

Food Cost Analysis During Lockdown Based on Activity-Based Costing and Food Frequency Questionnaire Methods in Batununggal Village, Bandung City

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Abstract

The emergence of the debate about the level of effectiveness and efficiency of vaccination versus Lockdown policies currently attracts the attention of the authors. The author believes that the lockdown policy will be effective to be implemented in the future. This study was aimed to determine the type and amount of food needs of residents in Batununggal Village, Bandung Kidul District, Bandung City. And obtain a mathematical model to predict the cost of food security if the Lockdown policy scenario is implemented. Urban areas are used as subjects in this study due to the vulnerability of food availability in cities when a pandemic condition occurs where food supply from the supply area (rural) is disrupted. In this study, the author uses an exploratory method, activity-based costing, and a food frequency questionnaire which aims to obtain information about the number of basic food needs for 100 residents of Batununggal Village, Bandung City, as the research sample. The results of the study found that the cost of food per person is Rp. 219,848 per pax for 14 Days. With the following mathematical equation Food cost during 14 days lockdown = IDR 219,848 X, X = Person.

Keywords: *Food Cost, Lockdown, Activity-based costing, food frequency questionnaire*



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INTRODUCTION

COVID-19 (coronavirus disease 2019) is a disease that can cause pneumonia, acute respiratory syndrome, kidney failure, and even death. The number of sufferers and cases of death due to Coronavirus infection every day continues to increase significantly, so that this incident is called a pandemic. When this proposal was made, the number of positive cases in Indonesia had exceeded 385,980 cases (Sari, 2020).

Lockdown is one of the options to minimize the virus spread. Many studies related to lockdowns related to food security and health have been carried out, including awareness and attitudes towards food waste, food purchasing behavior, and household food expenditure estimates (Jribi et al., 2020), the impact of lockdowns on food security caused by the limited number of workers, transportation, farmer morale and agricultural coordination (Inegbedion, 2021), the impact of lockdown on eating behavior deviations (Ramalho et al., 2021), nutritional adequacy (Batlle-Bayer

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et al., 2020), physical and mental health (Röhr et al., 2020), (Shoesmith et al., 2021), (Gambin et al., 2021).

In general, there is controversy regarding the lockdown policy. On the one hand, lockdown is considered effective and efficient to minimize the spread of the virus and save the country's economy (Alvarez et al., 2020), (Sonuga-Barke, 2021), (Dutta & Husain, 2020), but on the other hand, lockdown is considered to have a negative impact on the supply chain and the country's economy (Joshi et al., 2020), (Dutta & Husain, 2020), (Allen, 2021). Based on the above, the author is interested in researching the impact of the lockdown if it is implemented in Indonesia, especially how much food costs must be incurred by the Indonesian government if the lockdown is implemented.

The Indonesian government has a different policy from the Chinese government, which has implemented a centralized lockdown policy and succeeded in reducing the number of its spread in Wuhan. For the Government of Indonesia, the centralized lockdown policy is predicted to require very high costs, can disrupt economic growth, and have many technical obstacles in the field. At present, both the central and regional governments have made various efforts to break the chain of the spread of Covid-19, starting from the formation of the Covid Task Force, PSBB, studies on mass vaccinations, there are even local governments that have implemented Lockdown policies, however, until now, The efforts mentioned above have not produced satisfactory results, on the other hand, the acceleration of resolving Covid-19 must be carried out by the government considering that the longer the time will be directly proportional to the costs incurred both for handling Covid-19 and costs for restoring the national economy.

The Indonesian government's efforts to break the Covid-19 chain have many challenges, including budget problems, the decline in people's income if the Covid-19 policy is actually implemented like in Wuhan, different regional government policies both in terms of method and timing of policy implementation, lack of compliance the community towards the regulations in their respective regions, the boredom of the community over the pandemic and the PSBB which has been running for almost ten months, as well as other challenges. This is very understandable considering that this pandemic came suddenly and beyond prediction. Based on the above, many parties, including the government, believe that the alternative mass vaccination policy is the most appropriate policy to be implemented at this time. Based on the latest data obtained by the author, the government increased the PEN funds (covid management) in July 2021 to IDR 744.75 Trillion from the previous IDR 699.43 Trillion, of which IDR 187.8 Trillion was allocated for social protection (bisnis.com, 2021) and it is estimated that will increase in line with the planned increase in covid data and the government's plan to extend the PPKM. Meanwhile, the estimated cost of the lockdown, according to the government, is estimated at IDR 18.7 trillion per day for 34 provinces in Indonesia (Kompas.com, 2021), so that the current PEN cost is sufficient to carry out a lockdown for 40 days ($744.75 \text{ T} : 18.7 \text{ T} = 39.7 \text{ days}$), where experts say that it is enough to do a 15-day lockdown so that the government can make savings on the 2021 State Budget.

