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Original article

Milk and milk products consumption pattern, preference and purchase behaviour in communal areas of the Eastern Cape Province in South Africa

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ABSTRACT

A study was carried out between June 2014 and May 2015 using a pre-tested structured questionnaire and face to face interviews to characterize the consumption pattern, preference and purchase behaviour of milk and milk products in the Eastern Cape Province, South Africa. A multi-stage area probability sampling was used to select five hundred households from five districts within the Eastern Cape Province (100 from each district). The data was analysed using the IBM, Statistical Package for Social Sciences (SPSS) version 22. The communal average family size in the province was between 5-10 members with a monthly income of ZAR1340 per household. The monthly mean of raw milk consumption pattern was (2.196± 1.423) 2-5 litres of cattle milk, (4.780±0.785) 2-5 litres of goat milk and (4.980±0.692) 2-5 litres of sheep milk per household. Pasteurised milk was found to be the most regularly consumed and preferred milk product with an average consumption of 4.78±0.84 litres per household per month. Monthly cattle milk product consumption were 0.5 kg-1 kg of powdered milk and 2-5 litres of sour milk. Household composition and consumer preference were ($P<0.05$) significantly the primary reasons for the consumption of milk and milk products. The standard price for milk and milk products ranged

from R8.50-R9.50 per litre of fresh milk, R7.50-R8.50 per litre of sour milk, R33.00-R35 kg of powdered milk and R11.50-R12.50 litre of pasteurised milk. The study concluded that socio-demographic characteristics such as household size, household composition, gender of the household head and marital status greatly affected consumption patterns of milk and milk products in the Eastern Cape Province of South Africa.

1. Introduction

Milk and milk products are total foodstuff which exclusive offer nutritional quality as well as health status (Melesse et al., 2009). Apart from milk and milk products being of considerable biological value in terms of protein, they consist of other indispensable nutrients (Oni et al., 2012). Intake of milk and milk products provide essential nutrients such as protein, calcium, magnesium, folate, B1, B2, B6, B12 and vitamins A D, and E (Murphy et al., 1994; Black et al., 2002; Lonnerdal, 2003). These nutrients help to make milks nature most nearly excellent food (Vabi et al., 1995). Milk consumption exhibits spato-temporal variation owing to differences in the socio-economic aspects, tastes and food habits of people across agro-climatic regions and variation in milk availability in an area (Krishnadas et al., 2016). Health benefits (Hartog et al., 2006), value (Alden et al., 2007) and manufacturing, convenience and suitable packaging (Hoyer and Mqacinnis, 1997) are some of the driving forces which may entice population to consume milk and milk products.

The primary challenge in most developing countries today has been provision of quality and adequate nutrition (Abdulai and Aubert, 2004). However, it has been acknowledged that quality nutrition is an investment in human capital that yields returns today as well as in the future (Njarui, 2011). Nutrition plays a critical role in human resource development since deficiencies in essential nutrients lead to malnutrition, which affects an individual's mental and physical state, resulting in poor health and poor work performance (FAO, 1992). Currently, Africa has the lowest milk consumption trend (Dugmore et al., 2004), consuming around 37 liters per capita annually. This figure is well below the world average of 104 liters per capita accounting for six percent of world consumption (Oni and Fashogbon, 2012). The projected human population growth in South Africa stands at 1.3% per year (SAS, 2015). This implies that by 2016, the South Africa's population will be approximately 54 million and is projected to increase to 82 million by the year 2035 (ASA, 2008). Historical changes in the demand for livestock products have been largely driven by human population growth, income growth, and urbanization and the production response in different livestock systems (Thornton, 2010). Urbanization has considerable impact on patterns of food consumption in general and on demand for livestock products. It stimulates improvements in infrastructure, including cold chains, and this allows perishable food to be traded more widely (Delgado, 2005). It is assumed that the increasing human population, urbanization trends and rising household incomes will translate to substantial increase in the demand for livestock products, particularly milk and meat (Uzunoz and Akca, 2012). This is on the background that the actual consumption patterns, preference and purchasing behaviour of milk and milk products in most of the communal areas in South Africa is not well understood. Therefore, a study was conducted to characterise the consumption patterns, preference and purchasing behaviour of milk and milk products in the communal areas of the Eastern Cape Province of South Africa.

2. Materials and methods

2.1. Study area and sampling procedure

The Eastern Cape (Fig. 2.1) is the country's second-largest province after the Northern Cape, taking up 13.9% of South Africa's land area and with a population of around 6.5-million people (Statistics South Africa, 2011). It is lying on the south eastern coast of South Africa, it is a region of rugged cliffs, rough seas and dense green bush of the stretch known as the Wild Coast. The province's diverse climates and landscapes range from the dry and desolate Great Karoo to the lush forests of the Wild Coast and the Keiskamma Valley (Kakembo, 2001). District

municipalities in the province are Alfred Nzo, Amathole, Cacadu, Chris Hani, Nelson Mandela Bay Metropolitan and 37 local municipalities and two metropolitan municipalities (Cocks et al., 2003).

Climate is highly varied with the west of the province being dry with sparse rain during winter or summer, with frosty winters and hot summers. Mean annual precipitation is <500 mm while potential evaporation is >2000 mm (Kakembo, 2011). Coastal rainfall (600-1000 mm) decreases inland to 450-750mm on the central plateau, and increases on the seaward facing scarps and mountains. The winters temperature averages between 7 and 20º C (April and August) and summers temperatures range from 16 to 26º C (November and April) (Cundill, 2005) (Table 3.1). Convective mid-summer precipitation in the north-east is contrasted with winter rains in the west Kakembo, (2011). The interior can become very cold in winter with temperatures of 7^{o}C, with heavy snowfalls occasionally occurring in the mountainous regions between Molteno and Rhodes (Britz et al., 2001).

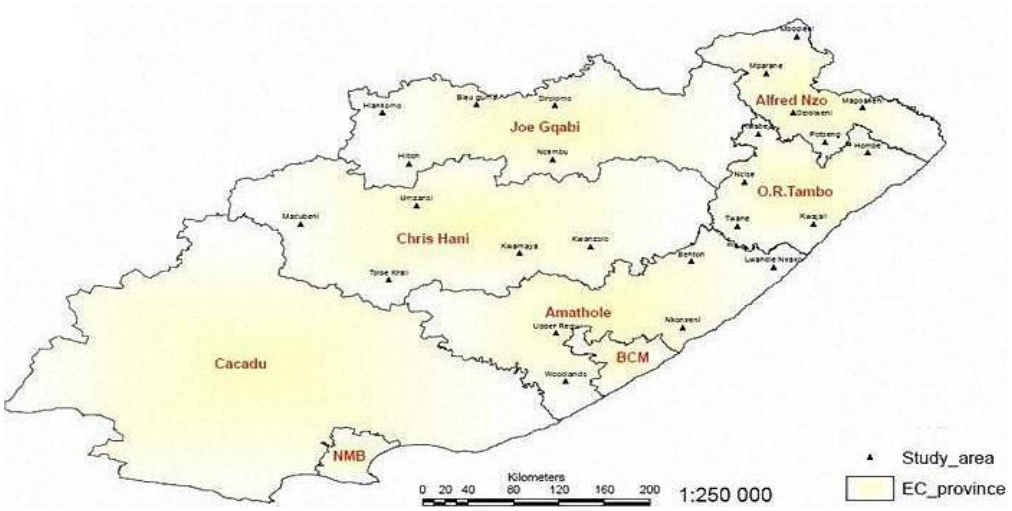

Fig. 2.1. Map of area under study per community surveyed and district municipality (South Africa National Biodiversity Institute (SANBI) (2015).

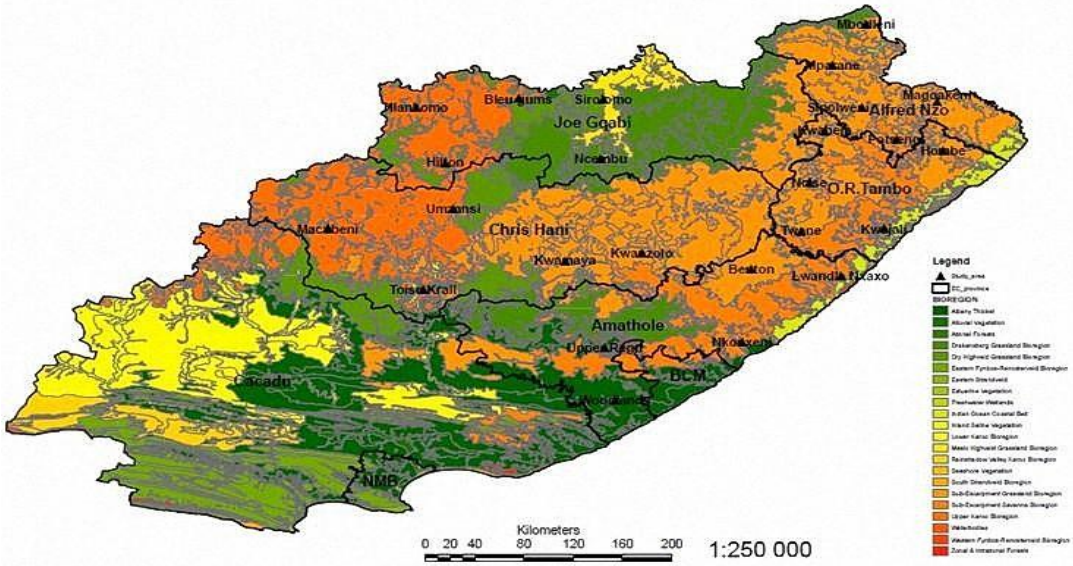

Fig. 2.2. Vegetation map of areas under study per community surveyed and district municipality (South Africa National Biodiversity Institute (SANBI) (2015).

