Impact of COVID-19 outbreak on horticultural farming in Tanah Datar Regency of West Sumatra Province, Indonesia

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Abstract. The COVID-19 outbreak affects almost all sectors of farmers' life. The lockdown policy has resulted in limited movement of farmers in carrying out social and economic activities. This study aims to identify those difficulties for horticultural farmers' households during the COVID-19 outbreak and analyze its impact on household income. We had carried out an online household survey, for data collection by interviewing 86 horticulture farmers, who were randomly sampled in two horticulture production centers in Tanah Datar District. We found that almost 50% of farmers are having difficulty accessing agricultural inputs during the pandemic, such as seeds, fertilizers, and pesticides. This happened because of implementing a lockdown policy., which disrupts farmers' smooth access to farm inputs. However, although almost half of the farmers have difficulty accessing farm inputs, the regression results show that the COVID-19 outbreak does not significantly affect household income. Based on our research, 96.5% of farmers were still farming and 55.8% of them were still working in the fields as usual. The difficulty for horticultural farmer’s households during the Covid-19 outbreak was increasing household expenditure such as for communication, health, education, and social/religion. They have to use household savings to overcome.

Keywords: covid-19 outbreak, farming activities, horticulture farming

1. Introduction
West Sumatra experienced the shock of COVID-19 on March 26, 2020. It spread widely so that it experienced lockdown from April 22 to May 5, 2020. The COVID-19 outbreak had an impact on all aspects, include the farmer's household. The farmer household is in a position as a community that is threatened by COVID-19, on the one hand, so that it must limit its social contacts and as a provider of food production, on the other hand, which plays a significant role in strengthening the food security of the community as a whole in surviving and fighting against an outbreak of COVID-19 and other outbreaks that may occur in the future. Besides, the COVID-19 outbreak has also disrupted food crop agribusiness, such as providing input and marketing agricultural products. Thus it is hypothesized that the COVID-19 outbreak will hurt farmer households and farming systems.

On the other hand, BPS data states that during April-June 2020, the agricultural sector grew by 2.19% annually. The contribution of agriculture to Gross Domestic Product [GDP] of 15.46% was the second largest sector after the industrial sector [1].
There is a difference between the researchers' initial hypothesis and the data presented by BPS. So, research is needed to determine the impact of COVID-19 on farmers. This research was conducted in two sub-districts in Tanah Datar District, namely Batipuh and X Koto Districts. Batipuh District is a center for horticultural crops in Tanah Datar Regency. This study's specific purpose is to identify the difficulties faced by horticultural farmer households during the pandemic and the effect of the COVID-19 outbreak on farmers' income. It is crucial to know how farmer households deal with shocks that affect various aspects of farmer household life during a pandemic because farmers are food producers that affect many people's lives.

2. Materials and Methods
This study used a horticultural farmer household survey approach in one of the horticultural production centers in West Sumatra. The survey research method is research in which the primary data and information sources are obtained from respondents as research samples using a questionnaire or questionnaire as a research instrument.

The number of samples in this study was 86 sample farmers. Farmers' household samples were taken using a simple random sampling approach, where farmers were taken randomly and had the same opportunity to be sampled. According to Sugiyono [2], the simple random sampling technique is a random sampling of members of the population without paying attention to the population's strata. This method is done when members of the population are considered homogeneous.

Data were collected from July to August 2020. Surveying farmer households collected data. Interviews using a questionnaire arranged in such a way with the help of Google Form. The survey was conducted using a remote technique [online]. In each district, a researcher contact person is determined who will be the liaison between the researcher and the respondent. A contact person is a research assistant in each district. This research assistant has been given outreach and guidance in guiding farmers to fill out Google Forms.

The data required in this study consist of: 1] Data on farmer households' demographic characteristics [number of family members, education level, age, and sex]. 2] Data on farmer household livelihoods [types of farming commodities, farmer social life, farming activities, and farmer finances]. 3] Changes in livelihoods during the COVID-19 outbreak [since April-July 2020]. The data is the nominal average of all sample farmers, namely production, price, and farmer income. 4] The farmers' response in managing their farming during the COVID-19 outbreak is in the form of access to farm input.

