

The effect of the food insecurities in farming and non-farming households: lesson learnt from households in the Francis Baard district municipality, Northern Cape Province of South Africa

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ABSTRACT

The purpose of this study was to determine the effect of food insecurity in farming and non-farming households in the Francis Baard District Municipality. The research approach used in this study was quantitative. By using a cross-sectional survey, data was collected referring to the population of interest. A simple random sample comprising of 516 respondents from farming and non-farming households in the Frances Baard Municipality was selected. The data were analysed using multiple logistic regression (MLR) models. The results revealed that food shortages are more likely ($B = 0.22$, $p = 0.01$) to cause severe food insecurities in farming households when access to food gardens and smallholding is constant. On the other hand, non-farming households could also be affected by severe food insecurity due to food shortages ($B = 0.29$, $p = 0.04$) and lack of access to smallholding farming areas. The results further showed that food gardening is highly likely to reduce severe food insecurity. The results imply that the municipality has to provide access to food gardening facilities and smallholder plots for non-farming and farming households to combat severe food insecurity and promote food security. The policy on comprehensive producer support only recognises the support for the farmers' different categories than the households. Therefore, it is recommended that the policymakers amend this policy to enable the household to be empowered as beneficiaries.

Keywords: Food insecurity, farming households, Francis Baard

1. INTRODUCTION

The 1996 World Food Summit defined *food security* as physical, social, and economic access to sufficient, safe, and nutritious food by all people, at all times, to meet their dietary needs and food preferences for an active and healthy life (Nara, Lengoiboni & Zevenbergen, 2020). In its entirety, food security refers to the provision of safe, nutritious and adequate foods using unrestricted availability and access to the populace, and it was suggested as early as 1975 by Meyer-Rochow (Kewuyemi, Kesa,

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Chinma & Adebo, 2020; Dunga, 2020; David & Grobler, 2020). This phenomenon has attracted more research across the global academic environment (Oduniyi & Tekana, 2020) and has remained a topical issue for discussion (Garekae & Shackleton 2020). The WHO (2019) revealed that globally, 820 million people are undernourished, and the highest proportion of food-insecure households are from developing countries. According to Oduniyi and Tekana (2020), studies on food security classify food insecurities as due to persistent poverty, inequalities, and environmental factors such as climate change and prevalent pandemic (Diallo, Donkor & Owusu, 2020). In Southern Africa, policymakers and leaders have developed various programs that seek to address food insecurity (Wegerif, 2020). The FAO (2018, 2019) reported that initiatives such as the Comprehensive Africa Agriculture Development Programme (CAADP) and New Partnership for Africa's Development have a central objective to achieve zero hunger, which is a Sustainable Development Goal (SDG) of the United Nations (Shin, 2020).

Besides, the FAO's agricultural outlook also highlighted the importance of food security research in Sub-Saharan Africa (FAO, 2018). According to its report released in 2018, this region will continue to rely on the global markets' food supply to feed its populace due to its insufficient capacity to produce adequate food (FAO, 2019). Mbajiorgu (2020) reported that households and communities' prevailing realities determine food security strategies. This author seems to think that South Africa's agricultural transformation is an important food security strategy.

The importance of household and national food security cannot be overstated in the South African environment (Dunga, 2020). Consequently, the right to food is enshrined in the South African Constitution (David & Grobler, 2020). However, food insecurity is seen as a severe challenge during this current economic period compounded by the COVID 19 pandemic (Ngumbela, Khalema, & Nzimakwe, 2020). There have been contradictory reports regarding the food security status in the South African provinces. Some reports claim that food security in South Africa has improved, yet there is evidence that suggests that food security in the rural areas has worsened, even prior to the COVID 19 pandemic (Hendriks, Viljoen, Marais, Wenhold, McIntyre, Ngidi, Annandale, Matlou & Stewart, 2020). This observation makes an assumption that to obtain a level of food security; food has to be available, accessible, and adequate for everyone without discrimination.