The distribution of the main veld types in the province can be described briefly as follows (Kakembo et al., 2001; Dovie et al., 2008) firstly, Coastal Tropical forest, which occurs from Alexandria to the south-western border of the Eastern Cape near the Knysna area; secondly, False Bushveld, which can be found between the Kei and

Keiskamma river valleys (Simnkonda et al., 2009), while Karoo and Karroid vegetation covers most of the interior of the region; and finally, Grassveld, which can be found only north of the Great Fish river basin (Cundill, 2005). (Fig. 2.2). Soil types there are laterite (red, leached, iron-bearing soil) Kakembo et al. (2001), unleached subtropical soils, and gley like (bluish gray, sticky, and compact) podzolic soils (highly leached soils that are low in iron and lime) as described in the Eastern Cape State of the Environment Report (2004).

A multi-stage area probability sample (Iyoke, 2006) was used between June 2014 and May 2015. The respondents were man and women of 18 years and above spread across the communal district areas of the Eastern Cape. They represent different age groups, education status, and socio-economic profile. The first level was the province, then the second level was the delineated district areas and subsequent smaller administrative areas such as wards with the ultimate household level. Although randomly selected the choice of these districts was driven with the intention to give a full detailed description of the Eastern Cape Province as a whole in terms of livestock milk production and communal household milk and milk product consumption patterns.

2.2. Data collection

Pre-tested semi-structured questionnaire and interviews were used to collect data through a single visit survey. A multi-stage area probability sampling was used to select five hundred households from five districts within the Eastern Cape Province (100 from each district). The semi structured questionnaire was prepared in English and translated in local languages (Xhosa and Swati) during interviews. Administration of questionnaire involved key informants such as headman, chiefs, district livestock and health officials, council members and randomly selected community households in all the study sites. Data was collected from May 2014 to June 2015. Collected data included aspects of socio-demographic characteristics, milk and milk product: consumption, price, preferences and purchase behaviour, livestock milk production practices and management of milk producing livestock.

2.3. Data analysis

Data was analysed using the IBM, Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics were generated to represent respondents' opinions on various aspects of livestock milk production. Significance differences among treatments means were separated using Tukey HSD at $P<0.05$. The following model was used to analyse data for household monthly income, consumer preference, consumption level for milk and milk products and price of milk and milk products.

$$Y_{ijkl} = \mu + W_i + L\,j_{(i)} + R_{k(ij)} + e_{l(ijk)}$$

Where:

Y_{ijkl} = The observed value of a dependent variable
μ = Overall mean
W_i = The effect of district
$L_{i(J)}$ = The effect of community nested under district
$R_{k(ij)}$ = The effect of income group nested under district and community
$e_{l(ijk)}$ = Random error

3. Results

3.1. Household social-economic demographics

3.1.1. Household age distribution

The majority (60.8%) of the households in the Eastern Cape Province were observed to be male headed and 39.2% of the households were found to be headed by female household members (Table 3.1). Of the male headed households, Chris Hani district had 81% while Oliver Tambo district had the lowest (52%) percentage of male headed households. The proportion of household heads (40-80 years of age) recorded the highest age distribution of 42.8% per household. Age distribution of male and female respondents were significantly different ($P<0.05$) among the households in each of the study location in Eastern Cape Province.

3.1.2. General educational status of household heads

The educational status of the household members was diverse; the majority of the household heads attended primary school only (Table 3.2). At 55%, Amathole district recorded the highest population of household heads with at least primary school level education. Alfred Nzo district at 22% had the highest number of household heads who were illiterate, and do not read and write. The highest recorded level of educated household heads at 7% were from the Oliver Tambo and Joe Qabi districts as shown in Table 3.2. There was no significant difference (P>0.05) in the level of education of the respondents in Amathole and Oliver Tambo districts. However, Alfred Nzo district had significantly higher (P<0.05) level of education than that of Chris Hani and a significant difference (P<0.05) was observed in Joe Qabi district.

Table 3.1.
The age and sex distribution of household heads in the study area (n=500).

Characteristic /Age group	Mean ± SD and percentages (%)									
	Amathole		Alfred Nzo		Chris Hani		Oliver Tambo		Joe Qabi	
0-20	-	5	0.11±0.04	1	0.10±0.01	-	-	-	-	-
20-40	0.14±0.09	41	0.56±0.34	11	0.16±0.18	6	1.27±1.01	19	1.01±0.48	8
40-60	3.24±1.98	48	3.44±2.10	44	3.13±1.80	36	3.24±1.27	44	3.01±1.22	31
60-80	3.82±2.11	6	3.29±1.98	38	4.01±2.76	54	3.66±1.89	35	4.01±3.11	57
80-100	0.21±0.03	5	0.41±0.04	6	0.43±0.02	4	-	2	0.38±0.03	4
Gender										
Female	0.44±0.68	44	0.48±0.546	40	0.86±0.49	19	1.03±0.675	48	0.94±0.71	45
Male	0.70±0.55	56	0.84±0.435	60	1.22±0.67	81	1.11±0.567	50	0.81±0.56	55

n=Number of respondents; SD= Standard deviation.

Table 3.2
The educational status of household heads in the study area (n=500).

Level of education	Mean ± SD and percentages (%)									
	Amathole		Alfred Nzo		Chris Hani		Oliver Tambo		Joe Qabi	
Illiterate	1.02±0.32	11	2.36±1.03	22	0.57±0.04	7	1.82±0.52	15	1.84±0.55	15
Primary	3.64±2.01	55	3.01±1.29	33	3.21±1.39	45	2.76±1.05	39	3.11±1.09	49
Secondary	3.26±1.01	33	3.67±1.52	45	3.78±2.02	46	3.24±1.89	39	2.67±1.11	29
Tertiary	0.45±0.04	1	-	-	0.87±0.21	2	1.09±0.76	7	1.11±0.89	7

n= Number of respondents; SD = Standard deviation.

3.1.3. Household size

Family size for all districts surveyed is presented in Table 3.3. The majority of the district's 60.0% Joe Qabi, 54.0% Chris Hani, 49.0% Alfred Nzo and 44.0% Amathole recorded family household sizes between 5-10members. The mean household size was recorded as Amathole (3.76±2.11), Chris Hani (3.69±1.29), Alfred Nzo (3.91±1.98), Oliver Tambo (1.64±0.731) and Joe Qabi (4.55±2.45) per household within each district. There was no significant (P>0.05) difference between the household family size and the distribution of households in each of the locations.

3.1.4. Household head occupation and source of income

In the districts surveyed, 40% to 58% of the sampled household's heads were old age pension government receivers (Table. 3.4). The highest level of household head occupation at (2.01±0.78) 20.0% blue collar and second highest at (0.42±0.02) 5% white collar employment falls under the Amathole district. Alfred Nzo recorded (0.81±0.07) 12% the highest self-employed household heads across the province. The mean household head occupation for Amathole (1.83±0.780), Chris Hani (1.66±0.695), Alfred Nzo (2.00±0.845), Oliver Tambo (2.02±0.819) and Joe Qabi (1.69±0.799) districts was recorded across the province. There was significant relationship (P<0.05) among the characteristics of household occupation and the study locations. There was higher significant (4.86) child grant income than alternative sources of income. Generally, there was no significant different (P>0.05) among the sources of income in all the study locations.

Table 3.3.
The household family size in the study area (n=500).

Household family size	Mean ± SD and percentages (%)									
	Amathole		Alfred Nzo		Chris Hani		Oliver Tambo		Joe Qabi	
1-5 People	4.02±1.88	49	3.85±1.27	40	4.21±2.09	51	3.88±1.37	42	3.09±1.86	31
5- 10 People	3.76±2.11	44	3.91±1.98	49	3.69±1.29	43	4.26±2.10	54	4.55±2.45	60
10-15 People	1.09±0.21	7	1.07±0.32	7	1.01±0.11	5	0.12±0.01	1	1.11±0.32	9
15-20 People	-	-	0.43±0.12	4	0.11±0.01	1	0.14±0.02	3	-	-

n= Number of respondent, SD = Standard deviation.

Table 3.4.
Characteristics of household head occupation and alternative sources of income in the study area (n=500).

Characteristic/ Household head occupation	Mean ± SD and Percentages (%)									
	Amathole		Alfred Nzo		Chris Hani		Oliver Tambo		Joe Qabi	
Blue collar	2.01±0.78	20	1.23±0.46	12	1.01±0.21	9	0.11±0.01	1	0.87±0.31	10
White collar	0.42±0.02	5	0.13±0.01	2	-	-	0.12±0.01	2	0.14±0.01	3
Traditional leader	0.11±0.01	1	0.11±0.01	1	0.11±0.01	1	0.11±0.01	1	0.11±0.01	1
Chief	-	0	0.11±0.01	1	0.11±0.01	1	0.11±0.01	2	0.11±0.01	1
Self employed	0.45±0.04	7	0.81±0.07	12	0.69±0.11	6	1.01±0.29	9	0.12±0.01	2
Alternative sources of Income										
Grant (Old age)	3.12±1.01	44	3.02±0.98	40	3.16±1.02	40	4.11±1.34	56	4.01±2.01	58
Grant (Child grant)	0.13±0.01	7	0.32±0.03	10	0.21±0.02	10	0.12±0.01	6	0.13±0.01	6
Pension+Child grant	0.11±0.01	4	0.10±0.01	2	-	0	0.13±0.01	5	0.11±0.01	1
Sick pensioner	0.11±0.01	1	0.11±0.01	2	0.13±0.02	4	0.11±0.01	1	-	0

n=Number of respondents, SD = Standard deviation.

