

# *Strategies to monitor and evaluate population sodium consumption and sources of sodium in the diet*

Report of a joint technical meeting convened by WHO and the Government of Canada. Canada, October 2010



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# *Executive summary*

Population-based interventions to reduce sodium intake are being successfully implemented in various countries worldwide, and have the potential to reduce the prevalence of raised blood pressure and the burden of cardiovascular diseases. High blood pressure is the leading risk factor for global mortality, causing around 51% of stroke and 45% of ischemic heart disease.

Monitoring sodium consumption at population level needs to be a key component of sodium reduction interventions. It provides essential information to policymakers and all interested stakeholders on: the population levels of sodium consumption and to what extent that poses a public health problem; the main dietary sources of sodium; the goals and objectives to be reached and the progress, limitations and results of the implementation of a sodium reduction intervention.

The World Health Organization and the Government of Canada jointly convened a technical meeting on “Strategies to Monitor and Evaluate Population Sodium Consumption and Sources of Sodium in the Diet”. The meeting provided an opportunity for detailed discussion on existing activities, tools and protocols for the comprehensive monitoring and evaluation of sodium consumption at population level.

During the meeting various methods and tools for assessing sodium consumption were presented and the strengths and weaknesses of each method discussed. To determine the intake of sodium at population level and the main sources of sodium in the diet, the following methods were presented: 24-hour urine collection, casual spot urine collection and timed spot collections; dietary intake surveys including 24-hour food intake recall, food diary or duplicate food collection, food frequency questionnaires, household income and expenditure surveys. It was highlighted that updated food composition databases play an essential role in the accurate assessment of the sodium content in foods. In addition, in terms of policy-making, the sodium content analysis of major staple foods, foods from restaurants and street vendors, traditional incountry or indigenous and ethnic foods can be highly informative. It was pointed out that additional information can also

be collected from food labels and industry web sites. However, currently, the reliability and accuracy of these sources may vary significantly across countries. Questionnaires can be used for the assessment of sodium added during cooking or at table and to investigate cultural preferences for particular high-sodium dishes or condiments. Specific questionnaires are also often used to monitor and evaluate the knowledge, attitudes and behaviours (KAB) of consumers towards sodium intake and health.

It was agreed by participants that governments need to play a leading role in monitoring and evaluating policies aimed at reducing sodium intake at population level, as well as in allocating appropriate resources to facilitate these activities. Moreover governments need to work in collaboration with relevant stakeholders to estimate population sodium intake, knowledge of dietary sources of sodium and the most up-to-date food consumption data. WHO is instrumental in the provision of tools for use by Member States in the monitoring and evaluation of national sodium reduction interventions. Nongovernmental Organizations (NGOs), civil society, academia and healthcare professionals have a significant role to play in monitoring – nationally and internationally – the actions, commitments and pledges of private and public sectors that influence population levels of sodium intake as well as monitoring the sodium content of foods and meals. Participants also agreed that the private sector should ensure that nutrition information and labelling are provided across all markets and to make publicly available updated data on the sodium or salt content of foods and meals. They should also strive to make publicly available pledges and commitments on product reformulation and reduction of sodium content, and make them applicable across all markets.

This report summarizes the evidence and experiences presented during the technical meeting on monitoring sodium intake levels at population level, assessment of dietary sources of sodium, and knowledge, attitudes and behaviours towards sodium and health. The discussions of the working group sessions as well as the conclusions reached by the participants are also included in this report. This technical meeting is the second of a series of three meetings organized by WHO.

# Introduction

High blood pressure is responsible for 13% of deaths globally. The risk of death from high blood pressure in low- and middle-income countries (LMIC) is more than double that of high-income countries (1). The total dietary salt consumed is an important determinant of blood pressure levels and of hypertension risk. This relationship is direct and progressive with no apparent threshold, and salt reduction in individuals is an important intervention in reducing blood pressure, increasing the efficacy of pharmacological therapies, and reducing the global risk of cardiovascular disease.

Monitoring sodium consumption at population level is fundamental when planning salt reduction policies, and provides essential information to policymakers and all interested stakeholders, on the implementation, progress, limits and effects of a sodium reduction policy. Monitoring sodium consumption can assist in future planning and decision-making processes, contribute to the evidence base and provide accountability of all involved. Moreover, it provides an opportunity for assessment of progress, identification of constraints as well as opportunities for corrective action, and for measurement of effectiveness and cost-effectiveness of the interventions being implemented. There are four different aspects to the monitoring process:

1. Monitoring of sodium intake at population level.
2. The main sources of sodium intake in the diet.
3. Consumer knowledge, attitudes and behaviours towards sodium and health.
4. Monitoring the actual impact and results of the sodium reduction intervention.

The joint meeting convened by WHO and the Government of Canada in Calgary, in October 2010, was the second of a series of three meetings organized by WHO, with

the overall long-term objective of producing a tool kit for Member States setting out practical approaches for effective population-based salt reduction strategies. The first technical meeting, held jointly by WHO and the United Kingdom Food Standards Agency in June 2010, focused on creating an enabling environment for the reduction of sodium consumption at population level (2). The third meeting will focus on the role of fortified salt in iodine deficiency prevention, and will take place in 2011 or 2012.

Specific objectives of this meeting were to review:

- Tools and protocols that are effective in the evaluation of population sodium consumption.
- Tools and protocols that are effective in the evaluation of the dietary sources of sodium in the population.
- Tools and protocols that are effective in the evaluation of knowledge, attitudes and behaviour on sodium consumption.
- The means to adapt and adopt protocols for low- and middle-income countries.

As part of the preparation for the meeting, a background paper was commissioned by the Government of Canada. Between August and October 2010, selected government officials and national experts from 52 countries representing all world regions were asked to participate in an e-mail survey on their activities monitoring sodium consumption. Of the 45 countries that responded, 37 reported some form of monitoring in place. The background paper is included at the end of this report as Annex 1. Participants of the technical meeting included representatives of government agencies, international health and consumer organizations and academics. A list of meeting participants is attached as Annex 2. The meeting programme is available as Annex 3.

# Evaluating sodium consumption at population level

## Measurement of population sodium intake

The assessment of population sodium intake underpins the implementation of sodium reduction policies. While sodium excretion analysis, using 24-hour urine collection, provides accurate information on sodium intake at population level, it can present a heavy burden to low- and middle-income countries. There is therefore an urgent need to explore, assess and validate potential alternatives, adaptable to the needs of specific countries. These alternatives include casual spot urine collection and timed spot collections (i.e. collection during the day, evening, or overnight). In addition, a variety of analytic alternatives exist, including methods using prediction (e.g. Tanaka's method) versus those that use estimation (e.g. the arithmetic method), and approaches that assess individuals versus those that assess groups.

Evidence on which to base an assessment of these methods includes:

- *A new systematic review being undertaken under the auspices of PAHO.* The investigators are currently preparing a meta-analysis of existing studies that compare spot urine collection methods with 24-hour urine collections. The search, conducted on both Medline and Embase, excludes non-English and abstract-only studies, as well as studies with a sample size below 30, and studies within particular patient groups. Currently, some two dozen pertinent studies have been identified, at least four of which were conducted among children and adolescents. Various types of spot collection methods are included, the most common being overnight collection. In comparing results from 24-hour and spot collection, correlation was the primary method used.
- *A new validation study based on data collected in the 1990s in a multi-ethnic British population.* This study involved just under 1000 randomly selected participants, distributed between three racial cohorts: white, African origin and South Asian. Ages ranged between 40 and 59 years. The data have been analysed using a variety of

methods, including correlation, Bland-Altman plots, quintile agreement and receptor-operator curves. Both predictive (Tanaka's) and estimation (arithmetic) approaches were used. Preliminary findings indicate that results obtained from spot collection differ significantly from those obtained using 24-hour urine collection. For certain groups and using certain analytic methods, these differences are substantial.

- *A 2006 comparison carried out in Scotland (3).* This found significant gender differences in the accuracy of spot urine collection versus 24-hour collection.
- *An analysis of time trends using spot collection data from the Health Survey for England.* Preliminary results indicate that the rate of change in sodium intake obtained using spot collection seems comparable to results obtained in other studies using 24-hour collection. Currently only the Scotland study has been published.

## Assessing main sources of sodium

While urinary sodium excretion can indicate the magnitude of the problem within a population, neither the origin of the sodium nor the means to reduce it can be identified. A complete determination of sodium sources involves assessment of several separate elements including: 1) dietary intake; 2) sodium content of foods consumed; and 3) discretionary salt use in cooking or at table. All these elements may be affected by local or regional factors such as cultural or regional preferences for particular dishes or condiments.

### 1) Dietary intake

Dietary intake of sodium, as well as other nutrients relevant to public health, is generally assessed by survey. Ideally, the survey sample should be representative of the population of interest, while the survey itself should be repeated at regular intervals and should yield a cross-sectional view of all food consumed by respondents in a particular period, whether at home or outside the home. Survey data can be used to identify broad categories of foods that are the most significant sources of dietary sodium, and may also include data on knowledge, attitudes and behaviours.

The following elements are important considerations in designing such a survey:

- *Overall design:* Ideally, the survey should yield a cross-sectional view of all food consumed in a particular period, whether at home or outside the home.
- *Survey participants:* The sample chosen needs to be representative of the population under study (e.g. nation, state or province) based on census data. Participants should be classified by age and sex, and the sample should include all groups with specific recommended daily allowances for sodium. Any exclusions should be noted (e.g. people living in remote locations, persons in the military, or residents of certain institutions such as hospitals or nursing homes). Pertinent demographic and socioeconomic data should be collected, as well as information on selected health conditions.
- *Survey schedule:* Typically, surveys are repeated on a continuous cycle (e.g. every 3, 5, 10 or 20 years). Where a regular schedule is not feasible, a country may plan to repeat the survey when resources permit.

Direct measures of food intake include 24-hour food intake recall, food diaries or duplicates of food collection, and food frequency questionnaires. Indirect or secondary sources for assessing food intake include household income surveys or expenditure surveys. Other sources of information include food disappearance data, production data, and import and export data. These sources, while sometimes used to track commodities like cereals, grains, fruits and vegetables or oils, are not particularly useful for assessing sodium intake.

The challenges of assessing dietary intake of sodium include the need for a systematic method of probing. This is to ensure:

- Accurate recording.
- A practical method to measure serving sizes and portions consumed.
- A method to quantify recipe ingredients in mixed or complex dishes.
- The taking into account of variations in a dish depending on location of preparation (e.g. restaurant versus home).
- Variations in food terminology and in commonly used household measurements.

