

Helpdesk Report: Salt intake

Date: 20 May 2011

Query: What is the extent of the problem of high salt intake in developing countries particularly SSA and South Asia?

-Are there particular sources of the salt in South Asia or SSA e.g. like soya sauce in China or processed food in the West.

-What strategies have been used to reduce salt intake and lessons learnt. Where possible please give examples from SSA or South Asia. If not from elsewhere.

Enquirer: DFID UK

Content

1. Overview
2. Salt intake data
3. Sources of salt intake
4. Strategies to reduce salt intake
5. Other information/ non-academic
6. Additional information

1. Overview

There is mixed evidence of the extent of the problem of high salt intake in South Asia and sub-Saharan Africa (SSA). Different reports and different unit measurements make it hard to compare and assess data.

Data in Table 1 suggests:

- a significant problem in India
- a moderate problem in South Africa and Zimbabwe
- a potential problem in Nigeria
- not a problem in Kenya, Uganda and Tanzania.

Findings on salt intake from other reports include:

- 82% of a sample from an urban developing community in South Africa had sodium excretion values above the recommended daily allowance
- Mean dietary salt intake in an urban south Indian population was 8.5g, higher than WHO recommendations. Higher intake was associated with older age and higher income.
- A study in Benin found salt intake in mothers to be 9g. Though higher than WHO guidelines, this was concluded to be a positive result as 50% was from discretionary salt. This salt could be iodised to improve iodine deficiency.

In many sub-Saharan African countries, particularly in less urbanised settings, the main source of dietary sodium is predominantly from salt added to food for preservation, for taste and added in the cooking process.

Other findings on the source of salt intake in South Asia and SSA:

- In the Ghanaian food culture, the use of salt in cooking and at table is very common. Consumption of salted fish and meat is regular.
- In the Ashanti region in Ghana salt is added to 98% of cooking. Salt is added at the table 52% of the time, more often in rural than semi-urban settings.
- In South Africa and Nigeria it is estimated that salt added after food preparation accounts for 45% of salt intake.
- Bread is the single greatest contributor to sodium intake from non-discretionary sources in South Africa.
- Discretionary salt was found to be 82% of total intake in a sample in Nigeria.

Strategies that have been used to reduce salt intake include:

- A health education programme carried out by community health workers in Ghana. Advice was given not to add salt to food, to limit the amount of salted fish, and to soak salted items overnight before eating them. Results from this intervention did not show significant change in sodium excretion.
- An earlier pilot study in Ghana found vigorous nutrition education sessions did reduce sodium excretion rates.
- Observance of 'World Salt Awareness Week'. In Bangladesh this has included a press conference, stake holder meetings, posters and talks.
- A study in Nepal found that extremely high physical activity and very low % fat could serve to mute the influence of high sodium intake.
- One report recommends reducing the sodium content in margarines.

2. Salt intake data

Sodium Intakes Around the World

Elliot, P & Brown, I, WHO, 2007

<http://www.who.int/dietphysicalactivity/Elliot-brown-2007.pdf>

This document presents and discusses sodium intake data in different countries. I have reproduced data available (from tables 5, 6 and 7) from African or South Asian countries with UK and US data for comparison in the following table. The report itself lists data from many countries disaggregated by age.

Table 1: Urinary excretion of sodium (in mmol/d where 1mmol =23 mg sodium)

<i>Populations sampled</i>	<i>Mean of men</i>	<i>Mean of women</i>	<i>Mean of men and women</i>
Ladakh, India	209.1	198.2	-
New Delhi, India	178	143.3	-
Kenya	60.5	53.2	-
Nigeria	111.6	-	-
South Africa (Black)	-	-	135.3
South Africa (Mixed ancestry)	-	-	147.5
South Africa (White)	-	-	168.4
Uganda and Tanzania	-	-	68.48
Zimbabwe	141.2	138.9	-
Birmingham, UK	166.3	139.9	-
Chicago, US	158.6	120.8	-

Salt Intake in an Urban, Developing South African community.

