

ARMENIA

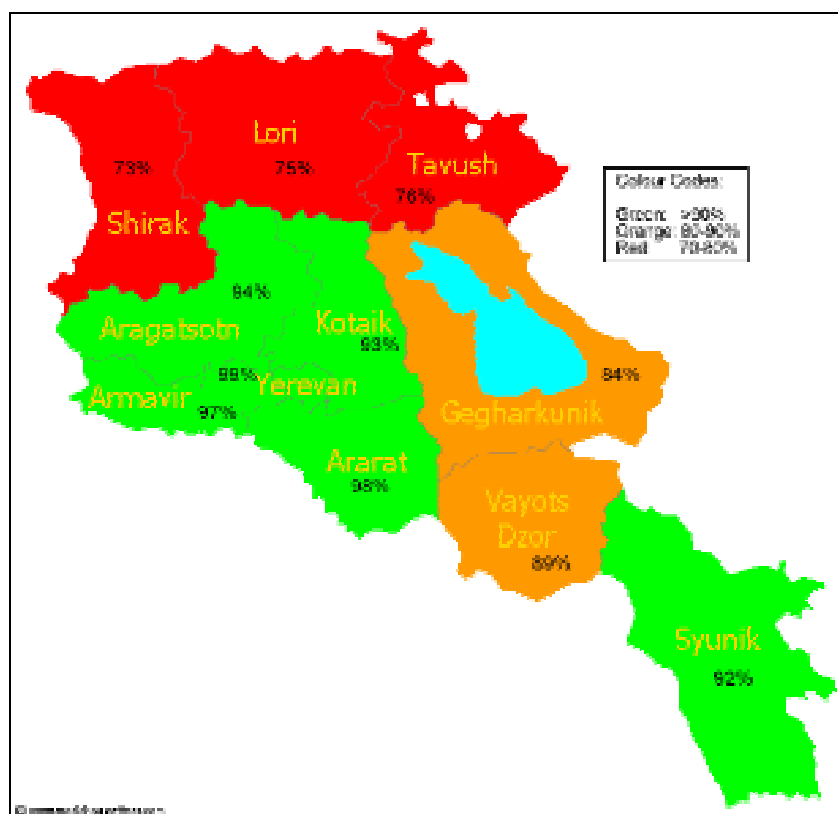
Armenia is a small, mountainous country with a history of mild-to-moderate iodine deficiency. It shares borders with Georgia, Azerbaijan, Turkey and Iran, though those with Azerbaijan and Turkey are closed due to territorial disputes. At the time of survey, salt iodization was not compulsory in Armenia, though legislation specified that any iodized salt should contain 50ppm KIO_3 .

Fortunately the country's only salt producer, Avan Salt Company in Yerevan, has been voluntarily iodising its salt since 1997¹ and produces enough iodized salt to supply the entire domestic market. In this survey, which took place from October to December 2000, 99.9% of households' salt was tested for the presence of iodine.

