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FOOD INSECURITY AND COPING STRATEGIES OF PHEZUKOMKHONO MLIMI FARMING HOUSEHOLDS IN THE NKOMAZI LOCAL MUNICIPALITY, SOUTH AFRICA

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ABSTRACT

Although South Africa is food secure at the national level, food insecurity is still experienced at the household and individual levels. In 2005, the Mpumalanga Provincial Government introduced the Phezukomkhono Mlimi (PKM) programme to help alleviate household food insecurity. However, the recent food security status of the beneficiaries has not been investigated. Therefore, this study evaluated food accessibility, coping strategies and factors correlated with food insecurity amongst beneficiaries of the PKM programme. The data were collected using a structured questionnaire from 355 PKM farming households. Descriptive statistics and multivariate analysis were used to analyse the data. The findings of this study suggested that the study area had a high level (72.68%) of household food insecurity and the mean Household Food Insecurity Access Scale (HFIAS) score was 4.20. The study was also able to demonstrate that the coping strategies commonly adopted by food-insecure households included dietary changes and increasing short-term food availability such as buying less expensive food (79.44%), consumption of unconventional food (68.73%) like edible insects such as mopane worms and locusts, eating uncultivated or wild vegetables and fruits (96.90%), and harvesting immature food crops (96.62%). Marital status, the level of education, household size and engagement of households in off-farm or non-farm income-generating activities were significantly correlated with household food insecurity in the study area. It can thus be concluded that the programme has not helped to improve food accessibility among the participants of the programme. However, the current food security status in the study is not at the level where its impact could have lasting negative effects on households and society at large given that very few households adopted severe or irreversible strategies to counter the effects of food insecurity. In view of this, policy interventions to improve access to education, family planning and off-farm income-generating activities are recommended.

Key words: Food availability, Food inaccessibility, Food security, insufficient food

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INTRODUCTION

South Africa leads sub-Saharan African countries in the ability to meet national food security [1]. Nevertheless, most of its people and households still face elevated levels of food insecurity [2, 3]. Food insecurity is the situation whereby households have no access to adequate food due to restrictions in finances or other resources [4]. Inadequate food accessibility contributes to household food insecurity, and it is associated with negative health and nutrition outcomes [5]. Food accessibility is one of the four indicators of food insecurity and has been identified as one of the main drivers of food insecurity in South Africa [6]. Recent statistics show that 7 to 17.30% of the population in South Africa struggle to access food, resulting in moderate to severe food insecurity [7]. These figures are likely to have risen due to the impact the coronavirus disease 2019 (COVID-19) pandemic had on food systems [8].

Communities as well as individuals adopt various behaviours such as purchasing food on credit, limiting portion sizes at mealtime, buying less expensive or less preferred food, and borrowing food or money to buy food to augment access to food [9]. This series of behaviours constitutes coping strategies. These coping strategies could result in altering food consumption patterns on a short-term to long-term basis. Therefore, by studying these behaviours, it is possible to assess the severity of food insecurity [10].

Literature shows that own-food production is a promising strategy for alleviating food insecurity because it reduces reliance on purchased food [11]. Heavy reliance on markets for food predisposes households to price fluctuations. This is critical when considering the high South African unemployment rate which is currently 34.52% [12]. For example, in a study conducted by Modibedi *et al.* [13] in Emfuleni Municipality among farmers participating in a food security programme, it was observed that own-food production improved access to fresh vegetables and reduced reliance on spaza (convenient) shops. This self-sufficiency through own-food production also became significant during the COVID-19 outbreak that was associated with restricted travelling and interrupted food supply [14].

To deal with the problem of food insecurity, the South African government formulated various policies and initiated several food security programmes [3]. Phezukomkhono Mlimi (PKM) is one such programme that was introduced by the Mpumalanga Provincial Government in 2005. One of the major objectives of the PKM programme is to increase food production with the aim of increasing food accessibility and income generation by marketing the surplus produce [15]. The PKM programme supports subsistence and smallholder farmers producing vegetables and grain crops. It provides seeds, fertilisers, chemicals and tractors to enable the beneficiaries to produce their own food [16].

