

CASE STUDY



Ministry of Health Malaysia

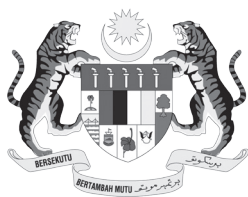


World Health
Organization

Representative Office
for Malaysia, Brunei Darussalam,
and Singapore

REDUCING SALT INTAKE IN MALAYSIA: AN INTERIM EVALUATION OF WHAT WORKS

REDUCING SALT INTAKE IN MALAYSIA: AN INTERIM EVALUATION OF WHAT WORKS



Ministry of Health Malaysia



**World Health
Organization**

Representative Office
for Malaysia, Brunei Darussalam,
and Singapore

© Ministry of Health Malaysia 2019

ISBN 978 967 2173 90 8

All rights reserved.

This report may not be reproduced, in whole or in part, in any form or means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system now known or hereafter invented, without written permission from publisher.

Suggested citation: Reducing Salt Intake in Malaysia: An Interim Evaluation of What Works (2019). Putrajaya, Malaysia: Ministry of Health Malaysia.

Published by the Ministry of Health Malaysia. Ministry of Health Putrajaya. Level 2, Block E3, Complex E. Federal Government Administration Centre, 62590 Putrajaya, Malaysia – Tel: +603 889 244 09 – Fax: +603 889 245 26 – Website: www.moh.gov.my.

Photo credits:

Cover: ©WHO/Y. Shimizu; p. 1: ©WHO/Pn Hasme Anim Bt Ahmad Basri

CONTENTS

Abbreviations	iv
Acknowledgements.....	iv
Executive summary.....	v
1. Introduction	1
2. Methods	3
2.1 Theoretical framework for midterm evaluation.....	3
2.2 Data collection.....	4
2.3 Data analysis.....	5
3. Findings	6
3.1 Overall salt reduction strategy.....	6
3.2 Monitoring.....	13
3.3 Awareness.....	14
3.4 Products.....	16
3.5 Contextual influences of salt consumption in Malaysia.....	18
4. Recommendations	20
4.1 Recommendations for strengthening implementation.....	20
4.2 Recommendations for ongoing process evaluation.....	26
References	28
Annexes	31
Annex 1. Plan of action for salt reduction in Malaysia, 2015–2020.....	31
Annex 2. Recommended framework for ongoing process evaluation of the Malaysian salt reduction strategy.....	32

ABBREVIATIONS

g/d	gram per day
KAP	knowledge, attitudes and practice
KOSPEN	Komuniti Sihat Perkasa Negara
MyCoSS	Malaysian Community Salt Study
MyFCD	Malaysian Food Composition Database
NCD	noncommunicable disease
NGO	nongovernmental organization
RE-AIM	Reach, Effectiveness, Adoption, Implementation and Maintenance
WHO	World Health Organization
WSAW	World Salt Awareness Week

ACKNOWLEDGEMENTS

The report was written by Kathy Trieu (lead investigator) and Jacqui Webster, World Health Organization (WHO) Collaborating Centre on Population Salt Reduction, Public Health Advocacy and Policy Impact at The George Institute for Global Health, for the Ministry of Health and the WHO Representative Office in Malaysia.

WHO thanks all those who shared their opinions, data and materials for the preparation of this report. This report would not have been possible without the dedicated work of all individuals who contributed from the Ministry of Health and other national agencies and institutions.

EXECUTIVE SUMMARY

In Malaysia, the amount of sodium consumed (mostly in the form of salt) is well above the recommended intake for good health. Excess salt intake causes raised blood pressure, which is the leading risk factor for deaths in Malaysia. In turn, reducing population salt consumption can lower blood pressure across the entire population. The World Health Organization (WHO) has recommended salt reduction interventions as best buys and set a global target to reduce mean population salt intake by 30% by 2025 for the prevention and control of noncommunicable diseases (NCDs).

For this reason, the Government of Malaysia has developed a five-year *Salt Reduction Strategy to Prevent and Control NCD for Malaysia (2015–2020)* with a view to lowering population salt intake by 15% by 2020. The Strategy has three core interventions: monitoring population salt intake and sodium levels in foods; generating awareness about the need to reduce salt intake and the approaches; and lowering the sodium content of food products through industry engagement, reformulation and labelling schemes (Annex 1). This report provides recommendations for how to strengthen the Salt Reduction Strategy in 2019–2020, based on an evaluation of the progress of implementation as well as barriers and drivers of the Strategy at the end of 2018.

In the first three years, the Strategy focused heavily on producing culturally specific salt reduction education resources and accurately monitoring population salt intake and salt levels in foods. Progress was moderate in establishing mechanisms to deliver such outputs to the Malaysian population (by training state health professionals and community members to spread the message) and engaging food manufacturers to reformulate or label the sodium content of processed foods. However, progress was low in ensuring the salt reduction messages, education materials and lower-salt processed foods reached and were adopted by the Malaysian population.

The major challenges of implementation include limited interaction among the three core interventions, competing priorities that dilute the importance of salt reduction, limited budget and human resources, lack of strategic dissemination of salt reduction messages to the public and limited food products with sodium labelling which hinder efforts to engage food manufacturers in reformulation. Key drivers of the Strategy include the engagement of researchers to conduct monitoring, the formation of the technical working groups to monitor progress and design of context-specific salt reduction resources and the Healthier Choice logo as an incentive for food reformulation.

In view of the current progress, barriers and facilitators to implementation, and the contextual influences on salt intake in Malaysia, the following steps are recommended for strengthening salt reduction interventions:

1. Extend the Salt Reduction Strategy beyond 2020.
2. Facilitate greater integration of strategies and the stakeholders leading different elements.
3. Conduct comprehensive monitoring of the sodium content of ready-to-eat processed foods and out-of-home dining foods in Malaysia.
4. Establish several communication channels to strategically reinforce salt reduction messages to the Malaysian population.
5. Prioritize and accelerate the sodium labelling legislation for all packaged foods.
6. Conduct ongoing evaluation of process measures to inform adaptations to the interventions.

The methods documented in the report can be used as a framework for process evaluations of salt reduction interventions that aim to generate information about the necessary adaptations to strengthen the strategy in the future – in Malaysia or other salt reduction interventions worldwide.

1. INTRODUCTION



STUDIES SUGGEST A DIRECT RELATIONSHIP BETWEEN SALT INTAKE AND BLOOD PRESSURE.

High blood pressure is a major risk factor for cardiovascular disease, the leading cause of death and disability worldwide (1). There is compelling evidence from animal studies, epidemiological studies, natural experiments, randomized controlled trials and population-based intervention studies that suggests a direct relationship between salt intake and blood pressure (2–5). Numerous systematic reviews of the evidence conclude that a reduction in salt consumption causes a dose-dependent reduction in blood pressure (2, 4, 6). Given the extensive evidence base, the World Health Organization (WHO) and other leading health and scientific organizations recommend that adults and children should lower their salt consumption (7, 8). Furthermore, WHO recommended in 2013 that all Member States adopt nine global targets to reduce premature mortality from noncommunicable diseases (NCDs) by 25%, one of which is to reduce mean population salt intake by 30% by 2025 (9).

In Malaysia, approximately one in three deaths is attributed to cardiovascular diseases(10), and high blood pressure is the leading single risk factor for deaths and disease burden (1).

In 2012, a survey among health staff found that mean salt intake was approximately 8.7 grams per day (g/d), nearly 1.75 times higher than the recommended intake of 5 g/d (11), providing justification for a salt reduction strategy. The study also found discretionary salt and sauces (including soy sauce, oyster sauce, stocks, seasoning, sambal and pastes) contributed 60% of salt in the diet and processed foods contributed 37%. Consequently, in 2015 the Ministry of Health developed the *Salt Reduction Strategy to Prevent and Control NCD for Malaysia (2015–2020)* (Annex 1), as part of the *National Strategic Plan for Non-Communicable Diseases (2016–2025)* (12). This strategy outlines three main interventions: monitoring (M), awareness (A) and products (P). It also includes the activities related to each and the stakeholders responsible for its implementation so as to achieve a 15% reduction in salt intake (7.4 g/d) by 2020 (11).

In October 2018, WHO engaged The George Institute for Global Health to conduct a midterm evaluation of the Salt Reduction Strategy in Malaysia, with a view to generating recommendations for strengthening the implementation of interventions in the next two years to ensure that the targeted 15% decrease in salt intake can be achieved by 2020. This provides an important opportunity to not only advance our understanding of the implementation process and effects of the salt reduction activities in Malaysia, but also contribute to much-needed global evidence about how to achieve reduced salt intake, particularly in low- and middle-income countries (13). This is crucial because, while 75 countries had adopted national salt reduction strategies in 2014, only five countries have successfully lowered population salt intake, suggesting there is uncertainty about the intervention elements and processes that are needed for success (14, 15).

