Available on: https://jnsrr.ep-journals.org/ E-ISSN: 3051-3766 P-ISSN: 3051-3758

Journal of Natural Science Research and Review

Volume: 02 Issue: 07 July-2026

Environmental Quality Assessment in Chicken Farming Areas Based on Public Perception: An Empirical Study in Nagari Mungka, Lima Puluh Kota Regency, Indonesia

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Published Date: July 14, 2026 **Article DOI: 10.65150/EP-jnsrr/V2E7/2026-05**

ABSTRACT: Chicken farming plays a vital role in supporting food security and the rural economy, but has the potential to degrade environmental quality if waste management and biosecurity are not implemented optimally. This study aims to analyse the impact of chicken farming on environmental quality based on community perceptions in Nagari Mungka, Lima Puluh Kota Regency Regency. The study used a quantitative approach with a survey method of 100 households using a total sampling technique. Data were collected using a questionnaire that had met validity and reliability tests, then analysed using descriptive statistics and simple linear regression. The results showed that chicken farming has a positive and significant effect on community environmental quality ($t = 14.223$; $p < 0.001$) with a coefficient of determination ($R^2 = 0.674$), indicating that 67.4% of the variation in community perceptions can be explained by chicken farming. The community believes that chicken farming provides economic benefits, provides animal protein, and utilises waste as organic fertiliser, although there are still concerns about the impacts on water, air, soil, and health quality. The novelty of this study lies in the use of community perception as the main indicator in evaluating environmental impacts, thus complementing the dominant biophysical approach in previous studies. These findings strengthen the community-based environmental assessment study and provide an empirical basis for strengthening Good Farming Practices (GFP), waste management, biosecurity, and community-based environmental management policies to support sustainable chicken farming.

KEYWORDS: chicken farming, public perception, environmental impact, environmental quality, community-based environmental assessment.

INTRODUCTION

The livestock sector chicken subsector is a fast-growing agribusiness and plays an important role in supporting food resilience, provision of animal protein, and improving social welfare in society. However, intensified production also increases the risk of organic waste, ammonia emissions, as well as potential water and soil pollution, a lower-quality environment and poor societal health. Therefore, sustainable farming is not only determined by productivity, but also by effective waste management, application of biosecurity, efficient use of source resources, and implementation of Good Livestock Practices (GLP) (FAO, 2018; UNEP, 2021; FAO, 2023; OECD, 2023). In line with that, the Sustainable Livestock Farming Framework emphasises that success system farm determined by a balance between economic productivity, environmental sustainability, social welfare, animal health, and efficiency source power. Its implementation covers waste management, biosecurity, efficient water use, as well as reception public as indicator of main sustainability, so that a chicken farm is capable give benefit economy without sacrifice quality environment and health society (FAO, 2018; OECD, 2023; World Organisation for Animal Health, 2024; Zhang et al., 2023; Beal et al., 2023;

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Azmi et al., 2023). In the study of the knowledge environment, Environmental Perception Theory explains that public perception is formed through interaction experience, knowledge, values social, cultural, and conditions environment, so that become indicator important in evaluate quality environment as well as a complete measurement of biophysical conditions (Whyte, 1977; Bonnes & Bonaiuto, 2002; Fraisl et al., 2022; Wang et al., 2023; IPBES, 2023). The concept This develop become a Community-based Environmental Assessment (CBEA), which places the public as the main in evaluation environment through integration knowledge local and approach scientific in order to improve the accuracy of evaluation, legitimacy policies and management participatory environment (Reed, 2008; Danielsen et al., 2014; Fraisl et al., 2022; UNEP, 2024; UNDP, 2024). Therefore, public perception is used as indicator social in evaluate impact environment activity farm chicken. Study previously generally evaluate the impact of chicken farming using Life Cycle Assessment (LCA), analysing emissions, water quality, air quality, and waste management. The results show that the consumption of feed and management dirt is factor main determinant footsteps environment livestock farming (Costantini et al., 2021; Azmi et al., 2023; Beal et al., 2023; Zhang et al., 2023). However, the approach the Still dominated indicator biophysical so that Not yet fully explain perception public as recipient direct impact environment (Fraisl et al., 2022; Wang et al., 2023). There are still four research gaps that need to be studied, namely the theoretical gap, because study more focus on indicators biophysical than perception society; methodological gap, consequences dominant LCA approach and analysis laboratory compared to analysis statistics based perception; empirical gap, because results study about impact farm to quality environment Still diverse and influenced management waste, biosecurity, and characteristics local (Doneley et al., 2023; Bava et al., 2024; Parajuli et al., 2024); as well as contextual gaps, considering study perception community at the center farm Chicken production in Indonesia, especially in Nagari Mungka, is still very limited (FAO, 2023; OECD, 2023). Novelty study This lies in the application of Community-based Environmental Assessment for evaluate impact environment farm chicken through perception public as indicator main quality environment with integrating Environmental Perception Theory and Sustainable Livestock Farming Framework, so that complete indicator biophysical with dimensions social in evaluation sustainability livestock (Whyte, 1977; FAO, 2018; Costantini et al., 2021; Fraisl et al., 2022; Wang et al., 2023). In general, practical results study expected become base strengthening policy management of waste, biosecurity, and sustainable farm participation based participation society (FAO, 2023; OECD, 2023). Research This aim analyze perception public as well as influence activity farm chicken to quality environment living in Nagari Mungka as base compilation policy farm sustainable.

