence through counseling(Akrom et al., 2019). This can be caused by the pharmacist's education carried out during *home visits.*

BLOOD SUGAR CONTROL

The following is an overview of the difference in blood sugar control for home *visit* groups and *non-home visits*. Control is calculated based on blood sugar data contained in the patient's Medical Record, namely GDP, GDS and HbA1c. Control is calculated based on the number of examinations performed by the patient then the amount of controlled blood sugar in percentage. Blood sugar control is divided into 2 groups, namely controlled < 50% and controlled >50%. The *home visit* and *non-home visit* groups had the same distribution of blood sugar control, namely < 50% of 11 people (36.67%) and > 50% of 19 people (63.33%). There was no difference in the distribution of the frequency of blood sugar control of the group given *home visits* and *non-home visits*. From the results of *the chi-square test, a* P value of 1 > 0.05 was obtained, meaning that there was no meaningful relationship between *the home visite* program and blood sugar control, and OR 1, this shows that both *the home visite* group and *the non-home visite* group have the same chance of blood sugar control. The results of the research conducted by Siwi Padmasari, namely the provision of education through *Home Pharmacy Care* (HCP) can increase the achievement of fasting blood glucose (GDP) targets, with an average decrease in GDP of the intervention group of 53.67±24.31 mg/dL (p=0.021). Pharmacist education programs that emphasize adherence to the overall treatment regimen, especially for diet and exercise as well as regular follow-up have greater benefits in glycemic control than simply emphasizing medication adherence. This shows that the presence of HPC in the intervention group can increase the achievement of the target GDP level, which is <126 mg/dL.

In contrast to the control group that did not get education with HPC would lead to low patient knowledge of the disease and treatment. Of course, this caused fasting blood glucose levels after the second measurement did not reach the target of >126 mg/dL caused by lack of adherence to taking medication(Padmasari et al., 2021). Another study conducted by Rasdianah Nur showed the positive impact of the implementation of pharmaceutical service activities at home there were changes after interventions were carried out on knowledge, medication adherence, therapeutic satisfaction and glycemic index. The average fasting blood sugar reduction before and after the intervention was 17.09mg/dl± 1.43. The provision of services has a significant effect on fasting blood sugar with a p value of 0.000< 0.05. The strength of the correlation between compliance and fasting blood sugar was 0.515 with a significant significance of 0.01 which showed a strong correlation between the level of compliance and the decrease in fasting blood sugar. The provision of services to the home is expected to be able to improve blood sugar control in order to slow down the process of complications(Rasdianah et al., 2020)

The results of the study conducted by Koniah Eni from 11 factors that affect blood sugar control, the most decisive is the factor of adherence to taking medication with OR 3,873, this means that respondents who do not comply have a chance of their blood sugar becoming uncontrollable 3.9 times compared to patients who are compliant after being controlled by gender, rationality and comorbidity variables.

Another factor that affects blood sugar control is the rationality factor with statistical test results of p = 0.047 and OR 5.445, meaning that patients who are irrational in their therapy have a 5.445 x chance of not having their blood sugar under control. Because the administration of drugs aims to improve the quality of life of patients. Factors that do not affect blood sugar control are gender, age, education, occupation, comorbidities, length of suffering from DM, physical activity and drug use(Koniah et al., 2021). In this study, it was seen that blood sugar control in both the group receiving *home visits* and *the non-home* visite group did not have significant differences because the compliance factor of the two groups showed the same results. This shows that the patient's medication adherence is in line with the control of his blood sugar

PATIENT'S QUALITY OF LIFE

Patients' quality of life was measured using the EQ-5D-5L instrument (*Europian Quality of Life -5 Dimension -5 level*). The EQ-5D-5L instrument itself is a generic instrument consisting of 5 dimensions and 5 levels. The 5 dimensions describe the individual's health in the dimensions of ability to walk, self-care, usual activities, pain/discomfort and anxiety/depression while the 5 levels consist of no problems (level 1), mild problems (level 2), moderate problems (level 3), severe problems (level 4) and incapacitated/extreme problems (level 5) followed by self-assessment of overall health status on the visual analogue scale (EQVAS). The research conducted by Purba in compiling the Indonesian *value set* is used as a protocol in describing the condition/condition of Indonesians (national) in measuring the quality of life by looking at the dimensions of the problem in the patient and measuring the value of the utility(Purba et al., 2017). Patients who received *both home visits* and *non-home visits* had no severe problems (level 4) and incapacitated/extreme problems (level 5) in all dimensions. The frequency distribution at level 1 for the mobility dimension is that patients have no problems in the ability to walk in the *home visit* group 70% and the *non-home visit* group 73.33%. For the self-care dimension, namely patients who have no problem doing self-care (bathing/dressing themselves), the *home visit* and *non-home visit* groups showed the same results of 86.67%.