In this context, this report sets out the methodology and findings of the midterm evaluation of the national Salt Reduction Strategy in Malaysia and an interim evaluation framework that can be used by other countries implementing salt reduction initiatives.

**THE NATIONAL
SALT REDUCTION
STRATEGY TO
PREVENT AND
CONTROL NCD
IN MALAYSIA
(2015–2020) AIMS
TO REDUCE SALT
INTAKE BY 15%
(7.4 g/d) BY 2020.**

2. METHODS

This report is the result of a series of engagements coupled with key stakeholder interviews and focus groups. In addition, we conducted an extensive review of the available published literature and documents capturing the progress of implementation as well as barriers and drivers of the Strategy to date (2018) in Malaysia. This report is part of Malaysia's five-year national Salt Reduction Strategy (2015–2020). The interim evaluation assessed the role the Ministry of Health and other national agencies have played in ensuring the intervention reaches the target audience, measuring the extent of the intervention delivered to a target participant and verifying the adoption of the intervention by the target organization.

2.1 Theoretical framework for midterm evaluation

**THIS REPORT
IS PART OF
MALAYSIA'S FIVE-
YEAR NATIONAL
SALT REDUCTION
STRATEGY.**

We followed the guidance from the Medical Research Council of the United Kingdom of Great Britain and Northern Ireland guidance on process evaluation of complex interventions to conduct a midterm evaluation of the Salt Reduction Strategy in Malaysia (16). This involves understanding the implementation of interventions to date (October 2018), the context in which the interventions are delivered and the mechanisms of impact. While the progress of intervention implementation was measured against the established targets and indicators set out in the national plan of action for salt reduction (11) (Annex 1) of the national Salt Reduction Strategy, this was supplemented with a comprehensive examination of implementation progress guided by Steckler and Linnan's process evaluation (17) and the RE-AIM (Reach, Effectiveness, Adoption, Implementation and Maintenance) framework (18). This involved examining the reach of the intervention among the target audience, dose delivered to the target participant or adoption of the intervention by the target organization, and the fidelity, which refers to the quality and integrity of the intervention delivered compared to what was conceived by the developers (Table 1).

Understanding the progress of implementation to date and the current contextual barriers and facilitators of delivering the Salt Reduction Strategy will allow us to generate recommendations about what activities need to be prioritized, the barriers that need to be overcome and the facilitators that should be leveraged during the last two years of the Strategy.

TABLE 1. Interim evaluation dimensions and definitions

DIMENSIONS	DEFINITIONS
Reach	The number or proportion of the intended target audience that comes into contact with the intervention (17)
Dose (delivered or received)	The quantity or amount of each intervention component delivered or provided and the extent to which participants actively engaged with the intervention (17)
Adoption	The proportion and representativeness of organizations that adopt the intervention or policy (18)
Fidelity	The extent to which the intervention was delivered as planned in relation to quality and integrity of the intervention as conceived by the developers (17)

2.2 Data collection

We used a mixed-methods approach comprising four main sources of data: routinely collected administrative data (activity logs and progress reports); publicly available information; semi-structured interviews; and focus group responses.

Routinely collected administrative data and publicly available information detailing intervention activities and the outputs were collated to generate insights into:

1. the salt reduction activities implemented and their outputs; and
2. the extent to which the interventions were implemented as planned, measured through the dimensions: reach, dose (or adoption) and fidelity.

This was supplemented with semi-structured interviews and focus group questions that were purposely designed to gain in-depth qualitative understanding of:

1. how the interventions were delivered and the mechanism by which they lead to the ultimate outcome of reduced population salt intake;
2. what contextual factors have affected implementation of the intervention to date; and
3. what opportunities need to be leveraged to achieve the targeted 15% reduction in salt intake by 2020.

The two investigators from The George Institute for Global Health conducted 12 semi-structured interviews, five with randomly selected state health department representatives and seven with purposely chosen representatives from agencies involved in the implementation of the federal Salt Reduction Strategy. Interview participants provided written consent for participating and having the interviews recorded.

Three separate focus groups were also convened with a total of 43 participants. The first focus group was conducted with 20 state health department representatives comprising nutritionists, dietitians, epidemiologists and medical doctors from all 15 states and three federal territories of Malaysia. As these participants were the front-line health professionals interacting with the community and patients throughout the country, the discussion focused on their opinions of the contextual barriers that make it difficult for Malaysians to lower their salt intake and the facilitators that might make it easier for them to do so. The two other focus groups comprised a mix of 23 representatives from:

- » different divisions of the Ministry of Health including the NCD Section of the Disease Control Division, the Nutrition Division, the Health Education Division, and the Food Safety and Quality Division;
- » government research institutes (Institute for Public Health) and private universities;
- » health nongovernmental organizations (NGOs); and
- » the food industry.

The discussion focused on the progress of implementation as well as the contextual influences of salt consumption. In each focus group, we used the nominal group technique to generate a list of priority barriers and facilitators of reducing salt intake in Malaysia, through a process that provides participants with an equal opportunity to contribute their personal views, without problems of group interaction (19).

2.3 Data analysis

Routinely collected administrative data and publicly available information were compiled and organized in a spreadsheet by the eight activities within the three strategy components: monitoring, awareness and products (summarized in Table 2). An independent company transcribed the semi-structured interview responses, which were then coded by the lead investigator using NVivo qualitative data analysis software (version 12; QSR International, Doncaster, Victoria, Australia). The interview responses were analysed by theme for the eight intervention activities. We collated the priority barriers and facilitators of reducing salt intake identified by the three focus groups using the nominal group technique and organized them into Story et al.'s ecological framework of the multiple levels of influences on food intake: individual factors, social environment, physical environment and macro-level environment (20). Qualitative and quantitative data were triangulated to provide validation for one another, where relevant. For example, when the interview responses suggested that the lack of packaged foods with sodium labelling was a major barrier to salt reduction, we triangulated this with quantitative data about the proportion and number of food products that had sodium content labelled on the pack.

3. FINDINGS

For each of the three main intervention components (monitoring, awareness and products) as well as the overall Strategy, we present the quantitative and qualitative findings in relation to the relevant process evaluation dimensions (reach, dose or adoption, and fidelity) and the contextual factors affecting implementation and functioning of interventions. To understand how the Strategy as a whole is functioning to achieve the goal of a 15% reduction in population salt intake by 2020, we developed a logic model (Fig. 1) illustrating the inputs (resources and contextual factors), activities and outputs achieved as of October 2018.

3.1 Overall salt reduction strategy

Implementation progress

Overall, the components of the Salt Reduction Strategy that have been implemented to date are of high fidelity and quality, but the amount of the interventions delivered (dose) or adopted by organizations has been moderate, and the reach of initiatives among the target audience (Malaysian population) has been low (Table 2). Of the three Salt Reduction Strategy components, the awareness initiatives have been implemented with the highest fidelity, dose or adoption and reach overall, followed by the monitoring initiatives and then the product initiatives (Table 2). In relation to the nine indicator targets set out in the Malaysia plan of action for salt reduction (11), five targets have been achieved so far: two of three for the monitoring strategy component, two of four for the awareness component and one of two for the products intervention component (Table 3). There has been limited interaction across the three strategy components (monitoring, awareness and products) and the stakeholders responsible for each, as shown in the logic model (Fig. 1). For example, while there has been a shop survey collecting nutrition information from packaged food labels indicating the lack of products that label sodium content, as part of the monitoring strategy, this information has not been used to advocate or inform the need for mandatory labelling, an activity of the products strategy.

THE AWARENESS INITIATIVES WERE IMPLEMENTED WITH THE HIGHEST FIDELITY, DOSE AND REACH.

Barriers and facilitators of implementation

Although there initially was new momentum to tackle salt reduction due to increased recognition of the need to address the NCD problems, several competing priorities surpassed salt reduction including initiatives to tackle smoking, excess sugar consumption, obesity and low physical activity. This may have dampened the implementation of salt

**MANDATORY
SODIUM
LABELLING HAS
BEEN DELAYED.**

reduction interventions, affected the engagement with food industry in reformulation and altered public perception of what risk factors were important for health. In terms of implementation of salt reduction activities, increasing competing priorities meant that financial and human resources were dispersed among other NCD prevention initiatives; intervention delivery was delayed to incorporate related priorities (for example mandatory sodium labelling was delayed to allow for the incorporation of sugar labelling); and salt reduction messages were disseminated as part of broader nutrition messages. From the perspective of the food industry, salt reduction was one among several issues that they needed to address, including adherence to the new nutrient labelling legislation (which includes both sodium and sugar labelling); the nutrient criteria required to display the Healthier Choice logo; the criteria required to display nutrition claims (for example “low in sodium”); criteria related to what foods cannot be marketed to children; and requests from the government for provision of nutrient composition data. Similarly, interviewees suggested that the general public was overwhelmed with nutrition-related messages and that education related to calorie intake, weight management and sugar reduction were more widespread and of higher priority compared to with salt reduction.