Other specific challenges include evaluation when a communal pot is used (which presents difficulties in assessing individual consumption), dishes such as stews or soups which may be consumed over several meals and include the addition of water and extra ingredients at various times, and challenges associated with eliciting accurate recall of consumption from young children or elderly respondents.

## **2) Sodium content of foods**

Direct data sources include national or regional food composition databases (e.g. USDA National Nutrient Database, Canadian Nutrient File), modified databases from another country, and direct food analysis. While nutrient databases are useful tools, there are several challenges involved with their use: Information may go out of date quickly; often large differences in content exist between brands of the same product, or even the same brand sold in different countries; commercial data sources are expensive, and carry restrictions on sharing or publishing the data. Finally, many countries have no access to reliable food composition databases for their region. Indirect content information for some food items may also be taken from literature, from food labels or from other industry-provided data.

## **3) Discretionary salt use**

Queries regarding salt added during cooking or at table usually focus on frequency rather than quantity. Often, culturally or regionally preferred high-sodium foods tend to be condiments such as soy or fish sauces, or foods such as fish, which are salted for preservation. Because these items can be extremely high in sodium, it is important to include them in food intake surveys.

## **Conclusions**

- There are various methods available for assessing sodium consumption at population level.
- Through urine analysis, 24-hour urine collection, casual spot urine collection and timed spot collections can all be used for detecting sodium consumption.
- The per-person cost of urinary sodium excretion collection and measurement, and of 24-hour dietary recalls, depends largely on location. It was noted that while there are some fixed costs in urinary studies (e.g. sample bottles, cost of analysis etc.) the bulk of costs is accounted for by administration (e.g. human resources).
- Regarding minimum sample sizes for 24-hour urine collection, it was noted that the INTERSALT Study achieved valid results with samples as small as 200 (4). On this basis, countries can plan for samples of at least 150–200 people for each separate population group they want to track (e.g. for each: sex; socioeconomic stratum; region). The bigger the sample size the country can afford, the greater the statistical power of the results.
- In order to identify the dietary sources of the sodium being consumed, several other tools need to be used: evaluation of dietary intake (foods consumed, amounts and frequency of consumption); measurement of sodium content in foods known to be major sodium sources; assessment of sodium added during cooking or at table; and cultural preferences for particular high-sodium dishes or condiments.

- Web-based food surveys, especially those that partner and take advantage of existing sites and software, have great potential for providing low- and middle-income countries with inexpensive and nationally relevant data. However it was noted that most web-based nutrition applications are based on the USDA database, with its associated limitations.
- In identifying less expensive modalities to measure sodium consumption in low- and middle-income countries, “tradeoffs” between cost and accuracy may be expected. For this reason, 24-hour urine collection can be used to establish a baseline, and changes in sodium consumption can then be tracked using less expensive alternatives.

# National experiences in assessing sodium consumption

The participants from Member States presented a variety of experiences and this provided an overview of national approaches to surveillance. Speakers and audience focused on the method used to establish the baseline of sodium consumption in the population, barriers faced with monitoring and evaluation processes, critical factors for success and how the various approaches presented could be used in a low-resource setting.

## Barbados

Cardiovascular disease is a major problem in Barbados. Of Barbadians aged 40 years and over, 50% have hypertension; 94% are of African descent. On average, there are three cases of stroke on the island every two days. It is estimated that sodium intake is between 12 and 15 grams per day. Several instruments for use in dietary surveys have been developed over the past eight years. In particular, the University of the West Indies has developed a 24-hour recall and food frequency questionnaire in collaboration with Hawaii's Cancer Research Centre, and the Universities of Alberta and North Carolina. These research surveys have identified condiments such as chopped seasonings used to flavour fish, chicken and lamb as a key source of sodium in the local diet.

A small pilot study has been completed with a sample of 25 people. Preliminary results indicate sodium levels of 139 mEq for women and 170 mEq for men, which are consistent with current estimates. The main population baseline intake measurement using 24-hour sodium collection is scheduled to start in January 2011. A national population sample of approximately 400 people will be chosen from the computerized electoral database, which covers all citizens of 18 years of age and older. The sample will be stratified by sex and age (25–44 and 45–64 years of age). Sample participants will receive no financial remuneration. The university research team will contribute containers for urine samples, which will be analysed for sodium, potassium, creatinine, protein and possibly iodine. Urine collection will be supplemented with a questionnaire on blood pressure and related information. In addition, a 24-hour dietary recall survey is planned.

Barriers include the difficulty of negotiating funding from governments and getting approval to start the study. The ability to raise supplementary funds is limited. However, Barbados is fortunate in having highly competent teams and an established research infrastructure. NGOs have contributed significant non-financial support. A strong relationship with the media will be central to achieving public interest and cooperation.

It is recommended that countries like Barbados, with significant resource constraints, dedicate resources at the outset for the best possible 24-hour urine collection and analysis, rather than investing in the creation of new dietary surveys.

## Canada

Canada's assessment of sodium consumption has been based on its national dietary survey. A 2004 usual intake baseline was estimated from the Canadian Community Health Survey Cycle 2.2 (5) using the SIDE method, developed at Iowa State University. The mean sodium consumption in Canada is estimated at 3100 mg/day, which does not take into account sodium added at table. The primary source of sodium information comes from the Canadian Nutrient File (CNF). However, some of the composition values used in the CNF are taken from USDA data, which, as noted earlier, can be several years out of date. Other barriers include complexity of the usual intake estimation methodology, which requires a relatively high level of knowledge and computing capacity.

Collaboration has been key to success, with vital support coming from Health Canada, Agriculture and Agri-Food Canada, Statistics Canada and the Public Health Agency of Canada, among others. Provincial and territorial governments, the food industry and academia also contributed support and information.

## China

Hypertension is a significant problem in China, and successive surveys indicate that national prevalence is rapidly increasing (from 5.11% in 1959 to 17.65% in 2002, among people aged 15 years and above). It has been estimated that hypertension accounted for 75% of mortality from Noncommunicable Diseases (NCDs) in 2004–2005. Furthermore, hypertension in 2003 accounted for 47.7% of direct costs associated with coronary heart disease and stroke.

A nutrition survey in 2002 indicated that there had been no significant change in salt intake since 1982. However, the Chinese diet is traditionally high in salt. While soy sauce, which is very high in sodium, is often the focus of blame, most dietary sodium comes from salt itself.

The relationship between salt intake and blood pressure is very evident in China. The main sources of relevant information include a national nutrition and health survey, the Youth Risk Behaviour Surveillance programme, and the Disease Surveillance Points system (DSPs), comprising NCD risk factor surveillance and the Death Cause Registry.

A survey on chronic diseases carried out in 2010, with a sample size of 97 200 people, included three components:

- 1) A questionnaire which included questions on tobacco and alcohol use, diet (food frequency questionnaire and household-based survey), physical activity, and mental health.
- 2) Physical measurements, including blood pressure, height, weight and waist circumference.
- 3) Laboratory analysis of fasting blood glucose, oral glucose tolerance test, insulin, haemoglobin A1C and lipids.

In the drive to reduce sodium consumption in China, challenges include:

- Regional diversities in dietary practices, with marked changes in dietary habits in recent years.
- Home-prepared meals and traditional sources of food supply being replaced in many areas by the use of supermarkets and the tendency for people to eat out more frequently.
- A lack of relevant national policies and strategies. (This is now being addressed, although a multisectoral collaborative mechanism has not yet been established.)
- A lack of reliable data on food composition, particularly processed and restaurant foods.

- A lack of nationally-representative data on 24-hour sodium excretion.
- A lack of evaluation of existing interventions.

While continuing with existing monitoring programmes, China intends to establish sodium surveillance by 24-hour urine collection, to develop NCD districts with a focus on sodium reduction, and to develop relevant public health policies and strategies.

## Fiji

Baseline data for Fiji suggest an average salt intake of 5 g/day. This is exclusive of discretionary salt. The 2004 Fiji National Nutrition Survey (6) featured a 24-hour dietary recall, but amounts of discretionary salt used were not recorded and overall intake is believed to be an underestimate. Major sources of dietary sodium are iodized table salt (27%), breads (17.4%), roti (14.5%) and fish or seafood (12.1%). Savoury biscuits account for 9% of intake, and meat products 7%. Import figures indicate the likelihood that table salt consumption is rising. Fiji imported 14.5 g of table salt per person per day in 2005, 14.8 g in 2006, and 15 g in 2007. Not all of this is for domestic consumption, however, as much is used in the manufacture of Fiji's exports (such as canned meats, snack foods, crackers) or in the very active tourist trade.

Currently, no tool exists to give a reliable assessment of sodium intake in Fiji. This was the impetus for a collaborative project currently being undertaken by Fiji National University, the National Food and Nutrition Centre, the George Institute for Global Health in Sydney and Deakin University in Melbourne. To be implemented in the summer of 2011, the study will assess the sodium content of locally processed foods and develop and validate a Food Frequency Questionnaire which can be used to assess population sodium intake. As part of the validation component, the investigators will also conduct a 24-hour urine collection and sodium excretion analysis among a small sample (200 staff from Fiji National University). While the results will not be nationally representative, they should provide a useful basis on which to measure future progress.

Meanwhile, Fiji has established three Salt Action Challenge Groups for "Industry", "Catering" and "Home", to develop strategies for product and meal reformulation and consumer awareness. The groups have requested hospitals in the country to reduce purchases of salt and sugar by a third. Additional funds are being sought to expand the urine collection to a nationally representative sample and to monitor the salt content of processed foods. The situation in Fiji has given rise to much discussion on the potential for regional cooperation. It has been proposed, for example, that an accurate assessment of sodium intake be carried out for small samples in a select group of countries, pooling the results to form a baseline from which to evaluate progress across the subregion.

## Portugal

Currently, Portugal has no national data on sodium intake. A small-scale survey among 416 adults in the north of the country in 2006 assessed an average intake of 12.3 g/day, using 24-hour urine collection. This is the baseline figure being used to advocate for a national strategy.

Portugal will implement its second National Dietary Survey in 2011; it is planned that the validation component will include spot urine analyses. Legislation came into force in 2009 setting a maximum of 1.4 g sodium per 100 g serving of bread.

