

## **Food or drink? Effects of alcohol on child nutrition in South Africa**

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**Summary** - This paper presents evidence of undernutrition among children in South Africa, and finds evidence that inability to afford food is associated with excessive alcohol consumption by some parents, as well as with poverty. I use data from two South African surveys (1993/4 and 2000) to test economic theories of household spending (unitary, and bargaining models); and also sociological analysis of households based on 'household allocative systems'. I find evidence that a household's choice of financial management system is an important influence on the decision (by some households) to buy alcoholic drink instead of food.

**KEY WORDS:** *South Africa, Africa; nutrition; alcohol; 'household allocative systems'.*

### **INTRODUCTION**

In many countries, a fraction of children are undernourished - for example, researchers have found about 35% of children in Madagascar, Rwanda, and Indonesia underweight (taking the average results for boys & girls cited in Millman & DeRose, 1998a: p. 137). Previous research has identified links between child undernutrition and poverty in, for example, Nepal (Panter-Brick, Lunn, Baker & Todd: 2001, p. 127) and Latin America (Schofield, cited in Svedberg, 1990: p. 469).

Poverty is not the only reason for hunger: some researchers (such as Haddad & Reardon, 1993) claim that many children suffer undernutrition because their parents choose to spend their money on non-food items. There is evidence from Côte d'Ivoire, Guatemala, Jordan and Mali (cited in Engle & Menon, 1999: p. 1318), and from Rwanda and The Gambia (cited in Kennedy & Haddad, 1994: p. 1081), that children fare better when mothers have more control over household decisions.

Child undernutrition causes long-term medical and psychological damage (Raynor & Rudolf, 2000: p. 365). It is also possible that alcohol causes or exacerbates domestic violence (implied by Gwagwa, 1998: pp. 43-4). This paper examines the extent to which women control spending in households, focussing on food and alcohol. I compare three different theoretical approaches: unitary models; bargaining models; and theories related to 'household allocative systems'.

### **DATA AND METHODS**

There are various ways to assess if a child has experienced undernutrition: "Wasting, or low weight for height, reflects a current or recent nutritional crisis. Stunting, or low height for age, is the cumulative effect of a child's longer-term nutrition history" (Millman & DeRose, 1998a: p. 153). The 'Body Mass Index' (BMI) is an example of a weight-for-height measure; but Raynor & Rudolf (2000: p. 365) claim BMI may fail to detect undernutrition, because a child underfed for a long time would be both shorter and lighter than normal - hence a child's reduced height could cancel out the low weight when calculating BMI. They conclude "we may as well continue to use weight alone as a measure of failure to thrive [...] There seems no extra value in including height in the computation" (Raynor & Rudolf, 2000: p. 365).

The Child Health Unit (1997: p. 7) classifies children as underweight if they are more than two standard deviations below the South African 'norm' (for that age); however, this underestimates undernutrition if many South African children are underweight. I compare the weight of South African children with the median weight for children in USA of the same sex and age (in years), from the National Center for Health Statistics (NCHS), using files 'wtage.txt' and 'wtinf.txt' downloaded on 7/4/2001 from the 'growth charts' section of [www.cdc.gov/nchs](http://www.cdc.gov/nchs). NCHS data has become a world standard for anthropometric research - such as Millman & DeRose (1998b: p. 46); Panter-Brick *et al* (2001); Waterlow *et al*, cited in Martorell (1984: p. 60). Nevertheless, my use of NCHS data tends to understate the fraction of the South African children who are underweight, because about 19% of children in USA are 'food insecure', i.e. have difficulty obtaining sufficient or acceptable quality food

(author's analysis of data for 1995, 1998 & 1999 from the USA government's Federal Interagency Forum on Child and Family Statistics, downloaded 7/4/2001 via [childstats.gov/ac2000/econ4a.htm](http://childstats.gov/ac2000/econ4a.htm)).

I adopt the widely-used Gomez scale: a child weighing 75% to 89% of the median weight is 1<sup>st</sup> degree underweight; a child weighing 60% to 74% of the median is 2<sup>nd</sup> degree underweight; and below 60% of the median is 3<sup>rd</sup> degree underweight on the Gomez scale. Following Martorell (1984: p. 61), I classify 2<sup>nd</sup> and 3<sup>rd</sup> degree malnutrition (i.e. weighing under 75% of the USA median) as 'underweight', and other children as 'not underweight'. I ignore differences between obese and normal-weight children: obesity may indicate malnutrition (if the diet lacks some nutrients), but not all obese children are malnourished. I interpret the occurrence of 'underweight' as evidence that children are underfed. Other factors influence a child's weight, including disease; the prevalence of AIDS in South Africa is a vital issue, but is beyond the scope of this paper.

