An assessment of the contribution of peri urban agriculture on household food security in Tongaat, eThekwini Municipality

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Abstract:

Peri-urban agriculture presents an opportunity as a livelihood strategy to alleviate poverty and ensure household food security. However, little is still known on the contribution of peri-urban agriculture towards household food security. The current study assessed the contribution of peri-urban agriculture on household food security in Tongaat peri-urban area. Using a stratified random sampling procedure, 208 households (that is 109 farming and 99 non-farming households) were selected. Descriptive statistics were used to describe household socio-economic characteristics. The Household Dietary Diversity Score (HDDS) and Household Food Insecurity Access Score (HFIAS) measures were employed to estimate a household food security status. The HDDS tool showed that a greater proportion (54%) – farming households consumed >6 food groups as compared to their counterparts, the non-farming households (40%) in the same food group. the HFIAS measure revealed that a greater proportion (about 72%) of the farming households indicated that they never or rarely worried about food shortages as compared to their counterparts – the non-farming households (about 61%) that never or rarely worried about food shortages. Overall results suggest that farming households were better-off in terms of food access and dietary requirements than non-farming households. Peri-urban agriculture if promoted can help households achieve food security.

Keywords: Households, Household dietary diversity score, Household food insecurity access scale, household food security, peri-urban agriculture, Tongaat.

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Abstract

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1   Introduction

The United Nations (UN), Food and Agriculture Organisation of the United Nation (FAO) and the World Bank set the eradication of hunger and poverty as their highest priority to be dealt with internationally. The target date to achieve this goal and others was the year 2015 (Molelu, 2015). Various goals have been set out for countries highly affected by hunger, food insecurity and food shortages, matters relating to economic growth, equality in general and poverty. The major movement being the Millennium Development Goals (SDGs), developed in 2000 at the United Nations Millennium Summit. South Africa in line with the international

community has taken a stand in reducing poverty as well as fulfilling the other seven goals set out by the UN, by being part of the UN and making sure that the SDGs were achieved by 2015 (Molelu, 2015). Numerous underprivileged South Africans are confronted with the increasing unemployment rate therefore they struggle to combat poverty eradication and food insecurity (Machethe, 2004; Abdu-Raheem & Worth, 2011). Though urban and peri-urban agriculture (UPA) are recognised as an essential livelihood strategy to curbing the presence of food insecurity in the urban areas, more research needs to be done to investigate the dynamics at play in the lives of those practicing peri-urban agriculture (Jansen van Vuuren, 2016). Urban and peri-urban agriculture accounts for a substantial segment in the food supply of numerous capitals in Sub-Saharan Africa (SSA). By practicing UPA locals are able to produce fresh milk, poultry products, and perishable vegetables. Urban and peri-urban agriculture is considerably contributing to employment, livelihoods, poverty alleviation and to a greater assortment of foods in the city market places (Cofie *et al.*, 2003; De Bon *et al.*, 2010).

Urbanisation has proved to be one of the major difficulties facing mankind (Briassoulis, 2009). According to UN forecasts, approximately half of the population in Africa and Asia will live in peri-urban and urban areas by the year 2020 (Cofie *et al.*, 2003; De Bon *et al.*, 2010). According to FAO (2011), there has been rapid economic growth which is associated with rapid rates of urbanization which is evident in sub-Saharan Africa, including South Africa. Increasing urbanisation coupled with increased poverty becomes a challenge because populations are growing, but employment prospects for these populations remain low. In addition to the identified poverty state, food insecurity is currently moving from rural areas to urban centres (Maxwell *et al.*, 2000; Hovorka *et al.*, 2009).

Furthermore, in order to fully address the problem of food security globally, much consideration has to be given to access and availability of basic services such as clean water, acceptable health care for the poor and sanitation (De Wet *et al.*, 2008; Frayne *et al.*, 2014). Underprivileged inhabitants in the urban centres of developing countries are confronted with challenges of securing livelihoods. This in turn disturbs the food security of the household and especially those of vulnerable groups. This group consists of the disabled, children, the elderly and women (Maxwell *et al.*, 2000; Guo, 2012). Males generally participate in the more skilled and physical labour meanwhile women are exposed to unskilled labour (Maxwell *et al.*, 2000; Hovorka *et al.*, 2009; Bhawra *et al.*, 2017). Due to the skewed distribution of employment opportunities by gender, both female and male headed

households face different difficulties in acquiring basic needs and food. Male headed households are characterised with greater incomes compared to female headed households (Statistics South Africa, 2011). Females are able to discover more inventive methods to earn incomes and to find food to sustain themselves and maintain their families. An established method that these women use is urban agriculture (UA) (Kiguli & Kiguli, 2004; Ngome & Foeken, 2012).

