

**Comparative assessment of economic returns on the well-being of adopters and non-adopters of improved melon processing technology in Niger state, Nigeria**

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**Abstract:** Economic returns play an important role in the attainment of improved well-being of the farming households. This study was carried out to compare economic returns and its implication on the well-being of adopters and non-adopters of improved melon processing technology. Simple random sampling technique was used to select one hundred and ninety (190) melon processors/marketers for this study. The economic return of melon processing was estimated using the budgetary analysis while well-being was measured as the sum of money spent to cater for basic needs through the proceeds obtained from sales of shelled melon. Gross Margin (GM) obtained from sales of shelled melon seeds using improved melon sheller was ₦47,530.00/week compared to ₦2,230.01/week obtained for hand shelled melon. The findings show that 65.3% adopters spent more than ₦5,000/month to purchase food stuff while 6.0% non-adopters spent between ₦3,000 – 4000/month on food stuff; 98.9% adopters spent between ₦2,500 – ₦12,000/session on their children’s education but 93.7% of non-adopters spent less (₦1,500 – ₦3,000) on their children education; 99.5% adopters made appreciable savings up to ₦2,000 – ₦10,000/week compare to 96.5% non-adopters that saved below ₦3000/week. This study established that economic returns obtained from improved melon sheller contributed more to the meeting of basic needs of the adopters than their non-adopters counterpart. Result of the t-test indicated significant difference existed between economic returns ( $t = -42.38, p = 0.00$ ) of the adopters and non-adopters in the study area. Well-being of the adopters and non-adopters were also significantly different ( $t = -57.4, p < 0.05$ ). Thus, the study recommends that rural women should continue to adopt improved melon processing technology rather than manual method to enhance their productivity.

**Keywords:** Economic returns, Well-being, Adopters, Non-adopters, Improved melon technology

**INTRODUCTION**

The declining agricultural productivity, high post-production losses, low economic returns and poor well-being of rural women in developing countries call for concern. Of the world’s 1.2 billion extremely poor people surviving on less than US\$1 a day, 75 percent live in rural areas (International Fund for Agricultural Development (IFAD), 2012; Wu *et al.*, 2010). For the most part, they depend on agriculture and related activities for survival (Ravallion *et al.*, 2009). The World Development Report acknowledges the enormous potential the agricultural sectors of developing countries possess (World Bank, 2009). The dominant role of agriculture stems from among other impacts, increased farm outputs and rural income generation which ameliorate the effects of hunger, starvation, food scarcity, and social problems of unemployment. On the other hand, agricultural development relates not only to increase in the level of farm productivity but also the improvement in rural income generation and sustained well-being of rural dwellers. Historically, agricultural income is a more stable indicator of welfare analysis of rural household. It has a transitory character through the process of earning and consumption (Benson *et al.*, 2004). Agriculture constitutes the single largest contributor to the well-being of the rural poor, sustaining 90% of the rural labour force (World Bank, 2010). Rural dwellers are no doubt the supposed first

stakeholder beneficiaries of agricultural development in Nigeria. It holds a lot of potentials for the future economic development of Nigeria as it had done in the past (National Bureau of Statistics (NBS), 2012). However, these potentials have remained largely untapped which has led to the dwindling performance of the agricultural sector both domestically and in the international trade over years (Akinwunmi, 2012). The case of women who are often cited as able to produce about 80% of basic food seems worst (Ampadu-Ameyaw and Omari, 2015). Although they have prime responsibility for food production, they remain malnourished and still live in a closed circuit of economic deprivations (Nwanesi, 2006). As women they usually lack technical knowledge, and often have poor access to current information, technology, markets and credit, which all contribute to their poor economic status (Olutunla, 2008).

Important determinants of living conditions of households and their members are economic activities in which they are engaged and the returns they are able to reap from there (NBS, 2012). Many households in Nigeria, especially rural women are increasingly engaged in post-production of agricultural produce. It has become clear worldwide that the most rapid growth in agriculture has been occurring on the part of post-production activities (Punjabi, 2007). This is driven by growth of middle-income consumers even in low income

countries and their demands for better-quality value-added products. Empowering women in developing countries through small-scale agro-processing is essential to reduce poverty among rural women (UNRISD, 2010).

