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South African household expenditure patterns: alcohol products in 1995 and 2000

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This research examines differences in household expenditure on alcohol between 1995 and 2000, the most recent years for which data is publicly available. The analysis reveals that both real expenditure on all alcohol products and the number of households purchasing alcoholic beverages have declined. However, it also shows a general decrease in total expenditure in all households, partly due to the change between 1995 and 2000 in the demographic and socio-economic structure of the households surveyed. Alcohol expenditure, particularly in better-off households, dropped by less than total expenditure, leading to an increase in the share of household expenditure allocated to alcoholic beverage purchases.

Suid-Afrikaanse huishoudelike bestedingspatrone: alkoholiese produkte in 1995 en 2000

Hierdie artikel ondersoek die verskille in die besteding van huishoudings aan alkohol tussen 1995 en 2000, die mees onlangse tydperk waarvoor daar algemeen beskikbare data is. Die ontleding dui dat reële besteding op alle alkoholprodukte, asook die aantal huishoudings wat alkoholiese produkte koop, afgeneem het. Dit dui egter ook op 'n algehele afname in die totale besteding van alle huishoudings, deels vanweë veranderinge in die demografiese en sosio-ekonomiese struktuur van die huishoudings onder beskouing tussen 1995 en 2000. Besteding op alkoholprodukte het, veral onder ryker huishoudings, met minder afgeneem as totale besteding, wat gelei het tot 'n toename in die gedeelte van huishoudelike besteding toegeken aan alkoholiese produkaankope.

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In examining trends in alcohol use, it is common to examine *per capita* consumption and production figures.¹ Rehm *et al* (2003 & 2004) show that in 2000, absolute alcohol consumption in South Africa stood at 10.3 litres per person per year, or 20 litres per adult per year; the latter figure is among the highest in the world. In terms of trends, the Alcoholic Beverage Review (1999, 2004) and the South African Wine Industry Information Systems (2004) provide data corroborating a relatively stationary trend in South Africa for the period 1994 to 2004, although the same data point to a move towards alcoholic spirit coolers and away from the consumption of sorghum beer. The consumption of natural wine, brandy, vodka, and malt beer initially increased and then declined, although malt beer consumption has recently risen again. Room *et al* (2000), who point out the increased availability of commercially produced alcoholic beverages in developing countries, suggest that there is potential for an increasing trend in the consumption of alcoholic beverages in such countries.

Trends in alcohol consumption can also be examined via changes in treatment populations and arrestee populations, as well as via changes in psychiatric and trauma unit admissions related to alcohol and other drug (AOD) consumption. The South African Community Epidemiology Network on Drug Use (SACENDU), described in Parry *et al* (2002a & 2002b), has collected, collated, compared and disseminated data from these major sources. Parry *et al* (2002a) report that from 1997 to 1999 the demand for alcohol abuse treatment fell in Cape Town, remained stable in Gauteng and Mpumalanga, but varied in Port Elizabeth and Durban; psychiatric treatment for patients with an alcohol disorder fluctuated most in Cape Town, but was more stable in Gauteng and Port Elizabeth; and breath alcohol concentration levels for trauma admissions exceeded the South African legal limit

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for 34% of patients in Cape Town, 16% in Durban, and 67% in Port Elizabeth. The addition of 2000 to the trend, as discussed in Parry *et al* (2002b), showed little change in the demand for treatment. The proportion of patients admitted with breath alcohol concentration levels above the legal limit decreased in Port Elizabeth but increased in Cape Town and Durban.

The final method of comparison is to examine data across various studies, on the assumption that the studies examine similar sets of populations. Using this approach, Shisana & Simbayi (2002) and Parry *et al* (2005) suggest that there has been an increase in the proportion of people over 15 years of age who have consumed alcoholic beverages in the past thirty days, while Rocha-Silva *et al* (1996) and Reddy *et al* (2003) point to an increase in life-time drinking among young Africans.

This article will consider and compare data from various studies in which the samples are not exactly the same, with different approaches being used to control for such differences. The purpose of the analysis is to provide further information on changes in household level alcohol consumption behaviour in the various South African population groups, and to show how other, more commonly available, nationally representative surveys containing additional socio-economic information can be used to analyse trends in consumption.

The remainder of this paper set outs to consider these trends. The basic methodology will first be outlined. In section 2, the data and related issues will be discussed. Section 3 will present summary statistics, setting the stage for the analysis presented in section 4, which comprises two regression methodologies and the estimated empirical results. Concluding comments and remarks will be presented in section 5.

1. Method

The 1995 and 2000 South African Income and Expenditure Surveys (IES), discussed below, were used for the analyses. Data on all categories of alcohol expenditure items from 1995 and 2000 were extracted. This alcohol expenditure data, together with all household-

level data on race, gender, residence locale, employment and income, were used to develop mean and frequency comparisons across both groups and years. Parametric tests (*t*-tests) for binary groups were used to determine whether differences existed across groups and within groups over time. In addition to the descriptive statistics, logit regressions of household participation and tobit regressions of alcohol expenditure shares were also estimated, allowing for a more nuanced comparison of consumption over time.

Given the concerns over differences in the sample frame, an attempt must be made to control for potential changes in that frame. The observed differences in household characteristics in each year are considered, and then controlled for in the regression analysis. The regressions allow for multiple independent variables affecting household-level participation and consumption. They are, therefore, more general than the descriptive statistics. The estimates were also compared over time to determine whether there were any significant differences between the factors affecting alcohol participation across households. Although changes in such factors will be interpreted as changes in participation decisions at the household level, it is also plausible that two different sample frames may have driven the results. For example, an increase in the income coefficient could be due to increased alcohol prices driving poorer people away from purchasing alcoholic beverages. Such a result would be “behavioural”. On the other hand, such an increase in the income coefficient might be driven by the 2000 household survey sample’s being generally more responsive to income variations than that of 1995.²

2. The data

In 1995 and 2000, Statistics South Africa (StatsSA) undertook a national survey of income and expenditure. The data from the surveys are collected primarily for use in categorising consumption baskets, which form the basis of South African inflation calculations,

2 Future research will attempt to control for potential sample frame bias by decomposing the changes across various population groups.

especially the CPI and the CPI-X.³ However, given the focus of the survey, which is on household income and its sources, as well as on expenditure and expenditure choices, the survey data can also be used in the consideration of specialised consumption baskets. The data on alcohol expenditure analysed in this paper is an example of one possible specialised consumption basket.

