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RESEARCH PAPER

Studying the Effect of Land Ownership on Family Food Security in the Barbardiya Municipality: Quantitative Findings from a One-Way ANOVA

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ABSTRACT

This study uses a quantitative technique, more particularly a one-way ANOVA, to examine how land ownership affects households' capacity to attain food security in the Barbardiya Municipality. A quantitative research technique was utilized to gather numerical data from a sample of 371 houses in the municipality that were randomly chosen. The data were analyzed using a one-way ANOVA to look for variations in the average evaluations of food sufficiency among various landholding categories. The research used the ANOVA, Welch, and Brown-Forsythe tests, as well as Tukey HSD post hoc analysis, to compare the size of the land in Katha among five food sufficiency groups. The findings suggested that there may be some variance in mean land size among food sufficiency groups, with the "Surplus" and "3 months" groups probably differing. The hypothesis testing did not discover any notable differences in the mean size of land across the various groups. The variance in land area that is related to differences between the categories is represented by the sum of squares between groups, degrees of freedom, and mean square, whereas the variance in land area that cannot be explained by differences between the categories are represented by the sum of squares within groups, degrees of freedom, and mean square. The study argues that rather than increasing the amount of land holdings, measures to improve food security should focus on boosting food storage and enhancing access to food. But it's also important to consider how community power dynamics could affect resource distribution, as well as the underlying social and economic structures that support inequality.

KEYWORDS ANOVA, Food Security, Land Tenure, Socio-economic

Introduction

Food security is a critical issue affecting millions of people around the world, particularly in developing countries. Access to sufficient, safe, and nutritious food is essential for the physical and mental well-being of individuals and communities. However, food security is not only dependent on the availability of food but also on equitable access to land and resources. It is still a major concern for millions of people worldwide, particularly in developing nations and critical to ensure that individuals and communities have access to sufficient, safe, and nutritious food for their physical and emotional well-being. Yet, ensuring food security requires more than just food availability; it also requires equal access to land and resources (FAO, 2021).

The notion of land tenure and its connection to food security in Bardiya (Rawal, 2022) explaind tenure is a social construction that establishes a person's rights and duties with regard to how to maintain and use their land. The research further explores the range of rights connected to land tenure systems and how they affect food security and discovers a statistically significant connection between land tenure systems and food

security using secondary sources and a chi-square test. The results of the study offer insightful information on the significance of stable land tenure for attaining food security in Bardiya and can guide future research on this subject.

The essential tenet of food security what Sen (1983) believes in assuring access to nutritious food. Empirical data reveals that food supplies were often accessible even during difficult times, as evidenced in places where a high proportion of residents suffered from malnutrition. The major difficulty, though, is that not everyone who needs food has the means to buy it. This implies that those who lack the means to buy food will still experience food insecurity even when food is plentiful. This emphasizes the significance of addressing not only agricultural output but also the more general economic and social variables that impact access to food. In this situation, policies that work to provide chances for income and employment, offer social safety nets, and address resource access disparities can be extremely effective in lowering food insecurity.

Food sufficiency was positively connected with landholding size in a research conducted in Nigeria (Oladeji et al., 2018). Access to financing, agricultural training, and extension services were all identified as critical factors influencing the link between landholding size and food sufficiency. The study has discovered that small landholdings were related with poorer levels of food security in a review of the literature on food security in Sub-Saharan Africa. According to the authors, boosting land productivity through better agricultural techniques and technology might assist smallholder farmers improve their food security? Further, Ajates (2020) is crucial for a review of the literature on agricultural cooperatives since it suggests a conceptual framework that takes into account the many stages that cooperatives go through, from repoliticization the process of politicizing agricultural cooperatives and their goals again which had previously undercut by neoliberal market-oriented policies through cooperative sustainability. It is crucial for policymakers, academics, and practitioners in the agriculture sector to have a thorough grasp of the elements that contribute to the longevity and success of cooperatives, which the framework provides. At this phase, cooperative ideals, principles, and identity are reestablished. Moreover, the function of cooperatives in agricultural development is redefined. This stage serves as a basis for attaining cooperative sustainability, and the framework highlights its significance.

