Original Research Article
The Influence of Health Facilities and Personnel on Life Expectancy in Yogyakarta Province

ABSTRACT

Aims: Health service development aims to improve the quality of human resources. In this case, health development leads to public awareness and their desire to live healthily. One indicator of development success is the change in the average life expectancy (AHH) of an area. Life expectancy is a national or regional standard for measuring the government's success in improving public health. The life expectancy rate for DIY Province will be the highest in Indonesia in 2022.
Study design: Multiple regression analysis on time series data.
Place and Duration of Study: Sample: This study uses data annual from 2000 to 2022 were extracted from data online Ministry of Health and Yogyakarta in Figures.
Methodology: The analytical method used is multiple regression on time series data.
Results: The results of the study showed that the number of health workers, outpatient visits, and inpatient visits did not have a significant effect, while the number of hospitals and health centres had a significant effect on life expectancy. It is hoped that this research can become the basis for policies to increase higher-quality medical personnel in the future.
Conclusion: The number of health workers, outpatients, and inpatients does not significantly impact life expectancy unless accompanied by quality facilities and infrastructure. In times of crisis (e.g. pandemic), inadequate facilities can decrease life expectancy. Additionally, increasing health workers without equal distribution, especially in remote areas, has no effect on life expectancy. However, the number of hospitals and health centers has a significant impact on life expectancy as they provide essential disease prevention and treatment services.

Keywords: Health Facilities, Life Expectancy, DIY, Expectancy in DIY, Multiple Regression.

1. INTRODUCTION

Life expectancy refers to the average age expected by some individuals or also as the average estimated years that humans will live. The basic choices that people usually choose are to live a decent life and be able to live a long, healthy life, obtain education and have access to the necessary resources. High and low life expectancy can be a factor that can be considered in describing a society's socio-economic progress. Life expectancy is an estimate of how long a person has lived since birth, measured in years. According to Saraswati and Widaningsih (2008), life expectancy is the average length of life of a person who has just been born.
Life expectancy is an important population standard and is used as an index to measure the quality of the population. The high and low average life expectancy is a factor that needs to be considered in describing the socio-economic progress of society. Life expectancy in each country varies greatly, and some developed countries tend to have higher life expectancy than developing countries. Increasing life expectancy shows the success of socio-economic development programs, so that life expectancy becomes a measurement index for the Human Development Index. The average life expectancy is increasing every year, indicating that

human development has achieved success. This is due to the productive age population meeting the needs of the elderly (Ministry of Health of the Republic of Indonesia, 2013).

2. MATERIAL AND METHODS

2.1 Literature Review

2.1.1 Health services

Komaruddin (1997: 394) defines service as an achievement carried out or sacrificed in order to satisfy the requests or needs of other parties. Another definition states that service is something that can help, welcome, reply, heed, satisfy, serve, present, help, respond, provide everything that is needed or something that is needed by another party (Syafii, 1998: 39).

2.1.2 Medical facility

in step with the Republic of Indonesia government law wide variety forty seven of 2016 regarding fitness carrier facilities (Ministry of health, 2016), a health centre or fitness service facility is a device or region that is used to carry out health provider efforts, each in phrases of promotive, preventive, curative and also rehabilitative done by using the significant government, nearby government, or the community. Health service facilities have 3 levels, including: Firstly, first level health service facilities that focus on providing basic health services. Second, second level health service facilities which focus on providing specialist health services. And thirdly, third level health services focus on providing subspecialty health services.

2.1.3 Health workers

Health workers primarily based at the law of the Republic of Indonesia regarding health No. 36 of 2014 are each person who dedicates themselves to the fitness zone and has understanding and capabilities via education within the fitness sector for positive types that require authority to perform fitness efforts. Health workers also have an vital function in enhancing the most excellent of health offerings to the community so that people are capable of increase their attention, will and capacity to stay healthily in order that the highest level of fitness may be carried out as an funding for the improvement of human sources which can be socially and economically efficient and as an detail of fashionable welfare as intended inside the Preamble to the 1945 charter of the Republic of Indonesia.

2.1.4 AHH indicators in development goals

The policy direction and strategy for national health development 2020-2024 is part of the long-time improvement Plan for health (RPJPK) 2005-2025. The intention of health development is to increase consciousness, will and ability to live healthily for everyone if you want to achieve the best degree of public health, as a funding for the development of socially and economically effective human assets. meanwhile, the fitness improvement goal to be carried out in 2025 is a boom inside the level of public fitness as indicated by an increase in lifestyles expectancy, a decrease inside the maternal mortality fee, a lower inside the infant mortality fee, and a lower in the superiority of undernutrition among kids below 5 (DIY Health Department Strategic Plan 2023-2026).

