INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY: APPLIED BUSINESS AND EDUCATION RESEARCH
2026, Vol. 7, No. 7, 2837 – 2847
http://dx.doi.org/10.11594/ijmaber.07.07.04

Research Article

Influence of Gender and Level of Education of Farmers on Sugarcane Productivity in The Visayas, Philippines: A Factual Phenomenon

Paulino A Oñal Jr*, Paulino Muguel M Oñal

Catholic Ming Yuan College, Inc., Murcia, Philippines

Article history:
Submission 30 June 2026
Revised 14 July 2026
Accepted 23 July 2026

**Corresponding author:*
E-mail:
docpaulonal011260@gmail.com

ABSTRACT

Agriculture is the backbone of an economy. In the Philippines, sugarcane farming is a major dollar industry that contributes an average income of Php 70 billion per year. The study aims to examine the influence of farmers' gender and the level of education on sugarcane productivity in the Philippines. The descriptive-correlation method was employed in the study. The instrument used was a validated survey questionnaire with a Cronbach's alpha of 0.84. The 320 sugarcane farmers were randomly identified at the seven locations in the Visayas area of the Philippines. Results indicate that the majority of the farmers are male (69.7%), secondary level (47.2%), with a low average production of <49 TC/ha. (53.9%). Analysis of variance (ANOVA) implied that there's a significant difference in the production of sugarcane among the different locations in the Philippines (alpha = 0.05). Furthermore, results implied that farmers' gender and their level of education significantly influence the production (alpha = 0.01). Relatively, the farmer's gender and their level of education strongly correlate with production (alpha = 0.01). Overall, the results implied that farmers' gender and level of education have a direct contribution to production. Hence, the government should play a vital role in improving the agricultural educational system. The budget for education should be increased, and more scholarship be made available, especially for students who will be taking courses in the agriculture field. More seminars and updates for aged and female farmers should be designed by the government. Enhancing the technical-vocational competency of the farmers will be provided, and ultimately, provide them with a National Certificate through TESDA.

Keywords: *Descriptive-correlation, Farmers' gender, Formal education, Informal education, Kruskal-Wallis H test, Mann-Whitney Test, Non-formal education, Normality test*

Introduction

Agriculture is the backbone of an economy. In the Philippines, sugarcane farming is a major dollar industry that contributes an average income of Php 70 billion per year. Sugarcane (*Saccharum officinarum*, L.) is a perennial crop

How to cite:
Oñal Jr., P. A. & Oñal, P. M. M. (2026) Influence of Gender And Level of Education of Farmers On Sugarcane Productivity in The Visayas, Philippines: A Factual Phenomenon**.** *International Journal of Multidisciplinary: Applied Business and Education Research* 7(7), 2837 – 2847. doi: 10.11594/ijmaber.07.07.04

that can produce sucrose up to 50% of the dry weight of a mature stalk (Wickramasinghe et al., 2024). The crop has significant implications for the rural economy, employing in cultivation, processing, marketing, and related industries (Gawas et al., 2024). It provides jobs for over 700,000 farmers, excluding the more than 700,000 workers.

On the production side, for Crop Year 2024-2025, the Philippines' total raw sugar production in the country is 2.085 million metric tons, with a total tonnage of 29.961 million or an average of 75.324 tons per hectare (SRA, 2026), a slight improvement from the target of 75 tons per hectare. Unfortunately, the average sugar rendement was only 1.62 LKg/TC, way below the target of 3.00 LKG/TC for the same year (2025), a difference of (-) 54.00 percent.

The vast sugarcane plantations in the Philippines are located in Regions 6, 7, and 8, specified as follows: 207,909 hectares for Region 6; 57,663 hectares for Region 7; and 10,200 hectares for Region 8, respectively. The total area of the three regions is 275,772 hectares or 71.01% of the total area of sugarcane plantation in the Philippines (Balita, 2024).

The world's top 5 producing countries in million tons are Brazil, India, Thailand, China, and Pakistan, with 752.9, 405.4, 131.0, 110.0, and 66.9, respectively (Nigam et al, 2026).

In Asia, however, the top 5 producing countries in million tons are India, China, Thailand, Pakistan, and the Philippines, with 299.0, 78.0, 53.0, 55.0, and 23.7, respectively (FAO, 2020).