LITERATURE REVIEW

1. Livestock Farming and Environmental Quality

Chicken farming has become one of the fastest-growing agricultural sectors due to its important contribution to food security, rural livelihoods, and the supply of affordable animal protein. However, intensive poultry production also generates considerable environmental challenges, including manure accumulation, ammonia emissions, greenhouse gas emissions, unpleasant odours, wastewater discharge, and the contamination of soil and water resources. Consequently, the sustainability of poultry farming is no longer assessed solely by production efficiency but also by its ability to maintain environmental quality while supporting economic and social development (FAO, 2018; FAO, 2023; OECD, 2023). The Sustainable Livestock Farming Framework emphasises that sustainable poultry production requires a balance among economic productivity, environmental protection, animal welfare, biosecurity, and efficient resource utilisation. Proper manure management, wastewater treatment, disease prevention, and environmentally friendly production systems are considered essential components of sustainable livestock development. Therefore, environmental quality has become one of the principal indicators for evaluating the sustainability of poultry farming systems (FAO, 2018; OECD, 2023; WOAH, 2024).

2. Environmental Perception Theory

Environmental quality can be evaluated through both objective environmental measurements and subjective community perceptions. Environmental Perception Theory proposed by Whyte (1977) explains that people's perceptions of environmental conditions are shaped by direct experiences, environmental knowledge, cultural values, and social interactions. Consequently, communities living close to livestock production areas possess valuable information regarding environmental changes resulting from farming activities. Environmental perception has increasingly been recognised as an important social indicator because environmental degradation directly influences community well-being, public health, and quality of life. Community perceptions therefore complement biophysical indicators by capturing the social dimensions of environmental quality that cannot always be measured through laboratory analysis alone (Bonnes & Bonaiuto, 2002).

3. Community-Based Environmental Assessment

Recent developments in environmental assessment have promoted Community-based Environmental Assessment (CBEA), which integrates scientific evaluation with local knowledge and public participation. This approach recognises local communities as active contributors in identifying environmental problems, monitoring environmental changes, and evaluating environmental management practices. According to Reed (2008) and Danielsen et al. (2014), participatory environmental assessment increases the legitimacy, transparency, and effectiveness of environmental management policies. Likewise, Fraisl et al. (2022) argue that citizen participation contributes significantly to environmental monitoring because local communities continuously observe environmental conditions and therefore possess valuable experiential knowledge. Consequently, community perception has become an increasingly important component in evaluating environmental sustainability, particularly in rural areas where formal environmental monitoring remains limited.

4. Environmental Impacts of Poultry Farming

Numerous studies have investigated the environmental impacts of poultry farming from ecological and technological perspectives. Intensive poultry production produces large quantities of solid and liquid waste containing nitrogen, phosphorus, organic matter, and pathogenic microorganisms. When improperly managed, these wastes may contaminate surface water and groundwater, increase greenhouse gas emissions, reduce air quality, and create public health risks (Costantini et al., 2021; Doneley et al., 2023). Recent studies also highlight that ammonia emissions, particulate matter, methane production, and antimicrobial resistance represent major environmental concerns associated with intensive poultry farming (WHO, 2023; UNEP, 2023; WOAH, 2024). Nevertheless, environmental impacts can be substantially reduced

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through Good Farming Practices (GFP), improved manure management, biosecurity implementation, composting technologies, and circular economy approaches that convert poultry litter into organic fertiliser or renewable energy (Martinelli et al., 2020; Zhang et al., 2023).