For the dimension of activities that are usually carried out, patients have no problems in carrying out daily activities, the *home visit* group is 73.33% while the *non-home visit* group is 76.67%. For the pain or discomfort domain, i.e. patients have no problems with pain due to pain suffered, the same results were shown for *the home visite* and *non-home visite* groups of 36.67%.

For the anxiety/depression domain, patients did not feel anxiety/sadness due to illness in the *home visit* group by 76.67% and the *non-home visit* group by 80%. Overall, the distribution of patient response frequencies in each dimension at level 1 was not much different for *the home visite* and *non-home visit groups*. The differences were in the domain of mobility (Mo), activities usually carried out (UA), anxiety or depression (PD) of *the home visite* and *non-home visite* groups showed slightly different results at level 1 where the non-home visite group was more dominant. For the self-care domain (SC) and discomfort of both groups showed similar results.

The frequency distribution at level 2 patients felt a slight problem in the mobility dimension of the *home visite* group by 26.67%, the *non-home visite group* by 23.33%, in the self-care dimension of the two groups showed the same result of 10%, for the dimension of activities that are usually carried out by *the home visite group with a result of 20% and non-home visite* showing a result of 16.67%, for the discomfort dimension of both groups showed the same result of 56.67%, and for the dimension of anxiety or depression *home visit* of 23.33% and *non-home visit* of 20%.

The difference in frequency distribution was in the domain of mobility (Mo), commonly carried out activities (UA), anxiety or depression (PD) of *the home visite* and *non-home visite* groups showed slightly different results at level 2 where *the home visite* group was more dominant. For the self-care domain (SC) and discomfort of both groups showed similar results. The frequency distribution at level 3 where patients felt considerable difficulty (moderate level) in all dimensions of *the home visite* and *non-home visite* recipient groups showed the same results. Mobility 3.33%, Self-care 3.33%, usual activities 6.67%, pain/discomfort 6.67%, anxiety/depression 0%.

Problem responses can be seen at level 2 and level 3. The pain dimension at level 2 where the patient felt little pain/discomfort showed the greatest outcome among the other dimensions, for the group receiving *home visite* and *non-home visite* showed the same distribution of 56.6%. The pain dimension at level 3 patients felt quite pain/discomfort showed the greatest results among the other dimensions, for *the home visite* group and *the non-home visite* group showed the same distribution of 6.67%. These results are in line with research conducted by Arifin using the same instrument *EQ-5D-5L* showed the most problems in patients with diabetes mellitus, namely in the dimension of pain/discomfort (61%) followed by problems in the ability to walk (37%), anxiety (34%), activities usually done (34%) and self-care 12%. (Arifin et al)[50]

In this study, an assessment was carried out on *the Health State* of patients who received *home visits* and *non-home visits*. The following is an overview of *the Health State* of patients who receive *home visits* and *non-home visits*

Table 5. Health State overview of patients receiving home visits and non-home visits

Source : By Researcher

Home Visit (n=30)				***Non Home Visit (n=30)***			
Health State	**frequency**	**%**	***Utility***	***Health State***	**frequency**	**%**	***Utility***
11111	10	33,33%	1	11111	10	33,33%	1
11121	5	16,67%	0,914	11121	7	23,33%	0,914
11122	3	10,00%	0,835	11122	3	10,00%	0,835
11221	2	6,67%	0,824	11221	1	3,33%	0,824
12322	1	3,33%	0,578	12322	1	3,33%	0,578
21121	2	6,67%	0,795	21121	2	6,67%	0,795

21122	1	3,33%	0,716	21132	1	3,33%	0,707
21132	1	3,33%	0,707	21211	1	3,33%	0,791
21211	1	3,33%	0,791	21221	1	3,33%	0,705
21221	1	3,33%	0,705	22221	1	3,33%	0,604
22221	1	3,33%	0,604	22222	1	3,33%	0,525
22222	1	3,33%	0,525	33331	1	3,33%	0,417
33331	1	3,33%	0,417				
TOTAL SCORE UTILITY		25.356				25.644	

