The impact of small holder commercialisation of organic crops on food consumption patterns in KwaZulu-Natal, South Africa

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1. Introduction

Food insecurity and hunger are a reality in rural areas of South Africa (Hendriks, 2005; Labadarois, 2000; Rose *et al,* 2002). While South Africa is nationally food secure, available data suggests that between 58.5 and 73 per cent of South African households may experience food insecurity; 15.9 per cent consume less than adequate energy; about 22 per cent of children under nine years of age are stunted; approximately 3.7, and approximately 30 per cent of households experience hunger (Hendriks, 2005 summarising: Labadarios and Nel, 2003; Rose, 2004; Rose and Charlton, 2003; Gerike *et al*, 2003).

Agricultural intensification and commercialisation may offer solutions to food insecurity in rural areas of South Africa (Cousins, 2005) through increased income from farm and non-farm sources. The potential for smallholder commercialisation to address food insecurity through agricultural intensification and increased incomes has not been adequately investigated in South Africa. This poster paper presents a summary of a study to explore the impact of commercialisation of organic production of traditional root crops on dietary diversity, energy consumption, micronutrient intakes and food expenditure patterns among smallholder farm households.

2. Methodology

A total of 127 households were interviewed in October/November 2004/2005 in two survey rounds. A comparative sample was drawn from a list of households whose members did not join the Ezemvelo Farmers= Organisation (EFO) but resided in the same tribal wards as EFO members. A simple random sample of ten cases was drawn from each stratum. Expenditure on 39 food items was collected. Dietary diversity was estimated as the sum of different food types consumed over a month. Reported monthly expenditure on each food (from purchases, gifts, payments, and own production) was converted into masses and volumes using average prices obtained from local stores. Food volumes and masses were then converted into energy (kj/day), iron (mg) and vitamin A (Φg Retinal equivalents) using food composition tables (Langenhoven *et al*, 1986) following the methodology applied by Rose *et al (*2002).

Analysis of Variance (ANOVA) was used to compare the difference in the mean values of household food diversity (food counts), and intakes and adequacy of energy, iron, vitamin A (ìg Retinal equivalents) and vitamin E among the three study groups. The three categories of farmers) A variant of the WorkingBLeser model, as used by Hazell & Roell (1983) and Delgado et al (1998), was used to estimate the absolute budget shares (ABSs), marginal budget shares (MBSs) and expenditure elasticities for each commodity category. Household characteristics included in the equation (household size and the area under cropping) captured differences in family composition and their influence on household expenditure. Per capita expenditure (Ei) on commodity *i* was therefore expressed as:

$E_i = a_i + b_iE + cE \log E + Ó_j(ì_i Z_{ji} + ë_i Z_{ji})$ YYYYYYYYYYYYYYYYYYYY(1)

where E was the total per capita consumption expenditure, *Zj* denoted the *j*th household characteristic variable and a_i, b_i, c_i, ì*ij* and ë*ij* were parameters to be estimated. Share equations were estimated by ordinary least squares. The equation used for this study was:

$S_i = b_i + a_i/E + c_i \log E + Ó_j (ì_{ij} Z_j /E + ë_{ij} Z_j)$YYYYYYYYYYYYYYYYYY (2)

where $S_i = E_i/E$ is the share of commodity *i* in total per capita expenditure. Following Delgado et al (1998), the equations used to estimate the budget shares and elasticities were:

$MBS_i = ä E_i / ä E = b_i + c_i (1 + \log E) + Ó_j ë_{ij} Z_j$ *YYYYYYYYYYY..YYYY.* .(3)

$ABS_i = S_i$ *YYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY.*(4)

$å_i = MBS_i / ABS_i$ YYYYYYY..YYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY (5)

3. Description of the sample

The sample included 200 respondents from 176 households. Twenty-four per cent of the respondents formed the comparative group of randomly selected EFO non-members, 48 per cent of the sample was partially certified EFO members who were in conversion to organic production certification and the remaining 28 per cent were organically certified EFO members. Household size ranged from one to 25, with a mean of eight members.

Farm size varied from 0.01 to 8.90 hectares with a mean of 0.6969 hectares (0.48, 0.77 and 0.75 hectares each for non-members, partially certified members and certified members respectively). The mean monthly household income was R2809 for the whole sample. The main sources of household incomes for all households were wages, state pensions and remittances.

