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RESEARCH ARTICLE

# EXAMINING FARMERS' KNOWLEDGE AND PARTICIPATION IN THE CATTLE AND BUFFALO BUSINESS INSURANCE PROGRAM IN TIMBUSENG VILLAGE, SOUTH SULAWESI, INDONESIA

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## ARTICLE INFO

## ABSTRACT

The Cattle and Buffalo Business Insurance (CBBI) program, launched by the Indonesian government, aims to provide financial protection to smallholder farmers against livestock deaths or losses. This study investigates the impact of farmers' knowledge on their engagement with the CBBI program in Timbuseng Village, situated in the North Polongbangkeng District of Takalar Regency, South Sulawesi, Indonesia. A cross-sectional descriptive quantitative analysis was conducted using primary data collected through structured questionnaires from a sample of 74 beef cattle farmers. Fisher's exact test was employed in a bivariate analysis to evaluate the link between farmers' understanding of CBBI objectives, registration procedures, premiums, and claim procedures and their participation in the program. All data were processed using STATA 14.2 software. The study findings reveal a robust and statistically significant correlation between the four types of knowledge about the CBBI program and their involvement in the program. Addressing knowledge gaps and simplifying processes could enhance CBBI program adoption to support sustainable livestock production and strengthen smallholder farmers' resilience in Indonesia.

# INTRODUCTION

Indonesia's national economy is growing substantially and is driven by the livestock subsector, which is a key component of the agricultural sector. The livestock subsector is crucial for Indonesia's economy and rural life, providing nutrient-dense food and resources for the underprivileged. Its relevance is increasing because of rising urbanization and income (Soedjana & Priyanti, 2017). Globally, "livestock products contribute to 40% of the total agricultural output in global sales" and are growing faster than in other agricultural subsectors (Cao & Li, 2013). This trend may also be relevant in Indonesia, which highlights the increasing importance of the livestock subsector.

The demand for beef in Indonesia is growing annually. Indonesia's economic growth has created a boost in beef demand; however, beef production in Indonesia, which comes from imports, has not met this demand (Rustinsyah, 2019). Due to a scarcity of beef, the Indonesian government is promoting agricultural development, particularly the production of commodities from beef cattle. Only roughly 45 percent of Indonesia's growing cattle demand can be satisfied by local production (Agus et al., 2018).

The total population of beef cattle grew from 15.4 million to 18.05 million between 2015 and 2021 (Badan Pusat Statistik, 2022). The overall mean annual meat intake per individual projected to grow from 2.72 kg to 3.36 kg in 2020 (Smith et al., 2018). It is, therefore, imperative to note that the Indonesian beef market faces the challenge of satisfying the rising demand in the country while taking into consideration issues linked to consumer safety.

The difference between demand and supply in the Indonesian beef market is substantial, such that it requires imports to fill that gap. The importance attached by Indonesia is quite high since it averages 14.50 percent. The level of openness for the importation of beef is at 0.02 percent (Danasari et al., 2023). The Indonesian government is pursuing strategies to make the level of imports consistent with local production.

In Indonesia's agricultural sector, the Ministry of Agriculture has policies in place to make the country self-sufficient in meat. This policy includes a subsidy for insurance premiums in the Cattle and Buffalo Business Insurance (CBBI) of 2016 (Maulidi et al., 2021). As stated by the Kementerian Pertanian Republik Indonesia (2023), CBBI provides a premium subsidy for cattle farmers in Indonesia. Djunedi (2016) explained that CBBI protects farmers' welfare through agricultural insurance.

Livestock farming is a profitable venture because it has various benefits, including the production of milk, meat, and leather products. However, there are risks such as disease, disasters, and death that can affect the business. The livestock insurance products help in managing the business risks (Listiyani, 2022) and can be considered a major risk management tool (Nepali, 2021).

