Covid-19 Case: Does Indonesian Need Health Endowment Fund?[1]

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Abstract

This paper examines whether Indonesia needs a Health Endowment Fund (HEF) to find the efficiency and effectiveness of the health cover fund. Since 2014, Indonesia has officially implemented the National Health Insurance (NHI or Jaminan Kesehatan Nasional/JKN) according to Law No.40/2004. The implementation of NHI is technically managed by Health Social Insurance Administration Organization (HSIAO), also known as *Badan Penyelenggara Jaminan Sosial* (BPJS) *Kesehatan*. Since 2014, the trend of people living with non-communicable diseases (NCDs) has increased between 2007 and 2014. This trend may lead to future consequences of potential financial deficits for HSIAO. Furthermore, many countries, including Indonesia, have been facing fiscal shock due to recessions from the COVID-19 pandemic and increasing deficits from health insurance claims. By employing secondary data IFLS4, IFLS5, and BRIN survey data in 2020, this study investigates the effect of NCDs on household expenditures to assess the need for HEF in Indonesia. Using regression analysis, the result showed that NCD was associated with household's per capita expenditure and access to health care. Moreover, NCDs harm subjective health status. Therefore, HEF may be a long-term solution for the financial burden that HSIAO may face mitigating fiscal shock for the government budget.

Keywords: health endowment fund, non-communicable diseases, national health insurance

JEL Classification: I13, I15, I18

INTRODUCTION

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The improving economy has led Indonesia to make significant progress in providing health services and access, as indicated by the increasing life expectancy between 1990 and 2016 from 63.6 years to 71.7 years (Kosen et al., 2018). Improvements in health infrastructure also significantly reduce the burden of infectious diseases, previously the number one killer in Indonesia, such as tuberculosis and diarrhoea. However, the challenges for the burden of disease have moved to non-communicable diseases (NCD) caused by, among others, dietary patterns, lifestyle, and smoking habits (Mboi et al., 2018) understanding patterns of morbidity and mortality is important to allocate resources and address inequality. The Global Burden of Disease 2016 study (GBD 2016. Moreover, NCD comprised six of the leading ten causes of Disability-Adjusted Life Years (DALYs) in 2016, compared with three in 1990. Currently, the most prevalent NCDs in Indonesia are cardiovascular disease and diabetes. Ischemic heart disease (IHD) became the leading cause in 2006 and remained in 2016. DALYs from cerebrovascular disease also increased substantially, rising from the eighth leading cause in 1990 to the second in 2016. From 1990 to 2016, total NCD deaths increased by 82%, from 617,903 to 1,127,544 deaths (Institute for Health Metrics and Evaluation, 2019; Mboi et al., 2018; Setyonaluri & Aninditya, 2019)understanding patterns of morbidity and mortality is important to allocate resources and address inequality. The Global Burden of Disease 2016 study (GBD 2016.

The changes have implications for the urgency of the health system, which must be able

to respond to changing needs for health services and financial barriers through the National Health Insurance (NHI) program. The increasing NCDs burden could have a significant health and economic impact. The expected economic output loss for Indonesia is USD4.47 trillion due to NCDs (cardiovascular disease [CVD], cancer, chronic obstructive pulmonary disease [COPD], diabetes, cancer, and mental health conditions) from 2012 through 2030 (Bloom et al., 2015). CVD accounts for 39.6% of the total loss of GDP and is followed by mental health conditions (21.9%) and respiratory diseases (18.4%). Cancer contributes to 15.7% of the total loss and diabetes accounts for the remaining 4.5%. Compared to India and China, the NCD burden in Indonesia is relatively more severe. As a result, Indonesia will suffer a total output loss (USD4.47 trillion), more significant than India, which was estimated to be USD4.32 trillion during 2012-2030. During the same period, the total loss of NCD-related increase in China was 3.57 times the GDP in 2012, while Indonesia's losses due to NCD-related were 5.10 times its GDP (Bloom et al., 2015).

At the individual level, NCDs significantly impact the economy through healthcare expenditure and reduction in income due to lower productivity. Measures of productivity impact in the available studies included DALYs, absenteeism, presentism, labour market (non-participation), change in hours worked, and medical/sickness leave. The outcomes were quantified using risks, proportions, odds, dollars, years, and days. Chaker et al. (2015) reviewed 126 quantitative studies on the impact of various NCDs on macroeconomic productivity, while Muka et al. (2015)stroke, type 2 diabetes mellitus, cancer (lung, colon, cervical and breast extended the studies by including randomized controlled trials (RCTs), systematic reviews, cohorts, case-control, cross-sectional, modelling, and ecological studies carried out in adults assessing the economic consequences of NCDs on healthcare spending and national income without language restriction for 153 studies. Jaspers et al. (2014)stroke, type 2 diabetes mellitus (DM reviewed the impact of NCDs on households and impoverishment, where NCDs impose a significant and growing global impact on households and impoverishment

in all continents and levels of income. This is due to expenditure on medication, transport, comorbidities, out-of-pocket (OOP) payments or other indirect costs; impoverishment, poverty line, and catastrophic spending; household or individual financial cost that requires coping strategies and the inclusion of marginalized and vulnerable people who do not seek health care due to financial barriers.