On the other hand, the FAO emphasises that for South Africa to avert food insecurity, it should have average GDP growth of 2.2% or more over ten years (FAO, 2018). The general household survey of 2018 showed that 78.5% of households in South Africa that are involved in agriculture mainly want to contribute to the household's food security situation. Of the 9.3% of households in Northern Cape province, who are involved in agriculture, 50% of its families were engaged in agriculture for food security purposes, while 9.7% were engaged in agriculture for income purposes. The latter could be classified as farming households while the former as non-farming households.

In general, approximately 64% of the households in South Africa are food insecure (Ruiters & Wildschutt, 2010; Maltou & Bahta, 2019; Mmbengwa, Rambau, Rakuambo, Tempia & Qin, 2020) because of recurring droughts and poverty (Masipa, 2017). Northern Cape is one of the provinces with recurring drought incidences that make it more vulnerable to food insecurity (Matlou, 2019). Espoir and Ngepah (2020) found that all the Northern Cape district municipalities have high poverty and income inequalities. Of the district municipalities in Northern Cape Province, Frances Baard was reported as

having the smallest area (3.4%) but with a significant dense population of 33.3% (STATSA, 2016) and poverty levels (Matlou, 2019). On the other hand, Matlou *et al.* (2019) reported that the Frances Baard district is unique in that it has citizens with considerably high farming and non-farming assets.

Food and nutrition security are essential dimensions of sustainable development (McNeill, 2019). According to STATSA (2017), only 20.5% of the households in the Northern Cape are food insecure, and the food insecurity level is above the national average of 15.8%. It is further noted from the same report that Northern Cape (13.0%), Mpumalanga (12.3%) and North West (11.6%) have severe inadequate access to food, almost twice the national average. This figure may significantly increase due to climate change and COVID 19 pandemic lockdown in 2020. Dunga (2020) further revealed that currently, the severe food insecurities in the Northern Cape Province stand at 15.7%, with 46.9% of households suffering from moderate food insecurities. In the Northern Cape Province, Frances Baard has the highest youth, 32.6%, and working population, 30.9%, relative to other district municipalities.

Various studies conducted in the past and present have not ventured into how farming and non-farming households are affected by food security in a particular province of South Africa. This observation assumes that food security and insecurity are the same in both farming and non-farming households.

Farming and non-farming households play a critical role in the smallholder agriculture sector, food security and climate change in South Africa (Abegunde, Sibanda & Obi, 2020; Hariharan, Mittal, Rai, Agarwal, Kalvaniya, Stirling, & Jat, 2020). Therefore, this study was designed to determine the effect of the food insecurities in farming and non-farming households in the Francis Baard District Municipality. This determination will stimulate the families to develop innovations that may combat the ongoing prevalence of food insecurity in these households.

2. RESEARCH METHODS

2.1. Participants and procedures

The sample size of the study was 516. The selection of the participants took place using simple randomized sampling techniques. The participants were farming households [331 (64%)] and non-farming households [185 (36%)] from Frances Baard District municipality (ten local municipalities) in Northern Cape Province of the Republic of South Africa (Figure 1).



FIGURE 1: District municipalities in the northern cape province of the republic of South Africa.
Source: Google maps (2020)

Out of 331 farming households who participated in the study, the majority [130 (25.20%)] came from Sol Plaatje municipality, followed by those that came from Phokwane municipality [67 (12.98%)]. Non-farming households only constituted 36% of the sample (Table 1).

TABLE 1: Demographic analysis of levels of food security

Municipalities	Farming households	Non- Farming households
	N (%)	N (%)
Dikgatlong	65 (12.65)	26(5.03)
Phokwane	69 (13.3698)	49 (9.50)
Magareng	49 (9.50)	31 (6.01)
Sol Plaatje	146 (26.74)	72 (13.95)
TOTAL (n=516)	331 (64)	185 (36)

Source: Survey, (2019)

2.2. Materials and methodology

This study used a cross-sectional research design. In this design, a quantitative research approach was followed in the data collection. The quantitative approach was deemed an appropriate methodology for estimating, comparing, and evaluating the food insecurities in the Frances Baard District Municipality (Liang, Tian, Cheng, Jiang, Wang & Su 2020; Jian, Luukkonen, Yki-Järvinen, Salonen & Korpela 2020). Without using the quantitative approach, it would have been difficult to estimate the likelihood of the effects of household food insecurity and compare both farming and non-farming households in terms of food insecurity and security.