## United States of America

The 2005 edition of Dietary Guidelines for Americans recommends a sodium intake of no more than 2300 mg/day, with “specific populations” (i.e. people with hypertension, people of African ancestry and people 40 years of age or older) being advised to limit intake to 1500 mg/day. Average sodium intake in 2009 was estimated at 3466 mg/day, far in excess of even the highest recommendation (7). According to data collected in 2005 and 2006, only 9.6% of US adults met the current guideline (8).

The USA surveillance efforts have four main components: 1) dietary intake; 2) sodium content of foods; 3) biological measurements; and 4) knowledge, attitudes and behaviours (KAB) regarding sodium.

### 1) Dietary intake

In the USA, the major source for information on sodium consumption is NHANES – the National Health and Nutrition Examination Survey.<sup>1</sup> NHANES uses two 24-hour dietary recalls, conducted on two non-consecutive days. The survey includes questions on salt added while cooking and at table, and asks respondents to identify whether food was eaten at home or outside the home. The USDA Food and Nutrient Database is used to process the data, generating daily aggregates of food energy and consumption figures for 63 separate nutrients. The results are published in *What We Eat in America* (9). The principal sources of sodium in the American diet are not necessarily the items highest in sodium, but those that are the most frequently consumed. A 1991 study indicated that the vast majority of sodium in US diets (77%) comes from processed and restaurant foods (10). The CDC is currently funding a study to update this estimate.

### 2) Sodium content of foods

Current data resources for sodium content include the Food and Drug Administration

(FDA) Total Diet Study and food composition research conducted by the Department of Agriculture (USDA). However, there are significant limitations of public data sources for use in sodium surveillance. Frequency of updating is always a concern, and is much more important for some items than others. White bread (a major sodium source in many countries), for example, has not been analysed by the USDA since 1999. The difference between the label claim for sodium and the actual content as determined by analysis can be as high as 25%. Furthermore, databases often lack brand name (or private-label) information, and have no links to sales or market-share data. Commercial data sources also used include Gladson (which contains some 160 000 products, uses the Nutrition Facts information on the label, links data to individual UPC codes, and is updated in to the day as formulations change), Publix (which also uses the label’s Nutrition Facts panel, links with UPC data and covers private-label “generic” products) and Nielsen (which has strong links with sales and market-share information).

Because it is not feasible to monitor every food product on the market, the CDC is recommending a system of sentinel food surveillance. This will entail selecting a list of packaged and restaurant foods and preparing a complete nutrient profile for each product listed. In addition, CDC will provide funds for an updated analysis of selected foods (such as white bread) that are major sodium contributors, for inclusion in the USDA databases.

### 3) Biological measurements

The CDC is continuing to evaluate the use of alternatives to collection of 24-hour urine to measure sodium excretion for national surveillance. The following studies are of particular interest:

- A validation study to compare spot urine tests with a 24-hour urine collection tests using NHANES methodology (sample size: 450 adults).
- The National Center for Chronic Disease Prevention and Health Promotion, and the National Center for Environmental Health are collaborating on analysis of stored casual urine samples from several NHANES survey periods to investigate trends in urinary sodium levels from 1988 to 2010 and to develop reference estimates of urine sodium for 2010.
- Comparative analyses of 24-hour urine samples, spot urine samples and 24-hour dietary recall from US participants, using data from the INTERSALT study.

### 4) Knowledge, attitudes and behaviours (KAB) regarding sodium

Knowledge, attitudes and behaviours are important aspects of sodium surveillance, and are being addressed by the CDC through the Behavioural Risk Factor Surveillance

<sup>1</sup> <http://www.cdc.gov/nchs/nhanes.htm>

System (BRFSS), administered by the National Center for Chronic Disease Prevention and Health Promotion. BRFSS data indicate that:

- Of the USA shoppers surveyed, 47.3% report that they buy “low-salt” items “always”, “often” or “sometimes”. However, what is meant by “low-salt items” remains unclear. While people do read the Nutrition Facts label panel, a HealthStyles survey carried out in 2005 (11) showed that less than 40% paid attention to the sodium line item. In 2008, this number had risen, but was still below 50%.
  - Those reporting that they do receive and act upon advice to change their eating habits accounted for 50–85%. Of those advised to reduce salt intake, upwards of 80% reported they had acted on it. Physicians are also advising patients to lower their sodium intake with 86.8% of doctors reporting giving this advice to hypertensive patients. However, the other two “special populations” in the Dietary Guidelines receive such advice less often with 43.3% of doctors reporting giving this advice to African–American patients, and only 22.3% to all patients over 40 years of age.
- No single method of intake assessment is “best” for all countries. Governments need to understand the strengths and weaknesses of the various methods available, and select monitoring methods which accord to their own national contexts and resource constraints.
  - While there is more activity in the area of KAB assessment than previously reported, it remains at a relatively low level. Question choice often does not follow a standard protocol.
  - Countries have a genuine desire to learn from others as they move forward. There is a need to articulate the lessons learnt in a more systematic way.
  - Regional collaboration would be practical and “resource-savvy” as a means of proceeding in many parts of the world. Even where resources were available, it was recognized that collaboration, complementarity and cost would be key to success.
  - Resources are usually the determining factor in the frequency of monitoring. Ideally the more frequently monitoring is carried out, the better. Monitoring cycles of 2–5 years are justifiable.

### Conclusions

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- Countries often consider it essential to set baselines in order to evaluate salt reduction activities, however the idea of “baseline assessment” is not clear in all countries.

# *Protocols for baseline assessment and monitoring of sodium consumption: a practical approach*

This section presents a summary of the working group discussions on baseline assessment and monitoring of sodium consumption.

## *Protocols for baseline assessment of sodium consumption*

Where possible and feasible, 24-hour urine collection should be used to establish the baseline, with a target sample of at least 150–200 people for each separate population group (e.g. sex, age group, ethnicity, rural or urban residency, socioeconomic status) for whom consumption is being assessed. Depending on objectives and resources, countries may also resort to using spot urines given its potential for lower costs and reduced complexity of implementation. Spot urine collection may be valuable for population information, trend analysis and country-to-country comparisons.

Where surveys are used, reliable food composition data is critical. Content data may be obtained in a variety of ways, including original analysis, commercial or public databases and nutritional labelling information. If label information is used, it should be validated with selective product sampling to monitor compliance. This may be approached on a regional basis. Similarly, national or regional consumer groups and research institutes could be funded to collect the necessary data. Furthermore, every effort should be made to make sodium content information universally accessible by expanding databases available to the public.

No single sampling design can serve for every country. Most developed countries can rely on accurate census data, supplemented, as needed, by other sources. The method used in Brazil includes five group domains from census data including urban, state, rural, etc., while Thailand samples by ethnicity. In China, sampling is carried out with the usual divisions (sex, rural, urban, region etc.) but is more complex, with 3000 contexts, each divided into six levels. It may be necessary to “oversample” certain groups of interest to ensure they are represented.

It is also essential to understand the chief sources of sodium in the foods of populations, and to understand who consumes those foods. While there will be differences between

countries in main sodium sources, there are regions (e.g. the Caribbean) where there may be many countries with similar profiles. Variability will dictate how large the sample size needs to be. It is essential that a valid representation of populations is taken into account in the sample frames, particularly where large discrepancies in sodium consumption may exist in different regions of a country.

Where accuracy of census data cannot be relied upon, substitutes such as voters’ lists and utility service listings may be available. However, depending on the country, these lists may be unacceptably biased towards more affluent socioeconomic levels. In such cases, non-traditional methodologies, including epicluster sampling, should be considered. This method, often used in infectious disease work, produces representative samples without reliance on a detailed national list such as a census. An individual village can be used as the sampling frame, and work through “village organizations”. Where appropriate, sentinel groups can also be used as samples.

The term “baseline assessment” must be used with caution. Countries should be reassured that they may not need to start “from scratch”; often, existing data may be used to establish a baseline. The choice of method depends on the ultimate purpose. Sentinel data may also be used to provide baseline assessments for sodium consumption. Food frequency questionnaires can be informative, as long as analysis is based on good food composition data.

## *Protocols for monitoring*

Once the baseline has been determined, the desired frequency of data collection for monitoring sodium intake should be decided on the basis of the ultimate purpose. For example, a five-year schedule may be adequate for tracking trends in population sodium consumption; however, more frequent monitoring is advisable if the intention is to provide a basis for programme modification. Where the baseline is used for policy-building, the first monitoring cycle may await implementation of subsequent interventions.

Where 24-hour (or spot) urine collection is chosen, monitoring may be planned in a phased or “stepwise” approach, and can begin with pilot projects. For countries where it is not feasible to determine and monitor actual levels of sodium consumption, it may be useful to detect and map trends. In general, full advantage should be taken of existing

survey tools and research supports. Surveillance of sodium sources is also essential in order to track industry compliance with reformulation plans and, if surveys are used for intake monitoring, to evaluate the results.

### Baseline assessment and monitoring of sodium consumption

Opportunities	Barriers	Success factors
Potential to build capacity and infrastructure while carrying out the baseline assessment.	Capacity: financial and human resources.	Political power and willingness.
Potential to use existing surveys, sharing trained teams and sampling frames while adding extra measurements for sodium.	Lack of training (depending on the type of assessment chosen).	Recognition of the problem.
Potential for developing proxy measurements by sharing and adapting information from neighbouring countries with similar profiles.	Lack of up-to-date food composition tables.	Practicality of what is being proposed.
Sharing knowledge and technical resources across existing networks.	Inability to prioritize salt reduction.	Involvement of healthcare professionals.
Identifying “champions” (individuals, experts or countries) and support their efforts.	Lack of recognition of the problem and lack of political power or willingness.	Infrastructure and resources available (human, technical, financial).
Potential to pressure industry to provide information for use in developing food composition tables.	Competing priorities.	Existence of cost benefit analysis, cost-effectiveness information.
Considering a diversity of data sources (e.g. World Bank expenditure databases) may be of use.	Continuity of the studies.	Highlighting potential and actual short-term achievements and the potential for long-term gains with salt reduction activities.
Opportunities for “third party” surveillance, e.g. Nielsen data, or similar organizations.	Ethics: free and informed consent versus incentives for participation in urine collection studies.	Community involvement.
	Industry collaboration and cooperation can be variable (e.g. with access to data).	Keeping some degree of consensus on the underlying science.
		Making databases transparent and assuring public access.
		Assistance from organizations and groups already active and achieving results (e.g. PAHO, WHO).
		Having reliable food composition databases.