RESULTS

Effect of Province on IS Consumption

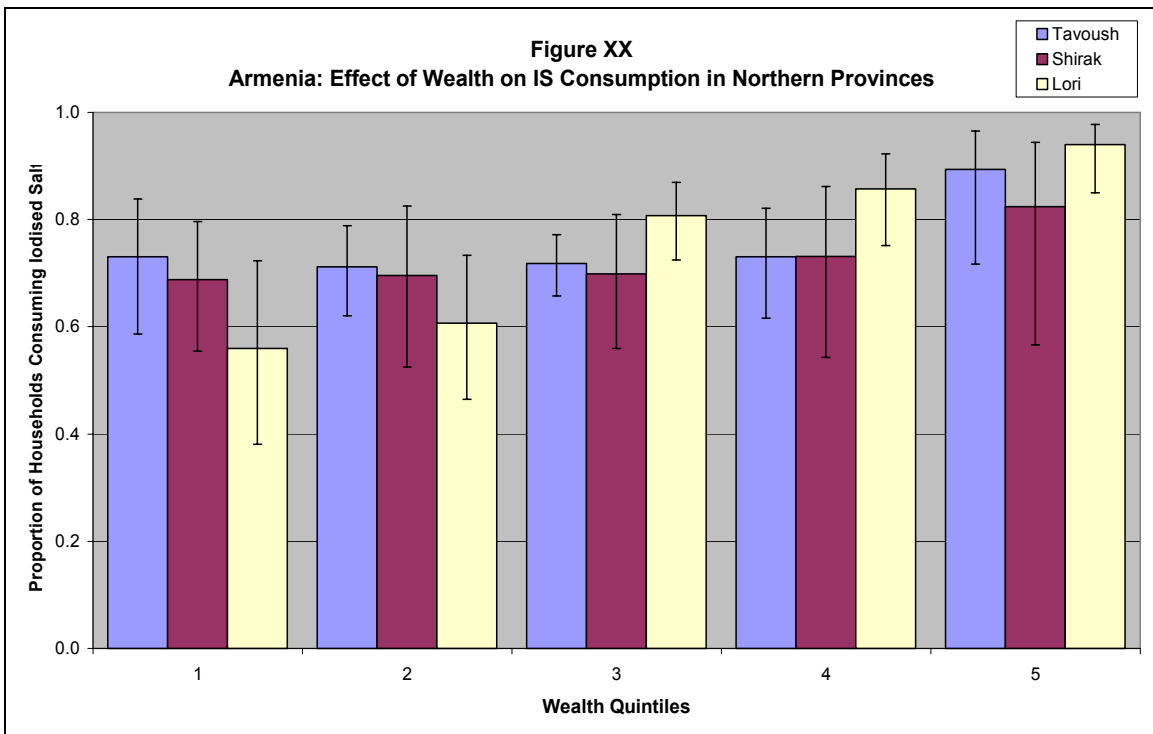
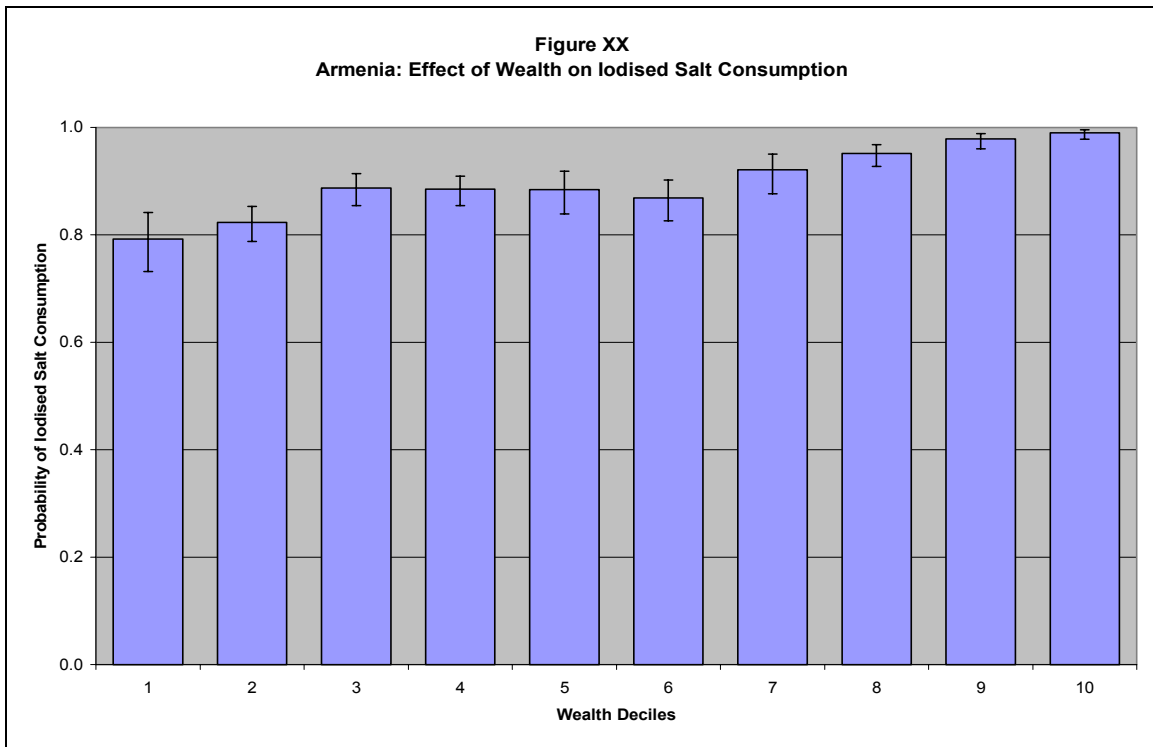
Figure 1: Iodized Salt Consumption by Province



