Salt

Reduction

A Report on the Second High Level Salt Reduction Consultation Meeting

**Sports Science Institute, Claremont, Cape Town, South Africa
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THE HEART
AND STROKE
FOUNDATION
SOUTH AFRICA

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CONTENTS

1. Acronyms and Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
BP	Blood Pressure
CEO	Chief Executive Officer
CVD	Cardiovascular Disease
DBP	Diastolic Blood Pressure
FBDG	Food Based Dietary Guidelines
HIV	Human Immunodeficiency Virus
HSFSA	Heart and Stroke Foundation South Africa
Na	Sodium
NCD	Non-Communicable Disease
NDOH	National Department of Health
NGO	Non-Governmental Organisation
OR	Odds ratio
SA	South Africa
SAGE	Study on global AGEing and Adult Health
SBP	Systolic Blood Pressure
UIC	Urinary Iodine Concentration
WHO	World Health Organization
WtHR	Waist-to-height ratio

2. Executive Summary

South Africa implemented legislation requiring progressive reduction of salt in processed foods in June 2016 and significant progress has been reported towards meeting the initial targets. Further targets come into effect in June 2019 and a high level meeting of experts was convened as a pro-active step in Cape Town on 5 October 2018 to: (1) identify how South Africa's strategy fits within global initiatives; (2) disseminate information on achievements to date; (3) identify challenges; and (4) develop a way forward in key areas of salt reduction efforts.

South Africa is taking a lead in salt reduction legislation and the food industry has taken its responsibility to reformulate food products seriously. Professor Pamela Naidoo, CEO of the Heart and Stroke Foundation South Africa (HSFSA) identified that food labelling and endorsement programmes have shown considerable success. The 2017 World Action on Salt and Health global bread survey that assessed the composition of bread reported that South Africa generally had high compliance with recommended salt levels (WASH survey, 2017/2018).

Professor Karen Charlton, from the University of Wollongong, Australia, explained how data from the WHO Study on global AGEing and adult health (SAGE) had been used to provide baseline information on salt consumption prior to the introduction of the 2016 legislation. Overall, salt intake at that time was lower than anticipated, although 65% of the nationally representative sample consumed more salt than the WHO recommendation of <5g/day. For younger adults in the survey (18-49 years) salt consumption was high at >9g/day. Older people (>50 years) tended to consume less salt, which may reflect a greater awareness of hypertension and its associated risk factors in this age group. SAGE Wave 3 will be completed in early 2019, and this follow-up will provide information on whether sodium, potassium or iodine intake has changed in a cohort of people since the South African sodium legislation was introduced in 2016.

Charlton also reported on analysis using data from SAGE-South Africa Wave 2 that was undertaken to identify predictors of hypertension awareness, treatment and control in the country. Hypertension prevalence was 43% overall, and, of these hypertensive subjects, 42% knew about their hypertension and 33% were being treated. These results could be considered favourable, however only 18% of hypertensives had *controlled* blood pressure (BP). Predictors for hypertension included age (OR=1.03), being coloured (mixed race) (OR=1.60) and being overweight (OR=3.33). Education offered slight protection (OR=0.95) and diabetes was a moderate predictor of hypertension (OR=1.89). Self-reported diabetes was a strong predictor (OR=7.05) of awareness. The most significant predictors for being on treatment were waist-to-height ratio (OR=9.84), having diabetes (OR=3.61) and depression (OR=3.02). Individuals reporting lower salt use were more frequently aware of their hypertension status and more likely to be on treatment, and for this to result in controlled BP. These results suggest that salt campaigns and legislation may be working, at least in terms of changing awareness.

Professor Charlton's third presentation examined issues related to alignment of the salt iodization and salt reduction agendas. Data on iodine status of the South African population was previously limited to a 2005 study in which 77% of households were using iodized salt. Although iodine deficiency is relatively uncommon in South Africa there is a concern that a successful salt reduction programme may have unintended consequences for re-emerging iodine deficiency. Cappuccio and others have argued that there is a need for coordinated programmes to optimize salt and iodine intake. Using the WHO-SAGE cohort, Charlton found that overall iodine levels were adequate at the time of introduction of the salt reduction legislation, but that 44% had spot urinary iodine concentrations (UIC) below 100 µg/L which indicates insufficiency. Participants with the lowest salt intake (<5g/day) had a median UIC of 102 µg/L, which is borderline, while 58% of this group had 'inadequate' iodine intakes.

Dr Bianca van der Westhuizen, Nutrition Science Manager at the HSFSA described the 'SHAKE the Salt Habit' initiative of WHO which reviews best practices from around the world. SHAKE is an acronym to summarise the key areas proposed by WHO for reducing salt consumption, namely: Surveillance; Harnessing Industry; Adopting Standards; Knowledge; and Environment. This presentation provided an overview of current salt reduction strategies within this framework and set the scene for further discussion. Successful salt reduction strategies include political commitment to set mandates and targets; programme leadership and governance which decides who will be responsible for effective implementation; advocacy to ensure that salt reduction stays high on the agenda and to decide whose responsibility this will be; partnerships which are multi-sectoral and multi-stakeholder and may require an advisory group; and integration with iodine deficiency elimination programmes to ensure a coordinated approach. All elements of the salt reduction strategy should be in place and monitored in order to reduce the prevalence of high BP.

Mr Nigel Sunley, of Sunley Consulting and representing the South African Association for Food Science and Technology, provided an update on the current salt content of processed foods and how this has changed since the introduction of the R.214 legislation. Based on progress to date, it seems that most products already meet the 2019 targets, with one or two exceptions, and that further salt reduction may be technically impossible for some products. He also highlighted some scepticism from the food industry as to whether their considerable efforts will have desired health outcome effects. Industry members are questioning the role of government and the public health community in monitoring progress towards meeting salt reduction targets, particularly once the 2019 levels have been implemented. Mr Sunley communicated a need required by industry for evidence to illustrate that salt reduction legislation has made a difference. Sunley argued that further regulation is neither desirable, nor technically feasible, for many products and that the focus going forward should be on consumer education.

Ms Terry Harris spoke about the work of Discovery Vitality and partnership opportunities. In order to enhance and protect the lives of Discovery Vitality members, their nutrition strategy is to improve the diets of their members by reducing sugar and salt and increasing fruit and vegetables purchased. In partnership with The George Institute, Vitality has conducted research into the sodium content of processed foods and published a study describing the information collected from over 11,000 packaged food items in four major supermarket chains between June 2015 and August 2016. Sixty-seven percent of the items were already below the legislated maximum sodium content. Categories with more than 50% of the products exceeding the legislated amount of sodium included: potato crisps (59%), salt and vinegar savoury snacks (58%), processed raw meat (55%) and bread (77%).