3.1.5. Household income characteristics

Household income for all districts surveyed is presented in Table 3.5. The highest income range was R10000-R15000 and was only 3.0% being the highest recorded in Chris Hani. The mean monthly income per household head within the district was recorded as Amathole (2.54±1.16), Chris Hani (2.30±1.00), Alfred Nzo (2.81±1.30), Oliver Tambo (2.65±1.05) and Joe Qabi (2.19±1.01) per household within the districts. There was a highly significant difference ($P<0.05$) in the mean distribution of household monthly income among the study locations.

Table 3.5.
Distribution of monthly income among the districts in the study area (n=500).

Income range	Mean ± SD and percentages (%)									
	Amathole		Alfred Nzo		Chris Hani		Oliver Tambo		Joe Qabi	
R0-R500	0.56±0.12	12.0	1.34±0.45	26.0	0.58±0.22	13.0	3.76±1.28	46.0	1.25±0.61	18.0
R500-R2000	4.85±3.01	61.0	4.31±3.11	60.0	4.87±3.09	63.0	3.87±1.98	50.0	5.15±3.14	72.0
R2000-R5000	0.68±0.24	13.0	0.21±0.03	5.0	0.71±0.13	15.0	0.11±0.01	2.0	0.16±0.01	4.0
R5000-R7000	0/15±0.02	4.0	0.11±0.01	1.0	-	-	-	-	-	-
R7000-R10000	0.12±0.01	2.0	0.31±0.04	6.0	0.11±0.01	1.0	0.11±0.01	1.0	0.14±0.01	3.0
R10000-R15000	0.13±0.01	2.0	0.12±0.01	2.0	0.13±0.02	3.0	0.11±0.01	1.0	0.12±0.01	2.0

n= Number of respondents, SD = Standard deviation.

3.1.6. Monthly consumption patterns of milk and milk products among the districts

The monthly consumption frequency of milk and milk products is presented in Figure 3 through to Figure 3.11. Across the Eastern Cape Province consumption frequency patterns of milk and milk products showed significant variation caused by price changes within the different communal areas. The average consumption frequency patterns were 5-10 litres of pasteurised milk, 100g-500g powdered milk and 2-5 litres fresh and sour

milk recorded monthly across the province. The daily mean consumption of milk and milk products was recorded as Amathole (3.50±1.07), Chris Hani (3.41±0.85), Alfred Nzo (3.71±1.18), Oliver Tambo (3.26±0.94) and Joe Qabi (3.80±0.94) per household within the districts. At 14% Chris Hani district recorded the highest amount of monthly consumed pasteurised milk of 15-25 litres. Alfred Nzo district recorded the highest consumed fresh milk, 8%, and sour milk (11%) with consumption values of 15-25 litres monthly. Joe Qabi district recorded the highest (94%) powdered milk consumption with a range of 4-6 kgs monthly.

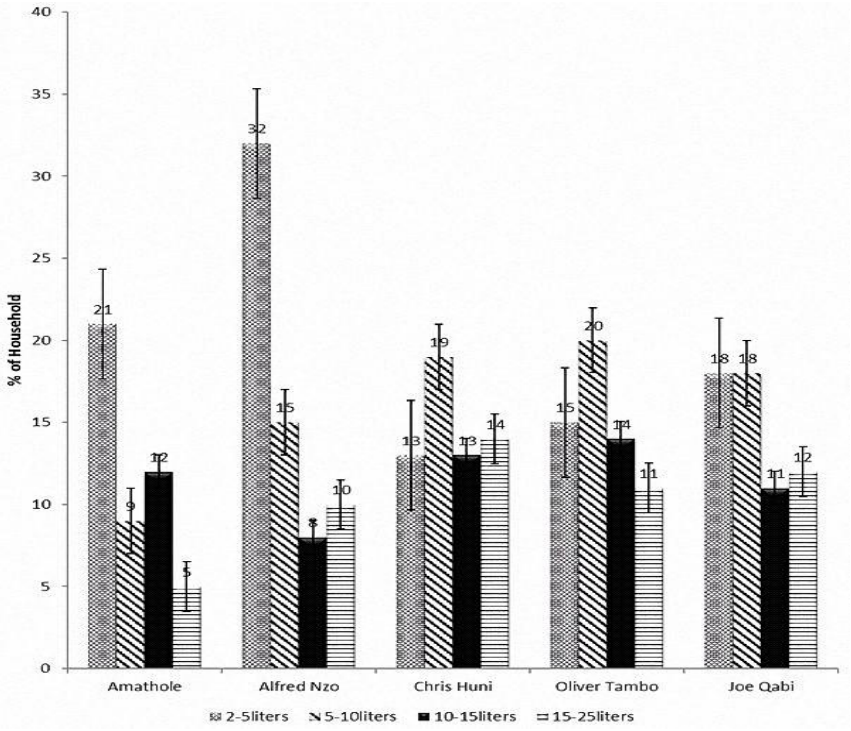

Fig. 3. Monthly consumption patterns of pasteurised milk products among the consuming districts of the Eastern Cape Province, South Africa.

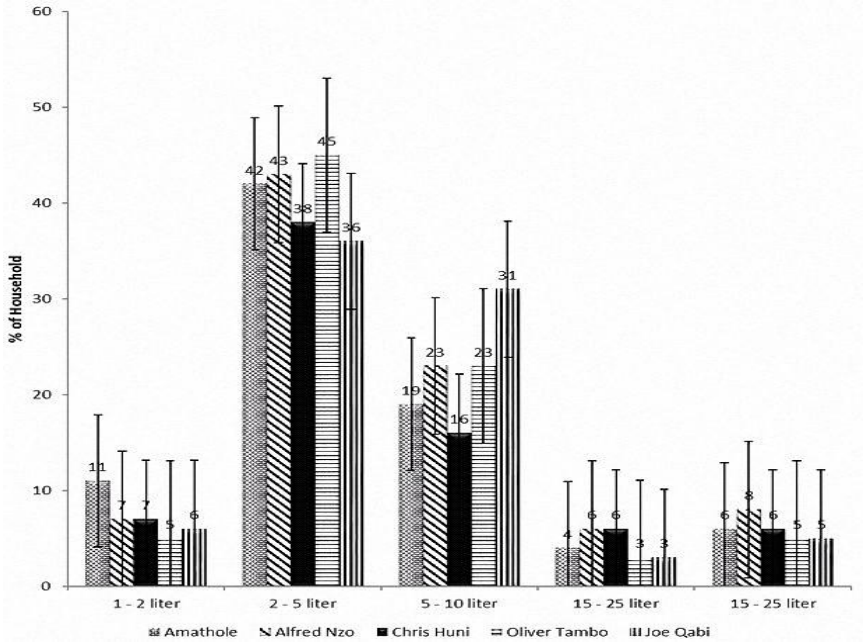

Fig. 3.1. Monthly consumption patterns of fresh milk products among the consuming districts of the Eastern Cape Province, South Africa.

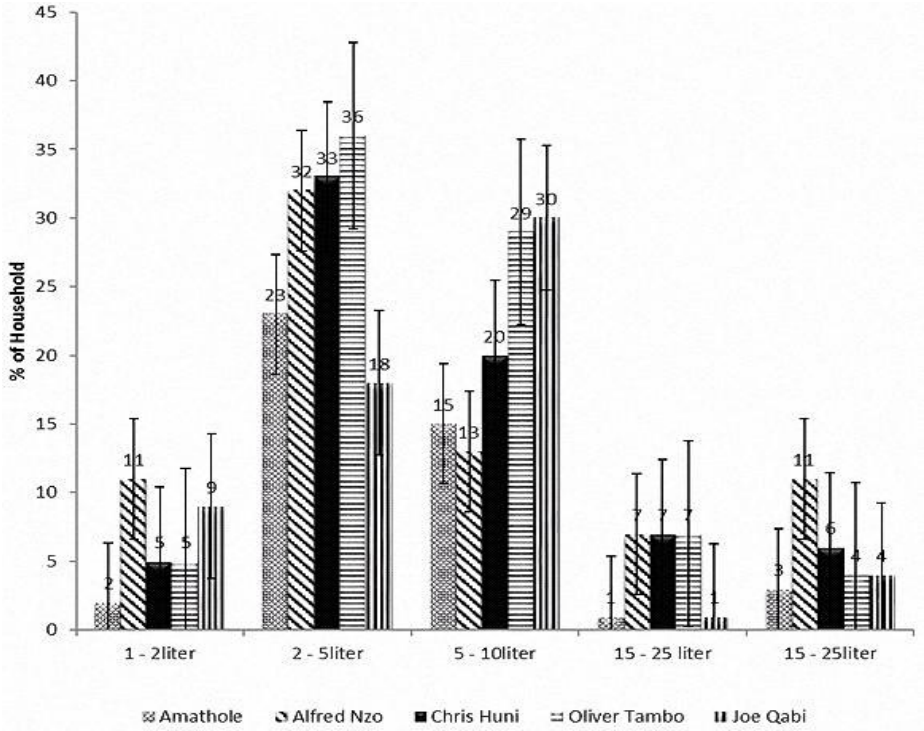

Fig. 3.2. Monthly consumption patterns of sour milk products among the consuming districts of the Eastern Cape Province, South Africa.