Iodized salt consumption was generally high; the mean level for the entire Armenian sample was 90.4%. The capital city, Yerevan, showed the highest levels (98.9%). The three northern provinces of Lori, Shirak and Tavoush were found to have significantly

¹ The company first received assistance from UNICEF in 1997, but was producing iodized salt before the collapse of the Soviet Union.

lower levels (75.4%, 72.7% and 75.7% respectively) than other provinces, even after adjusting for wealth (OR: 0.158; $p < 0.0001$, 95CI[0.119 - 0.210]). Figure XX, below, shows the IS consumption rates for all provinces.



Effect of Household Wealth on IS Consumption

For the entire sample there was a statistically-significant association between household wealth and iodized salt consumption (OR: 2.840; $p < 0.0001$, 95CI[1.992 - 4.050]).

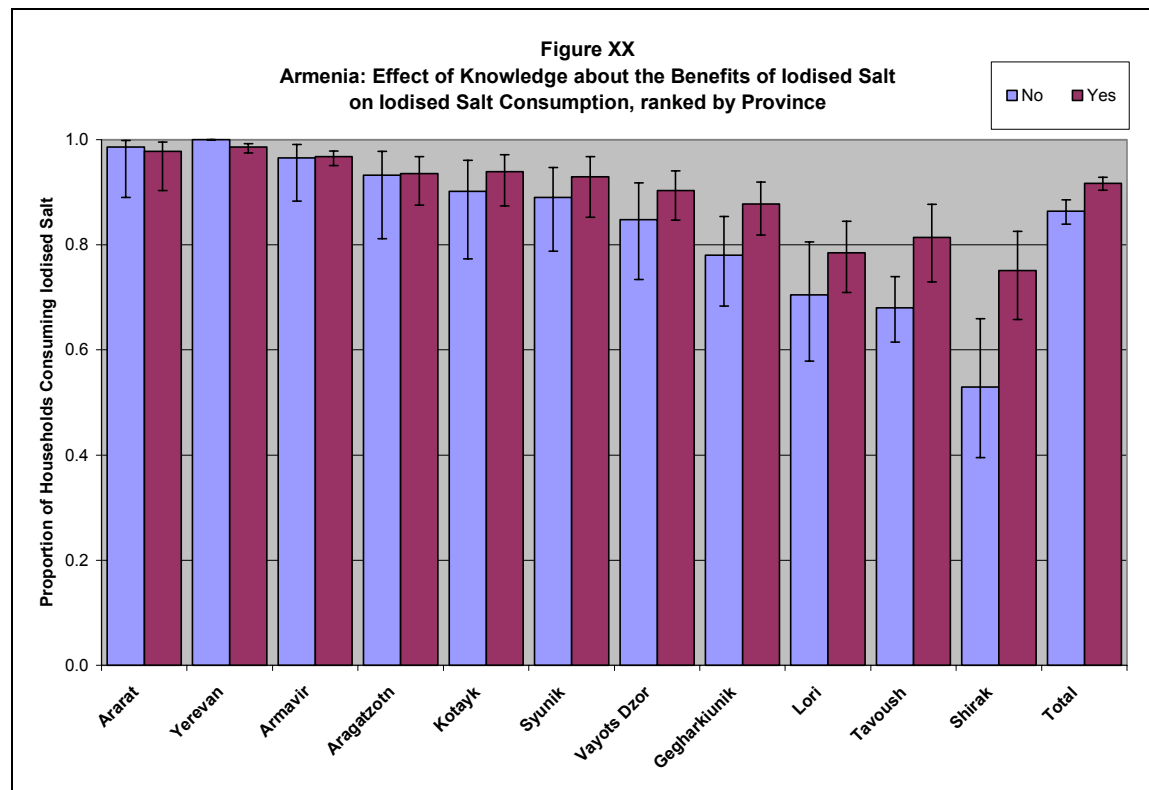
At provincial level, Lori showed the strongest wealth effect (OR: 4.684; $p = 0.009$, 95CI[1.606 - 13.664]). However, neither of the other two northern provinces produced a statistically-significant wealth effect, even Shirak which had IS consumption levels marginally less than Lori.