Discovery Vitality uses incentives to encourage healthier behaviours and applies behavioural economics principles technology and data to achieve this. Technology developed by The George Institute is used to capture information using the FoodSwitch mobile phone application on food products and uploaded to a central database. The HealthyFood[TM] benefit offers members up to 25% cash back when healthy foods are purchased from their retail partners. The purchasing data from more than 420,000 HealthyFood families has shown that cash back significant increases the ratio of healthy food purchases to total food and an increase in the ratio of fruit and vegetables to total food. Improved health outcomes have also been reported with 40% lower diagnosis of lifestyle-related diseases for members purchasing a greater proportion of healthy food.

A case study to test the proficiency of laboratories for measuring sodium content in processed foods was presented using pork meat products by Dr? Beulah Pretorius of the University of Pretoria. The study involved eight laboratories, of which four were ISO17025 certified, and used a certified reference sample from the UK. Local tinned Vienna sausages were the foods tested. Laboratories were asked to provide analyses for moisture, sodium, and sodium chloride. For the reference material, moisture results were outside the expected limits for two labs and one lab produced no result. For sodium, there was one outlier and one lab produced no results. Sodium chloride values were reported by three laboratories: for the certified reference material, two laboratories reported satisfactory results and one was too high; for the unknown sample, all laboratories obtained satisfactory Z-scores. Six of the eight participating laboratories performed satisfactorily when measuring sodium in processed pork meat.

Ms Duduzile Mthuli, from Unilever Pty Ltd., presented information from an observational study on the effects of sodium reduction in stock cubes on the salt content of the final dish, as consumed. The study concluded that, based on stew preparation, salt regulations and awareness campaigns are working. Less people were cooking with both stock cubes and salt in 2016 compared to 2012. However, 70% maintained their cooking behaviour of adding or not adding salt, regardless of the salt content of the stock cubes. The study concluded that health professionals should be encouraged to talk about the use of salt in food preparation, and suggest alternatives to salt, as well as communicate health messages via food labelling.

A wide-ranging discussion followed the formal presentations, details of which are contained the body of this report. The ideas that emerged were collated using the WHO SHAKE framework, as summarised below:

Surveillance

1. Ensure that analytical methods for salt measurement in foods are standardised across laboratories before embarking on more widespread monitoring.
2. Commission behavioural surveys to find out about table salt use as a potential compensatory behaviour associated with reduced sodium in processed foods.
3. Review the type of results which will come out of current endeavours, academic and otherwise, identify gaps and commission research to fill them.
4. Use existing data to provide baseline information of salt intakes in the South African population, such as the national WHO-SAGE Salt and Tobacco study and the 20-year cohort study in the North West province.
5. Identify funding post 2019 for a survey to assess whether food products are compliant with the stricter 2019 salt regulations.
6. Consider piggybacking salt questions onto other surveys, such as a sugar tax survey or future demographic health surveys or SANHANES surveys.
7. Advocate to government for an ongoing monitoring and surveillance framework for salt intake.

Harness industry

8. Acknowledge what has already been achieved by food industry in lowering sodium content of processed foods.
9. Reduce sodium consumption by changing the composition of the food that people buy. This applies particularly to poorer communities which have limited food choices.

Adopt Standards for Labelling and Marketing

10. Applying the public health policies advocated by WHO may be insufficient – South Africa needs to demonstrate the impact of these policies.
11. Establish who is responsible for monitoring and which governmental departments will ensure food industry compliance.

Knowledge

12. Teach the public why salt reduction is necessary in order to convince them that 'a little is enough'.

Environment

13. Create an enabling environment and make sure that all public health interventions to address NCDs that influence the food environment but also the health services environment, from prevention to treatment, fit together.

3. Background

Given implementation in June 2016 of the South African sodium regulations and significant advances that have been made towards meeting the initial targets for salt levels in foods, late 2018 was an optimal time to bring together key stakeholders to discuss progress and map out future directions. The objectives of this stakeholder meeting were:

1. To identify how South Africa's strategy fits within global initiatives;
2. Disseminate information on achievements to date; and
3. Identify challenges, and develop a way forward in key areas, namely, compliance and monitoring; consumer education; and the role of research in informing the effectiveness of salt reduction efforts.

The high-level consultation meeting, sponsored by WHO's Study on global AGEing and adult health (SAGE), through a grant from Bloomberg Philanthropies, brought together 19 global and national health experts, and representatives from government, industry, professional bodies and other key stakeholders. The meeting was a follow-up to one held in September, 2016, the outcomes of which were communicated in an editorial[1] and distributed through a glossy publication disseminated by the George Institute for Global Health.[2] Five priority areas for further action were identified at that meeting, as follows:

1. Support full compliance with the existing legislation and increase broad multi-disciplinary and multi-agency efforts to prepare for the 2019 legislative thresholds;
2. Target foods eaten out of the home, by understanding the contribution to foods eaten out of the home to total salt intake, including those from fast service restaurants;
3. Implement the next stage of the campaign to change consumer behaviours within a whole-of-diet approach;
4. Address health inequalities (campaigns need to target lower-socioeconomic groups, rural and township areas, and those with the worst health outcomes); and
5. Identify additional funds for research and monitoring.

The first phase of the 'Regulations relating to the reduction of sodium in certain foodstuffs' (R.214), published in March 2013, came into effect on 30 June 2016; the long lead-in period allowing the food industry time to establish a dialogue with government and to institute the required changes. The second phase of the regulations, which reduce targets for the maximum sodium content of many foodstuffs still further, comes into effect on 30 June 2019.

4. Purpose of the meeting

Professor Pamela Naidoo, CEO of the Heart and Stoke Foundation South Africa (HSFSA), welcomed delegates and pointed out that this meeting was a collaborative venture between HSFSA, WHO-SAGE and University of Wollongong. It brought together a group of experts from academia, government, the private sector and NGOs. She explained that the main objective of the meeting was to reflect on the impact of the ground-breaking 2016 legislation and consider the implications of the legislated targets for reduction of sodium in foodstuffs in 2019.

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[1] Webster et al. (2016) South Africa's salt reduction strategy: Are we on track, and what lies ahead? *South African Medical Journal* 2016; 107: 20-21.
[2] https://www.whoccsaltreduction.org/wp-content/uploads/2017/03/South-Africa-Report.pdf

After briefly reviewing the purpose of the 2016 meeting (referred to above) Prof Naidoo explained the purpose of the 2018 meeting was primarily to answer the following three questions:

        a) Have we followed through and made progress on the recommendations made in 2016 regarding education, the research mandate, advocacy, monitoring and compliance?

        b) Are we 'target ready' for 2019?

        c) What should we prioritise?