Both surveys were stratified random samples, although the stratification differed by year. In 1995, stratification was based on race, urban/rural residence, and province, while the 2000 data was explicitly stratified on province and urban/rural residence, with an additional implicit stratification by local government unit and household income.⁴ Each of the survey frames was initially set from the most recent census; for the 1995 survey, the most recent census was that of 1991, while the 1996 census was used for the 2000 survey. In 1995, the survey had to incorporate the formerly independent states of Transkei, Bophuthatswana, Venda, and Ciskei separately;⁵ by 2000, the incorporation was complete as these areas were no longer statistically treated as different sampling units.

2.1 Survey concerns

There are a number of striking differences between the 1995 and 2000 surveys. In 1995, the households in the sample were 65.2% African, 18.5% White, 12.7% Coloured, and 3.5% Asian; by 2000, the sampled households were 78.9% African, 8.4% White, 10.4% Coloured, and 2.1% Asian. The proportion of urban households also changed significantly, from 57.1% in 1995 to 61.7% in 2000. Such differences in demographics and location reflect not only the sample frames, but also migration to urban areas by rural residents and emigration from South Africa by White households.

3 The CPI is the consumer price index including interest rates, while the CPI-X excludes interest rates.

4 Local government units include district councils and magisterial districts; the income stratification was only undertaken at the level of magisterial districts.

5 These Apartheid-era homelands had been re-incorporated within the nation by the time of the 1996 census.

The survey composition also changed within households. In 1995, men headed 69% of households, while 73.8% of household heads were employed. The average age of heads of households was 47.9, the average number of household members was 4.3,⁶ and the average age of household members was 31.1 years. In 2000, men headed only 60.9% of the households, while only 61.7% of household heads were employed. The average age of heads of households was 45.9; there were, on average, 3.6 people in each household and the average age of household members was 31.4.

Due to the differences in sample frame, comparisons between the 1995 and 2000 surveys are difficult to undertake. For example, it is likely that the observed changes in household composition provide an explanation for the observation that real household incomes decreased by 39% (cf Table 1) from 1995 to 2000, a result that is discussed by many other authors, including Leibbrandt *et al* (2006) and Van Walbeek (2005). Many authors, especially Van Walbeek (2005) and Van der Berg *et al* (2005), have convincingly argued that the income and expenditure figures from the 2000 survey do not match the national accounts data, whereas the 1995 data came reasonably close.

Van Walbeek (2005), researching cigarette consumption, has identified differences between survey data, national accounts data and treasury receipts. In respect of income, the IES's weighted household income does not match the South African Reserve Bank's estimate of household income; there was a 96.1% underreport in 1995 and a 66.4% underreport in 2000. The weighted household cigarette consumption reported does not agree with the cigarette excise tax receipts collected by National Treasury; surveyed cigarette consumption was 48.8% of recorded excise tax receipts in 1995, but only 36.1% in 2000. Van Walbeek (2005) uses these figures to justify a multiplier across all income and expenditure categories. Van der Berg

6 In 1995, only ten household members were included in the data, so it was unclear if any households comprised more than ten members. Households were therefore restricted to those with under ten members. Even though all household members were recorded in 2000, only households with nine or fewer members were included, in order to maintain consistency with the 1995 survey.

et al (2005), who are also concerned with differences between national accounts data and household-level surveys, consider a number of approaches, including the multiplier approach previously discussed, as well as a data-cleaning exercise that removes any observations that appear to be poor, on the basis of a series of assumptions.

It would be possible for us to undertake a multiplier approach similar to Van Walbeek's (2005) or a data cleaning exercise similar to that of Van der Berg *et al* (2005), to control for the potential underreporting of income and expenditure. However, it is not clear that either approach is entirely valid. The multiplier cannot be expected to apply only to households involved in smoking — or drinking, in this case — since some underreporting is likely to be due to households not reporting any alcohol consumption. In such a situation, a more nuanced approach, attempting to correctly identify households which are likely to contain drinkers but do not report alcohol purchases, is more appropriate, although fraught with difficulties. Furthermore, in examining the data reported by Van Walbeek, it is not obvious that the two surveys do not adequately spot the trends in the data. Specifically, the differences in the underreporting ratios over time for income and cigarette purchases, as reported by Van Walbeek (2005), are not substantial; for income the ratio was 1.45 (96.1/66.4), while for cigarettes it was 1.35 (48.8/36.1).⁷ In other words, the underreporting went in the same direction in each survey, and the proportional change in underreporting was broadly similar, so that the proportional change in expenditure shares would be small. On the other hand, removing data that is “poor” is also liable to errors in interpretation, as the assumptions made to eliminate different observations may lead to more systematic bias than they correct.⁸

7 The actual multiplier applied to income was 1.04 (100/96.1) in 1995 and 1.51 (100/66.4) in 2000. For expenditure, the multipliers were 2.05 and 2.73 in 1995 and 2000, respectively.

8 For example, removing households that spend money they do not claim to earn might only eliminate households that are unwilling to admit that they earn their income in an illicit fashion. Similar behaviour might also partially explain why earnings in the national accounts do not match earnings in the surveys.

In the analysis below, we consider mean alcohol expenditure, an alcohol consumption indicator (1 if alcohol expenditure is recorded in the household; 0 if not), and the alcohol expenditure share per adult-equivalent [p a e] household member.⁹ The last of these is most similar to the multiplier imposed by other researchers, since it considers only reported alcohol consumption in relation to reported total expenditure, and essentially assumes that the inflation factors (multipliers) for alcohol and total expenditure are symmetrical. The categorical variable captures participation, and can give some indication of whether the multiplier strategy, based upon expenditure shares, is reasonable. The final variable, mean expenditure, is likely to be highly influenced by problems in the sample frame, but is recorded for purposes of comparison.