Low knowledge and awareness significantly affect farmers' participation in agricultural initiatives. Knowledge and awareness help farmers understand the objectives and requirements of the program (Maulidi et al., 2021). There is evidence that knowledge plays an important role in the decision-making of farmers to use technology and participate in the program (Connor et al., 2021; Hong et al., 2023). In addition, farmers' knowledge affects livestock insurance and practice programs (Jha & Singh, 2021).

However, despite the increased interest in livestock insurance, few studies examine the role of farmers' knowledge in their involvement in insurance schemes. This study examined the relationship between the components of knowledge and insurance adoption. This is important in improving the CBBI program in Timbuseng Village and other rural areas in Indonesia, as it sheds light on the role of knowledge in filling the information gap and promoting sustainable agriculture generally.

## RESEARCH METHOD

This research was carried out in October 2022 in Timbuseng Village, North Polongbangkeng District, Takalar Regency, South Sulawesi Province, Indonesia. The location of the research is presented in Figure 1.
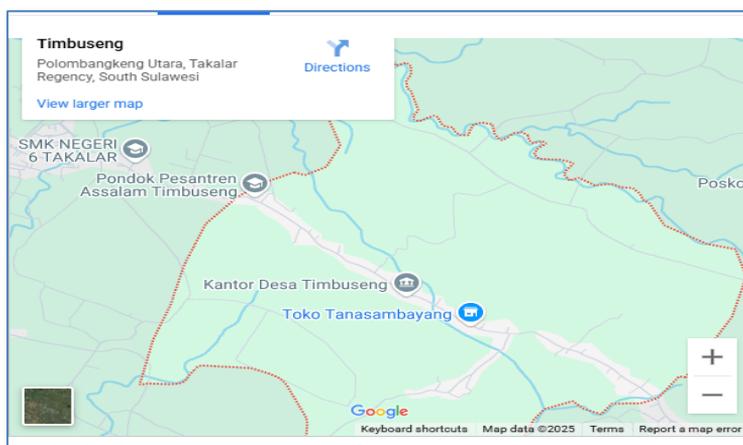


Figure 1.
Map of Timbuseng Village, North Polongbangkeng District, Takalar Regency
Source: Google Maps (2025)

In this research, the calculation of the number of samples was done using the Slovin formula (Sugiyono, 2013) as follows.

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{277}{1 + 277(0.1)^2}$$

n = 74 respondents.

With a population of 277 farmers, the formula results in a sample size of 74 for the research variable. In the formula, "n" is the required sample size, "N" is the total population, and "e" is the margin of error, which is 10 percent.

Proportional sampling was used in this study. Proportional sampling is a research method used to accurately represent subgroups or strata within a population, particularly stratified sampling, which divides the population into

homogeneous groups (Parsons, 2017). There are nine hamlets in Timbuseng Village. Sample determination for each hamlet was performed using the following formula:

$$P = \frac{F}{N} \times n$$

Where P represents the number of samples chosen from a particular hamlet, F denotes the hamlet population size, N signifies the total population size across all hamlets, and n indicates the overall sample size.

The results of the calculation of the number of samples or respondents for each hamlet are as follows.

1.  Timbuseng I Hamlet: P=25/277 x 74=7 respondents
2.  Timbuseng II Hamlet: P=32/277 x74=8 respondents
3.  Sauleya Hamlet: P=51/277 X74=14 respondents
4.  Tanasambayang Hamlet: P=25/277 x74=7 respondents
5.  Bontobaddo Hamlet: P=63/277 x74=16 respondents
6.  Panaikang I Hamlet: P=48/277 x74=13 respondents
7.  Panaikang II Hamlet: P=33/277 x74=9 respondents

Primary and secondary data were used for this study. Primary data were obtained through interviews with participants using a structured questionnaire. Secondary data are supporting data for research, such as those obtained from the local government of Timbuseng Village, North Polongbangkeng District, and Takalar Regency; documents from the Ministry of Agriculture of the Republic of Indonesia related to cattle and buffalo livestock insurance; and books and electronic media.