South Africa has had many positive outcomes from their progressive salt reduction strategy. The country is taking a lead in salt reduction legislation, industry has taken the legislation seriously and food labelling and endorsement programmes of the HSFSA have shown considerable success. Success indicators are derived from pre-post survey results for 'Salt Watch' [3]and the 2017 Salt Reduction campaign: *'Your body does not need the extra salt'[4]*. The 2017 World Action on Salt and Health global bread survey reported that South Africa generally had high compliance with recommended salt levels[5]. Unilever's consumer research also found that the HSFSA was one of the biggest influencers of salt consumption behaviour.

5. Using WHO-SAGE cohort data to monitor salt intake and blood pressure trends over time

Professor Karen Charlton, from the University of Wollongong, Australia, explained that the WHO-SAGE Cohort study is a study on ageing and health in six low-middle income countries, including South Africa. Waves 1 and 2 are complete and Wave 3 was currently in the field. The study provided an opportunity to 'piggy back' other research questions on the existing survey and for ongoing surveillance and this was made possible through additional funding provided by a grant from Bloomberg Philanthropy Foundation, administered through the CDC Foundation.

Given that the probability of dying from non-communicable diseases (NCD) in South Africa is among the highest in the world, prevention of NCDs is key and probably of even greater significance than HIV/AIDS. The WHO has identified a number of global NCD targets for 2025, one of which is a 30% reduction is sodium intake. Moreover, the South African Minister of Health, Dr Aaron Motsoaledi, has committed to reducing mean population intake of salt from the current level of 8-10g per day to less than 5g per day by 2020. This is to be achieved through a public health campaign and regulation of the food industry.

WHO recommends <5g salt/day and although African countries generally consume less salt than much of the rest of the world, only Kenya is achieving this target. Many countries have responded by introducing policy and legislation, and South Africa was a forerunner in 2015.[6] The South African approach to salt reduction includes a wide array of processed foods, whereas other countries have tended to focus on one or two staples, such as bread, which is the primary food contributor to salt intake in many countries.

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[3] Wentzel-Viljoen E, Steyn K, Lombard C, et al. Evaluation of a Mass-Media Campaign to Increase the Awareness of the Need to Reduce Discretionary Salt Use in the South African Population. *Nutrients*. 2017;9(11):1238.

[4] http://www.heartfoundation.co.za/topical_articles/your-body-doesnt-want-the-extra-salt/

[5] http://www.worldactiononsalt.com/

[6] Trieu K, Neal B, Hawkes C, Dunford E, Campbell N, et al. (2015) Salt Reduction Initiatives around the World – A Systematic Review of Progress towards the Global Target. *PLoS ONE* 10(7): e0130247. doi:10.1371/journal.pone.0130247
http://journals.plos.org/plosone/article?id=info:doi/10.1371/journal.pone.0130247

By 2015, mandatory salt targets were in place in nine countries of which South Africa was one. South Africa has a progressive salt reduction policy while other countries have opted for voluntary targets. Despite comprehensive legislation, some key questions remain: 'Will it work?' and 'What about discretionary salt use?' These questions require reliable baseline data in order to assess progress, which is where the WHO-SAGE study comes in[7]. The WHO- SAGE study included salt behaviour questions[8] in Waves 2 and 3, allowing for pre- and post-campaign samples to be collected, with Ghana included as a control country with no salt legislation. Twenty-four hour urine collection to determine sodium excretion was used as a proxy gold standard measure for salt intake.

Overall, salt intake before the 2016 legislation came into effect was lower than anticipated, although 65% of the sample ate more salt than the WHO recommendation of <5g/day, and for younger adults (18-49 years) salt consumption was high at >9g/day. Older people (>50 years) tend to eat less salt, which may be explained by a greater awareness of hypertension or its associated risk factors in this age group. Potassium intake was very low with only 7% getting enough potassium. The short questions on fruit and vegetable consumption used in this survey indicate that few participants reported eating more than one serving per day of either.

There appears to be a relationship between salt consumption and increase in BP with age. For the low salt group (<5g per day) there was 1.4 mm Hg SBP increase per 10 years and for the high salt group (>9g per day) 5.5 mm Hg SBP increase per 10 years. Thus high salt users appear to have significantly faster increase in BP with age[9].

Wave 3 data collection will allow repeat urine collection from the same households and is expected to be completed by early 2019. This will provide information on whether sodium, potassium or iodine intake has changed since the South African sodium legislation was introduced (June 2016). The legislation is predicted to:
a) decrease nationwide salt intake by 0.85 grams/day;[10]
b) reduce annual CVD deaths by 11%;
c) save the government US$51.25 million/year (R730 million/year); and
d) prevent 2000 cases of poverty/year by saving households >US$4 million/year (>R60 million/year) in out-of-pocket medical expenses.[11]

6. Predictors of hypertension awareness, treatment and control in South Africa

Prof Charlton also presented data from over 2000 WHO-SAGE (Wave 2) participants to examine predictors of hypertension awareness, treatment and control in South Africa[12]. Hypertension prevalence was 43% overall, and, of these, 42% knew about their hypertension and 33% were being treated. These are both fairly good results but only 18% had *controlled* blood pressure.

The analysis included unadjusted, age-adjusted and fully-adjusted logistic regression models for various outcomes including hypertension, awareness, treatment, control and also examined self-reported

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[7] Charlton KE, Ware LJ, Menyanu E, et al. Leveraging ongoing research to evaluate the health impacts of South Africa's salt reduction strategy: a prospective nested cohort within the WHO-SAGE multicountry, longitudinal study. *BMJ Open* 2016;**6**:e013316

[8] Menyanu E, Charlton KE, Ware L, Russell J, Biritwum R, Kowal P.Salt use behaviours of Ghanaians and South Africans: A comparative study of knowledge, attitudes and practices. *Nutrients* 2017; 9: 939; doi:10.3390/nu9090939

[9] Ware LJ, Charlton K, Schutte AE, Cockeran M, Naidoo N, Kowal P. Associations between dietary salt, potassium and blood pressure in South African adults: WHO SAGE Wave 2 Salt & Tobacco. *Nutrition, Metabolism & Cardiovascular Diseases* 2017; 27: 784-791.

[10] Bertram Y, Steyn K, Wentze-Viljoen E, Tollman S, Hofman J. (2012) Reducing the sodium content of high-salt foods: Effect on cardiovascular disease in South Africa. *South African Medical Journal* 2012;102(9):743-45.

[11] Watkins DA, Olson ZD, Verguet S, Nugent RA, Jamison DT. (2015) Cardiovascular disease and impoverishment averted due to a salt reduction policy in South Africa: an extended cost-effectiveness analysis. *Health Policy and Planning* 2015:czv023.

[12] Ware LJ, Chidumwa G, Charlton KE, Schutte AE, Kowal P. (2018). Predictors of hypertension awareness, treatment and control in South Africa: results from the WHO-SAGE population survey (Wave 2). *Human Hypertension*.

comorbidities such as diabetes and depression, obesity and other health behaviours. For obesity, this study found that waist-to-height ratio (WHtR) was a better predictor than body mass index.