The three main facilitators of the overall implementation of the Salt Reduction Strategy were:

1. the establishment of the technical working groups, which regularly brought together and monitored the progress of the different agencies responsible for leading the various intervention components;
2. the generation of local research, which provided greater justification for the need to lower salt intake in Malaysia; and
3. the experience, lessons and information available from previous salt reduction strategies implemented in other countries.

FIG. 1 Logic model of Malaysia's Salt Reduction Strategy and outputs achieved by 2018

FORMATIVE EVALUATION

INPUTS

PROBLEMS

- » High blood pressure is the leading risk factor for deaths in Malaysia
- » Direct link between salt intake and blood pressure
- » High salt intake (8.7 g/d) in Malaysians (2012)
- » Main sources: soy sauce, mixed dishes (fried rice, nasi lemak, fried meehoon, soups), roti, oyster sauce, anchovy sauce and tomato/chilli sauce

SOLUTIONS

- » Knowledge transfer from other countries' experience
- » WHO best buys on salt reduction

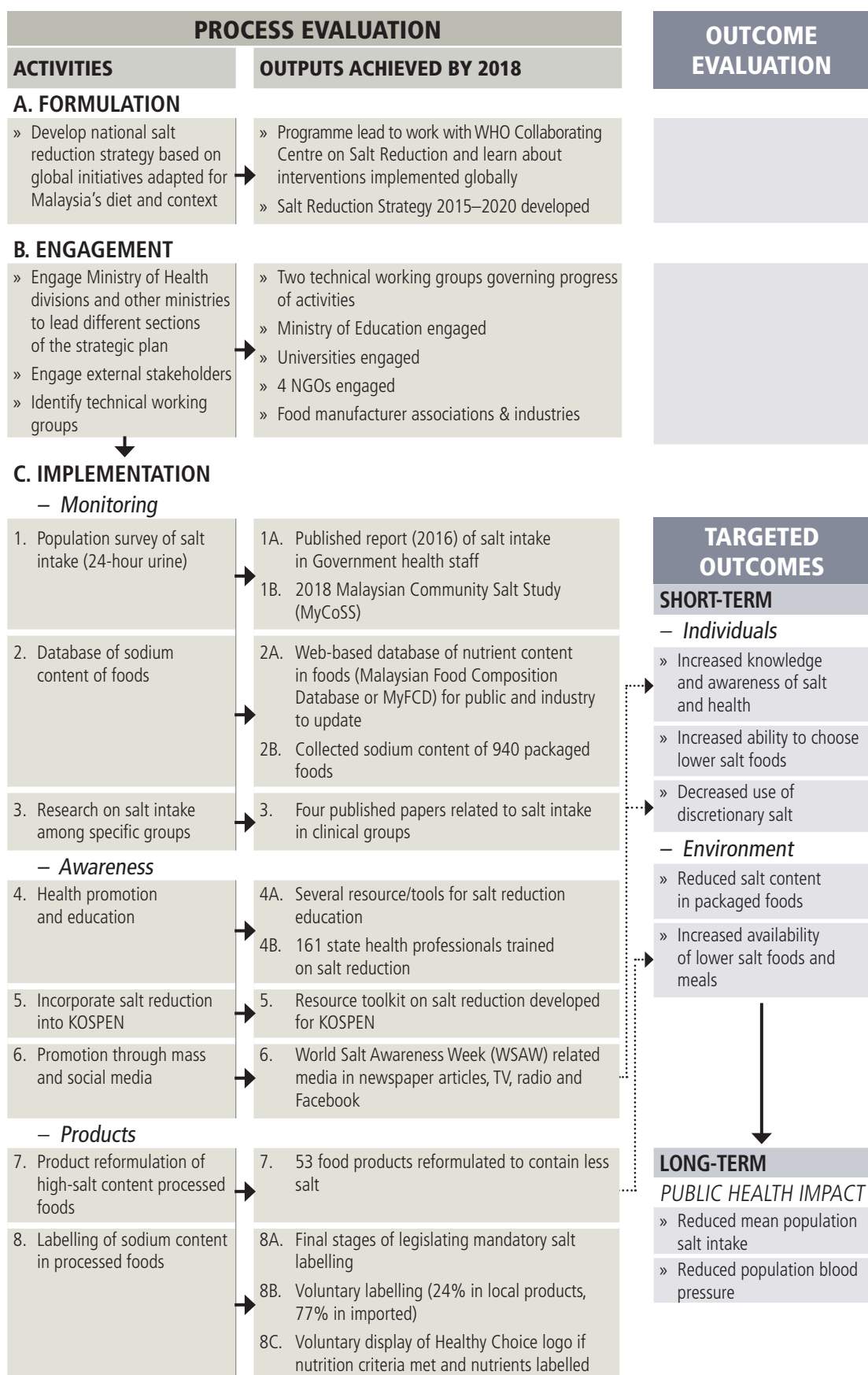
STAKEHOLDERS

- » Ministry of Health and other ministries
- » State health departments
- » NGOs
- » Universities
- » Research organizations: The George Institute, UK WASH Network
- » Food Industries and associations

CONTEXT

- » WHO Regional consultation on strategies to reduce salt intake in 2010
- » Not mandatory to label sodium content on packaged foods

FIG. 1 Logic model of Malaysia's salt reduction strategy and outputs achieved by 2018 (*continued*)



Note – KOSPEN: Komuniti Sihat Perkasa Negara of Ministry Health Malaysia (8).

TABLE 2. Summary of the implementation of the Salt Reduction Strategy by dimensions

DOMAINS	MONITORING			AWARENESS			PRODUCTS	
	Population survey of salt intake	Database of salt levels in foods for consumers	Research on salt intake in specific groups	Health promotion and education	Incorporating salt reduction into KOSPEN	Promotion through mass media and social media	Product reformulation of high-salt foods	Labelling of sodium content in processed foods
REACH	Low – Salt intake findings not publicized*	Low – Findings not publicized & database not utilized*	Low – Findings have not been widely disseminated*	Low – Little dissemination of material & public education*	No measure of reach of salt reduction education through KOSPEN	Low – Limited reach among the public*		
DOSE (delivered or received) or ADOPTION		Low – Limited input of nutrient data by companies & from shop survey into online database **^		Moderate – High progress in training the trainers but low adoption by trainers in spreading message**^	No specific metric to measure whether trained community leaders pass on salt reduction advice	Moderate – Some promotion on TV, radio, newspaper and social media but mostly during Salt Awareness Week**^	Moderate – 53 food products reformulated, but most are not high contributors of salt in diet**^	Moderate – 47% of products label sodium content (24% of locally produced and 77% of imported foods labelled)**^
FIDELITY	High – Three high-quality surveys of salt intake conducted **^	High – Extensive data collection (940 processed foods) **^	Moderate – Four universities engaged in salt intake research in specific populations**^	High – Many education materials developed and tested for Malaysia**^	High – Guidance developed for training KOSPEN community leaders to spread the message**^	High – Salt messages are context specific and pretested by a technical working group*	Moderate – Some foods had small reductions in salt content from 2–80%**^	Moderate – Sodium labelling is at the final stage of legislation but delayed past 2018 timeline*

DOMAINS	MONITORING		AWARENESS		PRODUCTS			
	Population survey of salt intake	Database of salt levels in foods for consumers	Research on salt intake in specific groups	Health promotion and education	Incorporating salt reduction into KOSPEN	Promotion through mass media and social media	Product reformulation of high-salt foods	Labelling of sodium content in processed foods
KEY BARRIERS	Researcher involvement may cause delay in disseminating findings due to publishing time, and study question cannot be determined by Government. Lack of sodium labelling on products and chemical analyses are costly.			Lack of strategic dissemination of salt reduction materials and messages at state and federal levels. At federal level, lack of mechanisms to communicate to the public directly. At state level, lack of opportunity and motivation for proactive dissemination.			Limited products with sodium labelling due to delayed legislation hindered food industry engagement activities. Industry belief low-salt foods will not sell.	
KEY FACILITATOR	Researchers ensure high-quality data and minimize cost to Government.			Leveraging KOSPEN and formation of a technical working group for designing materials & resources.				

* Based on qualitative data from semi-structured interviews or focus groups.

^ Based on data from routinely collected data or publicly available data. Domains are scored low if there is limited implementation, moderate if there is some activity but more is needed, and high if the level of effort is adequate.