Data collection methods include a) observation, which is data collection conducted by direct observation of the objects being studied. b) An interview that involves collecting data by directly interviewing respondents about the research variables using a questionnaire. c) Documentation, which involves data collection by recording and taking photographs in the field, as well as obtaining secondary data from related institutions.

A cross-sectional, descriptive, and quantitative approach was used in this study. The research variables consist of the independent variable, farmers' knowledge of CBBI, and the dependent variable, farmers' participation in the CBBI program. Table 1 describes the variables and indicators of the study.

Table 1.  Research Variables and Indicators

| Variables | Indicators |
| --- | --- |
| Knowledge of the CBBI objectives | |
| Knowledge of the CBBI registration procedures | 1 = Knew; |
| Knowledge of the CBBI premiums | 0 = Did not know |
| Knowledge of the CBBI claim procedures | |
| Participation of CBBI | 1 = Participated<br>0 = Did not participate |

In the study, farmers' understanding of the Cattle and Buffalo Business Insurance (CBBI) scheme is determined by their understanding of the critical aspects of the scheme. The comprehension of the CBBI scheme's objectives, registration procedures, premiums payable, and procedures to follow in case of claim payments

is captured in the variable. The respondents were presented with a questionnaire that enabled them to indicate their comprehension of the following aspects of the CBBI scheme: risk-cover protection, terms of registration, costs in terms of premiums, available means in terms of payment opportunities, government subsidies, and reporting in relation to mortality. Also, farmers' participation in the program was measured. Each variable was binary, with 0 = no and 1 = yes.

## Bivariate Analysis

Bivariate analysis was used to analyze the relationship between variables, which were the level of farmer knowledge regarding the CBBI program and the farmers' participation in the CBBI program. In most studies, bivariate analysis is used to determine whether the variables have any correlation (Halperin & Heath, 2020). The knowledge variable consists of insurance objectives, the registration process, insurance premiums, and insurance claim procedures.

Because the data are categorical, it is necessary to use the Fisher Exact Test, which is the most appropriate test in this case. The application of the Fisher test is presumed to attempt to establish whether a dependency relation is present between two categorical variables, presented as a double contingency table. This is particularly useful in scenarios in which the sample size is small. With the test, the probability of the table occurring, or a more extreme value if the table reflects the independence of the two test variables, is presented (Kim, 2017; Ma & Mao, 2018). Next, expected frequency helps in forecasting the proposed observation values for the independent variables through calculations of row and column totals based on the sample size. Observed and expected frequencies are compared to determine differences in distributions, which helps in applying Fisher's Exact Test in categorical data.

The analysis of the Phi value was conducted to establish the level at which the variables are correlated or not correlated. During the analysis of the value of Phi, values greater than 0.25 indicate a very strong relationship, values greater than 0.15 indicate a strong relationship, values between 0 and 0.10 indicate a moderate relationship, and values between 0 and 0.05 indicate a weak relationship. A value greater than 0, but not greater than 0.05, indicates little or no association (Akoglu, 2018). In general, this study verifies two hypotheses. H0: There is little or no association between farmers' knowledge of and involvement in the CBBI program. H1: There is an association between farmers' knowledge and involvement in the CBBI program. All analyses were conducted using STATA 14.2.

## RESULT AND DISCUSSION

### Respondents' Socio-Economic Profile

Respondents had an average age of 46 years, were fairly evenly divided between male and female participants, and had an average of 7 years of schooling. As indicated by Muladno and Agatha (2023), most of these people do not go beyond junior high because of the use of livestock as an economic buffer. The average person being questioned supports four people, has 15 years of farming experience, and raises three heads of cattle or buffalo. Breeders own no more than two to three cows; thus, cattle have become an economic buffer rather than an economic source of living

(Warangkiran et al., 2021). The total monthly earnings of most of them lie at an average of IDR 1,884,009, with an annual harvest of rice from growing rice and sugarcane.