Predictors for hypertension included age, which produced a slightly elevated risk (OR=1.03), being coloured, moderate risk (OR=1.60) and being overweight, a substantial risk (OR=3.33). Education offered slight protection (OR=0.95) and diabetes was a moderate predictor of hypertension (OR=1.89).

For awareness of hypertension, obesity (OR=11.66) and diabetes (OR=7.05) were strong predictors of awareness. Thus if people are overweight or diagnosed with diabetes they are much more likely to know whether they are hypertensive. In South Africa, doctors and nurses are good at routinely measuring blood pressure although this is less common in other countries.

For being on treatment, the most significant predictors were waist-to-height ratio (OR=9.84), having diabetes (OR=3.61) and depression (OR=3.02).

A question about whether people add salt to their food at the table found that people who did not add salt to food were more likely to be treated and for their hypertension to be under control. While this cannot be seen as a causal relationship, it implies that once on treatment, patients' awareness of the risks associated with salt increases. Likewise being diagnosed with diabetes was a positive predictor for adequate control of BP (OR=2.60).

In summary, almost half the 1,847 survey participants were hypertensive (43%), more than half of the 802 hypertensive adults did not know about their condition (57%) and 82% of them were either not on treatment or had inadequately controlled BP. There is a higher risk of hypertension in older, more overweight, and coloured populations, with lower educational levels or diabetes comorbidity. Women, those with co-morbidities, and the more overweight are consistently more likely to know they have hypertension and be on medication.

The only variables consistently related to controlled BP were diabetes comorbidity and salt use. Individuals reporting lower salt use were more frequently aware of their hypertension status and more likely to be on treatment, and for this to result in controlled BP. These results suggest that salt campaigns and legislation may be working, at least in terms of changing awareness.[13]

7. Alignment of Salt Iodization and Salt Reduction Agendas

Prof Charlton's final presentation asked the question 'What about iodine?' and examined issues around the alignment of the salt iodization and salt reduction agendas.

Currently, iodine deficiency is relatively uncommon in South Africa but there have been calls for increased iodine monitoring during the salt reduction strategy. Iodine deficiency has serious consequences for all age groups but is particularly important in pregnant women and infants. Even mild iodine deficiency can result in mental retardation and impaired cognitive and motor development, which affect performance at school and productivity of adults.

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[13] Edelweiss Wentzel-Viljoen et al. (2017) Evaluation of a Mass-Media Campaign to Increase the Awareness of the Need to Reduce Discretionary Salt Use in the South African Population. *Nutrients* 2017;9: 1238; doi:10.3390/nu9111238.

Prevention of iodine deficiency by iodization of table salt has been described as a 'public health triumph' with the great majority (78-91%) of households using iodised salt by 2017. In 1993, 110 countries were iodine deficient; by 2013 only 31 countries were and by 2016/17 this had fallen to only 20 iodine deficient countries. In South Africa, voluntary iodization of table salt (10-20 ppm) was introduced in 1954 and this became mandatory in 1995 (40-60 ppm) and the regulations were revised in 2007 to include a broader range (35-65 ppm). The last national survey of iodine status in South Africa was conducted in 2005 and this found that 77% of households were using iodized salt but there is a lack of recent comprehensive data. There is a concern that while salt reduction is going well there may be implications for iodine deficiency.

If the focus of salt reduction campaigns is only on the food industry, there may be little impact on iodine status because iodised salt is not generally used by the food industry. According to a 2003 study by Harris et al.,[14] none of the manufacturers of a range of bread and bread premixes said they used iodised salt. However, on investigation, one bread contained 61 ppm iodine, one margarine 39 ppm and salty snack flavourants 67-69 ppm. In response to this dilemma, the WHO organized an expert consultation in 2007 to discuss the use of salt as a vehicle for iodine fortification and its compatibility with recommendations for reducing salt intake that emerged from a WHO expert consultation held in Paris in 2006. Cappuccio and others have argued that there is a need for coordinated programmes to optimize salt and iodine intake.

Initial empirical data from Cape Town found that there was no association between urinary iodine concentrations (UIC) and 3 x 24 hr urinary sodium for three categories of salt consumption (<5g/day; 5-9 g/day; >9g/day)[15] and each category of salt intake had adequate iodine levels. A follow-up study, using the WHO-SAGE cohort, found that overall iodine levels were adequate but 44% fell below 100 µg/L which is categorised as 'insufficient'. When considering iodine status by salt intake, the low salt intake group (<5g/day) had a median UIC of 102 µg/L and which is close to the 'insufficient' cut off and 58% of this group had 'inadequate' iodine intake, based on 24-hour Urinary Iodine Excretion[16].

Overall, South Africa has a well functioning salt iodisation programme, but these results highlight a need for continued monitoring of population level iodine status, to coincide with efforts to reduce salt intake in the South African population. The WHO-SAGE Wave 3 data will allow for this assessment.

Discussion

In discussion, the question was raised as to whether salt is adequately iodized, to which Prof Charlton said that although this was not measured in 2015 there had been compliance with targets even before the legislation.

Another question raised the issue of whether in a sample of mostly older persons, such as WHO-SAGE, lower kidney function could compromise results. The response indicated that reference values for urinary creatinine excretion had been applied to the dataset. Dr Bianca van der Westhuizen reported that sufficient iodine was found in the <5 g/day group in another survey conducted from 2013 to 2016[17].

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[14] Harris MJ, Jooste PL, Charlton KE. (2003) The use of iodised salt in the manufacturing of processed foods in South Africa: Bread and bread pre-mixes, margarine, and flavourants of salty snacks. *International Journal of Food Science & Nutrition* 2003;54:13–9.

[15] Charlton KE, et al. (2013). A lowered salt intake does not compromise iodine status in Cape Town, South Africa, where salt iodization is mandatory. *Nutrition* 2013; 29: 630-634.

[16] Charlton KE, Ware LJ, Baumgartner J, Schutte AE, Kowal P. A How will South Africa's mandatory salt reduction policy affect its salt iodisation programme? A cross-sectional analysis from the WHO-SAGE Wave 2 Salt & Tobacco study *BMJ Open* 2018; 8: e020404

[17] Swanepoel, B., Schutte, A.E., Cockeran, M., Steyn, K. and Wentzel-Viljoen, E., 2016. Sodium and potassium intake in South Africa: an evaluation of 24-hour urine collections in a white, black, and Indian population. *Journal of the American Society of Hypertension*, 10(11), pp.829-837.