Since 2014, Indonesia has officially implemented National Health Insurance (NHI or Jaminan Kesehatan Nasional/JKN) according to Law No.40/2004 (Law No.40/2004, 2004). However, the implementation of NHI is technically managed by the Health Social Insurance Administration Organization (HSIAO), also known as *Badan Penyelenggara Jaminan Sosial* (BPJS) *Kesehatan*, which is mandated by Law No.24/2011 (Law No.24/2011, 2011). Unfortunately, since it was launched, BPJS-Kesehatan, as the HSIAO, has faced a budget deficit (of up to IDR9 trillion) due to a mismatch between mandatory premiums and the amount claimed by members. As a response, the Government of Indonesia (GoI) injected into HSIAO for IDR.5 trillion, which made HSIAO's financial deficit becoming IDR 6 trillion in 2016 (Hartomo, 2020). In 2017, the HSIAO budget deficit rose to IDR16.5 trillion, and the deficit is predicted to rise in 2024 by IDR77.9 trillion if there is no mandatory premium adjustment for each group member (Sukmana, 2019).

During the Coronavirus Disease (COVID-19) pandemic, the burden for both groups of HSIAO, the member of HSIAO class one and two, increased due to the membership insurance price being hiked. Meanwhile, member class three will get less burden than other classes through an in-kind subsidy from IDR16,500 in 2020 to become IDR7,000 per month per person by 2021 from the GoI (Handoyo, 2020c; Pernando, 2020). On the other hand, the impact of the policy for HSIAO successfully reduced the financial deficits and created a financial surplus by the end of 2020 by IDR2.56 trillion (Bisnis. com, 2020). Likely, a blessing in disguise for the HSIAO, the COVID-19 pandemic situation leads to underutilization of health centres (primary,

secondary, or tertiary), especially among those who usually utilize the health centre for certain diseases or conditions (i.e. high cholesterol, diabetes, or cancers) are at risk of contracting COVID-19 from visits to the health centres (Handoyo, 2021; Pratama, 2020). As the health centre focuses on handling COVID-19 patients, the claims of HSIAO significantly dropped during the pandemic. On the other hand, however, the GoI covers all the bills for COVID-19 patients, at the same time the mandatory fee for membership in HSIAO was raised by the government policy. These two factors enabled the HSIAO to get a financial surplus (Handoyo, 2020a, 2020c; Pernando, 2020)

Although HSIAO currently gets a financial surplus during a pandemic, it may no longer be the case after the GoI has lifted social restrictions – an indicator of the end of the pandemic status. If this is the case, then the utilization of HSIAO may increase as people may no longer be afraid of coming to the health centres. Consequently, increasing the claims to the HSIAO as such. The objectives of this study are twofold. First, this study aims to investigate the opportunities for endowment funds amid the dynamics and challenges in the health sector. Although the HEF has potential, the need for such an institution requires a depth analysis of the demand side of the health sector, especially at the household level. Second, this study aims to provide evidence on how NCDs influence the economy and welfare so that future needs can be projected.

LITERATURE REVIEW

HSIAO's surplus of IDR18.7 trillion during the pandemic was a natural consequence of the plummeted number of patients who accessed health care because they were concerned about the higher risk of infection. At the same time, since 2020, according to the Minister of Health Decree No.104/2020, the GoI bears all treatments for COVID-19 infections classified as emerging infectious diseases that are not covered by HSIAO and implied significantly reduced costs or claims. Second, the government, by President Regulation No.64/2020, has raised the mandatory fee for the members of HSIAO to each of group members

from classes one, two, and three. However, class three members get an in-kind subsidy in 2020 and 2021 (Handoyo, 2020a; Pernando, 2020). Even though HSIAO gets a financial surplus during a pandemic, it may not happen when the government lifted mobility restrictions (PSBB) when the pandemic status ended. Since then, the utilization of HSIAO may be increasing as a normal situation, and people may not be afraid to come to health care services. Therefore, it may implicate shock for HSIAO financial with increased health claim. Thus, this will not be an option for the long term even though the short-term work well. Then, the government should find another strategy to solve the financial deficits faced by HSIAO in the expected condition (without the pandemic COVID-19). One strategy that may help to solve the deficit problem in the long term is the health endowment fund (HEF).

The endowment fund has been implemented in developed countries in various sectors. South Korea and France, for example, have proven successful in accelerating the film industry development in their country. The rapid progress of the film industry in South Korea is inseparable from the role of film funding through the grant scheme established by KOFIC, a film agency in South Korea that, since July 2007, has established an endowment fund as a step to support and encourage the development of the film industry. Similarly, the national film institute in France, the *Centre National du Cinema e de l'image Animée* (CNC), has considerable authority over the film industry. For example, this institution has the authority to manage taxes from the film industry, so that film taxes in France are not paid to the Ministry of Finance but directly to the CNC (Sambodo et al., 2019).

Indonesia is adopting the funds for many sectors, for instance, the Educational Fund Management Institution (Lembaga Pengelola Dana Pendidikan – LPDP) with the mandate to ensure continuity of education establishment inter-generation (intergenerational-equity) (Fahdiansyah et al., 2018). The LPDP-managed funds are sourced from the State Revenue and Expenditure Budget (APBN) until 2019, reaching IDR51.12 trillion (LPDP, 2019). As mandated

by law, only income from investments in managed funds can be used by LPDP to finance its programs, including scholarships. Creative industries attempted to develop similar schemes as sources of perpetual financing recommendations regarding "endowment funds" are motivated by ecosystems, infrastructure, and funding in the film sub-sector, which is still less competitive (Sambodo et al., 2019).

RESEARCH METHOD

Data

This research used data from the fourth and fifth waves of the Indonesian Family Life Survey (IFLS; henceforth IFLS4 and IFLS5) conducted by the RAND Corporation (Strauss et al., 2016). In addition, this research also employed data from a survey conducted by the National Research and Innovation Agency (Badan Riset dan Inovasi Nasional – henceforth BRIN; formerly known as the Indonesian Institute of Sciences [LIPI]) in October 2020 during the COVID-19 pandemic. The IFLS data was used to represent the "pre-pandemic situation". In contrast, the BRIN survey data was used to represent the "during pandemic situation" and as a comparison to the former.

