

# If the alcohol doesn't get you, then the toxins will: The health impacts of bulk wine provision in the Western Cape province of South Africa

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## Background

The Western Cape province of South Africa has a reputation for producing some of the finest wines in the world. However, the area has an extremely high prevalence of excessive alcohol use and problem drinking by rural communities (London, 2000) culminating in the highest published prevalence of Foetal Alcohol Syndrome (FAS) in the world (May et al, 2000; Viljoen et al, 2002). Much of this has to do with the historical practice of providing farm workers with cheap wine as part of their payment (Figure 1). However, the active provision of wine rations (the "dop" system) has been phased out and replaced by sale through formal and informal liquor outlets. Given widespread alcohol dependence, the most pressing public health challenge is therefore the ease of availability of cheap, bulk, low quality wine. In particular, a common form of wine packaging is unboxed foil bags ("papsak") of 2, 5 or more litres volume (Figure 2). De-regulation has led to a proliferation of intermediaries in the supply chain who transfer bulk wine to a variety of plastic containers (Figure 3), sold in rural stores or informal liquor outlets with little attention to appropriate storage conditions such as refrigeration.

Figure 1.



Figure 2. Example of 'papsak' wine packaging



Figure 3. Example of carton wine packaging



## Aims

Provincial authorities commissioned a study to investigate the nature, extent and social impact of bulk alcohol sales in the rural Western Cape province of South Africa to provide data for policy interventions to restrict bulk alcohol availability. Bulk wine is defined as alcohol in containers ranging between 300ml and 5lt, and included plastic bottles and foil bags outside of a box

## Methods

Two rural Western Cape farming areas were selected (Figure 4).

Figure 4. Study sites: V = Vredendal; S = Stellenbosch



a) A survey of 40 randomly selected farms in each area: Interviews in the respondent's first language were conducted by trained interviewers using standardised structured questionnaires with the heads of households (n=469) on all farms.

b) This was complemented by a survey of non-random sample of consumers (n=100) buying alcohol at retail liquor outlets in the rural towns in the same areas.

c) Chemical analyses were conducted on 51 samples of bulk wine purchased from liquor outlets from 17 towns across the province for the presence and quantity of pesticides, trace metals, Ochratoxin A, Phthalate Esters, other volatile compounds.

Alcohol consumption was assessed as current (in past 30 days), ever or never, and problem drinking by the CAGE score (Cutting down, Angry, Guilty, Eye-opener; Range 0 to 4, cut-off for problem drinking 2). Socio-economic score was assessed from the extent of ownership of consumer items (car, television, fridge and telephone; range 0 to 4).

## Results

Demography: 76% male; mean age 35 (men) and 32 (women); 2% had any tertiary education; Socio-economic status: 75% reported monthly household income < \$350; 28% of family were in receipt of some form of social grant; Average number of commodities owned were 1.6 (typically TV and fridge).

Table 1. Drinking history of farm and town respondents

	Farm workers (n=469)	Town residents (n=100)
Drank alcohol in last 30 days	68%	93%
Drank alcohol > 30 days ago	24%	4%
Never drank alcohol	8%	3%

Table 2. Drinking preferences of farm and town respondents

	Farm workers (n=431)	Town residents (n=97)
Beer	29%	62%
Papsak	37%	27%
Other	34%	11%

25% of women and 38% of men listed papsak wine as their liquor of preference.

70% of drinkers scored 2 or more on the CAGE questionnaire.

Table 3. Attitudes to papsak wine: Why do you drink / not drink papsak?

Drinkers of papsak wine (n=198)	Non-drinkers of papsak wine (n=110)	
Price (cheap)	Previously made them ill	45%
Like the taste	Has bad influence on people	17%
Good quality	Poor quality	11%
Available	Poor taste	9%
Other	Other	9%

Respondent comments:

- o If you had a stomach problem, "papsak" is good for the worms
- o If you wanted to drink but did not want to get drunk too fast, beer would be preferable.
- o Wine in a bottle is "cleaner" than the "papsak".