### Conclusions

- *Key arguments in advocacy:* Sodium reduction is unique in that it has the potential to be not only cost-effective, but to result in a very significant net cost saving to the countries implementing it.
- Sodium intake is directly related to hypertension, which is the single most important underlying factor in mortality. Only tobacco use has a comparably strong evidence base demonstrating the need for action.
- *Uses of intake measures:* Measurement of population sodium intake is necessary for several reasons in addition to demonstrating the need for action. Perhaps most importantly, it provides the baseline against which progress can be measured. Data from surveillance of sodium intake can be compared with disease trends to develop

models for economic impact, which can be critical in sparking and maintaining government interest and action.

- *Monitoring in low- and middle-income countries:* While monitoring of population blood-pressure levels might appear to be an acceptable substitute for the monitoring of sodium intake in countries where resources are scarce, the experience in several countries has shown that this is less likely to lead to desirable policy changes. In many countries, an increased use of drugs has led to a levelling-off in hypertension rates; however, this is a superficial “solution” which treats rather than prevents the problem and ignores the underlying risk factors. Reducing population sodium intake is more cost-effective and potentially more successful. In order to encourage governments to take this route, it is essential to have a baseline measure of sodium intake, which can then be monitored.

# Tools and methods to assess main sources of sodium in the diet

## Food intake

Tools for assessing food intake include 24-hour dietary recalls, food diaries, food frequency questionnaires and indirect or secondary data sources such as household expenditures or sales data.

Developed in the USA, the automated multi-pass method for 24-hour recalls provides the interviewer with a computer “guide”. Depending on the answers given, the programme prompts the operator with further relevant questions. After asking the respondent to list everything eaten, they are then asked about a list of frequently forgotten foods such as coffee, tea, soft drinks and so on. Next, the respondent is asked to specify exactly when each item was consumed (e.g. at a specific meal, or afternoon snack). Each item is then quantified using pictures and models to help clarify amounts. These are automatically converted in the software. The final step is a probe for anything that may have been missed at some point in the day (e.g. food consumed at a meeting, while shopping, or while cooking). Taking this concept a step further is the self-administered online version of a 24-hour recall. An example of this is the ASA24™ available at the web site of the US National Cancer Institute.<sup>2</sup> With audio prompts, the questionnaire is easy to use, even for respondents with low literacy skills. Analysis in the ASA24™ is based on the USDA Food and Nutrient Database for Dietary Studies. The European Prospective Investigation into Cancer and Nutrition study (EPIC) has developed a similar tool, and there may be others.

Web-based food frequency questionnaires are also available in many versions (e.g. the US National Cancer Institute’s DHQ II).<sup>3</sup> If one of these instruments is chosen, it is essential that they be validated for the population in which they will be used. Many are linked to US databases, and may not reflect the foods available in other countries.

Regarding indirect or secondary sources, Brazil has a great deal of experience in working with household-level purchase data. Currently, they are able to track some 6000 foods using this method.

<sup>2</sup> <http://riskfactor.cancer.gov/tools/instruments/asa24/> access available to researchers, clinicians and teachers free of charge after registration.

<sup>3</sup> <http://riskfactor.cancer.gov/dhq2/about/>

## Sodium content of foods

### Direct and primary sources

Direct and primary sources include national and regional food composition databases such as the following, which have been frequently modified and validated for use in other countries:

- USDA ([www.nal.usda.gov/fnic/foodcomp/search/](http://www.nal.usda.gov/fnic/foodcomp/search/))
- Canadian Nutrient File ([webprod.hc-sc.gc.ca/cnf-fce/index-eng.jsp](http://webprod.hc-sc.gc.ca/cnf-fce/index-eng.jsp))
- Food Standards Australia New Zealand: NUTTAB 2006 ([www.foodstandards.gov.au/consumerinformation/nuttab2006/onlineversionintroduction/](http://www.foodstandards.gov.au/consumerinformation/nuttab2006/onlineversionintroduction/))
- UK Nutrient Databank Composition of Foods Integrated Dataset, and McCance and Widdowson’s *The Composition of Foods (12)*
- European Food and Information Resource (EuroFIR) ([www.eurofir.org/](http://www.eurofir.org/))

### Indirect and secondary sources

Food composition databases can be constructed from a variety of sources such as:

- Industry-provided data.
- Food label review. This is of most use in countries where nutritional labelling is mandatory, and where there is some assurance of accuracy.
- Food company or restaurant web sites. Caution should be exercised in using these sources as some use modified versions of government databases, which can introduce inaccuracies.
- Research data from the literature.

### *Amount of salt added during cooking or at table*

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Information about discretionary salt use is available, but is lacking in many respects. Usually, discretionary salt use is probed by questionnaire. It is recommended to word questions carefully: for example, asking what type of salt the respondent uses rather than asking whether they ever use it. Whatever the answers, quantitative information is likely to prove difficult to attain.

# National experiences in identifying sources of sodium in the diet

## Brazil

Since the late 1990s, Brazil has been using household budget surveys to determine the main sources of sodium and other nutrients in the Brazilian diet (13–16). The Institute of Statistics and Geography in Brazil assists by providing information on the acquired amount of each food item, allowing the linking of data on food used in a household with food composition tables. It is estimated that 75–80% of all food consumption is covered (17).

Limitations inherent in this method include the inability to distinguish individual from household consumption, and the fact that food eaten outside the home is not included. In addition, wastage is not taken into account and its effect must be calculated (15). Nevertheless, the Brazilian experience indicates that household budget surveys can be extremely useful, especially for countries with limited resources. These surveys have the following advantages in that they:

- Can be used in low-resource settings.
- Give a direct estimation of salt added in cooking or at table, as well as salt in processed and other foods.
- Include foods not purchased: e.g. fish caught for household use, or donated food items.
- Are available in almost every country, with updates usually every five to ten years.
- Give information specifically applicable to the country.
- Yield results that are highly comparable with data from other nations, since these surveys tend to use consistent methodologies.
- Yield results that provide a solid basis to advocate for the establishment of programmes.

Improvements to the surveys have been made incrementally. Originally, it included only amounts spent on various foods, however in 1995–1996, following negotiation, estimates of food quantities began to be included which added greatly to its dietary purposes use. From 2002–2003, information on weight and height began to be included. In 2008–2009, a 24-hour dietary recall was carried out in a subsample (15).

Household surveys offer a comprehensive dataset and an excellent opportunity to analyse various aspects of sodium consumption. One study carried out in 2002–2003 used survey data to calculate a proxy of sodium intake for the entire Brazilian population (4.7 g of sodium per 2000 kCal) (16). The data can be stratified by urban and rural residence and by income level, and consumption trends can be tracked by retrospective studies of data from previous years.

## Canada

The Canadian Multi-stakeholder Sodium Working Group (SWG) published their report in July 2010 outlining 33 recommendations for sodium reduction in Canada. They recommended an interim goal of reducing mean sodium intake from 3400 mg/day<sup>4</sup> to 2300 mg/day by 2016. The main sources of dietary sodium in the Canadian population were assessed using 24-hour dietary recall data from the Canadian Community Health Survey Cycle 2.2 (5). The leading contributors were found to be breads, processed meats, canned vegetables and juices, soups and mixed dishes (18). Given the ubiquitous nature of sodium in the Canadian food supply, the SWG recommended that sodium should be reduced across the entire food supply.

Work is being undertaken by Health Canada to determine the current baseline sodium levels in the food supply based on food label data. Canadian market-share data was

<sup>4</sup> Estimate from 2004 Canadian Community Health Survey 2.2 (18) + 10% added for discretionary sodium use.

purchased from Nielsen in both 2009 and 2010. A sampling plan was developed that ensured 80–100% of the market share of most categories was covered. Sodium content of foods was then collected from label information. A variety of methods was used for label collection: purchasing products in order to obtain product labels; requesting food labels directly from manufacturers; collection of food packaging materials from recycling programmes; photographing labels in stores, with the permission of store owners (this proved most feasible with smaller retailers); and from nutrition information posted by manufacturers on the internet. The collected data were analysed and sodium reduction targets are being set through analysis and modelling.<sup>5</sup>

In Canada, between 18% and 20% of food dollars are spent outside the home, typically at restaurants or cafeterias. Obtaining rough estimates of market-share data is planned for companies that track purchasing behaviour. However, it is likely that this will only be available from the major fast-food chains. The Canadian Restaurant and Foodservices Association have a voluntary programme in place that encourages restaurant chains to provide nutrition information for their menu items. This information is generally available on the internet as well as instore.

Using this methodology to estimate sodium in the food supply and intakes has certain benefits, such as:

- Data being specific to individual products and brands, so changes can be tracked over time.
- Label surveys can be more current than food composition databases, which have been established for different purposes other than tracking changes in individual product formulations.
- Product labels can be matched to market-share data through Universal Product Codes (UPC) to provide estimates of the weighted average for sodium for each food category.

However limitations and constraints exist, and these include:

- Market-share data is available from commercial databases such as Nielsen, but the associated costs can be very high. Coverage is also an issue: for example, Nielsen does not collect data from Newfoundland and the three territories. Nielsen also does not track purchases from small independent grocery retailers and non-traditional grocery outlets such as convenience stores, movie theatres, catalogue-based sales such as Amway or Epicure, box-stores such as Costco, hardware stores such as Canadian Tire, or internet-based grocery stores. These types of commercial tracking

systems do not track foods that are not sold through retail outlets. They include ingredients for further processing (e.g. manufacturer to manufacturer) and foods destined for foodservices or restaurants etc.

- In Canada, market share is available for the aggregate of private-label products within each category, individual market share of these products is not available.
- Packaged foods prepared instore (e.g. pizzas) are exempted from providing nutrition information.
- Nutrition data is not necessarily changed every time formulations are modified, particularly if the changes are within tolerances.
- Restaurant foods must be tracked using other sources. Restaurant and food service data is not available to the same extent as data for packaged foods.
- Collecting data is onerous and time-consuming. Hiring a contractor to purchase foods is costly, but takes the least time; cheaper methods are available, but consume more time.
- Local, imported and ethnic products are harder to track through label information than major national brands.