5. Previous Studies and Research Gap

Previous research has predominantly evaluated poultry farming using Life Cycle Assessment (LCA), environmental monitoring, emission inventories, and laboratory-based environmental measurements. These studies consistently demonstrate that feed production, manure management, energy consumption, and waste treatment constitute the primary determinants of environmental sustainability in poultry production systems (Costantini et al., 2021; Azmi et al., 2023; Beal et al., 2023; Bava et al., 2024). Although these studies provide valuable scientific evidence regarding environmental performance, relatively few investigations have incorporated community perception as a principal indicator of environmental quality, particularly in developing countries. Most previous studies have focused primarily on measurable environmental parameters while overlooking the social dimensions of environmental sustainability. Furthermore, empirical studies integrating Environmental Perception Theory with Community-based Environmental Assessment remain scarce in Indonesia, especially in rural poultry farming regions. Therefore, four research gaps can be identified. First, a theoretical gap exists because environmental perception has received less attention than biophysical indicators. Second, a methodological gap remains due to the dominance of laboratory-based environmental assessment over perception-based quantitative analysis. Third, an empirical gap persists because findings regarding the environmental impacts of poultry farming differ across regions depending on waste management practices, farm density, and local environmental conditions. Finally, a contextual gap exists because studies examining community perceptions of environmental quality in major poultry production areas of Indonesia, particularly Nagari Mungka, remain very limited. Based on these gaps, the present study contributes to the literature by integrating Environmental Perception Theory with the Community-based Environmental Assessment framework to evaluate environmental quality through community perceptions. This approach complements conventional environmental assessment methods and provides empirical evidence supporting sustainable poultry farming policies based on both environmental performance and community acceptance.

MATERIALS AND METHODS

The research location is in Nagari Mungka, District Mungka, Lima Puluh Kota Regency. Administrative map and map location study can be seen in the picture below:



Figure 1. Administrative Map of Nagari Mungka 2023

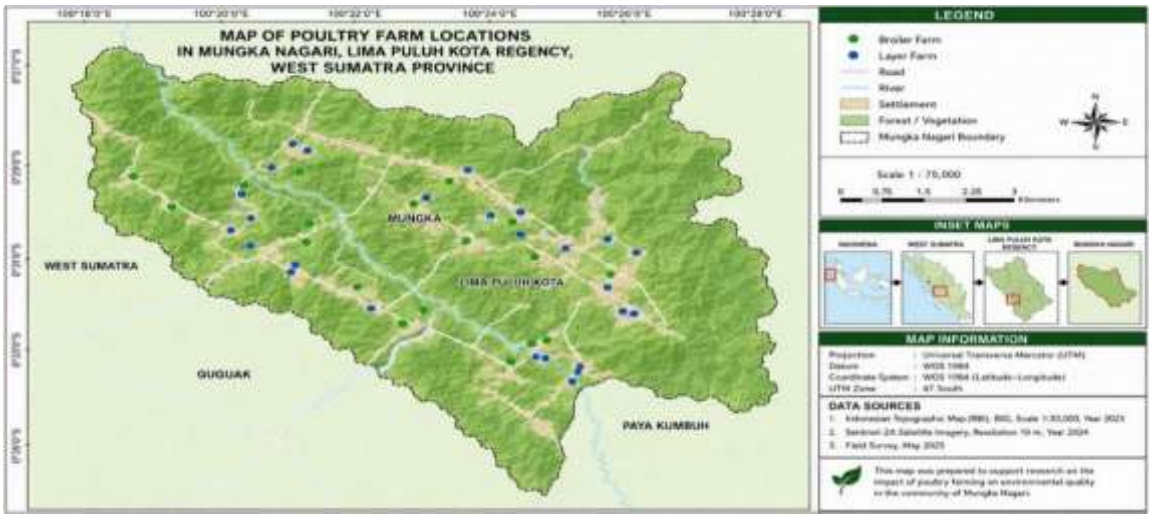


Figure 2. Map of Nagari Mungka Chicken Farmer Locations 2023

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Study This use approach quantitative with explanatory survey design for analyze influence activity farm chicken to perception community. All 100 heads of families around livestock in Nagari Mungka were made into respondents through a census study method. Data collected use questionnaire structured contains 40 statements with a five-point Likert scale, then analyzed in a way statistics For test the connection between variables (Hair et al., 2022; Saunders et al., 2023; Creswell & Creswell, 2023; Taherdoost, 2022; Krosnick & Presser, 2023). Before data collection, instruments were tested using IBM SPSS Statistics 25. The Pearson Product Moment validity test shows all items are valid ($r > 0.361$), while the reliability test produced a Cronbach's Alpha of 0.816 (X) and 0.942 (Y), which indicates Internal consistency was very good ($\alpha > 0.70$). Next, the data were analysed using IBM SPSS Statistics 25 through stages of analysis in accordance with objective research (Hair et al., 2022; Field, 2024; Kline, 2023; Taber, 2024; Watkins, 2021). Data were analyzed use statistics descriptive For describe characteristics of respondents and the distribution of the research. The feasibility of the model was tested through classical assumption testing, including normality tests and heteroscedasticity tests. Furthermore, the influence of activity farm chicken to quality environment life analyzed use simple linear regression with the help of IBM SPSS Statistics 25 (Hair et al., 2022; Field, 2024; Montgomery et al., 2021; James et al., 2023; Pallant, 2024).

$$\mathbf{Y = \alpha + \beta X + \varepsilon}$$

Where:

Y = Quality of life public
X = Activity farm chicken
α = Constant
β = Coefficient of regression
ε = Error

Significance of the regression model was evaluated using the t-test at the 95% confidence level ($\alpha = 0.05$), whereas the power of the model is explained through coefficient determination (R^2) for known proportion variation in quality of life that can be explained by the activity farm chicken (Hair et al., 2022; Montgomery et al., 2021).

1. Instrument Validity and Reliability

Before the main analysis, the research instruments were tested to ensure their validity and reliability. The Chicken Farming variable (X) was measured using 10 items, while the Community Environment variable (Y) was measured using 31 items. Validity testing was conducted using Pearson Product-Moment correlation, which showed that all items had a calculated r value > r table (0.361), thus being declared valid and able to represent the research construct (Hair et al., 2022; Field, 2024). Furthermore, the reliability of the instruments was evaluated using Cronbach's alpha. The test results showed an alpha value of 0.816 for variable X and 0.942 for variable Y (Table 1), both of which exceeded the minimum limit of 0.70, indicating that the instruments had excellent internal consistency and were suitable for use in further analysis (Hair et al., 2022; Taber, 2024; Pallant, 2024).

Table 1. Reliability Test Results

Variable X	Cronbach Alpha (α) value	Information
Chicken farm	0. 949	Reliable
Variable Y	Cronbach Alpha (α) value	Information
Community Environment	0. 952	Reliable

The Cronbach's Alpha values for both variables were well above the minimum threshold of 0.70. This indicates that the instrument has a very high level of internal consistency (excellent reliability). Therefore, all questionnaire items produced stable and consistent measurements, making them suitable for use in further analysis.

2. Assumption Testing

Before the regression analysis was conducted, the research instruments and statistical assumptions were tested to ensure data quality and the feasibility of the analysis model. The validity test results showed that all indicators in the Chicken Farming (X) and Community Environmental Quality (Y) variables had a calculated r-value > r-table (0.361), so all items were declared valid and able to represent the research construct (Hair et al., 2022; Field, 2024). The reliability test using Cronbach's Alpha produced a value of 0.816 for variable X and 0.942 for variable Y, both of which exceeded the minimum limit of 0.70, indicating that the instrument has high internal consistency and is suitable for use in research (Pallant, 2024; Taber, 2024). Before the linear regression analysis was conducted, the data were also tested to meet statistical assumptions. The residual normality test using the One-Sample Kolmogorov–Smirnov Test produced a value of Asymp. Sig. = 0.676 ($p > 0.05$), indicating that the residuals are normally distributed and thus meet the assumption of normality (Field, 2024). Furthermore, the homogeneity of variance test using Levene's Test obtained a significance value of 0.057 ($p > 0.05$), indicating that the data variance is homogeneous. These results indicate that the data meet the requirements of parametric analysis, so a simple linear regression model is suitable for testing the relationship between chicken farming activities and community environmental quality (Hair et al., 2022; Montgomery et al., 2021). Methodologically, meeting the criteria of validity, reliability, normality, and homogeneity indicates that the research instrument has good measurement quality and produces reliable data. Thus, the linear regression analysis used in the next stage is expected to provide an objective, accurate, and scientifically accountable estimate of the relationship between variables (James et al., 2023; Field, 2024).