8. Legislation and the broader strategy of salt reduction

Dr Bianca van der Westhuizen addressed the meeting with a presentation entitled *Contextualizing the R.214 legislation and post-legislation within a broader strategy of salt reduction.* The presentation provided an overview of the salt reduction strategy and set the scene for further discussion.

The salt reduction strategy framework comprises a problem statement, namely hypertension and its link with high sodium use, and the desired outcome of a national strategy for salt reduction. It was highlighted that three main components need to be monitored and evaluated, namely sodium intake, sodium content in food and consumer behaviour.

Dr van der Westhuizen described the 'SHAKE the Salt Habit' initiative of WHO which reviews best practices from around the world. SHAKE is an acronym for the key areas proposed for reducing salt consumption, namely: Surveillance, Harnessing industry, Adopting standards, Knowledge and Environment. The details of each component are as follows.

Surveillance – measure and monitor salt use
> *Why does it matter?*
>> It is necessary to measure the success of interventions
>> To show leaders and government
>> To identify dietary sources of salt & collect information on consumer behaviour
> *What needs to be done?*
>> Measure & monitor population salt consumption
>> Measure & monitor sodium in food
>> Monitor & evaluate the impact of the salt reduction programme

Harness industry – promote reformulation of foods and meals to contain less salt
> *Why does it matter?*
>> The bulk of the salt comes from processed foods
>> Encouraging reformulation is the first step
> *What needs to be done?*
>> Develop a clear set of targets for Na level
>> Voluntary or legislative approaches
>> Key steps: selecting foods; engaging with industry; defining the Na targets; setting timelines

Adopt Standards for Labelling and Marketing – implement standards for effective and accurate labelling and marketing of food
> *Why does it matter?*
>> Clear labelling systems allow consumers to understand Na content quickly
>> Standards will prevent marketing and labelling that misrepresents salty foods as healthy options
> *What needs to be done?*
>> A number of labelling strategies can be used to support salt reduction
>> Salt warning labels? Front-of-pack?
>> These ideas must be incorporated in the countries existing labelling system

Knowledge – Educate and communicate to empower individuals to eat less salt
> *Why does it matter?*
>> Consumer awareness is important

Raising awareness of the health impact of high salt intake and the major sources will influence consumer behaviour and increase demand for lower-salt products

What needs to be done?

Communication strategies to influence behaviour should be informed by research, strategically planned and should include education, social marketing and use of innovative platforms

Environment – support settings to promote healthy eating

Why does it matter?

Reach people where they live, work and play

Most adults spend the vast majority of their time at the workplace, therefore we need to protect and promote health in these settings

What needs to be done?

Identify key settings where evidence shows that strategies will have the greatest impact

Restricting marketing of high salt foods to children will promote healthy eating from an early age

Successful salt reduction strategies include those that incorporate core elements included in the SHAKE package. For successful implementation, these elements require political commitment to set mandates and targets; programme leadership and governance mechanisms to identify the stakeholders that are responsible for effective implementation; advocacy to ensure that salt reduction stays high on the public health agenda and ensure ownership by governmental directorates; partnerships which are multi-sectorial in nature and that include multiple stakeholder groups, including an unbiased advisory group; as well as integration with iodine deficiency elimination programmes to ensure a coordinated approach. The elements of any national salt reduction strategy need to be monitored for their effect on the prevalence of high blood pressure and other related health outcomes.

Discussion

A question was raised regarding whether or not iodised salt should be used in food processing. The answer was that this could potentially do more harm than good and that extensive monitoring may be required before taking such action. Australia, a country without universal salt iodisation, undertook an extensive dietary modelling process and wide public consultation before mandating the use of iodised salt in the bread-making process in 2009.

Another speaker raised the issue of fragmentation within government departments which complicates control efforts. Overarching food safety is the role of one department while sodium reduction strategies fall within another, while neither have resources for monitoring. While the Medical Research Council may be able to assist, most monitoring is done at the local level in 52 districts and metropolitan areas while imported foods are dealt with nationally. Monitoring the sodium content of products is particularly challenging.

A 20-year prospective study is underway at North West University, which started in 2013 and includes different age, ethnic and socio-economic groups, with the aim of identifying early determinants of hypertension. Data will include 24-hr dietary recall and 24-hr urine analysis, including iodine. The sample size is 1200 and the first paper will soon be published.

9. Industry compliance with current and future sodium regulations

Mr Nigel Sunley, of Sunley Consulting and representing the South African Association for Food Science and Technology, provided an update on the current salt content of processed foods and how this has changed since the introduction of the R.214 legislation.

His talk drew on a baseline established using published sodium levels from product labels in 2013 (prior to the introduction of R.214) and a further sample of the same products in May 2018. Sunley used a 'traffic light' system in his presentation to demonstrate which products were compliant: green for compliant with both 2016 and 2019 levels; orange for compliant 2016 but non-compliant 2019; and red for non-compliant for both. The method relied on what was declared on the product labels which, according to Marlise Korff (2018 Nutrition Congress presentation)[18], generally compares well with analysed values.

Non-compliant 2016

Compliant 2016, non-compliant 2019

Compliant 2016 & 2019

Informal comments from industry set the scene regarding the challenges arising from the new regulations. The process for bread has been difficult and has contributed to price increases mainly due to the cost of salt replacers, which are typically 25 times the price of salt, and extra gluten which had to be added to maintain texture.

Flavouring costs for snacks have significantly increased and many reformulated products are less acceptable according to consumer research. In some instances, previously, un-needed allergens have had to be incorporated in snack food flavourings. Savoury products have met 2016 requirements but achieving the 2019 requirements is proving extremely difficult and it is likely that discretionary salt will become an issue for savoury products at the 2019 levels. The whole reformulation exercise has been very expensive for industry in terms of research and development costs and additional resources.

The survey results showed the following:
- o Most *snacks* were non-compliant in 2013 but generally nearly compliant for 2019.
- o Most *potato chips* are in the orange or green categories although salt and vinegar chips are permitted higher sodium content because of the sodium diacetate which provides the vinegar flavour.
- o Most *cured processed meats* were already compliant in 2013.
- o *Uncured meats* are the most non-compliant but have been excluded from R.214 in the 2017 amendments, presumably on grounds of product safety because salt acts as a preservative. In this regard, *Listeria* is fairly salt tolerant but many other microbes are not, thus eliminating salt in these products increases the risk of microbial contamination.
- o Nearly all *bread* was in the green category but it has been difficult for industry to achieve this. Since bread is the biggest single contributor of sodium this is important and the industry deserves to be congratulated.
- o Many *fat spreads* are 2019 compliant, while others are getting close.
- o Most *breakfast cereals* are compliant and the remainder should get there by 2019.