In Nigeria high proportion of rural women is involved in processing, marketing and utilisation of melon seeds and products (van der Vossen *et al.*, 2004). This implies that melon processing is capable of determining socio-economic well-being and welfare of the rural women and their families. Women spend their incomes on their children education, feeding, health care, ploughing back of profit to their melon processing activities, acquisition of household assets, and social relationship. Duncan (2004) opined that economic prosperity of rural dwellers is often linked to the achievement of effective integration and synergy between agricultural produce, agro-processing and marketing. However, very little information is available in literature on the rural women adoption of improved melon processing technology and extent to which it has contributed to high productivity, increase economic returns and better well-being of rural women because these benefits can guarantee its full adoption, utilisation and sustainability. The focus has always been on technical efficiency of the technology in the workshop. Empirical studies have shown that gains from adoption of new agricultural technology influenced the poor directly, by raising productivity and income of farm households, and indirectly, by raising employment (Evenson and Gollin, 2003; Diagne *et al.*, 2009). Hart *et al.* (2005) affirms that the improved technology contributes to agricultural development in terms of increased production output, higher income, and improved standard of living. In contrast, non-adoption of improved technology or used of conventional or manual method of shelling melon is inefficient, tedious and timing consuming thus limiting production output, market supplies and economic returns (James *et al.*, 2011). It therefore becomes imperative in this study to compare economic returns of adopters and non-adopters of improved melon processing technology and its implication on their well-being in Niger State, Nigeria. Specific objectives were to:

1. estimate the economic returns of adopters and non-adopters of improved melon processing technology in the study area
2. compare the well-being of adopters and non-adopters of improved melon processing technology in the study area

The study's hypothesis stated that there is no significant difference between the economic returns and well-being of adopters and non-adopters in the study area.

## METHODOLOGY

Niger State is one of the six States in North Central Nigeria, and its population was 4,082,558 (National Population Census (NPC), 2006). The state was created in 1976 with its capital in Minna. Currently, the state covers a total land area of 76,000km<sup>2</sup> (about 9 percent of Nigeria's total land area). This makes it the largest state in the country (Community Portal of Nigeria, 2003). By reason of its location and its climate, soil, and hydrology, Niger State has the capacity to produce most of Nigeria's staple crops such as maize, sorghum, rice, yam, pepper and melon.

A multistage sampling procedure was used in selecting respondents for this study. There are twenty-five (25) LGAs with 274 wards in Niger State. First Stage involved purposive selection of three Local Government Areas (Lapai, Chata and Agaie LGAs) where melon is being predominantly produced as the major crop. In the second stage, simple random sampling technique was used to select two wards in the selected LGAs in Niger State, making total of six (6) wards selected for the study. Two villages were randomly selected from each of the wards making 12 villages from where empirical data were collected. In the fourth stage, simple random selection of 30% melon processors/marketers was made from each of the selected villages through the data collated by the Federal Ministry of Agriculture and Rural Development (FMARD) and Niger State Agricultural Development Project (NSADP) during the national farmers' registration exercise. There are five hundred and forty-three (543) melon processors which were stratified into 372 adopters and 171 non-adopters. Proportionate sampling of 35% was made from each stratum to give 130 adopters and 60 non-adopters. This gave a total sample size of one hundred and ninety (190) melon processors which was used for this study. The respondents were reached through the *maigari* (community leaders) and contacts of their association leaders.

The most straightforward depiction of a monetary flow would be to look at the sales made in the melon processing and marketing activities, providing an estimation of the earnings of the shelled melon. This was measured in Naira (₦) at ratio level. The economic return of melon processing was estimated using the budgetary analysis. The budgetary analysis involves deduction of total variable costs (in Naira) from the total revenue to obtain the gross margin for the manually and mechanically shelled melon. Total revenue was estimated as the weekly sales made from melon. Costs incurred on processing and marketing was measured in Naira (₦). The total variable cost includes transportation, market levy and miscellaneous. Gross Margin (GM) was used to estimate the profitability.

$$GM = TR - TVC$$

where;

TR – Sales made from shelled melon seeds

TVC – Total Variable Cost

Well-being was measured as ability of the rural women to cater for their basic needs through the proceeds obtained from sales of shelled melon. The basic needs considered were household feeding, health care, children’s education, savings to thrift and cooperatives and personal relationship and charity. This is in line with the Nigeria National Core Welfare Indicators (CWIQ) (NBS, 2006). Data obtained were analysed using t-test.