Despite the technologies that are already available and government support, the annual production could hardly be achieved year after year. Hence, educating our farmers, whether done formally, non-formally, and informal, is an area to be given impetus for the sustainability of the sugarcane industry.

Formal schooling helps farmers adapt to new technology. Non-formal education usually offers farmers better methods, while informal education keeps farmers exchanging ideas with one another.

Education plays a transformative role in agricultural production by boosting efficiency, enhancing the adoption of modern technologies, and increasing overall crop yields. Educated farmers are better equipped to navigate market changes, manage resource sustainability, and optimize farm inputs and labor costs.

In terms of farmers' gender, globally, male farmers often exhibit higher gross agricultural productivity than their female counterparts (PSA, 2024), with gender productivity gaps ranging from 20% to 40% depending on the region.

This study aims to understand the importance of educating our farmers, which could directly influence productivity per unit area and yield improvement.

Furthermore, this study will investigate the relationship between farmers' gender, level of education, and their sugarcane production in the Visayas, Philippines.

Objectives

The general objective of the study is to determine the relationship between the farmers' gender, level of education, and sugarcane production.

Specifically, it aims to;

a. Gather data on sugarcane production of farmers in seven locations;
b. Determine the influence of farmers' gender and level of education on their sugarcane production, and
c. Examine the relationships between the farmers' gender, level of education, and sugarcane production in the Philippines.

Methodology

The descriptive correlation method was used in this study. It focuses on sugarcane farmers' areas, farm profiles, and sugarcane production volume in relation to farmers' gender and level of education across seven locations in the Visayas, Philippines.

Research Environment

Areas planted with sugarcane were chosen as the sampling area. There are seven provinces in the Visayas where the majority of the sugarcane crops are planted. For this study, only six provinces are included, namely: Negros Occidental, Negros Oriental, Capiz, Iloilo, Cebu, and Leyte. As of Crop Year 2021-2022, the total area cultivated with sugarcane for the above-mentioned provinces was 271,622.89 hectares, and produced 15.58 million tons of cane with an average of 57.63 tons per hectare.

Specifically, the study covered the following locations, namely: CEB for Cebu province; LEY for Leyte; ILO for Iloilo; CAP for Capiz; Bayawan for Negros Oriental; San Carlos and Victorias for Negros Occidental. For the seven locations, the total area was 93,354.03 hectares and has produced a total of 5,073,484.90 tons as of Crop Year 2024-2025, with an average tonnage of 54.35 per hectare.