In summing up the processes involved, Mr Sunley noted that there have been significant flavour changes in some snack foods and even disappearance of some variants, such as some brands of salt and vinegar chips. Processed meats have managed the transition but it is desirable that uncured comminuted meat products remain excluded from the salt legislation. Bread has managed the transition but it has been difficult and producers are now at the absolute limit of technical feasibility. An important question may be whether removing salt from breakfast cereals results in consumers using more sugar to account for flavour changes.

A big challenge remains for savoury foods. Most instant noodles are still categorised as orange and will be very hard to improve. Soups and gravy powders still have a long way to go. Sauces, stock cubes and concentrates are getting there. For the most part, issues relate to flavour with no technical concerns.

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[18] Korff, M. Wicks, M, van Zyl, T and van der Westhuizen, B. 2018 South African Journal of Clinical Nutrition; 31(3):Supplement 1

Manufacturers have managed to meet 2016 limits, but the 2019 limits are currently only met by Knorr Stock Pot products. The 2019 limits are arguably unrealistic in spite of small increases in permitted levels for some categories. Salt is a major component of these products and major flavour changes are unavoidable, even with a progressive reduction strategy.

Major re-formulation is a challenge for research and development staff and replacement is difficult. Mr Sunley noted a need to for food manufacturers to consider non-sodium flavour enhancers or sodium-containing flavour enhancers at low dosages. These changes will almost certainly increase raw material costs and therefore product price for the consumer.

In terms of consumer acceptance, progressive reduction is the known to be the optimal approach but increases in discretionary salt use is a potential undesired consequence. It may be appropriate for food labelling to provide instructions that say "add salt to taste". Such instructions are permissible at present and industry may choose to take this approach.

Based on progress to date, it appears that most products will meet the 2019 targets, with one or two exceptions. However, there is some scepticism from industry as to whether their efforts will have the desired effect in terms of health benefits. Industry wants to know what the government and the public health community are going to do to monitor progress, particularly once the 2019 levels have been implemented. The scientific community, including the WHO, needs to silence its critics by providing evidence that this legislation and effort has made a difference.

Mr Sunley urged that in the short term, the following questions are pertinent:
- What effect have the regulations had on average per-capita intake of sodium in South Africa?
- Is there any evidence that discretionary salt intake has changed, following the implementation of the regulations?

In the medium term:
- Is there any significant change in the incidence of hypertension and related clinical conditions that should be affected by sodium intake?

In conclusion, Mr Sunley appealed to the meeting to:
- o acknowledge the progress made by industry in meeting regulatory targets;
- o table a plan for scientifically monitoring the effects of the regulation after an appropriate period;
- o consider the bigger picture and accept that food reformulation to meet stricter (phase 2; 2019) mandatory targets may be difficult; and
- o acknowledge that further regulation may neither be desirable nor technically feasible for many products and that the focus going forward should be on consumer education.

10. Partnership opportunities

Ms Terry Harris spoke about the work of Discovery Vitality, a subsidiary of Discovery Health insurance, which aims to promote healthy food and lifestyle choices, and focused on their research into the sodium content of processed foods during the introduction of the mandatory sodium limits. Their study collected food labelling information on over 11,000 processed food items purchased by Discovery clients in four major supermarket chains between June 2015 and August 2016. Of these items, 67% had salt contents that were already below the legislated maximum sodium content. Categories with more than 50% of the products exceeding the legislated amount of sodium included: potato crisps (59%); salt and vinegar snacks (58%); processed raw meat (55%); and bread (77%). This data has some imitations in that the analysis did not

include actual food purchases, consumption or market share of brands, and that the timing of the study spanned both prior and post 2016 legislation. It is likely that some manufacturers may have begun reformulating their products prior to June 2016[19]. A further study is underway to examine food purchases between 2016 and 2017 which will assess total salt content of foods purchased, identify the major food group contributors and allow for an updated assessment of sodium levels in foods. This data will inform which further reductions are required in order to achieve full adherence to the mandatory targets.

Ms Harris also provided information on the Vitality Shared-Value Insurance Model. This operates through a virtuous cycle of which encourages healthy behaviour of members that, in turn, benefits the company through lower claim rates and produces a healthier society and reduced healthcare burden. The model has been integrated into 17 international markets so far.

Vitality uses a combination of behavioural economics, technology and data to change behaviour. Decision-making can be influenced by appealing to aspects such as perceived value, loss aversion, social identity and incorrect perceptions. Technology can be used both to capture information on food products and upload this to a central database for analysis. The *Food Data Collector* app, is available for use after consultation with the George Institute, while the Discovery *HealthyFood Switch* app is already in the public domain (Google play store).

> *"The cost of nutritionally preferable foods can motivate people to significantly improve their diet, and behaviour changes are proportional to price changes. When there is a large gap between people's actual eating behaviours and what nutritionists recommend, even a 25% price change closes that gap."*
>
> Prof Roland Sturm, Economist, RAND Corporation

Discovery Vitality has HealthyFood[TM] purchasing data from more than 420,000 families participating in the Woolworths and Pick n Pay incentive scheme for cash back on healthy foods. This data has shown a significant increase in the ratio of healthy food purchases to total food and an increase in the ratio of fruit and vegetables to total food. There have also been improved health outcomes reported with a 40% lower diagnosis of lifestyle-related diseases for members purchasing a greater proportion of healthy food.

Ms Harris concluded her presentation by reiterating that there are further opportunities to change purchasing behaviours in order to improve health outcomes. The FoodSwitch database is one way to track food supply in the absence of chemical analysis of products and Discovery Vitality has a potential role to play in evaluating the impact of salt legislation.

Discussion
In discussion it was noted that the Discovery database comprises only those who subscribe to the HealthyFood option and that its members are typically from higher socio-economic groups. Other data sources are needed to describe the behaviour of poorer people.

Mr Nigel Sunley suggested that it may be possible to link the Discovery data on what their clients *purchase* to Nielsen consumer data which will show what has been *sold* overall (both are apparent consumption data sources). There will be cost and intellectual property issues to deal with but a large corporation such as Nielsen could be asked to make data available free of charge for public health reasons. Starting with a pilot

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[19] Peters, S.A., Dunford, E., Ware, L.J., Harris, T., Walker, A., Wicks, M., van Zyl, T., Swanepoel, B., Charlton, K.E., Woodward, M. and Webster, J., 2017. The sodium content of processed foods in South Africa during the introduction of mandatory sodium limits. *Nutrients*, 9(4), p.404.

for one product category of particular relevance to the sodium reduction strategy might be the best way to test the feasibility of this suggested approach.

Professor Rina Swart from the University of the Western Cape suggested that there may also be an opportunity to add dietary intake data to the next the income and expenditure survey and conduct dietary modelling to determine whether consumer purchasing patterns indicate a change in diet over time.