The evidence reveals that landholding size is a significant predictor of food sufficiency, with bigger landholdings linked with higher levels of food security. Yet, access to financing, agricultural training, extension services, and gender all have an impact on the link between landholding size and food sufficiency. Policies aimed at enhancing land productivity and expanding access to inputs

Literature Review

According to the theories of a number of significant philosophers, including John Rawls and Amartya Sen, guaranteeing equal access to land and resources is crucial for achieving food security and promoting social justice.

Political philosopher John Rawls believed that justice necessitates the equitable allocation of resources and opportunity. According to Rawls' view of justice as fairness, a just society is one in which everyone's fundamental rights are upheld and economic and social imbalances are structured to benefit the least advantaged. This concept is pertinent to the debate over access to land and resources because uneven access may lead to and sustain economic and social inequality that threatens people's and communities' fundamental rights (Rawls, 2020).

The economist and philosopher Amartya Sen has also added to the conversation over social fairness and resource availability. Sen's capability-based approach to development places a strong emphasis on the value of increasing people's capacities and freedoms, including their access to resources like land. Sen contends that a person's capacity is a significant determinant of their capacity to live satisfying lives and that uneven access to resources may constrict a person's capacity and sustain poverty and hardship (Sen, 2014).

In terms of food security, both Rawls and Sen's theories emphasize the need of making sure that all people and communities have equal access to the resources they require to meet their fundamental requirements and lead meaningful lives. As it is frequently a major source of food and income for rural inhabitants, particularly in developing countries, access to land is important in this equation. Hence, fostering social justice and ensuring food security depend on making sure that all people and communities have safe access to land and resources.

Land is the most significant aspect in agriculture and food production, as well as a key source of income for rural populations, particularly in developing nations. Individuals and communities are more likely to endure food insecurity and poverty if they do not have secure access to land and other resources. Additionally, access to land and resources is frequently uneven, with wealthy persons and businesses having greater access. This unequal allocation of land and resources can increase inequities in food availability, resulting in social injustice and poverty perpetuation.

Establishing fair access to land and resources is therefore vital for fostering food security and social justice. Policies and initiatives supporting equitable access to land can assist to address the underlying causes of food insecurity and poverty by empowering individuals and communities to produce their own food, create revenue, and improve their livelihoods. This can lead to a more sustainable and equitable food system that benefits both individuals and communities while also promoting social justice by minimizing resource inequities.

Material and Methods

The study employed a quantitative research approach. This meant that the research would entail the collecting and analysis of numerical data. Inferential statistics were utilized in the study to draw inferences from the acquired data. The information was gathered from the Barbardiya Municipality, and 371 households were chosen at random from the population using a basic random sample approach. This strategy ensured that each household in the population had an equal opportunity to be chosen for the research.

The researcher utilized one-way ANOVA (analysis of variance) to examine the data, which is a statistical technique used to test for differences in the means of two or more groups. The researcher was able to use this strategy to see if there were any significant variations in the variables of interest across the selected families. Overall, the researcher was able to make accurate conclusions about the population of interest based on the data acquired by using quantitative research methodologies and inferential statistics in this study.

Variables

The "Land Ownership" variable, indicated in Katha, represented the ownership status of the land used to cultivate food. This variable has no relationship to itself since it had a set quality. The capacity of a family to get enough food was referred to as "Family Food Security," and there was a positive correlation between the two. Families that owned property had direct access to food grown on their own land, which increased the likelihood that their food security would be greater.

Table 1
Link between Household Food Security and Land Ownership

Variable	Description	Relationship to Land Ownership	Relationship to Family Food Security	Test
Land Ownership	The ownership status of the land (In Katha) where food is grown	N/A	Positive	One way ANOVA
Family Food Security	The ability of a family to access sufficient food	Positive	N/A	

Using one-way ANOVA (Analysis of Variance), the association between land ownership and family food security was examined. A statistically significant difference between the means of two or more groups was checked using this test. In this instance, the test was used to evaluate whether there was a substantial difference between households with and without land ownership in terms of the mean degree of family food security.