Research Locale

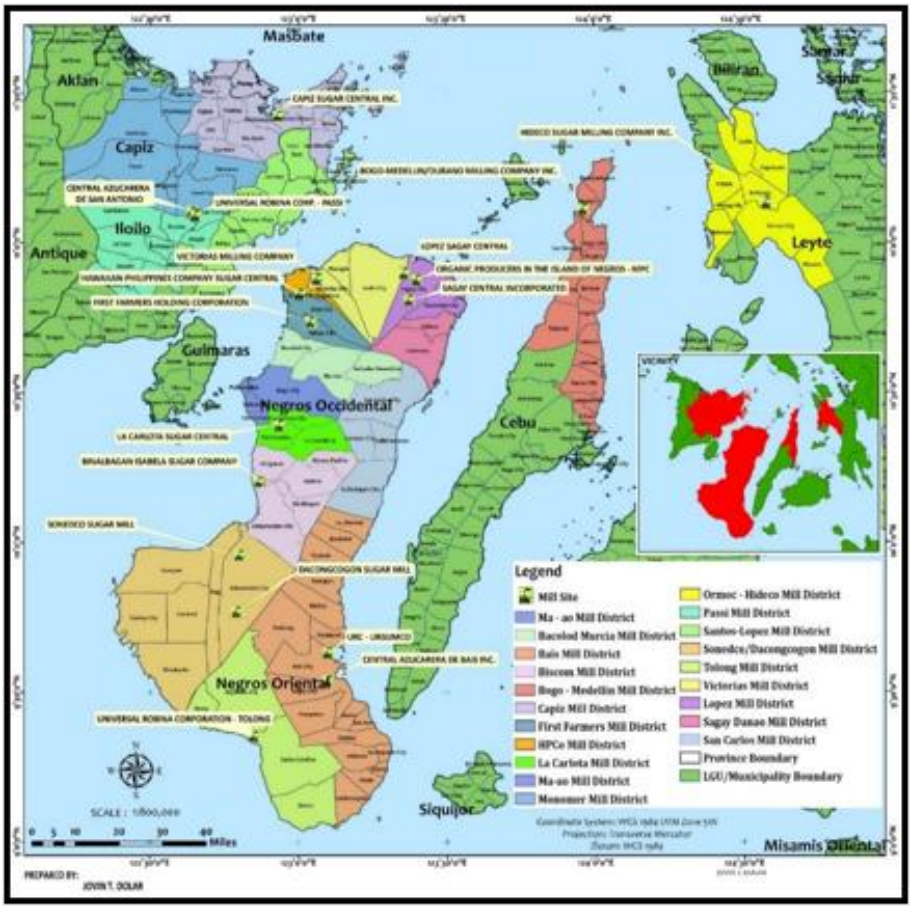

Figure 1. Sugarcane areas in the Visayas, Philippines.

The respondents of the study were the sugarcane farmers in the Visayan area, Philippines. Employing Slovin's formula, out of 18,539 (Crop Year 2021-2022) sugarcane farmers from the seven locations covered by this study. Three hundred twenty sugarcane farmers were randomly selected as the actual respondents. The number of respondents was determined by computing percentages relative to the total number of sugarcane farmers in each location. The percent distribution of the respondents per location is shown in Figure 2.

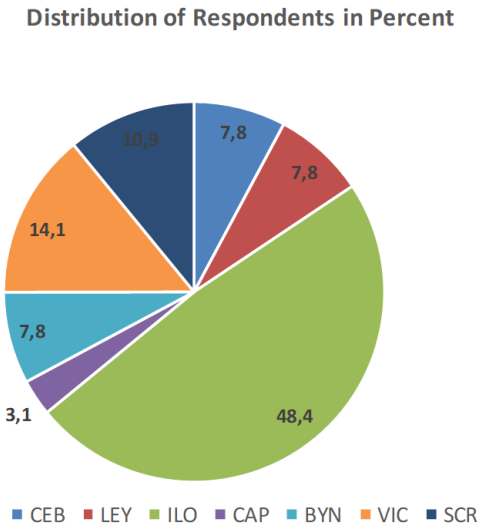

Figure 2. Distribution of respondents at seven locations in the Philippines

Research Instrument

The instrument used to gather data was the validated document, which focuses as well on the farmers' gender and level of education (Oñal et al 2021).

Data Gathering Procedure

Instrument preparation

The researchers had personally prepared the questionnaire/instrument. The instrument had already undergone reliability and validation tests in 2021 and is being used in all its previous studies, including this one. The instrument had undergone a reliability test with a Cronbach's alpha of 0.86 before the distribution.

Distribution of the Instrument and Gathering of Data

The researchers conducted an orientation on how to fill out the questionnaire with the field enumerators. It personally distributes the instrument to the enumerators. Thereafter, enumerators had commenced the gathering of data.

Retrieval of Instruments

The researchers had personally retrieved the instruments from the enumerators; others were sent through public courier.

Encoding and Statistical Analysis

Upon retrieval of the questionnaire, the researcher had tallied and analyzed the data using the Statistical Package for Social Sciences (SPSS) software under the close supervision and guidance of the statistician. The procedure is presented in Figure 3.

Statistical Tool

In the analysis of data, the following statistical tools were used in accordance with the nature of the specific objectives.

Frequency and percentage were used to describe the profile of the sugarcane on the farms.

The mean was used to determine the level of production with farmers' farm expenses and the size of landholding.

A Likert scale was used to determine and describe the production mean.

ANOVA was used to determine the difference in the level of production by location.

The Shapiro-Wilk test was employed to assess the normality of the variables.

Kruskal-Wallis H test was used to determine the difference in the level of production when respondents are grouped according to farmers' farm expenses, and the size of landholdings.

Spearman's rho correlation analysis was utilized to determine the significant relationship between the level of production versus the farmers' farm expenses, and the size of landholding.

