International Journal of Agriculture Innovations and Research
Volume 6, Issue 3, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy):
Received: 20/11/2017 | Accepted on: 27/11/2017 | Published: 09/12/2017

Production and Consumption of Indigenous Leafy Vegetables (Ilvs) as Source of Food Towards Improving Rural Household Diets: a Case of King Sabata Dalindyebo Munucipality, Eastern Cape Province of South Africa

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Abstract – **King Sabata Dalindyebo Municipality is located in one of the Eastern Cape Province's rural areas that are categorized by high poverty levels and food insecurity. This area is rich in biodiversity among which semi-domesticated vegetable species which are well-known as indigenous vegetables. Besides, these indigenous vegetables have been reported to be good in nutritional qualities such as macro and micronutrients. Regardless of the positive links associated with these vegetables, there is still a high predominance of malnutrition among low income bracket of the population within this area. Moreover, there is high level of agreement on the relevance of Indigenous Leafy Vegetables (ILVs) in complementing rural household diets.**

This study employed cross-sectional survey data to assess contribution of ILVs towards household diets using the Household Dietary Diversity Score (HDDS). The descriptive results reveal that involvement in the production and consumption of ILVs leads to a higher HDDS. Similarly, the Regression estimates revealed that involvement in ILV production and consumption positively contributes to a higher HDDS, suggesting that households who participate in production and consumption of these vegetables are more likely to have diverse diets when relating to households who do not participate in production and consumption of ILVs. Therefore, participation in ILV production and consumption has significant potential to improve the diversity of rural diets and ultimately reduce the level of household food insecurity.

Keywords – **Food Security, HDDS. Indigenous Leafy Vegetables, Participation in Ilvs, Rural Household Diets.**

I. Introduction

Indigenous Leafy Vegetables (ILVs) sometimes referred to as "wild leafy vegetables" can be defined as a collection of "normally indigenous" naturally growing plant species whose leaves, young shoots and flowers are consumed as leafy vegetables [1]. With agreed characterization of ILVs, indigenous plant species have been utilized as food for centuries [2], [3] and in spite of their noted good nutritional value, indigenous vegetables have not been widely domesticated and are not cultivated on a large commercial scale, especially in South Africa [4]. However, although ILVs have been noted to be an inexpensive source of high quality vegetables with high potential for nutritionally vulnerable communities [5], their production is still at subsistence level and is more common in rural areas [4]. As suggested by [6], indigenous and traditional food systems are seldom considered as basis for dietary quality and diversity strategy. To address these challenges, literature highlights the potential to improve micronutrient intake by increasing the production and consumption of ILVs [7].

Dietary Diversity (DD) is defined as the number of individual food items or food groups consumed over a given period of time [8]. Dietary diversity can be measured at the household or individual level through the use of a questionnaire [8]. It is most often measured by counting the number of food groups rather than the food items consumed [9]. The type and number of food groups included in the questionnaire and subsequent analysis may vary, depending on the intended purpose and level of measurement [10]. At the household level, DD is usually considered a measure of access to food; for example, the household's capacity to access costly food groups. At the individual level it reflects dietary quality, which is mainly the micronutrient adequacy of the diet [9]. The reference period can vary, but is most often the previous day or week [11], [12].

A study conducted by [2] on the importance of ILVs concluded that promoting indigenous vegetables may help diversify the food on the plate. Vorster *et al.* [2] suggest that in order to achieve this, the negative perceptions associated with ILVs needs to be addressed first and placing these vegetables in the supermarkets would help to increase the status of the crops, as they are currently primarily being sold in informal markets [4].

Against this background, the study therefore explore the production and consumption of ILVs and how they contribute towards rural household dietary diversity based on two group of participants; which include those who produce and utilize ILVs and those who do not.

II. Problem Statement

Indigenous Leafy Vegetables are known as plants that are harvested while growing in their wild state and are not farmed in the conventional manner; yields thus become lower and, consequently, their nutrient contribution to the diet is also very low [13]. Forwarding arguments for the low production and consumption, [14] noted that ILVs are still mostly treated as weeds by many researchers and extension personnel who also criticize farmers for not keeping this weed population under control, thus labeling this important food as not worthy of the space it occupies in the fields.

Thus far, the [4] highlighted that there is a decline in the use of indigenous and wild vegetables by many rural communities in South Africa; this has contributed to poor diets and increased incidences of nutritional deficiencies.