Farm activities generated R499 per annum for the whole sample and non-farm incomes averaged R2310 respectively per month. Farm income contributed 2.36, 5.05 and 7.53 per cent to household income of non-member households, households of partially certified and certified members respectively. The partially certified farmers generated 60 per cent of farm income from the sale of organic crops. Certified EFO members sourced all farm income from the sale of organic crops and farm income for this group was significantly higher (P= 0.05) than for households in the other two groups. Annual sales averaged R988 per household for certified farmers and ranged from R89 to R5194.

Food was sourced through purchases, gifts, food given as payments, and/or own production. More than 70 per cent of food was purchased. Despite increased production and active sale of agricultural produce, only seven and 26 per cent of food consumed came from own production in November and March respectively. The data showed substantial reliance on purchased maize.

4. The impact of smallholder commercialisation on food diversity

Food diversity ranged from five and eight food items consumed per household per month to 35 and 34 in rounds one and two respectively. EFO members enjoyed the greatest dietary diversity (see Table 1).

Table 1: Food diversity per group, Embo, November 2004 and March 2005

Household categories	Diversity in round 1 (November 2004)				Diversity in round 2 (March 2005)			
	Min	Max	Mean	ANOVA (P= 0.01)	Min	Max	Mean	ANOVA (P= 0.01)
Non-members	5	30	18 [a]		8	34	21 [a]	
Part-certified members	6	35	19 [a]		12	34	24 [ab]	
Certified members	10	33	24 [b]	0.000**	15	34	26 [b]	0.000**

*** = mean count differences significant at 1 % level of significance, a = the group with low mean food count while b is the group of high mean count; ab is the mid count group (Duncan Multiple Range Test).*

Little difference was observed between the dietary diversity of partially-certified and non-member households in round one. The dietary diversity of partially-certified members improved in the second round following the peak harvesting period for staples and saleable crops. Within food groups, little significant difference was observed between food diversity for the three groups for dairy and fruits in round one and baby foods and dairy in round two (see Table 2).

Table 2: Dietary diversity, Embo, November 2004 and March 2005

Food group	No of items in group	Round 1 (November 2004)				Round 2 (March 2005)			
		Mean number of foods consumed in a month				Mean number of foods consumed in a month			
		Non-members	Part-certified members	Certified members	ANOVA (P= 0.05)	Non-members	Part-certified members	Certified members	ANOVA (P= 0.05)
Baby foods	1	0.16 [a]	0.11 [a]	0.22 [a]	0.237	0.22 [a]	0.27 [a]	0.09 [a]	0.031*
Cereals	6	3.8 [a]	4.0 [a]	4.65 [b]	0.001*	4.53 [a]	4.65 [a]	4.65 [a]	0.734
Dairy	4	1.40 [a]	1.46 [a]	1.89 [a]	0.030*	1.63 [a]	1.88 [a]	1.89 [a]	0.388
Eggs	1	0.53 [a]	0.72 [ab]	0.78 [b]	0.015*	0.57 [a]	0.66 [a]	0.75 [a]	0.175
Fish	2	0.28 [a]	0.22 [a]	0.43 [a]	0.067	0.30 [a]	0.25 [a]	0.54 [b]	0.002*
Fruits	4	1.8 [a]	1.6 [a]	2.18 [a]	0.020*	1.53 [a]	2.13 [b]	2.63 [b]	0.001*
Legumes	1	0.92 [ab]	0.76 [a]	0.95 [b]	0.003*	0.73 [a]	0.83 [ab]	0.85 [b]	0.005*
Meat and poultry	4	2.40 [a]	2.20 [ab]	2.89 [b]	0.001*	2.46 [a]	2.44 [a]	2.61 [a]	0.478
Nuts	1	0.00 [a]	0.13 [ab]	0.16 [b]	0.016*	0.12 [a]	0.20 [a]	0.31 [a]	0.061
Oils	3	1.46 [a]	1.47 [a]	2.05 [b]	0.000*	1.89 [a]	2.29 [b]	2.20 [ab]	0.004*
Sugars	3	1.75 [a]	1.96 [ab]	2.20 [b]	0.022*	1.95 [a]	2.40 [b]	2.36 [b]	0.005*
Vegetables	9	3.61 [a]	4.14 [ab]	4.83 [b]	0.004*	4.91 [a]	6.36 [b]	7.10 [b]	0.000*