## Ghana

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The Kumasi Programme was developed from a research study conducted in rural and semi-urban locations in the Ashanti region of Ghana (19). The objectives were to assess the prevalence of hypertension. Data were collected on: detection, management and control (20); the relationship between blood pressure and body mass index (21) sources of dietary salt (22); average levels of salt intake (23); average levels of iodine intake; the relation between blood pressure and blood viscosity; and distribution of other cardiovascular disease risk factors. The study population was clustered in six rural and six semi-urban villages (24). Participants, numbering 1013, were recruited and were followed-up over a six-month period.

Ghana is the second largest salt exporter in Africa. In the traditional diet, sodium is used to preserve food. Salted, smoked fish is a favourite food item. As yet, very little processed food is available. A preliminary survey carried out as a basis for a health promotion intervention indicated the following chief sources of salt in the diet: koobi, kako, salted pigs' feet, salt beef, flavour-enhancing cubes and salt added at table or while cooking (22). The addition of salt during cooking is a major problem. The majority of the population carries out this practice, with little difference showing between rural and semi-urban populations. This indicates a strong cultural bias for the practice (22) and thus initiated the targeting of this item for intervention.

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<sup>5</sup> <http://www.hc-sc.gc.ca/fn-an/nutrition/sodium/sodium-reduction-targets-cibles-eng.php>

24-hour urine collections were carried out at baseline and at three- and six-month follow-up points (23). Results over the total study period were encouraging, with a significant association between lower sodium intake and lower blood pressure (23). Very encouraging results were also achieved in the pilot phase of the Kumasi Programme with a group of 20 farmers achieving a 20% reduction of total salt intake over only four weeks by reducing added salt. This was coupled with a significant reduction in both systolic and diastolic blood pressure over the same period (25).

## Singapore

In Singapore, a national nutrition survey is conducted every six years to monitor population dietary intake. Efforts to track sodium intake, specifically, began in 1998, using data from single day 24-hour dietary recalls. In the survey of 2010, each respondent participated in two-day 24-hour recalls. Respondents were asked to indicate whether each food item consumed was homemade, packaged or eaten outside the home. For home-cooked foods, details on the ingredients were also obtained. All items were then ranked according to sodium content in the amounts that they were consumed. From the ranking, the key sodium contributors could be identified. Analysis was conducted using an in-house food composition database system, which comprised data from laboratory analysis, data borrowed from other countries, and data derived from recipes.

The benefits of this method include nationally-representative results and collection of specific information on all foods consumed. Limitations include those inherent in self-reporting (e.g. accuracy of recall). In addition, the methodology was not designed specifically for analysing sodium consumption, and some food data may not be current.

Challenges and solutions:

- *Problems with recall:* To address this, interviewers were trained to use the multiple-pass method (a quick listing of all foods eaten; a probe for forgotten foods; details such as amounts consumed, cooking methods and salt added at table; and review). Family members or caregivers were asked to confirm intakes reported by elderly dependant respondents.
- *Difficulty in estimating portion sizes:* Interviewers were equipped with various household measures and containers; for example, bowls and spoons of different sizes to help participants visualize the amount of food consumed or used in cooking.
- *Difficulty in assessing amount of salt or condiment consumed:* This tends to occur when participants have not prepared the foods themselves, or when they reported eating only certain components of the whole dish. The team developed a protocol to help in this situation, using quantities used in typical recipes.

- *Commitment to completing two 24-hour recalls:* Substantial effort was made to reduce the inconvenience to participants. Interviews were carried out at respondents' own homes, and appointments were scheduled according to the respondent's convenience (including late evenings). Participants who completed both days of recall received an incentive (shopping vouchers).

## Thailand

As part of a major stroke awareness campaign conducted in 2005–2007, a multidisciplinary expert group including government health inter-departments, NGOs and representatives of the restaurants and food shops associations, collaborated to form "Salt Net", with the following goals:

- To conduct a comprehensive review and assessment of salt intake and major sources of salt in the diet, using all available resources including literature, assessment of Thai consumption patterns, and existing national nutritional and behavioural risk factor surveys.
- To promote policy review and formation with a view to integrating sodium reduction into the nation's Proactive Nutritional Plan and health networks.

The first Thai household survey of sodium consumption took place in 2007 led by the Department of Health Promotion in collaboration with Mahidol University and UNICEF. The survey collected general household information and a consumption inventory, and included a 7-day dietary recall covering foods consumed both inside and outside the home, with emphasis on the use of condiments. The results indicated two major sources of salt in the Thai diet:

1. Flavour enhancers such as fish sauce, table salt, soy sauce, shrimp paste and flavour powders.
2. Cooked foods and products such as processed noodles, canned fish, steamed mackerel, fermented fish (Pla Som), and varieties of spicy cooked paste (Nam Prik, eaten with vegetables and meat).

This is the first survey of its type to be carried out in Thailand and has generated information valuable in designing effective interventions for sodium reduction. Costs of the survey were moderate; however, the cost of human resources was not considered in the final figure, meaning that there are still resource-related obstacles before the survey can be established on a repeating cycle for monitoring purposes.

## USA, New York City

The majority of sodium consumed in the United States comes from packaged and restaurant foods. In 2009, the New York City Department of Health and Mental Hygiene (DOHMH) created two databases to support the National Salt Reduction Initiative (NSRI): the first, modelled on the database of the UK Salt Campaign is for packaged food; the second for restaurant food. The methodology used to develop both databases will be replicated in 2012 and 2014 to assess change in the sodium content of US foods (IOM, 2010). In addition to sodium, the NSRI database includes available information on other key nutrients, such as total fat, saturated fat, trans-fatty acids, calories, potassium, fibre, sugar, and calories. These will follow, as reformulation for sodium is undertaken in the food categories of the NSRI database. Information provided by these databases proved central to NSRI target setting and demonstrated the NSRI's commitment to understanding and developing objective, feasible and accountable measures in their work with industry.

### **Packaged food database and target setting**

The NSRI Packaged Food Database uses Universal Product Codes (UPC) to link sales data for the top 80% of products in 62 food categories to product-level Nutrition Facts label information. The database contains information on more than 7500 packaged-food products from over 500 manufacturers. Targets for sodium reduction are based upon the sales-weighted mean sodium value for each food category. Proposed targets were developed following careful analysis of the distribution and range of sodium, and the sales-weighted mean sodium in each food category. The NSRI closely studied products already below the mean – particularly top sellers – and compared proposed US targets to UK Salt Campaign targets. A year-long series of meetings with manufacturers and trade associations to solicit feedback and guidance took place before finalization of targets. Additionally, industry's submission of written comments was strongly encouraged, and a period of public technical feedback on proposed targets for both restaurants and packaged foods preceded their finalization in early 2010.

### **Restaurant food database and target setting**

The NSRI Restaurant Food Database includes nutrition information and market-share data for products in 25 restaurant food categories. The NSRI Restaurant Food Database was created using publicly-available nutrition data from 50 of the top-ranking (based on sales volume) quick-service restaurants (i.e. fast food restaurants). This data was linked to NPD Crest market-share data. Key analyses were similar to those conducted with the packaged food database. Sodium targets for the 25 restaurant food categories were guided by assessment of the market-weighted mean sodium for each category and industry feedback. Given the high level of sodium observed in many individual products,

and because restaurants generally serve portions to be consumed as served, the NSRI also set a maximum sodium limit for all items in restaurants. While the maximum is relatively high (the interim target is 1500 mg and the target for 2014, 1200 mg), lower targets were determined to be not feasible for industry to achieve within the target timeframe. An important limitation of this database is that independent (i.e. non-chain) restaurants are not included due to a lack of standardized nutrition information. However, the DOHMH has received funding and is currently undertaking work with independent restaurants on sodium reduction.

## Conclusions

- Comprehensive, reliable and updated food composition databases play an essential role in monitoring the content of sodium in foods.
- Low-income countries may need assistance in modifying food composition databases for their use. It was noted that academicians in all countries can help with this; however, governments and industry also play essential roles. International networks and academic congresses are opportunities to promote interest in helping to modify food composition databases for use in low-income countries.
- While large chain restaurants are often willing and even eager to cooperate with sodium reduction, engaging smaller independent restaurants and food-service establishments can prove more difficult.
- Current data – particularly those from household expenditure surveys – indicate socioeconomic gradients in sodium consumption, which is an issue which must be addressed when designing monitoring for reduction initiatives.
- Developing an open-source database using label information that all countries can share may be a useful means of proceeding.

# Protocols for identification of sources of sodium in the diet: a practical approach

This section presents a summary of the working group discussions on protocols for identifying sources of sodium in the diets of populations.

When planning for the identification of the main sources of sodium in the diet, if there is capacity, it may be helpful to list all methods available for each objective, describe them, detail the resources required, weigh up the pros and cons justifying the use of a particular method (perhaps rank outcomes), as well as which countries have implemented each. Identify key experts and researchers for support and include as well a gap analysis.

Currently the identification of sources of sodium can be made through a variety of surveys and questionnaires on such things as: household food purchases; household budgets; household availability of sodium and individual dietary intake. Different dietary methods can also be used: single 24-hour recall, multiple 24-hour recall, observed weighed method, food frequency methods and secondary data sources, such as import data and sales data. Different methods serve different purposes and respond to various objectives:

- *National nutritional surveys:* These are expensive and require extensive food composition tables and analytic support, but they are not only way to collect data on sodium sources.
- *Household budget surveys:* These are conducted regularly in most countries, and can yield useful information on sodium consumption. Although results are largely comparable between countries and are nationally representative and stratified by socioeconomic groups, they do not capture discretionary salt use or food eaten outside the home. Also, individual consumption has to be approximated by applying appropriate algorithms for age and sex.
- *Sentinel surveys:* These may also be useful where the resources for national sampling are lacking. Alternatively, routine NCD surveys could be modified to include questions about salt usage. Relevant research data is also available for many countries.
- *Food frequency questionnaires:* Besides 24-hour dietary recalls, these can be valuable as long as they capture all major sodium sources (including discretionary salt and seasonings).

- *Three-day food diaries:* These may provide more precise data. Household food inventories and food diaries are also possible. The lithium tagging method can help track discretionary salt use, but since it must be followed up with 24-hour urinary sodium excretion analysis, this may limit its applicability in low-resource situations.
- *Aggregated data:* These are taken from sales data, retailers, supermarkets, distributors and marketing boards, for example. They are non-specific, reflecting purchases but not necessarily consumption. Some sources may be expensive to access, and can miss culturally specific sources of sodium. Aggregate sources include procurement data (comparing amount of salt procured with its use in standard recipes), commercial sales data (e.g. Nielsen), and import and export figures for salt or specific foods.
- *Retail data and store-level surveys:* These may be most useful in urban areas. Many countries already track salt usage as part of fortification programmes.