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This study was aimed to determine the type and number of basic needs of residents in Batununggal Village, Bandung Kidul District, Bandung City. And obtain a mathematical model to predict the cost of food security if the Lockdown policy scenario is implemented. The emergence of the debate about the effectiveness and efficiency of vaccination versus lockdown policies currently attracts the attention of the authors. The author believes that the vaccination policy will be effective if it is followed by a lockdown policy in the future (as explained above), so it is very important to find a mathematical model for the cost of food security if a lockdown policy is taken in the future. Batununggal Village has very diverse social conditions, including diversity in income levels, education, age, population density, and others, so it is very suitable to be used as a subject representing urban areas (BPS Kota Bandung 2019). Urban areas are used as subjects in this study due to the vulnerability of food availability in cities when a pandemic condition occurs where food supply from the supply area (rural) is disrupted. It is hoped that the results of this study will become input for stakeholders in determining effective policies in breaking the chain of the spread of Covid-19.

The formulation of the problem in this study is how is the cost of family food during the lockdown based on the activity-based costing method and the food frequency questionnaire in Batununggal Village, Bandung City? As well as a simple mathematical model to determine the cost of family food costs during the lockdown period?

The purpose of this study was to determine the cost of family food during the lockdown based on the activity-based costing method and food frequency questionnaire in Batununggal Village, Bandung City? And get a simple mathematical model to determine the cost of family food costs during the lockdown in Batununggal Village?

LITERATURE REVIEW

Risk And Risk Management

Risk is an undesirable situation, and if it occurs, it will cause losses both in material and non-material forms (Supardi, 2019). Risk management is the application of management functions in handling risks, especially risks faced by organizations/companies, families, and communities. This includes activities in the form of planning, organizing, compiling, coordinating, and supervising (Djojosoedarso, 1999).

Covid-19

COVID-19 (coronavirus disease 2019) is a disease caused by a new type of coronavirus, namely Sars-CoV-2, which was first reported in Wuhan, China, on December 31, 2019. This COVID-19 can cause acute respiratory symptoms such as fever above 38 °C, coughing, and shortness of breath for humans. In addition, it can be accompanied by weakness, muscle aches, and diarrhea. In patients with severe COVID-19, it can cause pneumonia, acute respiratory syndrome, kidney failure, and even death. The number of sufferers and cases of death due to Coronavirus infection every day continues to increase significantly so that this incident is called a pandemic; when this proposal was made, the number of positive cases in Indonesia had exceeded 385,980 cases (Sari, 2020).

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Lockdown

According to Oxford University Press, the definition of a lockdown is an official order to control the movement of people or vehicles within an area due to a dangerous situation. Meanwhile, according to Lindsay Wiley, Lockdown is an effort to create a geographical quarantine, or also known as cordon sanitaire, which is to create a barrier and try to stop people from entering or leaving (from a certain area) with the exception of shipping goods or people to guard important needs. Based on the two definitions above, it can be concluded that lockdown is a security policy package against a threat, in this case, the spread of COVID-19. This policy must be complete with security guarantees for social needs such as food supply, health, education, and others even though they are being isolated. (Febrian & Santosa, 2020).

Food Security

According to the Food Law No. 7 of 1996, which was updated in the Law of the Republic of Indonesia Number 18 of 2012, food security is a condition of meeting food needs for households which are reflected in the availability of sufficient food, both in quantity and quality, safe, equitable and affordable. (UU RI Nomor 18 Tahun, 2012). Meanwhile, according to FAO, food security is a situation where all households have physical and economic access to food for all their family members, where households are not at risk of losing both accesses. To realize food security, it is necessary to strengthen the coordination and synchronization of related parties in planning, policy, development, and control. (Hanafie R., 2010)

Activity-Based Costing (ABC)

The activity-Based Costing method is a cost information system oriented to providing complete information about activities to enable policymakers to process activities. (Mulyadi, 2014). The provision of complete information in the ABC method covers all stages of activities, namely the planning stage, implementation stage, and logistic support stage. (Ahmad Dunia dan Wasilah, 2012). Based on the two definitions above, the ABC method is the most appropriate method to be used by the author in determining the type of activity in the household in full, which will then be used as the basis for calculating the cost of food security that occurs in the household during the lockdown.