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RESULTS

1. DESCRIPTIVE ANALYSIS

a). Existence of Chicken Farming in Nagari Mungka

Based on the results of the questionnaire of 100 respondents, a description about perception public to existence farm Chicken in Nagari Mungka. Recapitulation answer respondents presented in Figure 1, which shows that part big respondents give evaluation positive to existence of chicken farming, though there are still aspects of management and environmental assessment that are not optimal.

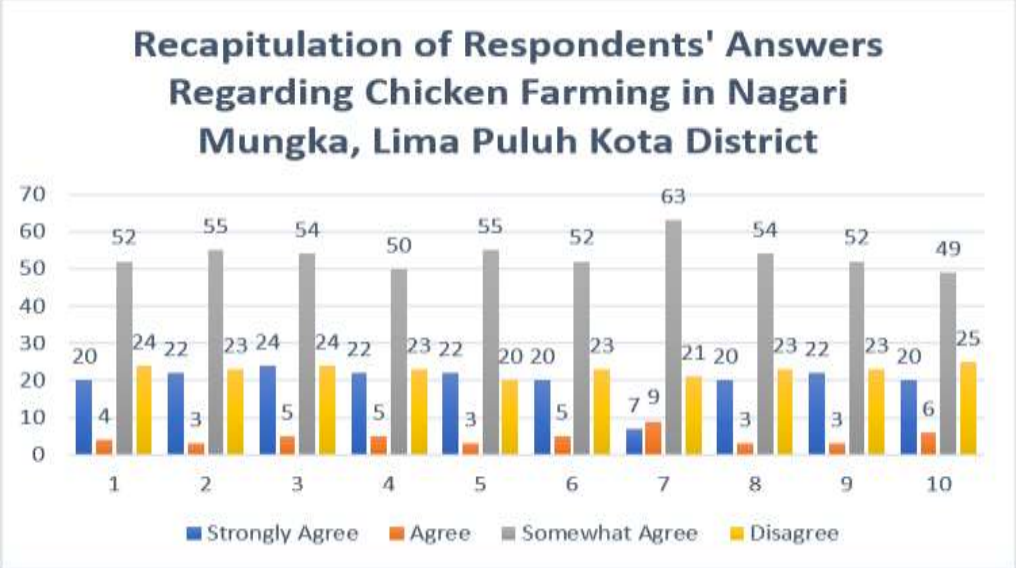


Figure 1. Recapitulation of Respondents to Existence of Chicken Farming in Nagari Mungka

Research results show that indicators with the lowest score perception cover management of chicken to prevent water pollution, spraying pens in a periodic, management of liquid waste, and education to the public about the health consequences of livestock farming. On the other hand, the indicators with the highest scores show that the public considers farm chicken to give benefit as provider of organic for activity agriculture. In terms of overall, the study shows that public own relative perception positive to existence of chicken, although Still there is several aspect management assessed environment need improved.

b). Public Perception of Impact Environment Activity Chicken farm

The results of the questionnaire obtained from respondents can then be arranged into a chart recapitulation of respondents' answers related environment life the community in Nagari Mungka as follows:

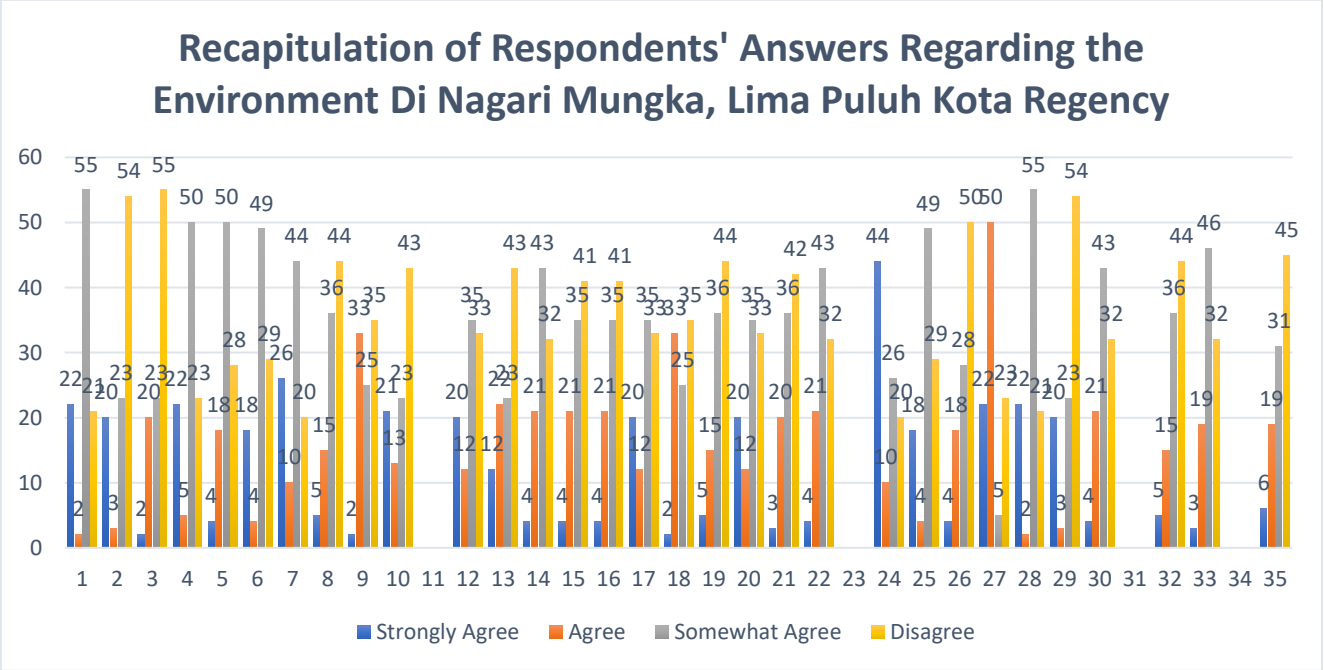


Figure 2. Graph Recapitulation of Respondents ' Answers Related to Community Environment in Nagari Mungka, Lima Puluh Kota Regency

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Research results show that part big respondents evaluate the impact environment activity farm chicken Still be at a level that can be accepted. Indicators with level agreement relatively low covering change water quality, water odour, land degradation, subsidence quality degradation, and risk of disease consequences from resistance to antibiotics. Findings show that majority public Not yet feel significant environment consequence activity farm chicken.

2. Influence of Chicken Farming on the Community Environment

Influence activity farm chicken to environment life public analyzed use simple linear regression. Analysis results show that activity farm chicken influential positive and significant to environment life public with mark coefficient regression coefficient (B) of 0.261 and a standardised beta coefficient (β) of 0.821. The results of the partial test show a t-value = 14.223 with $p < 0.001$, so the alternative hypothesis is accepted. The coefficient value determination ($R^2 = 0.674$) shows that 67.4% of the variation in public to environment can be explained by the activity of chicken, while 32.6% was influenced by other factors outside the research model.

DISCUSSION

1. **Existence of Chicken Farming in Nagari Mungka**

   Findings of the study show that public own relative perception of the existence of chicken is positive. However, the low scores on indicators of management waste, spraying cage, management waste liquid, and health education show that the management environment in some parts of the farm does not yet fully fulfil principles of Sustainable Livestock Farming. Conditions are allegedly related to high cost of management waste, limited means, weak supervision, as well as low awareness among breeders. These results are in line with Costantini et al. (2021) and Doneley et al. (2023), which explain that management less than optimal waste increases potential water and soil pollution, as well as ammonia emissions. On the other hand, the high evaluation to utilization dirt chicken as fertilizer organic show that public has feel benefit implementation the concept of the circular economy, namely utilising waste as source Power economy at a time reduce burden pollution (Martinelli et al., 2020). Findings: This shows that benefit economy farm Still become factor the main factor that forms a positive society. Therefore, the increase in waste, biosecurity, environmental education, and partnerships between government, breeders, and the community need to be strengthened for sustainability to be achieved (FAO, 2023; OECD, 2023; WOAH, 2024).