Circulating table V.11. can be seen the results of the assessment of *the health status* of patients who receive home visits and non-home visits. Health state 11111 is a perfect picture of health. The distribution of patients with health state 11111 was both the group that received *home visits* and *non-home visits* (33.33%). In the Health state 11121, the recipient group of home visite (16.67%) and the non-home visite group (23.33%). Health state 11121 describes no difficulty in walking, no difficulty in self-care, no difficulty in carrying out daily activities, no anxiety, just that the patient feels a little pain. For home visite patients, there are 13 *heath state* conditions, while for non-home visite patients, there are 12 *health state conditions*. The range of utility values is in the range of 0.417-1,000. The second difference is in the *health state* condition of 21122 with a utility value of 0.716 in *home visit* patients. The total utility of *the non-home visite* group was better at 25,644 than the *home visit group* of 25,365. This means that the quality of life or health status of the *non-home visite* group was better than the *home visit group*. The results of the analysis of the VAS score found that patients who received *home visits* (63.33%) and non-home *visits* (60%). For VAS, the home visit group (36.67%) is very good, while the non-home visit group (40%). The following are the results of the normality test of quality of life data (*Utility* and VAS) of patients receiving *home visits* and *non-home visits*

Table 6. Normality test results of quality of life data for patients receiving home visite and non-home visite

Source : By Researcher

Data	Patient	P	a	Decision
Utility	*Non Home Visit*	0,001	0,05	Abnormal
	Home Visit	0,000		Abnormal
VAS	*Non Home Visit*	0,203	0,05	Normal
	Home Visit	0,142		Normal

Description : $p < 0.05$

Based on table V.13 The results of *the utility* normality test show that patients receiving *home visits* and *non-home visits* have a p< value of 0.05, meaning that the data is not normally distributed, thus the statistical test used to determine the difference in quality of life (*utility*) between patients receiving *home visits* and *non-home visits* uses *the Mann Whitney* test. Meanwhile, the results of the VAS normality test show that *home visit* and *non-home visit patients* have a p value of > 0.05, meaning that the data is normally distributed, thus the statistical test used to determine the difference in quality of life (VAS) of patients receiving *home visits* and *non-home visits* uses *the Independent T Test*.

The following are the results *of the Mann Whitney* test on the quality of life (*utility*) of patients receiving *home visits* and non-home *visits*.

Table 7. Results of the Mann Whitney Test quality of life (Utility) of patients receiving home visits and non-home visits.

Source : By Researcher

Patient	N	p-value	□	Decision
Home Visit	30	0,791	0,05	No Changes
Non Home Visit	30			

Description : p 0.791 > 0.05

Based on table V.14, the *results of the Mann Whitney test* show a p value (0.791) > 0.05, meaning that there is no significant difference in the utility value of patients receiving *home visits* and non-home *visits*.

The following are the results of *the Independent T Test* quality of life (VAS) for patients receiving *home visits* and non-home *visits*.

Table 8. Results of the Independent Quality of Life Test (VAS) for patients receiving home visits and non-home visits.

Source : By Researcher

Group	Homogenitas Test			t test			
	Sig.	□	Description	t count	Sig.	□	Description
Home Visit Non Home Visit	0.872	0.05	Homogen	-0.222	0.825	0.05	No Changes

Description: homogeneity test P 0.872 > 0.05, T test p 0.825 > 0.05

Based on table V.15, the results of the homogeneity test show a value of p (0.872) > 0.05, meaning that the data is homogeneous. The results *of the Independent T Test* for homogeneous data (*equal variances assumed*) showed a value of p (0.825) > 0.05, meaning that there was no significant difference in quality of life (VAS) of patients receiving *home visits* and *non-home visits.* The quality of life (*Utility* and VAS) of patients receiving *home visits* and *non-home visits* did not differ significantly. The quality of life of the two groups was relatively good because the majority of patients were still able to carry out daily activities without being constrained by their illnesses.