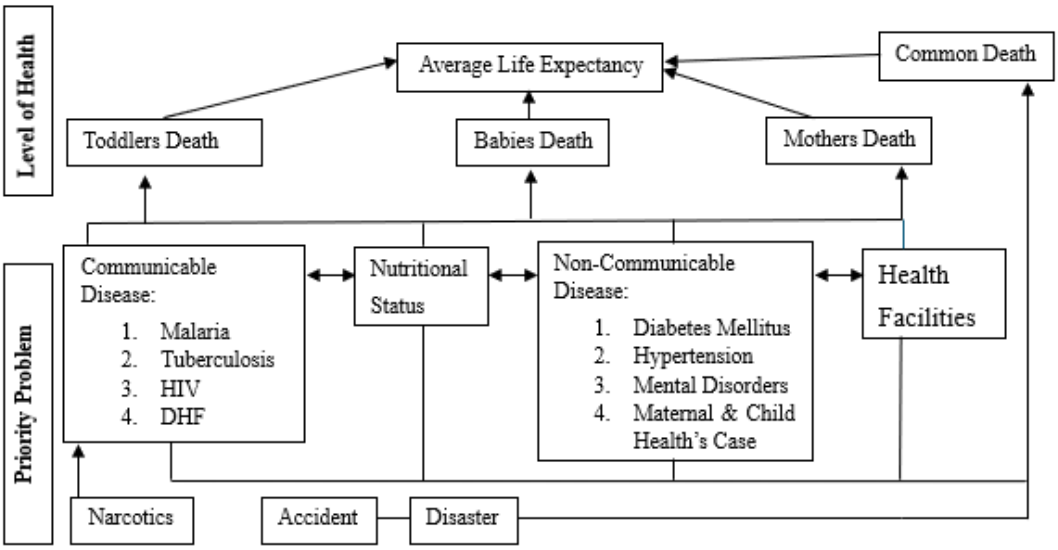

Fig. 1. AHH Indicator Achievement source: DIY Health Office Plan 2022

The degree of health as an indicator of the DIY Human Development Index (HDI) depends on the development of mortality and morbidity rates. In the health context, deaths that are of primary concern are deaths caused by various health problems which in this case can be divided into general deaths and specific deaths (deaths of mothers, babies, and toddlers). Specific deaths that are of priority concern have a large influence on life expectancy due to the magnitude they produce. DIY's Life Expectancy Rate (AHH) is the best nationally with an achievement of 74.74 years in 2017, 74.82 years in 2018, 74.92 in 2019, and in 2020 reaching 74.99 (DIY BPS), this shows that the health status of the people of DIY is getting better.

2.2 Previous Research Results

Health facilities, health workers and regional gross domestic product together or simultaneously have a significant influence on life expectancy in West Nusa Tenggara province in 2019-202(Olva Resa & Aprirachman, 2023). Factors that have a significant influence on AHH in South Sulawesi in 2019 are a clean and healthy lifestyle, poor nutrition, and average school attendance. (Alwi et al., 2023). From the research results (Princess, 2015) It can be seen that the significant contribution of health facilities and services, in this case the number of health workers sought by local governments, can create a higher level of life expectancy. Life expectancy is essentially a general description of the conditions of an area. The increase in life expectancy in Central Kalimantan province shows an improvement in public health status, including increased access and better quality of health services, helping to reduce poverty levels through increasing employment opportunities in Central Kalimantan province (Ginting, 2020). Apart from that, the ratio of community health centres per sub-district has a significant influence on AHH (Pratiwi & Budyanra, 2019)

There's sturdy and fine courting among clinical group of workers, medical insurance, and life expectancy. The dependency and poverty ratio also has a sturdy and negative dating with lifestyles expectancy. however, the provision of fitness facilities and earnings inequality have a weak dating with existence expectancy. (Kristanto et al., 2019).

2.3 Methodology

2.3.1 Classical Assumptions

The classical assumption test is used to test the feasibility of the multiple regression model used through the presence or absence of residual normality, multicollinearity, autocorrelation, and heteroscedasticity in the regression model. The research procedure for testing the classical assumptions in multiple regression analysis is as follows:

a. Normality Test: Normality check to check whether or not the standardized residual values within the regression example are commonly allotted or not. on this technique the residual fee is usually distributed if the Jarque-Bera opportunity value is > 0.05.
b. Multicollinearity Test: to test whether the regression version bureaucracy a very sturdy/high or ideal correlation among the impartial variables. If it is observed that there is an excessive dating between the unbiased variables, it can be said that there are multicollinear symptoms within the studies.
c. Heteroscedasticity Test: There is unequal variance in the residuals for all observations in the regression model. Based on the Obs*R-Squared P-value obtained when > 0.01, this proves that there is no problem with heteroscedasticity. You can use White's test or Breusch-Pagan test to test this hypothesis.
d. Autocorrelation Test: Carry out the LM test (Bruesch Godfrey method). This method is based on the F fee and Obs*R-Squared, wherein if the original opportunity price of Obs*R-Squared exceeds the self-assurance stage, then H0 is regular. is that there may be no autocorrelation problem.