2.3. Measurement of variables

The collection of the data was through a closed-ended questionnaire. This questionnaire instrument was divided into two sections. The first section was mainly the questions that dealt with the demographic information, followed by the section that dealt with the status of the household food insecurity. In the latter part, the nine questions were probed. These questions were measured in terms of the Likert scale (1-7), where one is strongly agreed, four is neutral, and seven is strongly agree (Table 2).

2.4. Data analysis

The data was collected using the closed-ended question. Before capturing the data, the questionnaire responses were numerically coded (Langat, Nyangweso, Kipsat & Kebenei, 2011; Kunene, Nxumalo, Ngwenya & Masarirambi, 2020). The data was then captured into Microsoft Excel Version 2013. The data analysis commenced after the data was cleansed. The importation of the data followed this to the analytical software (IBM SPSS Statistics 25 software). The data analyses were done two-fold. The first data analysis was descriptive and was followed by inferential analysis. Descriptive studies entailed the presentation of the respondents (Nara, Lengoiboni & Zevenbergen, 2020). These descriptions were demonstrated using various tabular and graphical illustrations to describe the sample's nature, chosen to evaluate the farming and non-farming households. While the inferential analysis was carried out using the multinomial logistic regression model (MLS). In this model, the dependent variables were farming and non-farming households with the independent variables that were severely food insecure and food secure. During the analysis, the comparison was drawn from farming households and non-farming households in the Frances Baard district municipality.

TABLE. 2: Factors hypothesized to influence the level of household food insecurity in the Frances Baard district municipality

Variable name	Description of Variables	Measurements	Expected sign
Dependent Variable Households	Which households do you belong to	(1=Farming, 2=Non-farming)	+
Explanatory Variables			
HHN	Households having no food at all.	(1=Strongly agree – 7=Strongly disagree)	-
HHAG	Households having access to food through gardening.	(1=Strongly agree – 7=Strongly disagree)	+
HHFSR	Households having food from smallholder farmers than retailers.	(1=Strongly agree – 7=Strongly disagree)	+

Source: Survey, (2019)

2.5. Analytical framework

Multinomial Logistical Regression (MLR) model was used to evaluate the probability of the severe food security and food security to occur in farming and non-farming households in Frances Baard district municipality:

$$\text{Probability (Severe food insecurity)} = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K}} \dots \dots \dots (1)$$

Where $e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K}$ is the odds of severe food insecurity occurring in the Frances Baard Municipality (Terblanche, 2016) and when a natural log is assumed, $\ln(\text{odds}) = \alpha + \beta_1 X_1 + \beta_2 X_2 \dots \dots \dots + \beta_K X_K$.

Where, α = intercepts, X_1 = HNM, X_2 = HNAG, and X_3 = HHFSR.

The dependent variable was: farming and non-farming households, with the independent variables being severe food insecurity and food security.

Then the probability ratio (g) was: $g(1) = 1$ vs 2 , where 1 = farming households and 2 = non-farming households.

Consequently, farming households were compared to non-farming households.

$$g(1) = \frac{\pi(1)}{\pi(2)} = \text{prob} \frac{(\text{farming households})}{\text{Non-farming households}} \dots \dots \dots (2)$$

This equation estimates the probabilities of severe food insecurity and food secured in comparison between the farming household and the non-farming one. In addition, the equation below is for the estimation of the previously mentioned in using the natural logarithm.

$$\ln\{g(1)\} = \ln \frac{\pi(1)}{\pi(2)} = \ln (\text{Prob}(\text{farming households} | \text{Prob}(\text{non-farming households})) \dots \dots \dots (3)$$

Equations (1-3) were estimated using IBM SPSS Statistics 25 software.