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The PKM programme has been plagued with setbacks since its inception. For instance, Shabangu [17] reported that the programme failed to provide adequate seeds, chemicals, fertilisers and tractors for mechanisation service on time. This was corroborated by Grobler [18], who revealed that the programme had been failing to plough and plant at least a quarter of the planned targets for the past three consecutive years due to non-functional and broken tractors. Institutional controls resulted to several configurations in the implementation of the PKM programme with changed entities responsible for the mechanisation service over the period with the aim of finding a cost-effective system while ensuring maximum support to beneficiaries [16]. Recently, the PKM programme was unable to acquire new tractors and implements or even repair enough number of broken tractors in the fleet due to budgetary limitations. The budgetary limitations also resulted to changes in priority, with vulnerable and subsistence producers being prioritised to receive free assistance with mechanisation service from the PKM programme while the other categories of beneficiaries expected to make a contribution for fuel and lubrication when needing such service [15].

To date, the impact of the PKM programme on food accessibility and consequently food security has not been thoroughly investigated. A few studies [16,18] about the programme that could be sourced, were conducted in other areas of the province about a decade ago. Furthermore, the study by Masoka [19] did not assess food security but instead examined the challenges experienced by the beneficiaries of the PKM programme using a sample size of 44 respondents in the Nkangala District Municipality, Mpumalanga province. Meanwhile, the study by Shabangu [17] was conducted using non-standardised food security measurement tools on a sample size of 120, and it revealed that 68 % of the respondents were food secure. Therefore, this study assesses food accessibility, coping strategies and factors correlated with food insecurity among PKM beneficiaries by employing current and standardised methodologies on a larger population. The results of this study can be used to inform policy decisions considering that there is minimal evidence of research done to examine the impact of government interventions such as the PKM.

MATERIALS AND METHODS

Study area, population and data collection

This study was conducted in the Nkomazi Local Municipality (NKLM) of the Mpumalanga province, South Africa. The study area was chosen due to its high unemployment rate (34.20%) and high number of households involved in agricultural activities [20].

The target population included all 543 agricultural households in the NKLM that benefitted from the PKM programme in the 2018/19 production season. Only

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household heads listed in the programme within the target population were eligible to participate. Therefore, only 355 agricultural households met the inclusion criteria and were available to participate in the study. This translated to 65% of the study population. This quantitative and cross-sectional study collected data on socioeconomic characteristics, the Household Food Insecurity Access Scale (HFIAS), and Coping Strategies Index (CSI) between 1 February and 24 March 2020.

Data management and analysis

Data were entered into Microsoft Excel and imported into the Statistical Package for the Social Sciences (SPSS version 28). The HFIAS score was thereafter determined for every household by adding the codes for every frequency-of-occurrence question. This score denotes the household's food insecurity level over the past 30 days. The occurrence of each of the nine food-insecurity-related conditions was coded as 0 = no occurrence, 1 = rarely, 2 = sometimes, and 3 = often occurs. Using the nine experience items, respondents were categorised into three: (i) feelings of uncertainty or anxiety concerning the household food stocks (described by item 1), (ii) perceptions that household food is of insufficient quality and food type preference (described by items 2–4) and (iii) insufficient food intake and its physical consequences (described by items 5–9) as suggested by Coates *et al*. [21]. Households with higher HFIAS scores experience more food insecurity than the ones with lower scores. The CSI was used to identify the diverse groups of strategies that households employed to deal with food insecurity.

The dependent variable (household food insecurity access) was reclassified into a dichotomous variable (1 = Food insecure and 0 = Food secure) by collapsing or merging the household food insecurity access categories, that is, mildly, moderately and severely food insecure into food insecure as suggested by several authors [22]. This reclassification from a multinomial to a dichotomous variable allowed for the application of the binary logistic regression model, which requires that the dependent variable has only two possible outcomes [23].

Categorical variables were analysed using descriptive statistics and presented as tables and figures. Multivariate analysis was used to identify the factors that were significantly correlated with household food insecurity to draw conclusions that are more realistic, precise and closer to the actual situation [24]. Binary logistic regression is one of the techniques and tools normally applied when performing multivariate analysis [25]. As adopted from Harris [26], the equation of the binary logistic regression model is as follows: -

$$P(y) = \frac{1}{1 + e^{-1(\beta_0 + \beta_1 X_1 + \beta_2 X_2)}} \ldots\ldots\ldots\ldots (1)$$

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Where P(y) is the probability of one category (often the presence of a behaviour or condition) of the dependent variable *Y (*the Y above can be either 1 or 0, depending on the score of i^{th} household on the dependent variable). The β represents the coefficients of the independent variable, and X stands for the independent variables.