This paper uses data from two sources. The 1993/4 World Bank 'Living Standards Measurement Study' (*LSMS*) studied almost 9,000 (rural and urban) households; *LSMS* was intended to reflect the ethnic mix of South Africa. Weight data is included in *LSMS*, but only for children age 1 to 6. *LSMS* data can be downloaded from the World Bank website ([www.worldbank.org/lsm/country/za94/za94home.html](http://www.worldbank.org/lsm/country/za94/za94home.html)). My second data source is the 'Work, Attitudes and Spending' (*WAS*) - a survey carried out in 11 metropolitan areas in September 2000, as part of the Markinor 'Year 2000 Syndicate' survey ([www.markinor.co.za](http://www.markinor.co.za)). I refer to *WAS* in Tables below as an "urban sample", to emphasise the risk of direct comparison with *LSMS* results. *WAS* is a quota sample (50% female; the ethnic make-up is 50% black, 32% white, 12% coloured, 6% Indian), stratified by ethnicity, town, and suburb. The *WAS* sample-size is 2,000 households. Child weight is not measured in *WAS*; instead, I assess undernutrition by the question "In the last 12 months, how often did anyone in your household cut the size of meals or skip meals because there wasn't enough money for food?", treating 'Almost every month' or 'Some months but not every month' or 'Only one or two months' as underfed, and 'Never' as not underfed. The *WAS* dataset will soon be deposited at the UK Data Archive ([www.data-archive.ac.uk](http://www.data-archive.ac.uk)).

To measure poverty, it is desirable to use a 'household equivalence scale', to take account of the number and ages of household members, as well as household income. I follow the 'OECD' income equivalence methodology (Hagenaars, de Vos & Ziadi, 1994: p. 18): the first adult in a household is given a score of 1, and subsequent adults score 0.7 each; 0.5 is added to the score for each child. This score is added up for every household, and I divide total household income by this score to calculate equivalent incomes. I use this equivalent income to split each survey into three roughly equal-sized income bands for Tables 1 and 2, and I also use the OECD equivalence score in devising Tables 4 and 7.

Unless stated otherwise, the phrase 'statistically significant' in this paper means significant at the .01 level of significance (rather than the less persuasive .05 significance level adopted in much research).

## DOES ALCOHOL CAUSE UNDERNUTRITION?

I begin by examining links between undernutrition and poverty in South Africa. Table 1 offers a simple way to assess the link between poverty and nutrition, by dividing each sample into three income-bands. For *LSMS*, one case in Table 1 represents a child age 1 to 6; the number of cases in Table 1 differs between rows, because richer households tend to have fewer children. For *WAS* data, each case is a household, so there are similar numbers of cases on each row.

**TABLE 1: Effect of income on nutrition**

<b>income band</b>	<b>Fraction of children with grade 2 or 3 undernutrition</b>	<b>Fraction who reduced/skipped meals in the previous 12 months</b>
	<i>LSMS</i> , 1993/4: urban & rural children age 1 to 6	<i>WAS</i> , 2000: urban data
<b>poorest third:</b>	19% (2,189 cases)	33% (522 cases)
<b>middle third:</b>	13% (1,120 cases)	18% (554 cases)
<b>richest third:</b>	5% (478 cases)	5% (579 cases)

*Differences between rows are statistically significant in both LSMS and WAS (based on an ANOVA test)*

A striking feature of Table 1 is the tendency for underweight children to be concentrated in poor households; this is clear in both *LSMS* and *WAS* data. We cannot compare the 1993/4 data with 2000 data, but the right-hand column of Table 1 makes clear that hunger remained a problem in South Africa long after the end of Apartheid. There is no room for complacency by the South African government.

I now turn to a possible alternative cause of hunger: the suggestion that some households spend money on items other than food, causing unnecessary hunger. I focus on alcohol spending; other personal spending items (such as tobacco, gambling, and what *LSMS* call "entertainment") may also be bought instead of food, but these spending categories are beyond the scope of this paper.

**TABLE 2: Effects of income and alcohol consumption on nutrition**

income band	alcohol consumption	Fraction of children with grade 2 or 3 undernutrition	Fraction who reduced/skipped meals in the previous 12 months
		<i>LSMS</i> , 1993/4: children age 1 to 6 only	<i>WAS</i> , 2000: urban sample
poorest third <input type="checkbox"/>	normal families	18 % (1,913 cases)	32 % (433 cases)
	heavy drinkers	27 % (245 cases)	38 % (89 cases)
middle third <input type="checkbox"/>	normal families	14 % (965 cases)	15 % (395 cases)
	heavy drinkers	14 % (140 cases)	25 % (159 cases)
richest third <input type="checkbox"/>	normal families	5 % (455 cases)	4 % (419 cases)
	heavy drinkers	6 % (18 cases)	8 % (160 cases)