2.2 Inflationary concerns

In considering changes in mean expenditure on alcohol, it is important to remember that the cost of alcohol products (like that of other goods) did not remain constant over the five-year period between the surveys. It was therefore necessary to control for the effects of inflation. In an effort to address this concern, a standard real analysis was undertaken, while two additional approaches were also considered, each of them broadly independent of inflation. The real analysis is based upon real *per capita* expenditure, where alcohol expenditure in 2000 is deflated to 1995 data using the GDP Deflator.¹⁰ The first comparative approach is based upon p a e expenditure shares (defined as the per household adult proportion of total expenditure devoted to a particular item), which are independent of inflation as long as the ratio of actual expenditure on a commodity to total expenditure on all commodities is determined by the same inflation factor.¹¹ The

9 We define individuals aged 14-64 as adult-equivalent, while children under the age of 14 are treated as the equivalent of 0.24 adults, and individuals aged 65 and over as the equivalent of 0.65 adults.

10 Cf footnote 10.

11 Over the period, inflation based upon the GDP Deflator, the CPI and the alcoholic beverage CPI was 47.2%, 38.3% and 44%, respectively. In our analysis, the differences between these rates was ignored. Had we used them, the result

second approach is to define a categorical variable for households, such that those which consume positive amounts of any particular alcoholic beverage are coded as ones and those which do not consume any positive amounts are coded as zeros. Since any positive nominal value will result in a positive real value, while exact expenditure is not the focus of comparison, these categorical variables are also independent of inflation.

3. Expenditure patterns

Initially, the separate 1995 and 2000 data are stratified by race, gender, residence, employment and income; mean *per capita* alcohol consumption across the two survey years is then compared using standard descriptive statistics and statistical tests.¹² In the analysis, there are six categories of alcoholic beverage expenditure, as well as a summary category; the 2000 categories were aggregated to match the 1995 data. The six beverage items are: spirits (eg brandy, whisky and gin), other spirits (primarily liqueurs), beer, bottled sorghum, table wine, and fortified wine (eg sherry and port); other alcoholic beverages (eg alcoholic fruit beverages) and cooking wines were not included in the analysis.

3.1 The sample frame

As has been mentioned, the survey methods — the sampling methods in particular — differed between 1995 and 2000. In order to assess the potential impact of these differences, the underlying sample differences are examined, comparing the survey data from 1995 and 2000.

In Table 1, the shift in the frame towards African female heads of household, who are less likely to be employed, can be seen as related to the decrease in real expenditure on nearly all alcoholic items, as well as total expenditure. These results mirror research by Leibbrandt *et*

would have been a relatively lower alcohol expenditure share in 2000 than the one we list, since alcohol inflation exceeded income inflation.

12 The reader is directed to van Wyk (2006) and Ground (2003), respectively, for separate considerations of the 1995 and 2000 data. Pooled analysis of the data is also available in Koch *et al* (2006).

Table 1: Expenditures on alcoholic products by year in constant 1995 prices

Expenditure Variable	1995 IES (n=29595)			2000 IES (n=24943)		
	mean	std dev	% > 0	mean	std dev	% > 0
Spirits	11.06***	52.10	11.5***	6.51	51.66	6.4
Other spirits	1.19***	15.91	2.2***	0.64	18.84	0.7
Beer	20.57	72.53	22.2***	21.30	82.32	21.0
Bottled sorghum	2.58***	17.93	6.0***	1.35	23.86	2.4
Table wine	6.56***	31.82	10.1***	3.35	27.56	5.0
Fortified wine	0.63**	7.65	2.1***	0.52	8.86	1.1
Other alcohol	0.36***	9.79	1.0***	0.17	4.10	0.4
Total alcohol	42.96***	126.97	33.4***	35.56	138.86	29.5
Total expenditure	56840***	122588	N/A	34689	102195	N/A

Source: Authors' calculations from 1995 and 2000 IES, using STATA 9.2 SE

Mean: Household average real (via GDP Deflator) expenditure by alcohol category

% > 0: Percentage of households with positive expenditures on item

*** Significantly larger at 1% level of confidence

** Significantly larger at 5% level of confidence

al (2005), which shows that real incomes decreased by 40% between 1995 and 2000. With the exception of household expenditure on beer, all households were spending more on alcoholic beverages in 1995 than in 2000. Not only were all households spending more, but proportionally more households were purchasing alcoholic beverages (including beer) in 1995 than in 2000. In contrast to the suggestions of Gureje (2000) and Parry (2000), the data presented here do not show an obviously increasing rate of alcohol consumption in South Africa; however, the data do partially agree with their findings that alcohol consumption is shifting from traditional, low-alcohol beverages such as bottled sorghum towards more commercially available beverages such as beer.

As can be seen, there are many underlying differences between the two samples, and comparing trends across groups is therefore a tenuous exercise. However, by focusing the comparisons on relative expenditures and participation, some of the problems can be lessened. Regression analysis can assist further, although the potential sample frame problems cannot be completely eliminated.

3.2 Trends across population groups

The general real alcohol expenditure trends discussed above are also mirrored in each of the race groups over time. With few exceptions, all households, regardless of the race of their heads, spent less in real terms on all alcohol in 2000 than they did in 1995; in fact, all households spent less in real terms on all items, not just alcohol.¹³ Despite the decrease in real expenditure on alcoholic beverages, the per capita share of household budgets devoted to alcohol was larger for some products and smaller for others. Descriptive statistics of per capita expenditure shares by population group are provided in Table 2. The results of statistical tests (*t*-tests of means) of differences across the time periods are also presented.

13 Due to constraints of space, these means are not presented; however, they are available in Koch *et al* (2006).

All household groups were similarly or less likely to consume a positive quantity of any alcoholic beverage in 2000 than in 1995, with one exception: African households' consumption of beer. Surprisingly, although fewer households were consuming any alcoholic items, the per capita share of household budgets devoted to alcohol expenditure rose, significantly in the case of African and Coloured households. These same two population groups expended a larger per capita share of total expenditure on beer. White households also spent more on beer, although the per capita share of expenditure devoted to table and fortified wines also rose. Few changes were identified for Asian households. In sum, all groups within the population were less likely to purchase alcohol in 2000 than in 1995. However, African and Coloured households devoted a larger per capita share of their budgets to alcohol consumption than before, much of the increase being due to the fact that beer comprised a larger share of those budgets than before.