Whatever the tool chosen, the survey should be as representative and as comprehensive as possible, capturing consumption regardless of location and being carried out as regularly as possible. Where processed food forms a major part of the national diet, access to accurate food composition data is crucial. Some countries conduct total dietary studies that involve purchasing, preparing and analysing foods. The addition of sodium to the analysis could be done at minimal cost. While the foods in the total dietary studies may not be the foods of most interest in terms of sodium content, over time a reasonable database of sodium values for foods could be created.

Where discretionary salt use is a more important sodium source, it must be remembered that local knowledge – particularly knowledge of cooking techniques – is key to monitoring and reducing sodium intake. The best way to proceed may be to gather qualitative information from focus groups, including special groups of experts. It may be advisable to select a few of the main sodium sources for monitoring, rather than trying to develop a completely new extensive food composition database.

### Identifying sources of sodium in the diet

<i>Barriers and limitations</i>	<i>Success factors</i>
<p>Lack of access to adequate food composition databases.</p> <p>It may not always be possible to separate household from individual consumption, especially in rural areas or in any communal meal situation.</p> <p>Changing patterns over time (e.g. all meals at home versus lunches eaten at workplace; increasing use of restaurants).</p> <p>Expenditure surveys may not have the capacity to identify sources of sodium, unless they can be linked to reliable food composition databases.</p> <p>It was noted that table salt is typically purchased for long-term use, not just for the period being tracked in a food expenditure survey.</p> <p>While lithium tagging helps overcome the problem of sodium loss in cooking (e.g. disposal of salted cooking water, it does require 24-hour urine sodium excretion analysis which may limit widespread applicability).</p> <p>It is difficult to see how sales data can be extrapolated to individual level.</p> <p>In developing countries, parents may allocate greater proportion of food to children, affecting the calculation of individual consumption from household data.</p>	<p>Representativeness of the population groups.</p> <p>Consistency and continuity of monitoring activities.</p> <p>Existence of accurate and updated food composition tables.</p> <p>Sharing food composition data.</p> <p>Thorough understanding of local contextual factors.</p> <p>Identifying the best methods specific to the country.</p> <p>Profiting from new technologies in regions where possible to do so (e.g. validity studies).</p> <p>Political buy-in and resources – technical, financial and human.</p> <p>Successfully linking monitoring with policy development and implementation.</p> <p>Access to experts with knowledge of population food consumption and chief sources of sodium in the diet.</p>

# Tools and methods to assess knowledge, attitudes and behaviours towards sodium and health

## *New Zealand*

The New Zealand Food Safety Authority (NZFSA) has initiated a sodium reduction work programme and prepared a discussion document on sodium as part of its mandate for the risk management of nutrient-related food safety hazards (26, 27). The discussion document identifies the following strategies for sodium risk management:

- Setting targets for sodium intake and sodium content in foods.
- Collaborating with the food industry to facilitate product reformulation.
- Increasing consumer knowledge of the risks associated with dietary sodium, and increasing consumers' use of food label information.
- Introducing monitoring and evaluation programmes to measure population sodium intake, sodium content in foods, and consumer behaviour.

The NZFSA determined that the most immediate aspects of knowledge, attitudes and behaviours to measure were: consumers' knowledge of dietary sodium sources and recommended sodium intakes; their engagement in behaviours to reduce their sodium intake; what motivated them to change these behaviours; their use of food labels in choosing lower sodium foods; and their awareness of sodium and health. A 2006 New Zealand research study found that 67% of people claim to monitor their salt intake, however, only 10% could correctly identify the maximum recommended daily salt intake, and only 2% were able to determine the sodium level in packaged food by looking at the label (29). This highlights a need to establish baseline quantitative data on levels of risk awareness, knowledge and understanding.

In preparing the survey, the programme team reviewed a variety of existing questionnaires from other countries, as well as published research and "grey literature" from New Zealand.

## *Latin America*

In order to understand at the outset what consumers know and believe about sodium, and to identify their perceptions, behaviours, barriers and motivations for reducing sodium intake, a baseline assessment has been carried out in Argentina, Chile, Costa Rica and Ecuador (and one is also planned for Canada). The assessment begins with a survey that uses a questionnaire with 20 multiple options and open questions. This is followed by qualitative research using in-depth interviews, observations and focus groups. In designing the overall assessment, the team faced several challenges such as lack of consensus within the Codex Committee on Food Labelling concerning the terms "salt" and "sodium". There has been no research in Latin America to probe consumers' understanding of these terms and few campaigns have been conducted in the region to raise consumer awareness of the dangers associated with high sodium consumption. Educational programmes on sodium or salt are almost non-existent.

### **Quantitative assessment**

To address this situation, the quantitative assessment attempts to establish a baseline on consumer knowledge, behaviours and labelling preferences for sodium, and to provide, as soon as possible, input to the Codex Committee on Food Labelling. Per country, the target sample consists of 400 adults (18+ years of age), of both sexes. Both rural and urban residents were included.

### **Qualitative research**

The purpose of this research is to explore knowledge, perceptions and behaviours associated with the consumption of dietary sodium in a variety of Latin American population groups. It also explores knowledge, behaviours, understanding and preferences on labelling for sodium content. Unlike the questionnaire, the qualitative assessment includes children (primary school and secondary school students), as well

as adults from different regions and ethnic groups. Following this, a decision will be made on topics to be addressed at the focus groups.

***Monitoring: assessing the effectiveness of interventions***

It is planned to conduct monitoring through surveys among key population groups on consumer knowledge and behaviours, coupled with 24-hour urine collection to estimate salt intake. This may be carried out using limited samples before and after interventions.

***Conclusions***

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- Monitoring KAB towards sodium will allow policymakers to tailor their interventions to the objectives and therefore increase the likelihood of effectiveness. Although questionnaires are tools often used to monitor and evaluate KAB, their validity may be affected by certain factors. For example, respondents may say they choose “low sodium” foods, but what they mean by that term may be unclear. Furthermore, literacy issues can prevent consumers from obtaining information from labels.

# *Tools and methods to assess knowledge, attitudes and behaviours towards sodium and health: a practical approach*

This section presents a summary of the working group discussions on information needed to understand consumer knowledge and behaviour, and tools typically used to assess them.

An understanding of key aspects of KAB, among industry and policymakers as well as among consumers, can be crucial for the success of interventions aimed at population sodium reduction. These key areas include:

- The extent to which consumers believe excessive sodium intake is a problem for them.
- The extent to which consumers feel personally responsible for reducing their salt intake.
- The basis for individual decisions to purchase particular food items. (For general consumers this includes an understanding and effective use of label information. However, the purchase process must also be explored with other groups, such as food retailers, restaurateurs and importers, whose decisions will determine the choices made available to consumers.)
- Knowledge, attitudes and behaviours relevant to discretionary salt use.
- Variations by age, sex, ethnicity, rural or urban residence, socioeconomic group with particular attention to children.

These and other areas require first setting a baseline, followed by ongoing surveillance to track changes. In doing so, it is important to bear in mind that increased knowledge does not necessarily correspond with behaviour change. Novel methods, such as the collection of grocery or restaurant receipts and the comparison with self-reports and physical intake assessment can help elucidate the relationship between knowledge and actual behaviour.

Finally, any intervention aimed at enhancing or modifying KAB must be evaluated in light of its purpose. For example, evaluation may focus on changing consumer knowledge or behaviours on the comparative efficacy of various labelling options, or in engaging industry to participate in reformulation.

Tools typically used include focus groups, observational studies and a variety of survey types, from national surveys to informal surveys of customers at a particular store. A multi-step approach can work well: KAB can be addressed by simple questions incorporated into existing surveys, and followed up with more targeted efforts and more detailed or complex questions. Qualitative focus groups can provide important detailed information, while observational studies are valuable tools for validation of self-reported data.

Attention should be paid to making survey questionnaires comparable to those used in other countries. This facilitates the customization and sharing of tools. For low- and middle-income countries, household expenditure surveys may sometimes be the only tool available. It may be possible to devise a set of core questions that can be added to these for use in multiple countries within a region. Surveys may be combined with intake assessments, using the same sample, while the survey launch and reporting of results can be used as opportunities for media exposure. Regardless of the tool used, it is essential that data on KAB be tied to a broader strategy for intake reduction across the population.

While there may be many opportunities to learn from the experiences of others, local context is crucial, particularly in countries where discretionary salt use is the main source of sodium. Provision of culturally relevant tools is crucial in countries with diverse populations, while customized approaches should be made to various sectors such as industry, policymakers and health professionals. Qualitative tools can be invaluable in exploring local contexts, preparatory to tool development.

Common interventions addressing KAB include mass-media campaigns, social marketing through existing channels, (such as schools, cultural groups and NGOs), labelling programmes and dietary guidelines. These may be supplemented with non-traditional approaches, including the development of tools for consumers to use in monitoring their own sodium intake, educational programmes for staff who make and serve food in various settings, and education for health professionals who often consider sodium reduction being relevant only to hypertensive patients.

*Assessing knowledge, attitudes and behaviours towards sodium and health*

*Barriers and limitations*

Low level of nutrition literacy.

Multiple official languages within the same country.

Difficulty in recruiting certain groups to participate in the questionnaires (e.g. low-income groups, young men).

Determining appropriate questions (this depends on the purpose of the survey.)

Public opinion surveys often being considered political tools rather than scientific tools to inform policy, geography, health and media literacy (e.g. health, IT, language literacy).

Consumer surveys sometimes being considered “soft science” by funders.

Lack of human, technical and financial resources.

Difficulty in ensuring that samples adequately represent important sections of the population.

Difficulty in including all sections of the population which have different dietary practices in ethnically diverse countries.

Difficulty in distinguishing whether the respondent understands an item, versus whether the respondent believes the item is important (i.e. knowledge to action).

Difficulty in making the connection to KAB when using indirect sources (e.g. purchasing data).

The adequate and appropriate frequency of monitoring, to accommodate changes in behaviour.

“Survey fatigue” among the target population.

Length of questionnaires.

The issue not resonating with the public (e.g. people struggling economically will be less likely to be concerned about sodium intake).

*Success factors*

Political leadership and support for the survey.

Making maximum use of the survey results.

Effective communication: to media, to the food industry and to consumers.

The importance of the survey being tied to a broader strategy and not being a “one-off” effort.