Lack of knowledge about nutritional composition, cooking methods and ways of preservation have also been suggested as reasons for the low use of indigenous vegetables [15]. Despite the claim that ILVs have several benefits, the production of ILVs is still characterized by low volumes [16] and is currently in decline which ultimately translate to lower utilization of these vegetables [4]. On a positive note, [17] suggest that ILVs have the potential to provide a valuable source of nutrition in areas with hot and dry climates that are normally characterized by high levels of food insecurity, as is the case in most rural communities of South Africa.

With the background of high food insecurity levels in South Africa [18], several studies call for collaboration between agriculturalists and nutritionists to build on traditional crop production and indigenous vegetable consumption [19], for purposes of improving the nutritional content of the diet in poor rural and urban households using ILVs. The need therefore arises to understand the consumption and production of ILVs and their contribution as a source of food towards improving rural household diets.

III. Objectives

- To assess contribution of ILVs towards rural household diets.
- To examine the influence of food groups consumed by the households.

IV. Literature Review

Reporting on the benefits of ILVs, these vegetables are an important part of farming and consumption systems throughout rural Africa [20]. The indigenous vegetables shown to be more drought and heat tolerant than commonly grown exotic vegetables, generally ILVs are easier to produce and usually require less resources such as water, while being rich sources of micronutrients, such as iron and Vitamin A [21]. They also play a role in nutrition, food security, culture and can provide employment opportunities [22]. They are important sources of micronutrients like vitamins A and C, iron and others [21]. In addition, ILVs provide more than 50% of the recommended daily allowance for Vitamin A, and they also provide varying amounts of other important nutrients, such as protein and various mineral elements, and also contained significant amounts of fibre [21]. Indigenous leafy vegetables play an important role in the contemporary food systems of people in South Africa, particularly in poor rural areas [21]. Indigenous Leafy Vegetables are, therefore, of extreme importance to dietary quality and diversity, especially during times of famine and natural disasters [23]. To that end, ILVs hold several advantages over the many exotic vegetables that dominate most supermarket shelves [4].

Reporting on the production and use of indigenous vegetables, [24] noted that the erosion of the ecosystem diversity has affected the availability and production of some indigenous food crops. Several authors [25], [15], [26], [27], [28] argue that the loss of indigenous knowledge resulted in the reduced production and use of indigenous vegetables, which contributes to the lack of DD. This ultimately translates into food insecurity and micronutrient deficiency, especially among poor communities [15], [35].

Previous studies also explain that the diets of people in South Africa consist primarily of staple plant foods and lack DD, which results in micronutrient deficiencies. Modi *et al.* [7], [29] suggests that the micro-nutrient intake can be improved if the production and consumption of indigenous crops can be increased. The decline in the production and consumption of ILVs has encouraged research to be done for under-utilised crops and ILVs that are such an important part of the livelihoods of many rural communities [30], [35].

V. Methodology

The study used a cross-sectional data survey within the King Sabata Dalindyebo Local Municipality (KSD LM). The selection criteria of the study population involved a total number of 150 participants who do not take part in the production and consumption of ILVs and a total number of 88 participants who take part in the consumption and production of ILVs. The study area was purposely selected based on the assumption that, the KSD LM region is constituted by a Xhosa speaking majority who are largely dependent on the land and its resources which includes wild vegetables to supplement their household needs. Despite an increase in national food security and relative wealth, the experience of most rural households in the Eastern Cape is that of continued poverty which is manifested in food insecurity [4]. The Household Dietary Diversity Score (HDDS) was used as an index estimate towards contribution of ILVs in household dietary diversity.

Through targeting the respondents' dietary history, a 24-hour dietary recall was conducted to obtain food group information regarding the respondents' food intake [31]. The respondents were asked to recall all foods eaten and beverages taken in over the twenty-four hours preceding the interview. A scale of twelve food groups was used in assessing the dietary diversity of the respondents, as summarized in Table 1 below, following an approach taken by [31].

Table I. The Categories of Food Groups

Food groups	Points
Any bread, rice, or any other foods made from millet, sorghum, maize, wheat, or any other locally available grain	1
Any potatoes, yams, cassava or any other foods made from roots or tubers	1
Any vegetables	1
Any fruits	1
Any beef, pork, lamb, rabbit, chicken, duck, other birds and organ meats	1
Any eggs	1
Any fresh or dried fish or shellfish	1

Food groups	Points
Any foods made from beans, peas and lentils	1
Any yoghurt, milk or milk products	1
Any food made with oil, fat or butter	1
Any sugar	1
Any food such as sugar or tea	1
Total	12

***Key*:** If the answer is yes award 1 point and if the answer is no award 0 points.

A single point was awarded to each of the food groups consumed over the reference period giving a maximum sum total dietary diversity score of 12. Points for each individual in the event that his/her responses are positive to all food groups [32]. A value of zero would therefore mean a low dietary diversity score (HDDS) and the closer the score is to 12, the higher the dietary diversity of the respondent. This approach avoids crude categorization of dietary diversity into low, medium and high by treating dietary diversity as a continuum [33].