11. Challenges in testing the sodium content of foods: Case study of processed pork

Dr Beulah Pretorius, of the University of Pretoria, presented information on an inter-laboratory study to test proficiency for measuring sodium content in processed pork meat products. The rationale for the study was that there is wide variation in reported sodium content of different brands of the same product which may be related to differences in testing methods.

Two samples were used, a certified reference material (BB501b) of processed pork meat and an unknown test sample of local tinned Vienna sausages. Eight laboratories participated, four of which were ISO17025 certified. The assigned value and the uncertainty for moisture and sodium for the reference sample were certified by LGC, UK. A calculated value and uncertainty for sodium chloride were calculated by LGC using the certified sodium and chloride values.
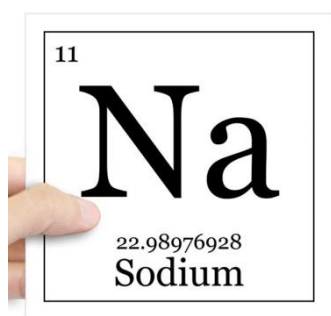
For the reference material, moisture results were outside the expected limits for two labs and one lab produced no result. For the unknown test material, a consensus value was calculated as the arithmetic mean and standard deviation from the results reported by the participating laboratories. Z-scores were used as the performance indicator. For moisture, one lab had a high positive deviation, indicating a need for remedial action and two labs produced no results. For sodium, there was one outlier, which was excluded, and one lab produced no results. Sodium chloride values were reported by three labs: for the certified reference material, two labs reported satisfactory results and one was too high; for the unknown sample, all labs obtained satisfactory Z-scores.

Overall, sample preparation techniques did not influence accuracy directly, although one lab, which was an outlier for all values, did not submit method information. Six of the eight participating laboratories performed satisfactorily when measuring sodium in processed pork meat. A cause for concern was that the sodium content stated on the product label of the unknown sample was more than 20% below the mean sodium value reported by the participating laboratories.

Discussion

In discussion, the point was made that a previous speaker had provided evidence that most products labels were usually correct. However, it was pointed out that products with a high fat content (such as processed pork) are particularly difficult to analyse. Nonetheless, the incorrect results are a cause for concern given that these were large laboratories that are routinely used by industry. It was also noted that the regulations allow for 20% variation because it is so difficult to measure sodium accurately.

Contract analysis is big business but the quality of some labs is questionable. A lot of companies send material overseas because they do not trust local results but it is incorrect to say that sodium determination cannot be done in South Africa.

12. Effect of sodium reduction in stock cubes on food preparation and consumer preferences

Ms Duduzile Mthuli, from Unilever, presented information on an observational study of the effects of sodium reduction in stock cubes on the final dish, as consumed. Unilever carried out a consumer study using chicken stew, which is one of the most commonly eaten dishes in South Africa. The research questions were: 1) Will consumers like the sodium reduced cube (2019 level) significantly less than the current one? 2) Will consumers change their cooking behavior and add more salt when cooking with the sodium reduced cube? 3) Is the net sodium content of the final dish the same, more, or less, when cooking with the reduced sodium cube?

The method was to observe consumers' stew preparation when cooking with salt only, with the 2016 formulation stock cube and finally with the 2019 formulation stock cube (**Error! Reference source not found.**). The sample comprised 292 black South African women who regularly prepared chicken stew using a specific brand of stock cubes. After stew preparation a sample was taken for analysis and the consumers were asked about product satisfaction. There was no control over other ingredients used in the stew.
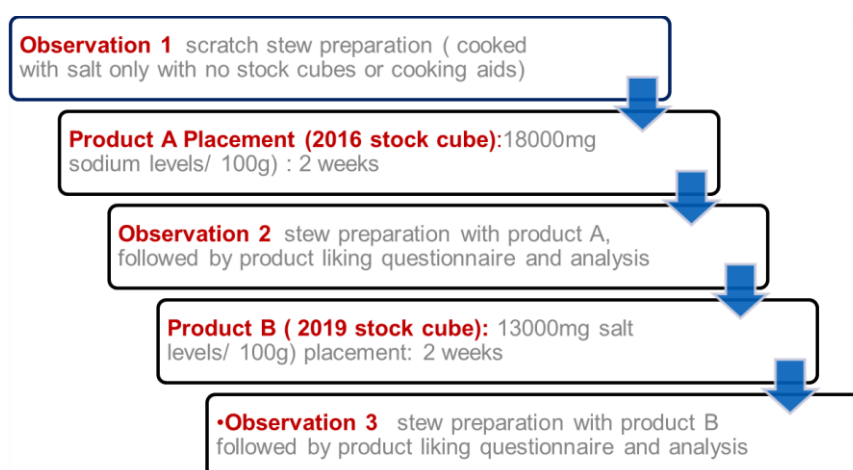

Figure 1 Methodology: consumer study of sodium reduction in stock cubes (Mthuli, D, Unilever)

The study concluded that, based on consumer preparation of a common dish such as meat stew, salt regulations and awareness campaigns are working. Fewer participants reported cooking with both stock cubes and salt (70% in 2012 compared with 54% in 2016). All consumers achieved sodium reduction with the 2019 cube and this was greatest for those who did not add additional salt. However, 70% maintained their cooking behaviour, i.e. adding or not adding salt, regardless of the salt content of the cubes. The majority only tasted the dish at the end of the cooking process, thus even the most motivated consumers may require further encouragement to change salt behaviours. Conclusions were presented as follows: Health professionals should be encouraged to include advice about food preparation techniques and suggest alternatives to salt; salt communication could be included in popular cooking shows; and salt reduction should be promoted via labelling and social marketing advertisements.

Discussion

During the discussion Dr Nelene Koen mentioned that work in progress at Stellenbosch University had found that only 15% of a sample of 650 people knew about the salt legislation and most had not noticed any change in taste. Most people reported adding salt every day and only tasted their food after preparation, while only 10% choose products which are low in salt. A possible concern is that the 2016 change was relatively small and therefore not noticed, whereas the 2019 change will probably be large enough for consumers to notice.

South African consumers need to be more conscious about salt but salt does not receive as much publicity as sugar which may be because the public are aware of high obesity levels, while hypertension remains invisible. The introduction of the sugar tax further places sugar as a higher focus as the public will feel the impact on food expenditure.

It was suggested that just as it has become fashionable to go 'sugar free' perhaps a similar strategy should be applied to popularising reduced salt intake. Another speaker pointed out that there has been little advertising of the governmental total salt strategy (<5g/day) and that it is surprising that any consumers are aware of the salt legislation. HSFSA has produced some good campaigns but there is no continuous education about reducing salt. However, it was argued that salt should not be singled out, but that dietary guidance should address the food-based dietary guidelines (FBDGs) which incorporate dietary messaging related to salt, sugar, micronutrients and overall nutrition in its entirety.