Urban agriculture comprises of agricultural activities that take place in developed peri-urban fringes and intra-urban areas of metropolises and cities (Thornton, 2008; Orsini *et al.*, 2013). These activities range from production, processing, distribution and marketing of agricultural products (Mougeot, 2000; Specht *et al.*, 2014). Returns from these activities are either food crops or livestock (Thornton *et al.*, 2010; Frayne, 2010; Giannini *et al.*, 2017). Urban agriculture occupies vacant land usually situated along river banks, roadsides and streams and in wetlands (Thornton *et al.*, 2010; Nzunda *et al.*, 2013).Currently urban agriculture is on the increase in sub-Saharan African cities regardless of some of the challenges of access to basic services and land tenure. According to Statistics South Africa (2011), South Africa's urban population has increased. Gauteng Province having the highest population of 12.2 million people in 2011 then followed by Kwa-Zulu Natal with 10.3 million people (Statistics South Africa, 2011). This is an outcome of the labour movement to the larger metropolises from the rural South Africa (De Wet *et al.*, 2008; Maziya *et al.*, 2017).

Urban agriculture has been found to be increasing within small sections in cities, either in vacant plots of land being used to grow food near informal settlements, yards and nearby rivers (Stewart *et al.*, 2013). These various different plots are maintained and sustained either by individuals or small groups. The main purpose is to feed their families and perhaps make additional money to provide for their families and households to be able to sustain their growing potential. Regardless of the use of cutting-edge technology for agricultural production, the current food system has failed to ensure food security for the rapidly growing global population (Foley *et al.*, 2011). Conventional agriculture does not guarantee endless food security for the growing population and based on the negative effects that conventional agriculture has on the ecosystem, alternative methods of food production should be further explored (Viljoen *et al.*, 2005; Ward *et al.*, 2014) Urban food security needs to undergo policy intervention in order to improve implementation of food security strategies within

urban areas (Jansen van Vuuren, 2016). Food insecurity is conventionally theorized as a rural development problem and the current theoretical tools to comprehend the challenge and frame the responses are inadequate to address food insecurity in urban areas. Such tools mainly concentrate on issues of accessibility rather than finding solutions on improving food production through peri-urban and urban agriculture. Though urban agriculture is recognised as an essential approach to curbing the presence of food insecurity in the urban areas, further research needs to be done to discover more of the dynamics at play in the lives of those practicing peri-urban agriculture (Jansen van Vuuren, 2016). The aim of this study was to assess the contribution of peri-urban agriculture on household food security in in Tongaat peri-urban area of eThekwini Municipality through describing the status of peri-urban agriculture by households in Tongaat peri-urban area and by distinguishing the food security status between farming and non-farming households in Tongaat peri-urban area.