Hypotheses

The hypotheses testing for the ANOVA test in exploring the relationship between food sufficiency and landholding in Barbardiya Municipality is as follows:

H0: In Barbardiya Municipality, there is no significant variation in the mean food sufficiency score across different landholding groups.

H1: In Barbardiya Municipality, there is a substantial variation in the mean food sufficiency score across different landholding groups.

Results and Discussion

Descriptive Statistic

The statistics on food sufficiency from the sample of 370 families in Barbardiya Municipality are summarized in Table 2. The frequency and descriptive data for each category's food sufficiency are displayed in the table. The majority of households in the sample (145) reported having enough food for nine to twelve months, as seen in the table. For this group, the mean food sufficiency period is 11.58 months, with a 17.857 standard deviation. Families in the surplus group reported having more than enough food to last them for at least 14 months, with a standard deviation of 19.274 for this group.

Table 2
Food Sufficiency (In Months)

	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		

< 3 months	84	7.68	10.571	1.153	5.38	9.97	1	60
3 - 5 months	26	9.19	10.995	2.156	4.75	13.63	1	40
6 - 8 months	54	10.41	12.693	1.727	6.94	13.87	1	60
9 - 12 months	145	11.58	17.857	1.483	8.65	14.51	1	150
Surplus	61	14.64	19.274	2.468	9.70	19.58	1	100
Total	370	10.86	15.697	.816	9.25	12.46	1	150

Notes: N = number of observations, M = mean, SD = standard deviation, SE = standard error, 95% CI = 95% confidence interval for mean, Min = minimum, Max = maximum. The categories represent different periods of food sufficiency, ranging from less than 3 months to surplus that has been owned for more than a year. The total row represents all observations combined.

Families in the 3-month group had the biggest standard deviation and the lowest mean food sufficiency (7.68 months) (10.571). Families in the 3-5 month and 6-8 month groups, however, scored better on the mean measure of food sufficiency, with scores of 9.19 months and 10.41 months, respectively.Overall, the findings indicate that food sufficiency among households in Barbardiya Municipality varies greatly, with some families having more than enough food to support themselves and others finding it difficult to satisfy their minimal food requirements.

Test of Homogeneity of Variances

The table 3 shows the results of a variance homogeneity test for the size of land in Katha. The Levene statistic, degrees of freedom (df1 and df2), and significance level (Sig.) are specifically provided. The Levene statistic calculates the difference in variances between two or more groups. The test in this scenario is determining if the variability in land size in Katha are equal across five distinct categories.

The degrees of freedom (df1 and df2) denote, respectively, the number of categories minus one and the total number of observations minus the number of categories. Under the null hypothesis of equal variances, the significance level (Sig.) is the likelihood of receiving the observed test statistic (or a more extreme result). Statistical significance is normally determined using a significance level of.05 or less.

Table 3
Size of Land (Katha)

Levene Statistic	df1	df2	Sig.
1.838	4	365	.121

Notes:To test the hypothesis of similar variances for the amount of land in Katha across five categories, the Levene statistic was utilized. As evidenced by a non-significant Levene statistic (F(4, 365) = 1.838, p =.121), the assumption of equal variances was fulfilled.

ANOVA

The results of an analysis of variance (ANOVA) for the size of land in Katha are presented in Table 4. For the between-groups and within-groups variance components, the table shows the sum of squares, degrees of freedom (df), mean square, F-value, and significance level (Sig.).The sum of squares between groups shows the variance in land area in Katha that can be attributable to variations between the five categories. The sum

of squares within groups reflects the variation in land area in Katha which can't be explained by variations between categories.

The between-groups component has degrees of freedom equal to the number of categories minus one, and the within-groups component has degrees of freedom equal to the total number of observations minus the number of categories. Divide the total of squares by the degrees of freedom to get the mean square. The F-value is defined as the ratio of the between-groups mean square to the within-groups mean square, and it is used to test the null hypothesis that no significant difference exists between the means of the five categories.The significance level (Sig.) denotes the likelihood of receiving an F-value equal to or greater than the one observed under the null hypothesis. Statistical significance is normally determined using a significance level of.05 or less.