TABLE 3. Progress against Malaysia's Salt Reduction Strategy (2015–2020) targets

STRATEGY	INDICATOR	TARGET	PROGRESS
Monitoring	Published report of population-based survey using 24-hour urine collection	Report published in 2016	Published survey among health staff. 2018 MyCoSS study results being written up
	Web-based application of database of salt content of processed foods	Operational by 2018	MyFCD website of Food Composition Database operational
	Number of research papers on salt intake	Five scientific papers per year	Four scientific papers published in English, two under review, six abstracts/presentations (three are related to MyCoSS population survey findings)
Awareness	Health promotion and education resource toolkit	Toolkit published annually	Resource toolkit and several resources developed
	Knowledge, attitudes and practice (KAP) survey among target groups	Significant improvement in KAP among those that have been exposed to education toolkit	Results to be analysed
	Resource toolkit on salt reduction for KOSPEN	Resource toolkit published by 2017	Resource toolkit developed
	Number of salt reduction promotions through mass and social media	20 articles, television or radio slots per year on salt reduction	11 newspaper articles, three blogs, two television, two radio, posts on Facebook, YouTube
Products	Number of product reformulation of processed foods with high salt content	Five products per year	53 food products reformulated
	Mandatory labelling of sodium content on packaged foods	Mandated sodium labelling by 2018	Mandatory sodium labelling not yet gazetted but in final stages

3.2 Monitoring

Implementation progress

**LOCAL RESEARCH
FINDINGS SHOULD
BE DISSEMINATED
TO HELP
CONSUMERS
LOWER SALT
INTAKE.**

The strategy to monitor population salt intake and sodium content in processed foods has been implemented with high fidelity and quality to date, and salt-related research among specific groups has been conducted with moderate fidelity. However, dissemination of the findings of the monitoring research has been low, meaning that these activities have had low reach among the general population (Table 2). Two surveys estimating salt intake in Malaysia using the gold standard 24-hour urine collection have been conducted, but the most recent Malaysian Community Salt Study (MyCoSS) findings have not been publicized yet. This is crucial as interviewees suggested that most people are unaware of the recommended daily salt intake and the amount that they are consuming. Similarly, recent surveys have collected data on the sodium content when labelled and noted when sodium content is not labelled in approximately 940 processed foods products from major supermarkets in Malaysia, but the findings are yet to be disseminated to the public.

In addition, the sodium content data are yet to be included in the online Malaysian Food Composition Database (MyFCD), which was designed to be a publicly available platform that displays the nutritional information of food products to help consumers identify healthier food options. MyFCD is currently operational and thereby met the 2018 target, but its use by consumers is low. There is also low adoption by food companies inputting the nutritional information of their food products in the database despite various efforts to engage food industry to do so. Lastly, although there has been moderate progress in local research related to salt intake with approximately four published papers and six abstracts or presentations, most have been related to clinical populations and, therefore, the findings are not widely disseminated to the general public.

Barriers and facilitators of implementation

Involving researchers and university academics in the implementation of the monitoring activities can be both a facilitator and barrier. While engaging researchers to conduct the monitoring surveys means measurements follow a rigorous methodology and human and financial resources to the Ministry of Health are minimal, the disadvantage is that findings need to be peer-reviewed and published before they can be disseminated to the public, thereby causing delays. Additionally, researchers as opposed to the Government choose what to study, so much of the research is focused on interventions in clinical settings or patients with hypertension which are less relevant to the general population and to the Salt Reduction Strategy. This may explain the high quality of the monitoring surveys but low reach of the survey findings among the general population so far.

Other barriers hindering efforts to monitor sodium levels in foods is the lack of labelling on packaged foods and the high costs involved in laboratory or chemical analysis

to determine the sodium content of commonly consumed meals or prepared foods in Malaysia. The shop survey of 940 packaged foods from major supermarkets in the country found that half do not declare or label the sodium content in foods. In particular, roughly 77% of locally produced foods do not label the sodium content compared with 23% of imported food products. This makes it difficult to monitor changes in the sodium levels of packaged foods or to understand the average and range of sodium content among food categories. Further, it has become increasingly common for Malaysians to consume prepared meals from street food vendors, takeaway shops and fast food outlets, some of which are open 24 hours, making it equally important to know the sodium content in these meals to raise awareness and educate the population. Such laboratory analyses, however, are costly for both the Ministry of Health and researchers.

3.3 Awareness

Implementation progress

Similar to the monitoring activities, the awareness-raising initiatives have achieved high fidelity and quality, moderate dose delivered or adoption, and low reach. Considerable effort has been invested in developing and testing a range of context-specific, engaging and easy-to-understand salt reduction materials and resources, including one resource toolkit to specifically incorporate salt reduction education into the KOSPEN[#] intervention, one manual on how to use the education materials and resources for salt reduction, a video with 17 visuals about salt reduction and the adverse health effects of excess salt intake, five videos demonstrating how to cook low-salt recipes, six infographics, 19 posters, one low-salt recipe book, one nutrition booklet on calculating sodium intake, one salt reduction education PowerPoint, one salt-related knowledge, attitudes and behaviour questionnaire, one food frequency questionnaire, and one food diary form to estimate salt intake and understand salt-related practices. Some of these materials are used in promotion through mass media and social media, and some additional materials have been developed for newspapers articles, blogs, televisions, radio, Facebook and YouTube.

Although ample salt reduction education resources have been developed, overall dose delivered has been moderate and reach has been low because the hypothesized mechanism of delivering the majority of the salt reduction education through state-level health professionals (community nutritionists, medical doctors and dietitians) has not functioned as planned. Although approximately 161 state-level health professionals from the five zones have been trained on the need for salt reduction and how to use the resources, there has been low adoption by the trained professionals to train other health professionals within their state department or to educate the community.

[#] KOSPEN (Komuniti Sihat Perkasa Negara) is a community intervention aimed at reducing the level of behavioural and biological risk factors of noncommunicable diseases by empowering and training community members to be the agents of change (for instance to undertake screening for high blood pressure, obesity and risk of high blood sugar levels).

ENGAGING AND EASY-TO-UNDERSTAND SALT REDUCTION MATERIALS AND RESOURCES FOR AWARENESS-RAISING HAVE BEEN DEVELOPED.

All five representatives of different state health departments interviewed had not received training from the Ministry of Health or from their colleagues that had received training. Only one of the five representatives suggested that their colleagues had passed on the salt reduction education materials; the rest did not know such resources were available. The five state health department representatives suggested that specific education related to salt reduction was undertaken once a year during World Salt Awareness Week (WSAW), on the rare occurrences that it was requested and in one-to-one counselling in clinical settings. The other opportunities for salt reduction education were usually as part of broader healthy eating education and through the KOSPEN initiative. There was no documentation, however, of the number of community leaders that were trained on salt reduction or the number of instances when salt reduction education was delivered as part of the KOSPEN initiative. The only instances when the Ministry of Health had directly disseminated salt reduction messages were through mass media and social media during WSAW each year. Although the mass media communication was likely to receive high reach, social media reach was not substantial (around 600 views), and hence overall dose and reach was moderate and low, respectively.

Barriers and facilitators of implementation

The main barrier of the awareness intervention was that while the federal Ministry of Health focused its efforts on training the trainers (state health professionals), strategic and proactive dissemination of the salt reduction messages to the general population was low at both the state and federal levels. Most interviewees, including the state health department representatives themselves, acknowledged that the role of the state-level health professionals was to disseminate health-related education to their communities and the public. They suggested, however, that other than during WSAW they were not proactively spreading the salt reduction message to large groups, and only did so for hypertensive patients or when asked to. Reasons for the lack of dissemination include difficulty in educating about the correct amount of salt intake, lack of opportunities for community-level education, lack of motivation or incentive to spread the salt reduction message, and the absence of a mechanism to monitor efforts. Relying on state-level health professionals to disseminate the salt reduction messages meant that the awareness component was not the priority intervention for other stakeholders (federal Ministry of Health divisions, NGOs, professional associations) involved in the implementation of the salt reduction strategy.

In particular, the Ministry of Health did not have other mechanisms or channels of communication in place to regularly deliver salt reduction messages to the general population directly. While there were some efforts to ensure WSAW achieved high reach, this was only once a year and through costly channels such as television, radio and newspaper articles. More feasible channels such as social media had limited reach (due to few followers which may be related to irregular activity). It was felt that regular population-wide promotion of the salt reduction message would require additional human resources.

The facilitators of the awareness intervention were the ability to incorporate salt reduction education into the existing KOSPEN programme and the establishment of a specialist technical working group that involved state-level health professionals in developing and testing the salt reduction messages, materials and resources. Four interviewees suggested that the KOSPEN intervention was a suitable programme for the dissemination of salt reduction messages as it contains a healthy eating component, relates to the blood pressure screening component and empowers community volunteers to have context-specific conversations about how to lower salt intake in their community. However, there were some concerns about the future intensity and scope of the KOSPEN programme. Further, it was not known whether the trained community volunteers were delivering the salt reduction message, given the lack of specific metrics and abundance of healthy eating messages.