2   Materials and methods

2.1   Description of Study Area

The study was carried out in Tongaat which is a peri-urban area which falls within the eThekwini Municipality. Tongaat area has been purposively selected because of its productive and potential peri-urban farming. Tongaat is located about 37km northbound of Durban (South Africa.Com, 2017). The name Tongaat is synonymous with sugar because this is where Tongaat Hullet Group (an agriculture and agro-processing business of sugarcane and maize) has its headquarters and their largest mill. Tongaat is one of the largest sugar producing regions in the world. Tongaat is found between the development corridor that exists between Richards Bay and Durban (eThekwini Municipality, 2008). This area is known for its increasing and potential development prospects. Tongaat is accessible to the populations living in the surrounding rural areas as it provides a convenient transportation. Tongaat makes use of both rail and road to connect the rural communities to the Durban city centre (eThekwini Municipality, 2008). Figure 1 is a map showing the location of the study area (Tongaat) which lies within the eThekwini Municipality.
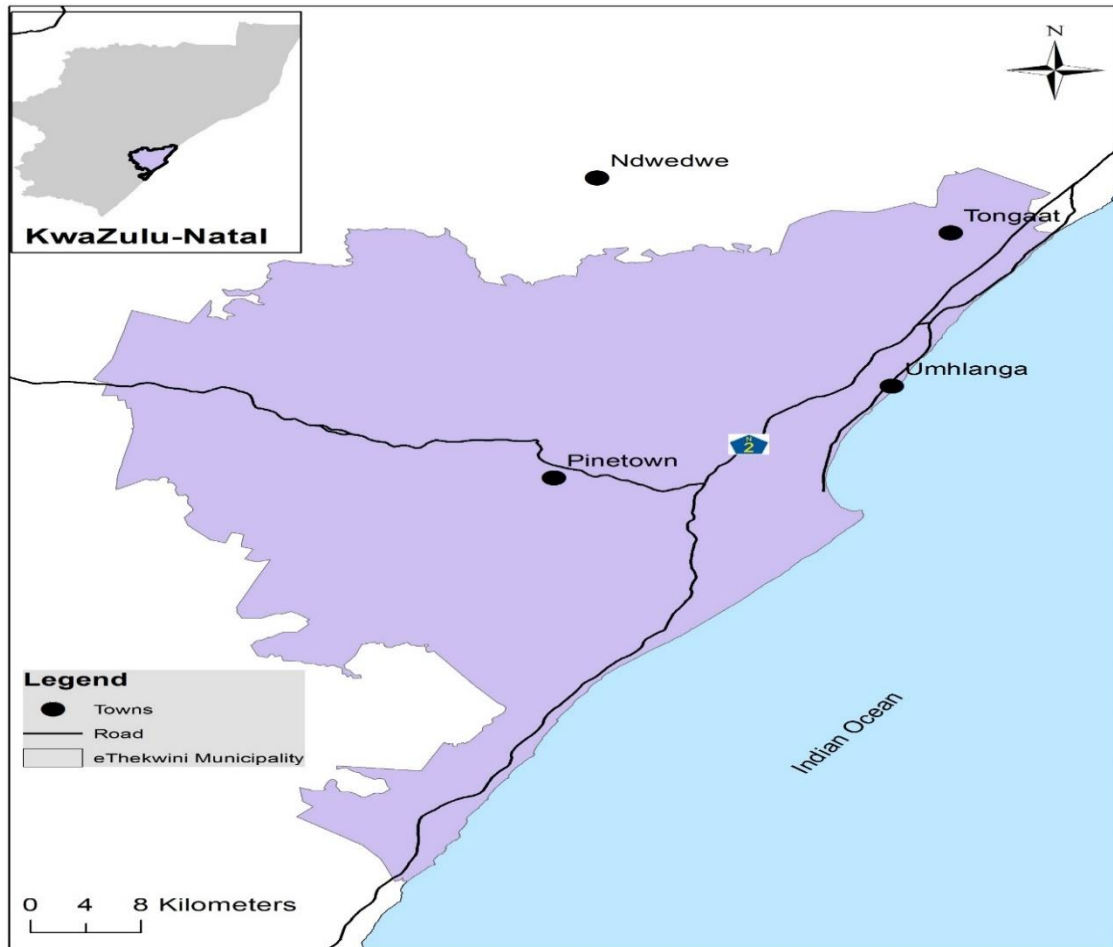
Figure 1: Map showing the location of Tongaat   Source: Unizulu Geography
Department (2017)

2.2   Research design
The study adopts a quantitative research approach. Quantitative research is an empirical investigation using scientific methods. It involves the collection of numerical data that can be statistically analysed and conclusions made. Quantitative research is important because deductive reasoning moves from general to specific. A descriptive cross-sectional study was used in this study to collect data on relevant variables required from the sample size. A cross-sectional study makes it possible to capture information at a specific point in time based on required data. This design was suited for this study because it is an inexpensive method and does not require too much time.

2.3 Sampling procedure and size

Sampling is a statistical method used to obtain representative data or observations from a group. There are two sampling approaches which are probability and non-probability sampling. This study made use of probability sampling. Probability sampling was employed because the targeted sample group was stratified into farming and non-farming households. A sample is "a smaller (representative) collection of units from a population used to determine truths about that population" (Field, 2005). A sample of 208 respondents (that is 109 households practising any form of urban agriculture and 99 households that are not practising any form of urban agriculture) were selected using a stratified random sampling technique. A sample size of 208 respondents was deemed to be large enough to generate a meaningful statistical analysis, yet at the same time small enough to be manageable. By making use of the stratified random sampling technique, the researcher intended to highlight differences between specific sub-groups whilst ensuring greater precision (Crossman, 2017). One advantage of using the stratified random sampling technique is that it allows for improved representation of particular groups within the population and ensures that certain groups are not over-represented (Crossman, 2017). A study population is a collection of individuals or objects that have a common binding characteristic or trait. The study population of interest composed of peri-urban dwellers (both households involved in any form of peri-urban agriculture and those not) in Tongaat area under the eThekwini Municipality. The actual study respondents from the selected households were the individuals that were involved in preparing the food for the household.

2.4 Data Collection

Data was collected through questionnaire by a survey method. Questionnaires were administered to individuals that were involved in preparing the food for the households to answer. As already indicated, the respondents were selected from households practising any form of peri-urban agriculture and those households not practising any form of peri-urban agriculture to allow comparative analysis on the contribution of peri-urban agriculture on household food security. Data was collected in December 2017 to January 2018. Data wasn't collected in unusual times such as festive events, funerals, weddings paydays and social grant payout dates. The rationale behind this is that the study had to reveal the true nature of household food security status particularly when households experience greatest food shortages. The questionnaire collected data that included household characteristics such as