## RESULTS AND DISCUSSION

### Economic returns of adopters and non-adopters of improved melon processing technology

The economic returns for melon shelled with hands and melon sheller are presented in Table 1. The average market price of hand shelled melon was ₦500.00/mudu while the one from melon sheller was ₦450.00/mudu. Similarly, average output of melon shelled with hands and melon sheller was approximately 12 mudus/week and 300 mudus/week respectively. The total variable cost incurred on hand shelled melon was ₦3,769.99/week while that of melon sheller was ₦87,570.00/week. The estimated total revenue for hand shelled melon was ₦6,000/week while it was ₦135,000/week for melon sheller. Meanwhile, the

Gross Margin (GM) estimated for hand shelled melon was ₦2,230.01/week compare to ₦47,530.00/week obtained from melon sheller. Adopters of improved technology earned higher economic returns than non-adopters. This implies that adoption of improved technology has impacted positively on the economic returns of melon processors, thereby increasing their probability of escaping economic hardship and poverty. This is in line with the findings of Fadilah *et al.* 2013 that productivity-enhancing agricultural innovations can contribute to raising incomes of rural households, poverty alleviation, food security and better well-being in developing countries. A cross-country study of African countries by Terlin (2003) cited in Nwanyanwu *et al.* (2014) found that monthly income generated in over 18 countries adopting modernized agricultural practices was 40% more than those practicing traditional methods of farming. Ezeh and Nwachukwu (2007) in their study of the impact of selected rural development programmes on poverty alleviation in Abia State, Nigeria found that the participating farmers performed better in terms of income and output compared to their non-participant counterparts. Therefore, improvement in economic returns will further encourage adoption of introduced modern processing technology by the melon processors and marketers.

**Table 1: Estimation of economic returns using budgetary analysis technique**

Shelled melon (kernels)	Non-Adopters (₦500/mudu)	Adopters (₦450/mudu)
<b>Variable cost (₦)</b>		
Qty unshelled melon (mudus/five days)	24	600 (10 bags)
Purchase (unshelled melon @ ₦8,000/bag)	3,199.99	80,000.00
Market levy	50.00	50.00
Petrol/diesel and oil	0	2,400.00
Labour (wages)	0	2000.00
Transportation	270.00	1,320.00
Miscellaneous	250.00	1700.00
<b>Total Variable Cost (TVC)</b>	<b>3,769.99</b>	<b>87,570.00</b>
<b>Revenue (₦)</b>		
Average output (mudus/every five days)	12	300 (5bags)
<b>Total sales of shelled melon (TR)</b>	<b>6,000.00</b>	<b>135,000.00</b>
<b>Gross Margin (GM = TR – TVC)</b>	<b>2,230.01</b>	<b>47,530.00</b>

Source: Field Survey, 2016

1 mudu of shelled melon approximately weighed 1.26kg

**Well-being of adopters and non-adopters**  
**Household Feeding**

From the result in Figure 1, all the respondents (100%) indicated that melon contributes to household food security as food condiment along with other food items like *masara*, *chikafa* while returns obtained from melon are used to purchase other food stuff like rice, beans, corns, dry fish and the like. According to Ajani (2008) rural women provide up to 60 to 80 percent of domestic food consumption. However, majority (65.30%) of adopters spent more than ₦5,000/month to purchase food stuff while only very few (6.0%) of non-adopters spent between ₦3,000 – 4000/month

on food stuff depending on the household size. The results uphold the findings of Ampadu-Ameyaw and Omari (2015) that rural women involvement in agro-processing enables the processors to provide the food requirements of the household members and thereby helping such households to escape hunger and poverty, which is becoming endemic in some African countries. IFAD (2012) described women as the principal, if not sole economic support for themselves and for their children. This implies that they are responsible for food security and nutritional well-being of their families (Omonona and Agoi, 2007).

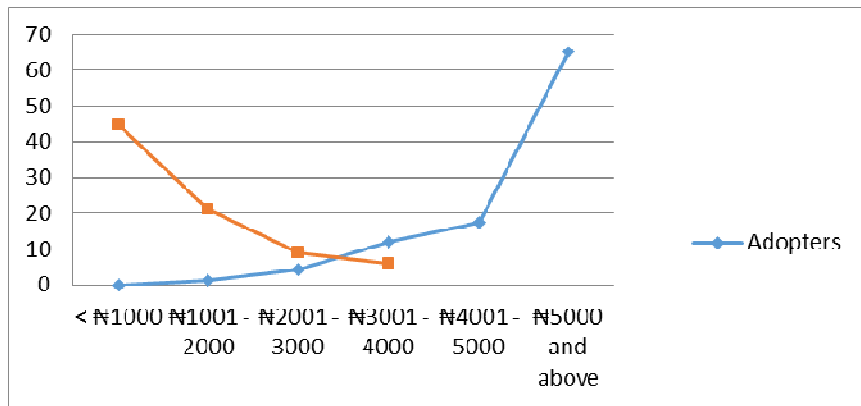


Figure 1: Graph showing contribution to household feeding  
 Source: Field Survey, 2016