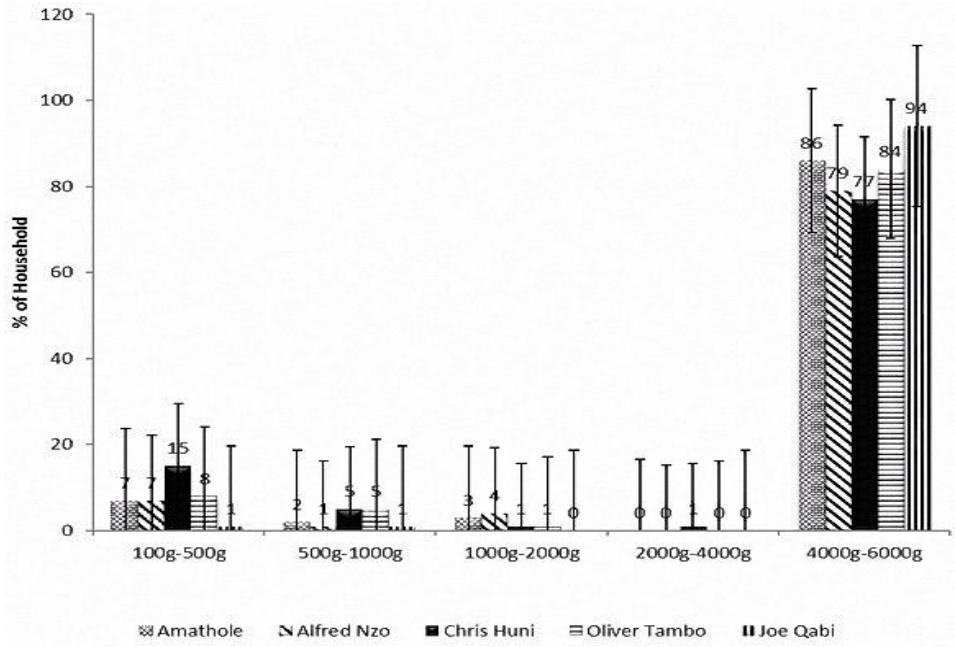

Fig. 3.3. Monthly consumption patterns of powdered milk products among the consuming districts of the Eastern Cape Province, South Africa.

3.1.7. Consumer preference of milk and milk products among the districts

Residents of Oliver Tambo district showed the highest consumer preference (77%) towards milk compared to the other districts. Both sheep and goat milk were mostly preferred in Chris Hani district, with values of 25% and 15%, respectively (Fig. 3.4). There was a significant difference ($P<0.05$) between the consumer preference of milk

and milk products among the districts. Most districts preferred consuming a combination of fresh and sour milk to other milk products with Oliver Tambo district recording the highest preference of 64% among the three milk products (Fig. 3.5). Sour milk had the highest consumer preference with Joe Qabi recording the highest preference at 16% followed by 6% in Amathole, 4% in Alfred Nzo and 3% in Chris Hani districts.

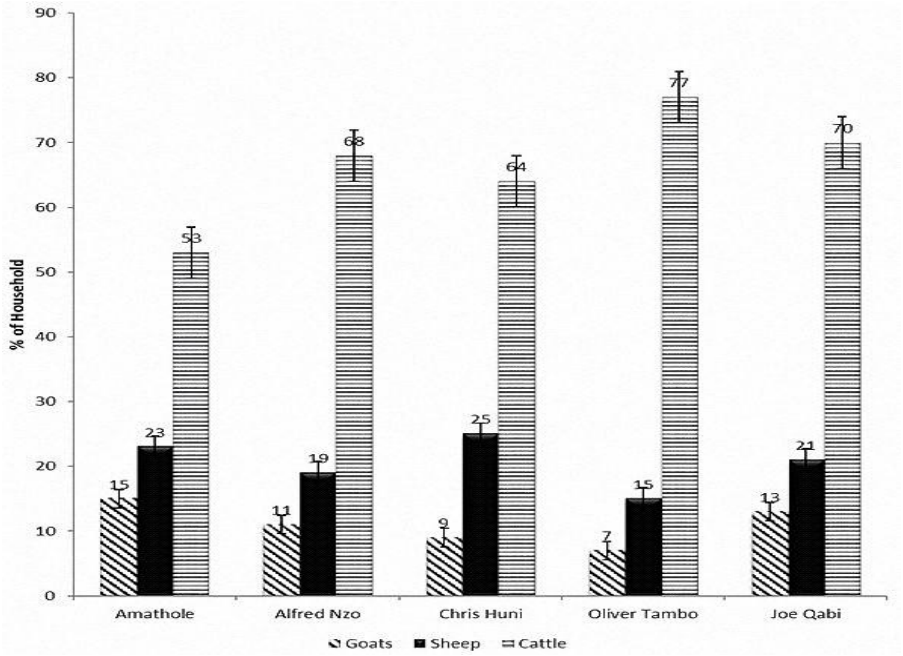

Fig. 3.4. Livestock milk preferences among the districts of the Eastern Cape Province, South Africa.

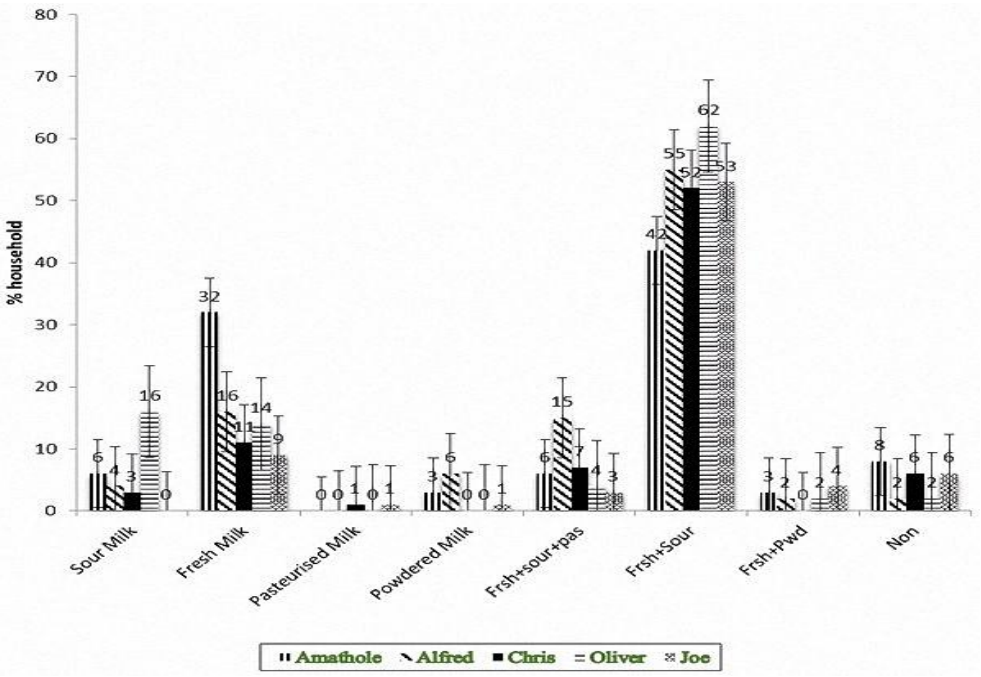

Fig. 3.5. Consumer preference of milk products among the districts of the Eastern Cape Province, South Africa.

3.1.7. Consumer purchasing behaviour of selected milk and milk products

Amathole district recorded the highest consumer price preference of pasteurised milk and powdered milk respectively (Fig. 3.5). The price for fresh milk varied between R7.50 to R8.50 across the surveyed area (Fig. 3.6).

However, Joe Qabi district recorded the highest (32%) fresh milk price between R9.50-R10.50. Alfred Nzo district also recorded the most expensive price preference of sour milk purchased at 33% between R9.50-R10.50 (Fig. 3.7) and powdered milk at 55% between R50.00-R52.00 (Fig. 4.10) The overall mean and standard deviation of milk prices observed were 0.13±2.98 per litre of pasteurised milk, 0.11±2.58 per litre of fresh milk, and 0.07±1.59 per kg of powdered milk and 0.04±0.82 per litre for sour milk (Amasi) across the province. There is a significant (P>0.05) difference between product price and consumer purchasing behaviour of selecting milk and milk products types.

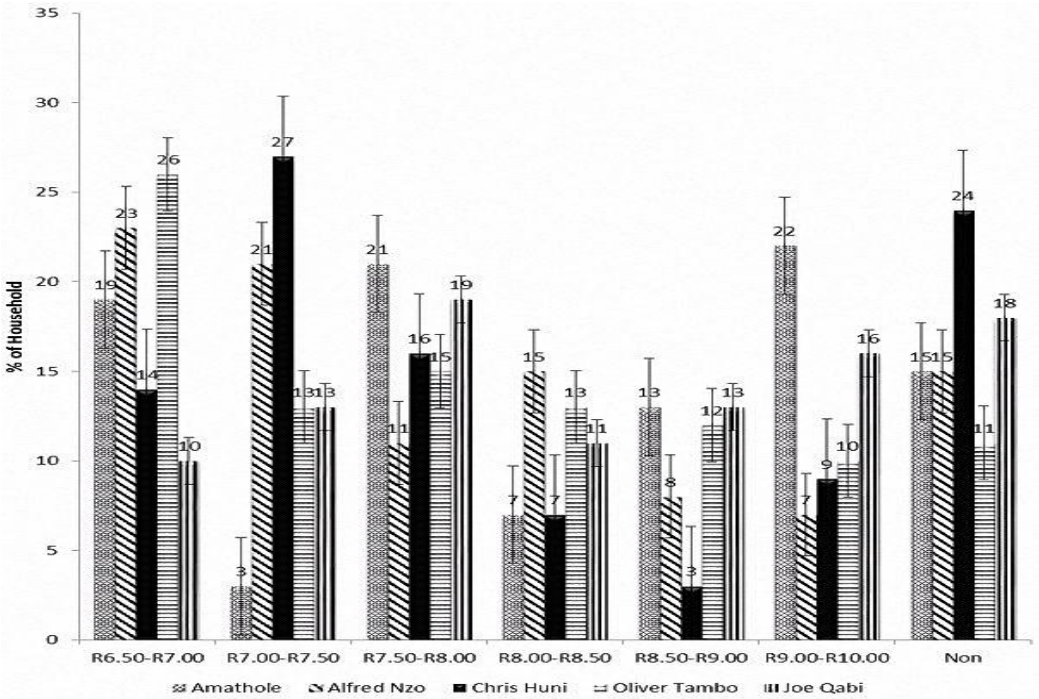

Fig. 3.6. Purchasing price of selected pasteurised milk products purchase among the districts of the Eastern Cape Province, South Africa.