3.3 Trends across gender and employment status of heads of households

In line with the general trends reported in Table 1, real alcohol expenditure decreased, as did total household real expenditure, for nearly all households, regardless of the gender or the employment status of their heads. Similarly, the proportion of households spending some positive amount on any alcoholic product decreased, although the proportion of male-headed (or employed) households purchasing beer was the notable exception. Despite the decreases in real alcohol expenditure (not shown) and the decrease in the number of households purchasing any alcoholic beverages (shown), the previously discussed "beer effect" is observable, as the per capita share of household budgets devoted to beer increased, whether the heads of those households were male or female, employed or unemployed.

Table 2: Per adult equivalent expenditure share means in 1995 and 2000 by race of household head

Expenditure Share Variable	African-headed households						White-headed households					
	1995 IES (n= 19303)			2000 IES (n= 19724)			1995 IES (n=5486)			2000 IES (n=2091)		
	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0
Spirits	0.70	6.19	6.5***	0.73	6.67	3.9	1.37	4.82	30.8**	1.32	5.09	28.3
Other spirits	0.07	1.84	1.0***	0.09	2.64	0.4	0.13**	1.36	7.3***	0.07	1.09	2.3
Beer	3.17	13.65	18.9	5.54***	20.71	19.7**	1.36	4.44	35.7	1.59**	5.78	35.2
Bottled sorghum	1.03***	7.30	7.3***	0.76	9.23	2.8	0.07**	1.02	4.6***	0.03	0.86	0.5
Table wine	0.31***	4.33	4.3***	0.17	3.12	1.4	0.77	2.99	28.7	0.91*	4.00	30.0
Fortified wine	0.06	1.69	0.6***	0.07	2.26	0.4	0.07	0.67	6.5***	0.10**	0.77	5.0
Total alcohol	5.40	18.85	27.9	8.66***	28.82	26.4	3.79	9.59	53.6	4.09	10.28	54.4

Table 2: Per adult equivalent expenditure share means in 1995 and 2000 by race of household head (continued)

Expenditure Share Variable	Coloured-headed households				Asian-headed households							
	1995 IES (n=3766)		2000 IES (n=2603)		1995 IES (n=1040)		2000 IES (n=525)					
	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0			
Spirits	0.58	3.64	8.2*	0.59	4.15	7.1	0.78	3.73	14.2*	1.04	7.45	11.0
Other spirits	0.08	1.39	1.4	0.23**	3.24	1.5	0.11	1.26	2.6***	0.02**	0.34	0.6
Beer	1.70	6.41	21.2	2.61***	13.11	20.8	0.84	9.21	15.9**	0.69	4.18	12.6
Bottled sorghum	0.25	2.62	2.8***	0.21	4.86	0.9	0.04*	0.97	0.7***	0.00	0.00	0.0
Table wine	1.78	9.81	14.5***	1.79	8.99	12.2	0.09	0.66	4.9*	0.16	2.62	3.2
Fortified wine	0.34	3.95	3.6	0.46	5.00	3.3	0.01	0.18	1.3	0.01	0.12	0.6
Total alcohol	4.95	13.93	27.9	6.40***	19.94	26.4	1.87	10.37	53.6	1.97	9.60	54.4

Source: Authors' calculations from 1995 and 2000 IES, using STATA 9.2

Percentage expenditure shares per adult equivalent in household (adult = 1.0, child = 0.24, retiree = 0.65) multiplied by an additional 100 for display purposes

% > 0: Percentage of households with positive expenditures on item

*** Significantly larger at 1% level of confidence, comparison across years holding race constant

** Significantly larger at 5% level of confidence

* Significantly larger at 10% level of confidence

Table 3: Per adult equivalent expenditure share means in 1995 and 2000 by gender and employment of household head

Expenditure Share Variable	Male-headed households						Female-headed households					
	1995 IES (n = 20433)			2000 IES (n = 15169)			1995 IES (n = 9162)			2000 IES (n = 9741)		
	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0
Spirits	1.04	6.49	14.6***	1.12	7.44	9.2	0.30*	2.78	4.60***	0.23	4.05	2.20
Other spirits	0.11	1.94	2.9***	0.14	2.69	0.9	0.04	0.89	0.90***	0.05	2.40	0.30
Beer	3.22	12.74	27.6	7.00***	23.11	28.8***	1.11	8.26	10.20***	1.38**	8.68	8.70
Bottled sorghum	0.87	6.61	7.2***	0.83	9.29	3.1	0.38	4.31	3.40***	0.31	6.66	1.20
Table wine	0.72***	6.03	12.5***	0.55	5.01	6.7	0.25**	2.01	4.90***	0.18	2.57	2.30
Fortified wine	0.11	2.27	2.6***	0.15*	3.15	1.5	0.05	1.12	1.00***	0.06	1.31	0.60
Total alcohol	6.16	18.58	41.1***	11.28***	31.76	39.5	2.17	10.82	16.20***	2.65***	14.31	13.70

Table 3: Per adult equivalent expenditure share means in 1995 and 2000 by gender and employment of household head (continued)

Expenditure Share Variable	Unemployed household heads						Employed household heads					
	1995 IES (n = 7736)			2000 IES (n = 9538)			1995 IES (n = 21859)			2000 IES (n = 15372)		
	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0
Spirits	0.66***	4.67	7.6***	0.42	4.62	3.5	0.87	5.92	12.9***	0.99**	7.21	8.3
Other spirits	0.06	1.17	1.3***	0.07	1.81	0.4	0.09	1.84	2.6***	0.13	2.97	0.9
Beer	1.33	8.45	13.2***	2.56***	14.19	12.5	3.01	12.47	25.4	6.19***	21.38	26.2***
Bottled sorghum	0.59	5.92	5.1***	0.56	7.97	2.3	0.77*	6.02	6.3***	0.67	8.60	2.4
Table wine	0.38***	3.13	6.4***	0.26	3.50	2.9	0.64***	5.68	11.4***	0.49	4.62	6.3
Fortified wine	0.09	2.00	1.6***	0.12	3.30	0.9	0.10	1.98	2.3***	0.11	2.03	1.3
Total alcohol	3.13	13.49	22.8***	5.08***	22.14	20.5	5.56	17.62	37.1***	9.64***	29.01	35.0