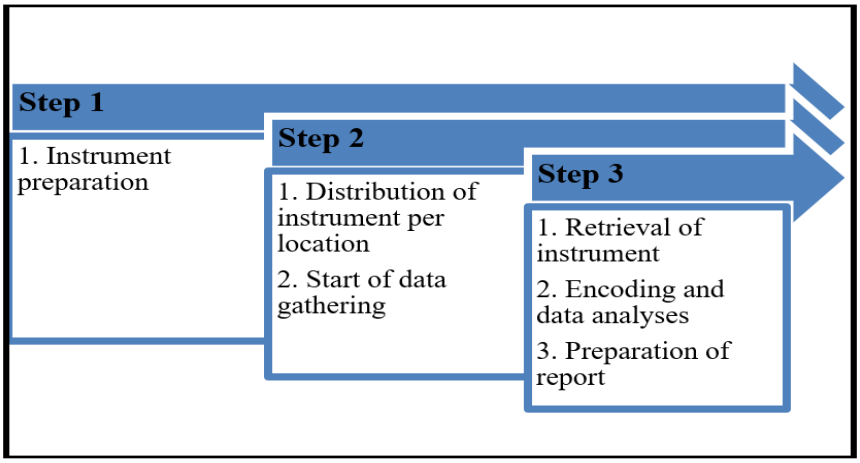

Figure 3. Data gathering procedure

Result and Discussion

Profile of the farmers

Farmers' profile in terms of gender and the level of education is shown in Table 1. Results revealed that the majority of the farmers are male (69.7%) and have a secondary level of education (47.2%).

Farmers' average production is shown in Table 1.a. Majority of the farmers have low production (53.8%) or an average of <49 TC/ha, while 18.8% have a medium production with an average of 50-64 TC/ha.

In the Philippines, the 2022 statistics indicate that 75.4% farmers were male and 24.6% were female, respectively. Around 39.0%, 38.6%, 17.6%, and 1.8% were in elementary, secondary, college, and others, respectively.

Table 1. Farmers' profile at the different locations of the Visayas, Philippines

Variables	Number of Farmers	Percentage
Gender		
Male	223	69.7
Female	97	30.3
Level of Education		
Elementary	54	16.9
Secondary	151	47.2
College	103	32.2
Vocational	12	3.8
TOTAL	320	100.0

Table 1.a. Production profile at the different locations in the Visayas, Philippines.

Variables	Number of Farmers	Percentage
Average Production		
>65 TC/ha (high production)	88	27.5
50-64 TC/ha (medium production)	60	18.8
<49 TC/ha (low production)	172	53.8
TOTAL	320	100.0

Difference in Sugarcane Production in the Visayas, Philippines, when Grouped by Location

Table 2 presents the difference in sugarcane production in the Visayas, Philippines, when grouped by location using One-way ANOVA. The results further revealed that there

is a significant difference in sugarcane production in the Visayas, Philippines, when grouped by location (M=2.28), with an average production of 50-64 TC/ha. This implied that sugarcane production in the Visayas, Philippines, when grouped by location, is not comparable (alpha = 0.05).

In detail, the results indicate that CEB (M=1.88), LEY (M=2.31), ILO (M=2.20), CAP (M=2.13), and BYN (M=2.22) have a medium production or an average of 50-64 TC/ha. On the other hand, VIC (M=2.63) and SCR (M=2.60) were classified with high production or an average of 65 TC/ha.

The high productivity of VIC and SCR could be attributed to the vast plantation of high-yielding varieties and training given to the farmers in the two localities (Oñal et al., 2022).

The world average sugarcane yield of 71.28 TC/ha was recorded by ISO (2023), a 42.0% yield improvement from their previous record.

Relatively, it is noteworthy that sugarcane productivity in the Eastern Brazilian Amazon showed a significant increase from 2012-13 to 2021-22 (Cardoso et al, 2024). For 2024-2025, the top sugar producers in the world are Brazil with 43.7 million MT, with a world share of 24.1%, and India with 28.0 million MT, which contributed 15.5% to the world, respectively.

Table 2. Analysis of Variance of sugarcane production in the Visayas, Philippines, when grouped by location

Location	Mean	Description
CEB	1.88	Medium production
LEY	2.31	Medium production
ILO	2.30	Medium production
CAP	2.13	Medium production
BYN	2.22	Medium production
VIC	2.63	High production
SCR	2.60	High production
Mean	2.28	Medium production
F	2.816	
Sig	0.011*	

Production guide: high production: >65 TC/ha, medium production: 50-64 TC/ha, low production: <49 TC/ha

*significant at 5% level

Assessing the Normality of the Variables

The present study examined whether there is a significant difference in the volume of sugarcane production in the Philippines when farmers are grouped according to their level of education and gender (Table 3).