The model was built by running univariate analysis to identify independent variables significantly associated with the dependent variable at a cut-off point of $p \leq 0.20$. Later, a multivariable binary logistic regression model was fitted using all the variables that were significantly associated with the dependent variable in the univariate analysis. Confounders were tested by assessing the measure of association before and after adjusting for a potential confounding variable. A variable with an estimated measure of association that varied by >10% was deemed a confounder and then kept in the model. The variance inflation factor (VIF) and tolerance values were calculated and the results showed that all the independent variables had VIFs < 3 and tolerance values > 0.20. These confirmed that multicollinearity was not a problem.

The omnibus test evaluated the model's goodness of fit. The model with the predictors fits the data more appropriately than the null model [$x^2(26) = 135.42; p=0.00$]. In addition, the Hosmer-Lemeshow test was performed to assess the goodness of fit of the model, and the results showed that the model fit the data well [$x^2(8) = 6.71$; $p = 0.57$] at $\alpha = 0.05$ significant level.

Ethical consideration

The study was approved by the Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) and the University of South Africa (Ref #: 2019/CAES_HREC/178) before the data collection commenced.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

Just over half (56.05%) of the sample were over 60 years and 59.44% were females (Table 1). About half (49.86%) of the respondents were married. Many respondents (43.66%) had a primary education while 41.97% did not have a formal education. In terms of farm size, most respondents (60.28%) had less than three hectares of farmland.

Food insecurity among farming households

The study showed that 36.06% of respondents were worried about not having enough food, while 62.54% were unable to eat their preferred food (Table 2). Two-thirds (66.20%) ate a limited variety of foods and the majority (70.14%) ate food they did not prefer. Nearly 59.72% indicated that they ate smaller quantities of food while 61.41% had fewer meals in a day. The results conform with other authors [27] who observed that the majority of the households ate a limited variety of foods (78.91%), ate food they did not prefer (77.70%),

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had fewer meals in a day (64.91%) and were unable to eat the preferred food (81.41%) in the study conducted among farming households in Bangladesh.

The majority of households (62.50%) experienced insufficient food quality (Figure 1). This is a worrying finding given that eating insufficient food quality is associated with poor educational and psychological performance, as well as poor health outcomes in both adults and children [28]. Furthermore, 36.06% of the respondents experienced anxiety and uncertainty about food supply. This finding was comparable to that of Shone *et al.* [29] in a study conducted in the West Abaya district of Ethiopia. Finally, about 59.70% of the respondents were subjected to insufficient food intake and its physical consequences in this study. This means that at some stage over the study period the respondents had either slept hungry or had nothing to eat the entire day and night. However, these findings contrast with findings by Shone *et al.* [29] who observed that 34.50% of the households in their study fell within this domain. The differences in these studies could be attributed to the fact that in the present study, data were collected during pre-harvest season while in the latter study, data were collected over the harvesting season. The pre-harvest season is associated with higher food inaccessibility compared to the harvesting season [30].