Sample

The original sample was selected from IFLS waves 4 and 5 for individuals above 15 years old and completed the response on whether they had chronic conditions due to specific diseases. The data was gathered from 27,259 individuals from 38,490 households. Meanwhile, the BRIN survey was aimed at individuals who represented a household. Out of 858 individuals were either pregnant or had some non-communicable disease out of 1,955 respondents. Respondents in BRIN surveys were individuals who represented her/himself as well as other members of the households. Thus, for some of the variable of interest that was questioned at the individual level, the average values based on the number of households member were applied.

Statistical model

This research used quantitative analysis to address the research questions by fitting data to several econometric models (pooled data, panel data, and cross-section data). This study applied estimations of (1) pooled regression and (2) balanced panel regression from IFLS data. Moreover, as the BRIN survey data in 2020 was collected only once, the analysis of this data was done cross-sectionally.

To assess the link between NCDs and per capita expenditure, medical expenditure, and subjective health status, controlling for Individual, family, and regional characteristic, thus the models are as follow:

IFLS estimations:

$$Y_{it} = \beta_0 + \beta_1 ncd_{it} + \sum_{m=10}^{p} \beta_m X_{it} + a_i + u_t \qquad (1)$$

$$Z_{it} = \delta_0 + \delta_1 ncd_{it} + \sum_{m=9}^{p} \delta_m X_{it} + a_i + u_t \qquad (2)$$

$$V_i = \theta_0 + \theta_1 ncd_i + \sum_{m=7}^{p} \theta_m \varphi_i + a_i \qquad (3)$$

Where:

Y_{it} = log per capita expenditure; log medical expenditure

Z_{it} = subjective health status

V_i = household expenditure

ncd_{it} = dummy variable on non-communicable disease

X_i = individual and family characteristics

β_i = regression coefficient for log per capita and medical expenditures

δ_i = regression coefficient for subjective health status

θ_i = regression coefficient for household expenditure

p = number of control variables included in the model

In this model, β_1, δ_1, and θ_1 were the main effects of NCD on per capita expenditure, health expenditure, health status, household expenditure, holding constant individual, and family characteristics (X_{it} and $_{Ji}$).

Variables

Dependent variables

Monthly per capita expenditure (PCE) was calculated as total monthly household expenses divided by the number of household members. Household expenditure was an aggregation of expenditures for food, non-food, goods and services for household utilities, education costs, and housing. Household expenditure in IFLS has been described in detail by Witoelar et al., (2009)since 1993. We use the Indonesia Family Life Survey (IFLS. We defined the monthly PCE in absolute terms and convert it into a log. Likewise, medical expenditure was OOP expenditure measured as the number of household expenses paid to obtain health care during the previous year. Medical expenditure includes hospitalization costs, clinic fees, doctor fees, traditional medicine fees, and medicines. To remove the effect of inflation, we adjusted the value of annual expenditure using the Consumer Price Index (CPI) to 2007 values. We set the unit of analysis at the individual level by dividing this health expenditure by the household size. Subjective health status was a self-reported measure of general health status divided into four categories unhealthy (1) to very healthy (4). In addition, in the BRIN survey, the variable value of household expenses was an 8-categorical variable from a minor expenditure of less than IDR1 million (1) to above IDR15 million (8).

Main-right side endogenous variables

IFLS asked for chronic illness consisting of 14 types, from physical to mental and memory-related illnesses. In this study, we excluded infectious diseases caused by germs/bacteria, such as tuberculosis and other lung conditions, leaving 12 types. We constructed a binary variable for NCD and assigned a value of one (1) if the individual has at least one (1) of the eight non-communicable diseases and a value of zero (0) if otherwise.

The control variable used in equation (1, Table 7) consisted of ten individual factors, household, and region. Individual factors included age, gender, and marital status, a 5-categorical variable in which one (1) for not married and (2-5) is to be currently married or ever married. The educational variable was the length of schooling from 0 years for those who have never attended school to a maximum of 22 years for those who complete up to doctoral level education. Employment status is a binary variable for those who have worked (1) and not worked (0) in the past week; subjective health status; dummy from insurance ownership either from a government program; independent, or from the workplace; expenditure on alcohol and tobacco food types indicating individual habits and consumption patterns. The household size represents the household variable, and the region variable is the binary variable of the village/city where the city (1) and the village (0).

For equation (2, Table 8), the control variables used are the same as equation (1), except that they excluded the health status variable to be the dependent variable. In equation (3, Table), as data sourced was the BRIN survey, which differed naturally from IFLS data and was estimated at the household level. The confounding variables used in equation (3, Table 9) include the household food security index, the 6-category education variable, the employment status binary variable, the binary variable of receiving social assistance (either from the government or non-government), and the consumption strategy. The food security index was modified by the United States Department of Agriculture (Bickel et al., 2000) et al., 1997. It consisted of 4 categories from food insecure with severe hunger (1), food insecure with moderate hunger (2), food insecure without hunger (3), and food secure (4). Consumption strategies were summed up from the various consumption strategies taken by the households during the pandemic, ranging from 0-10, such as withdrawing saving to meet daily needs, owing some money to neighbours and relatives, selling liquid assets and so on.

RESULTS AND DISCUSSION

Table 1 shows descriptive statistics for data sourced from IFLS. The average per capita expenditure in each household is less than IDR950,000, with expenses on medicine only about 3% of total expenses. The average health status was somewhat healthy; only about 35% of the samples were at risk of NCDs. The average

age of the sample was 42 years, where women comprised 55% of the entire sample. Most are married and working in the formal sector (66%). The average length of schooling is around eight years, or they have a lower middle school (SMP) education.