3. RESULTS AND DISCUSSION

3.1. Descriptive and demographic analyses

Table 3 shows the results of the descriptive analysis of the farming and non-farming households in the Frances Baard District Municipality of South Africa. The results revealed that the sample's average age of non-farming (45.70 ± 15.73) and farming households (44.77 ± 15.95) was almost the same. More households selected in this study came from farming households compared to the non-farming households. More importantly, a large number of female respondents from the farming households [193 (55.00%)] and non-farming households [112 (60.50%)] constituted the sample of this study. The marital status, race, language and economic status of the respondents in the sample are presented in Table 3. As seen in Table 3, from the farming households, 24,2% were employed, 15,1% were self-employed, 21,7% were pensioners, and 2,6% were entrepreneurs. The non-farming households followed a similar trend (Table 3).

TABLE 3: Descriptive analysis of the farming and non-farming households in Francis Baard district municipality.

Variables & measurements	Farming	Non-farming
Age (year); M±SD	44.77 ± 15.95	45.70 ± 15.73
Household size, M±SD	5.031 ± 3.13	4.97 ± 4.33
Gender, n (%)		
Gender (male)	158 (45.00)	73 (39.50)
Gender (female)	193 (55.00)	112 (60.50)
Marital status, n (%)		
Married	136 (38.70)	79 (42.70)
Widowed	30 (8.50)	13 (7.00)
Separated/Divorced	22 (6.30)	8 (4.3)
Never married/Single	159 (45.3)	85 (45.9)
Race, n (%)		
Caucasian/White	5 (1.40)	2 (1.10)
African/Black	250 (71.20)	136 (73.50)
Indian	6(1.70)	2 (1.10)
Ancestry/Coloured	90(25.60)	45 (24.30)
Language, n (%)		
English	20 (5.70)	5 (2.70)
Afrikaans	104 (29.6)	61 (33.00)
Setswana	190 (54.10)	103(55.70)
Xhosa	24 (6.80)	8 (4.30)
Sesotho	10 (2.80)	4(2.20)
IsiZulu	1(0.30)	4(2.20)
Economic status, n (%)		
Employed	85(24.20)	35 (18.90)
Self-employed	53(15.10)	26(14.10)
Pensioner	76(21.70)	46(24.90)
Entrepreneur	9(2.60)	4(2.20)
Unemployed	126 (35.90)	74 (40.00)

Source: Survey, (2019)