Percentage expenditure shares per adult equivalent in household (adult = 1.0, child = 0.24, retiree = 0.65) multiplied by an additional 100 for display purposes

% > 0: Percentage of households with positive expenditures on item

*** Significantly larger at 1% level of confidence, comparison across years holding gender or employment status constant

** Significantly larger at 5% level of confidence

* Significantly larger at 10% level of confidence

Table 3 provides a summary of the data by the gender and the employment status of the heads of households. In Table 3, we see that per capita alcohol expenditures were generally similar (or statistically insignificantly smaller) in 2000 than in 1995 for nearly every beverage other than beer, and that the net effect of the increase in the beer share was an increase in the overall share of the total alcohol expenditure per capita. The result holds for both male- and female-headed households, whether those heads were employed or unemployed.

3.4 Trends by income quintile

In addition to comparisons across gender and race, the surveys of 1995 and 2000 were compared across income quintiles.¹⁴ In line with the discussion in the preceding analyses, all households, regardless of income quintile, were devoting less real expenditure to the consumption of alcohol. In general, the result was fewer households spending a positive amount on alcohol. However, as real total expenditure was also lower for all households and the number of adults in each household was smaller, the shares of household expenditure actually increased between 1995 and 2000 — a result that, as may be seen below, depends upon the product and the income quintile. See Table 4 for expenditure shares across income quintiles and years.

Table 4 shows that the beer and total alcohol shares of per capita expenditure increased for all household income quintiles from 1995 to 2000. Depending upon the income quintile, other alcoholic beverages also registered an increase. However, the proportion of households purchasing beer registered an increase only in the middle and second-highest income groups. In other words, the increase in the per capita alcohol expenditure share was largely driven by the increase in the per capita beer expenditure share and not by an increase in the number of households purchasing beer. Generally, all other alcoholic beverages were more likely to be purchased by any household in 1995 than in 2000.

14 The two surveys cover income and expenditure, so expenditure quintiles could also have been used for this analysis. Importantly, the choice of variable does not affect the qualitative results, thus income, which is more commonly discussed, is used here. Expenditure comparisons are available from the authors upon request.

Table 4: Per adult equivalent expenditure share means in 1995 and 2000 by income quintile of household

Expenditure Share Variable	Lowest income quintile households					Second lowest income quintile households						
	1995 IES (n=5943)			2000 IES (n=3356)		1995 IES (n=5902)			2000 IES (n=4614)			
	mean	std dev	% > 0	mean	std dev	mean	std dev	% > 0	mean	std dev	% > 0	
Spirits	0.70	6.86	2.2***	0.61	6.80	1.6	0.75*	6.30	5.0***	0.55	6.11	2.1
Other spirits	0.10*	2.96	3.8	0.06	1.45	2.6	0.08	1.31	9.3***	0.21**	3.95	5.6
Beer	3.19	14.56	11.8***	4.31***	20.69	9.5	3.04	13.54	15.6***	4.37***	19.61	13.3
Bottled sorghum	2.04***	10.93	9.2***	1.46	14.07	3.0	0.94	6.02	7.4***	0.79	9.88	2.7
Table wine	0.64***	5.81	3.1***	0.35	4.90	1.1	0.79*	8.72	4.6***	0.59	6.52	2.2
Fortified wine	0.19	3.31	0.8***	0.19	4.02	0.5	0.16	2.72	1.1***	0.12	2.24	0.7
Total alcohol	7.01	22.58	23.3***	10.01***	35.97	18.6	5.84	19.81	27.1***	7.81***	27.48	22.2

Table 4: Per adult equivalent expenditure share means in 1995 and 2000 by income quintile of household (continued)

Expenditure Share Variable	Middle income quintile households					Second highest income quintile households				
	1995 IES (n=5914)		2000 IES (n=4963)		% > 0	1995 IES (n=5917)		2000 IES (n=4997)		% > 0
	mean	std dev	mean	std dev		mean	std dev	mean	std dev	
Spirits	0.91	6.98	7.2***	4.1	0.87	4.06	13.2***	1.09**	6.97	7.1
Other spirits	0.08	1.35	1.1***	0.5	0.10	1.27	2.4***	0.10	2.19	0.6
Beer	3.49	14.55	20.1	21.6***	1.99	6.83	25.6	7.21***	21.82	28.1***
Bottled sorghum	0.44	4.31	5.1***	3.4	0.12	1.41	3.7***	0.24***	2.97	1.9
Table wine	0.49	3.46	5.2***	3.2	0.45***	2.65	10.2***	0.30	2.72	3.5
Fortified wine	0.04	0.64	1.0	1.1	0.05	0.93	1.8***	0.08	2.66	0.9
Total alcohol	5.48	18.20	29.0	30.0	3.61	10.33	34.5	9.36***	25.47	33.8

Table 4: Per adult equivalent expenditure share means in 1995 and 2000 by income quintile of household (continued)

Expenditure Share Variable	Highest income quintile households					
	1995 IES (n=5919)			2000 IES (n=4980)		
	mean	std dev	% > 0	mean	std dev	% > 0
Spirits	0.85	2.43	29.8***	0.84	4.29	17.4
Other spirits	0.08	3.59	6.6***	0.07	1.25	1.6
Beer	1.13	0.76	38.0	2.62***	11.84	32.6***
Bottled sorghum	0.06	1.79	4.6***	0.06	1.36	0.8
Table wine	0.49***	0.25	27.5***	0.38	1.90	15.0
Fortified wine	0.03	6.08	5.8***	0.05**	0.60	2.5
Total alcohol	2.66	18.20	53.1***	4.09***	14.60	42.9