VI. Results and Discussion

Table II: Basic sample statistics of non-participants in ILV Production and Consumption

	GENDER	AGE	EDUCATION	INCOME	HH.SIZE	ATM	DTM	ATE	ATC	ATL	ORG
Valid	150	150	150	150	150	150	150	150	150	150	150
Mean	1.69	3.49	2.05	2.01	6.97	1.45	1.45	1.16	1.23	1.93	1.82
Std. deviation	.465	1.145	.907	.825	2.385	.499	.499	.368	.424	.250	.385
Skewness	-.813	-.225	.836	.312	.832	.217	.217	1.874	1.274	-3.510	-1.683
Minimum	1	1	1	1	2	1	1	1	1	1	1
Maximum	2	5	4	3	14	2	2	2	2	2	2

Key: GEND: Gender (0 = male; 1 = female), **AGE:** Age (1 =< 25; 2 = 26-35; 3 = 36-46; 4 = 47-56; 5 => 56), **EDUC:** Education (1 = no education; 2 = primary education; 3 = secondary education), **INCO:** Income per month (1 =< R1000; 2 = R1000-R3000; 3>R3000), **HHS:** Household size, **ATM:** Access to market (0 = no access; 1 = access), **DTM:** Distance to market (1 =< 5km; 2 => 5km;), **ATE:** Access to extension (0 = no access; 1 = access), **ATC:** Access to credit (0 = no access; 1 = access), **ATL:** Access to arable land (0 = no access; 1 = access), **ORG:** Membership of CBOs (0 = non membership to CBO; 1 = membership to CBO).

Table II provides the basic sample characteristics from the study area for non- participants. A total of 150 non-participants in ILV production respondents were considered for this study, with a mean household-head age range of 36-46 years. The median education level was 2; this implies that, on average, respondents were educated up to the level of primary schooling. Basic sample statistics also suggest that the considered sample had more females than males with an average monthly income between R1000 and R3000. The sample results further reveal an average household size of 7 family members with a minimum of 2 and a maximum of 14. A majority of the respondents did not have access to extension, market and credit services. With reference to arable land and membership to CBOs sample statistics reveal that a majority had access and were members respectively. The asymmetry of distribution was both positively and negatively skewed, as shown in Table II above Most of the variables had skewness values below and close to 1 (except for access to land); this suggests that the distribution did not differ significantly from a normal symmetric distribution.

Table III: Basic Sample Statistics of Participants in ILVS Production and Consumption

	GENDER	AGE	EDUCATION	INCOME	HH.SIZE	ATM	DTM	ATE	ATC	ATL	ORG
Valid	88	88	88	88	88	88	88	88	88	88	88
Mean	1.58	3.41	1.85	2.23	7.25	1.19	1.17	1.24	1.22	1.91	1.58
Std. deviation	.496	1.319	.598	.784	2.801	.397	.378	.429	.414	.289	.496
Skewness	-.328	-.368	.058	.159	.611	1.581	1.783	1.248	1.405	-2.896	-.328
Minimum	1	1	1	1	2	1	1	1	1	1	1
Maximum	2	5	3	3	15	2	2	2	2	2	2

Key: GEND: Gender (0 = male; 1 = female), **AGE:** Age (1 =< 25; 2 = 26-35; 3 = 36-46; 4 = 47-56; 5 => 56), **EDUC:** Education (1 = no education; 2 = primary education; 3 = secondary education), **INCO:** Income per month (1 =< R1000; 2 = R1000-R3000; 3 > R3000), **HHS:** Household size, **ATM:** Access to market (0 = no access; 1 = access), **DTM:** Distance to market (1 =< 5km; 2 => 5km;), **ATE:** Access to extension (0 = no access; 1 = access), **ATC:** Access to credit (0 = no access; 1 = access), **ATL:** Access to arable land (0 = no access; 1 = access), **ORG:** Membership of CBOs (0 = non membership to CBO; 1 = membership to CBO).