3.4 Products

Implementation progress

The products intervention, which involves engaging the food industry in product reformulation and mandating sodium content labelling on packaged foods, has achieved moderate fidelity and adoption so far. To date, approximately 53 food products from various categories (instant noodles, flavoured cakes, sauces, biscuits, snacks, frozen meats, dressing, tea and 3-in-1 drinks) have been reformulated to contain lower levels of sodium. While this meets the programme's target of at least five products with reduced sodium content each year, the sodium reductions were in the 2–80% range, and only some reformulated food products were high contributors of sodium in the Malaysian diet or market leaders within their category, meaning the impact of reformulation on Malaysians' diet may be limited. Overall, interviewees felt that engaging the food industry to reformulate the sodium content of their products has been slow, but it has been a useful process to understand what approaches were more likely to work or not in keeping the food industry engaged in the Malaysian context.

Mandatory labelling of sodium content on packaged foods had not been gazetted by the targeted date (2018). However, it has reached the seventh out of eight steps of the regulatory process, and the legislation will apply to all 154 food categories as opposed to the current regulation, which only requires certain food categories to label the four core nutrients. Furthermore, there have been efforts to encourage food manufacturers to voluntarily label sodium in foods through consultation with food industries and manufacturer associations about the upcoming labelling legislation, the sodium criteria required to use the Healthier Choice logo, and the sodium-related nutrient claims "low in sodium", "very low in sodium" and "free of sodium". Approximately 23% of locally produced foods have sodium content labelled, although it is currently not mandatory.

53 FOOD PRODUCTS HAVE BEEN REFORMULATED TO CONTAIN LOWER LEVELS OF SODIUM, BUT MORE IS REQUIRED.

A PAUCITY OF PRODUCTS WITH SODIUM LABELLING HINDERS FOOD REFORMULATION INITIATIVES.

Barriers and facilitators of implementation

The interviewees suggested several interconnected barriers to efforts to encourage food manufacturers to reformulate foods to lower salt content levels and declare the sodium content on packaged food labels. Although sodium labelling has reached the final stage of the regulation process, the legislation is being delayed to incorporate sugar labelling requirements, which were initiated at a later time (and therefore is in the earlier stages of the regulatory process) and face more technical difficulties. This was intended to require food manufacturers to change their packaged food labels only once to display both the sodium and sugar contents.

As a result of the delay in the sodium labelling legislation, interviewees explained that not having sodium content labelled on all packaged foods made it more challenging:

1. to identify which food manufacturers to engage in reformulation (as current sodium content on food products was unknown) and set feasible sodium content targets for food manufacturers to work towards; or
2. to set appropriate sodium criteria for the Healthier Choice logo, as the average sodium content of foods products within the category was unknown.

Furthermore, food manufacturers were reluctant to lower the sodium content in their food products because they believed that Malaysians prefer salty foods, so that lowering the sodium content would cause a reduction in sales. They also stated that they did not have the budget for research and technology. An added barrier to reformulation of foods to contain less sodium or salt was that some foods such as soy sauce have outdated requirements about the minimum levels of salt, as opposed to a maximum. There was also reluctance from food companies to label the sodium content while it was still voluntary. Because there was no clear mechanism for monitoring the correctness of labelling, food companies felt they were being singled out from their competitors. In addition, clear communication about the finalized labelling requirements was missing, which created uncertainty about whether the finalized labelling requirements would change.

Lessons and experiences from previous successful initiatives to engage the food industry in reformulation, obtained through publications and shared by salt reduction experts, were considered as both a barrier and facilitator. While lessons from other successful initiatives were a motivator for continued action with the food industry, they were also considered a barrier or setback when the same approach was not contextually appropriate and did not have the same effect. Another driver of product reformulation and voluntary sodium labelling was the introduction of the Healthier Choice logo to be displayed if food products labelled the sodium content and it met certain sodium and nutrient criteria, as food companies believed the logo would make their products more sellable. The food industry associations or corporations were also identified as a facilitator, as they assisted the Ministry of Health to contact other food manufacturers, particularly the small- and medium-sized businesses, and offered to provide advice to small food manufacturers about how to reformulate, calculate sodium content and label their food products.

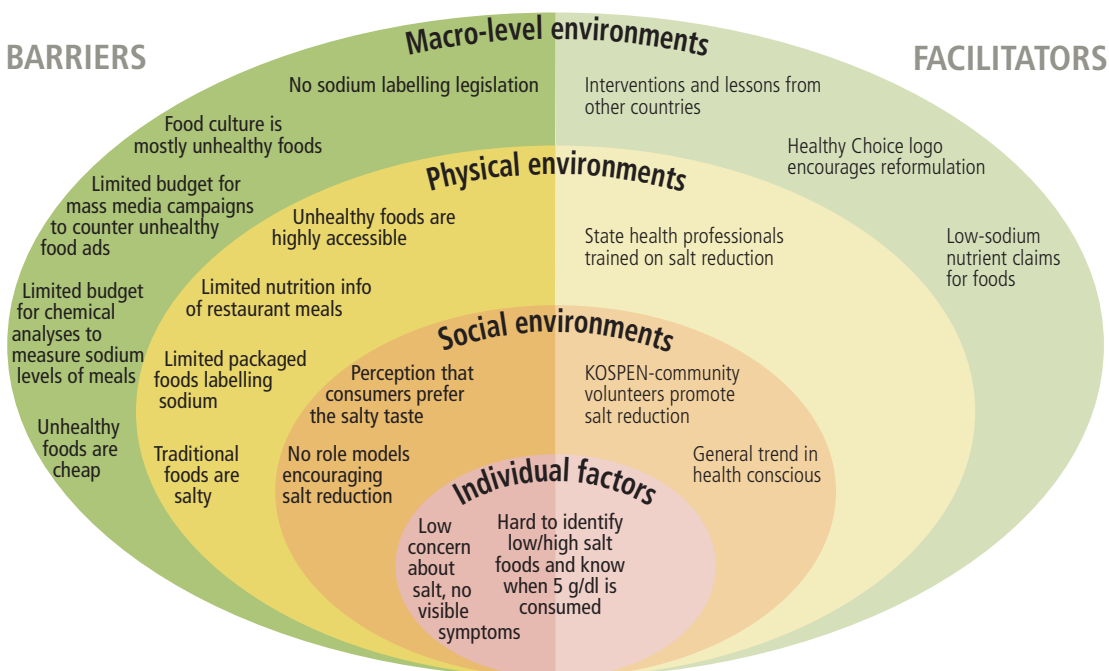
3.5 Contextual influences of salt consumption in Malaysia

Implementation progress

In addition to barriers and facilitators affecting the implementation of interventions, current contextual barriers and facilitators influence what people in Malaysia consume and their salt intake. These should also be taken into consideration when strengthening the implementation of the salt reduction initiatives. The barriers and facilitators identified by the interviews and focus groups have been summarized in Story et al.'s ecological framework depicting the multiple levels of influences on what people eat (Fig. 2).

First, the macro-level barriers of consuming less salt in Malaysia are the high accessibility of cheap unhealthy foods compared to healthy foods, lack of legislation mandating sodium content labelling on packaged foods, insufficient budget for chemical analyses to determine the sodium contents of foods particularly meals sold out of home, limited budget for mass media campaigns about healthy eating compared to the funds that the food industry spends on advertising unhealthy foods, and the popularity of mostly unhealthy foods in the food culture in Malaysia. The facilitators at the macro level include the ability to introduce and apply learning from salt reduction policies implemented by other governments around the world as well as the introduction of the Healthier Choice logo (front-of-pack labelling) scheme and the sodium-related nutrient claims to encourage food manufacturers to reformulate their products to contain lower sodium levels and to help consumers identify lower-salt foods.

FIG. 2 Barriers and facilitators of consuming less salt in Malaysia depicted on Story et al.'s ecological framework



Second, the barriers to healthy eating in physical environments or settings include the high and increasing availability and consumption of unhealthy foods from food outlets and restaurants (with growing 24-hour food stalls), limited nutrition or sodium information of these foods eaten out of home, limited packaged foods items currently declaring sodium on packaged foods, and the salty taste of traditional Malaysian foods. In contrast, a facilitator is that state health professionals working in community and hospitals have now been trained to educate others on the importance of salt reduction and healthy eating.

Third, among social environments, there is also the perception that consumers prefer the salty taste of food and the food industry is therefore reluctant to lower salt in their products and that there are currently no role models that advocate the need to lower salt intake. Two facilitators in the social environments that may counter these barriers are that community volunteers as part of the KOSPEN initiative have been trained to disseminate the salt reduction message and that there is a trend in Malaysia to be more health conscious in general. Last, individuals find it difficult to identify what foods are low or high in salt due to lack of labelling and to know when they have consumed the recommended intake. Currently, concern about the need to lower salt intake is low (compared with other nutrition concerns such as weight loss), as there are no short-term, visible symptoms of excess salt intake or high blood pressure.

4. RECOMMENDATIONS

Overall in the first three years, the Malaysian Salt Reduction Strategy made strong progress on developing high fidelity and quality outputs, but more effort is needed to increase the dose or adoption of these initiatives and, in particular, to accelerate the reach of such outputs to the general population in the next two years. In the first three years, priority was given to: conducting robust surveys of salt intake and salt content and labelling of packaged foods, providing comprehensive training to trainers (state-level health professionals and community volunteers), and developing an easily accessible online database of the nutrition composition of foods, as well as a comprehensive range of context-specific and relatable salt reduction education materials.