FIGURE 2: Educational achievements of the farming respondents

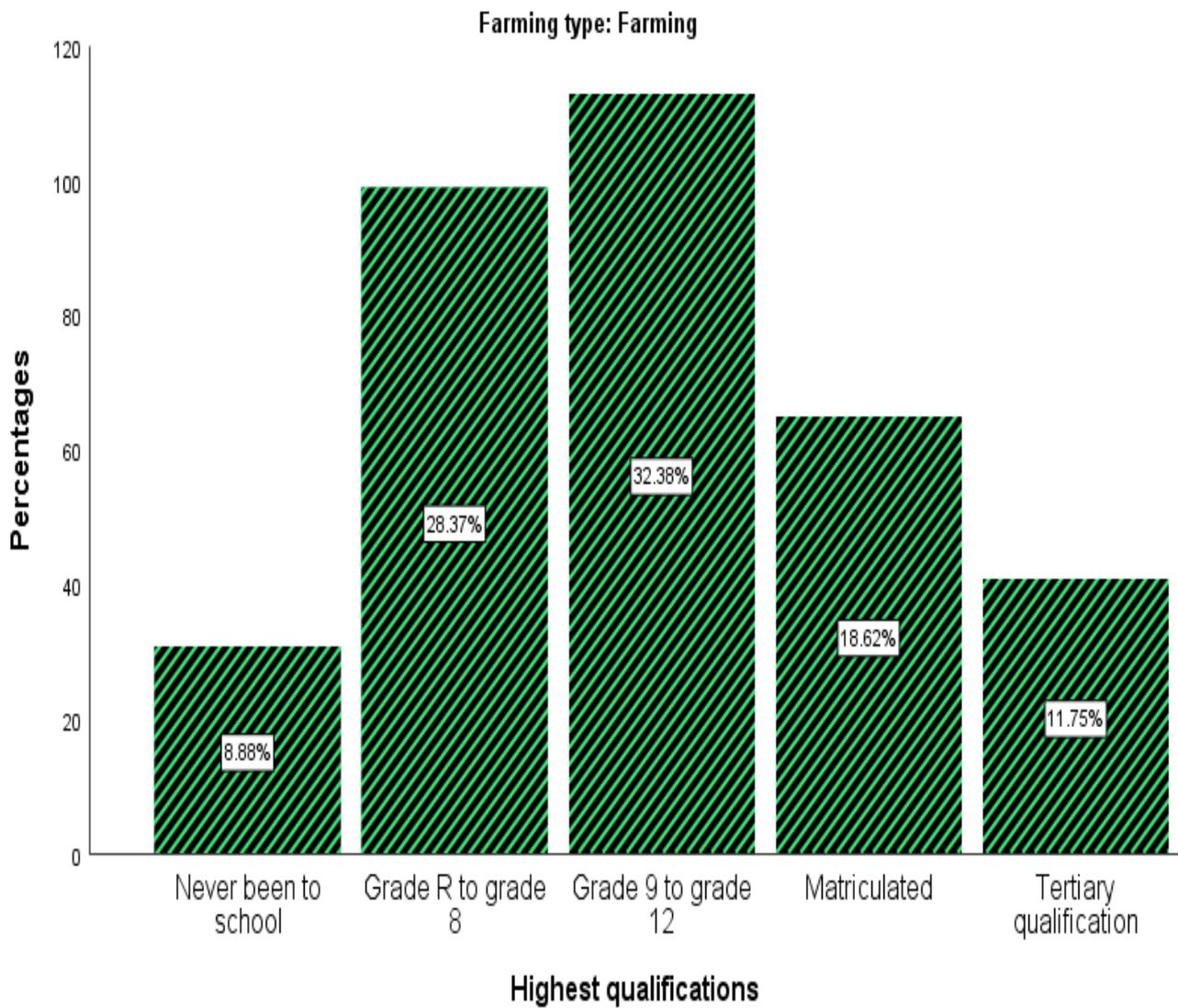


Figure 2 and 3 presents the educational achievements of the different households under consideration. It was revealed that a higher proportion of the respondents, regardless of the household category, were poorly educated.