Before the main analysis, the assumption of normality was assessed using the Shapiro–Wilk test. Results revealed that the distribution of average production scores significantly deviated from normality for both education, $W(320) = 0.790$, $p < 0.001$, and gender, $W(320) = 0.749$, $p < 0.001$. These results indicate that the data are not normally distributed, thereby justifying the use of a nonparametric test, specifically the Kruskal–Wallis H test.

Testing normality for a small sample size (n <50), the Shapiro-Wilk test should be used because it has more power to detect non-normality (Mishra et al, 2019).

Table 3. Assumption of normality of variables using the Shapiro-Wilk Test

Variables	Statistic	Df	Sig.
Average Production by Education	0.790	320	<0.001
Average Production by Gender	0.749	320	<0.001

**highly significant at 1% level

The Descriptive Statistics and Differences in Volume of Production of Sugarcane in the Visayas, Philippines, when Grouped by the Level of Education of the Farmers

Descriptive statistics (Table 4) indicate that the overall mean production score was M = 2.12 (SD = 0.81), with scores ranging from 1.00 to 3.00. Based on the coding scheme (1 = low production, 2 = medium production, 3 = high production), this suggests that, on average, respondents fall within the medium production category, indicating moderate production performance across the sample.

To examine differences in production levels according to educational attainment, a Kruskal-Wallis test was conducted. The results revealed a statistically significant difference in average production among the three education groups, $H(2) = 143.524$, $p < 0.001$(Table 4.a.).

Inspection of the mean ranks shows a clear increasing trend in production scores as educational level increases. Respondents with elementary education had the lowest mean rank ($M_{(}rank_{)} = 42.39$), followed by those with secondary education ($M_{(}rank_{)} = 156.66$), while those with tertiary education obtained the highest mean rank ($M_{(}rank_{)} = 210.12$). These findings suggest that individuals with higher educational attainment tend to have higher production levels.

The results imply that education may play an important role in improving production performance, possibly through enhanced knowledge, technical skills, decision-making ability, and access to information.

Overall, the findings demonstrate a strong and statistically significant association between level of education and production, with higher educational attainment corresponding to higher production categories.

The farmers' education significantly increased the level of efficiency of production of the farmers (Dube et al, 2018).

In particular, the production yield of farmers with a secondary level of education is 41% higher than that of those with primary education (Zegiri et al., 2016).

Table 4. Descriptive statistics for average production by education

Variable	N	Mean	SD	Minimun	Maximum
Average Production by Education	320	1.88	0.81	1	3

Table 4.a. Kruskal-Wallis H Test summary for average production by level of education

Level of Education	N	Mean Rank	H	df	P
Elementary	54	43.39	143.524	2	<0.001
Secondary (high school	151	156.66			
Tertiary (college)	103	210.12			

**highly significant at 1% level

The Descriptive Statistics and Differences in Volume of Production of Sugarcane in the Visayas, Philippines, when Grouped by Farmers' Gender

Descriptive results (Table 5) show that the overall mean score for average production was M = 2.35 (SD = 0.61), with scores ranging from 1.00 to 3.00. Based on the coding scheme (1 = low production, 2 = medium production, 3 = high production), this mean indicates that, on average, respondents fall within the medium production level (50-64 TC/ha), approaching the higher end of the scale. This suggests that the farmers' overall production performance is moderate.

To determine whether production levels differed by gender, a Mann-Whitney U test was conducted. Results revealed a statistically significant difference between males (n = 223) and females (n = 97), U = 9275.50, Z = −2.274, p = .023 (Table 5.a.).

Examination of the mean ranks indicates that males ($M_{(}rank_{)} = 167.41$) had higher production scores than females ($M_{(}rank_{)} = 144.62$). This suggests that male respondents generally reported higher production levels compared to female respondents (alpha = 0.05).

Overall, the findings demonstrate that production levels differ significantly by gender, with males showing relatively higher average

production scores. These results may reflect differences in access to resources, roles in production activities, or other contextual factors.

The productivity of male farmers was 44.3% higher than that of female farmers (Gebre et al, 2019). A similar trend is shown in Ghana, wherein female farmers' productivity is 46.0% lower than that of their male counterparts (Boahen et al, 2024)

However, Sulaimanova and Jasoolov (2018) found out that no significant evidence of a gender gap in agricultural productivity.