Table 4
Size of Land (Katha)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1879.891	4	469.973	1.926	.105
Within Groups	89044.800	365	243.958		
Total	90924.692	369			

Notes: The hypothesis of equal averages for the area of land in Katha across five categories was tested using ANOVA. There was no significant variation in the mean size of land in Katha between the groups, according to the data, $F(4, 365) = 1.926$, $p = .105$. The sum of squares between groups, degrees of freedom, and mean square show the variance in land area in Katha that can be related to variations between the categories. The variation in land size in Katha that cannot be explained by variations across categories is represented by the within-groups sum of squares, degrees of freedom, and mean square.

Robust Tests of Equality of Means

The results of the Welch and Brown-Forsythe tests, two reliable checks for equality of means for land size in Katha, are shown in Table 5. These tests are employed when the assumptions of variance homogeneity and normality are not fulfilled, which might result in erroneous findings when using regular ANOVA. The Welch test employs a modified F-ratio formula that accounts for uneven variances between groups, whereas the Brown-Forsythe test employs a modified F-ratio formula that accounts for unequal variances as well as data non-normality.

For both tests, the table displays the test statistic, degrees of freedom for the numerator (df1) and denominator (df2), and significant level (Sig.). The numerator of the Welch test has 4 degrees of freedom and the denominator has 119.671 degrees of freedom, but the denominator of the Brown-Forsythe test has 250.725 degrees of freedom.The significance level (Sig.) measures the likelihood of receiving a test statistic that is equal to or greater than the one obtained under the null hypothesis of equal means. Statistical significance is normally determined using a significance level of.05 or less.

Table 5
Size of Land (Katha)

	Statistic[a]	df1	df2	Sig.
Welch	2.181	4	119.671	.075
Brown-Forsythe	2.237	4	250.725	.066

Notes: a. Asymptotically F distributed. To test the hypothesis of equal means for the size of land in Katha across five categories, the Welch and Brown-Forsythe tests were

applied. When the assumptions of variance homogeneity and normality are not fulfilled, these tests are acceptable. According to the Welch test, t(119.671) = 2.181, p =.075, and the Brown-Forsythe test, F(4, 250.725) = 2.237, p =.066, there was no significant difference in the mean size of land in Katha across the groups. The numerator's (df1) and denominator's (df2) degrees of freedom denote the number of categories minus one and the residual degrees of freedom, respectively. Asymptotically, the tests are F distributed.

Post Hoc Tests Multiple Comparisons

The Tukey HSD test was used as a post hoc analysis to discover whether pairs of means varied substantially from one another. The findings revealed that there were no significant variations in the means of any two groups at a significance level of.05, with the exception of a marginally significant difference between the "Surplus" group and the "3 months" group (mean difference of -6.961, p-value of.064). As a result, we may infer that there is no substantial variation in mean land size across the various food sufficiency groups, with the exception of a probable difference between the "Surplus" group and the "3 months" group. Nonetheless, because the p-value is only marginally significant, this finding should be regarded with care.

Table 6
Dependent Variable: Size of Land (Katha)
Tukey HSD

(I) Food Sufficiency (Months)		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
< 3 months	3 - 5 months	-1.514	3.505	.993	-11.12	8.10
	6 - 8 months	-2.729	2.724	.855	-10.20	4.74
	9 - 12 months	-3.901	2.142	.363	-9.77	1.97
	Surplus	-6.961	2.627	.064	-14.16	.24
3 - 5 months	< 3 months	1.514	3.505	.993	-8.10	11.12
	6 - 8 months	-1.215	3.728	.998	-11.44	9.01
	9 - 12 months	-2.387	3.326	.952	-11.51	6.73
	Surplus	-5.447	3.658	.570	-15.48	4.58
6 - 8 months	< 3 months	2.729	2.724	.855	-4.74	10.20
	3 - 5 months	1.215	3.728	.998	-9.01	11.44
	9 - 12 months	-1.172	2.490	.990	-8.00	5.65
	Surplus	-4.232	2.918	.596	-12.23	3.77
4 9 - 12 months	1 < 3 months	3.901	2.142	.363	-1.97	9.77
	2 3 - 5 months	2.387	3.326	.952	-6.73	11.51
	3 6 - 8 months	1.172	2.490	.990	-5.65	8.00
	5 Surplus	-3.060	2.384	.701	-9.59	3.47
Surplus	< 3 months	6.961	2.627	.064	-.24	14.16
	3 - 5 months	5.447	3.658	.570	-4.58	15.48
	6 - 8 months	4.232	2.918	.596	-3.77	12.23
	9 - 12 months	3.060	2.384	.701	-3.47	9.59