demographics (sex, age, education, marital status, employment status, household income); the status of peri-urban agriculture (crops and livestock information); HDDS 24 hour recall food security questions; HFIAS 4 week recall food security questions; health status (food insecurity related diseases for both adults and children); perceptions of households towards the practice of peri-urban agriculture ; and the factors influencing the practice of peri-urban agriculture by households. Six trained research assistants were employed to assist in collecting data from the study area. The questionnaire was translated to the native IsiZulu language. A questionnaire that consisted of both close and open ended questions was used as a tool for data collection. A questionnaire is used in the generalization of findings so as to understand the phenomenon in its natural context (Bless *et al.*, 2006). The questionnaire was translated to the local language which is isiZulu. A pilot test was conducted before the actual survey. The test was able to determine the viability of the study before continuing with the major research. The questionnaire was administered to respondents through face-to-face interviews. The benefits of an interviewer-administered questionnaire is that respondents are able to seek clarity from the researcher and reduces confusion for the respondent (Bless *et al.*, 2006).

2.5   Analytical tools

To estimate the household food security status for the two groups – farming households and non-farming households, the HDDS and HFIAS indices were computed. These instruments are further described in detail in literature.

2.5.1   Computing the Household Dietary Diversity Score (HDDS)

An improvement in a household's score reveals that there has been a substantial enhancement in the household's diet and this will be obtained by asking questions on food groups consumed at household level. For each household, the HDDS has to be calculated. Tabulation of HDDS was constructed by using a computer (spreadsheet). The HDDS was then determined by adding the quantity of food groups consumed either by an individual or household over a period of 24-hour recall. According to Rajendran (2012) HDDS does not have a restrictions regarding the quantity of food groups to indicate adequate or inadequate dietary diversity. Consequently, it is therefore recommended that a researcher should use the distribution or average of scores in order to be able to analyse data as accurate as possible. The following represents how the average HDDS was calculated (equation 1):

$$Average\ HDDS = \frac{Sum\ (HDDS)}{Total\ number\ of\ households} \qquad (1)$$

2.5.2 Computing the Household Food Insecurity Access Scale (HFIAS)

The information gathered from the questionnaire was encoded on a Microsoft spreadsheet and later exported to SPSS software. This study in addition to the HDDS analysis, employed the Household Food Insecurity Access Scale Score to supplement the results of the HDDS tool. The HFIAS tool was adopted from Coates, Swindale and Bilinsky (2007). The HFIAS score represented the degree in which a household found themselves food secure and/or insecure for the preceding four weeks. A household's HFIAS score was determined by adding the frequency of occurrence codes for each question for each household by adding the codes for each frequency-of-occurrence question. The HFIAS score ranged from 0 to 27 for each household. A household that had a higher than the average score indicated that it is food insecure. Therefore, a household that had a lower than the average score indicated that it is food secure. The following depicts how the HFIAS was calculated (equation 2):

$$HFIAS\ Score = Sum\ frequency\ of\ occurence\ question\ response\ codes\ (Q1a + Q2a$$
$$+ Q3a + Q4a + Q5a + Q6a + Q7a + Q8a + Q9a) \qquad (2)$$

The average HFIAS was then computed as follows (equation 3):

$$Average\ HFIAS\ score = \frac{Sum\ of\ HFIAS\ in\ the\ sample}{Total\ number\ of\ HFIAS\ scores\ in\ the\ sample} \qquad (3)$$

There are basically four food security categories which the households could possibly fall in namely: food secure, mildly food secure, moderately food insecure and severely food insecure. A food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. HFIA category = 1 if [(Q1a = 0 or Q1a = 1) and Q2 = 0 and Q3 = 0 and Q4 = 0 and Q5 = 0 and Q6 = 0 and Q7 = 0 and Q8 = 0 and Q9 = 0].

A mildly food insecure household sometimes or often worries about not having enough food and is unable to eat preferred foods, or eat a more monotonous diet than desired, or, however rarely, eat some foods considered undesirable. HFIA category = 2 if [(Q1a = 2 or Q1a = 3 or Q2a = 1 or Q2a = 2 or Q2a = 3 or Q3a = 1 or Q4a = 1) and Q5 = 0 and Q6 = 0 and Q7 = 0 and Q8 = 0and Q9 =0].

Moderately food insecure households sacrifice quality more frequently, by eating a monotonous diet, or, sometimes or often, undesirable foods. They sometimes, however rarely, start cutting back on quantity by reducing the size or number of meals, although they do not experience any of the three main severe conditions. HFIA category = 3 if [(Q3a = 2 or Q3a = 3 or Q4a = 2 or Q4a = 3 or Q5a = 1 or Q5a = 2 or Q6a = 1 or Q6a = 2) and Q7 = 0 and Q8 = 0 and Q9 = 0].

A severely food insecure household often graduates to cutting down on meal size or on the number of meals, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going the whole day and night without eating).

HFIA category = 4 if [Q5a = 3 or Q6a = 3 or Q7a = 1 or Q7a = 2 or Q7a = 3 or Q8a = 1 or Q8a = 2 or Q8a= 3 or Q9a = 1 or Q9a = 2 or Q9a = 3] (Coates *et al.*, 2007).

