Marketing of non-iodized salt through unconventional distribution channels is one of the factors weakening the national salt iodization program in South Africa. The aim of this study was therefore to quantify the various sources of household salt, and to relate this information to socio-economic status. Questionnaire information was collected by personal interview during home visits from a multistage, cluster, probability sample of 2164 adults representative of the adult population. Nationally 77.7% of households obtained their table salt from the typical food shops distributing iodized salt. However, in the nine different provinces between 8 and 37.3% of households used unconventional sources, distributing mainly non-iodized salt, to obtain their household salt. These alternative sources include distributors of agricultural salt, small general dealer shops called spaza shops, in peri-urban and rural townships, street vendors and salt saches placed in the packaging of maize meal bags. Countrywide around 30% of low socio-economic households obtained their salt from unconventional sources compared to less than 5% in high socio-economic households, emphasizing the vulnerability of low socio-economic groups to the use of non-iodized salt. Intervention strategies should mobilize all role players involved in unconventional marketing channels of household salt to provide only iodized salt to consumers, as required by law.

Key Words: iodine, salt, household salt, socio-economic status, South Africa.
the full range of residential categories in the country. These residential areas included traditional tribal rural areas, and, in both metropolitan and non-metropolitan areas, informal settlements, hostels, townships, towns and cities. Exceptions to proportional sampling were required to achieve a minimum of 100 households per province and a minimum of 100 Asian households that was fixed beforehand in order to generate sufficiently stable estimates for the provincial and overall national study sample. Census enumerator areas (N=295) were used to form clusters, with either eight or four respondents drawn per enumerator area.

Within these enumerator areas the households and respondents were selected using a random grid, and respondents interviewed at their homes. Only one respondent per selected household, aged 16 years or older, was included in the study. Substitution of the visiting point was allowed in case of refusal, empty premises, nobody on the stand qualifying for the study, if the designated respondent could not be found after three visits, inability to communicate due to foreign languages, or due to physical or mental limitations.

Fieldworkers collected the data by means of a structured questionnaire during March and April 2002. Information was obtained on socio-demographic characteristics of the respondent, and they were specifically asked where they usually buy or get the salt that they use for preparing food in the house. Fieldworkers had at least 12 years of schooling and were bilingual or multilingual to be able to conduct the interview in the language of the respondent. Fieldwork coordinators checked at least 20% of questionnaires for correct completion during the data collection stage, and the office contacted a further 15% of respondents to ensure that correct fieldwork procedures were followed during data collection. It was explicitly stated at commencement of the interview that respondents were not obliged to answer any of the questions, that their participation was voluntary, and that all personal information will be kept confidential. This study was conducted in accordance with the internationally agreed ethical principles for the conduct of medical research.

Data analysis
To correct for over sampling introduced to generate stable estimates, provincial and national data were adjusted in a weighted analysis using the 1996 census distributions to achieve representative population profiles. Summary statistics were generated, including frequencies, proportions, and means. A composite index reflecting socio-economic status on a ten-point scale, the living standard measure (LSM), was created from the biographical information in the questionnaire. Low LSM values reflected low socio-economic status and high LSM values, high socio-economic status. Biographical data used for this calculation included the availability of household appliances (e.g. fridge, freezer, washing machine, tumble dryer, dishwasher, sewing machine, vacuum cleaner, microwave oven, electric stove, television, hi-fi, radios, cell phone, home computer, one or more cars), household facilities (e.g electricity, domestic servant, home security, piped water, hot running water, flush toilet), geographical area, and whether the respondent lived in a hut. The LSM was then graphically related to the proportion of people who obtained their household salt from alternative sources to define the groups in the population making use of unconventional distribution channels when obtaining their household salt. The significance of this association was determined by means of the Spearman correlation.

Results
Overall 2164 respondents, representing a national response rate of 98%, participated in the study (Table1). In terms of biographic data the weighted study sample consisted of 74.7% black, 9.1% coloured (mixed race), 2.9% Asian and 9.1% white people, while 47.1% were male and 52.9% were female, reflecting the ethnic and gender profiles of the country. The percentage of respondents aged 16 to 24 years was 28.1%, 25.2% was 25 to 34 years old, 18.5% was 35 to 44 years, 11.4% was 45 to 54 years, and 16.9% was 55 years and above.

In the national sample 77.7% of respondents purchased their salt in typical food shops like the big chain stores and superettes (Table 2). In the 3 northern provinces, Mpumalanga, Limpopo and North West, this percentage varied between 62.7 and 66.1%, indicating that approximately one third or more of the population in these provinces obtained their household salt from sources other than the conventional food stores. From Table 2 it is evident that these alternative sources include agricultural salt obtained through farmers, agricultural wholesalers or elsewhere, spaza shops in rural and peri-urban settlement areas, street vendors, and small salt saches placed in bags of maize meal.

Although only 2.4% of respondents in the national sample used agricultural salt for domestic purposes, this percentage was as high as 13% of respondents in North West Province and 7% in Northern Cape. The percentage households purchasing their household salt from spaza

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Provinces</th>
<th>National sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>West Cape</td>
<td>East Cape</td>
</tr>
<tr>
<td>Number of enumerator areas</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Sample size</td>
<td>264</td>
<td>240</td>
</tr>
<tr>
<td>Weighted sample size</td>
<td>230</td>
<td>307</td>
</tr>
<tr>
<td>Response rate (%)</td>
<td>100</td>
<td>96.8</td>
</tr>
</tbody>
</table>
shops varied from 0.9% in Free State to 23.6% in Mpu-

malanga, with a national average of 13.1%. Similarly, the
practice of purchasing salt from street vendors varied in
the provinces as can be seen from the fact that none of the
respondents said they purchased their household salt from
vendors in four of the nine provinces, whereas 11.6% of
respondents in Limpopo obtained their salt from this
source. In addition, a significant percentage of households
in Limpopo and North West Provinces, just more than
6%, obtained their salt in sachets placed in the maize meal
package (Table 2).