Having a clear understanding of the challenges and barriers specific to the context and using culturally relevant tools and surveys.

Having adequate resources – financial, human and technical.

Understanding the purpose for which the data is being sought (e.g. to initiate programmes, to monitor effectiveness of interventions, to effect policy change, to demonstrate “action”).

Understanding the current state of knowledge and awareness of the issue and determining relevant questions.

Consumers seeking out reduced sodium products.

Engaging health professionals to start disseminating appropriate information and advice.

Consistency in who is carrying out the surveys.

# Conclusions and following actions

Population-based strategies to reduce sodium intake must be monitored and evaluated. Information on process, output and outcomes of the implementation of these sodium reduction strategies should be collected, disseminated and used to improve policies, programmes and interventions. Taking into consideration the existing tools and protocols for monitoring and evaluation of sodium consumption, and while being informed by the current evidence and existing experiences on assessing sodium intake and its main dietary sources, the participants of the technical meeting identified the following key actions for four key stakeholders: WHO Member States; WHO; NGOs, civil society, academia and, healthcare professionals; and the private sector.

## *Actions identified for WHO Member States:<sup>6</sup>*

1. Play a leading role in monitoring and evaluating policies aimed at reducing sodium intake at population level and allocate appropriate resources to facilitate these activities.
2. Request from food and meal manufacturers, through regulatory or other appropriate mechanisms, product nutritional information, including sodium content, for all standardized packaged and catered foods sold in their country, and to make this information publicly available. To create a publicly accessible database of nutrition information, including sodium, from all standardized packaged and catered foods sold in the country.
3. Work in appropriate partnership with relevant NGOs, healthcare professionals, education and science organizations, UN agencies and the private sector to estimate population sodium intake, knowledge of dietary sources of sodium and the most up-to-date food consumption data.
4. Develop key indicators for monitoring and evaluation of national or regional policies, plans and programmes aimed at population sodium reduction and identify the relevant tools to achieve the most effective and affordable surveillance, monitoring and evaluation systems.
5. Use existing, or adapt surveillance infrastructures and tools, such as STEPS WHO STEPwise approach to Surveillance (29) or ongoing national nutrition surveys, to obtain relevant data for surveillance, monitoring and evaluation of sodium reduction policies.
6. Share examples of best practices on monitoring and evaluation of sodium reduction policies with other Member States through appropriate knowledge management systems.
7. Monitor and evaluate national government food procurement practices as they relate to sodium content (e.g. food purchased and served by schools, public hospitals, prisons).
8. The monitoring and reporting by ministries of health or the appropriate government mandated agencies on marketing practices of the private sector, as part of the implementation of the set of recommendations on marketing of foods and non-alcoholic beverages to children, which was endorsed by the 63rd World Health Assembly in May 2010 (30).
9. Ensure that monitoring and evaluation activities of iodine deficiency disorders in the population are, whenever possible, aligned or carried out in conjunction with monitoring and evaluation of sodium consumption.

<sup>6</sup> Ministries of health or the appropriate government mandated agencies.

### *Actions identified for WHO:*

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1. Sensitize Member States and policymakers to the importance of monitoring and evaluation of sodium reduction policies.
2. Develop and pilot-test a framework to enable Member States to identify the tools required to obtain the most relevant data to:
  - a. sensitize policymakers on the importance of a national sodium reduction strategy.
  - b. develop and implement a national sodium reduction strategy.
  - c. develop appropriate monitoring and evaluation mechanisms.
3. Develop tools or modify those existing for use by Member States in monitoring and evaluation of national sodium reduction strategies and activities.
4. Provide technical support to Member States in the development, implementation and maintenance of relevant monitoring and evaluation processes on sodium intake, and what influences sodium content of foods from farm-to-fork.
5. Provide technical support to Member States in developing multinational collaborative actions, partnerships or networks, as appropriate, aimed at collating and sharing data for developing, monitoring and evaluating population sodium reduction strategies.
6. Continue dialogue with the relevant multinational private sector entities to encourage sharing of up-to-date and accurate data on sodium content in foods, product reformulation and product sales.
7. Encourage Member States, international organizations and UN agencies to develop or enhance and make publicly available relevant databases which provide information on sodium content of foods.
8. Work with the Food and Agricultural Organization of the United Nations (FAO) and other relevant stakeholders to determine the implications of sodium reduction on trends in the global food supply (e.g. replacement of sodium with other nutrients such as trans and saturated fats or sugars, issues around food safety, food availability, and fibre, iodine, potassium, calcium and magnesium content of the reformulated food items).
9. Ensure that guidance on monitoring and evaluation practices for iodine deficiency disorders are, whenever possible, consistent with monitoring and evaluation of sodium consumption.

### *Actions identified for NGOs, civil society, academia and healthcare professionals:*

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1. Provide support for, and participate in, research, development and implementation of tools to effectively monitor and evaluate dietary sodium intake.
2. Advocate for and assist with the evaluation and monitoring of evidence-based sodium reduction policies.
3. Encourage and contribute to mobilization of resources, both human and financial, for monitoring and evaluation activities.
4. Monitor, nationally and internationally, the actions, commitments and pledges of private and public sectors that influence population levels of sodium intake and hold them accountable.
5. Monitor knowledge, attitudes and behaviour change of healthcare professionals and healthcare institutions towards sodium and health.
6. Monitor the sodium content of foods and meals, and conduct research on factors contributing to the trends in sodium consumption.

### *Actions identified for the private sector:<sup>7</sup>*

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1. Ensure that clear, easy-to-understand and accurate nutrition information and labelling are provided across all markets.
2. Make publicly available in a clear, accessible and standardized format, up-to-date data on sodium or salt content of foods and meals.
3. Make publicly available and applicable across all markets the pledges and commitments on product reformulation and reduction of sodium content.
4. Report progress on commitments and reformulation plans and make such data public.
5. Monitor the implementation of procurement policies for reformulated meals (lower in sodium) for catering services with a high turnover of meals (e.g. worksite canteens).
6. Monitor the changes in knowledge, attitudes and behaviour of culinary professionals and food processors towards sodium reduction and health.

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<sup>7</sup> The private sector includes, but is not limited to, the food and beverage industries, retailers, the restaurant and food service sector, catering companies, small and medium-sized enterprises, advertising and recreation businesses, global marketing research firms, insurance and banking groups, pharmaceutical companies, the media and the trade associations that represent them.

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## Annex 1

# Sodium monitoring activities: results of a 45-country survey

As part of the preparation for the technical meeting, a background paper was commissioned by the Government of Canada. Between August and October 2010, selected government officials and national experts from 52 countries representing all world regions were asked to participate in an e-mail survey regarding their sodium monitoring activities. NGOs were not included in the survey. Of the 45 countries that responded, 37 reported some form of monitoring in place. The salt monitoring activities identified were usually led by governments in the context of salt reduction activities, broader nutrition or health surveys, or iodine deficiency and fortification strategies. In some cases, information was provided on smaller subnational surveys conducted independently of government.

Respondents were asked about four types of monitoring activities:

1. Assessment of sodium intake.
2. Knowledge, attitudes and behaviours relevant to intake.
3. Sources of sodium (sodium content of foods and discretionary intake).
4. Activities aimed at reducing sodium consumption.

### Assessment of sodium intake: key results

- In the sample of 45 countries, 30 had conducted formal national assessments of salt intake. In addition, 6 countries reported independent scientific studies in subpopulations.
- Of the 36 countries, 19 used urinary analysis for sodium and 25 used dietary surveys (9 used both). Of the 19 countries with urine sampling, 16 used 24-hour sampling (6 were national) and 3 used spot tests (1 nationally-representative).
- Of the 25 countries that used the dietary survey method, 13 chose a 24-hour recall, 7 used a food diary, 3 a food frequency questionnaire, and 2 a household expenditure survey. 14 countries plan to conduct intake assessments for the first time or in an upgraded form in the near future. Of these, 6 specified they intended to use urinary sodium excretion as the evaluation method, with 4 stating they plan to use the 24-hour collection method.

- National assessments of sodium intake have typically been conducted as part of broader nutrition and health assessments (20 of the 28 countries) – usually national nutrition and diet surveys (19 countries).
- Most of the surveys included nutrients other than sodium.
- Most of the surveys were restricted to adults (only 8 had separate results for children).
- Respondent perspectives of the method of urinary collection methods varied. Low response rates to 24-hour urinary analysis presented a challenge for some countries. Success in obtaining sufficient response rates was attributed to: careful study design tailored to the population; good instructions; minimizing the inconvenience for the participants; and providing a sufficient financial incentive for participation.
- Regarding dietary surveys, respondents pointed out that this method offers the advantage of building on existing surveys. However, achieving accurate results and measuring discretionary salt intake were noted as being challenging.
- Key barriers cited to monitoring sodium intake were: lack of sufficient skills, capacity and resources, especially financial resources owing to the high cost of both urine analysis and dietary surveys; the lack of a dedicated budget; and the difficulties of fundraising.
- Factors cited for successful monitoring of sodium intake were: adequate technical skills; capacity and resources (financial and human resources); supportive partnerships among key stakeholders, including NGOs; political support (e.g. national governments, regional and international organizations); and technical support from various institutions (e.g. WHO).

Sample sizes:

- Sample sizes for dietary surveys ranged from 1001 to 56 000.
- Target samples for 24-hour collection ranged from 400 in Barbados, to 1800 in Switzerland. New Zealand reported a target of 4700 for its spot urine collection.
- Slovenia reported a sample size of 143 and France 1593.

### *Knowledge, attitudes and behaviours: key results*

- Some form of monitoring of KAB regarding salt was reported by 22 countries. However, most monitoring of KAB was minimal, involving one or two questions squeezed into a much broader survey on the amount of salt added at table (17 countries) or during cooking (7 countries).
- Only 3 countries have completed dedicated KAB initiatives, with an additional country currently engaged in its first; 5 plan to conduct this kind of monitoring in future.
- Participants noted that it can be quite difficult to fit sufficient questions about KAB into existing questionnaires. The importance of doing so, however, is recognized.
- While discretionary salt use was the most frequently asked question, the following topics also appeared on KAB questionnaires: use of labels; whether respondents are “using less salt”; whether respondents buy and use “low-salt” products or salt substitutes; understanding of the terms “salt” and “sodium”; whether respondents have received advice to reduce salt from a health professional.