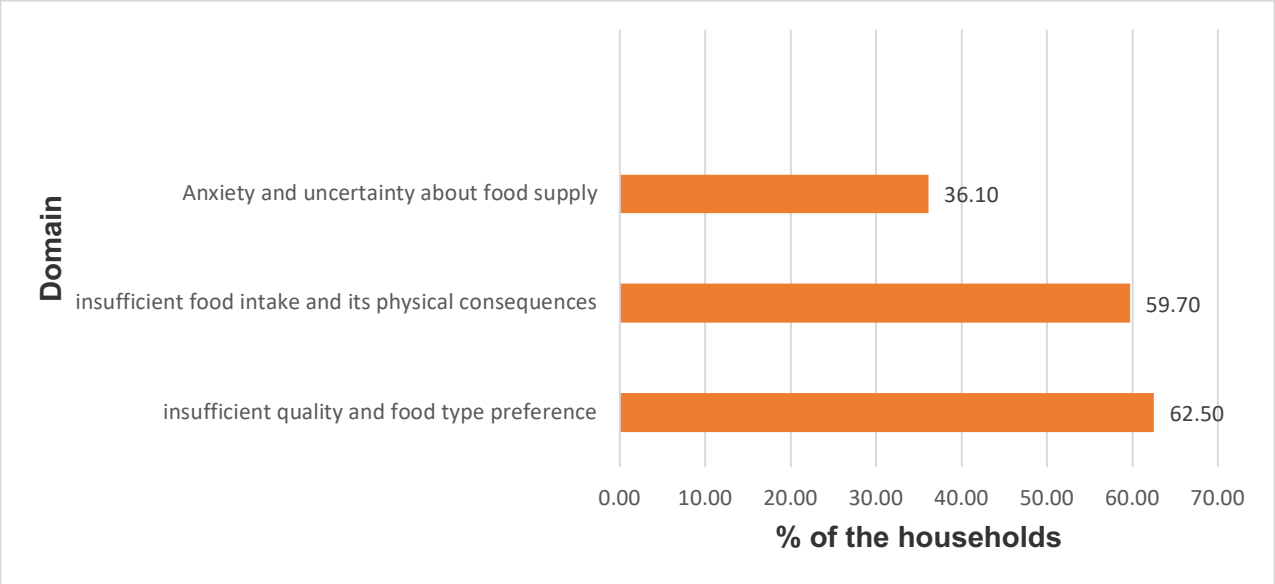

Figure 1: Distribution of households by Experience Food Insecurity Access-related Domains (N =355)
NB: Multiple responses were permitted

Less than one-third (27.32%) of households were food secure. The remaining 16.06% and 56.62% were mildly and moderately food insecure, respectively (Figure 2). A mean HFIAS score of 4.20 was observed in the current study. This indicates that households generally had inadequate access to food. Moreover, it is higher than the average (<2) of the Mpumalanga province [2] where the PKM programme was

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implemented. Furthermore, the food security status of the households was reclassified into two levels, that is, food secure and food insecure. Accordingly, by combining mild and moderate levels, 72.68% of the households were food insecure and 27.32% were food secure. This shows that the proportion (72.68%) of PKM farming households experiencing food inaccessibility in the NKLM was higher than the national figure of 17.30% and that of the Mpumalanga province (22%) [7]. However, since Statistics South Africa used a sample from the general population, this could explain the differences observed.

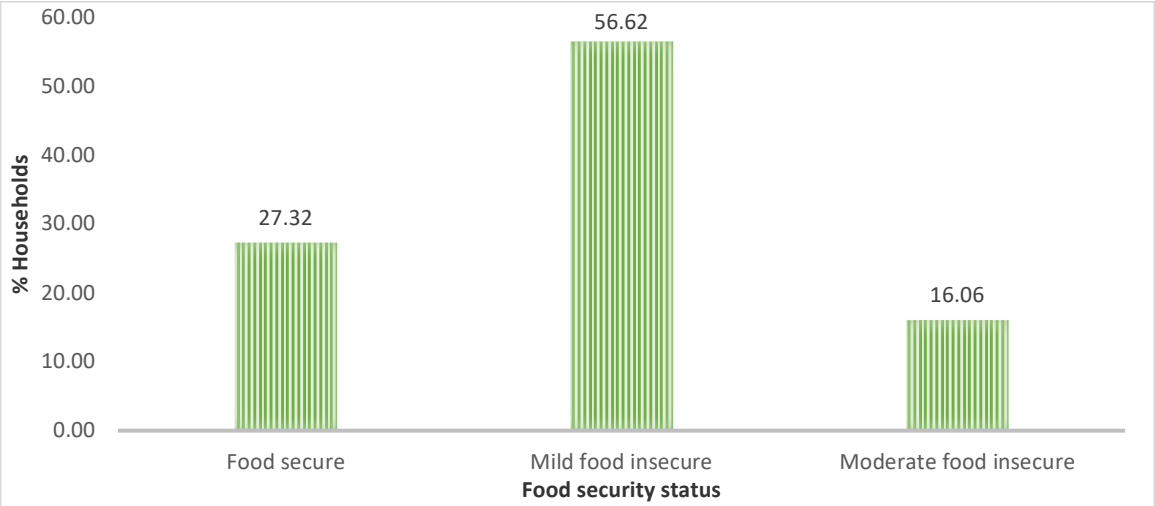

Figure 2: Distribution of households by food (in)security access prevalence (N=355)