**Health care** - The availability of health care services such as primary health care centres, maternity facilities, hospitals and pharmacies, basic health care workers, nurses, midwives, doctors and traditional healers, and other medical services and the use of these services by rural households are indicators of well-being and measures of good health (Oladimeji, 2015). All the adopters (100%) indicated that they spent about ₦200 – ₦1,000 to buy drugs and supplements, and that they paid medical bill of their households up to ₦3,000 and above depending on the nature of illness when they go to hospital for treatment. Meanwhile, most (54.0%) of the non-adopters reported that they spent ₦200 – ₦1,000 on drugs, while 9.30% could

afford ₦1,000 – ₦2,000 when they visit hospitals for treatment. This implies that irrespective of technology status of the melon processors they all attend to their households and personal health needs but the adopters can afford to spend more on drugs and pay higher medical bills going by their production size and economic returns which is higher when compared to the non-adopters. The finding however contradicts submission by Etim and Ukoha (2010) who obtained a value of ₦1,134.34/month for health expenditure of rural households in Akwa Ibom State. Fujitsu (2008) stated that people today have higher expectations of modern health care than they did before so, they spend more to access it.

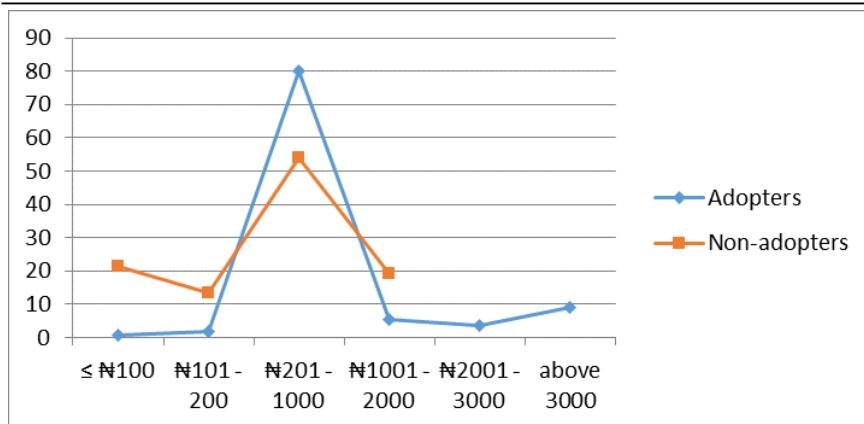


Figure 2: Graph showing contribution to health care  
Source: Field Survey, 2016

**Children’s education** - Almost all (98.90%) adopters spent between ₦2,500 – ₦12,000/session to buy books, school uniforms and sandals for their children, out of which 71.80% stated that they pay the children school fees (₦4000 – ₦5000) to assist their husbands. On the other hand, most (93.70%) of non-adopters spent between ₦1,500 – ₦3,000 on their wards school kits, while 6.30% claimed that they pay their wards school fees (₦3000 - 4000). This implies that melon processing and marketing

activities are major contributor of funds for the education needs of the respondents’ wards. However, the adopters could afford to contribute more funds to cater for their children education than non-adopters. Generally, the women prioritize their children’s education over other social activities. Various studies also show that in rural area women are able to meet their children’s education need first by paying school fees (Ampadu-Ameyaw and Omari, 2015).