** = mean count differences significant at 5 % level of significance, a = the group with low mean food count while b is the group of high mean count; ab is the mid count group (Duncan Multiple Range Test).*

While almost all households consumed bread (89 per cent of all households) and rice (97.5%), considerably more certified member households consumed flour (81%) and prepared cereals (21%) in round one than the partially certified and non-members households, influencing the dietary diversity results. Consumption of fats and oils increased for the partially certified members following the harvesting season for saleable crops in March 2005.

The increased consumption of tinned fish in the second round for certified members could have indicated improved nutritional intakes with regard to many fat soluble vitamins, calcium and protein. Considerable increases in the variety of vegetables consumed by the partially and fully certified member households were observed across the two rounds. Overall, food diversity was found to be significantly higher among households engaged in certified commercial farming than for the other two groups that should have influenced energy and nutrient intakes.

5. Effect of smallholder commercialisation on nutrient intakes

Certified member households were better off nutritionally, with the greatest proportion of adequately nourished households in both rounds. It is clear from Table 3 that households of certified EFO members engaged in commercial organic production had average intakes of energy, iron and vitamin A in excess of the recommended dietary allowances per adult female equivalent except for vitamin A in round two. The average adult female consumed about a quarter of the RDA (800 retinol equivalents) in round two. Seventy-eight per cent of certified EFO households showed inadequate intakes of vitamin A for round two compared to 51 per cent in round one. This anomaly could not be explained from the data and was not expected when considering the overall increased intake of fats and vegetables in round two. Households of partially certified EFO members showed deficit intakes in round one for energy, iron and vitamin A but average consumption improved more than three fold in round two. While non-member households had slightly less adequate average intakes of energy, iron and vitamin A than the partially certified EFO member households, non-member household intakes exceeded requirements for energy and iron in the second round. Non-member household deficits for vitamin A were similar to those for certified member households in round two.

The Duncan Multiple Range test identified significant rankings for energy, iron and vitamin A for round one and for vitamin A in round two. For round one, the test was favourable for energy and nutrients for the certified member households and favourable for partially certified member households in round two for vitamin A. Households of non-members were worse off overall in terms of energy and iron than EFO member households.

Table 3: Food consumption deficits, Embo, November 2004 and March 2005

		Mean adequacy of intakes per female adult equivalent (figures in parentheses indicate the per cent of households with inadequate intakes)				**ANOVA (P= 0.05)**
		Overall sample	Non-members	Part-certified	Certified members	
Energy (kj)	Round 1	-184.22	-667.02 [a]	-438.51 [a]	932.53 [b]	0.000*
		(75%)	(81%)	(80%)	(59%)	
	Round 2	1458.82	1199.55 [a]	1133.83 [a]	2484.99 [a]	0.082
Iron (mg)	Round 1	(31%) -3.66	(38%) -5.80 [a]	(31%) -5.41 [a]	(26%) 2.67 [b]	0.000*
		(78%)	(85%)	(89%)	(57%)	
	Round 2	39.33	35.64 [a]	32.37 [a]	59.28 [a]	0.058
Vitamin A (Retinal equivalents)	Round 1	(13%) -187.33	(15%) -430.14 [a]	(13%) -302.14 [a]	(15%) 339.82 [b]	0.000*
		(76%)	(91%)	(81%)	(52%)	
	Round 2	121.48	-230.11 [a]	436.77 [b]	-217.36 [a]	0.000*
		(58%)	(81%)	(42%)	(78%)	

Note: Negative values indicate consumption below the requirement, while + means the opposite.
** = significant at 5 % level of significance, a = the group with low mean food intake while b is the group of high mean intake (Duncan Multiple Range Test).*

Cereals and legumes were found to be primary sources of energy, and cereals and vegetables were dominant sources of iron in the first and second rounds respectively. Vegetables were the major sources of vitamin A in both survey rounds.

