

## Reducing the risks of iodine deficiency disorders

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**W**e all face a danger if our diet lacks iodine. Only a trace amount is required, as little as 150 µg is the recommended daily dose, but the consequences of insufficient iodine can be quite severe. The obvious manifestation is goitre — an enlargement of the thyroid gland in the neck — but lack of iodine will also lead to varying degrees of mental impairment, at worse severe mental and physical retardation (cretinism). Whereas the lack of iodine in our diet is a potential hazard, the likelihood of this occurring in the developed world is generally low. This is because we supplement our iodine intake with foods from outside our local environment. In particular, seafood, meat and dairy produce are quite enriched in iodine. However, under-development in many parts of the world, has left millions suffering from iodine deficiency: here, people live at subsistence levels and are very dependent on their immediate environment to provide food and water.

Traditionally, the main thrust of effort to reduce iodine deficiency disorders has been coordinated by the International Council for the Control of Iodine Deficiency Disorders (ICCIDD) with the iodisation of salt. This work has been very successful. In both of the high incidence IDD areas where our current project has collected data, the Atlas Mountains of Morocco and Xinjiang Province in China, IDD has been reduced over the years and large goitres are now rarely seen. Medical studies by the project have shown that in such areas the iodine status of the population

has been raised, although evidence of historic iodine deficiency can still be seen. The areas that suffered more iodine deficiency have thyroid sizes larger than the areas that were historically free from such problems. However, salt iodisation is not applicable in every situation, particularly where populations would prefer to continue making salt freely from local sources. Other intervention techniques have been applied such as the iodisation of irrigation waters which had been done in one of the project's case study areas in Xinjiang. Our current project looks at why the environment is iodine deficient, and investigates whether we can realistically improve the iodine status of the soil and water.

The project has completed its data-gathering phase and is now considering all the new data available in order to produce publications and conference contributions concerned with the factors that control iodine's behaviour in the environment. The main aim of the project is to bring to the attention of the medical community the factors that control the iodine status of the environment, so that iodine supplementation programmes are better equipped to ensure effective measures to raise levels of iodine both in the population and their surroundings.

The project has to date achieved the following :

- A web site on environmental controls in iodine deficiency disorders has been created ([www.bgs.ac.uk/dfid-kar-geoscience/idd](http://www.bgs.ac.uk/dfid-kar-geoscience/idd)).

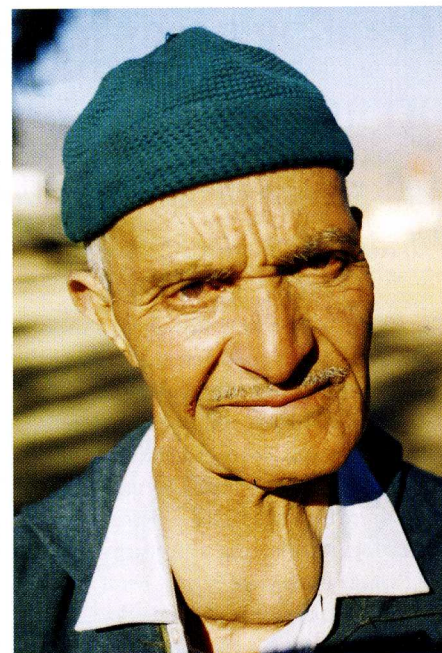


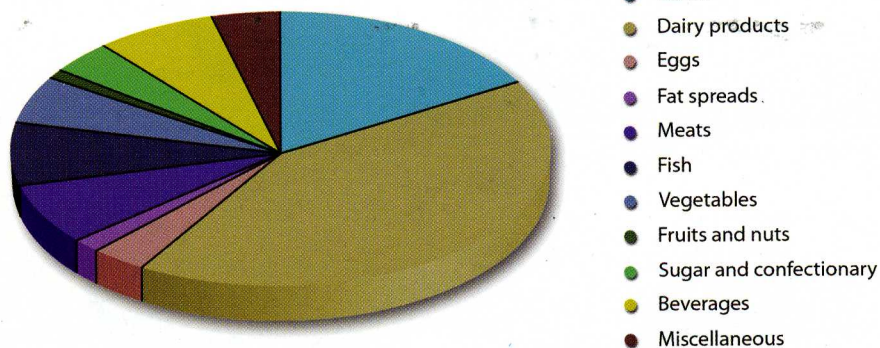
Photo © Alex Stewart

A resident of the Ounein Valley in the High Atlas Mountains, Morocco, with a goitre. Historically dietary deficiency of iodine reached more than 90% in some villages affecting more than 50% of households.

- An internet discussion group has been set up for medical workers and geochemists with an interest in the iodine status of the environment (<http://groups.yahoo.com/group/iodine>).
- Two technical reports have been written on the work carried out in Xinjiang Province, China and High Atlas Mts, Morocco. These contain new data on the iodine status of the local populations and the iodine levels found in soils, waters and crops.
- A database of iodine results for soils taken from published literature containing more than 2200 entries has been created, plus a similar database for iodine in foodstuffs and drinking water.
- A bibliographic database has been created containing in excess of 900 published references to work on iodine geochemistry and general articles on IDD's.

Initial interpretation of available data suggests that, with the exception of coastal areas of the world, most of the land area is probably iodine deficient and unable to provide self-sufficient communities with adequate dietary iodine. Development, social and nutritional factors are therefore fundamental aspects of reducing the risks from IDD's. High prevalences of IDD are used to identify regions of the world where significant deficiencies of iodine in the environment occur.

Iodine is a very mobile element in the environment and migration through the atmosphere as a result of volatilisation from the soil-plant system is of far greater significance than has been previously reported. The iodine content of surface waters appears to be the best indicator of the iodine status of an environment



Graphic by Chris Wardle, BGS © NERC

Figure showing the contribution of food types to average daily intake of iodine (156 µg/day) for United Kingdom (15-18 year Group, 1997) from UK Food Standards Agency Revised Review of Iodine prepared for Expert Group on Vitamins and Minerals. Take everything out of the diet except cereal, eggs, vegetables and beverages to get a diet more typical of the underdeveloped world and the average iodine intake is reduced by two-thirds. In reality, far less food would be consumed in such places and this reduces the average intake to a small fraction of that consumed in the developed world.