Notes:According to the Tukey HSD post hoc test, there were significant variations in land size (Katha) for various degrees of food sufficiency (months). Particularly, individuals who had a surplus of food had a considerably smaller land size than those who had less than three months of food sufficiency (p=.064).

Homogeneous Subsets

According to table 7, the 3 months food sufficiency group had the smallest mean land size (mean = 7.68 Katha), followed by the 3-5 months group (mean = 9.19 Katha), 6-8 months group (mean = 10.41 Katha), 9-12 months group (mean = 11.58 Katha), and lastly the Surplus group (mean = 14.64 Katha). It is critical to note that the group sizes were uneven, and the Tukey HSD test was calculated using the harmonic mean of the group sizes. As a result, the Type I error levels are not guaranteed. Overall, these data show that there may be some changes in land area across levels of food sufficiency, but further research is needed to corroborate these findings.

Table 7
Size of Land (In Katha) Tukey HSD

Food Sufficiency (Months)	N	Subset for alpha = 0.05
		1
< 3 months	84	7.68
3 - 5 months	26	9.19
6 - 8 months	54	10.41
9 - 12 months	145	11.58
Surplus	61	14.64
Sig.		.141

Notes: Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 54.245.
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Means Plots

The link between the food sufficiency groups and the average area of land (in Katha) for each category is represented visually by the mean plot. The graphic demonstrates how the mean amount of land grows in tandem with rising food sufficiency ratings. This shows that those that have more land to work with are generally better able to attain food security.

The mean land sizes for the "less than 3 months" and "3-5 months" groups can be separated from one another with a difference of only 1.5147 Katha. Nevertheless, the average land size increases are greater for the "6-8 months," "9-12 months," and "surplus" categories. With a mean size of 14.639 Katha, the "surplus" category has the largest mean size of land.

This implies that families with a food surplus often have far bigger land holdings than those in the other food sufficiency groups. The mean plot, in general, sheds light on the connection between land ownership and food security and emphasizes how crucial access to land is for achieving food sufficiency.