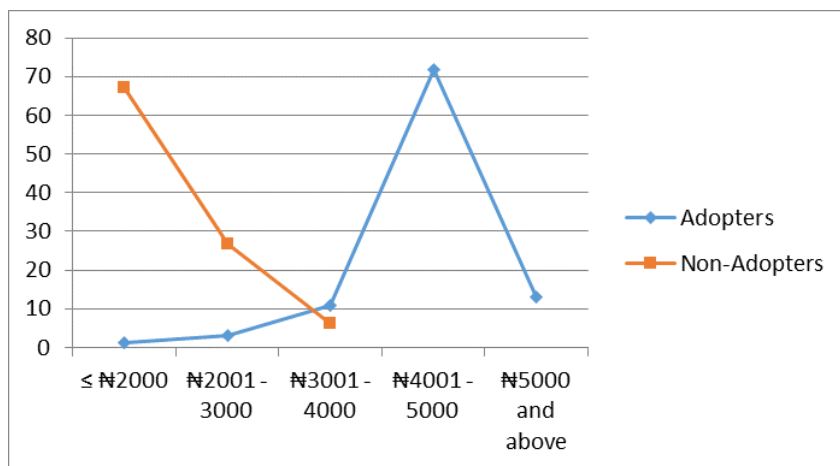


Figure 3: Graph showing contribution to children’s education  
Source: Field Survey, 2016

**Savings to thrift and cooperatives** - About one hundred percent (99.50%) of the adopters reported that economic return from melon is improving because they made appreciable savings up to ₦2,000 – ₦10,000 weekly depending on the demand trend. Adeyemo and Bamire (2005) stated that savings are of great importance in developing world as it has direct bearing on the level of economic activities of the country. It is capable of improving income which is a major poverty index in the rural areas. Study by Fasoranti (2007) also showed that savings mobilization is positively related to investment, asset acquisition, human

development and personal income in the rural areas. With regards to non-adopter only very few (3.50%) mentioned that economic return was favourable and saved between ₦3000 – 4000/week, while majority (96.50%) argued that return is not consistent and as such they could not save much money (less than ₦3000/week). This implies that adoption of improved technology has contributed to consistence and increase in savings for adopters. The more outputs produced, the higher the income generated by the melon processors. In the same vein, higher income depicts higher profit which is expected to be ploughed back into the processing

and marketing of melon by the rural women, by purchasing additional inputs for the subsequent processing and business expansion. The implication here is that rural savings tend to improve the living standard of the rural women in the study area in terms of its contributions to financial strength of the rural women and expansion of their melon processing and marketing activities. Rural savings have become a back bone of rural development given that accessibility to the capital market and formal financial sectors is quite

limited (Fasoranti, 2013). Rural savings among women could be in different forms such important ones are rotating savings (*Esusu*), daily contribution (*Ajo*), cooperative thrifts and credit societies (*Alajeseku*). These informal financial sectors have been found more effective than the formal financial sector since credit facilities from the informal sectors are often accompanied by high interest rates thereby making investment unprofitable.

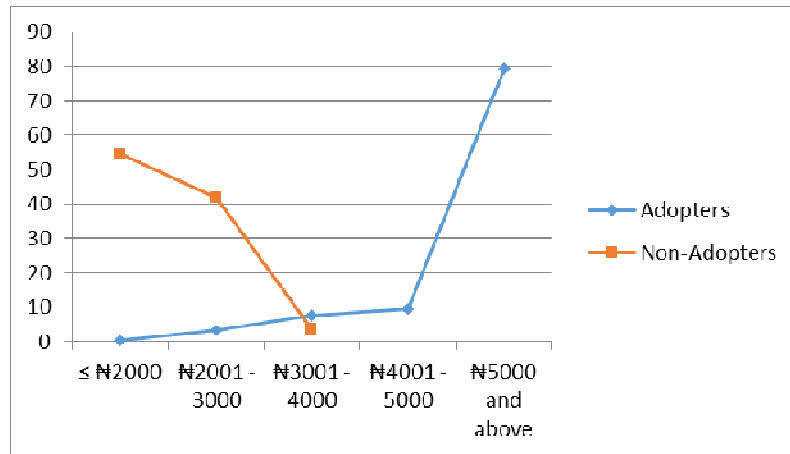


Figure 4: Graph showing contribution to weekly savings  
 Source: Field Survey, 2016

**Personal relationship and charity**

Social relationships have long been considered as one of the strongest and most important predictors of well-being (Argyle, 2001). This assumption is in accord with the arguments of numerous scholars regarding the importance of group living and interpersonal relationships in shaping human evolution (Taylor, 2010). The findings show that both the adopters and non-adopters (100%) relate well with their neighbours but 52.60% of adopters said they had friends they

could support with ₦300 and above as charity. In contrast, 10.50% of non-adopters stated that they could support their friends with up to ₦50 and ₦200 if the need arises. This implies that there is cordial relationship between the melon processors and their neighbours which signifies peaceful co-existence and better well-being. Examples of empirical support from family, friends, and especially from a significant other is tied to greater well-being (Walen and Lachman, 2000; Gallagher and Vella-Brodrick, 2008).