Increased intake of energy could be attributed to increased consumption of fruit, legumes, nuts and sugars (sugar, jams, jellies, sweets and soft drinks). Iron intakes showed the greatest increase over the two survey periods with the number of households that consumed inadequate iron decreasing from 78 to 12 per cent between the two rounds. The increase in iron intake was likely due to the considerably increased consumption of a variety of vegetables in round two. The improved intake of vitamin A could be attributed to increased consumption of fruit, legumes, nuts and green leafy vegetables. The proportion of households with inadequate intakes was consistently higher in round one than in the second round, highlighting a concerning seasonal variation in dietary adequacy.

Significant positive relationships were found between income from non-farm activities and household energy and nutrition availability in the second round for households of partially certified EFO members. Farm income was significantly and positively related to vitamin A intake in a Duncan Multiple Range test. The results indicated that intensified farming had positive influences on the food consumption patters of all farmers and may explain the improvement of certified farm nutrition intakes.

6. The impact of commercialisation on consumption patterns

Due to the small sample size for certified farmers, very few significant equations for food groups were found but significant equations showed marginal increases across food types confirming the findings of the results reported above. Far clearer patterns emerged from the analysis of partially certified members for whom significant equations close to unity were found for fruit (-1.18*), maize (-1.06*), rice (-1.18**), legumes (-0.92*) and sugars and jams (-0.85**), indicating a possible reduction in expenditure on these foods should incomes rise in round one (start of the agricultural season) but an increase in dairy product consumption would be likely (0.46*). While increased consumption of dairy products (1.65*) and eggs (0.87*) seemed likely in the period following the main commercial harvest period should incomes rise. The analysis seemed to indicate an overall improvement in food expenditure following the main harvest. Increased income was likely to lead to increased expenditure on fats and oils (1.64**), and eggs (2.51**) among non-member households in the first round (1.13**), rice (1.03**), roots (0.72*) and sugars and jams (-0.82*). It seems from the expenditure analysis for foods that commercialisation lead to more consistent overall increases in food types as incomes increased for households of certified organic farmers who showed lower seasonal variation in consumption than seen among consumption patters of partially certified member households and non-member households but overall the impact of increased incomes could lead to positive consumption changes.

7. Conclusions and recommendations

Smallholder involvement in commercial agriculture seems to have significant positive impacts on food diversity, intakes and consumption patterns. Certified member households benefited in terms of food diversity and adequacy. Increased agricultural incomes directly impacted on dietary diversity and intakes while labour returns seemingly generated greater benefits for households of partially certified members in the second round of surveys where differences between consumption patterns became distinguishable from non-members households.

While increased farm income seemed to improve nutrition, it cannot be conclusively stated from the findings of this study that small holder commercialisation can alleviate hunger or solve malnutrition. Caution should be exercised in pinning hopes on small holder commercialisation as an effective means of addressing food insecurity, hunger and malnutrition in communities such as Embo without further and deeper investigation, including analysis of nutritional status and further investigation of the impact of seasonality on food procurement, dietary diversity, and consumption patterns.

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References

Cousins, B., Agrarian reforms and the Atwo economies@: Transforming South Africa=s countryside. Draft paper in R. Hall, and L. Ntsebeza (Eds.), *The Land Question in South Africa: The challenge of transformation and redistribution*, (Programme for Land and Agrarian Studies (PLAAS), School of Govemment, University of the Western Cape: Cape Town, 2005).

Delgado, C.L., The role of smallholder income generation from agriculture in sub-Saharan Africa in L. Haddad (Ed.), *Achieving food security in southern Africa, (*International Food and Policy Research Institute: Washington DC, 1997).

Hazel, P.B.R. and Röell, A., *Rural growth linkages: household expenditure patterns in Malaysia and Nigeria, (*International Food and Policy Research Institute: Washington, DC, 1983).

Hendriks, S.L., The challenges facing empirical estimation of food (in)security in South Africa, *Development Southern Africa*, 22, no. 1 (2005), 103 B 123.

Langenhoven, M.L., Conradie, P.J., Gouws, E., Wolmerans, P. and van Eck, M., Food Quantities Manual, (Medical Research Institute, Cape Town, 1986).

Rose, D., Bourne, L. and Bradshaw, D., *Food and nutrient availability on South African households: development of a nationally representative database.* Technical Report, (Health and Development Research Group, World Health Organization Collaborating Centre for Urban Health Burden and Disease Research Unit, Medical Research Council: Cape Town, 2002).