Coping strategies adopted by households

Increasing short-term food availability was the most adopted strategy by households to help alleviate food inaccessibility (Table 3). Within this group, most respondents (96.92%) ate uncultivated and wild vegetables and fruits, while 96.62% harvested immature food crops. The number of respondents resorting to increasing short-term food availability as a coping strategy in this study was much higher than in previous studies done in the country. For example, in a study conducted in Potchefstroom and Thabazimbi, 62.10% of the participants consumed wild food [31] while 37.01% gathered wild food, hunted or harvested immature crops in a study done in Jozini, KwaZulu-Natal province [32]. Therefore, these findings raise concerns about the effectiveness of the PKM programme in the study area. However, the high consumption of wild food observed in this study could be attributed to the increased awareness created by several strategies that have been implemented to promote wild foods [33].

Some respondents opted for rationing, and the most common rationing strategy adopted involved allowing children to eat first (60%). About 79.44% of the respondents bought less expensive food and over two-thirds (68.73%) consumed

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unconventional food such as mopane worms and locusts as a way to cope with food inaccessibility. The findings concur with other authors [34] who observed that most (74.80%) households consumed mopane worms in the study conducted in Gwanda District, Zimbabwe. The consumption of edible insects such as mopane worms and locusts are commended [35]. These insects are good sources of proteins and iron needed for the production of haemoglobin, a constituent of red blood cells [35]. The haemoglobin prevents anaemia while the red blood cells are essential for the conveyance of oxygen and nutrients around the body [36].

Withdrawal of children from school (3.38%), migrating to search for jobs (28.73%), households seeking off-farm employment (37.75%), borrowing money (30.99%), selling livestock (25.92%) and selling of household assets (16.62%) were also adopted as coping strategies, albeit by few respondents. This shows that the food insecurity situation is not severe or at the point where participants are forced to adopt irreversible coping strategies, notwithstanding the high numbers (72.68%) of people affected by food insecurity. This is encouraging as evidence in literature [37] suggests that severe and irreversible coping strategies such as selling household assets, withdrawal of children from school, borrowing money and so forth, have lasting negative effects on the food security status of households and society.

Factors correlated with food insecurity among PKM farming households

In this study, marital status, age of household head, level of education, household size and participation in non-farm activities were significantly correlated with food insecurity (Table 4). Households headed by widows were twice as likely to be food insecure (adjusted odds ratio (AOR) = 1.95; 95% confidence interval (CI): 1.02–3.71; p-value (p) = 0.04) when compared to households headed by married respondents. Similar results were observed by Aboaba *et al.* [38] in a study conducted among farming households in Nigeria. A possible reason for this could be the fact that widowed heads are the sole providers in their households, unlike married couples who jointly contribute to meeting their household needs.

Respondents aged 51 to 60 years (AOR = 0.09; 95% CI: 0.01–0.65; p = 0.02), 61 to 70 years (AOR = 0.05; 95% CI: 0.01–0.40; p = 0.00), 71 to 79 years AOR = 0.05; 95% CI: 0.01–0.41; p = 0.00), and > 80 years (AOR = 0.04; 95% CI: 0.00–0.34; p = 0.00) had lower odds of being food insecure when compared to households headed by younger heads (aged 18 to 30 years) as the referent. The finding of this study is in line with other authors that also observed that households headed by older persons (above 51 years) were less likely to suffer from food insecurity compared to households headed by youth in the study conducted in Australia [39]. The current study and the one conducted in Australia by Kent *et al.* [39] consisted predominantly of retirees and older respondents who are likely to be beneficiaries of retirement

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funds and social grants, which have a potential impact on food accessibility and hence food security.