On average, small cattle ownership is simply a savings scheme and not an additional source of livelihood for farmers. This is seen by the number of cattle that a farm owns. The intention is that a farmer can only afford to have two to three cows. This is an indication that cattle ownership is simply an additional source of income and not their major area of focus.

## Implementation of The CBBI Program

The Cattle and Buffalo Business Insurance Program (CBBI) is managed by the Ministry of Agriculture of the Republic of Indonesia in collaboration with PT Jasindo as the implementing agency (Kementerian Pertanian Republik Indonesia, 2023). The district office responsible for animal husbandry and health has been appointed as the technical assistance team for the implementation of the CBBI Program in the Takalar Regency since 2017. The 80% CBBI premium subsidy is specifically designated for productive female cattle, thereby encouraging breeding and breeding farmers to increase their cattle-raising activities. If there are risks due to death and loss of cattle during breeding, farmers can continue their businesses through insurance compensation funds. The premium paid by farmers in Timbuseng Village is IDR 40,000 per cow annually, plus a stamp duty of IDR 10,000. Some criteria that must be met by farmers who want to have their cattle or buffalo insured include: (1) having an NIK (population identification number); (2) having productive female dairy or cow cattle at least one year old and in good health; (3) having one farmer register a maximum of 15 cattle; and (4) having a bank account to transfer compensation funds in the event of a claim.

At the local level, District and City Animal Husbandry Offices provide technical support and coordinate the CBBI program, which has been running in Takalar Regency since 2017, to assist smallholder cattle farmers. However, in Timbuseng Village, outreach activities have occurred only four times since the program began, reflecting an implementation challenge that may limit farmer participation.

Figure 2 shows farmers' involvement in the CBBI insurance program socialization. Of 74 farmers, 38 (51.3%) participated in program outreach while 26 (48.7%) did not, indicating unsuccessful farmer engagement. The insurance companies' cooperation with the Ministry of Agriculture is important (An-nisa et al., 2015).

PT Jasindo and partners need to advocate for the CBBI initiative. This will improve farmers' socio-economic status and protect livestock from risks. Awareness, accessibility, and government support will enhance insurance effectiveness. Farmer participation in livestock insurance will boost agricultural investment and reduce yield fluctuations (Aditya et al., 2018).
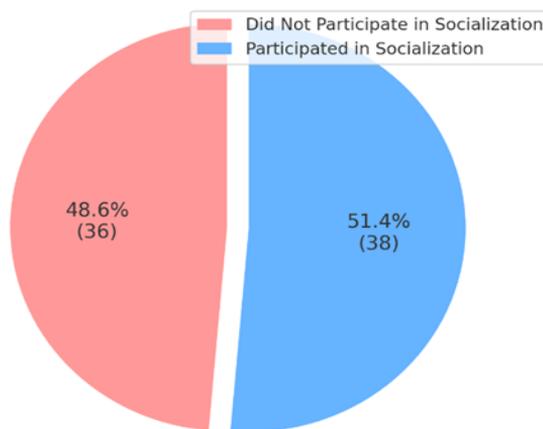
Figure 2.
Identification of Farmers' Participation in the Socialization of the CBBI Program

## The Relationship Between Farmers' Knowledge and Participation in The CBBI Program

Understanding farmers' knowledge and participation in the CBBI program helps improve the livestock business. Analysis provides feedback on insurance systems. Knowledge of objectives, premiums, claims, and benefits increases participation (Halim & Razak, 2022). Farmers with greater access to extension services are more likely to participate in insurance (Akintunde, 2015). We examine how farmers' knowledge of the insurance process affects their involvement.

### Relationship Between Knowledge of CBBI Objectives and Participation

Through the objective of CBBI, the farmers are provided with the required resources for the protection of their cattle or buffalo. Table 2 shows the respondents' level of knowledge and involvement.