In contrast, progress was low in relation to strategies to deliver these outputs widely and regularly to the general population, such as using the education resources and survey findings of salt intake and salt content of foods to raise awareness among Malaysians. This aligns with interview and focus group findings that motivation is low for reducing salt consumption (particularly compared with weight loss or sugar reduction) and ability is limited concerning how to control salt intake among the Malaysian population. Progress was moderate in relation to food companies voluntarily adopting salt reformulation and labelling efforts, but the dose and level of adoption are inadequate to impact the population's salt intake (that is, too few products with substantial reductions in salt content and not enough products with sodium labelling to allow consumers to compare and select the lower-salt alternatives).

On this basis, we have identified both high-level recommendations for the Strategy overall and specific recommendations for the three intervention elements (monitoring, awareness and products). In addition, we recommend a framework for ongoing interim evaluation to guide adaptations of the interventions in real time and ensure that the targeted reduction in population salt intake can be achieved.

**HOW TO CONTROL
SALT INTAKE
AMONG THE
MALAYSIAN
POPULATION?**

4.1 Recommendations for strengthening implementation

Overall

1. Extend the Salt Reduction Strategy beyond 2020.

Rationale

Given that the sodium labelling legislation was not passed in 2018 (as targeted) and there will be a subsequent grace period (usually two years) for manufacturers to comply

with the legislation (change their packaged food labels to include sodium content), the Salt Reduction Strategy should be extended beyond 2020 so that all subsequent interventions that rely on sodium labelling can be properly implemented (described in the products recommendation). Previous successful population salt reduction initiatives demonstrate that long-term efforts of over five years are required to change mean population salt intake (14, 15). For example in the United Kingdom of Great Britain and Northern Ireland, the salt reduction strategy was initiated in 2003–2004 and there were concerted efforts by a quasi-governmental organization, the Food Standards Agency, and a nongovernmental organization, Consensus Action on Salt and Health (CASH), until October 2010 (approximately six years), before a 1.4 g/d reduction in salt intake was achieved in 2011 (21). Furthermore, mandatory salt content labelling was already in place in the United Kingdom during the implementation of the salt reduction initiatives.

Actions

- » Another process evaluation of the implementation of the Salt Reduction Strategy should be conducted in 2020 (detailed in the recommendation for ongoing process evaluation and Table 4) to guide the design of the subsequent national salt reduction strategy for the next five years (until 2025). It should aim to lower population salt intake by 30% in line with the WHO target.
- » The findings from the 2020 process evaluation can also help determine whether there have been enough activities and outputs to justify a repeat survey of population salt intake to assess whether there has been a reduction. An evaluation of the short-term outcomes (increased salt knowledge and behaviours, decreased discretionary salt use, reduced salt content in foods) as shown in the logic model in Fig. 1 may be conducted instead of a repeat 24-hour urine collection to measure population salt intake, which is often costly and time-consuming.

2. Facilitate greater integration of strategies and cohesion among stakeholders leading different elements of the Salt Reduction Strategy.

Rationale

Most current interventions and their outputs are achieved independent of each other and are not utilized by other intervention components in the Malaysian strategy. However, most effective salt reduction strategies are multifaceted with interacting intervention components (14, 15). This is because various influences of nutrient and food intake are intertwined and individual behaviour change alone, without environmental change, is unlikely to cause reductions in population salt intake (22).

Actions

- » The technical working groups that bring together stakeholders from different agencies and with responsibility for different elements should share and utilize other outputs to enhance implementation of activities.

- » This is shown by the blue arrows in a revised logic model (Fig. 3) highlighting which outputs should inform which activities for better cohesion. For example, all the findings from monitoring activities, such as salt intake in the Malaysian population and subgroups, salt content in foods and other salt-related research should inform the messages of the awareness campaigns. Data on salt content in food categories could be used to generate media releases and encourage consumers to select foods with lower sodium content and those with the Healthier Choice logo. In addition, the data should also be used to identify and engage food manufacturers whose products have a relatively higher sodium content within the food category. Promotion and education about salt reduction and the Healthier Choice logo among the public should create consumer demand for such products and help incentivize food manufacturers to reformulate their foods to comply with the salt standards to achieve the logo.
- » Fig. 3 is a revised logic model that illustrates in blue the activities to focus on over the next two years of the Strategy. Additionally, in the final two years, the outputs of each activity should also be generating short-term outcomes.

Monitoring

3. Conduct comprehensive monitoring of the sodium content of ready-to-eat processed foods or meals and out-of-home dining meals in Malaysia.

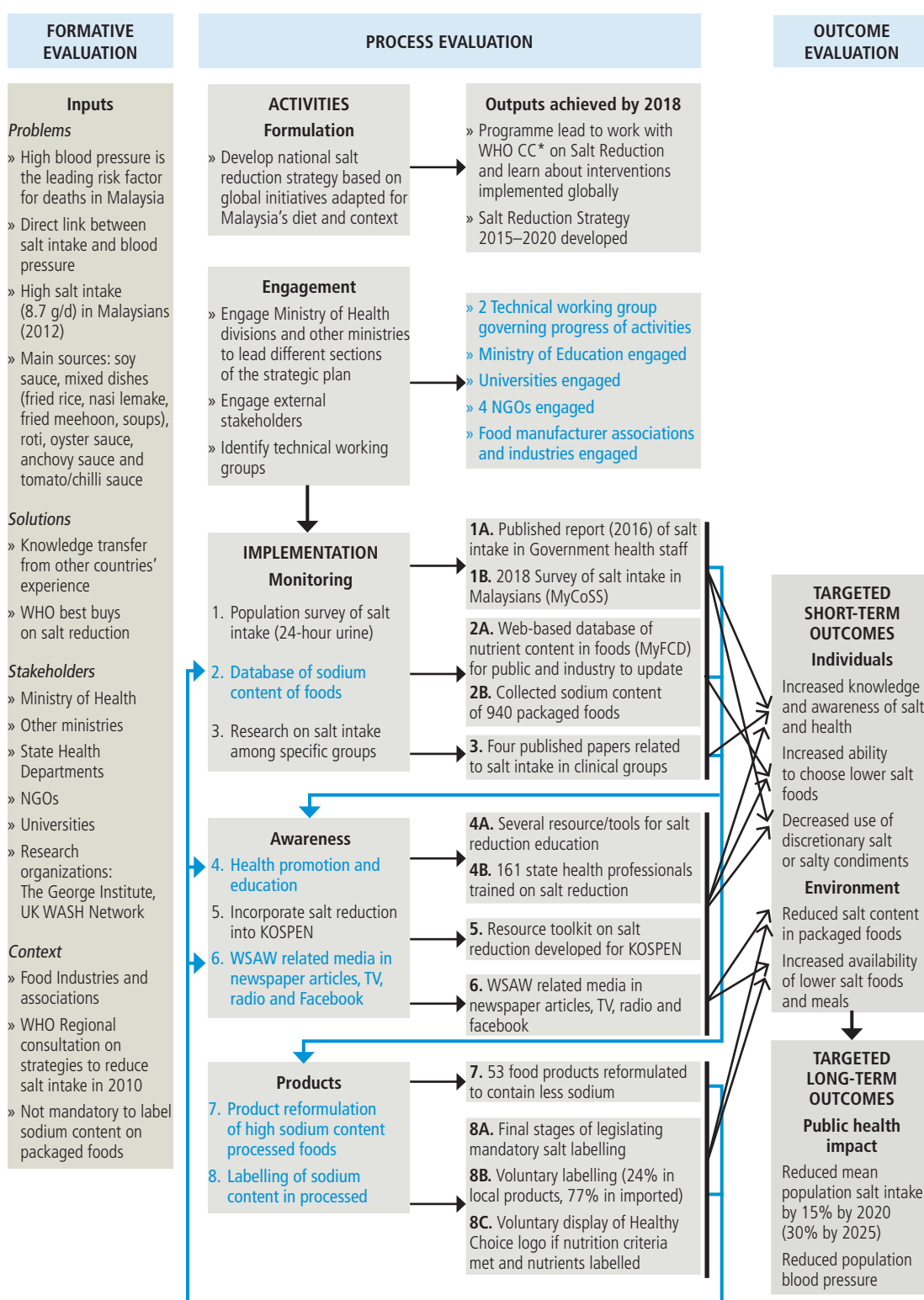
Rationale

As salt intake and salt content of packaged foods has now been monitored, the remaining information required to comprehensively understand the sources of salt in the Malaysian diet should come from measuring the amount of sodium or salt in foods and meals eaten out of home. As identified by the interviews and focus groups, such foods are a common and increasing source of unhealthy food intake for Malaysians due to the convenience, low cost and high availability; therefore, this is an area that needs to be urgently addressed. Measuring the salt content of ready-to-eat and out-of-home dining foods can be used in consumer education but can also inform future interventions, similar to the Healthier Hawker Programme in Singapore (23). The Health Promotion Board of Singapore successfully piloted the programme to improve the healthiness of foods sold by street vendors. The multipronged strategy included engaging and educating food producers and business owners to produce and use healthier ingredients as part of corporate social responsibility, creating a social movement among the community and working with regulators to develop stall licences and labels (Healthier Choice symbol) to promote stores with healthier foods (23).