The research objective was achieved by identifying which parts of the horticultural crop agribusiness system were disrupted in the on-farm sector and qualitative analysis of the tendency of respondent farmers' choices for each impact that was felt due to the COVID-19 outbreak, starting from access to farm inputs, production, prices, and farmers' income.

3. Result

3.1. Characteristics of Farmers
Table 1. Characteristics of farmers

| Information          | Number of people | Percentage |
|----------------------|------------------|------------|
| **Gender**           |                  |            |
| Male                 | 68               | 80         |
| Female               | 18               | 20         |
| **Age**              |                  |            |
| < 30 Years old       | 2                | 2          |
| 31 – 40 Years old    | 26               | 30         |
| 41 – 50 Years old    | 37               | 43         |
| 51 – 60 Years old    | 17               | 20         |
| > 60 Years old       | 0                | 0          |
| **Education**        |                  |            |
| No school            | 8                | 9          |
| Elementary School    | 22               | 26         |
| Junior High School   | 25               | 30         |
| Senior High School   | 29               | 34         |
| Diploma              | 1                | 1          |
| Bachelor             | 1                | 1          |
| **Number of Family Members** |      |            |
| 2-3                  | 8                | 9          |
| 4-5                  | 59               | 69         |
| 6-7                  | 17               | 20         |
| >7                   | 2                | 2          |
| Number of samples    | 86               |            |

In our study, most sample farmers were male with an age range of 41 - 50 years with high school education levels and the number of family members in the range of 4 - 5 people. Almost all sample farmers are of productive age and are not in the category that is vulnerable to the impact of covid-19. Quoting the results of Siagian's research [3], those who are vulnerable to the impact of COVID-19 are the elderly [over 65 years]. The education of the majority of sample farmers in middle school, where according to researchers, people who have a high school education level can receive information well and can determine attitudes and actions in response to the conditions of the COVID-19 outbreak as it is now.

3.2. Types of Farming Business Commodities
Fig 1. Type and Quantity of Vegetable in X Koto, Tanah Datar

The data above shows that the sample farmers are farmers who produce vegetables. Enormous vegetables produced are red chilies and green beans. Red chili is an essential commodity for the people of West Sumatra in carrying out food processing. Almost all dishes of the people of West Sumatra use red chilies. Other vegetable commodities produced by the sample farmers were green onions, shallots, cabbage, and cayenne pepper.

One of the research areas, namely X Koto, based on BPS Tanah Datar in Figures [1], is a center for vegetable production in Tanah Datar, such as shallots with a total production of 386.9 tons, leeks of 20,335.2 tons, 11,268 tons of red chilies and 638.4 tons of cabbage.

3.3. Knowledge of the Plague

In this study, we tested sample farmers’ knowledge about the COVID-19 outbreak, whether the sample farmers were aware of an outbreak, and the transmission mode. We also asked where did the sample farmers know about outbreak 19. This data is useful for obtaining information, whether the sample farmers knew or did not know the current outbreak conditions. The response we got was from the question “Do you know the current state of the COVID-19 outbreak and know how it is transmitted?”. The results showed that 83% of sample farmers knew about the current outbreak conditions and knew how it was transmitted, while 17% said they did not know. Based on this, we conclude that all activities carried out by farmers are based on the knowledge and risks they will experience. We also get data from a survey conducted that shows that television is the primary source of farmers [91%] in obtaining information about COVID-19. This indicates that the news sources obtained by farmers are valid.