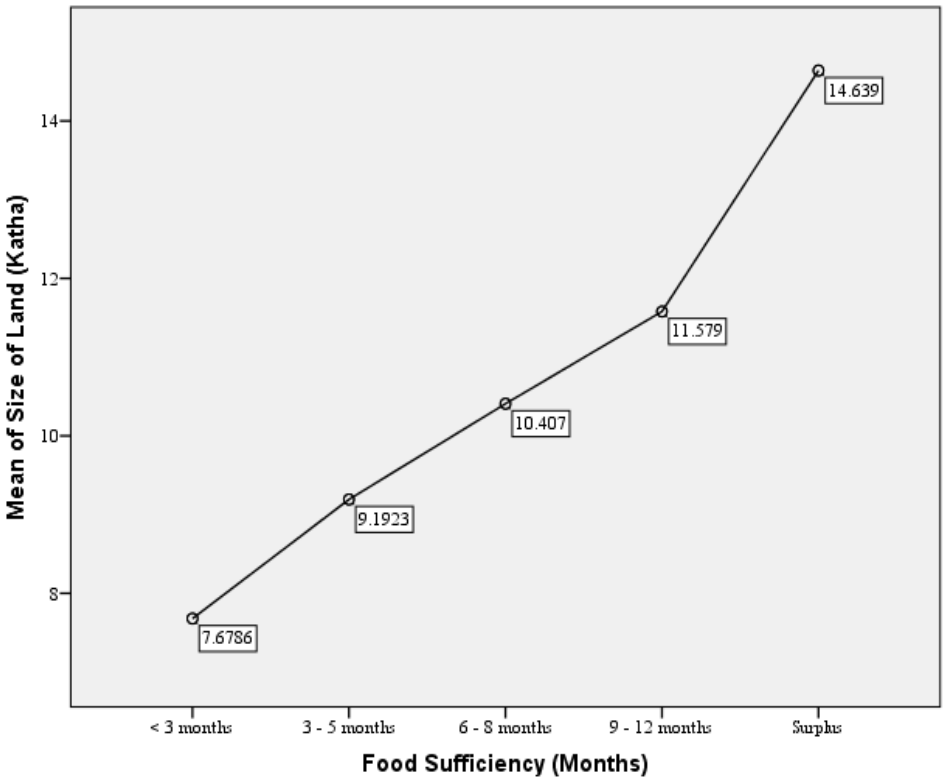

Figure 1 Relationship between the food sufficiency groups and the average area of land (in Katha)

Conclusion

According to the study's results, securing fair access to land and resources is critical to attaining food security in Barbardiya Municipality. The study emphasizes the need of policies and initiatives that encourage equal access to land and resources, particularly for vulnerable populations like women and small-scale farmers. Such policies and initiatives can aid in the promotion of social justice, the reduction of disparities, and the maintenance of sustainable food systems (Mutea et al., 2019)

The research underlines the significance of guaranteeing fair access to land and resources in order to achieve food security and promote social justice. The conclusions of this study are applicable not only to the unique context of Barbardiya Municipality, but also to other locations and nations confronting comparable issues in attaining food security and sustainability.

In conclusion, the research offers an analysis of food security and land size in Katha, based on data acquired through a household survey. According to the descriptive data, homes in Katha have a food sufficiency of 6-12 months, with some households having a surplus of food. ANOVA and robust tests of equality of means suggest that there is no significant difference in land size across the five groups. These findings imply that strategies targeted at enhancing food security in should prioritize expanding access to food and strengthening food storage over increasing land holding size. Overall, the study gives useful insights on food security status and land distribution, which can be used to drive policy choices and future research in this area.

These statistical findings may be understood in the context of power relations and resource allocation within the community using conflict theory. This idea holds that

societies are defined by social inequality and conflict between different groups, particularly those with power and those who do not.In the instance of the survey discovered no significant disparities in food sufficiency or land size among different categories, implying that resources are dispersed evenly. Yet, it is vital to evaluate the possibility that this distribution is the outcome of communal power dynamics.

People in positions of authority may have used their clout to ensure that resources are allocated properly. Instead, the absence of variations in resource distribution might be the result of a lack of mobility and social stratification in the society. Furthermore, while the statistical data show equitable resource distribution, it is critical to analyze the underlying social and economic systems that may be sustaining inequality. a priori, that there is a priori. These arrangements have the potential to concentrate wealth and resources in the hands of a few, worsening already existing socioeconomic inequities.

In sum up, the statistical findings of the research on food sufficiency and land size indicate that resources are allocated fairly in the community. Yet, it is vital to evaluate the underlying power dynamics and social structures that may be influencing these outcomes, as well as to continue critically analyzing and addressing socioeconomic inequities in the community and outside.

Recommendations

I would suggest this article to researchers, decision-makers, and organizations working on issues related to food security and land ownership based on the study's findings. In order to improve food security and advance social justice, policymakers and practitioners can use the study's useful insights into the relationship between land ownership and food security in a particular context to guide their decisions and interventions.

A rigorous analysis of the data is provided by using a quantitative research technique, especially the one-way ANOVA, which raises the study's credibility. The inclusion of numerous statistical tests and post-hoc analysis will strengthens the study's findings even more.

Furthermore, it is particularly noteworthy that the study will acknowledges the potential influence of social structures and power dynamics on resource distribution. This emphasizes the necessity of having a thorough understanding of the underlying problems and structures that support inequality and obstruct efforts to increase food security.

Overall, I think this article will makes a significant contribution to the study of land ownership and food security and is well worth reading for anyone who cares about these topics.

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