3 Results

3.1 Summary of Socio-Economic Characteristics of Respondents

A study conducted by Arene and Anyaeji (2010) revealed that households that are headed by older members are more likely to be food secure than those headed by younger members. The results of this study suggested that the respondents were at their economically active years and had the ability to partake in agricultural activities and as well earn an income. The mean age was about 45 and about 47 years old for the farming and non-farming households respectively. Table 1 shows that the age of the respondents ranged from 21 to 73 years and from 22 to 70 years for the farming households and non-farming households respectively. The results showed that the average age of the non-farming households was slightly older than that of farming households. The mean household size was about 10 and 9 members for the farming household and non-farming households respectively. Household members consisted of grandchildren, parents, and other extended family members. lt is therefore more likely that households with more members rely on farm produce to keep members' food

secure, therefore constant food availability motivates them to participate in peri-urban agriculture. Altman *et al.* (2009) agreed that an increased household size and the associated demand for more food encourages engagement in subsistence production as a way of feeding a larger group of dependents.

Table 1: Summary of socio-economic characteristics of respondents

Variable	Farming Households				Non-farming households			
	Mean	Min	Max	SD	Mean	Min	Max	SD
Age (years)	44.68	21	73	16.053	46.84	22	70	12.09
Household size	9.68	2	26	5.366	8.63	2	22	3.760
Educational level (years)	9.17	2	19	3.441	9.16	2	15	3.288
Variable	**Frequency**		**Percent (%)**		**Frequency**		**Percent (%)**	
Gender_*Female*	61		56.0		53		53.5	
Male	48		44.0		46		46.55	
Marital status_ *Single*	43		39.5		35		35.4	
Married	34		31.4		26		26.3	
Divorced	13		11.9		17		17.2	
Widowed	19		17.4		21		21.2	
Employment status_*Unemployed*	71		65.1		34		34.3	
Formally employed	38		34.9		65		65.7	
Type of social grant received_ *Child*	55		50.4		44		44.4	
Disability	3		2.8		6		6.1	
Pension	17		15.6		15		15.2	
Child and Pension	18		16.5		20		20.2	
No grant received	16		14.7		14		14.1	
Average household income(ZAR)								
0-499	7		6.4		3		3.0	
500-999	4		3.7		4		4.0	
1000-1499	17		15.6		15		16.2	
1500-1999	17		15.6		11		11.1	
2000- 2500	15		13.8		19		19.2	
>2500	49		45.0		47		47.5	

Min – Minimum; Max – Maximum; SD – Standard Deviation; ZAR– South African Rand
Source: Survey data (2017/18)

Overall, the results show that the maximum number schooling years was 19 years. Farming households however appear to have a greater (19 years) maximum number of schooling years than their counterparts (non-farming households – 15 years). The overall average number of schooling years was 9.45 years for all households; 9.17 years for farming households and

9.16 for non-farming households. The average number of schooling years between farming and non-farming households suggests that the education levels between the two groups was more or less the same.

In this study, there were more female respondents that is 56 and 53 percent for farming and non-farming households respectively than males who only accounted for 48 and about 47 percent for farming and non-farming households respectively. Indeed, women tended to be the majority in the farming sector (Ngome & Foeken, 2012). The finding showed that men tended to have a lesser participation in agricultural activities. Single respondents accounted for about 40 for farming households and about 35 percent for non-farming households. The minority was made up of the household heads that were divorced which was about 12 and 17 percent of the farming and non-farming households respectively. These results generally showed that married respondents were fewer than single respondents. According to a study conducted by Mwendera and Chilonda (2013), revealed that farming households that are married rely heavily on their immediate family for labour in their agricultural practices. Therefore the marital status may have a positive influence on the practice of peri-urban agriculture as evident in a study by Gallaher *et al.* (2013) in Kenya where the respondents were more successful in their farming operations if they were married.

The results revealed that there is a high rate of unemployment with about 65 and 34 percent for the farming and non-farming households. High unemployment rate can make households to be extremely vulnerable to poverty and food insecurity. Households that received the child support grant accounted for a higher (about 51%) proportion for the farming households and about 44 percent for non-farming households. The minority accounted for about 3 and 6 percent of the farming and non-farming households respectively. Households that did not receive any form of government social grant constituted about 15 and 14 percent of the farming and non-farming households respectively. The income that is available to a household determines what they can afford and the quantity in which they can afford to buy (Akter & Basher, 2014). A higher income level is advantageous to households as they can afford more and have a greater variety to choose from. Farming and non-farming households accounted for 45 and about 48 percent of the households that indicated an average monthly income of greater than ZAR2 500. The minority of the interviewed households received an average income of between ZAR500 - ZAR999 per month that is 3.7 and 4 percent for the farming and non-farming households respectively. The minimum stipulated wage in South Africa is ZAR3 500 for 40 hours and ZAR3 900 for 45 hours (Von Finel, 2017) .