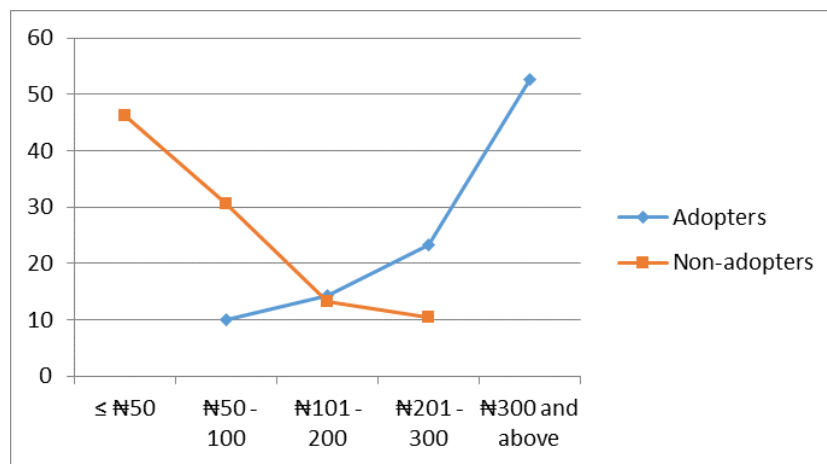


Figure 5: Graph showing contribution to personal relationship  
 Source: Field Survey, 2016

**Test of hypotheses**

**Difference between the economic returns of adopters and non-adopters**

Results of t-test revealed that there is a significance difference between the economic returns of adopters and non-adopters in the study area ( $t = -42.38, p = 0.00$ ) at  $p < 0.05$  level of significance. Adopters realised higher economic

returns compared to non-adopters. The higher economic returns of adopters are attributed to increased output obtained from improved melon processing technology. The null hypothesis that “*there is no significant difference between the economic returns adopters and non-adopters in the study area*” is rejected.

**Table 12: t-test result of significant difference between the economic returns of adopters and non-adopters**

Economic returns	Sample size	df	Mean	Std. Dev.	Std. Error	Mean diff.	t	p-value	Decision
Non-Adopters	60	59	2807.3	5.59	0.65	-4859.4	-42.38	0.00	S
Adopters	130	129	7666.7	1.98	0.22				

Source: Field Survey, 2016. S - Significant at  $p < 0.05$  level of significance

**Difference between the well-being of adopters and non-adopters**

Results of the t-test show that significant difference existed between the economic returns and well-being of adopters and non-adopters in the study area ( $t = -57.4, p = 0.00$ ) at  $p < 0.05$  level of significance. The negative sign indicates an inverse relationship between the well-being of Adopters and Non-adopters. It can be inferred that a better well-being is as a result of increased productivity and economic returns of adopters through

improved technology which has enhanced their ability to meet basic household needs than their counterpart non-adopters. This supports the position of Grabowski and Self (2006) increased agricultural productivity is central to growth, income distribution, improved food security and alleviation of poverty in rural Africa. Therefore, the null hypothesis that “*there is no significant difference between the well-being of adopters and non-adopters in the study area*” is rejected.

**Table 13: t-test result of significant difference between the well-being of adopters and non-adopters**

Well-being	Sample size	df	Mean	Std. Dev.	Std. Error	Mean diff.	t	p-value	Decision
Non-Adopters	60	59	1.88	0.58	0.08	-194.7	-57.4	0.00	S
Adopters	130	129	196.7	26.3	3.34				

Source: Field Survey, 2016. S - Significant at  $p < 0.05$  level of significance

**CONCLUSION**

Gross Margin (GM) obtained from sales of shelled melon seeds by adopters of improved melon processing technology was higher than that of non-adopters. Hence, higher economic returns realised from improved melon technology contributed more to the meeting of basic needs of the adopters than their counterpart, non-adopters in terms of household feeding, health care, children’s education, financial savings, and personal relationship. Also, t-test results indicated that significant differences existed between economic returns and well-being of the adopters and non-adopters in the study area.

2. Extension agents should be proactive in disseminating innovative information to the melon processors in order to promote further adoption of improved melon processing technology among the rural women.
3. The melon processors’ associations should be seen as a platform to encourage more women to adopt melon shelling innovations in the study area.

**RECOMMENDATIONS**

This study therefore recommends that:

1. Rural women should continue to adopt improved melon processing technology rather than manual method to enhance their productivity.

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