Meanwhile, the BRIN survey shows that at the household level, from a sample of 1,495 households, the average expenditure slightly differs between before and during the pandemic, in the range of IDR3 million-7.5 million (Table 2). Household members with NCD only happened for about 30% of households. Based on its characteristics, most of the sample lived in urban areas (77%), worked (76%) and with a relatively well-educated head of household that was an average university graduate. This is also in line with the small portion of the sample that received social assistance (25%); thus, their food security status was relatively secure.

NCDs in Indonesia

According to the results, NCD positively impacted PCE and medical per capita expenditure. However, NCD hurt health status. Thus, NCD affected people who live with NCD spending more of their money on medical care compared to people who do not live with NCD. Table 3 shows the respondents classified by age range who live with and without NCD from both datasets (IFLS 4 & 5). The data shows that respondents with NCD in IFLS 5 tend to increase compared to respondents in IFLS 4. The age range from 40 to 60 shows that in each category, the number of respondents who live with NCD doubled in 2014 (IFLS 5) instead of 2007 (IFLS 4). This condition confirms that NCD should be a concern

Table 1. Individual characteristics by outcomes and confounders

Variables	Definitions	N	mean	Std. dev
NCD	=1 if the person has been diagnosed with at least one chronic disease categorized as NCD	27,259	0.356	0.479
Age	#	38,490	41.618	14.782
Sex	=1 if male	38,490	0.455	0.498
Marital status	=1 if married or ever married	38,490	2.155	0.915
Years of education	years	38,423	7.812	4.569
Jobs status	=1 if employed	36,314	0.66	0.474
Insurance	=1 if insured	38,490	0.385	0.487
Alcohol and tobacco expenditure	IDR	38,249	161,909	244,369
Rural/Urban	=1 if urban	38,490	0.543	0.498
Household size	#	38,456	4.234	1.827
Per capita expenditure	IDR (monthly)	38,102	948,701	17,200,000
Medical expenditure	IDR (monthly)	38,405	32,132	175,505
Health status	1 = unhealthy	38,488	2.937	0.6
	2 = somewhat unhealthy			
	3 = somewhat healthy			
	4 = very healthy			

Source: Authors' calculation of data from Strauss et al. (2008, 2016)

Table 2. Household's characteristics by outcomes and confounders

		n	mean	Std. dev
Household expenditure before the pandemic (monthly)	1 = < IDR 1 million	1495	4.462	1.771
	2 = IDR1-1.8 million			
	3 = IDR1.81-3 million			
	4 = IDR3.1-4.8 million			
	5 = IDR4.81-7.2 million			
	6 = IDR7.21-10 million			
	7 = IDR10.1-15 million			
	8 = > IDR 15 million			
Household's expenditure March-May 2020 (monthly)	1 = < IDR 1 million	1495	4.345	1.812
	2 = IDR1-1.8 million			
	3 = IDR1.81-3 million			
	4 = IDR3.1-4.8 million			
	5 = IDR4.81-7.2 million			
	6 = IDR7.21-10 million			
	7 = IDR10.1-15 million			
	8 = > IDR 15 million			
Household's expenditure June-Sept 2020 (monthly)	1 = < IDR 1 million	1495	4.379	1.815
	2 = IDR1-1.8 million			
	3 = IDR1.81-3 million			
	4 = IDR3.1-4.8 million			
	5 = IDR4.81-7.2 million			
	6 = IDR7.21-10 million			
	7 = IDR10.1-15 million			
	8 = > IDR 15 million			
NCD	=1 if one of the household's members has at least one of the following diseases: heart, coronary, lung disease, types, intestinal problem, high blood pressure, stroke, allergic, or covid-19	1495	0.342	0.474
Food security index	1 = deficient food security	1495	3.49	0.77
	2 = low food security			
	3 = marginal food security, and			
	4 = high food security			
Rural/Urban	=1 if urban	1495	0.772	0.42

		n	mean	Std. dev
Level of education	1=Elementary School	1495	4.888	1.016
	2=Junior High School			
	3=Senior High School			
	4=College (Diploma 1, 2, 3)			
	5=University (Diploma 4/ Bachelor)			
	6=University (Postgraduate)			
Marital status	1= Married	1,490	1.245	0.505
	2= Never Married			
	3= Divorced/Widower			
Household size	#	1479	4.117	1.545
Job formality	=1 if employed	1495	0.761	0.427
Banos recipient	=1 if received assistance from the government or community	1495	0.252	0.434
Strategy for food consumption	Strategies to overcome difficulties in meeting food consumption (1-12 items)	1495	1.547	1.391

Source: Authors' calculation of data from BRIN (2020)

in the future because, in seven years, the number of people who live with NCD has doubled.

Table 3. Age Range and NCD Status

	2007		2014	
Age range	Without NCD	With NCD	Without NCD	With NCD
11-19	0	0	2	0
20-29	0	1	1,923	636
30-39	0	0	3,790	1,530
40-49	2,902	966	2,922	1,720
50-59	1,501	873	1,835	1,612
60 up	1,089	682	1,591	1,684
Total	5,492	2,522	12,063	7,182

Source: Authors' calculation of data from Strauss et al. (2008, 2016)

Table 4 shows the level of expenditure, which represents economic status, comparing respondents who live with and without NCD. It is generally seen that NCD increase is in line with the increase in economic status both in 2007 and 2014. The proportion of individuals with NCD is about the same as those without NCD in the wealthiest 20% group. The number and percentage of individuals with NCD also nearly tripled between 2007 and 2014. This is likely because the data needed to be better recorded due to poor access to health care (underestimated) or the lifestyle and diet of the middle and upper groups having a higher probability of having overnutrition as a risk factor for NCD instead of undernutrition.