### *Sources of sodium – monitoring sodium content of foods: key results*

- Of the 45 countries, 21 had conducted assessments of sodium content of food, 8 of which had made more than one form of assessment. Countries estimating which food categories are leading sources of sodium intake, numbered 18, and those stating their intention, or having a clear plan for conducting analysis of sodium levels in food in the future, numbered 13.
- In 19 of the 21 countries, the assessments were made of foods in the marketplace through a salt-specific survey (12 countries) or for the purposes of building a food-composition database (12 countries). Countries that had analysed foods in the marketplace as if prepared at home, numbered 3, and a further 3 for foods consumed at home.
- Different types of samples were used for the assessments: “all foods” for the purposes of a food composition database (12 countries), or foods consumed at home (3 countries); “all” packaged foods containing sodium (3 countries); a smaller sample of foods pre-defined as leading sources of salt intake (8 countries); or of the foods that are the most frequently consumed (4 countries).
- Four methods were used to obtain information on the sodium content of food: (i) food analysis (20 countries); (ii) recipe analysis (3 countries); (iii) nutrition labels (6 countries); and (iv) already published data from public databases or from the food industry (5 countries). More than one technique was used by 6 countries.
- Almost all (19 countries), analysed their results by food category only, with 1 analysing solely by brand, and 1 by category and brand.

- Of the countries with data on sodium levels in foods, 11 conducted assessments at more than one time, allowing assessment changes over time.
- The most critical factor for the success of assessments of sodium content of food was the presence or development of good databases. Most available databases focus on establishing sodium levels in categories of foods, leaving brand tracking to industry.
- For those developing new databases, access to existing market-survey data and high quality food analysis was seen as crucial. Open communication with the food industry was also seen as advantageous. Using label data had the advantage of easy access and low cost, but can be inaccurate and cannot be used for non-prepackaged foods.
- Key challenges to developing or maintaining databases were: lack of resources and capacity; the large number, high turnover and frequent reformulation of products in the marketplace; monitoring products in numerous small and medium-sized enterprises (e.g. bakeries); and lack of cooperation of the food industry.

### *Sources of sodium – monitoring discretionary salt intake and use: key results*

Discretionary use includes salting foods at table, while cooking, or while eating outside the home, as well as the use of salty condiments such as soy sauce.

- Countries that reported conducting some form of monitoring of salt added in the home, using quantitative or qualitative approaches, numbered 21. Only 6 countries said they had conducted quantitative surveys of salt use at home, and no country said they would be monitoring salt use at home in the future. Other countries reported the potential to calculate salt added in the home from urine analysis or from dietary surveys of foods consumed at home, but did not appear to have carried out the necessary calculations.
- Qualitative survey questions concerning salt use at home had been conducted in 17 countries; in 2 of these it was the only existing form of salt monitoring.
- In “meal-based” consumption assessments, no effort was made to distinguish sodium content contained in the food at the time of purchase from salt added during cooking or at table.
- While some countries noted the potential to calculate discretionary use from the results of urinary analysis and dietary surveys, none has carried out the necessary calculations.
- No country reported future plans to evaluate discretionary salt use.

### ***Monitoring the results of sodium reduction activities: key results***

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- Of 15 countries reporting four types of monitoring activity, 7 included more than one type:
  1. Repeated intake assessments (9 countries).
  2. Monitoring of salt levels of foods (independent of industry) (5 countries).
  3. Changes in salt levels in foods reported by food industry in a government framework (8 countries) or NGO framework (1 country – New Zealand).
  4. Monitoring of consumer salt awareness campaign (2 countries – Hungary and the UK).
- Monitoring of salt reduction activities was being planned by 11 countries as part of their future salt reduction initiatives.
- Baseline assessments of intake, sodium content of food, and KAB need to be monitored in order to be able to evaluate success of sodium reduction activities.
- There appears to be no consistent and shared framework for monitoring the effects of sodium reduction activities.
- In general, countries recognize that there is a range of different types of database that can be used to assess sources of dietary sodium. Countries are aware of the technical specifications of building such databases, but knowledge is often lacking regarding the features of a “good” database, or the relative advantages of different methods and data sources.
- Despite the far higher contribution of discretionary sodium intake to the population diet in developing countries, the monitoring of discretionary sodium intake is receiving far less attention. Similarly, there has there been no effort to measure discretionary salt use outside the home.
- Conducting regular surveys of monitoring activities around the world would make it possible to assess the progress of countries in their sodium-monitoring activities. The current survey presents a form of baseline on which further information could be built, and against which progress could be measured.
- There appears to be a genuine desire by countries to learn lessons from others to enhance the potential for success.

### ***Points of interest suggested by overall survey results:***

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There is greater potential to obtain information regarding sodium intake from existing national assessments, regardless of whether a sodium reduction initiative is developed.

- No single method of intake assessment appears to be “the best” for all countries. Governments understand the strengths and weaknesses of the various methods available, and choose intake monitoring methods according to their own national contexts and resource constraints.

## Annex 2

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# Annex 3

## Programme

*Tuesday 19 October 2010*

<b>08:00–09:00</b>	<b>Registration</b>
<b>09:00–09:30</b>	<b>Welcome and opening</b>
<b>09:30–10:30</b>	<p><b>Plenary 1: What are the tools, protocols and key components for monitoring and evaluation of population sodium consumption?</b></p> <ol style="list-style-type: none"> <li>1. Francesco Cappuccio (Urine)</li> <li>2. Mary L'Abbé (Food intake)</li> <li>3. Robert Merritt (Comparison)</li> </ol>
<b>10:30–10:45</b>	<b>Coffee break</b>
<b>10:45–12:15</b>	<p><b>Plenary 2: Country experiences with assessing sodium consumption.</b></p> <ol style="list-style-type: none"> <li>1. Corina Hawkes (overview)</li> <li>2. Anselm Hennis (Barbados)</li> <li>3. Kokou Agoudavi* (Togo)</li> <li>4. Michel Vigneault (Canada)</li> <li>5. Wenhua Zhao (China)</li> <li>6. Jacqui Webster on behalf of Isimeli Naisoso Tukana (Fiji)</li> <li>7. Sofia Guiomar (Portugal)</li> </ol>
<b>12:15–13:15</b>	<b>Lunch</b>
<b>13:15–15:00</b>	<p><b>Working Group Discussion – Identifying the most appropriate protocols for:</b></p> <ol style="list-style-type: none"> <li>1. Baseline assessment of sodium consumption</li> <li>2. Ongoing monitoring of sodium consumption</li> <li>3. Sampling strategies to obtain data representative of the country</li> </ol>
<b>15:00–15:15</b>	<b>Coffee break</b>

\* Unable to attend the meeting and sent electronic participation.

<b>15:15–15:45</b>	<b>Plenary 3: Tools and Methods to assess Knowledge, Attitudes and Behaviours (10 minutes each).</b> 1. David Roberts (New Zealand) 2. Amal Al Jowder* (Bahrain) 3. Adriana Blanco (Costa Rica)
<b>15:45–17:30</b>	<b>Working Group – Tools and methods to assess Knowledge, Attitudes and Behaviours.</b> Participants to address: “Which are the main tools used to assess Knowledge, Attitudes and Behaviours?”
<b>Wednesday 20 October 2010</b>	
<b>08:30–11:00</b>	<b>Plenary 4: Tools and methods to assess main population sources of sodium (baseline and monitoring and evaluation – home use and processed foods).</b> 1. Mary L'Abbé – discussion on tools 2. Corrina Hawkes – overview of survey 3. Charmaine Kuran (Canada) – monitoring 4. Sonia Angel (New York) – monitoring 5. Francesco Cappuccio on behalf of Jacob Plange Rhule (Ghana) – monitoring 6. Rafael Claro (Brazil) – baseline 7. Meng Thiam Lim (Singapore) – baseline 8. Chaisri Supornsilaphachai (Thailand) – baseline
<b>11:00–11:15</b>	<b>Coffee break</b>
<b>11:15–13:15</b>	<b>Working Group Discussion – Identifying the most appropriate protocols for identifying the main sources of sodium in the population diet, and monitoring and evaluation.</b>
<b>13:15–14:15</b>	<b>Lunch break</b>
<b>14:15–15:15</b>	<b>Plenary 5: Population Sodium Reduction – Framework for Action</b>
<b>15:15–15:30</b>	<b>Closing remarks</b>

\* Unable to attend the meeting and sent electronic participation.

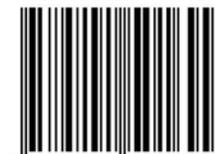
## Annex 3

# Abbreviations

<b>AWASH</b>	Australian Division of World Action on Salt and Health
<b>AMRO</b>	WHO Regional Office for the Americas
<b>BRFSS</b>	Behavioural Risk Factor Surveillance System (US)
<b>CDC</b>	Centers for Disease Control and Prevention (US)
<b>CIHR</b>	Canadian Institutes of Health Research
<b>EURO</b>	WHO Regional Office for Europe
<b>FDA</b>	Food and Drug Administration (US)
<b>FAO</b>	Food and Agricultural Organization of the United Nations
<b>ICRH</b>	Institute of Circulatory and Respiratory Health (CIHR)
<b>INCIENSA</b>	Instituto Costarricense de Investigación y Enseñanza en Nutrición y Salud
<b>INMD</b>	Institute of Nutrition, Metabolism and Diabetes (CIHR)
<b>ISCHF</b>	International Society of Cardiomyopathies and Heart Failure (World Heart Federation)
<b>LMIC</b>	Low- and Middle-Income Countries
<b>NCD</b>	Noncommunicable disease(s)
<b>NCI</b>	National Cancer Institute (US)
<b>NCNCD</b>	National Center for Chronic and Non-communicable Disease Control and Prevention (China)
<b>NGO</b>	Nongovernmental Organization
<b>NHANES</b>	National Health and Nutrition Examination Survey (US)
<b>NHIS</b>	National Health Interview Survey (US)
<b>NSRI</b>	National Sodium Reduction Initiative (US)
<b>NCHM</b>	National Center for Health Marketing (US)
<b>NCCDPHP</b>	National Center for Chronic Disease Prevention and Health Promotion (US)
<b>PAHO</b>	Pan-American Health Organization
<b>TMRI</b>	Tropical Medicine Research Institute (Barbados)
<b>USDA</b>	US Department of Agriculture
<b>WHO</b>	World Health Organization
<b>WPRO</b>	WHO Regional Office for the Western Pacific



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