COST AND BENEFIT ANALYSIS (IN RUPIAH)

The cost (*input*) and program results (*output*) in *the Cost Benefit Analysis* (*CBA*) will be quantified based on the value of money so that it will be easy to determine whether the results in the program (*output*) are proportional to the value invested or spent, so that it can be known whether the cost of a program can be profitable. Profits can be in the form of cost savings due to the long-term effects of a disease. The cost calculated in this study is direct cost. Direct costs are related to the health services provided to patients. Direct costs include doctor's fees, laboratory fees and drug costs. The cost data used in this study was taken in the period September 2019 – December 2020. Data were obtained from clinical driver's license, BPJS-K Primary Care, clinic management, INACBG for mild chronic diseases outpatient and interviews with patients. The cost that has been calculated from each clinic is then compared so that the *cost benefit* can be seen.

Direct costs for primary clinics that carry out *home visits* and primary clinics that do not carry *out home visits* for patients with prolanis diabetes mellitus

The following is the data on the recapitulation of direct costs of prolanis diabetes mellitus patients who receive *home visits* and *non-home visits.*

Table 9. Recapitulation of direct costs of prolanis diabetes mellitus patients who receive home visits and non-home visits

Source : By Researcher

Yes	Direct Cost of Treatment	Home Visit N = 30	No Home Visit N = 30	Overall Total N = 60
1	Cost of visits to health facilities (number of visits X doctor's consultation fee per visit Rp. 2000)	(218xRp 2000) IDR 436,000	(283x Rp2000) 566.000	IDR 1,002,000
2	Drug costs (Cost of DM Drugs + non DM Drug Cost)	IDR 10,379,064	IDR 24,325,400	IDR 34,704,464
3	Laboratory fees (The cost of 2x examinations per year for prolanis patients is IDR 780,000 + laboratory GDS examination at the clinic every month. 1x examination IDR 10,000	IDR 24,310,000	IDR 24,580,00	IDR 48,890,000
4	Home visit fee (investment). The cost is Rp 10,000 per patient	IDR 3,030,000	0	IDR 3,030,000
TOTAL DIRECT COSTS		Rp. 38. 155.064	IDR 49,471,400	IDR 87,626,464

Based on table V.16, the results of the recapitulation of the direct costs of prolanis patients with diabetes mellitus who received *home visits* and *non-home visits*, the total direct cost of *home visite* patients was Rp. 38,155,064 while the total direct cost of *non-home visite patients* amounted to Rp. 49,471,400. Doctor's fees for home visit patients with 218 visits are (Rp436,000) while doctor's fees for *non-home visit* patients with 283 visits are (Rp566,000), there is a difference in the number of visits because non-home visit prolanis DM patients are more often checked at the clinic, the complaints felt are also more.

The total cost of medicine for home *visit patients* is (Rp. 10,379,064) and *non-home visit* patients is (Rp. 24,325,400). The cost of drugs incurred for *the home visit* group is lower than for *the non-home visit* group. This difference can occur because the use of drugs in *non-home visit* patients is more numerous, the dominant patient uses more than one type of drug. The use of drugs is widely based on patient complaints, doctor's diagnosis and long suffering from DM. The frequency of suffering from DM *for non-home visiting* patients for a long time is more than that of *home visit* patients , which can affect the type and amount of drug use so that the total cost of the drug becomes greater.

Routine services for laboratory examinations for prolanis DM patients are provided once every 6 months. Tests include HbA1c, urea and creatinine levels. The examination is in collaboration with Kimia Farma. Monthly check-ups are carried out once a month at the clinic for GDP or GDS checks. Laboratory examination of *home visit patients* amounted to (Rp. 24,310,000) and *non-home visit patients* amounted to (Rp. 24,580,000). The cost of laboratory examinations

for *home visite* and *non-home visite patients* is not much different because the packages specified from the clinic are the same.

For home *visit patients,* there is a fee incurred for the implementation of *a home visit* of (IDR 3,030,000), this fee is incurred by the clinic as one of the efforts to improve services for prolanis DM patients and foster a sense of trust in the clinic, improving the patient's quality of life. The *cost of home visits* incurred by the patient clinic is (IDR 10,000) for one visit made by health workers at the clinic that carries out *the home visit*, this is because BPJS-K only provides funds for education or counseling for prolanis and prolanis gymnastics participants while funds for other activities such as *reminders* through SMS *gateways* and *home visits* there is not yet. On the other hand, the implementation of prolanis programs such as gymnastics and counseling cannot be followed by prolanis participants, most of whom are elderly for certain reasons.