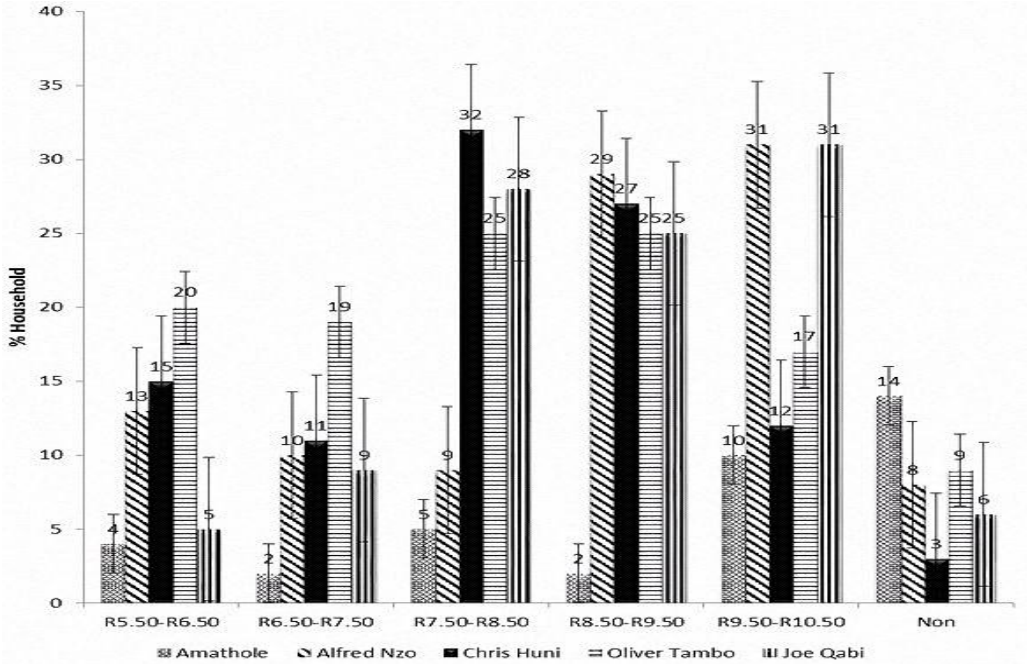

Fig. 3.7. Purchasing price of selected fresh milk products purchase among the districts of the Eastern Cape Province, South Africa.

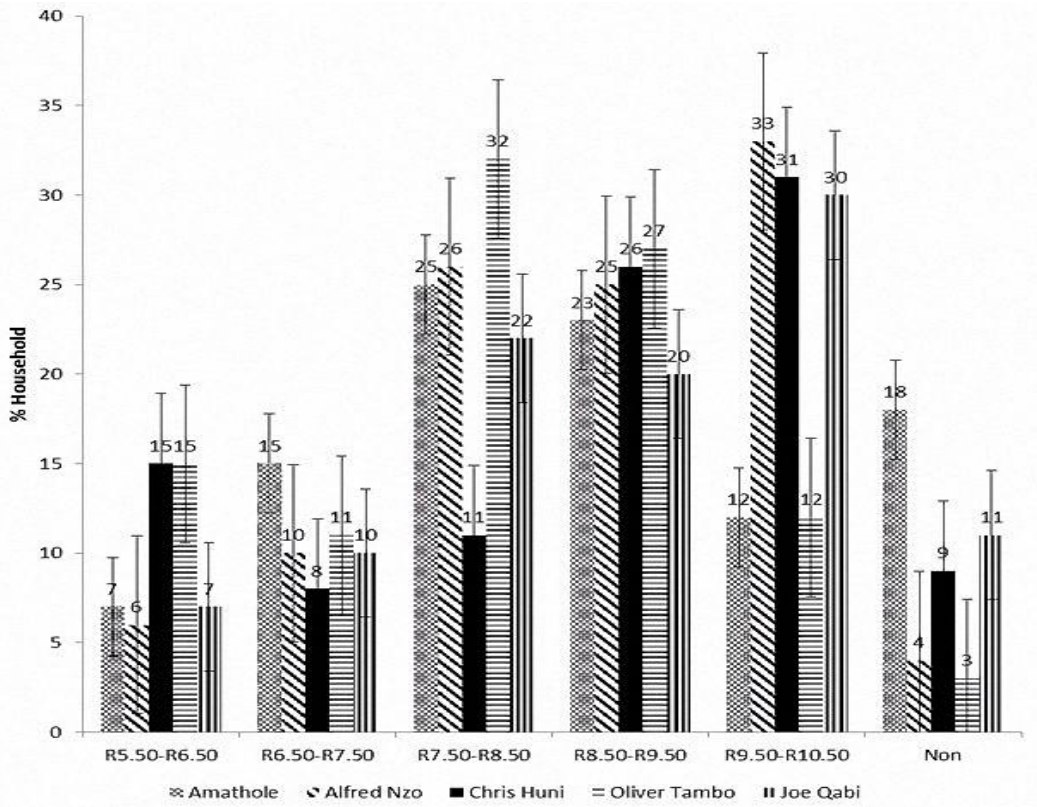

Fig. 3.8. Purchasing price of selected sour milk products purchase among the districts of the Eastern Cape Province, South Africa.

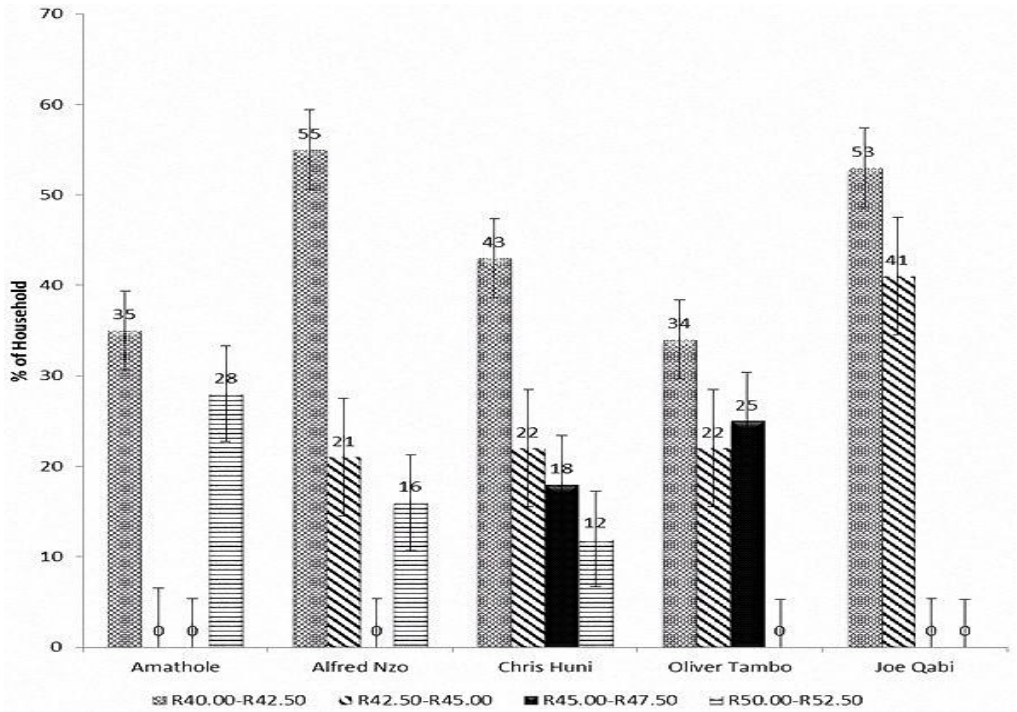

Fig. 3.9. Purchasing price of selected powdered milk products purchase among the districts of the Eastern Cape Province, South Africa.

3.1.8. Consumer rational preference for selected milk and milk products

The consumer purchasing behaviour of selected milk and milk products is greatly affected by the consumer rational of preference. Across the Eastern Cape Province consumers interviewed stated that household dynamics and preference are the most considered factors for rational choice of selected milk and milk product for purchase. Household dynamics at 45% recorded Joe Qabi district as the highest consumer rational preference for selected milk and milk products (Fig. 3.10). In Chris Hani district 35% consumers stated choice and 15% consumers in Alfred Nzo district stated availability as the some of the main factors affecting their rational preferences used by consumers when purchasing milk and milk products. There was no significant difference (P>0.05) between the consumer rational preference for selected milk and the type of milk products purchased.