*Differences between normal & heavy drinking are statistically significant in LSMS & WAS (ANOVA test)*

Table 2 confirms the impression from table 1, that poorer households are more likely than rich families to be short of food. But Table 2 has a second dimension, dividing households into "heavy drinkers" and "normal families": I define a 'heavy drinking' family as one in which over 5% of household spending goes on alcoholic drink (the 5% figure is arbitrary). Previous research suggests that spending on alcohol tends to be understated in surveys, but this will not distort research results if all households understate spending similarly. It appears that a larger proportion of households were classified as 'heavy drinking' in 2000 than in 1993/4; but this may be a result of differences in definition between *LSMS* and *WAS*, such as whether or not to include soft drinks bought in a bar with spending on alcohol. As in other tables, Table 2 combines urban with rural data.

The *LSMS* column in Table 2 indicates that among the poorest children (age 1 to 6), the fraction who are underweight among heavy drinkers (27%) is much more than the fraction among non-heavy-drinker families (18%). Alcohol appears to be a cause of undernutrition: households choose between food or drink. I now examine some theories on household spending, and compare different explanations of why some households buy alcohol when there is not enough food.

### UNITARY MODELS OF HOUSEHOLD BEHAVIOR

In economics, 'unitary' household models are those which assume a household can be studied as a unit (rather than studying persons within it); unitary models assume each household has a 'joint utility function' (Akram-Lodhi, 1997: p. 37). This analysis was pioneered by Samuelson's application of neoclassical economics; more recent analysis, also related to neoclassical economics, is the 'economics of the household' (or 'new home economics') associated with Gary Becker (Akram-Lodhi, 1997). Many of Becker's ideas are no longer popular - for example, Akerlof (1998: p. 303) uses the word "obsolete" to describe the Becker-Mincer analysis of why some women remain housewives whilst others take paid work. However, Becker's work has been very influential in this area; as recently as 1997, Akram-Lodhi claimed that neoclassical economists "continue to cling to unitary models"(1997: p. 39). Part of the 'unitary' theory put forward by Becker is the 'benevolent dictator' model:

"Becker assumes that the household is governed by a dictator capable of imposing their utility function upon the household [...] the dictator is benevolent; when setting the objectives of the household they altruistically formulate their own utility function so that it reflects the interest of the entire household" (Akram-Lodhi, 1997: p. 38).

It is clear from writings such as Ghez & Becker (1975) that Becker uses the term 'head of household' to refer to the husband rather than the wife. The 'benevolent dictator' model suggests that the household head does not want to see his children starve, and that he has sufficient power over household spending to ensure money is spent to meet such needs.

I now consider an empirical test of Becker's 'benevolent dictator' perspective. In Table 3, households (including those containing several adults) are classified according to the gender and marital status of the head of household - treating cohabitation as equivalent to marriage, and including non-resident spouses. I refer to a non-married head-of-household as a

'solo' head, even if other adults (such as grown-up offspring) also live in the household. For comparability with Tables 1 and 2, the *LSMS* column of Table 3 is limited to children age 1 to 6; 'heavy drinking' refers to the parents of these children, or other adults in the household.

**TABLE 3: Prevalence of 'heavy drinking', by household head**

	fraction of households which spend over 5% on alcohol	
	<i>LSMS</i> , 1993/4: children age 1 to 6 only	<i>WAS</i> , 2000: urban sample
<b>solo male head-of-household:</b>	16 % (160 cases)	37 % (158 cases)
<b>married/cohabiting couple:</b>	11 % (3,425 cases)	27 % (1,082 cases)
<b>solo female head-of-household:</b>	9 % (1,391 cases)	15 % (494 cases)

*Differences between rows are statistically significant in both LSMS and WAS (based on ANOVA)*

Table 3 indicates that 'heavy drinking' (alcohol spending over 5% of total spending) is more common in households headed by an unmarried man; households headed by an unmarried woman are far less likely to be 'heavy drinkers'. This suggests that if women control family spending, they direct more spending towards children; this has been observed before. A study of Accra by Levin, Ruel, Morris, Maxwell, Armar-Klemesu & Ahiadeke (1999: p. 1983) found that male-headed households spend significantly more on alcohol than do female-headed households. Similarly, a Malawi study (cited in Kennedy & Haddad, 1994: p. 1080) found that female-headed households spend 25% to 50% less on alcoholic drink than male-headed households; and "The lower level of malnutrition among female-headed households, particularly among *de facto* female-headed households, is striking given these households' significantly lower incomes" (Kennedy & Haddad, 1994: p. 1082). Further evidence that female-headed households fare better than comparable male-headed households has been found in Kenya (Kennedy & Peters, 1992).