FIGURE 3: Educational achievements of the non-farming respondents

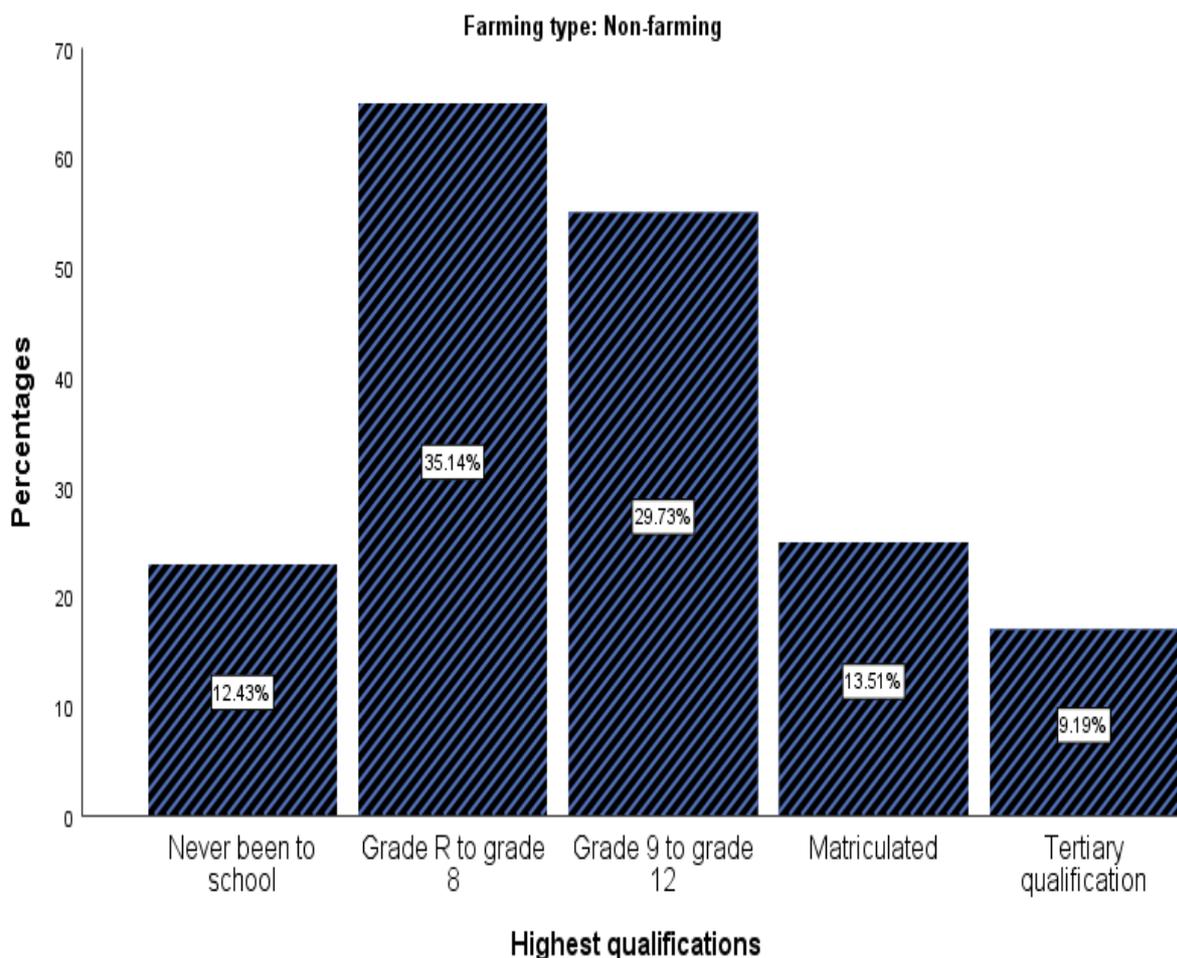


Table 4 depicts the respondents in terms of farming and non-farming households. The results show a mirror image in the representation of the regions in both farming and non-farming. According to the graphical illustrations, the highest number of household participants in both the farming (37.04%) and non-farming (35.68%) categories come from Sol Plaatje region, followed by the Phokwane (24.79% and 26.49% in the farming and non-farming, respectively) and Magareng (13.96% and 16.76% in the farming and non-farming respectively).

TABLE 4: Municipalities of the farming and non-farming respondents

Local Municipalities	Farming (%)	Non-Farming (%)
Dikgatlhong	11.11	11.89
Pokwane	24.79	26.49
Magareng	13.96	16.76
Sol Plaatje	37.04	35.68

The results of the demographic analysis of the levels of food security are presented in Table 5. In farming households, the results show that most of the regions under consideration suffer mostly from moderate food insecurity. However, severe food insecurity levels of 64.18% are reported in farming households in the Sol Plaatjie Region. Furthermore, 16.47% of non-farming households in the same region experience severe food insecurity. Throughout all regions, a very low percentage of food security was reported, with the lowest levels in Dikgathong (Table 5).

TABLE 5: The results of the demographic analysis of levels of food security

Region	Levels of food security	Farming households	Non-Farming households
		N (%)	N (%)
Dikgathong	Severe food insecurity	10 (15)	8 (18.60)
	Moderate food insecurity	44(67)	31 (72.09)
	Food secured	9 (18.9)	3 (6.98)
	Missing	2 (5.4)	1(2.33)
	Total	65 (100)	43 (100)
Polokwane	Severe food insecurity	25 (26)	3 (6.1)
	Moderate food insecurity	59 (61.5)	29 (59.2)
	Food secured	8 (8.3)	5 (10.2)
	Missing	7 (7.3)	12 (24.5)
	Total	67 (100)	49 (100.0)
Magareng	Severe food insecurity	6 (12.2)	3 (9.7)
	Moderate food insecurity	28 (57.1)	20 (64.5)
	Food secured	10 (20.4)	4 (12.9)
	Missing	5 (10.2)	4 (12.9)
	Total	49 (100)	31 (100)
Sol Plaatje	Severe food insecurity	181 (64.18)	14 (16.47)
	Moderate food insecurity	76 (26.95)	44 (51.77)
	Food secured	13 (4.61)	12 (14.12)
	Missing	12(4.26)	15 (17.65)
	Total	130 (100)	85 (100.0)

Source: (Survey, 2019)

Estimates of internal consistency were measured by Cronbach's alpha coefficient. The results revealed that all measurements exceeded 0.60 (Table 6). This result implies that the scales used had acceptable reliability.