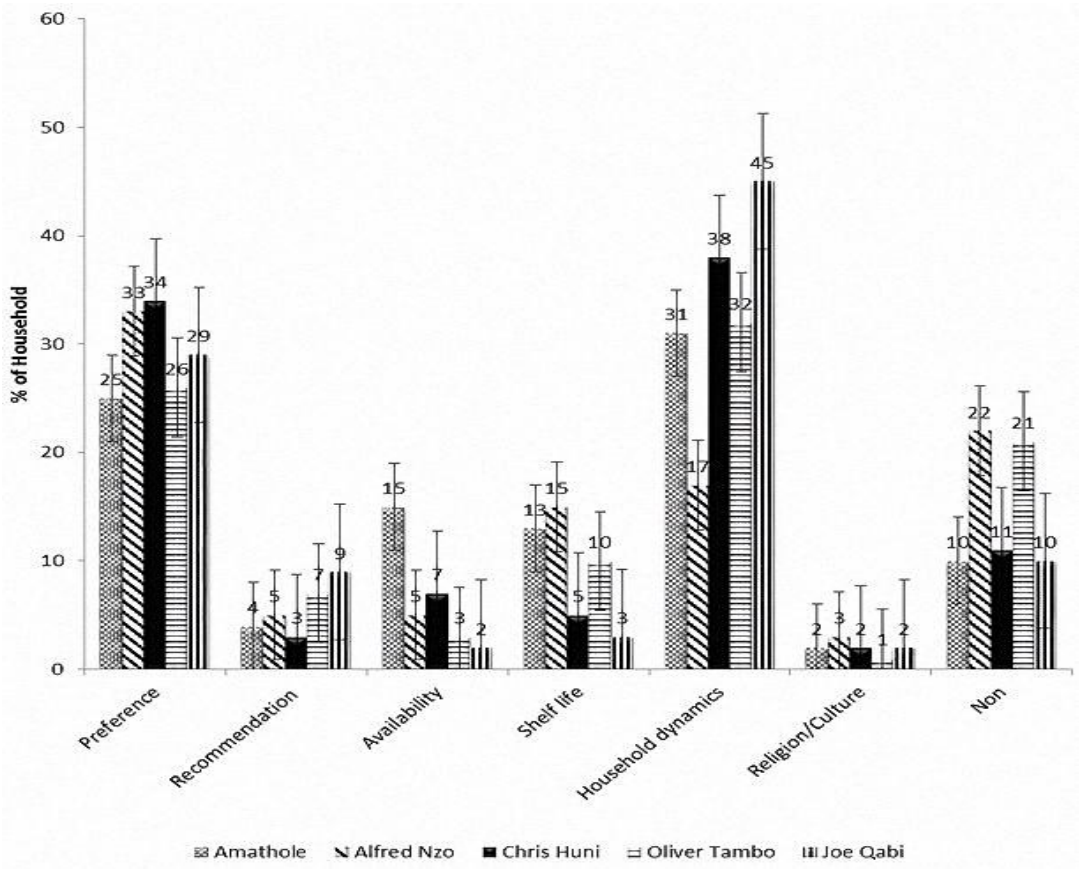

Fig. 3.10. Consumer rational preference for selected milk and milk products purchased among the districts of the Eastern Cape Province, South Africa.

3.1.9. Consumer buying location preference of selected milk and milk products

The majority of respondents preferred buying household milk and milk products in town location (Fig. 3.11 to 3.15). Amathole district at 22% had the highest fresh milk consumption preference, followed by Oliver Tambo district at 10% which had the highest sour milk. Town also showed a high purchase preference of pasteurised milk products at 5% in the Alfred Nzo district. Consumer buying location preference of milk products like sour and fresh milk also showed a high in local shops. There was significantly difference (P<0.05) between selecting milk products and consumer buying location preference (Table 3.6).

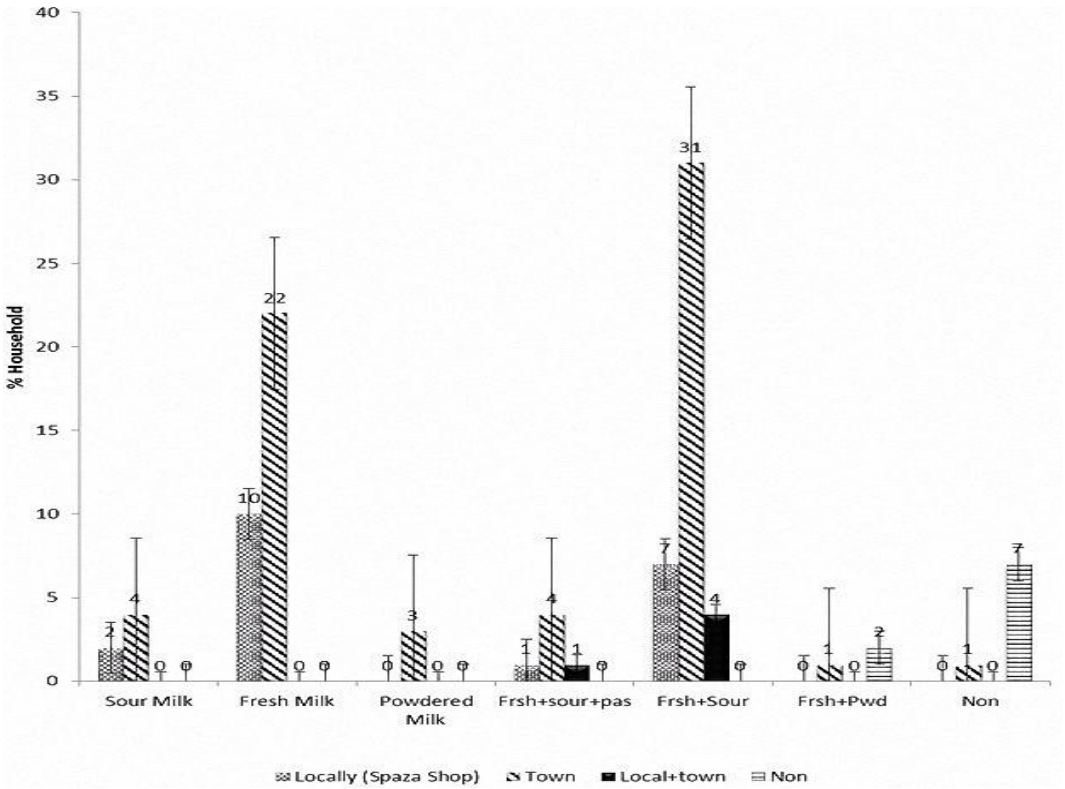

Fig. 3.11. Location preference of selected milk and milk products purchase among consuming Amathole districts households.

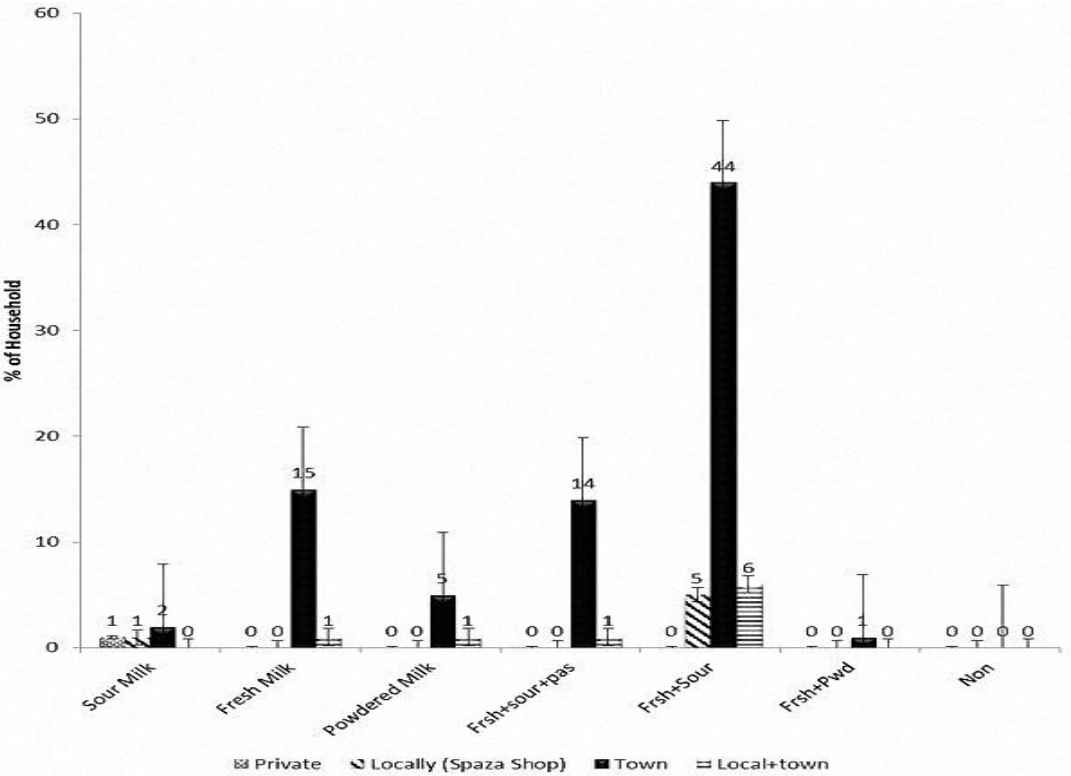

Fig. 3.12. Location preference of selected milk and milk products purchase among consuming Alfred Nzo districts household.