Actions

- » The Ministry of Health should seek opportunities to collaborate with local universities or laboratories with facilities and technical capabilities to chemically analyse the sodium or salt content in foods.

FIG. 3 Revised logic model depicting recommended priority salt reduction activities and areas of integration to prioritize in the next two years (2019–2020) in blue



* WHO CC: WHO Collaborating Centre

- » Further collaborations and funding opportunities should be identified, including for conducting chemical analyses and purchasing samples of commonly consumed street foods as these are often costly.
- » In order to carry out a chemical analysis, it is necessary to identify and purchase a range of commonly consumed ready-to-eat and outside-of-home meals and foods from recent population surveys of the food intake in Malaysia.
- » Findings of the salt content of such foods should be shared on MyFCD, in education materials and in media releases to raise awareness and provide suggestions for selecting lower-salt food options or lower-salt intake.

Awareness

4. Establish several communication channels to strategically reinforce salt reduction messages to the Malaysian population.

Rationale

Given pretested education materials and new data on salt intake in subgroups and salt content in foods, more resources should be invested in establishing channels for communicating such messages to the population regularly and strategically. Based on previous population salt reduction education interventions, awareness activities should be grounded by an overall strategy or behaviour change framework/theory (22). This involves considering the series of salt reduction messages that result in specific, actionable advice as well as the modes of delivery to ensure widespread reach and regular reinforcement of the message (21, 24).

Actions

- » Several stakeholders should reinforce the salt reduction message, including the federal Ministry of Health, the state health department, health professionals, NGOs, academics and community leaders. This is a key strategy in the Communication for Behavioural Impact (COMBI) framework (25), which was utilized in successful salt reduction interventions in Australia and Viet Nam (26, 27).
- » The Ministry of Health should focus on setting up mechanisms to deliver simple, wide-reaching salt reduction messages to the public directly. As commonly identified by interviews and focus groups, social media can be a potential communication channel given that most Malaysian use it as source of information.
- » Furthermore, the Ministry of Health should more frequently coordinate, incentivize and monitor communication and education efforts conducted by state health department professionals and NGOs. Like WSAW activities, the ministry should regularly coordinate strategic communications across the state health departments, for example identifying all public holidays where salty traditional foods are consumed to release relevant media about the high levels of salt in such foods (28) or identify all relevant health days (for example World Heart Day) to promote salt reduction.

NGOs AND SOCIETAL ROLE MODELS SHOULD BE MOBILIZED TO REINFORCE THE SALT REDUCTION MESSAGE.

- » It is important that state health professionals proactively reinforce the salt reduction messages and provide the community and their colleagues with more detailed education and resources. While there has already been training of trainers, motivation and opportunity to disseminate the salt reduction messages were low. Therefore, it is crucial to introduce an innovative mechanism to incentivize and monitor the dissemination efforts of the state health professionals, for example through a competition among the different states. While the salt reduction themes or messages should be coordinated by the Ministry of Health so that messages are consistent across states, these will need to be tailored to the community and their diets. Additionally, state health department professionals should independently identify existing opportunities to deliver salt reduction messages proactively, for example in other health or nutrition programmes and events.
- » NGOs already involved in the Salt Reduction Strategy such as the Nutrition Society of Malaysia, Malaysian Society of Hypertension, Malaysian Dietitians' Association and Malaysian Alliance for Salt Reduction Initiative, as well as community leaders or societal role models, should be mobilized to reinforce the salt reduction messages. As in the United Kingdom of Great Britain and Northern Ireland salt reduction strategy (21), NGOs can play a vital role as they are often trusted by the community and are able to release media materials and statements that government departments may not be able to. Similarly, NGOs such as Heart Foundation and VicHealth are leading an ongoing salt reduction strategy in Victoria, Australia (28). Community leaders or societal role models should be engaged as salt reduction champions as often they are influential and have an established network.

Products

5. Prioritize and accelerate sodium labelling legislation for all packaged foods.

Rationale

Given that the sodium labelling legislation is at the final stage of the regulatory process and several subsequent interventions rely on the knowledge of sodium content in packaged foods, the legislation should be passed immediately and not held up by sugar labelling. Currently, the implementation of salt reduction interventions is hindered by the lack of food products with sodium content labelling. Mandatory sodium labelling on all packaged foods is needed so that several interventions can properly implemented or enhanced.

First, the sodium label on packaged foods can be a tool upon which education initiatives can focus to assist consumers in identifying foods and beverages with high sodium content as well as alternatives with lower sodium content. This helps address the commonly identified barrier of not knowing what high-salt foods to avoid and what lower-salt alternatives to select. Second, making it mandatory for food companies to be transparent about the sodium content of packaged foods may incentivize reformulation

of those with high sodium contents and increase the uptake of the Healthier Choice logo or the relevant nutrient claims among lower-sodium products, making the food supply healthier and making it easier for consumers to select healthier foods (29). Third, the Government or NGOs can use the sodium information of individual food products to engage and hold the food industry accountable for commitments to improve the healthiness of their products and/or to develop innovative interventions to make it easier for consumers to eat healthier foods, for example mobile applications or online platforms that identify lower-salt foods (30, 31). Last, it allows for an assessment of the average and range of sodium content of food categories. These are necessary to determine feasible sodium content targets for reformulation (32, 33), establish sodium content criteria for the Healthier Choice logo and sodium-related claims, and monitor progress towards a healthier food supply following the implementation of interventions.

Actions

- » The sodium labelling legislation should apply to all packaged food groups and should be passed immediately (without being held up by sugar labelling requirements) so that a grace period (usually two years) can be initiated. If food manufacturers wish to change their food labels only once, this may encourage earlier adoption of sugar labelling.
- » Longer grace periods can be provided to small- and medium-sized manufacturers if they face more technical difficulties, whereas large or international manufacturers should have shorter grace periods. Larger manufacturers are likely to be market leaders, so earlier adoption of labelling is likely to have a large reach. Food manufacturer associations should be encouraged to continue sharing their technical expertise on calculating sodium content.
- » The legislation should consider how to monitor the accuracy of labels and how to administer enforcement or penalties for noncompliance.
- » Mass media awareness and education about the new sodium labelling should be implemented shortly after to ensure that the public understands and uses the nutrition label.

4.2 Recommendations for ongoing process evaluation

6. Conduct ongoing evaluation of process measures to inform adaptations to the interventions.

Rationale

There is growing recognition of the importance of conducting process evaluations of complex public health interventions such as this midterm evaluation to advance our

understanding of what, how and why an intervention works (or does not work) within particular contexts (16, 17, 34). Recent studies of population salt reduction strategies (35–37) support the importance of process evaluations and also suggest that this should be conducted throughout the implementation stage to allow for real-time modification of the intervention to suit the context (38). Additionally, clear documentation of the implementation process will help advance our understanding of what salt reduction interventions work, how, why and in what contexts.

Actions

- » This midterm evaluation of the Malaysia's Salt Reduction Strategy and the dimensions examined to understand implementation progress should form the basis of an ongoing process evaluation that informs adaptations of the intervention. While output indicators and targets have been generated in the Malaysia's plan of action for salt reduction (2015–2020), complementary process measures such as reach, dose or adoption, and fidelity provide a more comprehensive understanding of progress and areas for improvement in such complex interventions.
- » Annex 2 outlines the recommended framework for ongoing process evaluation developed specifically for the Malaysian Salt Reduction Strategy. It outlines the specific process measures and the source of data that will provide such information including: routinely collected data from the Ministry of Health as part of administrative procedures, meeting minutes or publicly available information; qualitative sources such as interviews and focus groups with relevant stakeholders; and surveys of the general population. These process measures are designed to be a relatively low burden and low cost to collect.
- » This process evaluation framework can also be modified for other population salt reduction strategies in other countries.