Abstract <http://www.ncbi.nlm.nih.gov/pubmed/17001421>

Maseko, MJ et al. Cardiovascular Journal of South Africa, 17(4) 2006

This study assessed how mean 24-hour urinary Na(+) and K(+) excretion rates, used as an index of salt intake, compared against recommended daily allowances (RDA) in an urban, developing South African community. It also aimed to determine the relationship between hypertension awareness and treatment, and 24- hour urinary Na(+) and K(+) excretion rates in this community.

Thirty-one per cent of the sample of 291 subjects were hypertensive (either receiving therapy or with an average blood pressure (BP) measured on three separate occasions $> \text{ or } = 140/90$ mmHg). Sixty-seven per cent of hypertensives were aware of their hypertension and were being treated for it.

Findings:

- On average, 82% of subjects had 24-hour Na+ excretion values above the RDA for Na(+) intake of 65 mmol/day.
- All subjects had 24- hour K(+) excretion rates below the RDA for K(+) intake (120 mmol/day).
- The mean value excretion rates in patients who were aware of their hypertension and receiving treatment for it was similar to that of patients who were unaware of their hypertension, or to normotensives.
- The lack of relationship between either hypertension awareness and treatment, and Na(+) and K(+) intake levels suggests that current recommendations for a reduced Na(+) and increased K(+) intake in hypertensives do not translate into clinical practice in urban, developing communities of South Africa.

Diet and Blood Pressure in South Africa: Intake of Foods Containing Sodium, Potassium, Calcium, and Magnesium in Three Ethnic Groups

Charlton, KE et al., Nutrition 21(1), 2005

Abstract only <http://www.ncbi.nlm.nih.gov/pubmed/15661477>

This study investigated whether habitual intakes of sodium (Na), potassium, magnesium, and calcium differ across South African ethnic groups, assessed the proportion of Na intake, which is discretionary, and identified which food sources were the major contributors to Na intake.

Findings:

- Mean urinary Na excretion values equated to daily salt (NaCl) intakes of 7.8, 8.5, and 9.5 g in black, mixed ancestry, and white subjects, respectively.
- Between 33% and 46% of total Na intake was discretionary, and, of the non-discretionary sources, bread was the single greatest contributor to Na intake in all groups.
- 70% of total non-discretionary Na was provided by bread and cereals in rural black South Africans compared to 49-54% in urban dwellers.

Dietary Salt Intake and Hypertension in an Urban South Indian Population

Radhika, G et al., Journal of Association of Physicians of India, volume 55, 2007

http://mdrf-eprints.in/40/1/Salt_intake_hypertension_-_JAPI.pdf

The aim of the study was to determine the mean dietary salt intake in urban south India and to look at its association with hypertension. Mean dietary salt intake (8.5 g/d) in the population was higher than that recommended by the World Health Organization (<5g/d). Higher salt intake was associated with older age and higher income (p for trend<0.0001).

The report includes detailed data tables including clinical and dietary profile of normotensive and hypertensive subjects, and descriptive characteristics of subjects by quintiles of total dietary salt intake.

Investigation of High Salt Intake in a Nepalese Population with Low Blood Pressure

Kawasaki, T, et al., *Journal of Human Hypertension* 7(2), 1993

Abstract <http://www.ncbi.nlm.nih.gov/pubmed/8510085>

Average urinary Na excretion was 183-221 mEq/day in two villages (one hilly, one suburban).

In spite of high salt consumption, there was no increase in BP with age in males in the hilly village, suggesting that the BP may be influenced by physical activity, fat-free mass and nutrient consumption in addition to the high sodium intake, and that extremely high physical activity and very low %Fat could serve to mute the influence of high sodium intake.

Sodium and Potassium Intakes Amongst Free-living Adult Nigerians

Smith IF, *European Journal of Clinical Nutrition* 42(6), 1988

Abstract <http://www.ncbi.nlm.nih.gov/pubmed/3409861>

Analysis of data showed:

- mean daily intake of 8.1 g table salt with a range of 3.8 to 18.1 g which provided a mean daily intake of 3.2 g sodium
- mean sodium intake from foods alone was 0.85 g +/- 0.08 while sodium nutrient density was 2.3 g/1000 kcal
- discretionary use of salt was 82 per cent of total intake with table salt supplying 78 per cent.