Food Frequency Questionnaire (FFQ)

The Food Frequency Questionnaire (FFQ) is a questionnaire that provides an overview of the consumption of energy and other nutrients in the form of a person's consumption frequency. These frequencies include daily, weekly, monthly, and yearly, which are then converted into consumption per day. FFQ provides an overview of individual eating patterns or habits of nutrients. Food ingredients and foods listed in the FFQ can be made according to the needs of researchers and research facilities (Umi, 2007). In this study, the authors use the Simple or Non-Quantitative FFQ, considering the data needed is a list of data along with the amount of food that is generally consumed by one family on a regular basis with daily, weekly, monthly, and yearly frequencies without involving nutrition, portions, and others.

METHODOLOGY

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The above problems will be solved by several methods, namely exploratory methods, analytical descriptive, Activity Based Costing (ABC), and Food Frequency Ratio (FFQ). The exploratory method is a research method that aims to dig up information (Arikunto, 2011), where this study aims to dig up information about the number of basic food needs of families in Batununggal village, Bandung.

Analytical descriptive is a method that is characterized by focusing on solving problems that exist in the present or actual with the data collected and then explained and analyzed. (Sedarmayanti, 2011)

The analysis in this study also uses the ABC and FFQ methods, where the ABC method will be used in determining the type of activity in the household completely and then will be used as the basis for calculating the cost of food security that occurs in households during a lockdown. Meanwhile, the FFQ will be used during data collection using a questionnaire. The results of the FFQ will then be analyzed using a simple statistical method to make an expenditure cluster for each household, then the feasibility of each cluster will be analyzed using the ABC Return method to recalculate the feasibility of the data that has been collected.

The final result of this research is to obtain a model in the form of a mathematical equation to predict the cost of family food security during the lockdown period.

The total population based on 2018 data is 56,151 people (BPS 2019). While the sample used in this study is calculated using the Slovin formula with an error rate of 10%, which is equal to:

$$n = N / \{1 + N (e)^2 \}$$

$$n = 56.151 / \{1 + 56.151 (0.10)^2 \}$$

$$n = 99.82 \text{ atau } 100 \text{ People}$$

The sampling technique in this study used the Cluster Random Sampling Technique, where the sample was determined based on the domicile group or region of the members of the research population.

Data collection techniques in this study are observation, interviews, questionnaires, FGD, and triangulation, namely data collection techniques that combine data from various collection techniques and existing data sources.

In this research, the data collection method required is through:

- a. The Preliminary Survey is preceded by
 - a.1. Literature Study on family expenses.
 - a.2. Creating a family cluster that will be used as a target sample includes families with prosperous, simple, and pre-prosperous economic levels.
 - a.3. Conduct initial interviews with targeted families to determine the type and amount of daily, weekly, monthly, and yearly expenses.
 - a.4. FGD with a team of lecturers to determine the distribution of clusters and the contents of the questionnaire.
- b. Questionnaire distribution.

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- c. Questionnaire results are processed quantitatively with the method of calculating the ratio of food adequacy for each family or person to determine the type of food need and the amount, then the average need for each person is calculated, and the rupiah value is determined using the ABC method so that an equation can be made for the above calculations.
- d. FGD with family representatives and a team of lecturers to minimize calculation differences that may occur as a result of inflation variables, shipping costs, and others that may occur.

FINDINGS AND DISCUSSION

This study was conducted to analyze the cost of family food during the lockdown based on the method of activity-based costing and food frequency questionnaire in Batununggal Village, Bandung City? So the author gets a simple mathematical equation model to determine the cost of family food costs during the lockdown in Batununggal Village. Family expenditure to be breakdown as follows:

- a. Average electricity expenditure per month.
- b. LPG gas purchases on average per month.
- c. Purchase of drinking water on average per month, if purchased.
- d. Purchase of clean water on average per month, if purchased.
- e. Purchase of rice on average per month.
- f. Average sugar purchases per month.
- g. Purchase of cooking oil on average per month.
- h. Expenditures for seasonings (onion, chili, pepper, salt, vetsin and others) are on average per month.
- i. Expenditure for purchasing eggs on average in one month.
- j. Expenditure for purchasing fish on average in one month.
- k. Expenditure for purchasing meat on average in one month.
- l. Expenditure for purchasing chickens on average in one month.
- m. Expenditure for purchasing vegetables on average in one month.
- n. Expenditure for purchasing tofu and tempeh is an average of one month.
- o. Expenditure for purchasing fruits on average in one month.
- p. Expenditures for purchasing bath soap, washing, washing floors, baygon and others are averaged in one month.
- q. Expenditures for the purchase of supplies of medicines (wood puti, betadine, etc.) on average in one month.