Table 4. Socio-economic and CAGE scores by alcohol preference

Preference:	Mean Socio-economic score	Mean CAGE score	Prevalence problem drinking (CAGE ≥ 2)
Beer (n=125)	2.00	2.04	65%
Papsak (n=98)	0.82	2.54	82%
Other (147)	1.95	1.74	60%
No alcohol (n=41)	2.09	n/a	n/a

Papsak wine was associated with lower socio-economic score compared to other alcohol forms (OR=6.68; 95% CI 4.45-10.01).

Drinking patterns:

9% bought their alcohol on credit

No association found between receipt of a grant and use of alcohol, or preference for papsak.

2% admitted to concomitant use of other substances (other than tobacco)

46% drinkers reported at least one other household member drinks with them.

Table 5. Contaminants of bulk wine from liquor outlets, Western Cape province, South Africa

Contaminant	Plastic / carton container (n=35)	Foil bag (n=16)	All samples (n=51)	
1. Pesticides	% samples with a detection <sup>a</sup>	40%	25%	35%
2. Metals	% detects of Hg above standard <sup>b</sup>	24%	12%	20%
	Mean Hg (range)	98 µg/L (range 0 to 454µg/L)		
3. Di (2-ethylhexyl) Phthalate, or DEHP	% detects above DL <sup>c</sup>	100%	57%	86%
	Mean DEHP (range)	144 (0-2382µg/L)		
4. Ochratoxin A	% detects above standard <sup>d</sup>	26%	31%	27%
	Mean Ochratoxin A levels (range)	2.89 µg/L (range 0 to 22.6µg/L)		

a - All detections were for iprodione at levels below its level of quantification

(QL: QL<sub>iprodione</sub> = 0.05 mg/kg; 2 concomitant detects for fenhexamid

(QL<sub>fenhexamid</sub> = 0.05 mg/kg) and one for azoxystrobin; QL<sub>azoxystrobin</sub> = 0.01 mg/kg.

b - Regulatory standards for mercury in water = 50 µg/L in South Africa. There were no detects above standard for other heavy metals (e.g. Pb, Cd, As)

c - Detection Limit for DEHP = 6ppb

d - Regulatory standards for Ochratoxin A in wine is set at 2ppb (µg/L) in South Africa

About a fifth of samples had toxic levels of Mercury, a quarter toxic levels of Ochratoxin A and almost all samples had phthalates present at detectable concentrations.

## Discussion

High rates of drinking and of problem drinking were confirmed in this population, consistent with previous research (London et al, 1998). Papsak consumption is associated with lower socio-economic status and higher prevalences of problem drinking and is the liquor of choice for poor families because of low price.

Contamination of papsak wine with toxicants is widespread, particularly for plastic, rather than foil containers. Contaminants of concern are:

a) Mercury was present in 20% of samples above maximum permissible levels. Mercury is known teratogen and neurotoxicant.

b) Di (2-ethylhexyl) Phthalate was present in 86% of samples at levels above the EPA MCL (Maximum Contaminant Level) of 6 parts per billion. Acute exposure to DEHP is associated with gastrointestinal disturbances, nausea, vertigo and over the long-term, it is suspected of causing liver and testicular damage, reproductive effects and cancer.

c) Ochratoxin A (OTA) is a secondary metabolite produced by *Penicillium* and *Aspergillus* species and was present in 28% of samples above maximum permissible levels. Exposure over a long period of time has carcinogenic, nephrotoxic, teratogenic and immunotoxic effects.

Given the known teratogenic effects of alcohol and documented rates of foetal alcohol syndrome amongst rural children in this region in excess of 5%, the presence of these toxins and the potential for interaction with alcohol is of great concern, and may help to explain why women in the Western Cape appear to be vulnerable to having a FAS child at lower levels of drinking than other exposed populations (Viljoen et al, 2002).

Action to restrict availability of papsak wine to protect vulnerable rural populations in South Africa is warranted. Proposals to ban papsakke and inferior plastic containers are under presently consideration in the province. Control of decanting and illegal vendor activities is a priority, as is the monitoring and control of conditions under which wine is stored and sold. Comprehensive programmes to address the causes and impact of alcohol abuse in the rural Western Cape should be strengthened.

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