3.2 Types of food consumed

Table 2: Type of food consumed by household members

Food types consumed	Farming Households	Non-farming households	All households (combined analysis)
	Percentage (%)	Percentage (%)	Percentage (%)
Any bread, mabele, rice, noodles, biscuits, scones, fatcakes, other food made from millet, sorghum, maize, wheat	86.2	74.7	80.8
Any potatoes and sweet potatoes or any foods made from roots and tubers	88.1	67.7	78.4
Any yellow or orange and green vegetables	78.0	66.7	72.6
Any fruits	78.9	68.7	74.0
Any beef, pork, lamb, mutton, chicken or other birds, liver, kidney, hearts and other organ meats	69.7	69.7	69.7
Any eggs	70.6	66.7	70.2
Any fresh fish or dried fish	67.0	59.6	63.4
Any foods made from beans, peas or lentils	66.1	61.6	65.4
Any dairy products: milk, yogurt, cheese,	46.8	45.5	46.2
Any foods contain fat, butter or oil	68.8	68.7	68..8
Any sugar or honey	70.6	71.7	71.2
Condiments: tea, coffee, sauces, cool drink, juice	59.6	63.6	61.5

Source: Survey data (2017/18)

The food consumption calculation was done using 12 food groups. Respondents were asked to indicate the type of foods consumed among the households in a 24-hour recall and their responses are shown in Table 2. In this study, there were more (about 81%) household

respondents who ate cereals (millet, sorghum, maize and wheat) (that is about 86 and 75 percent for farming and non-farming households respectively). Household respondents that ate foods made from roots and tuber constituted about 78 percent of the total sample (that is about 88 and 68 percent of the farming and non-farming households respectively). The least consumed food type was dairy product with a minority (about 46%) of the total sample reported that they consumed dairy products (that is about 47 and 46 percent of the farming and non-farming households respectively). Cereals were the most commonly consumed main ingredient since maize meal that is used for porridge preparation and pap, is the common cultural staple food in the study area. Roots and tubers were the second most important component of the diet for the interviewed households. Starch is part of the total carbohydrates, along with sugars and dietary fibre (Jacob, 2017). The consumption of starch has the potential of raising blood sugar and contributes to the number of calorie consumed. It is important to monitor the consumption of starchy foods because it has the same effects as eating sugary foods. Consuming starchy foods with lack of exercise contributes to raising bold sugar levels and weight gain contributing to diet related problems such as obesity.

3.3 Household dietary diversity score according to the three classes/ groups consumed by households in Tongaat

Table 3: Household dietary diversity score according to the three classes/ groups consumed by households in Tongaat

Food groups consumed	Farming Households		Non-farming households		All households (combined analysis)	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
<3 (low dietary diversity)	13	11.9	12	12.1	25	12.0
4 – 5 (medium dietary diversity)	37	33.9	47	47.5	84	40.4
>6 (high dietary diversity)	59	54.2	40	40.4	99	47.6
Total	**109**	**100.0**	**99**	**100.0**	**208**	**100.0**

Mean HDDS score	5	4.5	4.75

Source: Survey data (2017/18)

Overall, the average mean HDDS score was about 5 (all households). Results from both groups (the farming and non-farming households) show that close to half (about 48%) of the households were above the mean HDDS level. Using the mean HDDS as a cut-off point where there is no meaningful measure for wealth and household income, households which fall above the mean HDDS level can be regarded as food secure and those that fall below the mean HDDS level can be regarded as food insecure. Therefore, overall, the interviewed households could be regarded as food secure. However, it is important to note the proportion (54.2%) of farming households who were above the mean HDDS score was higher (about 54%) than the non-farming households (about 40%). Farming households do not rely on purchasing food hence they grew their own food without making use of monetary resources (Morse & McNamara, 2013). A study conducted by FAO (2009) revealed that households in developing countries actually benefit from gardens which act as a main source of food to meet household consumption requirements. This is supported by the results from this study.

3.4   Household Food Insecurity Access Scale categories

The HFIAS category values were calculated for each household by assigning a code for the food insecurity category in which it falls. There are basically four food security categories which the households could possibly fall in namely: food secure, mildly food secure, moderately food insecure and severely food insecure. A food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. With regard to food access by the interviewed households, overall results show that the majority (about 66%) of the total sample indicated that they did not or rarely worried about food shortages (deemed to be food secure). However, a greater (about 72%) proportion of the farming households did not or rarely worry about food shortages when compared to their counterparts, the non-farming households (about 61%) in the same HFIAS category. Those households that indicated that they sometimes or often worry about not having enough food (deemed to be mildly food secure) constituted about 14 percent of the total sample (that is about 15 and 14 percent of the farming and non-farming households respectively). The

minority (about 7%) of the total sample was made up of the household that frequently cut down on their meal size or on the number of meals (deemed to be severely food insecure). A higher (7%) proportion of this group belonged to the non-farming households as compared to about 4 percent of the farming households who were in this same HFIAS category. It is quite evident from the results in Table 5.22 that farming households were better off in terms of food access than their counterparts, the non-farming households. The finding is supported by the studies by Shisanya and Hendriks (2011) and (Bhawra *et al.*, 2017) where they revealed that farming households were better off than non-farming households with regard to food access. This is because farming households are able to produce their own food rather than relying on financial capital to access food (Morse & McNamara, 2013).