Research on *LSMS* and *WAS* (not reported here) indicates that there are some household heads (both male and female) in single-adult households, who have children, and who are heavy drinkers. This rejects Becker's view, because it implies the head of household is a heavy drinker - which is not altruistic. Table 3 also gives a second reason to reject Becker's model: if husbands control household decisions (as the 'benevolent dictator' model claims), then married men could impose male priorities, as revealed in 'solo male' households. However, Table 3 shows that married-couple households' behavior is somewhere between the 'solo male' and 'solo female' households; this implies that married/cohabiting men are not all-powerful, but are forced to compromise with their partners. According to Table 3, Becker was wrong that household heads are altruistic; and wrong that the head can dictate to other household members. This is simply another nail in the coffin of unitary models, which have been widely rejected: Becker's claim that households maximise utility of household members subject to household income "has been empirically refuted in a number of settings" (Haddad & Hoddinott, 1994: p. 543). More generally, Kabeer and Joeke (cited in Akram-Lodhi, 1997: p. 40) were referring to unitary models when they stated "the neoclassical approach [...] is by now surely discredited". And Akram-Lodhi (1997: p. 39) wrote "Joint utility functions thus appear to be empirically unsubstantiated, methodologically inconsistent and theoretically vacuous". I now turn to a different approach.

## **BARGAINING MODELS**

Since the demise of 'unitary' models of the household, economic theories of household decision-making have focussed on (game theory) 'bargaining models'. Such models treat household every decision as a battle between husband and wife; the outcome of a battle is determined by each spouse's "threat point", which is related to that person's (actual and potential) income - the more a person is financially dependent on their partner, the less power s/he has (MacPhail & Bowles, 1989; Haddad & Reardon, 1993; Haddad & Hoddinott, 1994).

**Table 4: Alcohol spending per household (Rand per month) by earnings, LSMS 1993/4**

		Husband's earnings (Rand per month equivalent):				
		0	1 to 130	131 to 250	251 to 350	over 350
<i>wife's earnings (Rand per month equivalent):</i>	<b>0:</b>	<b>18</b> <i>846</i>	<b>22</b> <i>434</i>	<b>25</b> <i>203</i>	<b>41</b> <i>116</i>	<b>37</b> <i>374</i>
	<b>1 to 130:</b>	<b>23</b> <i>85</i>	<b>23</b> <i>215</i>	<b>25</b> <i>58</i>	<b>28</b> <i>25</i>	<b>28</b> <i>18</i>
	<b>131 to 250:</b>	<b>11</b> <i>28</i>	<b>32</b> <i>24</i>	<b>36</b> <i>22</i>	<b>54</b> <i>9</i>	<b>21</b> <i>28</i>
	<b>251 to 350:</b>	<b>23</b> <i>16</i>	<b>32</b> <i>9</i>	<b>21</b> <i>7</i>	<b>26</b> <i>7</i>	<b>42</b> <i>56</i>
	<b>over 350:</b>	<b>44</b> <i>43</i>	<b>24</b> <i>12</i>	<b>16</b> <i>5</i>	<b>25</b> <i>14</i>	<b>55</b> <i>363</i>

Table 4 divides households into 25 categories, according to incomes of husband and wife (income ranges were chosen to ensure, as far as possible, adequate numbers of observations in each cell). I use the OECD equivalence score (see methods section) for each household; I divide husband's monthly earnings by this score, to create an earnings measure which is approximately 'equivalent' between large and small households; and the same for wife's earnings. Numbers in **bold** text represent average household spending on alcohol, also divided by the OECD score (Rand per month). The *italicised* numbers in Table 4 are the number of households in that cell.

The shaded cells in Table 4 represent households where the husband earns about the same as his wife. If alcohol is a higher priority for men than for women (as Table 3 suggests), bargaining models predict that alcohol spending would be high in the top-right corner, where the husband is the main earner. Table 4 supports this prediction: as we go down the right-hand column from the top row, equivalent alcohol spending falls from 37 Rand (wife is not earning) to 21 Rand (wife earns 131 - 250 Rand); so, although the latter cell represents richer households than the top-right cell, earning wives seem better able to limit their husband's alcohol spending. As we go down the right-hand column, women's earnings appear to make them more influential.

Bargaining models are not, however, vindicated by other aspects of Table 4. In the bottom-left corner of Table 4, wives earn far more than their husbands; yet these households spend more on alcohol as we approach the bottom-left corner: the opposite of what bargaining models predict. Alcohol spending is more in the bottom-left cell (where the husband's earning-power is weakest) than in the top-right cell (where his earning-power is strongest). Household income in the bottom-left cell is about the same as in the top-right cell, so household income cannot explain this odd result. There are many different game theory models of household behavior (some assume co-operative bargaining, other models assume non-cooperative bargaining); but as far as I am aware, no bargaining model can explain results in Table 4.