2.3.2 Multiple Regression (log-linear)

$Y = \alpha 0 + \boldsymbol{\beta}1 \ln(X1t) + \boldsymbol{\beta}2X2t + \boldsymbol{\beta}3X3t + \boldsymbol{\beta}4 \ln(X4t) + \boldsymbol{\beta}5 \ln(X5t) + \varepsilon t$

2.3.3 Statistical Test (Adjusted R-Squared)

At the value of the coefficient Adj, R^2 which is an illustration that the independent variables together are able to provide an explanation of the dependent variable by the coefficient value.

2.3.3 Data

In research using secondary data, using data on life expectancy, the number of health facilities including the number of hospitals and the number of health centres, the number of medical personnel or doctors, the number of outpatient/inpatient visits in Yogyakarta Province, taken from the Central Statistics Agency (BPS) and Yogyakarta publication in figures 2001-2023.

3. RESULTS AND DISCUSSION

Table 1. Descriptive Statistics

Variabel	Min	Maks	Mean	Std. Deviasi	Jarque-Bera
Life Expectancy (year)	71.98000	75.08000	73.63783	1.055862	2.041116
Medical Personnel (people)	606.0000	6306.000	2445.304	1556.801	4.350355
Number of Hospitals (unit)	31.00000	93.00000	56.69565	22.34530	2.681566
Number of Community Health (unit)	446.0000	670.0000	579.7391	56.57916	1.594648
Number Of Outpatient Treatments (visit)	35905.00	10087270	4926542.	3151176.	1.530108
Number Of Hospitalizations (visit)	5235.000	1680451.	374362.8	454100.9	18.19722

Variable Description:
Y : Life Expectancy
X1 : Medical Personnel
X2 : Number Of Hospitals
X3 : Number Of Community Health Centres
X4 : Number Of Outpatient Treatments
X5 : Number Of Hospitalizations

The Normality Test of this regression model obtained a Jarque-Bera value of 0.785 > 0.05, which means the model is normally distributed. Multicollinearity Test in the multicollinearity test estimation results, the Cantered VIF value is less than 10, which means the model is free from multicollinearity. Heteroscedasticity Test in the estimation results of the heteroscedasticity test, the Obs R-squared probability value has a value of 0.3492 > 0.05, so it can be interpreted that this model is free from heteroscedasticity. The autocorrelation test on this estimate obtained a chi square probability value of 0.3891 > 0.05, which means the model is free from autocorrelation. From the classical assumption test above, the estimation model can be tested further as below.

Table 2 : Data statistics and tnterpretation

Dependent Variable: Y
Method: Least Squares
Date: 10/28/23 Time: 08:05
Sample: 2000 2022
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	67.09482	1.058822	63.36740	0.0000
LOG(X1)	-0.056225	0.157340	-0.357348	0.7252
X2	0.029829	0.004809	6.202116	0.0000
X3	0.006161	0.001926	3.199456	0.0053
LOG(X4)	0.090385	0.055105	1.640244	0.1193
LOG(X5)	0.029832	0.042744	0.697913	0.4947

R-squared	0.960248	Mean dependent var	73.63783
Adjusted R-squared	0.948556	S.D. dependent var	1.055862
S.E. of regression	0.239483	Akaike info criterion	0.198789
Sum squared resid	0.974985	Schwarz criterion	0.495005
Log likelihood	3.713923	Hannan-Quinn criter.	0.273287
F-statistic	82.12990	Durbin-Watson stat	1.713603
Prob(F-statistic)	0.000000		

Based on the results of the model estimation in EViews, it is clear that variables Medical Personnel, Number of Outpatient Treatments and Number of Hospitalizations do not have a significant influence in the long term. Meanwhile, the number of hospitals has a significant effect on life expectancy, every increase of 1 hospital will increase life expectancy by 2.9%. then the number of community health centers has a significant effect, every increase of 1 community health center will increase life expectancy by 0.6%.
From the results of the data processing above, it shows that the value of Adj. R2 is 0.9485 (94.85%). This illustrates that the Medical Personnel, Number Of Hospitals, Number Of

Community Health Centers, Number Of Outpatient Treatments, Number Of Hospitalizations together is able to provide an explanation of the life expectancy rate of 94.85%. The other 5.15% is explained by other variables that are outside the model.