TABLE 6: Reliability test for household food insecurity of farming and non-farming households in Francis Baard municipality.

Items	N	Mean	SD	Min	Max
Statistics for the scale					
Farming	8	3.99	.32	2.88	4.77
Non-farming	8	3.94	.34	2.20	4.93
Inter-item correlation					
Farming	8	0.18	.05	-0.13	0.63
Non-farming	8	0.19	.03	-0.03	0.61
Item total statistics	Scale Mean if item deleted	Scale variance if item deleted	Corrected item total correlation	Squared Multiple correlation	Alpha if item deleted
Farming households					
Households not having enough food	28.16	28.98	.62	.50	.55
Households members not able to it preferred food	28.06	29.27	.51	.44	.57
Households members eat fewer meals	27.77	30.03	.43	.32	.59
Households having no food at all	27.79	29.45	.48	.40	.58
Households sleep hungry	27.38	30.15	.51	.36	.57
Smallholder avail food to households	27.95	34.69	.18	.09	.66
Households getting food from the gardens	27.12	35.79	.10	.11	.68
Food from smallholder cheaper than the retailers	29.01	39.53	-.06	.05	.70
Non-farming households					
Households not having enough food	27.94	31.14	.53	.44	.58
Households members not able to it preferred food	27.85	30.43	.51	.43	.58
Households members eat fewer meals	27.51	31.85	.34	.22	.63
Households having no food at all	27.52	30.48	.46	.39	.59
Households sleep hungry	27.11	31.88	.49	.41	.59
Smallholder avail food to households	27.57	35.03	.24	.14	.65
Households get food from gardens	26.60	36.37	.14	.10	.67
Food from smallholder cheaper than the retailers	28.57	37.45	.11	.09	.68
	Cronbach's Alpha		Standardized Cronbach's Alpha		
Reliability coefficients for 8 items	Farming	0.648	Farming	0.638	
	Non-farming	0.655	Non-farming	0.655	

3.2. Inferential analysis

Food insecurity is a critical socio-economic factor, which, if underestimated, could lead to social instability. Northern Cape government is one part of the South African government with enormous strain on food insecurity. This current study sought to compare households (farming and non-farming) to determine the effect of household food insecurity in the Frances Baard District Municipality. The levels of food insecurity (severe food insecurity and food secured) were measured by looking at three factors (Table 7).

TABLE 7: The effects of level of household food insecurity in the Frances Baard district municipality.

Food security	Effects	Farming households			Non-farming households		
		B (SE)	Exp (B)	p-value	B (SE)	Exp (B)	p-value
Severe food insecurity							
	Intercept	-1.75 (0.66)		0.01	-2.33 (0.98)		0.02
	HHN.	0.22 (0.08)	1.24	0.01	0.291 (0.14)	1.34	0.04
	HHAG.	0.10 (0.08)	0.91	0.24	-0.28 (0.15)	0.76	0.06
	HHFSR	0.12 (0.11)	1.13	0.26	0.34 (0.16)	1.40	0.04
Food secured							
	Intercept	-1.98 (0.86)		0.02	-3.54 (1.17)		
	HHN.	0.04 (0.11)	1.05	0.70	0.27 (0.15)	1.31	0.07
	HHAG.	0.03 (0.14)	0.97	0.79	0.04(0.17)	1.04	0.84
	HHFSR	0.10 (0.14)	1.11	0.47	0.23 (0.17)	1.26	0.18
Pseudo R-Squares							
	Cox and Snell	0.037		0.102			
	Nagelkerke	0.042		0.114			
	McFadden	0.018		0.048			
Goodness-of-fit							
	Pearson	df = 267, sig = 0.41			df = 189, sig = 0.486		
	Deviance	df = 267, sig = 0.90			df = 189, sig = 0.855		

Notes: HHN = Households having no food at all, HHAG = Households having access to food through gardening, HHFSR= Households having food from smallholder than retailers.