The (italicised) sample-sizes in Table 4 may give us useful insights into intra-household processes. There are very few households where the wife earns more than her husband (these few are underneath the shaded diagonal in Table 4). Women may be avoiding earning more than their husbands, to protect their husband's self-image as the main provider for the household:

"The effect a particular resource has on marital power depends on whether couples consider it as a gift or a burden. Those men who are denied a sense of occupational success are less likely to view their wives' market work as a gift. Sensitive to their husbands' feelings of failure, some wives respond by not resisting their husband's dominance to "balance" his low self-esteem" (Pyke, 1994: p. 89).

Pyke's view suggests that women who earn more than their husbands may not gain bargaining power by their earnings; a woman's earnings could even reduce her power over household decisions, because she feels the need to defer to her husband to balance his loss of self-respect. Among the few households which are below the shaded diagonal in Table 4, most are in the left-hand column, i.e. where the husband has no earnings: these wives of non-employed husbands may have been forced to seek employment by dire poverty. This situation is likely to be very stressful to husbands, as the following paragraph explains.

Gwagwa's study of Durban households found two inter-related problems. The first problem is "*izehluleki*" (men are seen as failures): some men do not want to work, or become unemployed and cannot find work - one man who had lost his job said "You feel useless" (Gwagwa, 1998: p. 44). Another form of *izehluleki* (from a wife's viewpoint) is employed men who do not

support their families financially - often spending money on drink, or on other women. Whether a husband is unemployed or withholds earnings from his family, *izehluleki* forces women to earn money to support themselves and their children; this in turn leads to another problem, "*bayanyotha*", in which husbands feel even less need to support their families. Gwagwa implies a downward spiral (feelings of failure; drink; and perhaps domestic violence; lack of male support for their families). I find Gwagwa's findings reminiscent of behavior of some men in other countries, including Britain (Pahl, 1985: p. 34); India (Rao & Bloch, cited in Haddad, 2000: p. 112); Puerto Rico (Comas-Dias & Duncan, 1985); and USA (Tauchen, Witte & Long, 1991). It is difficult to test Gwagwa's ideas with LSMS or WAS data; I hope future household surveys will include questions on (the threat of) domestic violence, as well as household financial management.

Recent research, such as Turner (2000: p. 1032), has cast doubt on bargaining models; Folbre (1986: p. 24) wrote "Unless and until inequalities within the family can be systematically linked to differences in bargaining power, it can be argued that they represent voluntary choices, collective decisions, or simple cultural prejudices. In this respect the empirical record can only be described as weak." Similarly, Lundberg & Pollak (1996: p. 139) wrote "A current snapshot of family economics would show the traditional framework under siege on both theoretical and empirical fronts. [...] no new theoretical framework has gained general acceptance as a replacement for common preference models". Table 4 suggests that bargaining models, like the unitary models they replaced, are unsuccessful. The next section suggests a possible way to make progress in studying household spending.

### HOUSEHOLD ALLOCATIVE SYSTEMS

In general, unitary and bargaining models reduce household decision-making to (actual or potential) incomes of husband and wife. However, other social scientists claim that a woman's earnings do not always give her power: Engle & Menon (1999: pp. 1318-9) wrote "Working for income, however, does not automatically mean that women control their incomes; in many societies, income is automatically assumed to be the property of the husband". Along similar lines, Cotter, DeFiore, Hermsen, Kowaleski & Vanneman (1998: pp. 1700-1) wrote "Labor force participation may not raise women's relative standing unless they can control the fruits of that participation".

Sociologists have investigated systems of financial management within households, known as 'household allocative systems'. This approach often classifies households according to which household member(s) have responsibility for handling money: husband, wife, or both (Pahl, 1985). Financial management is thought to be important, because it influences the relative power of different household members over financial decisions; this, in turn, influences household spending patterns. Household financial management is not measured in LSMS, so I use the WAS question:

***"Which ONE of the following statements is the nearest to the way your household organises money?"***

*The husband usually looks after the household money*

*The wife usually looks after the household money*

*Husband and wife manage money together*

*Husband and wife keep money separately*

*Other (SPECIFY)"*

Table 5 reports evidence from WAS that the household financial management system adopted by a household is related to food and alcohol consumption.