Based on data collection in the field, it was found that 114 were filled in by respondents and then 100 questionnaires were selected that represent the population, with a description of 100 respondents, 182 respondents' children, 72 respondents' spouses, and 52 other dependents in the respondent's house, so that the total population was 406. person. Which will be the current divisor. The average income of respondents is known to be around 3,670,200 per family/respondent and the average family expenditure for food needs is currently Rp. 1,912,678. Based on the FFQ method, the current demand for food is shown in the following Table 1 and Table 2. So that the food cost per person during the lockdown is Rp. 219,848 for 14 days. So if the current total population of Indonesia is 271,349,899 people x Rp. 219,848 obtained lockdown fee of Rp. 59,655,757,843,757 (59 Trillion) which is much cheaper than the costs incurred by the current government. Where the calculation above is still fairly high because the cost of lockdown in the area is likely to be smaller than the need in urban areas.

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The mathematical equation for estimating lock down is as follows:

$$\text{Food cost during 14 days lockdown} = \text{IDR } 219,848 X$$

$$X = \text{Person}$$

The above equation is very useful for predicting the inventory that must be provided by the government along with the logistics costs and logistics arrangements.

Tabel 1. Lockdown Cost Breakdown based on FFQ method

No	Description	Total Per Month (a)	divider (3+4+5+100) (b)	Per capita c = a / b	Per Day d = a / 30	Lockdown Cost e = d x 14
1	Montly Income	324.900.000	406	800.246	10.830.000	151.620.000
2	Spouse Monthly Income	367.200.000		904.433	12.240.000	171.360.000
3	Children	182				
4	Spouse	72				
5	Other	52				
6	Drinking water (Gallon)	638		2	21	298
7	Rice (Kgs)	1.819		4	61	849
8	Sugar (Kgs) :	213		1	7	100
9	Cooking Oil (ltr) :	425		1	14	198
10	eggs (Kg)	331		1	11	154
11	Fish (Kgs)	200		0	7	93
12	Beef (Kgs)	153		0	5	71
13	Chicken (Kgs)	322		1	11	150
14	Vegetables (kgs)	420		1	14	196
15	Clean water (Gallon)	601		1	20	280

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Tabel 2. Lockdown Cost Breakdown based on ABC method

No	Description	Total Per Month (a)	divider (3+4+5+100) (b)	Per capita c = a / b	Per Day d = a / 30	Lockdown Cost e = d x 14
1	Drinking water	7.623.500		18.777	254.117	3.557.633
2	Rice	20.490.000		50.468	683.000	9.562.000
3	Sugar	3.197.000		7.874	106.567	1.491.933
4	Cooking Oil	8.548.500		21.055	248.950	3.989.300
5	Eggs	7.443.000		18.333	248.100	3.473.400
6	Fish	6.200.150		15.271	206.672	2.893.403
7	Beef	13.511.000		33.278	450.367	6.305.133
8	Chicken	11.351.168		27.959	378.372	5.297.212
9	Fruits	11.939.280		29.407	397.976	5.571.664
10	Vegetables	14.083.000		34.687	469.433	6.572.067
11	Electricity	25.577.000		62.998	852.567	11.935.933
12	Clean Water	6.132.000		15.103	204.400	2.861.600
13	Bumbu (Rp)	8.845.250		21.786	294.842	4.127.783
14	Bath soap	20.443.000		50.352	681.433	9.540.067
15	Baby needs	9.366.000		23.069	312.200	4.370.800
16	Tahu Tempe	6.894.000		16.980	229.800	3.217.200
17	Gas	9.624.000		23.704	320.800	4.491.200
	Total Cost	191.267.848		471.103	6.375.595	89.258.329
	Total Income - Total Expenditure	175.932.152		433.330	5.864.405	82.101.671

Food Cost During Lockdown per person (IDR)	219.848
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CONCLUSION AND FUTURE RESEARCH

Based on the results of the study, the following conclusions can be drawn:

1. The cost of food per person during the lockdown based on the activity-based costing method and food frequency questionnaire in Batununggal Village, Bandung City is Rp. 219,848,-
2. A simple mathematical model to determine the cost of family food during the lockdown period in Batununggal Village is as follows:
Food cost during 14 days lockdown = IDR 219,848 X

The suggestions in this study are as follows: the government should adopt the lockdown method to stop the Covid-19 pandemic because the cost is much cheaper than the current method. The implementation should follow Germany, where the public is given cheques rather than purchasing their respective lockdown supplies. This is to minimize changes in the logistics pattern of food delivery.

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