Effect of Educational Attainment on IS Consumption

Before adjusting for the effects of wealth, only highly-educated households showed any significant difference from the other educational categories, these households being 7.2% more likely to consume iodized salt than uneducated ones (OR: 2.34; $p = 0.003$, 95CI[1.353-1.048]). After adjusting for wealth these differences disappeared ($p = 0.748$).

Effect of Urban / Rural Status on IS Consumption

Before adjusting for the effect of wealth, urban households were 6.8% more likely to consume iodized salt than rural ones (OR: 2.14; $p < 0.0001$, 95CI[1.652-2.763]). After adjusting for wealth this difference disappeared ($p = 0.246$).



The only provinces to show a statistically-significant urban-rural difference after adjusting for wealth were Shirak and Lori. In Shirak, those households located in the 'small city' category were much less likely to consume iodized salt than those located in rural areas (61% in the city compared to 89% in rural areas, OR: 5.586, $p=0.002$, 95CI[2.282 - 13.672]). It would therefore seem likely that Gyumri, the capital city of Shirak, was the main source of non-iodized salt in this province. In Lori, the opposite seemed to be true; urban households were significantly more likely to consume iodized salt than rural ones (84% compared to 72%, OR: 0.461; $p=0.037$, 95CI[0.219 - 0.971]) after adjusting for wealth.

Effect of Knowledge of the Role of Iodized Salt on IS Consumption

About 75% of all households were aware of the benefits of iodized salt. Having such knowledge improved a household's probability of consuming iodized salt by 3.7% (OR: 1.380; $p=0.005$, 95CI[1.103 - 1.727]).

Low statistical power at provincial level prevented statistically-significant differences from being seen in all provinces except Shirak, where there was a 22% difference between those with knowledge and those without. A general trend could be seen whereby, the lower the general level of iodized salt consumption, the more significant knowledge seems to have been.

Effect of Storage Method on IS Consumption

There were two categories of salt storage, which approximated 'good' and 'bad' conditions. 'Good' included being kept in a closed container, away from the cooker or in a dark place. 'Bad' was classified as being stored in an open container, close to the cooker or in direct sunlight.

Unfortunately, neither the DHS Final Report nor the household questionnaire provide guidance as to whether a closed container stored next to the cooker would be either 'good' or 'bad'. All that can be assumed is that 'good' storage methods were generally better than the 'bad' ones.

About 80% of all household salt was kept under 'good' storage methods and was 7.3% more likely to contain iodine than that stored under 'bad' conditions (OR: 2.04; $p<0.0001$, 95CI[1.664-2.509]).

Good storage conditions therefore increase the likelihood of consuming iodized salt, though probably only to a small degree. In any case, the validity of this result is questionable given the ambiguity over what constitutes 'good' or 'bad' storage conditions.

DISCUSSION

Effect of Wealth on IS Consumption

Despite the generally high levels of IS consumption, a significant wealth effect was found for the sample as a whole. At provincial level those with the lowest IS consumption rates did not necessarily have the strongest wealth effect. Although it was strong in Lori, it was much weaker in Shirak and Tavoush, despite Shirak having the lowest level of IS consumption. This suggests that in these provinces factors other than wealth were playing a significant role in the availability of iodized salt.