Table 2. Relationship Between Knowledge of CBBI Objectives and Participation in the CBBI Program

| CBBI Objectives | Not Participated (0) | Participated (1) | Total |
|---|---|---|---|
| 0 (Did not know) | 39 (expected: 24.2) | 0 (expected: 14.8) | 39 |
| 1 (Knew) | 7 (expected: 21.8) | 28 (expected: 13.2) | 35 |
| Total | 46 | 28 | 74 |

Fisher's Exact Test = 0.000

Phi Coefficient = 0.8236

Table 2 shows that farmers without CBBI program knowledge (39) exceed the anticipated number (24.2), proving a correlation between knowledge and participation. Farmers who understand objectives (28) exceed the anticipated number (13.2). Program benefits include livestock death, major diseases like

Anthrax, Brucellosis, Haemorrhagic, Septicemia, Tuberculosis, accidents, and theft (Kementerian Pertanian Republik Indonesia, 2023).

Fisher's exact test revealed significance (p = 0.000) with a Phi coefficient of 0.8236, establishing a relationship between knowledge of the program and farmer participation in livestock insurance schemes. Greater awareness of the program could lead to better participation by farmers (Pon, 2025).

Knowledge level and educational activity influenced farmers' participation in cattle insurance, supporting Fahad et al. (2018), who linked knowledge and insurance adoption.

### Relationship Between Knowledge of Registration Procedures and Participation

In Indonesia, Cattle and Buffalo Business Insurance (CBBI) provides smallholder farmers with financial protection against livestock loss. Farmers must meet the Ministry of Agriculture's criteria regarding cattle and buffalo age and ownership, as specified by Kementerian Pertanian Republik Indonesia (2023). Table 3 illustrates how knowledge of registration procedures can influence the involvement of farmers.

Table 3. Relationship Between Knowledge of CBBI Registration Procedures and Participation in the CBBI Program

| Registration Procedure | Not Participated (0) | Participated (1) | Total |
|---|---|---|---|
| 0 (Did not know) | 40 (expected: 24.9) | 0 (expected: 15.1) | 40 |
| 1 (Knew) | 6 (expected: 21.1) | 28 (expected: 12.9) | 34 |
| Total | 46 | 28 | 74 |
| Fisher's Exact Test = 0.000 | | | |
| Phi Coefficient = 0.8462 | | | |

In Table 3, the knowledge of CBBI registration among farmers was found to have a strong positive relationship with participation. The 40 farmers who were not aware of the registration did not join, which is more than the expected 24.9. Among those who were aware, 28 out of 34 joined, which is more than the expected 12.9. This was verified by Fisher's Exact Test (p=0.000, Phi=0.8462), which emphasizes the significance of awareness in insurance programs (Tekin et al., 2021).

### Relationship Between Knowledge of CBBI Premium and Participation in the CBBI Program

The insurance premium refers to the cost of insurance coverage. In Indonesia, it costs IDR 200,000 per year for a person, with 80% (IDR 160,000) paid by the government and 20% (IDR 40,000) paid personally (Ministry of Agriculture, Republic of Indonesia, 2023). The relationship between CBBI premium knowledge and CBBI premiums is shown in Table 4.

From Table 4, none of the farmers who did not know the premium structure participated in 40 cases, more than the expected value of 24.9 and far more than an expected count of 15.1. Meanwhile, 28 of the 34 farmers who knew the premium structure participated, far more than the expected value of 12.9. The observed frequency thus deviates from that expected, indicating a significant relation of

premium knowledge with participation, which is supported by a Fisher's Exact Test at p = 0.000 and a Phi coefficient of 0.8462, meaning a very strong relation. Accordingly, smallholder farmers do not use agricultural insurance to a great extent because of their lack of knowledge of agricultural insurance (Ankrah et al., 2021).