Source: Authors' calculations from 1995 and 2000 IES, STATA 9.2

Percentage expenditure shares per adult equivalent in household multiplied by an additional 100 for display purposes

% > 0: Percentage of households with positive expenditures

*** Significantly larger at 1% level of confidence across years, holding income quintile constant

** Significantly larger at 5% level of confidence

* Significantly larger at 10% level of confidence

3.5 Trends by locale

The final comparison across the datasets is made across residence location, either rural or urban. Descriptive statistics and statistical comparisons by residence and year are reported in Table 5. These results confirm the trends already set out above. The beer p a e share of the budget for rural and urban households increased from 1995 to 2000, as did the share of the p a e budget for the summary alcohol category. However, there was a little more variability, as rural households registered an increase in the p a e share of other spirits, while the p a e share of both bottled sorghum and fortified wine increased in urban households.

4. Regression analysis

In this section, we consider two separate empirical models in order to examine the effect of various household characteristics on household participation and average consumption. A logit regression is employed to analyse the participation changes and a tobit regression to analyse the average expenditure share.¹⁵ First, a binary variable is defined, such that $y_{ij} = 1$ if household i purchases alcoholic beverage j , and y_{ij} if not. With t as a dummy indicator for the year 2000, the probability ($y_{ij} = 1|X$) = $F(X\gamma_1 + tX\gamma_2)$ is then estimated via maximum likelihood, based on the assumption that F is the logistic cumulative distribution function:

$$(1) \quad F(X\beta) = \frac{\exp(X\gamma_1 + tX\gamma_2)}{1 + \exp(X\gamma_1 + tX\gamma_2)}$$

For the tobit estimate, the same binary variable is used to describe whether or not a purchase is made; however, if a purchase is made the actual value of the share is estimated as part of a linear regression, which is assumed to have a cut-off at zero. In such a model, the expected share is corrected for observations that are truncated, such that

15 In this section, we are no longer considering p a e shares, since we can control for the household size and age within the regression. Furthermore, the share variable is multiplied by 100, so it can be treated as a normal percentage.

Table 5: Per adult equivalent expenditure share means in 1995 and 2000 by household locale

Expenditure Share Variable	Rural households					Urban households														
	1995 IES (n=12682)					2000 IES (n=9548)					1995 IES (n=16913)					2000 IES (n=15362)				
	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0	mean	std dev	% > 0					
Spirits	0.66	5.56	7.0***	0.59	5.92	3.7	0.93	5.66	14.8***	0.89**	6.60	8.2								
Other spirits	0.06	1.99	1.2***	0.12**	3.40	0.6	0.10	1.42	3.1***	0.09	1.92	0.8								
Beer	2.79	11.96	18.5***	3.86***	16.95	16.5	2.40	11.29	25.0***	5.39***	20.19	23.8								
Bottled sorghum	1.28***	8.18	8.9***	0.88	10.52	3.1	0.30	3.51	3.8***	0.47***	6.68	2.0								
Table wine	0.72***	7.16	6.7***	0.41	4.51	3.2	0.46**	2.77	12.7***	0.40	4.04	6.1								
Fortified wine	0.12	2.61	1.3***	0.09	2.64	0.7	0.08	1.33	2.7***	0.13**	2.56	1.4								
Total alcohol	5.72	18.61	31.0***	7.65***	28.34	25.8	4.32	15.04	35.2***	8.05***	25.60	31.7								

Source: Authors' calculations from 1995 and 2000 IES, using STATA 9.2

Percentage expenditure shares per adult equivalent in household (adult = 1.0, child = 0.24, retiree = 0.65) multiplied by an additional 100 for display purposes

% > 0: Percentage of households with positive expenditures on item

*** Significantly larger at 1% level of confidence, comparison across years holding household locale constant

** Significantly larger at 5% level of confidence

* Significantly larger at 10% level of confidence

$$(2) \quad E[w_{ij}|X] = \text{prob}(y_{ij}=0) \cdot 0 + \text{prob}(y_{ij}=1) \cdot [X\beta_1 + tX\beta_2 | w_{ij} > 0]$$

In equation (2), it is assumed that the estimated coefficients for 1995 and 2000 could be different, with the time dummy variable t allowing for that difference.

4.1 Logit regression trends

The first to be discussed is the logit regression. As described in the results presented in the first five tables, household characteristics and income play an important role in determining alcohol participation and expenditure, while most households were less likely to purchase any alcoholic beverage other than beer in 2000 than in 1995. Initially, it might have been expected that these results would be strengthened in the logit regression; however, certain household characteristics might be correlated, which would lessen the regression impacts. The regression results presented in Table 6, re-presenting only spirits, beer, wine and sorghum, are not in complete agreement with the earlier tables.

Table 6 shows, as expected, that white households were more likely and Asian households less likely than African households to purchase spirits, beer and wine (although there were insufficient Asian households to generate results in the sorghum equation). The real surprise is that white households were 24% more likely to purchase bottled sorghum than African households at the mean.¹⁶ We also see that male-headed households were more likely to purchase all of the alcoholic beverages listed — for example, 6.9% more likely to buy beer than female-headed households in 1995. The results also point to a normal effect of income on the probability of purchasing spirits, wine and beer, as increases in total expenditure are related to an increase in the probability of purchase, but to an inferior effect for sorghum. Given that expenditure is measured as the natural log, the marginal effects can be interpreted as participation elasticities; for example, every 1% increase in expenditure results in a 0.036%

16 Given that the mean is so strongly correlated to African households, this result suggests that if white households had characteristics that were more similar to African households, they would be far more likely to purchase bottled sorghum.