Determination of Discretionary Salt Intake in Rural Guatemala and Benin to Determine the Iodine Fortification of Salt Required to Control Iodine Deficiency Disorders: Studies Using Lithium-labeled Salt

http://www.ceecis.org/iodine/08_production/assay/prod_assay_AJCN_lithium.pdf

The use of discretionary salt, which is salt added during cooking and at the table, as a suitable vehicle for iodine intake, was assessed by measuring salt consumption using the lithium-marker technique in rural areas of Guatemala and Benin. In both countries, we studied boys aged 6–12 yrs and their mothers. Subjects used lithium-labelled salt after all unlabelled salt was removed from their households.

In Guatemala, 24-hour urine samples for 9 mother-son pairs were collected at baseline and on days 7, 8, and 9 during the use of lithium-labelled salt. Total maternal salt intake averaged 5.2 ± 1.7 g/d ($\bar{x} \pm$ SD), of which $77 \pm 24\%$ came from discretionary sources, whereas Guatemalan boys consumed 1.8 ± 0.6 g salt/d, of which $72 \pm 12\%$ came from discretionary sources.

In Benin, urine collection from 13 mother-son pairs took place at baseline and on days 5 and 7. Beninese mothers had a total salt intake of 9.0 ± 2.9 g/d and their sons had an intake of 5.7 ± 2.8 g/d; discretionary salt contributed $52 \pm 14\%$ and $50 \pm 13\%$, respectively, of total salt consumed. Therefore, fortification of household salt appears to be an appropriate method of

controlling iodine deficiency in both countries, although fortification of other salt sources could be considered in Benin.

3. Source

Rural and Semi-urban Differences in Salt Intake, and its Dietary Sources, in Ashanti, West Africa

Kerry, S.M., *Ethnicity and Disease*, 15(1), 2005

Abstract

<http://www.ncbi.nlm.nih.gov/pubmed/15720047?dopt=AbstractPlus&holding=f1000.f1000m.isrctn>

The objective of this study was to provide a socioeconomic profile of rural and semi-urban settings in Ashanti, West Africa and to investigate the relationship between urbanisation and sources of salt in the diet.

Results found that salt is almost invariably added to food in cooking (98%), and salted foods such as fish and meat are eaten in both rural and urban communities. Salt is often added at the table (52%), more often in rural villages than in semi-urban settings (59% vs 45%; $P < .01$), although the total salt consumed as measured by urinary sodium was similar (99 vs 103 mmol/day). Potassium levels were higher in rural villages (58 vs 40 mmol/day difference 18 mmol/day [95% CI 11-26]; $P < .001$).

The study concludes that there were no significant differences in the amount of salt consumed between rural and semi-urban communities but the sources of salt differed between the two settings.

Less Salt, Less Risk of Heart Disease and Stroke

Report of a WHO Forum and Technical meeting, October 2006

http://www.who.int/dietphysicalactivity/reducingsaltintake_EN.pdf

In Asian countries, as well as in many African countries, the salt added in cooking and present in sauces and seasonings represent the major sources of sodium in the diet.

Iodine fortification of salt is used to improve iodine deficiency disorders. When attempting to reduce the salt intake by populations, the issue of salt iodisation must be taken into consideration. A comprehensive strategy that effectively encompasses both public health problems must be developed.

In the African continent, only two countries, Nigeria and South Africa, have developed dietary guidelines regarding salt intake.

In the Ghanaian food culture, the use of salt in cooking and at table is very common. Consumption of salted fish and meat is regular, especially in rural communities, and high salt-containing "seasonings" are frequently used in cooking.

In many sub-Saharan African countries, particularly in less urbanised settings, the main source of dietary sodium is predominantly from salt added to food for preservation, for taste and added in the cooking process.

Dietary Intake of Adult Women in South Africa and Nigeria with a Focus on the use of Spreads

Steyn NP & Nel JH, *South African Medical Research Council*, 2006

<http://www.mrc.ac.za/chronic/kenyareport.pdf>

This report finds the sodium intake in South Africa and Nigeria was moderate to high and less than the recommended 2 g sodium per day. However, one still has to add discretionary salt that would account for an additional 45% of salt added after preparation. This increases the South African mean salt intakes to bordering on the maximum recommended levels.

The report recommends reducing the sodium intake in margarines.