Table 4.  Relationship Between Knowledge of CBBI Premium and Participation in the CBBI Program

| CBBI Premiums | Not Participated (0) | Participated (1) | Total |
|---|---|---|---|
| 0 (Did not know) | 40 (expected: 24.9) | 0 (expected: 15.1) | 40 |
| 1 (Knew) | 6 (expected: 21.1) | 28 (expected: 12.9) | 34 |
| Total | 46 | 28 | 74 |

Fisher's Exact Test = 0.000

Phi Coefficient = 0.8462

Despite the null hypothesis that the distribution of farmers who participated with and without knowledge of premium payments is equal, there is a large difference between the two variables. The level of program participation remained very low at 37.8 percent, suggesting that considerations other than premium payment costs also influenced farmers' choice to participate in the program. According to Tenrisanna et al. (2024), farmers were willing to pay 17.55 percent lower than the premium price established by the government, suggesting that farmers found the premium too expensive or that it did not provide sufficient value for the purchase price.

***Relationship Between Knowledge of Claim Procedures and Participation in the CBBI Program***

According to Listiyani (2022), when insured cattle die because of diseases, accidents, or complications during delivery, their owners are eligible to claim compensation. However, compensation is subject to paying insurance premiums, cattle mortalities, and benefit periods. Table 5 illustrates the respondents' levels of knowledge of the compensation/claim processes.

Table 5. Relationship Between Knowledge of Claim Procedures and Participation in the CBBI Program

| Claim Procedure | Not Participated (0) | Participated (1) | Total |
|---|---|---|---|
| 0 (Did not know) | 41 (expected: 25.5) | 0 (expected: 15.5) | 41 |
| 1 (Knew) | 5 (expected: 20.5) | 28 (expected: 12.5) | 33 |
| Total | 46 | 28 | 74 |

Fisher's Exact Test = 0.000

Phi Coefficient = 0.8696

In Table 5, there appears to be a significant relationship between the farmers' knowledge of the CBBI claims process and their participation in the program. None of the 41 farmers lacking knowledge in the claims process decided to participate, which greatly exceeded the expected 25.5, while 28 out of the 33 farmers who knew the process also decided to participate, which greatly surpassed the expected 12.5. It can be anticipated that there indeed appears to be some relation due to the significant difference indicated by Fisher's Exact Test (p = 0.000) and Phi coefficient value of 0.8696.

It is important to raise awareness among farmers regarding how to claim insurance to promote the uptake of cattle insurance. According to Kandel et al. (2021), simplifying the claiming process will result in a high uptake of cattle insurance by farmers. The cattle sector in China is changing the way claims are made using blockchain technology and smart contracts (Shen et al., 2023).

Knowledge of claim procedures is, therefore, important but perhaps not of the utmost priority to participation in the programs. In this light, resolving other constraints and technological solutions may be required for significant improvements in adoption rates and risk management at the farm level.

## CONCLUSION

The outcome of Fisher's exact test indicates a significant relationship between knowledge and CBBI program participation, specifically in terms of farmer knowledge about objectives, the registration process, payments made, and claims in the Cattle and Buffalo Business Insurance program. The outcome shows that farmers should be given proper information to participate in CBBI programs.

This study is relevant to our existing knowledge base concerning farmer participation factors in livestock insurance because of its emphasis on the significance of farmer knowledge as a basic ingredient for farmer enrollment in the CBBI. The study's findings indicated that improved education, facilitation of registration, and claiming processes may increase involvement. However, this study is limited by its geographic scope and may be subject to unobserved heterogeneity.

## AUTHOR CONTRIBUTION STATEMENT

[Author 1]: design of the study, manuscript draft, data analysis, and addressed reviewers' comments; [Author 2]: analytical and research directions; [Author 3]: research conceptualization, methodological guidance; [Author 4]: data collection and research conceptualization. The final version of this manuscript has been reviewed and approved by all authors.

## DECLARATION OF COMPETING INTEREST

The authors declare that there are no known financial conflicts of interest or personal relationships that could influence the findings of this study.

## ACKNOWLEDGMENT

## ETHIC STATEMENT

This study did not need any ethical review or approval because there was little risk of harm to the participants and no intervention. Before the study, all participants gave their informed consent, and all data were kept confidential and anonymous.

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