Table 4: Household Food Insecurity Access Scale categories of the interviewed households in Tongaat

Household Food Insecurity Access Scale category	Farming Households		Non-farming households		All households (combined analysis)	
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %
Food secure (does not or rarely worries about food shortages)	78	71.6	60	60.6	138	66.3
Mildly food secure (sometimes or often worries about not having enough food)	16	14.7	14	14.2	30	14.4
Moderately food insecure (sacrifice quality more frequently)	11	10.0	15	15.1	26	12.6
Severely food insecure (cutting down on meal size or on the number of meals)	4	3.7	10	10.1	14	6.7
Total	**109**	**100.0**	**99**	**100.0**	**208**	**100.0**

Source: Survey data (2017/18)

3.5 A comparative analysis of the food security related diseases within households

The food security status of households may affect the health status of household members. Numerous studies have shown associations between food insecurity and adverse health outcomes among children. Studies of the health effects of food insecurity among adults are more limited and generally focus on the association between food insecurity and self-reported diseases. Households were asked to indicate the occurrence of some food insecurity related diseases Bhawra *et al.* (2017) among its members (both adults and children) (that is if they had any household member/s that suffered from any of the indicated food insecurity related diseases at the time of the study).

Table 3: Food insecurity related diseases affecting household members (both adults and children) of the interviewed households in Tongaat at the time of the study

	Adults					
	Farming households		Non-farming households		All households (combined analysis)	
Food insecurity related disease	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Hypertension	34	31.2	30	30	64	30.8
Hyperlipidaemia	35	32	9	9.1	44	21.2
Diabetes	45	41.2	40	40	84	40.4
Obesity	39	35.7	62	62.6	101	48.6
Heart attacks	1	0.91	0	0	1	0.4
Diarrhoea	28	25.7	24	24	52	25
Osteoporosis	13	11.9	16	16.2	29	13.9
Iron deficiency anaemia	21	19.2	8	8	29	13.9

	Children					
	Farming households		Non-farming households		All households (combined analysis)	
Food insecurity related disease	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %
Malnutrition	14	12.8	3	3	17	8.17
Obesity	21	19.3	68	68	89	42.8
Underweight	11	10	4	17.2	15	7.2
Rickets	14	12.8	0	0	14	6.7
Diarrhoea	9	8.3	17	17.2	26	12.5
Kwashiorkor	0	0	0	0	0	0
Iron deficiency anaemia	13	11.9	9	9.1	22	10.6

Source: Survey data (2017/18)

Results showed that obesity was the common food insecurity related disease among adults as reported by almost half (49%) of the total sample. Obesity, was however, a more serious food insecurity related disease among the non-farming households (as indicated by the majority (about 63%) of the non-farming households) as compared to about 39 percent of their counterparts (the farming households) who reported the same food insecurity related disease problem among its adult members. Diabetic adults constituted about 40 percent of the total sample (that is about 41 and 40 percent of the farming and non-farming households respectively). Other food insecurity related diseases reported by the interviewed households suffered by the adult household members for the total sample included hypertension (30.8%); hyperlipidaemia (21.1%); diarrhoea (25.0%); osteoporosis (13.9%); iron deficiency anaemia (13.9%) with adults that suffered from heart attacks constituting the minority (0.4%).

Results also showed that obesity was a serious problem in children. Overall, about 43% of the total sample reported obese children in their households. This problem appeared to be more among the non-farming households (as indicated by the majority (about 68%) of the non-farming households as compared to about 19 percent of their counterparts (the farming households) who reported the same food insecurity disease among its children members. Children in the household that suffered from diarrhoea constituted about 13 percent of the total sample (that is about 8 and 17 percent of the farming and non-farming households respectively). Other food insecurity related diseases reported by the interviewed households suffered by children household members for the total sample included malnutrition (8.17%); underweight (7.2%); rickets (6.7%) with adults no children that were reported to suffer from Kwashiorkor.