**Table 5: Effect of financial management (WAS: married/cohabiting only)**

	<b>proportion of heavy drinkers</b>	<b>proportion of underfed families</b>
<b>husband only:</b>	39 % (283 cases)	21 % (145 cases)
<b>husband &amp; wife jointly:</b>	26 % (716 cases)	12 % (565 cases)
<b>husband &amp; wife separately:</b>	23 % (40 cases)	10 % (29 cases)
<b>wife only:</b>	16 % (403 cases)	11 % (152 cases)

*Differences between rows are statistically significant for the 'heavy drinker' column at the .01 significance level; and for the 'underfed' column at the .05 significance level (based on ANOVA).*

The 'husband only' row of Table 5 represents financial control by husbands; this is associated with high alcohol spending, and with a higher risk of missing meals due to lack of money. Where women have some control over household finances (in other rows of Table 5), spending is associated more with food and less with drink. This is consistent with earlier research: Gwagwa (1998) found that women in Inanda Newtown, Durban, prefer to pool incomes with their husband in order to prevent her husband retaining income for his personal spending. Gwagwa's research implies that the ability of a man to buy more alcohol

and less food is related to his control over household money. Gwagwa also seems to hint that using (or threatening) domestic violence gives some men the power to buy alcohol.

**Table 6: Respondent's knowledge of household income, by household allocative system (WAS)**

<i>Household Allocative System</i>	Fraction of respondents who do not know the total income of their household	
	<i>male respondent</i>	<i>female respondent</i>
<i>husband (or single man):</i>	4 % (198 cases)	10% (87 cases)
<i>wife (or single woman):</i>	9 % (105 cases)	1% (282 cases)
<i>husband &amp; wife together:</i>	6 % (389 cases)	3% (332 cases)
<i>husband &amp; wife separately:</i>	0 % (19 cases)	12% (25 cases)
<i>other - unspecified:</i>	8 % (132 cases)	6% (125 cases)

*Difference between rows are statistically significant for male respondents, but not for female respondents.*

Gwagwa found "Women, across the age spectrum, generally do not know how much their husbands earn", and "There is a general feeling in Newtown, especially among women, that the main reason for men not revealing their incomes is that they want to retain a percentage for their "own use". This money is spent mainly on liquor, tobacco and girlfriends" (Gwagwa, 1998: p. 50). In Table 6, women who make financial decisions (alone, or jointly with husband) tend to be better-informed about their husband's earnings. Among women respondents whose husbands manage finances, ten per cent did not know the household income; whereas in wife-managed households, only one per cent of women did not know their household's income (centre-right of Table 6).

Economists might interpret household financial management in terms of a 'Principal/Agent' model (Nelson, 1994: p. 128). Some husbands (the Principal) may decide to share or delegate day-to-day financial dealings to his wife (the Agent); but in doing so, the wife may gain some decision-making power - perhaps because such women are better-informed about household money.

## REGRESSION ANALYSIS

Tables 1 to 6 suggest various inter-relationships involving undernutrition, heavy drinking, and other factors; but it is unclear how these variables relate to each other. The standard economics approach to deal with such complexity is regression, to which I now turn. However, I consider my results to be tentative, until an adequate theoretical model is developed; and there are other variables (such as social class) which may be relevant, but which I omit because the WAS sample-size is fairly small. I am not confident that I have included all relevant variables. Hence, I relegate my regression results to the appendix.

The appendix reports two regression equations. For the first regression in Table 7, 'heavy drinking' is treated as dependent on various explanatory variables such as household income. The second regression (right-hand column of Table 7) treats undernutrition as the dependent variable; the 'heavy drinking' (dummy) variable is treated as an explanatory variable in the second regression. The results generally support the lessons in Tables 1 to 6. The bottom row of the right-hand column of Table 7 indicates that 'heavy drinking' is a significant cause of undernutrition, controlling for various other factors such as household income; this confirms the pattern shown in Table 2.

Regression results in the appendix highlight the importance of household allocative systems, as we might expect from Table 5. High spending on alcohol, and being unable to afford sufficient food, were both significantly more likely where the husband had exclusive control over household finances. If (as previous research suggests) women prefer to buy less alcohol and more food, then women seem more able to influence household spending decisions if they manage household finances (alone, or with their husband).

Table 7 offers only very weak support for bargaining models. I consider the "wife's relative earnings" variable to be a reasonable test of bargaining models: such theories suggest that if the wife earns more, she will have more bargaining-power in the household. If we accept the claim (in previous research, and in Table 3) that women generally prefer to spend less on alcohol and more on food, then bargaining models predict the "wife's relative earnings" variable should be negative in both columns of Table 7. This variable is negative in the left-hand column, but only significant at the .05 level; and it is positive (but not significant) in the right-hand column - the opposite sign to that predicted by bargaining models. This is not persuasive evidence against bargaining models (there are various econometric problems with this research, as discussed in the appendix); but it is interesting to contrast this weakness with the very strong support for household allocative systems in Table 7. This casts doubt on bargaining models (as did Table 4).