Table 6: Marginal effects from household level logit regressions by alcoholic beverage category

Spirits	1995 parameters		2000 slopes		Beer	1995 parameters		2000 slopes	
	Marg eff	Std error	Marg eff	Std error		Marg eff	Std error	Marg eff	Std error
White	0.022**	0.010	0.012*	0.006	White	0.061**	0.024	-0.050**	0.018
Coloured	-0.014	0.009	0.008	0.008	Coloured	0.057**	0.028	-0.052***	0.017
Asian	-0.024***	0.009	0.019*	0.011	Asian	-0.087***	0.024	-0.034	0.028
Male	0.025***	0.008	0.001	0.007	Male	0.069***	0.016	0.028**	0.016
Household head employed	-0.018**	0.011	0.015**	0.007	Household head employed	0.021	0.022	0.011	0.013
In(Expenditure)	0.036***	0.004	0.001	0.003	In(Expenditure)	0.063***	0.007	0.010**	0.005
Welfare receipt	-0.012	0.009	0.009	0.008	Welfare receipt	-0.001	0.023	0.017	0.016
Household size	0.001	0.002	-0.001	0.001	Household size	-0.002	0.004	0.000	0.003
Proportion female	-0.001	0.013	-0.026***	0.010	Proportion female	-0.126***	0.027	0.007	0.018
Average adult eq	0.081***	0.030	-0.031	0.022	Average adult eq	0.071	0.060	0.011	0.038
Own dwelling	-0.014**	0.007	0.006	0.005	Own dwelling	-0.070***	0.014	0.022	0.009

Table 6: Marginal effects from household level logit regressions by alcoholic beverage category (continued)

Wine	1995 parameters		2000 slopes		Sorghum	1995 parameters		2000 slopes	
	Marg eff	Std error	Marg eff	Std error		Marg eff	Std error	Marg eff	Std error
White	-0.007	0.006	0.038***	0.005	White	0.244**	0.076	-0.059***	0.010
Coloured	0.026**	0.012	0.010*	0.006	Coloured	0.010	0.016	-0.013	0.010
Asian	-0.030***	0.003	0.034***	0.011	Asian	n/a		n/a	
Male	0.018***	0.006	-0.007	0.005	Male	0.012**	0.005	0.004	0.004
Household head employed	-0.002	0.007	0.005	0.005	Household head employed	0.004	0.006	0.004	0.004
In(Expenditure)	0.025***	0.003	0.000	0.002	In(Expenditure)	-0.002	0.000	-0.003**	0.003
Welfare receipt	-0.017***	0.006	0.012*	0.006	Welfare receipt	0.008	0.008	-0.004	0.002
Household size	-0.002*	0.001	0.000	0.001	Household size	0.001	0.001	-0.001	0.003
Proportion female	0.014	0.009	-0.009	0.007	Proportion female	-0.009	0.008	-0.001	0.001
Average adult eq	0.025	0.020	-0.005	0.013	Average adult eq	-0.003	0.015	0.008	0.009
Own dwelling	-0.014***	0.005	0.005	0.004	Own dwelling	-0.014***	0.005	0.003	0.003

Source: Marginal effects calculated from logit (0 if no purchase, 1 if purchase) regression results and evaluated at the means of the independent variables

Slope coefficients estimated via dummy variables interpreted as change in 1995 estimate due to a change in year

Other variables included in regression, but not reported: urban residence and provincial location

* 10% significance

** 5% significance

*** 1% significance

increase in the probability of purchasing spirits and a 0.063% increase in the probability of purchasing beer.

Apart from the results already discussed, there are no other uniformities in the regression results. More interestingly, there are no strong negative time effects, as might be expected — households were generally less likely to purchase any alcoholic beverage in 2000 than in 1995, with the exception of beer in some situations.

4.2 Tobit regression results

As shown above, the logit regression results appeared to be reasonably stable over time. Below, we will see that the expected alcohol expenditure share means were less stable. The tobit regression results are presented in Table 7, which shows that although white households were more likely to purchase alcoholic beverages, actual purchase does not necessarily translate into a higher mean expenditure share.¹⁷ Asian households, which were shown in the logit regressions and the descriptive statistics to be less likely to purchase, also expended a smaller percentage of their earnings on alcoholic beverages — the wine share was 0.26% lower than African households, the beer share 0.23% lower. As was expected, male-headed households expended between 0.09% and 0.19% more of their budget on alcoholic beverages than female-headed households. One other variable associated with lower average shares of alcohol expenditure, but not analysed in Section 3, is whether or not the household owns the dwelling it occupies. The alcohol expenditure share for home owners is anything from 0.05% lower (in the case of spirits) to 0.25% lower (in the case of sorghum).

In addition to the dummy variables that affect the average expenditure share, there are two continuous variables that exert a consistent impact on the mean alcohol expenditure share: the proportion of females in the household and the total household expenditure. In the case of expenditure, which is measured as a natural log, the coefficients can be interpreted as expenditure share elasticities. Therefore, a 1% increase in total expenditure leads to a 0.10% increase in the percentage of the budget devoted to purchase of spirits, a 0.075% increase in the share devoted to beer purchases, and a 0.11% increase

Table 7: Estimates from household level Tobit regressions by alcoholic beverage category

Spirits	1995 parameters		2000 slopes		Beer	1995 parameters		2000 slopes	
	Coeff	Std error	Coeff	Std error		Coeff	Std error	Coeff	Std error
White	0.059*	0.033	0.041*	0.024	White	0.050	0.039	-0.128***	0.029
Coloured	-0.053	0.041	0.018	0.031	Coloured	0.055	0.048	-0.084**	0.036
Asian	-0.104*	0.058	0.064*	0.043	Asian	-0.226***	0.076	-0.087	0.055
Male	0.130***	0.032	-0.012	0.023	Male	0.145***	0.036	0.060**	0.025
Household head employed	-0.079**	0.038	0.070***	0.025	Household head employed	0.013	0.045	0.047*	0.028
In(Expenditure)	0.101***	0.009	0.009	0.009	In(Expenditure)	0.075***	0.015	0.026***	0.010
Welfare receipt	-0.051	0.041	0.043	0.030	Welfare receipt	-0.049	0.047	0.068**	0.033
Household size	-0.002	0.007	-0.004	0.005	Household size	-0.009	0.008	0.001	0.005
Proportion female	-0.026	0.051	-0.092***	0.036	Proportion female	-0.234***	0.058	-0.044	0.038
Average adult eq	0.286***	0.105	-0.075	0.067	Average adult eq	0.163	0.118	0.044	0.075
Own dwelling	-0.054**	0.024	0.018	0.017	Own dwelling	-0.158***	0.028	0.045***	0.020