2. **Public Perception of Impact Environment Activity: Chicken Farm**

   Research results show that the public evaluate impact environment activity farm chicken Still be at a level that can acceptable. Perception the show that benefit economy farm Still more dominant compared to the perceived environmental impact in a direct way. Findings: This support theory perception environment that states that public perception is influenced by experience, environmental conditions, and level of exposure to source pollution (Whyte, 1977). The research results are also consistent with Costantini et al. (2021), Zhang et al. (2023), and Beal et al. (2023), which state that the impact of livestock farming on the environment is greatly influenced by the effectiveness of waste, conditions hydrology, as well as the supporting environment. Relative perception low to water pollution, land degradation, as well as decline quality the air also shows that influence the environment that is created Not yet felt in a way widely used by the community. In addition, the utilisation of waste as organic show implementation of the concept of a circular economy that is capable of increasing the efficiency of power sources (Martinelli et al., 2020; Azmi et al., 2023). The low perception of the risk of antimicrobial resistance indicates a still limited understanding among the public about the impact of using antibiotics in the livestock sector (WHO, 2023; WOAH, 2024; UNEP, 2023). Therefore, education, environment and communication risk become important in increasing public awareness.

3. **Influence of Chicken Farming against Community Environment**

   Analysis results of the regression show that activity farm chicken own influence positive and significant to perception public about environment alive. The R^2 value of 0.674 indicates that activity farm is sufficient factors dominant in explain variation perception society, even though Still there is other factors such as sanitation, activities agriculture, conditions hydrology, as well as characteristics socio-economic factors that contribute influence quality environment. Findings This strengthen that activity farm chicken is one of the determinant quality environment through production waste solid, waste liquid, emissions ammonia, dust organic, and microorganisms that have the potential influence water quality, air, and land if No managed in a way sustainable (FAO, 2023). Research results This consistent with Costantini et al. (2021), Zhang et al. (2023), Doneley et al. (2023), and Bava et al. (2024), which explains that impact environment farm influenced by the system management waste, density livestock, technology production and implementation biosecurity. In addition, waste farms that are not managed with Good can increase accumulation of nitrogen and phosphorus, triggering eutrophication, resulting in emission ammonia and methane, as well as increase risk distribution microorganisms pathogens and antimicrobial resistance (WHO, 2023; UNEP, 2024). On the other hand, the implementation of the concept of circular economy through utilization waste as fertilizer organic and biogas is capable reduce pollution at a time increase efficiency utilization source power (Martinelli et al., 2020; FAO, 2023). Findings This support the Sustainable Livestock Farming Framework, which emphasizes balance between productivity economy, protection environment and welfare social (OECD, 2023; WOAH, 2024). Therefore that, the implementation of Good Farming Practices (GFP), closed house system, biosecurity, management good waste, as well as determination zoningbased Power support environment become an important strategy For guard sustainability farm chicken without reduce quality environment life public.

CONCLUSION

Study This prove that activity farm chicken influential positively and significant to environment life community in Nagari Mungka, Lima Puluh Kota Regency Regency. Simple linear regression results show t- count value = 14.223 > t- table = 1.940 with $p < 0.001$, so that activity farm chicken proven influence perception public to quality environment. The R^2 value = 0.674 indicates that 67.4% of the variation in public perception can be explained by the chicken farm chicken, while 32.6% is affected by other factors outside the model. Society recognizes benefit farm as source field work, animal protein providers, and utilization waste as organicfertiliser, but still realises the potential impact on water quality, air, soil, and health if environmental management is not optimal. Contribution main study: This is an implementation of public perception as the main

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approach in evaluate impact environment farms, so that the study is completed earlier than focusing on indicators biophysical findings. This strengthens community-based environmental assessment studies and shows that farm sustainability is determined by aspects technical at a time reception society. In general, practical, results study support strengthening Good Farming Practices (GFP), management waste friendly environment, biosecurity, as well education society. Limitations of the study lie in the use of perceptual data without measurement of environmental quality in a way directly. Therefore that, research furthermore recommended integrating survey perception with analysis laboratory, spatial modelling, or Life Cycle Assessment (LCA) in order to obtain evaluation impact a better environment comprehensive.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to PGRI University of West Sumatra for providing institutional support throughout this research. Our deepest appreciation is also extended to the Government of Nagari Mungka, Mungka District, Fifty City Regency, for granting permission and facilitating the field research process. We are grateful to all community members who willingly participated as respondents and shared valuable information that contributed significantly to this study. The authors also appreciate the constructive suggestions and support provided by colleagues and reviewers, which greatly improved the quality of this manuscript. Finally, the authors acknowledge everyone who contributed, directly or indirectly, to the successful completion of this research. This research received no external funding.

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