Households headed by individuals who did not have formal education were ten times (AOR =10.07; 95% CI: 2.43–41.8; p = 0.00) as likely to be food insecure compared to households that were headed by individuals who had attained tertiary education (referent). Similarly, households headed by respondents with Grade 12 education (AOR = 5.14; 95% CI: 1.10–24.1; p = 0.04) or without Grade 12 education (AOR = 8.18; 95% CI: 2.09–32.1; p = 0.00) had significantly higher odds of experiencing food insecurity as compared to households headed by individuals who had attained tertiary education. These results suggest that food insecurity decreases with the increase in level of education of the household head. This view is supported by other authors in the study conducted in the Kedida Gamela District of Ethiopia who found that education significantly improved household food security status [37]. This is because people without formal education have lower prospects of finding jobs and earning stable incomes which can be used to buy food, especially in the current crippling global economy [12].

The odds of households with six to ten members experiencing food insecurity were twice (AOR = 2.11; 95% CI: 1.18–3.76; p = 0.01) that of households that had fewer family members. The results of the present study suggest that having a large household size was significantly correlated with household food insecurity. Similar assertions have also been made in the literature [2]. This is because the head of a household will be forced to feed more people with the limited resources in the household.

Households headed by individuals who were involved in non-farm activities (AOR = 0.52; 95% CI: 0.29–0.94; p = 0.03) were significantly less likely to experience food insecurity compared to those who did not participate in non-farm activities. Similarly, findings by Yohannes *et al.* [37] in the study conducted among rural farming households in the Kedida Gamela District of Ethiopia demonstrated that households headed by individuals who participate in non-farm activities were less likely to experience food insecurity compared to their counterparts who did not participate in non-farm activities. This suggests that participation in non-farm activities has the potential to generate income which can be utilised by households to access food through purchases from the market and on-farm production.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

Food insecurity persists in this study area despite interventions in the form of the PKM programme. The food insecurity status in the study is high but not severe and the programme has had a positive impact as evidenced by the low adoption of severe or irreversible strategies to counter the effects of food insecurity. Therefore,

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food insecurity has no lasting negative effects on households and society at large. The PKM programme in its current state is unable to adequately address the problem of food accessibility. The study identified the following factors as significant predictors of food insecurity: marital status, level of education, household sizes and off-farm income-generating activities. Policy interventions aimed at improving access to education and family planning are crucial. These could be achieved by investing in adult basic education and training and other skills programmes. The use of mobile clinics in strategic locations such as shopping centres, malls, transit terminals, etcetera is an initiative that could assist in ensuring that access to family planning is improved. Funding and/or incentives to develop off-farm income-generating activities to boost household income should be encouraged. For example, while the provision of agricultural inputs and infrastructure is commendable, the introduction of agro-processing industries and the Expanded Public Works Programme are some of the initiatives that could be used to improve the incomes of the beneficiaries. Awareness of non-severe and reversible coping strategies such as consumption of uncultivated and wild leafy vegetables and fruits, consumption of unconventional food like mopane worms and locusts and purchase of cheaper and less preferred food items that families facing food insecurity adopt is recommended.

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Table 1: Socio-economic profile of respondents (N=355)

Variable	Frequency (n)	Percentage (%)
Age		
22-30	10	2.82
31-40	15	4.23
41-50	43	12.11
51-60	88	24.79
61-70	99	27.88
71-79	71	20.00
> 80	29	8.17
Gender		
Male	144	40.56
Female	211	59.44
Marital status		
Single	44	12.39
Married	177	49.86
Divorced	20	5.63
Widowed	114	32.11
Education level		
No formal education	149	41.97
< grade 12 education	155	43.66
Grade 12	35	9.86
Tertiary education	16	4.51
Household size		
1-5 Members	123	34.65
6-10 Members	186	52.39
11-15 Members	40	11.27
16-20 Members	06	1.69
Farming Experience		
1-5 Years	56	15.78
6-10 Years	62	17.47
11-15 Years	28	7.89
16-20 Years	39	10.99
> 21 Years	170	47.89
Farm Size		
< 3 Hectare	214	60.28
3-5 Hectares	99	27.89
5-10 Hectares	30	8.45
>10 Hectares	12	3.38
Annual Farm Income		
< R40 000	342	96.34
R40001-R80000	10	2.82
R80001-R120000	01	0.28
>R120000	02	0.56

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Table 2: Distribution of responses to standardised HFIAS questions (N=355)