Another significant influence on spending, according to Table 7, is gender of the household head. It appears from the left-hand

regression (Table 7) that female-headed households are less likely to be 'heavy drinkers' (i.e. to spend over 5% of household spending on alcohol), controlling for factors such as total household income. This finding is consistent with Table 3, although Table 7 uses a dummy variable (see appendix) and hence is not directly comparable with Table 3.

Many writers advocate improving education of girls/women to improve children's well-being (Haddad, 2000: pp. 104-5); a more educated woman "feels (and therefore is) more capable of influencing her child's health" (Sandiford, Cassel, Montenegro & Sanchez, 1995: p. 17). For developing countries, it has been claimed that ten years' education of each woman would be more beneficial than doubling all incomes and providing everyone with a flush lavatory (Sandiford *et al.*, 1995: p. 5). The fact that education is not statistically significant in either regression in Table 7 appears to cast doubt on the importance of women's education. However, the education row in Table 7 refers to respondent's education - about half of WAS respondents are male, and education levels of other household members are not reported in WAS. It would be possible to select only female respondents for regression, but this would halve the sample-size and hence compromise the regression results. My analysis of WAS data indicates that improving a woman's education does significantly increase the likelihood that she will manage the family finances (alone, or jointly with husband); hence women's education does seem likely to improve the well-being of children. I do not report more evidence on the effects of women's education due to space limitations.

## CONCLUSIONS

This paper reports evidence that many South African children are underfed because money is spent on alcohol by their parents (usually men, it seems). I have found a similar pattern in Britain, but the evidence is not reported here for reasons of space. Empirical evidence from various countries indicates that a woman's relative influence on household decision-making affects household spending patterns: "there is now some empirical regularity in the result that marginal income under women's control tends to result in increased food consumption of children and better child nutrition" (Haddad, 2000: p. 114). This paper provides evidence that 'household allocative systems' reveal the extent of women's power in the household; financial management, as well as revealing intra-household processes, may also affect other household behavior such as spending decisions. Perhaps future social scientists will combine economic analysis with sociological insights, such as household allocative systems and the effects of domestic violence by some men.

From my reading of the 'benevolent dictator' model, Becker seems to imply that all husbands are altruistic, and all wives selfish (I apologise to Gary Becker if I misrepresent his views). If this is Becker's view, then it is far from the truth: evidence in this paper, and in previous research, indicates the opposite - many husbands spend money on alcohol for themselves, whereas wives generally prefer to spend more money on food for their children. But my research rejects a simple division into 'women altruistic, men selfish' - some mothers (including female single parents) buy alcohol, and not all fathers drink.

Perhaps we should not be too unforgiving of poor people driven to drink by poverty; but sympathy for adults should not blind us to the suffering of hungry children. The democratically elected South African government must balance an individual's freedom to buy alcohol against the rights of children to enough food. I recommend the government develop incentives, such as taxes, to discourage excessive drinking (and the domestic violence which often accompanies it). In view of the undesirable effects of alcohol, it may be appropriate to tax alcohol heavily in order to pay for a state-run child nutrition program.

Many observers think the (post-Apartheid) 'Reconstruction and Development Programme', though initially very successful, has lost momentum and should be reinvigorated. One way to improve child health is to extend the South African 'Primary School Nutrition Programme' to cover all pupils; school feeding programmes have been effective in other countries (Child Health Unit, 1997: p. 81). However, this will not solve undernutrition among preschool children, so additional measures are needed. A system like the UK 'Child Benefit' scheme is thought to be efficient because it is paid to mothers - whereas fathers would be more likely to spend the benefit on drink (Lundberg & Pollak, 1996: p. 155; Haddad, 2000: p. 126). There is evidence of real benefits to children from schemes such as the USA 'Aid to Families with Dependent Children' scheme, the Mexican 'Progresas' scheme, and the Bangladesh 'Food For Education Program' (Haddad, 2000: pp. 118-20).

Current economic bargaining models of households are highly sophisticated (for example, often using game theory, matrix algebra, and cutting-edge regression techniques). Nelson (1994, p. 130) wrote "Studies of the economics of marriage [...] are surrounded by a comforting aura of precision and rigor. Such comforting narrowness, however, may be a handicap in understanding the process of who gets what, who does what, how decisions are made within marriage". Perhaps economists are looking at the wrong problems: "economic models of distribution between men and women focus on the subgame of bargaining within a particular marriage [but] the real action is elsewhere - in the prior game that determines social norms and gender roles" (Lundberg & Pollak, 1996: p. 152). Strauss, Mwangi & Beegle (2000: pp. 132-3) wrote "Evidence has begun to emerge that suggests that modelling households as though they are individuals can be at variance with their true behaviour [...] more complicated models have begun to be proposed and are still in their formative stages; much remains to be done". Personally, as an economist, I cannot see a way to make current economic models successful in explaining household behavior.