Table 5. Descriptive statistics for average production by gender

Variable	N	Mean	SD	Minimum	Maximum
Average Production by Gender	320	2.35	0.61	1	3

Table 5.a. Mann-Whitney U Test summary for average production by gender

Level of Education	N	Mean Rank	U	Z	P
Male	223	167.41	9275.5	-2.274	0.023
Female	97	144.62			

*significant at 5% level

Association Between the Farmers' Level of Education and the Volume of Production

The association between level of education and the volume production was examined using a Chi-Square Test of Independence (Table 6). The results revealed a statistically significant relationship between education level and production category, $\chi^2(6, N = 320) = 217.17$, $p < .001$. This indicates that production levels significantly differ across educational groups.

As shown in the cross-tabulation, respondents with tertiary education demonstrated the highest proportion of high production (>65 TC/ha), with 68.9% falling under this category. In contrast, those with secondary education were distributed across production levels, though a considerable proportion (35.8%) achieved high production. Meanwhile, participants with elementary education were predominantly classified under low production (<49 TC/ha), accounting for 96.3% of this group. A similar pattern was observed among respondents with technical/vocational education, where most were also categorized under low production (83.3%).

These findings suggest a clear positive relationship between educational attainment and production performance, with higher levels of education corresponding to higher production categories.

Education may enhance knowledge, technical skills, management practices, and decision-making abilities, thereby contributing to improved productivity outcomes.

Educated farmers have higher productivity than non-educated farmers (Nlebem & Omoruka, 2019); relatively, farmers with higher formal education have higher productivity (Kergilet & Biru, 2019).

Table 6. Association between the level of education and the volume of production

Volume of Production	Low (<49 Tc/ha)	Medium (50-64 TC/ha)	High(>65 TC/ha)	Total
Level of Education	n (%)	n (%)	n (%)	n (%)
Elementary	52 (96.3%)	2 (3.7%)	0 (0.0%)	54 (100%)
Secondary	25 (16.6%)	72 (47.7%)	54 (35.8%)	151 (100%)
Tertiary	0 (0.0%)	32 (31.1%)	71 (68.9%)	103 (100%)
Technical/Vocational	10 (83.3%)	2 (16.7%)	0 (0.0%)	12 (100%)
Total	87 (27.2%)	108 (33.8%)	125 (39.1%)	320 (100%)

Chi-square Test: $\chi^2(6, N = 320) = 217.17$, $p < .001$

Association Between the Gender of the Farmers and the Volume of Production of the Farmers

The association between gender and the volume production was analyzed using a Chi-Square Test of Independence. The results indi-

cated a statistically significant relationship between gender and production category, $\chi^2(2, N = 320) = 24.70$, $p < 0.001$. This finding suggests that production levels differ significantly between male and female respondents (Table 7).

As presented in the cross-tabulation, male respondents had a higher proportion in the medium production (53.8%) and high production (44.0%) categories, with only a small percentage (2.2%) classified under low production. In contrast, female respondents showed a higher proportion in the low production category (17.5%) compared to males. Although a substantial number of females were also in the medium (44.3%) and high production (38.1%) groups, their distribution indicates relatively lower representation in the highest production category compared to males.

These results suggest that gender is significantly associated with production level, with males tending to have higher production categories in this sample.

In Ethiopia, male farmers' productivity is higher by 4.0% over and above from female farmers with 3.7% productivity level (Abdisa et al, 2024).

Relatively, agricultural productivity between male and female farmers was 70.84% (Gebisa et al, 2019).

The educated women farmers have a higher production than the non-educated women (Nlebem & Omoruka, 2019).

UN report (Rodgers, 2018) presents that gender gaps in productivity indicate that the inefficiency of women is not caused by their lack of experience but it is due to the inequitable access to land and agricultural inputs.

Table 7. Association between gender and the volume of production

Volume of Production	Low (<49 TC/ha)	Medium (50–64 TC/ha)	High (>65 TC/ha)	Total
Gender	n (%)	n (%)	n (%)	n (%)
Male	5 (2.2%)	120 (53.8%)	98 (44.0%)	223 (100%)
Female	17 (17.5%)	43 (44.3%)	37 (38.1%)	97 (100%)
Total	22 (6.9%)	163 (50.9%)	135 (42.2%)	320 (100%)

Chi-square Test: $\chi^2(2, N = 320) = 24.70$, $p < .001$

Conclusion and Recommendation

The study shows that farmers' gender and level of education had an influence on the volume of production of sugarcane in the Visayas, Philippines.