Based on the data mentioned above, it can be seen that the total direct cost of patients who receive *home visits* is lower than patients who do not receive *home visits*. The difference can be seen from the number of visits, total laboratory costs and total drug costs.

Benefits of reducing readmissions and referrals (in rupiah) of primary clinics that carry out *home visits* and primary clinics that do not carry *out home visits* in patients with prolanis diabetes mellitus

Table 10. Reimbursement fees and referral fees for prolanis Diabetes Mellitus patients

Source : By Researcher

Fee Type	Home visit	Not home visits	Total	Cost difference between home visited and non-home visite (pengehematan)
	n = 30	n = 30	n = 60	
1. Readmisi (repeated visits to the clinic)				
a. Total number of remissions	49	85		
b. Total doctor's consultation fee (each 1x visit Rp. 2000)	Rp. 98000	IDR 170,000		IDR 72,000
c. Total Drug Cost	IDR 251,638	IDR 262,778		IDR 11,140
d. Total Cost of Admission	IDR 349,638	IDR 432,778	Rp.782.416	IDR 83,140 (10,63%)
2. References				
a. Number of Referrals b. Referral fees (Referral fee at Class C Hospital rate	54 IDR 10,373,400	81 IDR 15,560,100	IDR 25,933,500	IDR 5,186,700 (20%)

based on INA-CBG rate for small chronic outpatients of Rp. 192,100)				

From table V.17, it is known that the average remission cost incurred by the clinic for *home visit* patients with a total of 49 visits amounted to (Rp. 349,638) and for *non-home patients* with 85 visits amounted to (Rp. 432,778) while the difference in remission costs amounted to (Rp. 83,140). The referral fee incurred by BPJS for *home visit* patients with a total of 54 referrals is (Rp. 10,373,400) and referral fees for *non-home visit patients with a total of 81 referrals amounting to (Rp,* 25,933,500) while the difference in referral costs is (Rp. 5,186,700). The amount of remission and referral costs for *non-home visite* patients is higher than for *home visite patients*

Cost Benefit Analysis Calculation

Table 11. Savings on remission fees and referral fees

Source : By Researcher

Yes	Savings	Sum
1	Difference Between Readmissions a. Difference in Doctor's Consultation Fee b. Drug Cost Difference TOTAL READMISSION SAVINGS	 IDR 72,000 IDR 11,140 IDR 83,140
2	Referral Difference	IDR 5,186,700
Total cost savings in remission and referral in the home visit group compared to the non-home visit group		IDR 5,269,840

Based on table V.18, it can be seen that the savings from the remission fee and the savings from the referral fee are 5,269,840. Cost and benefit analysis is carried out to determine the net amount of benefits in monetary value, it is necessary to calculate the net *benefit* obtained by means of costs minus benefits in monetary value. *The Cost Benefit Ratio* is obtained by dividing the cost by the value of the benefit in monetary value. If the result of the calculation *of the Cost Benefit Ratio* >1, then the benefits obtained from a treatment are greater than the costs needed. If *the Cost Benefit Ratio* = 1, then the benefits generated by the required costs are the same. If the *Cost Benefit Ratio* is <1, then the cost required is greater than the benefits obtained. Therefore, the treatment with the *greatest Cost Benefit Ratio* value is the most *Cost Benefit treatment.* In this case, the investment cost incurred is in the form of *home visit costs* incurred by the clinic. Meanwhile, the value of benefits obtained from savings in remission costs and referral costs so that the *cost benefit ratio* is obtained

Net Benefit = Benefit (savings) – Cost (investment)

= 5.269.840 – 3.030.000

= 2.239.840

Cost Benefit Ratio = Benefit

$$= \frac{\text{Cost Cost savings}}{\text{Home Visitation Investment}} = \frac{5269840}{3030000}$$

= 1,73

In the calculation of *the cost benefit ratio*, it is known that the *cost benefit ratio* value is 1.73 which means that greater than 1 can be concluded that the *home visit* program is acceptable.