3.4. Farming Activities and Work during the Outbreak
Table 2. Farming Activities and Work During The Outbreak

| No | Information                                      | Number of People | Percentage [%] |
|----|--------------------------------------------------|------------------|----------------|
| 1. | **Farming Activities**                           |                  |                |
|    | The frequency to the fields is fixed             | 36               | 42             |
|    | The frequency to the fields is slightly reduced  | 48               | 56             |
|    | Did not go to the fields at all                  | 2                | 2              |
| 2. | **Work during the Outbreak**                     |                  |                |
|    | Reducing farming activities and doing other jobs  | 3                | 4              |
|    | Keep farming                                     | 83               | 96             |

During the outbreak, nearly half of the sample farmers, namely 42%, still went to the same frequency fields as before the outbreak. This group is aware of the risk of outbreaks but decided not to reduce farming activities for various reasons, such as not wanting the risk of crop failure. Some other sample farmers, namely 56%, reduce their frequency to the fields slightly. However, the sample farmers’ main job is still farming [96%], not doing other businesses, because farming is their main livelihood, there is no desire to do other livelihoods.

These findings are similar to Fatihah et al. research finding. They found that in Grobogan District, there are two responses to farmer group, some are stating that Covid 19 affects farming activities and some do not affect their farming activities. It depends on their commodities, the age of farmers, and other income resources [4].

3.5. Financial Difficulties and How to Overcome Them

Almost all sample farmers experienced financial difficulties during the pandemic. We obtained data that 98% of sample farmers experienced financial difficulties based on the questions we asked, namely, "Did you experience financial difficulties during this outbreak compared to before the outbreak?". Only 2% of sample farmers do not experience financial difficulties. This certainly harms farmer households, resulting in farmers continuing to carry out activities in the fields as usual, even during a pandemic.

The next question, "What did you do to overcome these financial difficulties?". We allow each farmer to choose several answers, and the result we get is that using savings is the most option chosen by sample farmers [80 samples] and then making savings on household spending [64 samples].

3.6. Farmers Household Expenditure

Identifying the covid-19 outbreak's impact on farmer households was previously explained that the covid-19 outbreak caused financial difficulties for sample farmers. We also did it with the types of expenditure made by farmer households. We identified what types of household spending have increased since the time of the COVID-19 outbreak. The data we get is as follows:

| Type of Expenditure | Before Outbreak [Rp] | After Outbreak [Rp] |
|---------------------|----------------------|---------------------|
| Food                | 55.100.000           | 55.575.000          |
| Clothes             | 12.860.000           | 12.785.000          |
| Education           | 9.635.000            | 11.260.000          |
| Communication       | 5.140.000            | 7.355.000           |
| Health              | 4.135.000            | 6.010.000           |
| Social / Religious  | 2.258.000            | 3.560.000           |
| Saving              | 47.615.000           | 45.675.000          |
| Others              | 12.275.000           | 11.945.000          |
| Total               | 149.018.000          | 154.165.000         |
The data shows an increase in household expenditure of sample farmers, although only 3.5%. The increase in expenditure for education, communication, health, and social/religion. They said that they have to use households’ savings to overcome. There is no significant expenditure for the consumption of food. This means the consumption patterns of farmers are not different before and during an outbreak. It is different from the research result by Bidarti [5], during Covid 19, farmers in South Sumatera, there was a decrease in consumption of 34.6 USD, so that, they try to reduce their expenditure and survive by borrowing money from money lending institutions around them.

3.7. Access to Farming Inputs during Outbreak

Table 4. Access to Farming Inputs During Outbreak

| Access to Input   | Number of Sample Farmers [Person] |
|-------------------|----------------------------------|
|                   | Getting Harder | No Changes | Getting Easier |
| Seeds             | 39             | 47         | 0             |
| Chemical Fertilizers | 36           | 49         | 1             |
| Manure            | 36             | 49         | 1             |
| Pesticide         | 40             | 46         | 0             |
| Worker            | 29             | 57         | 0             |
| Farming tools     | 38             | 48         | 0             |
| Capital           | 28             | 58         | 0             |
| Counseling        | 22             | 64         | 0             |
| Agricultural Assistance | 20         | 66         | 0             |