Specifically, the results implied that male farmers and those who attained the tertiary level of education have produced more than female farmers and those with a lower level of education, respectively.

The government is encouraged that the budget for education should be increased, and more scholarship be made available, especially for students who will be taking courses in the agriculture field.

More seminars and updates for aged and female farmers should be designed by the government. Enhancing the technical-vocational competency of the farmers will be given, and ultimately provide them with a National Certificate through TESDA.

Conflict of Interest

No other group is involved in these undertakings, and no monetary contribution is given for the conduct of this study.

Ethical Considerations and Data Privacy

The respondents had agreed to publish all generated data, and the researcher takes responsibility for securing the sanctity and confidentiality of all information/data written on the instrument. The result will be used for academic/research and in designing programs/projects for the industry.

Acknowledgement

Our sincere gratitude to the sugarcane farmers and the technical enumerator who were involved during the data gathering and processing of the same.

References

Abdisa, T., Mehare, a. & Wakeyo, M. B. (2024). *Analyzing the Gender Gap in Agricultural Productivity: Evidence from Ethiopia*. Journal of Agriculture and Food Research. Vol 24(2024). https://doi.org/10.1016/j.jafr.2023.100960

Balita, C. (2024). Area planted/Harvested of Sugarcane for Raw Sugar Philippines 2023: by Region. https://www.statista.com

Boahen, E. A., Dankwah, J. B., & Berko, D. (2024). *Understanding the Gender Gap in Productivity in Agricultural Production Among Smallholder Cereal Growers in Rural Ghana*. Cogent Economics and Finance. 12(1); 1 – 19. https://doi.org/10.1080/23322039.2024.2318979

Cardoso, L. A. S., Farias, P. R. S., Soares, J. A. C., & De Oliveira, J. (2024). *Planted Area, Productivity, and Sugarcane Production in the Eastern Brazilian Amazon*. Bulgarian Journal of Agricultural Science. 30(4): 686-701. https://www.agrojournal.org/30/04-18pdf

Dube, A. K., Ozkan, B., Ayele, A. A., Idabe, D., & Aliye, A. (2018). *Technical Efficiency and Profitability of Potato Production by Smallholder Farmers: The Case of Dinsho District, Bale, Zone of Ethiopia*. Journal of Development and Agricultural Economics. 10(7); 225–235. https://doi.org/10.5897/JDAE.2017.0890

Gawas, O. M., Naik, V. G., Jachak, R. S., Malave, D. B., & Borate, H. V. (2024). *Economic Analysis of Sugarcane Cultivation in Sinhhudurg District of Maharashtra State*. International Journal of Agriculture Extension and Social Development. 7(10; 155 – 161. https://doi.org/1033545/26180723.2024.v710C.1204

Gebre, G. G., Isoda, H., Rahut, D. B., Amekawa, Y., & Nomura, H. (2019). *Productivity: Evidence from Maize Farm Households in Southern Ethiopia*. Geo Journal. 86(2); 843 -864. https://doi.org/10.1007/s10708-019-10098

International Sugar Organization. (2023). *Inputs, Costs, and the World Sugar Industry*. MECAS (23) 05. page 2. https://www.isosugar.org

Kergilet, H. S. & Biru, M. W. (2019). *Effect of Farmers Education on Farm Productivity: Evidence from Small- scale Maize Producing Farmers in North Bench District, Bench Maji Zone.* Humanities and Social Sciences. 9(17);26–34. https://doi.org/10.7176/RHSS/9-17-04

Mavaliya, M., Jahanara, Khakhal, A. & Chopra, B. (2025). Relationship Between the Selected Independent Variables of Sugarcane Growers and Their Level of Knowledge About the Recommended Package of Practices. International Journal of Agriculture Extension and Social Development. 8(5):205-207. https://www.doi.org/10.33545/26180723.2025.v8,i5c.1889

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive Statistics and Normality Tests for Statistical Data. Annals of Cardia Anaesthesia. 2(1);67. https://doi.org/10.4103/aca.ACA_157_18