Table 4. Level of Per Capita Expenditure and NCD Status, years 2007 and 2014 (%)

Per-capita Expenditure	2007		2014	
	Without NCD (%)	With NCD(%)	Without NCD(%)	With NCD(%)
Bottom 40%	72.08	27.92	69.60	30.40
Mid 40%	65.52	34.48	64.56	35.44
Top 20%	56.82	43.18	55.41	44.59
Total	68.66	31.34	62.70	37.30
N	5,392	2,461	12,046	7,165

Source: Authors' calculation of data from Strauss et al. (2008, 2016)

As discussed in the data section, NCD was constructed from 8 illnesses to be a binary variable; we then decomposed again by the number of diseases that happened to the Individual. Table

5 presents that each respondent may have more than one NCD, even though not all respondents live with NCD. It shows the same pattern that respondents who have per capita expenditure middle 40% and top 20% related to diagnosis with NCD, in addition, each respondent may have more than one NCD. This should interest policymakers because the trend of people who live with NCD increases from time to time. The implication for Indonesia, which already had universal health coverage under HSIAO, is financial deficits for the HSIAO. Then, it may lead to a fiscal burden because, according to Indonesian Law No.24/2011, the government could take a particular action to save HSIAO from a financial deficit (Law No.24/2011, 2011). Thus, the financial deficit faced by HSIAO could lead to a fiscal burden for the GoI.

NCD would be a potential problem for HSIAO because according to the Indonesian Law No.24/2011 and Government Regulation No.64, 2020, HSIAO would cover all kinds of treatment needed by each member of HSIAO (Law No.24/2011, 2011; President Regulation No. 64/2020, 2020; Presidential Regulation No.82/2018, 2018). However, HSIAO would cover all diseases to all members restricted under the terms of the Indonesian Case Base Group (Ina-CBGs) (Handoyo, 2020b; Minister of Health Regulation No.52/2016, 2016; Minister of Health Regulation No.76/2016, 2016). Then, Table 6 shows the data cost of treatment for each member where they live or stay. The table shows mostly members of HSIAO live in region one and the most members of HSIAO who live with NCD as well compared to other regions. Those regions are classified into four regions. Region

1 covers all provinces in Java Islands, namely Banten, DKI Jakarta, West Java, Central Java, D.I. Yogyakarta, and East Java. Then, region 2 covers West Sumatra, Riau, South Sumatera, Lampung, Bali, and West Nusa Tenggara. Region 3 covers Aceh, North Sumatera, Jambi, Bengkulu, Bangka Belitung Islands, Riau Islands, West Kalimantan, North Sulawesi, Central Sulawesi, South Sulawesi, South East Sulawesi, Gorontalo, and West Sulawesi. Region 4 involves Central Kalimantan, South Kalimantan, East Kalimantan, and North Kalimantan.

Table 6. Cost of Treatment by Region and NCD Status, years 2007 and 2014

Cost of Treatment by Region	2007		2014	
	Without NCD	With NCD	Without NCD	With NCD
Region 1	3,318	1,394	6,676	4,237
Region 2	1,325	676	3,366	1,693
Region 3	657	294	1,459	852
Region 4	192	158	562	400
Total	5,492	2,522	12,063	7,182

Source: Authors' calculation of data from Strauss et al. (2008, 2016)

According to data IFLS 5, the percentage of people diagnosed with NCD is 37.31%, however, the 2020 BRIN data survey shows the percentage of households with one or more members with NCD is 10.76% (Purwanto et al., 2020). It is mainly caused by the different nature of the data, in which the BRIN data was not weighted to represent the population. Moreover, the data was also skewed to those with formal jobs representing

Table 5. Level of Per Capita Expenditure and Number of NCDs in each Individual, years 2007 and 2014

Per Capita Expenditure	Number of NCD to each Respondent								
	0	1	2	3	4	5	6	7	8
Bottom 40%	6,106	1,799	534	129	32	5	3	0	0
Mid 40%	7,585	2,800	908	315	72	24	4	3	0
Top 20%	3,747	1,842	744	266	101	34	8	2	1
Total	17,438	6,441	2,186	710	205	63	15	5	1

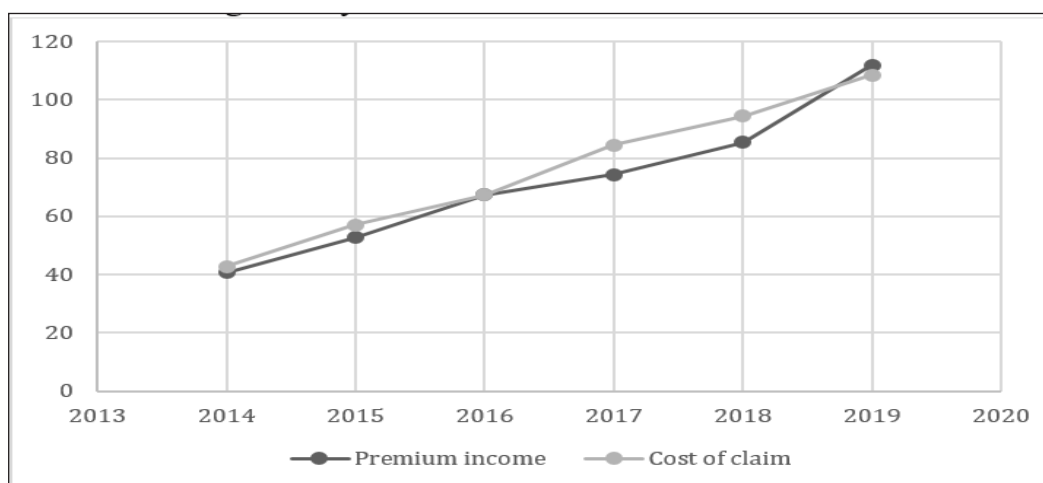Source: Authors' calculation of data from Strauss et al. (2008, 2016)