Astronomers used to think planets revolved around the Earth; when evidence contradicted theory, astronomers added 'epicycles' to reconcile theory with observation. Even epicycles could not explain observations; it was not until Copernicus's insight (that the Earth is not the centre of the universe) that astronomers could make progress (Ronan, 1983). Perhaps a simple idea will help social scientists understand household behavior: millions of hungry children (in South Africa and elsewhere)



could potentially benefit.

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## APPENDIX

LSMS does not include a question on household financial management, so I use WAS data. I created the following variables for regression:

<b>Log of equivalent income:</b>	net household income divided by the OECD income equivalence score.
<b>white ethnic group:</b>	one, if respondent is in the 'white' ethnic group; zero for other ethnic groups.
<b>Indian ethnic group:</b>	one, if respondent is in the 'Indian' ethnic group; zero for other ethnic groups. Hence the reference group for regression is the 'black'/'colored' ethnic groups.
<b>Muslim:</b>	equals one if respondent is Muslim; or zero for other religion/no religion.
<b>respondent's education:</b>	an index, varying between zero (no education) and 85 (graduate or above, with a professional qualification).
<b>wife's relative earnings:</b>	a scale from zero to one, measured by wife's earnings expressed as a fraction of [wife's earnings plus husband's earnings] and set to ½ if neither is employed.
<b>female head of household:</b>	equals one for a female-headed household, or zero if male-headed.
<b>financial management:</b>	measures who organises household money (equals one if wife organises money alone/with husband, or zero if finances are dealt with by the husband alone). Households with 'other' financial management are excluded from regressions.
<b>'heavy drinker':</b>	equal to one if the household spent over 5% of total spending on alcohol, or zero otherwise. This is the dependent variable in the left-hand regression, and an explanatory variable in the right-hand regression, in Table 7.
<b>unable to afford meals:</b>	equal to one if the household had to skip meals in the last year because they could not afford food; or zero otherwise. This is the dependent variable in the right-hand regression in Table 7.

**Table 7: Probit regression results (WAS data)**

	<b>Dependent variable: 'heavy drinking'</b>	<b>Dependent variable: unable to afford meals</b>
Log of equivalent income:	.109 *	-.438 **
white ethnic group:	-.156	-.132
Indian ethnic group:	-.595 **	-.445
Muslim:	-1.198 **	.733 **
number of adults:	-.005	-.034
number of children:	-.080 *	.061
respondent's education:	-.005	-.005
wife's relative earnings:	-.272 *	.035
female head-of-household:	-.379 **	.092
financial management:	-.355 **	-.356 **
'heavy drinking' household:	[ not included ]	.249 *
	(1,250 observations)	(1,199 observations)

*Coefficients marked \* are statistically significant at the .05 level; those marked \*\* significant at the .01 level*

My regression analysis assessed the effect of respondent membership of 'white' and 'Indian' ethnic groups. Whites are not significantly different to the 'black'/'colored' reference group. Membership of the 'Indian' group, and respondents of the Muslim faith, are both associated with significantly reduced alcohol spending; this presumably reflects the Islamic rule against intoxication. However, the right-hand column of Table 7 indicates that Muslims are significantly more likely to be underfed (controlling for other factors, such as household income). Various writers have suggested that Islam is unfavourable to women's autonomy, and this may explain why Muslims are more likely to be hungry - perhaps Muslim women cannot direct household spending towards their children. However, this result is suspect: the WAS sample-size is not large enough to assess this issue reliably, especially in view of collinearity between Muslims and ethnic 'Indians'. More research would be needed before we can tell if Islam helps, or harms, children.

There are many reasons for caution over regression results in Table 7. One issue is relationships among explanatory variables (collinearity): I avoid using a variable where I consider collinearity is too serious - the highest Pearson correlation between any pair of explanatory variables in the regressions is less strong than 0.8 (a convention used by some econometricians to define acceptable collinearity). I use probit regression, the standard econometric approach for a dummy dependent variable. It may be desirable to use Vector Auto Regression to analyse spending, because spending on alcohol and food are inter-related decisions; but it is difficult to establish cause-and-effect. For example, Gwagwa (1998) suggests that a husband's inability to support his family may cause a wife to seek employment; perhaps low food spending is a cause and wife's employment an effect. It might be preferable to add terms to allow for nonlinear relationship between income and heavy drinking (suggested by Engel curves), but I consider the WAS sample-size too small for this. In survey data, there is a real risk of heteroscedasticity; I do not test for this, because there is no universally-accepted measure of heteroscedasticity, and because (if it is a problem) I know of no technique to solve heteroscedasticity which is compatible with probit regression. I consider the results in Table 7 to be a useful guide, but they should not be treated as definitive.