3.2.1. Farming households

The results show a significant effect (B= 0.22, p = 0.01) of food shortages (HHN) on the severity of farming households' food insecurity. The food shortage is more likely to influence these households' increase of food insecurity by 22%. The results further show that food gardens and smallholder farming pieces are not significant to influence severe food insecurity in this type of farming activity. These results suggest that food security interventions may not succeed by providing land for gardening and smallholder farming alone. These results are contrary to the norms that land provision could assist farming households with food insecurity reduction. The provision of inputs coupled with land resources or input subsidies or capacity building may help these households produce more food to avert food insecurity.

3.2.2. Non-farming households

The lack of food has a significant positive impact on food insecurity ($B = 0.29$, $p = 0.04$). Similarly, households with access to smallholder farming resources also positively influence food insecurity ($B = 0.34$, $p = 0.04$). Notably, access to food gardens has a significant negative impact ($B = -0.28$, $p = 0.05$) on food insecurity when a lack of food and smallholder farming resources are held constant. These results imply that increasing access to smallholder farming to non-farming households could reduce food insecurity by 28%. This observation may suggest that the best intervention is to provide farms to households without farming experience. This suggestion may not make sense since experience could provide improvement in farming. The results may be implying that households without farming backgrounds may be willing to explore farming opportunities rather than those with the current smallholder farms.

4. POLICY IMPLICATION OF THE STUDY

The analysis of the farming and non-farming households' food security status in Frances Baard municipality is critical to economic development and social cohesion. The study was conducted during the COVID 19 global pandemic, which on its own, has adversely affected the economy. Although this study was not designed to analyse the impact of COVID 19 on food security, it is vital to indicate that the effect of COVID 19 on the food security of the households is inescapable.

Practically and theoretically, the results imply that for the municipality to combat food insecurity and promote food security, the municipality should identify those households that do not have food at all in both non-farming and farming households. The policy on comprehensive producer support only recognizes the support for the different farmers categories rather than the households. The advisors and policymakers should amend this policy to enable households to be empowered regardless of their food production involvement.

The policy, such as Fetsa Tlala and the National Development Plan (NDP), should be amended to identify and include vulnerable households. Though Greenberg, Hara, Friel, and Sanders (2018), also suggested that there be a food Legislation Advisory Group in health centres that may assist the households to start some micro agricultural activities in the form of household food gardens and retailing. The latter could help the households to bring the much-needed income that could supplement the household income.

Furthermore, it has been revealed that single-headed families are the most affected by food insecurity. The government's efforts to make small-scale farming commercially viable have seen severe challenges. Although it has been cited that small-scale farming plays a critical role in ensuring household food security, it was found that households with gardens and access to food from smallholder farming have an insignificant impact on the severity of the food insecurity in Frances Baard Municipality. These findings theoretically imply that food security interventions had no meaningful impact on households' food insecurity situation.

5. CONCLUSION AND RECOMMENDATIONS

This study is significant to all government structures since it tends to uncover the shortcomings of the policy trajectory and unforeseen factors that may impede the securing of food by the households at a municipality level. On the other hand, it is clear that climate change and pandemics such as COVID 19 play a pivotal role in food insecurity, while economic factors such as unemployment, poverty and social exclusion could negatively impact food security.

Given the study and its findings, it may appear to point out that both farming and non-farming households are prone to food insecurity in this municipality if appropriate policy measures are not in place and implemented with due diligence. This view affirms the norms that suggest households with food gardens and small farming areas may use their surplus products for their household food security needs. However, it does not expose the impact of household dependency on the state on food parcels. If the latter was considered, the households with support from the state could have been in a different light.

In conclusion, the study showed that food insecurity significantly affects low-income households regardless of their farming status. Therefore, it is recommended that these households be capacitated to perform farming activities to be food secure. The capacitation of these households may not imply that the municipality provides them with farming infrastructure. However, instead, they should carefully be selected using empirical measures and be trained on the program so that the agricultural resources they are given could be used efficiently and productively for their food security.

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