4. Strategies to reduce

A Community Programme to Reduce Salt Intake and Blood Pressure in Ghana

Cappucio, FP, *BMC Public Health* (6)13, 2006

<http://www.biomedcentral.com/1471-2458/6/13>

In Africa hypertension is common and strokes are increasing. Detection, treatment and control of high blood pressure (BP) is limited. BP can be lowered by reducing salt intake. In Africa salt is added to the food by the consumer, as processed food is rare. A population-wide approach with programmes based on health education and promotion is thus possible.

An intensive health education programme was carried out by community health workers. The educational and health promotion sessions were open to all villagers, irrespective of their participation into the trial. They were encouraged to attend by preliminary meetings with health visitors, the endorsement of their chief and community leaders. The meetings were held daily for the first week of the study and once weekly thereafter. The sessions were held in communal areas like churches, churchyards, schools and community centres. The sessions lasted approximately one hour (both for intervention and control).

A standard health education package from the Ghana Ministry of Health was used in all the villages. Flip charts were the main medium of communication; they consisted of double-sided A3-sized sheets with a colour picture on one side (shown to the participants) and written text on the other (facing the health visitor and used as a prompt). In the intervention villages additional advice was given not to add salt to food and in cooking, to limit the amount of koobi, momoni, kako and tilapia (salted fish), salted pigs' feet and salted beef and to soak the items in water overnight before eating them.

The net intervention effect was a non-significant change in sodium excretion. The intervention group showed a small reduction in both systolic and diastolic BP, more pronounced at 6 months and statistically significant for diastolic BP at 6 months. This effect was not consistent with the effect observed on urinary sodium excretion.

Prevention of Hypertension and Stroke in Africa

Cappucio F et al. *The Lancet* 356, issue 9230, 2000

Abstract <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2805%2973821-6/fulltext#>

There is good evidence that a reduction in salt intake reduces blood pressure and that Black people are more sensitive than White people in this regard. In the Western world, notwithstanding this good evidence, it is very difficult to implement successful salt-reduction strategies in the population, since most of the salt ingested is in processed food. So, any intervention would involve the participation of the food industry. In contrast, in populations whose intake of processed food is negligible —such as are found in sub-Saharan Africa—

salt reduction strategies should be relatively easy to implement and have a good chance of success.

In Ghana, food is mainly unprocessed and any salt in the diet comes from the frequent consumption of highly salted fish and meat, the addition of salt during cooking and at the table, and the use of monosodium-glutamate-based flavouring cubes. It is clear that in this population it should be possible to reduce salt intake effectively. In 1999, a small pilot study was carried out testing 20 participants in the Ashanti Region of Ghana. They underwent initial assessment then for a week attended a daily 1.5 h session of vigorous nutrition education, followed by weekly sessions thereafter. After 4 weeks they were assessed again. At the end of the 4 weeks of the study there had been a significant reduction in urinary sodium excretion (both absolute and as sodium/creatinine ratio) indicating a reduction in sodium intake. The change in sodium excretion was a fall of about 50% compared with the initial values, despite the initially low urinary sodium. During the same period there was a fall in both systolic and diastolic blood pressure. The mean fall in weight was consistent with the fall in salt intake.

The Feasibility of Implementing a Dietary Sodium Reduction Intervention Among Free-living Normotensive Individuals in South West Nigeria

Adeyemo AA et al., *Ethnicity and Disease* 12 (2), 2002

abstract

<http://www.ncbi.nlm.nih.gov/pubmed/12019929?dopt=AbstractPlus&holding=f1000.f1000m.isrctn>

In this study, we tested the feasibility of achieving a reduction in dietary sodium intake in free-living individuals using a dietary intervention among 82 free-living normotensive adults in southwest Nigeria. The participants received dietary advice to reduce sodium intake and maintained the reduced sodium diet for a 2-week period. Blood pressure and 24-hour urinary excretion of sodium were measured at baseline and after two weeks on the reduced sodium diet.

Baseline 24-hour urinary sodium excretion was 140.5 (SD 53.4) mmol/24 hours among men and 132.6 (SD 48.0) mmol/24 hours among women. Twenty-four hour urinary sodium excretion fell by 76.9 (95% CI 59.7, 94.1) mmol/24 hours among men, and by 79.4 (95% CI 59.4, 99.1) mmol/24 hours among women.