The results of the *cost benefit ratio* analysis, that the existence of *home visit interventions* can reduce the number of re-admissions and patient referrals to advanced health facilities, from the data, it can be seen that home *visit* patients are referred to follow-up health facilities less than *non-home visit patients*, so that there are cost savings (reduction in therapy costs) for BPJS. *The benefits* for BPJS are not just seen from the savings in referral costs but rather the long-term benefits that BPJS can get, namely patients get education to be obedient in taking medications, blood sugar is more controlled so that the incidence of complications caused by uncontrolled diabetes mellitus can be minimized. The average diabetes mellitus patient who is often referred is due to uncontrolled blood sugar and this can cause costs to be more expensive, especially if complications have appeared. So that costs can be avoided by controlling uncontrolled blood sugar.

Financing for catatopic diseases is currently Rp 23.5 trillion from 22 million cases. The highest cost ranking is occupied by cardiovascular diseases with a total cost of Rp 10.3 trillion with 13 million cases. The existence of interventions through *home visits* that are carried out as early as possible at health clinics is expected to be an input for BPJS, so that BPJS can provide incentives to clinics that carry out *home visits* so that the number of referrals can be minimized(BPJS Kesehatan, 2020).

In the study conducted by Al-Qudah RA, the evaluation of benefits and costs provided insight into the economic benefits of the home treatment management provided by pharmacists to prevent ADE for chronic outpatients, this is cost-effective and offers great cost savings for healthcare hospital payers, resulting in a benefit-cost ratio of 5.98(Al-Qudah et al., 2019).

Based on the results of the above research, the differences in the group in the home visite clinic and the group in the non home visite clinic are as follows

No	Difference	Home Visit Clinic	Non-Home Visit Clinic
1	Characteristics of Education	Majority of Elementary School 43.4%	Majority of Universities 60%
2	Characteristics of long-term DM > 3 years	46.67%	76.67%
3	Medication adherence	15	14
	(OR)	1.143	
4	Controllability (OR)	1	

5	Quality of life	Level 1 (no problem) (MB) 70 % (SC) 86.6% (UA) 73.3% (PD) 36.67 % (AD) 76.67%	Level 1 (no problem) (Mo) 73% (SC) 86.6% (UA) 76.67% (PD) 36.67 % (AD) 80%
	Total score utility	25.356	25.644
6	Amount of fees	(Rp. 38. 155.064)	(Rp. 49,471,400).
7	Number of readmissions	IDR 349,638	IDR 432,778
8	Number of Referrals	IDR 10,373,400	IDR 15,560,100

The results of the study showed significant differences in the characteristics and length of diagnosis of DM in both groups. The education of the *home viste group* is dominated by elementary school while *the non-home visite group* is dominated by junior high school. Long suffering from DM >3 years, *the number of non-home visit* patients is more dominant. Although there was no significant difference in medication adherence, blood sugar control and home *visitation quality of life* provided benefits for patients as seen from the decrease in the number of remissions. *Home visits* provide moral motivation and foster the patient's enthusiasm to consume medication regularly, patients are more enthusiastic and optimistic, the patient's blood sugar condition is monitored and the patient increases his knowledge related to a healthy lifestyle. The moral support provided from *home visit activities* minimizes the level of stress of patients due to taking medication for a long period of time. The patient's enthusiasm to stay productive in living a life with diabetes mellitus is a positive energy for the patient. It was observed that the condition *of home visiting patients* reduced the number of readmissions to clinics and referrals to hospitals.

CONCLUSION

This study demonstrates that while there were no statistically significant differences in medication adherence, blood sugar control, and quality of life between home visit and non-home visit groups, the implementation of home visits yielded positive economic and motivational outcomes. Patients who received home visits showed slightly better medication adherence, reduced rates of re-admission and hospital referral, and reported increased emotional support and disease awareness, despite lower educational backgrounds and shorter durations of illness. Moreover, the cost-benefit analysis revealed that home visits offer a favorable return, with a benefit-cost ratio of 1.73, indicating that the program is economically acceptable and beneficial for *BPJS-K* and primary clinics. Therefore, home visit interventions should be considered a strategic initiative to enhance patient care and reduce long-term healthcare costs. It is recommended that *BPJS-K* explore the potential of incentivizing clinics that implement home visit programs, especially those serving high-risk, low-income, and elderly populations. Future research should involve a larger and more diverse population, a

longitudinal study design to measure long-term outcomes, and explore the integration of digital tools for home-based care education and monitoring.

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