Table 7: Estimates from household level Tobit regressions by alcoholic beverage category (continued)

Wine	1995 parameters		2000 slopes		Sorghum	1995 parameters		2000 slopes	
	Coeff	Std error	Coeff	Std error		Coeff	Std error	Coeff	Std error
White	-0.040	0.029	0.174***	0.023	White	0.979***	0.160	-0.059***	0.010
Coloured	0.154***	0.034	0.024	0.025	Coloured	0.076	0.164	-0.013	0.010
Asian	-0.258***	0.063	0.142***	0.047	Asian	n/a		n/a	
Male	0.087***	0.028	-0.023	0.021	Male	0.186**	0.079	0.004	0.004
Household head employed	-0.023	0.034	0.033	0.023	Household head employed	0.071	0.100	0.004	0.004
ln(Expenditure)	0.108***	0.014	-0.020**	0.009	ln(Expenditure)	-0.054	0.037	-0.003**	0.003
Welfare receipt	-0.090**	0.037	0.049	0.028	Welfare receipt	0.144	0.101	-0.004	0.002
Household size	-0.011 *	0.006	0.001	0.004	Household size	0.023	0.017	-0.001	0.001
Proportion female	0.050	0.042	-0.034	0.029	Proportion female	-0.227*	0.131	-0.001	0.006
Average adult eq	0.161*	0.085	0.052	0.052	Average adult eq	0.027	0.239	0.008	0.009
Own dwelling	-0.094***	0.020	0.015**	0.015	Own dwelling	-0.250***	0.072	0.003	0.003

Source: Estimates from tobit regression of alcohol expenditure shares (as a % of total) on independent variables; slopes from time dummy interacted with variable

Other variables included in regression, but not reported: urban residence and provincial location

* 10% significance

** 5% significance

*** 1% significance

in the share devoted to wine, but has an insignificant and negative effect on the share devoted to sorghum. As far as the other variable with a generally consistent effect is concerned, a 1% increase in the proportion of females in a household reduces the budget share devoted to beer and sorghum purchases by 0.23%. In addition to the preceding general effects, a number of different household variables affect different alcohol budget shares, although these will not be discussed in detail here.

As in the case of the logit regressions, the effect of the time dummy is not uniform across all the alcoholic beverages, although more of the variables matter in the tobit regression than in the logit regression. For example, if the head of the household is employed, the average budget shares of spirits and beer increase by 0.07% and 0.05%, respectively. A 1% increase in total expenditure in 2000 raises the beer budget share by 0.025% but reduces the sorghum budget share by a statistically significant, but economically minor 0.003%. Otherwise, only white households seem to behave differently across the alcoholic beverage categories — they spent an additional 0.04% of their budget on spirits in 2000, while spending an additional 0.17% on table wine in 2000, but reduced the budget share expended on beer and sorghum by 0.13% and 0.06%, respectively.

5. Conclusions and discussion

This paper describes the results of a descriptive and empirical analysis of trends in household-level alcohol consumption in South Africa, using data from the income and expenditure surveys undertaken by StatsSA in 1995 and 2000. The descriptive results point to a general decrease in the proportion of households actually purchasing alcoholic beverages, but further suggest that beer purchases as a share of the total household budget have risen. The increase in beer expenditure, as a share of the total budget, has offset the general decreases in the shares devoted to other alcoholic beverages. Overall, thus, South African households are devoting a larger portion of their budgets to alcoholic beverages. The regression analysis, however, does not generally suggest major changes in “behaviour” at the household level

from 1995 to 2000, as most of the coefficients associated with the year 2000 dummy variable are not statistically different from the 1995 coefficients — and when they are statistically significant, the effects are not large in economic terms.

Given the two data sources, it is tempting to assume that the general decrease in mean alcohol consumption expenditure was being driven by the decrease in real income reported over the time frame. It is also tempting to assume that the decrease was driven by major changes over time in the structure of the households sampled. However, such conclusions are not wholly supported by the data. Notably, the most reasonable measure of alcohol expenditure is the alcohol expenditure share, which can be assumed to control for the observed large changes in reported earnings because it captures the relative consumption of alcohol to earnings. This variable shows decided decreases for nearly all purchases except beer. However, the beer effect outweighs the effect of other alcoholic beverages, so that a general increase in the relative share of expenditure devoted to alcohol consumption is recorded.

Despite the general reduction in expenditure on all alcoholic beverages, there is evidence of a larger number of households, proportionally speaking, purchasing beer in 2000 than in 1995. Given the reduction in purchases of bottled sorghum by the poor, beer purchases might represent household substitution of more commercially available beverages. The increase in the share of expenditure devoted to total alcohol, especially beer, as well as the increase in the proportion of households purchasing beer, could result from ineffective alcohol control policies or from advertising successes on the part of South African Breweries.¹⁸

Although the aim of the research was to present a definitive story, concerns over the differences between the 1995 and 2000 surveys are such that the results could be completely spurious. For example, it is possible that the households surveyed in 2000 included far more beer drinkers than those surveyed in 1995, or that the households surveyed had all just returned from the liquor store, and so were more able to recall their beer purchases. Because of the potential problems, the analysis made extensive use of expenditure shares and a binary purchase variable in an attempt to lessen the potential for spurious

results. Although no empirical analysis can cover all potential data problems, the expenditure variable does consider relative behaviour and not absolute behaviour; it should therefore be more accurate than simple means. Although the binary purchase variable, in isolation, may not provide much relief, when it is included in a probability regression, the results suggest some stability across a wide range of controls over time.

These concerns suggest that future research should consider other ways of controlling for the changes in the sample frame. For example, it is possible to decompose the expenditure share or the binary participation regression results to account for changes in the sample and the parameters over the sample period. The analysis could be conducted across racial groups, gender of heads of households, or even more continuous household measures. The results presented above suggest that some household-level differences may warrant separate regressions by group.

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