13. Open Forum Discussion

The wide-ranging discussion that followed has been captured using the framework of the WHO SHAKE model. This approach was chosen to allow similar or overlapping concepts to be brought together in a coherent fashion.

Surveillance – *measure and monitor salt use*
- o Discretionary salt use needs to be monitored, especially in the context of products where salt reduction causes large changes in taste to processed food products.
- o More information is required on food purchasing practices of the South African population and identification of the drivers of these practices. FBDGs are useful, but food purchasing practices are complex and usually influences by one key household member.
- o Learnings can be gathered from the experience of rapid adoption of the sugar tax, namely the prediction of the number of lives that could be saved.
- o A health economics paper that published data to show how many lives will be saved by the salt reduction strategy[20] but the available information needs to be repackaged to make it accessible to the public.
- o Evidence that sodium intake has reduced will provide justification for the measures taken.
- o In the absence of further local studies, South Africa could be guided by the *Systematic review of Salt Reduction Initiatives around the World* which shows what has worked elsewhere.[6]
- o McKinsey took a similar approach for obesity and ranked 16 initiatives in terms of DALYs saved, cost and the volume of scientific evidence. Reformulation and portion size control came out as the main determinants while legislation and taxation were at the bottom.[21] The McKinsey report is of high quality and could provide useful guidance.

Harness industry – *promote reformulation of foods and meals to contain less salt*
- o The fast food industry should be prioritised because most of their products fall outside the current legislation. However, updated food consumption data is needed for the South African population.
- o There is more scope for reducing sodium in products such as sauces which are used with other foods since the change in taste is then less detectable. Once again, consumption data is needed.
- o Discovery Vitality has effectively demonstrated an incentive scheme by rewarding healthy eating. However, this reaches mostly middle- and upper- income groups (the insured) and we need to devise incentives which will work at population level bearing in mind that the majority of South Africans do not have medical insurance.
- o Several major supermarket chains are already promoting healthier choices by providing free fruit for children instead of targeting them with sweets. The stores need to be encouraged to do something similar to reduce use of salty snacks.
- o The food industry has been reducing salt surreptitiously and it was only when they announced that a product was 'salt free' that people began to complain.
- o There will always be demand for salty and sugary foods, so small improvements are better than none.

Adopt Standards for Labelling and Marketing – *implement standards for effective and accurate labelling and marketing of food*

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[20] Bertram, M.Y., Steyn, K., Wentzel-Viljoen, E., Tollman, S. and Hofman, K.J., 2012. Reducing the sodium content of high-salt foods: effect on cardiovascular disease in South Africa. *South African Medical Journal*, *102*(9), pp.743-745.
[21] McKinsey Global Institute (2014) Overcoming obesity: An initial economic analysis.
https://www.mckinsey.com/search?q=overcoming%20obesity%20an%20initial%20economic%20analysis

- While not strictly 'marketing', government has the ability to incentivise purchasing by (further) reducing VAT on healthy foods, or increasing tax on unhealthy ones.
- Legislative control is limited but NDOH is working on regulations for advertising aimed at children, including times when adverts can be screened and labelling of products.
- The general desirability of salt as an antimicrobial agent cannot be ignored and although there are alternatives these are more expensive.

Knowledge – *Educate and communicate to empower individuals to eat less salt*
- The question of why consumers seem to resonate with the sugar reduction message, but not salt reduction, needs to be investigated. Advertising in relation to weight and health outcomes has contributed to the successful facilitation of the sugar tax but more work is needed to promote salt reduction.
- Unilever's Social Listening study found that although people do not talk about salt very much, they have more negative views about it than sugar. Negative in that they didn't want to reduce salt intake but were keen to reduce sugar intake
- Salt and sugar are both desirable to the consumer but for different reasons. Consumers regard salt as enhancing flavour rather than something consumed for its own sake.
- Typically, salt is added along with other flavourings which may also contain salt. Prevention messages should thus target the whole food package and not just salt.
- Health promotion slogans could include 'taste before you shake' and 'sprinkle not shake'.
- FBDGs should be publicised more and included in the school curriculum.
- The mass media (SABC) should be approached to provide free air time to promote healthy eating messages.
- It is important not to 'throw the text book at consumers', i.e. messages must be appropriately packaged and attractive.
- Bite-sized messaging which reach the *majority* of the population at the point of decision-making is important.

Environment – *support settings to promote healthy eating*
- Several organisations, including the National Department of Health, have changed the food and drink provided at meetings.
- In Australia, no sugary drinks are sold in public health facilities and restaurants often do not have salt cellars on the table.
- The collective voice is the strongest and a guideline for government endorsed by the Nutrition Society, Public Health Association and HSFSA may be warranted. This could be couched in terms of 'the right to healthy food'.

14. Summary of Recommendations

- Regular monitoring of the salt content of processed foods against mandated salt targets for food categories remains a challenge in assessing compliance of the food industry to salt reduction regulations in South Africa. This needs urgent attention.
- Consumer education regarding food preparation behaviours appears warranted to ensure compensatory addition of salt does not occur as salt is removed from processed foods.
- A collective voice from all stakeholders are needed to lobby for aspects of the salt reduction strategy at Government level. Aspects include monitoring, both the food supply chain as well as the population's salt intake and cosumer education.
- A multi-sectoral approach is essential to ensure a healthier food supply in South Africa that will assist in addressing the high burden of NCDs, particularly hypertension.

- Evidence-based strategies are required to inform the most effective consumer education activities to communicate to the public the message that "a little salt is enough".
- More research on consumer behaviour is needed in light of the salt reduction strategy.

15.Closing

Prof Charlton closed the meeting with a vote of thanks to the presenters and participants and said that the report of the proceedings would be reviewed by Prof Naidoo, Dr van der Westhuizen and herself and then circulated to participants for comment.

16. Acknowledgements

Presenters

Prof Karen Charlton, University of Wollongong, Australia

Ms Terry Harris, Discovery Vitality

Ms Dudzile Mthuli, Unilever

Prof Pamela Naidoo, CEO, Heart and Stroke Foundation South Africa

Dr Beulah Pretorius, University of Pretoria

Mr Nigel Sunley, Sunley Consulting and South African Association of Food Science and Technology

Dr Bianca van der Westhuizen, Heart and Stroke Foundation

Other participants

Prof Edelweiss Wentzel-Viljoen, North-West University.

Prof Rina Swart, University of the Western Cape

Ms Leanda Weppener, North West University and WHO SAGE

Dr Avelarda van Graan, Medical Research Council

Ms Jessica Byrne, Association for Dietetics in South Africa

Prof Hettie Schonfeldt, University of Pretoria

Dr Nelene Koen, University of Stellenbosch

Ms Penny Campbell, National Dept of Health

Ms Maude de Hoop, National Dept of Health

Mrs Hlanzeka Mpaza, Unilever

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