4. CONCLUSION AND RECOMMENDATIONS

Based on the analysis carried out, the conclusions of this research are the number of health workers, the number of outpatients and the number of inpatients do not have a significant long-term effect on life expectancy, this is because the large number of health workers if not balanced by quality facilities and infrastructure does not have a significant effect, this is also applies to the number of outpatients and inpatients, because low or inadequate quality in health services can reduce their positive impact on life expectancy. Under certain conditions the number of inpatient and outpatient care increases (for example a pandemic) and then the number of health facilities is inadequate, then life expectancy will decrease. Meanwhile, under normal conditions, the number of Health Workers is increasing, but if it is not accompanied by equal distribution, especially in remote areas, it will have no effect on life expectancy. The number of hospitals and the number of health centres have a significant effect on life expectancy because hospitals and community health centres have the task of preventing disease in the community (at community health centres) and treating disease with adequate facilities (at hospitals).

Apart from that, we also provide recommendations based on research results, it is necessary to increase the number and quality of hospitals and health centers in DIY Province, so that a clear strategic plan needs to be prepared to improve the quality of health services and facilities. In terms of health budget management, it is best to maximize the health budget towards the costs of socializing disease prevention in the community, because prevention can make a limited budget more effective than focusing on medical costs. For future research, it is recommended to use data with a longer range or use panel data (per district) to analyze the influence of different entities in each district.

REFERENCES

1. Komaruddin, Anwar. (1997). Basics of Working Capital Management. Jakarta: PT Rineka Cipta
2. Shafi, Antonio. Mohammed. (1998). Introduction to Government Science. Jakarta: Rineka Cipta Republic of Indonesia government regulation Number 47 of 2016 based on the Law of the Republic of Indonesia concerning Health No. 36 of 2014
3. Yogyakarta Special Region Health Service Work Plan 2022
4. Strategic Plan 2023-2025 Regional Government of Yogyakarta Special Region
5. Alwi, W., Sauddin, A., & Islamiah. M, N. (2023). Factors That Influence Life Expectancy in South Sulawesi Using Regression Analysis. Journal of Mathematics and Statistics and Their Applications, 11. https://doi.org/https://doi.org/10.24252/msa.v11i1.32266
6. Ginting, AL (2020). The Impact of Life Expectancy and Job Opportunities on Poverty. EcceS (Economics,Social, and Development Studies), 7(1), 42. https://doi.org/10.24252/ecc.v7i1.13197
7. Kristanto, E., Daerobi, A., & Samudro, BR (2019). Indonesian Life Expectancy: Role of Health Infrastructure and Socio-Economic Status. Journal of Economic Sciences, 8(2), 159–178. https://doi.org/10.15408/sjie.v8i2.9579

8. Olva Resa, E., & Aprirachman, R. (2023). Analysis of Factors Influencing Life Expectancy of West Nusa Tenggara Province Analysis of Factors Influencing Life Expectation of West Nusa Tenggara Province.
9. Pratiwi, F., & Budyanra. (2019). ANALYSIS OF DETERMINANTS OF LIFE EXPECTANCY IN MALUKU PROVINCE 2015-2017. National Seminar on Official Statistics, 2019 no 1 (Development of Official Statistics in supporting SDG's Implementation), 602–607. https://doi.org/https://doi.org/10.34123/semnasoffstat.v2019i1.25
10. Putri, A. (2015). TECHNICAL EFFICIENCY OF WEST JAVA PROVINCE HEALTH SECTOR SPENDING BUDGET (Vol. 4, Issue 2). https://doi.org/http://dx.doi.org/10.15408/sjie.v4i2.2302
11. Suryandari, A. N. (2018). The Influence of Economic Growth, Education, and Health on Poverty Levels in DIY Province in 2004-2014. Journal Of Education and Economics, 7(1), 33-41
12. Damodar N. Gujarati, D. C. P. (2013). BASIC ECONOMETRICS. In Introductory Econometrics: A Practical Approach.
13. Law of the Republic of Indonesia Number 36 of 2009 Concerning Health.
14. Regulation of the Minister of Health of the Republic of Indonesia Number 75 of 2014 Concerning Community Health Centres.
15. Regulation of the Minister of Health of the Republic of Indonesia Number 43 of 2019 Concerning Community Health Centres.
16. Yogyakarta in Figures: 2000-2023.