Table III provides the basic sample characteristics from the study area for participants. A total of 88 participants in ILV production were considered for this study, with a mean household-head age range of 36-46 years which was also similar with non-participants. The mean education level was 2; this implies that, on average, respondents were educated up to primary level similar to the non-participant group. Basic sample statistics also indicate that the considered sample had more females than males with an average monthly income between R1000 and R3000. The sample results further reveal an average household size of 7 family members with a minimum of 2 and a maximum of 15. A majority of the respondents did not have access to extension, market and credit services. The statistics further reveal that respondents had access to arable land and were also members to local CBOs. The asymmetry of distribution

was both positively and negatively skewed, as shown in Table III above. Most of the variables had skewness values below and close to 1 (except for access to land); this suggests that the distribution did not differ significantly from a normal symmetric distribution.

A. Food Groups Consumed from the Study Area

This section presents the food groups consumed from the study area.

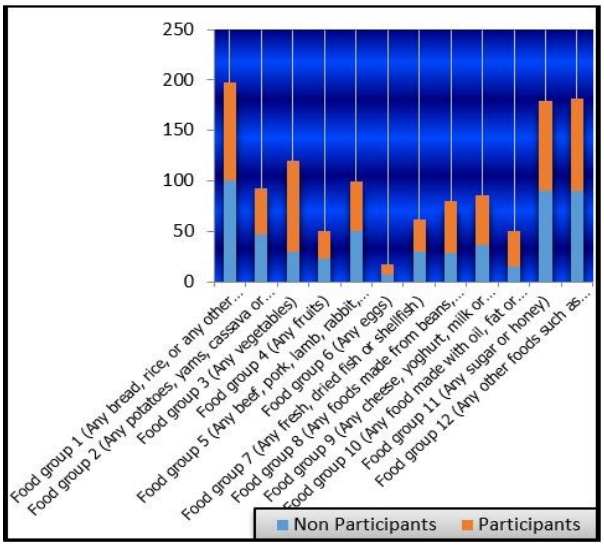

Fig. 1. Food groups consumed from the study area

Reporting on the food groups from the study area based on a 24-hour dietary recall, figure 1 above presents the results of the reported food groups from the study area by participation status. These results suggest that participation in the production and consumption of ILVs may improve rural household diets in the following food groups: group 3 (vegetables), group 8 (food made from beans, peas, lentil or nuts) and group 10 (food made of oils, fat or butter). In support of this, the results also approve that rural diets are dominated by staple starch food groups which may seriously affect the dietary diversity of rural communities in South Africa.

B. Contribution of ILVs as a Source of Food Towards Household Dietary Diversity

This section focuses on the contribution of ILVs towards rural household diets based on the participation status of the respondents.

Table IV: Household Dietary Diversity Score (HDDS) by participation status of respondents

	Low Dietary Diversity	Medium Dietary Diversity	High Dietary Diversity
Dietary Diversity Score	0 - 4	5 - 8	9 - 12
Participants		7	
Non- Participants		5	
Food security proxy	**Insecure**	**Moderately secure**	**Secure**

The study paired participants and non-participants with regard to the HDDS as presented in Table IV above. Also, the table shows a combined summary of the calculated HDDS for both participants and non-participants. The results indicate that the two groups were classified in the moderately food secure category. These findings therefore, suggest that both groups had a medium dietary diversity. Although the two groups were classified in the same category of moderately food secure, the results further reveal that participants in the production and consumption of ILVs had a higher HDDS of 7 compared to an HDDS of 5 for non-participants. Thus far, participation in the production and utilization of ILVs may, therefore, positively contribute towards diversifying the diets of rural households. Similar comparable findings were earlier noted by [7], [34] who suggest that micro-nutrient intake can be improved if the production and consumption of indigenous crops is increased.

These results may not be conclusive since they indicate that both groups of participants and non-participants in the production and consumption were classified in the moderately food secure category. Although the two groups were classified in the same category (medium dietary diversity), the results reveal that participants had a higher HDDS of 7 compared to a HDDS of 5 for non-participants. Therefore, participation in the production and consumption of ILVs positively contribute towards household dietary diversity.

VII. Conclusion

With regard to the contribution of ILVs as a source of food towards rural household diets, the study concludes that participation in the production and consumption of ILVs leads to a higher Household Dietary Diversity Score (HDDS). Thus far, this paper concludes that households who take part in ILV production and consumption are more likely to have diverse and quality diets than the households who do not take part in production and consumption of ILVs.

Acknowledgment

We acknowledge Govern Mbeki Research Development Centre (GMRDC) for financing this study.

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