On the low sodium diet, systolic blood pressure fell by 4.7 (95% CI 1.9, 7.4) mm Hg among men, and by 7.0 (95% CI 2.6, 11.4) mm Hg among women while diastolic blood pressure fell by 1.9 (95% CI -0.3, 4.1) mm Hg among men and by 1.6 (95% CI -1.8, 5.0) mm Hg among women.

It is concluded that a significant reduction in sodium intake may be achievable in free-living individuals in this setting using a simple dietary intervention. The findings of this pilot study should encourage more sophisticated intervention studies (such as cross-over trials and double blind randomised clinical trials) in Africans for the elucidation of mechanisms and consequences of hypertension in Blacks.

Observance of “World Salt Awareness Week”

Hypertension Committee of National Heart Foundation of Bangladesh, 2009

<http://bit.ly/mF2EJw>

Activities included:

- A press conference was held with local newspapers and reporters.
- A round table meeting on Salt & Health was organised with experts and stake holders such as local leaders, school teachers, representatives from food industries and salt

- industry, catering business, eminent cardiologists, nephrologists, physicians, nutritionist, NGO personnel, WHO representative and representative from different social organisations.
- A poster and brochure carrying the messages of ill effects of excess salt consumption and advices to reduce salt intake were published on the eve of the World Salt Awareness Week 2009 in local language. Posters and brochures were distributed in the locality and throughout the whole country.
 - Talk shows on salt and health comprising of experts like cardiologists and renowned physicians were arranged and aired on several national TV and radio channels.

The report states that the observance of World Salt Awareness Week 2009 by the Hypertension Committee of National Heart Foundation of Bangladesh had very important contributions in raising the awareness about prevention of cardiovascular diseases in Bangladesh. It was widely discussed in most of the national dailies. We believe observance of this week regularly will greatly contribute to the prevention and control of cardiovascular diseases.

The report recommends regular observance of World Salt Awareness week to be done by the Hypertension Committee of National Heart Foundation of Bangladesh. A request letter will be sent to all the 35,000 doctors and paramedics accross Bangladesh to take necessary measures to reduce salt intake in communities and at family level with special emphasis on hypertensive patients, obese population and also to discuss the ill effects of high salt intake with patients' relatives.

The World Health Report 2002 - Reducing Risks, Promoting Healthy Life

WHO, 2002

http://www.who.int/whr/2002/en/whr02_en.pdf

Two approaches to population wide salt reduction are evaluated. The first involves cooperation between government and the food industry to include appropriate labelling about salt content on products and to ensure a stepwise reduction of salt in commonly consumed processed foods. This could be through multi-stakeholder initiatives such as the development of voluntary codes of conduct. The estimated eventual effect would be a 15% reduction in sodium intake with corresponding education in regional age-specific and sex-specific mean systolic blood pressure levels.

The second approach is based on legislative action to ensure a reduction of salt in processed food with appropriate labelling. It also requires collaboration between multiple stakeholders, with the addition of quality control and enforcement. As a result, costs are higher than the voluntary version, but effects on salt intake are also likely to be higher. An eventual 30% reduction in sodium intakes is assumed.

In all subregions, population strategies to reduce blood pressure are very cost-effective. Legislation is potentially more cost-effective than voluntary agreements with industry – this effect is due to the assumption that legislation with enforcement will lead to a larger reduction in salt intake in the diet than voluntary agreements – but the trade-off between legislation and voluntary agreements is likely to depend on the national context.

5. Other information/ non-academic

Health - Salt in your Diet

<http://www.virginactive.co.za/eat%20well/view/recipe/57>

This webpage contains informal information and advice for South Africans.

Useful for comparing data is information on converting between salt and sodium:

- To convert salt to sodium, divide by 2.5 (eg. 1g salt = 0.4g sodium)
- To convert sodium to salt, multiply by 2.5 (eg. 0.8g sodium = 2g salt)

Salt Poses Challenge for Food Producers

News article from *Business Day*, South Africa, Kahn, T., 2010

<http://allafrica.com/stories/201006230703.html>

South Africans get up to 60% of their daily salt intake from processed food, and add the rest at the table, says Prof Krisela Steyn, of the University of Cape Town's department of medicine.