Figure 1 shows that generally decreasing proportions
of households obtained their salt from alternative sources
(agricultural salt, street vendors, spaza shops, in maize
meal package) with increasing LSM values (r = -0.95,
P<0.001). It was thus apparent that the respondents with
low LSM values, reflecting low socio-economic status,
were more likely to obtain agricultural salt, salt from
spaza shops, vendors and in maize meal packaging com-
pared to respondents with high LSM values.

**Discussion**

In this national survey the sources of household salt
varied considerably in the various geographical areas as
well as in different socio-economic strata of the popu-
lation. In areas where a high proportion of households
bought their salt from food shops, that are legally
obliged to distribute only iodised salt, the likelihood is
higher that consumers will obtain adequately iodised salt
compared to areas where alternative sources of salt are in
operation. To illustrate this point, the three provinces in
this study with the highest proportion of households
obtaining their salt from alternative sources were also the
same three provinces with the highest proportion of
households using inadequately iodised salt in an earlier
study.5

![Figure 1](https://example.com/figure1.jpg)

**Figure 1.** Proportions of people within each of the Living
Standard Measure (LSM) categories, as a composite index
of socio-economic status, that obtain their household salt from
alternative sources

It is known that agricultural salt is not iodised in this
country5 and it is most likely that none of the other alter-
native sources distribute iodised salt, perhaps with the
occasional exception of spaza shops, of which a few may
sell iodized salt. Small-scale traders usually obtain non-
iodised salt or agricultural salt in bulk directly from salt
producers or from agricultural wholesalers, which is then
repackaged and distributed. Although not quantified, it
has been observed that owners of small rural spaza shops
in the northern provinces repackage agricultural salt to be
sold to the local communities. This data therefore suggest
that the practice of using alternative sources of household
salt, such as agricultural salt, salt from spaza shops, street
vendors or salt in maize meal packaging, represents fac-
tors weakening the national salt iodisation programme.

More research is, however, needed to investigate the
iodine content of these alternative sources of household
salt.

Spaza shops appear to be a significant distribution
point of household salt in most of the provinces. Because

**Table 2.** Frequency (%) of respondents purchasing their household salt at various sources, by province and nationally

<table>
<thead>
<tr>
<th>Source of household salt</th>
<th>Provinces</th>
<th>National Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>West Cape</td>
<td>East Cape</td>
</tr>
<tr>
<td>Shop</td>
<td>89.4</td>
<td>84.2</td>
</tr>
<tr>
<td>Agricultural salt</td>
<td>0</td>
<td>1.4</td>
</tr>
<tr>
<td>Spaza shop*</td>
<td>5.3</td>
<td>12.6</td>
</tr>
<tr>
<td>Street vendor</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>Bag of maize meal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No salt in household</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Do not know</td>
<td>5.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Spaza shop = small general dealer shop in rural or peri-urban townships.
of the potential impact the salt distributed by these small shops may have on the iodine status of poor communities in peri-urban townships or rural areas, special attention should be paid to these outlets. This means that the iodine content of salt sold in these small shops needs to be monitored as part of retailer monitoring exercises, that the owners or managers of these spaza shops need to be made aware of the benefits of selling only iodised salt, and that wholesalers or salt producers supply only iodised salt to these spaza shop owners.

Street vendors selling household salt seem to be active only in some geographical areas. It is suspected that these vendors purchase non-iodised salt in bulk from producers or wholesalers and then repackage the salt to be sold in the informal business sector. Similar to the small packets of salt being put in the packaging of some brands of maize meal, this practice is probably operated by people not aware of the importance of using adequately iodised salt and not aware that they are transgressing the law. In fact, they are unknowingly depriving women and children of the opportunity of using iodised salt. Again, appropriate intervention strategies should target those responsible for distributing non-iodised salt in these ways, including the salt producers or suppliers of the salt.

Low socio-economic groups in a population are more likely to be exposed to low concentrations of iodine in household salt. This situation could partly be related to the positive association between the general level of education and awareness of the benefits of iodised salt reported in a Turkish study. In the present study around 30% of people from the lower end of the socio-economic spectrum, as indicated by their low LSM values, obtained their household salt from alternative sources compared to the less than 5% in high socio-economic categories. In addition to the low educational level, usually encountered in low socio-economic groups, these people are also price sensitive and will more likely opt for the cheapest salt available. These informal and cheap sources of household salt are invariably not iodised, aggravating the vulnerability of low socio-economic sub-groups in the population to inadequately iodised salt.

Alternative, or unconventional, sources of household salt should thus be considered one of the factors contributing towards the difficulty in reaching the last portion of populations with adequately iodised salt. Invariably this portion of the population includes communities in remote or rural areas, or low socio-economic communities on the periphery of cities. As these sources of household salt may differ from country to country, intervention strategies should be tailored according to the country situation.

References
1 Delange F. The disorders induced by iodine deficiency. Thyroid 1994; 4: 107-128.