more middle class. The data from Institute for Health Metrics and Evaluation (IHME) shows that NCDs dominated the top ten causes of death in Indonesia in 2017 (Institute for Health Metrics and Evaluation, 2019). Those diseases, such as stroke, heart disease, and diabetes, are in the top three of the most NCD-causing death in 2017. The condition is matched with data from *Riset Kesehatan Dasar* (Riskesdas) 2018 that shows the prevalence of NCD increased compared to that from Riskesdas 2013. The NCD has included cancer, stroke, diabetes, hypertension, and kidney diseases. In addition, NCD cases significantly increase that would increase the burden for people and the government, then, HSIAO in 2017 recorded spent IDR 14.6 trillion (21.8% of total health cost IDR 71.3 trillion in a year) for 10.8 million members (5.7% of member HSIAO) were divided into some NCD such as heart diseases (spent IDR 7.4 trillion), kidney chronic (spent IDR 2.6 trillion), and others (spent IDR4.6trillion) (Direktorat Jenderal Pencegahan dan Pengendalian Penyakit, 2019).

Audited financial report from HSIAO (BPJS-Kesehatan) recorded the number of NCD cases (also known as catastrophic diseases) as follows, heart diseases (13.04 million cases; IDR10 trillion), cancer (2.4 million cases; IDR3.5 trillion), stroke (2.1 million cases; IDR2.5 trillion), kidney diseases (1.7 million cases; IDR2.3 trillion), thalassemia (224 thousand cases; IDR509 billion), haemophilia (70 thousand cases; IDR405 billion), leukaemia (134 thousand cases; IDR361 billion), cirrhosis hepatitis (183 thousand cases; IDR310 billion) (HSIAO (BPJS-Kesehatan), 2019). In total, NCD cases in 2019 recorded 19.99 million cases with a cost of IDR20.924 trillion. By the trend, we can see that NCD cases increase over time and get higher costs, which HSIAO should cover.

According to the audited financial report of HSIAO in 2019, for the first time since launched, the income from premiums was IDR 111.75 trillion, higher than the cost of a claim IDR108.46 trillion Figure 1). In 2020, HSIAO faced a surplus after the government of Indonesia increased the premium to each of its members, even though the policy faced many critics because it would increase the cost of living. On the other hand, many people may face financial burdens. Therefore, if we see the condition, HEF may be an alternative solution for the government to cover the cost of claims that potentially increase from time to time due to increasing number of NCD cases and other diseases which are also increasing. The proportion cost for NCD cases in 2019 reached 18.5% of the total cost; thus, it could increase in the future since the NCD cases gradually increase from time to time.

Effect of NCDs on Expenditure and Health Status

Source: HSIAO (BPJS-Kesehatan) (2019)

Figure 1. Trend Income and Cost of Claim HSIAO

Quality of life is inseparable from health. The existence of NDC is one of the factors that can reduce the quality of life. These implications also will affect household spending, medical expenditure, and individuals' decisions on healthcare. Table 7 depicts the influence of NCDs, socio-demography, and health status on

household and health expenditure. The regression results show that the growing prevalence of NCD has significant economic implications for household and healthcare budgets. In Indonesia, the NCD household was estimated to incur higher real-capita expenditure of 14.9% and 38.7% in medical expenditure. For instance, at 10% of

Table 7. Regression Results Based on Ordinary Least Squares (OLS) and Panel

VARIABLES	OLS		PANEL	
	PCE (log)	Medical expenditure (log)	PCE (log)	Medical expenditure (log)
Non Communicable Diseases (NCD)	0.149***	0.387***	0.0623***	0.179
	(0.00970)	(0.0437)	(0.0170)	(0.176)
Age	0.00197***	-0.0661***	0.0773***	0.00822
	(0.000421)	(0.0109)	(0.00173)	(0.0911)
Age squared		0.000638***		0.00106
		(0.000104)		(0.000830)
Sex	-0.0607***	-0.0434	-0.491	
	(0.00979)	(0.0447)	(0.411)	
Marital Status	0.0123**	-0.0126	0.00303	0.0415
	(0.00586)	(0.0260)	(0.0127)	(0.140)
Years of Education	0.0509***	0.0573***	-0.000380	0.0167
	(0.00116)	(0.00521)	(0.00617)	(0.0685)
Job-status of Respondents	0.0130	-0.0862*	0.0103	0.0675
	(0.0104)	(0.0495)	(0.0184)	(0.175)
Health Status	0.0163**	-0.140***	0.0223*	-0.327***
	(0.00690)	(0.0373)	(0.0117)	(0.118)
Insurance Status	0.0381***	0.0171	0.0109	0.402**
	(0.00885)	(0.0434)	(0.0164)	(0.174)
Alcohol and tobacco expenditure	0.257***	0.212***	0.195***	-0.0913
	(0.00433)	(0.0189)	(0.00833)	(0.0820)
Urban	0.0681***	-0.0574	0.0356	0.486*
	(0.00910)	(0.0420)	(0.0307)	(0.289)
Household Size	-0.144***	0.100***	-0.149***	0.216***
	(0.00256)	(0.0113)	(0.00514)	(0.0511)
Constant	10.58***	8.509***	8.520***	7.026***
	(0.0632)	(0.389)	(0.230)	(2.581)
Observations	17,948	6,542	17,948	6,542
R-squared	0.392	0.100	0.639	0.221
Number of id_pid			14,047	6,038

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation of data from Strauss et al. (2008, 2016)

the total household expenditure as the threshold, having two NCDs increases the health expenditure to 1.58 times compared with having no NCD, and this increased to 1.69 times for those with three NCDs or more (Marthias et al., 2021). The NCDs are more impactful in health status where it is associated negatively and statistically significant at 1%.