"Our bread is among the saltiest in the world," she says. "A study by (former colleague) Karen Charlton in 2005 showed that Cape Town city council workers got between 25% and 40% of their daily salt from bread. We were shocked." Products like soup mix and stock, used extensively by the poor to flavour bland staples like mealie meal, are high in salt.

Some local food companies have already started reformulating selected products. Pick n Pay has begun reformulating some of its products, such as soup, but has discovered that removing salt in baked goods is trickier. Salt helps make products such as biscuits develop crispness, so cutting back may require increasing the amount of sugar and fat – two ingredients consumers are also urged to eat in lower quantities, says the Pick n Pay's head of regulatory affairs, Melinda White.

Pioneer milling and baking executive Tertius Carstens says its baking division, Sasko, has gradually reduced the amount of salt in its loaves over the past few years, and cannot go much lower. *"There are technical limitations. Salt is not just added for flavour. It plays an active role as an ingredient. You can bake without salt, but the product will be flat, dense and underdeveloped, and go stale quite quickly,"* he says.

While there are a growing number of "salt replacement" products such as potassium chloride (which is bitter), they are expensive and consumers do not always tolerate the switch, warns Mr Carstens.

The Salt Challenge

Down to Earth, Science and Environment online, India, 2011

<http://www.downtoearth.org.in/content/salt-challenge>

A news article on reducing salt intake in India.

For India, reducing salt intake is a challenge because there is no reliable data on the amount we consume. An ICMR survey in 13 states in 1986-88 shows an adult consumes 13.8g salt a day. The salt manufacturing industry puts daily consumption figure at 7g on the basis of sales. The National Institute of Nutrition (NIN) at Hyderabad, recommended in 2010 that salt intake limit should be reduced from 10g, which it had advised earlier, to 5-6g per day.

Reducing salt by 1g (from 7g to 6g) is not too difficult for the industry, says Hiralal Parakh, member of the Indian salt manufacturers' association, Gujarat. The industry has also started manufacturing salt low on sodium, Parakh says. It may, however, be difficult to convince the food manufacturing industry.

On a national level, India needs to formulate guidelines so that low salt consumption benefits future generations as well, says K Srinath Reddy, director of the Public Health Foundation of India.

WASH – World Action on Salt and Health

Newsletter issue 1, Autumn 2007

<http://bit.ly/jukK8z>

This newsletter has some information on Bangladesh with no source.

On May 13, 2007 the Hypertension Committee of the National Heart Foundation arranged a conference on “Salt and Hypertension” in Bangladesh to create awareness among the public, attended by leading food and health representatives. A proposal for government is being developed to reduce salt consumption.

A conservative estimate shows that about 15 million adults in Bangladesh are suffering from high blood pressure. Data on salt intake in Bangladesh is scarce; the salt industry estimates that average salt consumption is 15 g per day. However this is a crude estimate, only taking into account the volume of production and sales of salt producers. Prof. R.K. Khandaker and his team are undertaking an ambitious and important programme to estimate salt intake in the Bangladesh population and its relationship with hypertension.

Nepal Hypertension Society

<http://www.nhs.org.np/>

This website has some information on Nepal’s activities for World Hypertension Day. There appears to be little recent activity on the site.

6. Additional information

Author

This query response was prepared by **Laura Bolton** l.bolton@ids.ac.uk

About Helpdesk reports: The HDRC Helpdesk is funded by the DFID Human Development Group. Helpdesk Reports are based on up to 2 days of desk-based research per query and are designed to provide a brief overview of the key issues, and a summary of some of the best literature available. Experts may be contacted during the course of the research, and those able to provide input within the short time-frame are acknowledged.

For any further request or enquiry on consultancy or helpdesk service please contact justask@dfidhdc.org

Disclaimer

The DFID Human Development Resource Centre (HDRC) provides technical assistance and information to the British Government’s Department for International Development (DFID) and its partners in support of pro-poor programmes in education and health, including nutrition and AIDS. The HDRC services are provided by three organisations: Cambridge Education, HLSP (both part of the Mott MacDonald Group) and the Institute of Development Studies. The views in this report do not necessarily reflect those of DFID or any other contributing organisation.