	No		Yes	
HFIAS items	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Worry about not having enough food	227	63.94	128	36.06
Unable to eat preferred food	133	37.46	222	62.54
Eat just a limited kind of food	120	33.80	235	66.20
Eat food really do not want	106	29.89	249	70.14
Eat smaller quantity of food	143	40.28	212	59.72
Eat fewer meals in a day	137	38.59	218	61.41
No food of any kind to eat in household	252	71.99	103	29.01
Go to sleep hungry at night	288	81.13	67	18.87
Go a whole day and night without food	296	83.38	59	16.62

Table 3: Strategies adopted by farming households in event of food insecurity (N=355)

Coping Strategies	Frequency (n)	Percent (%)
1. Increasing short-term food availability		
Consuming seed reserve	216	60.85
Purchasing food on credit	150	42.25
Dependence on help from relatives	169	47.61
Eating uncultivated/ wild vegetables and fruits	344	96.90
Harvesting immature food crops	343	96.62
2. Rationing strategies		
Limit portion size at mealtime	187	52.68
Allowing children to eat first	213	60.00
Skipping meals for whole day	87	24.51
Limit consumption by adults to allow young children to eat	198	55.78
Skipping Meals	136	38.31
3. Dietary changes		
Buying of less expensive food	282	79.44
Consumption of Unconventional Food	244	68.73
4. Decreasing people in the households		
Picking of leftover food at social function	56	15.78
Withdrawal of children from school	12	3.38
Migrating to search job	102	28.73
5. Non-consumption and irreversible strategies		
Borrowing Money	110	30.99
Seeking off-farm employment	134	37.75
Selling durable assets	59	16.62
Selling livestock to buy food	92	25.92

NB: Percentages add up to more than 100%, multiple responses were permitted

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Table 4: Factors correlated with food insecurity among the PKM farming households (N=355)

Variable	Food Security Status		p value	AOR	95%CI
	Food secure n (%)	Food insecure n (%)			
Age (in years)					
22-30	2 (0.56)	8 (2.25)	Reference		
31-40	4 (1.13)	11 (3.10)	0.13	0.16	0.02-1.73
41-50	9 (2.54)	34 (9.58)	0.26	0.31	0.04-2.39
51-60	22 (6.20)	66 (18.6)	0.02	0.09	0.01-0.65
61-70	30 (8.45)	69 (19.4)	0.00	0.05	0.01-0.40
71-79	21 (5.92)	50 (14.1)	0.01	0.05	0.01-0.41
> 80	9 (2.54)	20 (5.63)	0.00	0.04	0.00-0.34
Marital Status					
Married	53 (14.9)	124 (34.9)	Reference		
Divorced	7 (1.97)	13 (3.66)	0.50	0.70	0.24-1.99
Widowed	23 (6.5)	91 (25.6)	0.04	1.95	1.02-3.71
Single	14 (3.9)	30 (8.5)	0.07	0.43	0.18-1.05
Level of Education					
Tertiary	9 (2.54)	7 (1.97)	Reference		
No formal	38 (10.7)	111 (31.3)	0.00	10.1	2.43-41.8
< Grade 12	39 (10.9)	116 (32.7)	0.00	8.18	2.09-32.1
Grade 12	11 (3.10)	24 (6.8)	0.04	5.15	1.10-24.1
Household Size (in members)					
1-5	43 (12.1)	80 (22.5)	Reference		
6-10	41 (11.6)	145 (40.9)	0.01	2.11	1.18-3.76
11-15	12 (3.38)	28 (7.89)	0.53	1.32	0.55-3.14
> 15	1 (0.28)	5 (1.41)	0.37	2.81	0.30-26.5
Farm Size (in hectares)					
>10	3 (0.85)	9 (2.54)	Reference		
< 3	47 (13.2)	167 (47.0)	0.59	0.59	0.08-4.10
3-5	36(10.1)	63 (17.8)	0.22	0.29	0.04-2.07
6-10	11 (3.10)	19 (5.4)	0.68	0.64	0.08-5.36
Engagement on Non-farm activities					
No	68 (19.2)	156 (43.9)	Reference		
Yes	29 (8.17)	102 (28.7)	0.03	0.52	0.29-0.94

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