Anecdotal evidence collected from interviewers suggests that, in many of the households with non-iodized salt, the salt's packaging indicated that it had been imported from the Ukraine or Iran. At the time of survey the only salt producer in Armenia, the Avan Salt Company, produced salt, which was sold throughout Armenia, including Yerevan and Armavir, which had IS consumption levels of 99% and 97% respectively. On the basis that it is highly unlikely that this producer would systematically under-iodise salt destined for specific provinces, this would suggest that imported salt was most probable source of the problem.

This would explain some of the differences in IS consumption between the provinces, since it was those bordering Georgia that had the lowest levels. At the time, most of Georgia's salt was imported from the Ukraine and Russia and was largely non-iodized (8% in 2000) despite legislation being in effect that prohibited the sale of non-iodized salt.

Due to the lack of salt legislation in Armenia this non-iodized salt was legally imported from Georgia where it competed with Armenian iodized salt. However, if it were considerably cheaper than Armenian salt, one would expect poorer households to have been its main consumers. While this seems to be the case in Lori, the wealth effect is much less pronounced in Shirak and Tavoush, suggesting either that its competitive advantage is slim or else some other factor is at work.

POLICY IMPLICATIONS

Legislative Reform

Armenia has still not passed legislation requiring the mandatory iodization of edible salt; the system as it stands remains totally voluntary. Thankfully the sole producer in Armenia has an excellent track record of iodising its salt, which means that the vast majority of the population is not at risk of iodine deficiency.

However, in this study approximately 10% of households were found to use uniodized salt, which is still a significant proportion of the population. There is also no guarantee that the Avan Salt Company will remain the only salt producer in Armenia or even that it will continue to iodise its salt. The creation of comprehensive legislation that prohibits the importation or sale of non-iodized salt would ensure that any future changes in the salt supply would not reverse the excellent progress made thus far.

Monitoring and Enforcement

The Armenian situation provides an excellent opportunity to demonstrate the cost-efficiency of monitoring only the points that are crucial to the production and distribution of iodized salt. For instance, 90% of the country's salt supply could be monitored by carrying out regular internal and external checks on the salt being produced at the Avan Salt Company's factory in Yerevan.

For imported salt, at present only the borders of Iran and Georgia are open to the flow of goods due to ongoing disputes with Turkey and Azerbaijan. Once the legislation has been passed, the Armenian Border Service should focus their efforts on the six customs points on the Georgian border. Border officials could be provided with cheap yet effective salt-test kits which require virtually no training or expertise to use.

Effective customs inspections would allow the government to prevent any further importation of non-iodized salt. Anyone attempting to import non-iodized salt could be liable either to have their goods seized or else be refused entry. Fines or arrest may not be the most suitable methods of control in this case, given the opportunities it would present for abuse and corruption.

CONCLUSION

For the sample as a whole, wealth was significantly associated with IS consumption, but at provincial level it was only found to be statistically-significant in Lori. In all other provinces the wealth effect was less than significant due to a combination of a generally weaker effects and low statistical power.

In Shirak, the main problem area seemed to be the provincial capital, Gyumri, which had markedly lower levels of IS consumption than the rest of the province for reasons that could not be ascertained. In Tavoush, no significant associations or differences could be found in the data to explain its low IS consumption levels.

The common factor shared by these three northern provinces was their border with Georgia, a country which at the time had very low household usage of iodized salt. It would seem probable therefore that imported Georgian salt was the main source of non-iodized salt, at least in these provinces, though data are not available to test this assumption.

Armenia's general progress towards USI has been encouraging, though significant problems remain. Unless legislation prohibiting the importation or sale of non-iodized salt is brought into effect, these problems will continue to threaten public health in the country. Once legislation comes into effect, monitoring and enforcement operations can be carried out most efficiently by focusing on the small numbers of critical monitoring points needed to ensure compliance.