A study by Seligman *et al.* (2010) revealed that there was an association between food insecurity and clinical evidence of diet-sensitive chronic diseases. This supports the finding of this study because overall non-farming households suffered more from the diet sensitive diseases as compared to the farming households. As revealed by the results of this study, the households of Tongaat ate starchy based foods which has an effect on their blood sugar levels and could cause weight gain. Obesity in South Africa is a huge problem and it is evident in the results of this study. Child obesity is also problematic as it sets them up for serious health problems later on in life. About 13 percent of children are overweight in South Africa which is more than double the global average of 5 percent (Green, 2017).

4   Discussion

Females were the dominant gender in the study area. Results showed that there were more females respondents that is 56 and 53 percent for farming and non-farming households respectively. Generally, respondents were in the economically active age group. The mean age was about 45 and about 47 years old for the farming and non-farming households respectively. Overall, respondents were fairly educated in the study area. The average number of schooling was 9.17 and 9.16 years for farming and non-farming households. It was noted that formal employment is still a challenge in the study area. The results revealed that there is a high rate of unemployment that is about 65 and 34 percent for the farming and non-farming households respectively. A greater proportion depends on government social grants as a source of income in Tongaat. Results showed that majority of the households relied on government social grant as a source of income which was about 85 and 86 percent of the farming and non-households respectively. The results from this study also indicated that the majority of the interviewed households received a total household income less than (<ZAR2 500) which is below the South African minimum wage rate which was about 45 and 48 percent for farming and non –farming household respectively. The HDDS and HFIAS tools were used to analyse the food security status of the households. The results revealed that starch (cereals - millet, sorghum, maize and wheat) was the most consumed type of food as indicated by the majority (about 81%) of households (that is about 86 and 75 percent for farming and non-farming households respectively). The average mean HDDS was about 5. Using the mean HDDS as a yardstick for food security status of households, households which fell above the mean HDDS level were regarded as food secure and those that fell below the mean HDDS level were regarded as food insecure. Overall, a greater proportion (about 48%) of the total sampled households were above the mean HDDS. However, the majority (about 54%) that were above the mean HDDS belonged to the farming households as compared to the non-farming households (where about 40% were above the mean HDDS). The households were categorised into three (3) dietary classes/ groups. The 3 dietary classes/ groups were categorised as follows: <3 food groups (low dietary diversity); 4 to 5 food groups (medium dietary diversity) and >6 food groups (high dietary diversity). With regard to the HFIAS results, the minority (about 7%) of the total sample was made up of the households that frequently cut down on their meal size or on the number of meals (this group was deemed to be severely food insecure). A higher (7%) proportion of this group belonged to the non-farming households as compared to about 4 percent of the farming households who were in the same HFIAS category. The HFIAS results further revealed that a larger

proportion (72%) of the farming households had a comparatively better access to food (this group was deemed as food secure) than the non-farming households were about 61 percent never or rarely worried about food shortages in the household. It is quite evident from these results that farming households were better off in terms of food access than their counterparts, the non-farming households. The results confirmed the findings from literature that farming households are comparatively food secure than the non-farming households. When people live under limited dietary diversity or if they are forced to use severe coping strategies where nutrition is compromised, this may result in nutrient deficiency which will make them prone to a variety of diseases. This makes life more difficult for households because it has a potential not only to decrease labour productivity of a household but also to increase their health care bills. Regarding the food insecurity related diseases (problems), obesity was the largely reported health problem suffered by both adults and children for all the households. However, this problem was noted to be more prevalent in the non-farming households as compared to the farming households. This is because farming households were in a better position to diversify their food needs as already pointed out.

5   Conclusion

A greater proportion of the households rely on government social grants which indicates that households are dependent on them as a livelihood source and for disposable income. The majority of the interviewed households earn less than (<ZAR2 500) which is below the South African minimum wage rate. This implies that the majority of the households are at risk of becoming food insecure and could benefit from practicing peri-urban agriculture to supplement their household income. Again, the majority of households in Tongaat were not formally employed. This implies that there are times when the household members are without work and therefore not earning a stable income. High unemployment rate can make households to be extremely vulnerable to poverty and food insecurity. Farming households were comparatively better off in terms food diversity and food access. This implies that farming households are in a better position to be food secure than the non-farming households. This reinforces the notion that the practice of peri-urban agriculture is able to ensure food security among peri-urban households. An analysis of the prevalent food security related diseases showed that obesity was the most reported food security related issue for both adults and children from the total sampled households. However, the problem of obesity was most prevalent in the non-farming households. It is therefore important that households

do not only just acquire food (access) but make sure that the food they eat is nutritious (of diverse nutrients – balanced diet). It is through the practise of peri-urban agriculture that households can be able to diversify their food needs in addition to the food items bought.

Author Contributions

Author 1 developed the study concept as part of her MSc study under the supervision of Author 2. Author 1 collected data and compiled the draft manuscript. Author 2 assisted with data analysis. The final manuscript is the result of collaborative efforts of both authors.

Conflicts of Interest

The authors declare no conflict of interest.

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