Overall, for access to farm inputs, farmers answered that there was no change between before and during the outbreak. However, almost 50% of farmers stated that access to farm inputs was getting more difficult. The data states that 45.3% of farmers have difficulty accessing seeds, 41.9% of farmers have difficulty accessing chemical fertilizers, 46.5% of farmers have difficulty accessing pesticides, 33.7% of farmers have difficulty accessing labor, and 44.2% of farmers have difficulty accessing agricultural tools. This occurs because of the implementation of a lockdown policy, which disrupts farmers’ smooth access to farm inputs. The results of our study differ from research conducted by Boughton et al. [6]. In Myanmar, 44% of farmer samples harm supply. Input procurement in the form of fertilizers and pesticides takes longer because they are imported from other regions so that the input price increases. The negative impact of covid 19 on input was also experienced in China. Research results by D, Pan et al., find that access to seeds, fertilizers, pesticides, and other agricultural input is difficult to obtain. It is because of the pandemic that makes crop production materials are difficult to enter the village[7].

3.8. Farming Activities During an Outbreak
Table 5. Type of Farming Activities During Outbreak

| Type of activity          | Number of Sample Farmers [Person] |
|--------------------------|-----------------------------------|
|                          | getting easier | No changes | getting harder |
| Land Processing          | 56             | 30         |
| Irrigation               | 57             | 29         |
| Planting                 | 53             | 33         |
| Fertilization            | 53             | 34         |
| Weeding                  | 53             | 33         |
| Disease Pest Control     | 51             | 35         |
| Harvesting               | 56             | 30         |
| Transport of inputs and product | 52             | 34         |
| Product marketing        | 51             | 35         |

Not much different from the results of access to farming, more than 50% of sample farmers said there was no change in farming activities during the outbreak. This means that most of the sample farmers did not experience difficulties in managing their farms during this outbreak and sell their harvests because it is taken directly by the collectors to the harvest's location. Most of the farmers do not sell their products directly to the market. Research to Adhikari in Nepal, the farmers did not need the market because the products were consumed at home or locally, only 12% of their productions sell to the market [8].

3.9. Effect of Outbreaks on Farmers' Income

Table 6. Regression Model

| Variable            | Unstandardized Coefficients | Standardized Coefficients | t      | Sig. |
|---------------------|----------------------------|---------------------------|--------|------|
|                     | B                          | Std. Error                | Beta   |      |
| Constanta           | -2375031,325               | 255250,741                | -9,305 | ,000 |
| Production          | 7426,479                   | 309,215                   | 24,017 | ,000 |
| Price               | 303,294                    | 13,240                    | 22,907 | ,000 |
| Pandemic            | -105070,824                | 151930,158                | -0,22  | ,490 |

F calculate = 278,759
Rsquare = 0.830
Income [Y] Information * significance at the 5% real level

We used regression to test whether this pandemic period affected farmer incomes. From the test results, it can be concluded that the pandemic period has no significant effect on farm income. Meanwhile, the research results by Harris et al. [9], in India obtained data that more than half of the sample farmers experienced a decrease in income of up to 60%.

However, for the average production of sample farmers, we obtain data showing a 7% decrease in production during the outbreak. The average price decline also occurred by 7%. This is because a small proportion of farmers have difficulty accessing farm inputs and difficulties in farming activities.

In Senegal, Middendorf et al. [10], found that covid 19 has negative impacts on farmers, there are reduce access to inputs [86,1%of samples], reduce farmers ability to plan vegetables [73,9% of samples], reduce farmers ability to hire labor [72,3% of samples], and also reduce their yields in upcoming harvest season [86,1% of samples].
India experiences the same condition. Research conducted by Harris et al. [9] found that vegetable farmers in India experienced an 80% decline in sales during the pandemic. In another study conducted by Ying GU et al. [11], Shanghai, 27.3% of sample farmers responded that there was a price reduction of 10-20%.

4. Conclusion

This study has shown that farmers have difficulties in family finances, but not because their farms are affected by the COVID-19 outbreak. This was caused by increased expenditure by farmers during the Covid-19 pandemic. In accessing inputs, almost 50% of farmers are having difficulty accessing agricultural inputs during the pandemic. Based on the regression model, the pandemic gave a significantly negative impact on increasing household expenditure. They have to use household savings to overcome. The suggestion based on our research is the government should pay attention to health and education facilities for farmers and facilitates access to loan funds.

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