The rise of NCD has been driven by lifestyle alterations such as tobacco smoking, harmful use of alcohol, unhealthy diets, and physical inactivity. Tobacco use and alcohol consumption are important risk factors that cause NCD, like cardiovascular diseases, cancer, liver disease, and chronic respiratory disease, creating social problems in the family. The estimation result describes expenditure on alcohol and tobacco significantly increasing the percentage of household and medical expenses by 25% and 21.2%, respectively. Central Bureau Statistical of Indonesia mentioned that the total expenditure per capita to purchase cigarettes by Indonesian in one month was IDR258,300 or reached IDR 3,099,600 in one year (2015). Purchasing cigarettes wasthe third-highest spending per capita during 2014, after prepared foods and rice grains (Kosen et al., 2018). We also compared the relationship between an increase in alcohol and tobacco expenditure and observed that both spendings has significantly affected health status.

In the social and health aspect, the determinant level of education, age, and health status were factors to increase household and health expenditure. Compared to those with lower educational attainment, respondents with higher educational attainment were more likely to experience rising spending per capita, 5.09% and 5.73% on health. The respondents with higher education have significantly increased by 1.50% in health status. The same result is also found in another social determinant, namely the level of age. The number of vulnerable diseases in older age groups has increased, and most older adults usually have two or more NCDs. This implication causes household spending also increases slightly by 0.197%. However, after the maximum point of age, health expenses will decrease by 6.61%. The relationship between health status and healthcare

spending is statistically significant. Theoretically, interventions that improve physical and mental health status can significantly impact healthcare costs, where an increase in health status was linked to a reduction in expenditure on health by 14% (Goodman, 2015).

The panel data shows that the increase in the prevalence of NCD has significant economic implications for age, health status, alcohol and tobacco expenditure and household size. The regression results in Table 8 show that respondents affected by NCD have actual capital expenditures of 6.23% and 17.9% for health medical expenditures, and those who have NCDs have an effect of 94% have a disorder on their health status. The seriousness of a person's illness is a significant factor in increasing the chances of seeking health care (Gotsadze et al., 2005). Besides NCD, which affects health status, sex, years of education, job status, and insurance status also have a significant effect on health status.

According to Nugraheni & Hartono (2017), health status is related to catastrophic health spending. This catastrophic disease is a "high cost, and high risk" disease, and complications can be life-threatening (Cummins & Mahul, 2008)ranging from the growing concentration of population and assets in risky areas to increases in climate variability, the economic costs of major slow-onset disasters (e.g., drought. The regression results show that health status affects real per capita expenditure by 2.23% but negatively affects health expenditure by 32.7% when people experience NCD. This happens because some people have the behaviour of seeking medical insurance at health facilities. Insurance aims to protect a person from the costs incurred when using health services (Preker et al., 2013)political instability, and lack of good governance. Usually government taxation capacity is weak, formal mechanisms of social protection for vulnerable populations absent, and government oversight of the informal health sector lacking. In this context of extreme public sector failure, community involvement in financing health care provides a critical though insufficient first step in the long march toward improved access to health care by

Table 8. Regression Results Based on LOGIT and XTOLOGIT

VARIABLES	OLOGY	XTOLOGIT
	health_stat	health_stat
Non Communicable Diseases (NCD)	-0.877***	-0.940***
	(0.0346)	(0.0386)
Age	-0.00122	0.000957
	(0.00735)	(0.00824)
Age squared	-0.000161**	-0.000204**
	(7.47e-05)	(8.45e-05)
Sex	0.0922***	0.103**
	(0.0354)	(0.0399)
Marital Status	-0.0310	-0.0345
	(0.0198)	(0.0224)
Years of Education	0.0150***	0.0163***
	(0.00393)	(0.00446)
Job-status of Respondents	0.262***	0.289***
	(0.0384)	(0.0427)
Insurance Status	-0.0781**	-0.0946***
	(0.0318)	(0.0351)
Alcohol and tobacco expenditure	-0.0248*	-0.0256*
	(0.0139)	(0.0154)
Urban	-0.0154	-0.0164
	(0.0320)	(0.0360)
Household Size	-0.0170**	-0.0172*
	(0.00867)	(0.00970)
cut1	-5.312***	
	(0.260)	
Constant		-5.669***
		(0.292)
cut2	-2.190***	
	(0.251)	
Constant		-2.366***
		(0.281)
cut3	0.963***	
	(0.250)	
Constant		1.161***
		(0.280)
sigma2_u		
Constant		0.644***
		(0.0971)
Observations	17,981	17,981
Number of id_pid		14,060
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: Authors' calculation of data from Strauss et al. (2008, 2016)

the poor and social protection against the cost of illness. It should be regarded as a complement to — not as a substitute for — strong government involvement in health care financing and risk management related to the cost of illness. Based on an extensive survey of the literature, the main strengths of community financing schemes are the extent of outreach penetration achieved through community participation, their contribution to financial protection against illness, and increase in access to health care by low-income rural and informal sector workers. Their main weaknesses are the low volume of revenues that can be mobilized from poor communities, the frequent exclusion of the very poorest from participation in such schemes without some form of subsidy, the small size of the risk pool, the limited management capacity that exists in rural and low-income contexts, and their isolation from the more comprehensive benefits that are often available through more formal health financing mechanisms and provider networks. The authors conclude by proposing concrete public policy measures that governments can introduce to strengthen and improve the effectiveness of community involvement in health care financing. This includes: (a. The regression results also show that respondents with health insurance have 40.2% smaller health expenditures than respondents who do not have health insurance when exposed to NCD. On the other hand, insurance status does not affect 9.4% of health status. People with disease severity have higher medical expenses than those with low severity (Nugraheni & Hartono, 2017).