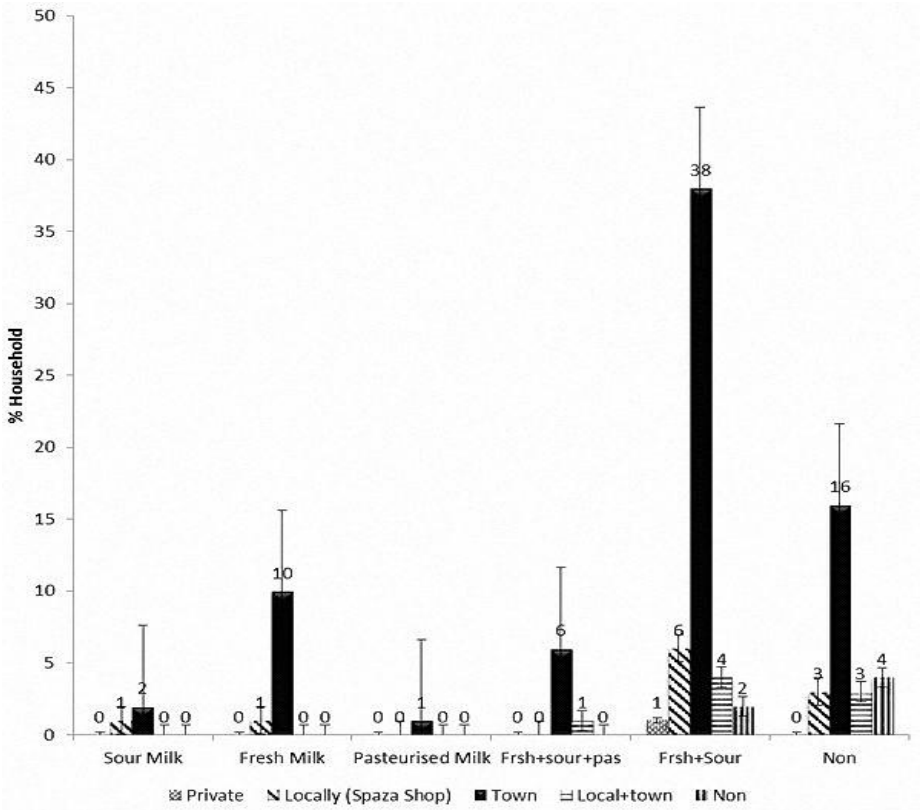

Fig. 3.13. Availability of selected milk products among consuming Chris Hani districts household.

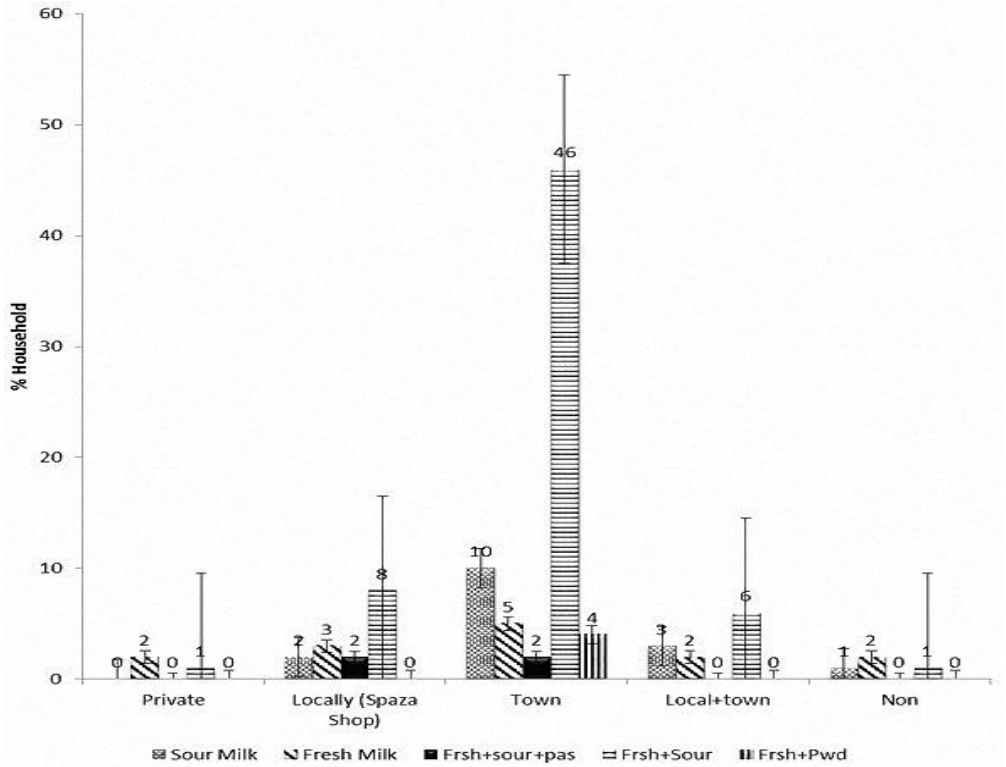

Fig. 3.14. Location availability of selected milk products among consuming Oliver Tambo districts household.

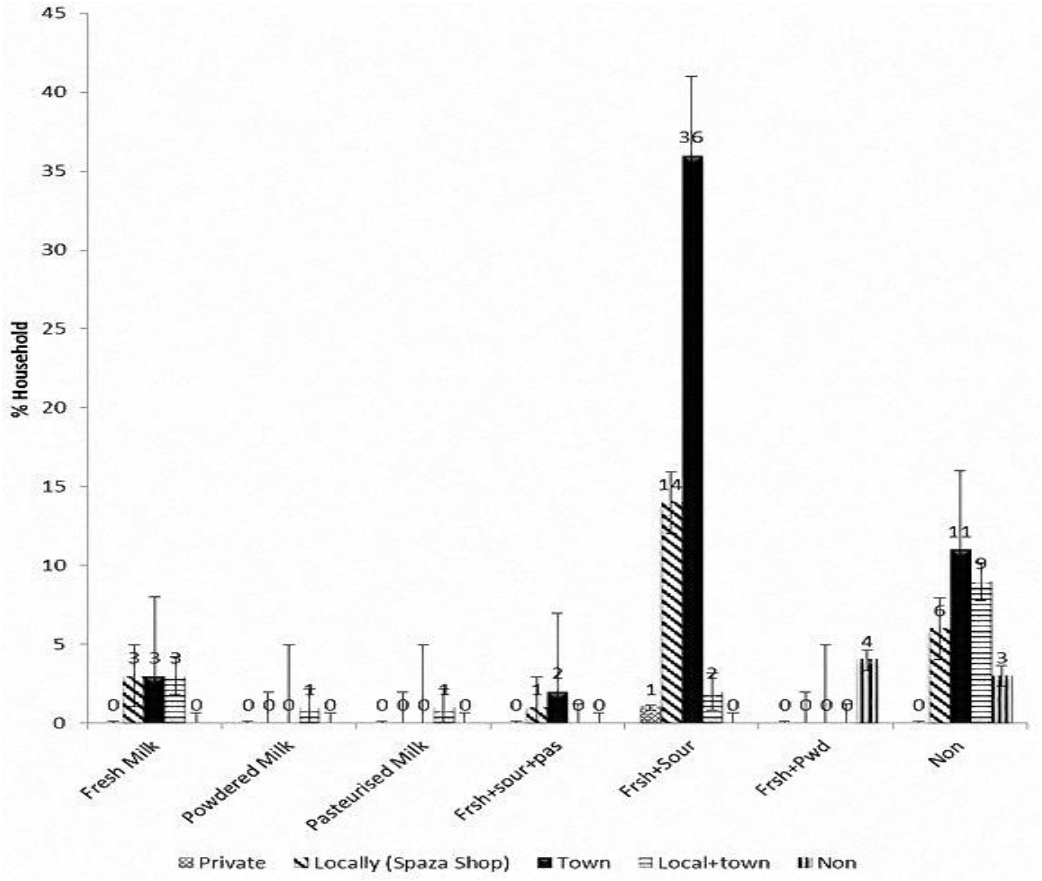

Fig. 3.15. Location availability of selected milk products among consuming Joe Qabi districts household.

Table 3.6.
Monthly consumption level of milk and milk products among consuming households in the districts.

Products amount consumed (per litre or kg/household/month)						
Milk and milk products	**Amathole**	**Alfred Nzo**	**Chris Hani**	**Oliver Tambo**	**Joe Qabi**	**Significant level**
Sour milk litre	0.19	0.074	0.21	1.02	0.90	*
Fresh milk	0.26	2.34	0.09	0.09	1.22	**
Pasteurised milk	0.06	0.99	0.29	0.22	0.10	**
Powdered milk	0.28	1.20	0.83	1.10	0.23	NS
Fresh + Sour + pasteurised milk	1.99	2.93	4.10	1.48	0.62	NS
Fresh + Sour milk	28.42	17.3	11.23	15.72	9.37	NS
Fresh + Powdered milk	0.01	0.03	0.102	0.01	0.29	**

NS = Not significant; *significant at P < 0.05; **significant at P < 0.01.

The table above indicates that there are significant associations among the districts with respect to milk and milk products type of sour milk, fresh milk, pasteurised milk, fresh and sour milk and fresh and pasteurised milk at a significant level of 0.05 and 0.01 respectively.

Table 3.7.
Correlations between consumption level and household social-economic demographics.