Nlebem, B. S. & Omoruka, O. P. (2019). Impact of Agricultural Education on Agricultural Productivity of Women Farmers in Omuna Local Government Area of Rivers State. International Journal of Psychology & Social Development. 7(2); 83 – 90. https://www.seghipapublications.org

Oduro-ofori, E., Aboagye, A. P. & Acquaye, N. A. E. (2014). Effects of Education on the Agricultural Productivity of Farmers in the Offinso Municipality. International Journal of Development Research. 4(9); 1951 – 1960. https://www.journalijdr.com

Gebisa, B., Shumela, Z., & Regassa, G. (2019). Gender Difference and Its Effect on Agricultural Productivity: The Case of Yubdo District in Ethiopia. World Journal of Agricultural Sciences. 15(2); 54 – 59. https://doi.org/105829/idosi.wjas.2019.54.59

Nigam, R. K., Singh, P., & Singh, J. S. (2026). Microbial and Physicochemical Approaches in Sustainable Management of Sugar Mill Effluent. Green Energy and Environment

Technology. 5; 1 – 31. https://doi.org/105772/geet.2025.0125

Oñal, P. A., Neri, V. A., & Jinon, R. J. (2022). Challenges in Sugarcane Extension: The Current Guide in Increasing Productivity at a Lower Cost. Lambert Academic Publishing. Republic of Moldova, Europe.

Oñal, P. A. Jr., Panes, N. P., & Neri, V. A. (2021). Level of Productivity of Sugarcane Farmers and Farm Profile in the Visayas, Philippines. European Journal of Agricultural and Rural Education (EJARE). 2(12): 16-24. https://scholarzest.com/index.ph/ejare/article/view/1527

Oñal, P. A. Jr., Buenafe, O. B., & Eraldo, V. M. (2022). Farm Profile of Sugarcane Farmers in the Visayas, Philippines, and Their Productivity Level. Revista Review Index Journal of Multidisciplinary. 2(1): 01-09. https://doi.org/10.31305/rrijm2022.v02.n01.001

Oñal Jr., P.A., Jinon, R. J., & Martinez, L. B. (2022). The Extension Services and the Level of Productivity of Sugarcane Farmers in the Visayas, Philippines. International Journal of Multidisciplinary: Applied Business and Education Research. 3(1), 90-101. https://dx.doi.org/10.11594/ijmaber.03.01.10

Oñal Jr., P.A., Andrade, F.E., & Oñal, P.M.M. (2025). Farmers' Aspirations, Happiness, and Sugarcane Production in the Visayas, Philippines. International Journal of Multidisciplinary: Applied Business and Education Research. 6(9), 4364-4376. https://dx.doi.org/10.11594/ijmaber.06.09.12

Philippine Statistics Authority (2024). 2022 Census of Agriculture, Fisheries, Agricultural Households, and Operators. https://www.psa.gov.ph

Rodgers, Y. V. D. (2018). The Cost of Gender Gap in Agricultural Productivity: Five African Countries. UN Women Policy Report. https://doi.org/10.7282/00000262

Sugar Regulatory Administration (2026). Philippine Sugar Statistics for Crop Year 2024-2025. Quezon City, Philippines. http://sra.gov.ph/view_file/sugar_statistics/OvXbQG2fPOceZOu

Sulaiman, B., & Jassolov, D. (2018). The Gender Gap in Agricultural Productivity in Kyrgyzstan. 2018 International Conference on Eurasian Economics. Eurasian Economies Association. https://doi.org/10.36880/C10.02039

Wickramasinghe, K. P., Kong, C. Y., Lin, X. Q., Zhao, P. F., Mehdi, F. L., X. J., Liu, X. L., Mao, J., & Lu, X. (2024). Photoperiodic and Lighting Treatments for Flowering Control and Its Genetic Regulation in Sugarcane Breeding. Heliyon. 10(7); e28531. https://doi.org/10.1016/j.heliyon.2024.e28531

World Bank (2019). Employment in Agriculture (% of total employment). Modeled ILO Estimate. https://www.data.worldbank.org/indicator

Zegiri, M., Shabu, E., Bicoku, Y., & Pire, E. (2016). Level of Dairy Farmers in KOSOVO. STOCARSTVO. 70(2); 51- 60. https://www.academia.edu/publication/82299729