Based on the results of the regression of respondents who consume alcohol and tobacco effect, expenditure per capita is 19.5%. However, it does not affect medical spending on NCD

Table 9. Regression Results on Household Expenditure Using BRIN 2020

VARIABLES	(1) Before pandemic	(2) Mar-May 2020	(3) Jun-Sept 2020
NCD	0.003	-0.045	0.001
	(0.085)	(0.085)	(0.084)
Food security index	0.268***	0.353***	0.389***
	(0.059)	(0.058)	(0.058)
Rural/Urban	0.827***	0.752***	0.742***
	(0.098)	(0.098)	(0.097)
Education level	0.342***	0.312***	0.331***
	(0.045)	(0.045)	(0.045)
Household size	0.217***	0.217***	0.216***
	(0.026)	(0.026)	(0.026)
Job formality	0.371***	0.675***	0.681***
	(0.104)	(0.104)	(0.104)
Receive social program	-0.621***	-0.671***	-0.661***
	(0.097)	(0.096)	(0.096)
Strategies to meet food consumption	-0.136***	-0.147***	-0.143***
	(0.030)	(0.030)	(0.030)
Constant	0.409	0.012	-0.190
	(0.299)	(0.298)	(0.297)
Observations	1,479	1,479	1,479
R-squared	0.248	0.286	0.298

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Economic Research Center Survey, Author's Calculation (Purwanto et al., 2020)

by 9.1%. Meanwhile, tobacco use and alcohol consumption are important risk factors that cause NCDs, such as cardiovascular disease, cancer, liver disease, and chronic respiratory disease.

An online survey by BRIN conducted in September 2020 aimed to elaborate on households' responses to their food consumption behaviour during the COVID-19 pandemic. Of 1,400 respondents gathered, 24.6% (367) are people with NCD with up to five types of lung or cardiovascular diseases, diabetes, hypertension, stroke, and diseases of the digestive systems. The study recorded expenditures in three periods, before March 2020 or before a pandemic, March to May 2020 to represent an early time of the outbreaks, and June to September 2020 as adjusted time.

After controlling for socio-demographic variables consisting of age, the number of households member, sex, the beneficiary of social security, and regional characteristics, OLS shows that NCD has no effects on households' expenditures in all three periods. Unlike the results of IFLS, the survey provides contrasting figures mainly due to several reasons 1) limitations in online surveys to capture a representative sample of the population from various backgrounds; as a consequence, it could reach out to those with access to mobile phones only. 2) Online surveys, similar to phone surveys, limit people from recalling previous information and lead to overestimating information. 3) the ambiguity of information regarding the expenditure variables during the three periods of the pandemic between food expenditure and all expenses; therefore, there were no significant differences in medical expenses.

CONCLUSION AND RECOMMENDATION

Universal health coverage in Indonesia, which operates by HSIAO (*BPJS-Kesehatan*), implements mandatory Indonesian Law No.40/2004. The HSIAO was launched in 2014, ten years after the law was made in 2004. Ten years of preparation to develop the system of HSIAO may have required more because of the many problems faced by HSIAO since the

institution officially launched. When the HSIAO operated, one of the significant concerns was financial deficits from time to time, even though in 2020, for the first time, it had a financial surplus. However, this condition may not be permanent due to the COVID-19 pandemic. Therefore, many people would consider not visiting healthcare centres. Moreover, the number of members of HSIAO who live with NCD gradually increased from time to time. By exercising the data IFLS 4 & 5 and BRIN data survey, we found some results that could be concluded into several parts.

First, the trend for people who live with NCD increased in 2014 compared to 2007. The trend also increases in the age range of respondents. In addition, people who have higher expenditures also correlate people with NCD. The respondents with expenditures in the middle 40% and top 20% tend to have NCD compared to the respondents with expenditure bottom 40%. Moreover, the male respondents have fewer numbers living with NCD than female respondents. One of the surprises from the data, 3,185 respondents live with more than one type of NCD (complication), even though the respondents who live with one type of NCD dominated. We also found that people who live on Java Island dominate not only the number of people and density but also the number of people who live with NCD.

Second, using IFLS 4 & 5, NCD is statistically significant on per capita expenditure; however, NCD harms health status. Moreover, some independent variables are also statistically significant, such as age, sex, years of education, job status, insurance status, alcohol and tobacco expenditure, and household size on per capita expenditure, medical expenditure, and health status. However, using the BRIN data survey, NCD is not statistically significant on household expenditure, even though NCD negatively affects the food security index. Some independent variables such as age, region, household size, social protection, and sex are statistically significant.

Third, the trend of NCDs is increasing over time, bringing consequences to a potential financial deficit for HSIAO in the future. Thus, the HEF should be alternative financing for

HSIAO, which may face a financial deficit during normal conditions. On the other hand, NCD is not statistically significant using the BRIN data survey conducted during the COVID-19 pandemic. NCD is not significant because people with NCD would not come to the health care centres to avoid transmission of COVID-19. Therefore, people with NCD (also known as comorbid) may suffer more if COVID-19 infects them than people without NCD. That is also why HSIAO had a financial surplus in 2020; at the same time, the government raised the premium to each member's class, except class three got the in-kind subsidy. The increasing premium of each member's HSIAO could be a short-term solution because not all members of HSIAO can afford to pay the premium if there is an increase from time to time. Therefore, HEF would be a long-term solution for the financial burden that HSIAO may face. On the other hand, HEF can mitigate fiscal shock for the government budget because, according to the law, the government should take over the financial burden on HSIAO when it occur.

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