Type social-economic demographics	What amount of fresh cow milk consumed	What amount of sour cow milk consumed	What amount of powder cow milk consumed	What amount of pasteurised milk consumed
Level of education	0.03	0.10*	0.036	-0.070
	0.52	0.03	0.417	0.118
	500	500	500	500
Principal occupation	0.10*	0.09*	-0.06	0.041
	0.03	0.05	0.22	0.37
	500	500	500	500
Primary income source	0.11*	-0.07	-0.03	0.02
	0.01	0.12	0.56	0.68
	500	500	500	500
Size of household	0.09*	0.01	0.01	0.06
	0.04	0.85	0.84	0.22
	500	500	500	500
Type of livestock	0.06	0.15**	-0.04	.020
	0.17	0.01	0.41	0.650
	500	500	500	500
At what price do you buy "Pasteurised" milk	0.03	0.01	-0.01	0.05
	0.56	0.81	0.89	0.28
	500	500	500	500
At what price do you buy "Fresh" milk	-0.02	-.303**	0.01	-0.08
	0.73	0.00	0.91	0.07
	500	500	500	500
At what price do you buy "Powdered" milk	0.08	0.15**	0.36**	0.07
	0.06	0.01	0.00	0.13
	500	500	500	500
At what price do you buy "Sour" milk	0.03	0.12**	0.07	0.63**
	0.50	0.01	0.15	0.00
	500	500	500	500

**. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed).

There was significant (<0.05) correlation between type of livestock, price of fresh, powdered, sour and sour milk consumption.

4. Discussion

Most of the households were observed to be headed by man whose ages ranged mainly between 40-80 years. This age distribution is most likely caused by migration back to the communal areas as retirement plans. Phuong and Marcus (2013) observed that male headed households had shown a stronger economy than those headed by females. The same sentiments were echoed by Ebru and Neslihan (2013) who described that the economy of the household headed by females becomes weaker and weaker with time. Age distributions of male and female respondents were significantly different among the households, which indicated that in individual households, age and gender of the respondents is a determinant factor in Eastern Cape Province. This probably might be linked to male headed households having women as economic helpers as a result reducing reliance on one household head as a sole bread winner. There was no significant difference between the household family size and the distribution of households in each of the locations which means that the numbers of member of the household family did not determine the output from the household distribution.

The level of education influenced households' milk and milk product consumption. General assumptions hypothesised that the more educated consumers were likely to consume more milk and milk products than less

educated consumers, which is in agreement with the observation by Olarinde et al. (2005). This is simple because educated consumers have a more understanding on type of food consumptions and associated health benefits. The findings by Phuong and Marcus (2013) imply a similar understanding, where they state that rural consumers who are more educated are now more conscious about health and wellness issues related to food choices and diet. According to the studies done the hypothesis is supported since educational level of household heads was positively correlated (r=0.10) with sour milk consumption level. The challenges to pursue education above primary school among the older generation might be the reason for the pattern of education of household heads across the districts.

Employment of household head is a factor that has high significant effects on household's milk and milk product consumptions because it reflects the lifestyles and economic well-being of the consumer. There was a positive correlation of household head occupation between fresh milk at (r=0.100) and sour milk at (r=0.089) consumption levels. The type of employment has a direct implication on level of income received. This is in agreement with the statistically significant relationship among the characteristics of household occupation and the study locations. Boniface and Umberger (2012) and Ebru and Neslihan (2013) had similar conclusions where they stated that consumption of a products is associated with the product price and consumers purchasing power.

The study showed that households with high income levels spent more on milk and milk products. There was higher significance on child grant than the rest of alternative sources of income. The present results are consistent with those of Zhou et al. (2002) who reported that increased consumer incomes and food supplies have resulted in a shift towards high quality and healthy food products, such as milk and milk products. A positive correlation was observed between household income and level of fresh milk consumption (r=0.10). Elsewhere, Smallholder Dairy Project (SDP) (2006) reported that milk consumption in Kenya was higher with increased income. The present results are also consistent with those of Jabbar and Domenico (1992), while Michael and Emmanuel (1995) results indicated that household groups from high incomes spent more money on milk and milk products compared to other income group households in Southern Nigeria and Cameroon. In a similar study, Michael (1996), Hans (1992), Zhou et al. (2002) and Zhou et al. (2002) reported that consumption of milk and milk products and other protein rich foods increases as income increases. In the present study the differences in consumption levels among income groups nested under the province and the five districts was significant.

There was a negative correlation between consumption of sour milk and price of fresh milk (r=-0.30). A positive correlation between sour milk and powdered milk (r=0.15) and sour milk and price of fresh milk (r=0.12) were observed. This indicated that many of the respondents consume fresh milk more than other types of milk products in all the study locations. According to the results, communal household's milk and milk products consumption are highly influenced by socio-economic and demographic characteristics of the households such as income, education, household head age, regional differences and occupation of household head. The price of powdered and sour milk are positively correlated to their consumption level, (r=0.36) and (r=0.63) respectively. These finding are in accordance with observations done for costal Kenya consumption of processed dairy products among different income households (Mullins et al., 1994).

There was a positive correlation (r=0.15) between sour milk consumption and type of milk producing livestock owned by household head. This was also acknowledged by Zewdu et al. (2003) who reported that the type of milk producing livestock owned by a household was affected by type of milk consumption preference in a household. However, the size of household was negatively correlated (r=-0.09) with milk and milk product consumption. Tiruneh et al. (1998) reported similar findings, were household size and composition greatly affected milk and milk product consumption due to the variation and preference associated with household characteristics. In a similar study by Mullins et al. (1994) reported that with an increase in the number of people in a household there is a direct increase in milk and milk products consumed and purchased. They proceeded in stating that the type of household composition characteristics can also affect the consumption levels of milk and milk products.

In the present study the raw milk monthly consumption pattern for different animal species were (2.02± 1.42) 2-5 litres of cattle milk, (4.78±0.79) 2-5 litres of goat milk and (4.98±0.69) 2-5 litres of sheep milk per consuming household. Pasteurised milk was found to be the most monthly, regularly consumed and preferred milk product at (4.78±0.84) 5-10 litre per consuming household. The average monthly cattle milk product consumption were (4.45±1.41) 0.5 kg-1 kg of powdered milk and (1.99±1.80) 2-5 litres of sour milk. The present results are also consistent with those of Zewdu et al. (2003) who reported similar findings. However, in a Kenyan study household preferred raw milk from cattle based on considerations of taste, affordability and availability (SDP, 2006). There was no statistically significant difference in the consumer purchasing behaviour in selecting milk and the type of

milk product purchased. This showed that consumer behaviour does not influence the choice of purchasing milk products.

It was observed that the most consumed milk product in the Eastern Cape Province was pasteurised milk. Here was no relationship between the consumer rational preference for selected milk and the type of milk products purchased. This was due to consumer purchasing behaviour which was greatly influenced by the selection of type of milk product purchased in each of the districts. There was higher significant difference in the relationship of fresh and sour milk than any other combination. This showed that most of the respondents had high preference for fresh and sour milk consumption. In a similar study SDP (2006) reported the same justification towards the preference of pasteurised milk among Kenyans. However, other households preferred to consume fresh milk products possibly due to the lower price of raw milk products as compared to other milk products. Mekonnen (2006) reported a high preference for fresh milk in Cameroon due to lower prices of raw milk. During the examination of the frequency of consumption of milk and milk products in the Eastern Cape Province, it was observed that some households had zero consumption of milk and milk products. This might be due to the low level of household real income, unavailability and higher price of milk and milk products.

Regarding consumer purchasing behaviour of milk and milk products, it was noted that purchasing was mostly centralized in town areas. The purchasing price of raw milk was found to be negatively correlated (r=-0.015) with consumption level. This indicates that as the price of milk increases, consumption of milk and milk products will decrease. The mean and standard deviation of milk prices were (0.13±2.98) for pasteurised milk, (0.11±2.58) for fresh milk, and (0.07±1.59) for powdered milk (0.04±0.82) for sour milk. This simple means that the fluctuation in milk and milk product prices could be due lack of static milk prices. Such effect was reported by Nicholson et al. (2004) as a result of seasonal variation of tropical grasses in Nigeria, which deteriorates rapidly during the period of growth and consequently contribute to low milk production. The variation in vegetation across the Eastern Cape Province stated by Dugmore et al. (2004) could also be associated with Nicholson et al. (2004), Robb et al. (2007) findings. Since 2004, milk prices have increased in most countries. This is driven by favourable world market prices for dairy products and the devaluation of the United States dollar against most other currencies (Ministry of Agriculture (MOA), 2013). Also, different patterns of milk prices and developments in the African countries like Uganda, Kenya, Nigeria, Cameroon and South Africa were observed in 2005 (Robb et al., 2007).

Household location was found to affect consumption of milk products by influencing the accessibility and availability of milk products. Studies done by Jabbar and Domenico (1992), Limpho and Gary (1992) and Mullins et al. (1994) reported findings which were consistent with the current observations in which availability of milk and milk products had an impact on the consumption patterns. Majority of the households preferred buying milk and milk products in the urban town near the communal areas. Household location was negatively correlated (r=-0.082) with consumption level such that as distance from the milk market decreased, the consumption of milk and its products increased. A similar report was put forward by Hans (1992) were location of the household had an impact on the consumption of milk and milk products. However, income appeared to be more important than household location as a determinant of milk products consumption. Apart from income differences limited access to milk and milk products in rural areas is an important limiting factor (Zhou et al., 2002). In similar studies income, location of the household, household head age, price of milk, were cited as determinants of milk products consumption by several authors (Hans, 1992; Jabbar and Domenico, 1992; Limpho and Gary, 1992; Mullins et al., 1994; Cliff et al., 2007).

5. Conclusion

The findings in the present study showed that demographic characteristics of households, such as household size, household composition, gender of the household head and marital status greatly affect consumption patterns of milk and milk products in the Eastern Cape Province, South Africa. However, income appeared to be more important than household location as a determinant of milk products consumption. Households with high income levels spent more on milk and milk products. The purchasing price of raw milk was negatively correlated with consumption level indicating that as the price of milk increases, consumption of milk and milk products will decrease.

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