REFERENCES

1. Institute for Health Metrics and Evaluation. GBD Compare. Seattle: IHME, University of Washington; 2017 [cited 2017 3 November]; available from: <http://vizhub.healthdata.org/gbd-compare>.
2. He FJ, Li J, Macgregor GA. Effect of longer term modest salt reduction on blood pressure: Cochrane systematic review and meta-analysis of randomised trials. *BMJ* 2013; 346: f1325. Epub 2013/04/06.
3. He FJ, MacGregor GA. Reducing Population Salt Intake Worldwide: From Evidence to Implementation. *Prog Cardiovasc Dis* 2010; 52: 363-82.
4. Aburto NJ, Ziolkovska A, Hooper L, Elliott P, Cappuccio FP, Meerpohl JJ. Effect of lower sodium intake on health: systematic review and meta-analyses. *BMJ* 2013; 346: f1326.
5. Elliott P, Stamler J, Nichols R, Dyer AR, Stamler R, Kesteloot H, et al. Intersalt revisited: further analyses of 24 hour sodium excretion and blood pressure within and across populations. Intersalt Cooperative Research Group. *BMJ* 1996; 312: 1249-53. Epub 1996/05/18.
6. Newberry SJ, Chung M, Anderson CAM, Chen C, Fu Z, Tang A, et al. Sodium and Potassium Intake: Effects on Chronic Disease Outcomes and Risks. Comparative Effectiveness Review No. 206. Rockville, MD: Agency for Healthcare Research and Quality; 2018 [cited 2018 1 September]; available from: <https://effectivehealthcare.ahrq.gov/topics/sodium-potassium/final-report-2018>.
7. World Health Organization. Guideline: Sodium intake for adults and children. Geneva: World Health Organization; 2012 [cited 2016 8 August]; available from: http://apps.who.int/iris/bitstream/10665/77985/1/9789241504836_eng.pdf?ua=1&ua=1.
8. American Heart Association Nutrition C, Lichtenstein AH, Appel LJ, Brands M, Carnethon M, Daniels S, et al. Diet and lifestyle recommendations revision 2006: a scientific statement from the American Heart Association Nutrition Committee. *Circulation* 2006;114(1):82-96. Epub 2006/06/21.
9. World Health Organization. NCD Global Monitoring Framework. Geneva, Switzerland: World Health Organization; 2013 [cited 2015 16 November]; Available from: http://www.who.int/nmh/global_monitoring_framework/en/.
10. The World Health Organization. Malaysia: NCD Profile. Geneva: The World Health Organization; 2018 [cited 2019 9 January]; available from: https://www.who.int/nmh/countries/2018/mys_en.pdf.
11. Ministry of Health Malaysia. Salt Reduction Strategy to prevent and control NCD for Malaysia 2015-2020. Putrajaya, Malaysia: Ministry of Health Malaysia; 2015 [cited 2018 18 October]; available from: <http://www.moh.gov.my/english.php/pages/view/115>.
12. Ministry of Health Malaysia. National Strategic Plan for Non-Communicable Diseases (NSP-NCD) 2016-2025. Putrajaya, Malaysia: Ministry of Health Malaysia 2016.

13. He FJ, MacGregor GA. Role of salt intake in prevention of cardiovascular disease: controversies and challenges. *Nature Reviews Cardiology* 2018; 15: 371-7.
14. Trieu K, Neal B, Hawkes C, Dunford E, Campbell N, Rodriguez-Fernandez R, et al. Salt Reduction Initiatives around the World - A Systematic Review of Progress towards the Global Target. *PLoS One* 2015; 10: e0130247. Epub 2015/07/23.
15. Barberio AM, Sumar N, Trieu K, Lorenzetti DL, Tarasuk V, Webster J, et al. Population-level interventions in government jurisdictions for dietary sodium reduction: a Cochrane Review. *Int J Epidemiol* 2017; 46: 1551-405. Epub 2017/02/17.
16. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ* 2015;350:h1258. Epub 2015/03/21.
17. Linnan L, Steckler A. *Process Evaluation for Public Health Interventions and Research: An overview*. San Francisco: Jossey-Bass; 2002.
18. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999; 89: 1322-7.
19. Campbell SM, Braspenning J, Hutchinson A, Marshall MN. Research methods used in developing and applying quality indicators in primary care. *BMJ* 2003; 326: 816-9.
20. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. *Annu Rev Public Health* 2008; 29: 253-72. Epub 2007/11/23.
21. He FJ, Brinsden HC, MacGregor GA. Salt reduction in the United Kingdom: a successful experiment in public health. *J Hum Hypertens* 2014; 28: 345-52. Epub 2013/11/01.
22. Trieu K, McMahon E, Santos JA, Bauman A, Jolly KA, Bolam B, et al. Review of behaviour change interventions to reduce population salt intake. *Int J Behav Nutr Phys Act* 2017; 14:17. Epub 2017/02/10.
23. World Health Organization. *Making Street Food Healthier in Singapore: A Case Study*. Manila: World Health Organization; 2018 [cited 2019 20 April]; available from: http://www.wpro.who.int/noncommunicable_diseases/about/HealthierFoodCentreProgramme-Singapore.pdf.
24. Mozaffarian D, Afshin A, Benowitz NL, Bittner V, Daniels SR, Franch HA, et al. Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. *Circulation* 2012; 126: 1514-63. Epub 2012/08/22.
25. Hosein E PW, Schiavo R. *Communication for behavioral impact: an integrated model for health and social change*. *Emerging Theories in Health Promotion Practice and Research*. San Francisco, CA: Jossey-Bass; 2009.
26. Land M-A, Wu JHY, Selwyn A, Crino M, Woodward M, Chalmers J, et al. Effects of a community-based salt reduction program in a regional Australian population. *BMC Public Health* 2016; 16:1-11.
27. Do HT, Santos JA, Trieu K, Petersen K, Le MB, Lai DT, et al. Effectiveness of a Communication for Behavioral Impact (COMBI) Intervention to Reduce Salt Intake in a Vietnamese

- Province Based on Estimations From Spot Urine Samples. *J Clin Hypertens* 2016; 18:1135-42. Epub 2016/11/05.
28. Heart Foundation and VicHealth. Unpack the salt - news / blogs. VicHealth; 2019 [cited 2019 20 April]; available from: <https://unpackthesalt.com.au/blog/>.
 29. Shangguan S, Afshin A, Shulkin M, Ma W, Marsden D, Smith J, et al. A Meta-Analysis of Food Labeling Effects on Consumer Diet Behaviors and Industry Practices. *Am J Prev Med* 2019; 56: 300-14. Epub 2018/12/24.
 30. Dunford E, Trevena H, Goodsell C, Ng KH, Webster J, Millis A, et al. FoodSwitch: A Mobile Phone App to Enable Consumers to Make Healthier Food Choices and Crowdsourcing of National Food Composition Data. *JMIR mHealth and uHealth* 2014; 2: e37. Epub 2014/08/26.
 31. Ali SH, Luo R, Li Y, Liu X, Tang C, Zhang P. Application of Mobile Health Technologies Aimed at Salt Reduction: Systematic Review. *JMIR mHealth and uHealth* 2019; 7: e13250. Epub 2019/04/18.
 32. Campbell N, Legowski B, Legetic B, Ferrante D, Nilson E, Campbell C, et al. Targets and timelines for reducing salt in processed food in the Americas. *J Clin Hypertens* 2014; 16: 619-23. Epub 2014/08/01.
 33. Downs SM, Christoforou A, Snowdon W, Dunford E, Hoejskov P, Legetic B, et al. Setting targets for salt levels in foods: A five-step approach for low- and middle-income countries. *Food Policy* 2015; 55: 101-8.
 34. Evans R, Scourfield J, Murphy S. Pragmatic, formative process evaluations of complex interventions and why we need more of them. *J Epidemiol Community Health* 2015; 69: 925-6. Epub 2014/12/07.
 35. Trieu K, Webster J, Jan S, Hope S, Naseri T, Ieremia M, et al. Process evaluation of Samoa's national salt reduction strategy (MASIMA): what interventions can be successfully replicated in lower-income countries? *Implement Sci* 2018; 13: 107.
 36. Webster J, Pillay A, Suku A, Gohil P, Santos JA, Schultz J, et al. Process Evaluation and Costing of a Multifaceted Population-Wide Intervention to Reduce Salt Consumption in Fiji. *Nutrients* 2018; 10: 155.
 37. Trieu K, Jan S, Woodward M, Grimes C, Bolam B, Nowson C, et al. Protocol for the Process Evaluation of a Complex, Statewide Intervention to Reduce Salt Intake in Victoria, Australia. *Nutrients* 2018; 10: 998.
 38. Trieu K. The implementation and effectiveness of interventions to lower population salt intake worldwide. Australia: The University of Sydney; 2018.

ANNEXES

ANNEX 1. Plan of action for salt reduction in Malaysia, 2015–2020

ACTIVITIES	ACTION BY	INDICATORS	TARGETS
STRATEGY: MONITORING (M)			
1. Population-based survey using the existing survey among the health staff as proxy by using 24-hour urine analysis, conducted every four years	<ul style="list-style-type: none"> » Disease Control Division » Institute of Public Health » Nutrition Division » State Health Department 	Published report	Reports published in 2016 and 2020
2. Creation of a database on salt content of processed food, with data available to the public	<ul style="list-style-type: none"> » Nutrition Division 	Web-based application	Operational by year 2018
3. Research on salt intake among specific groups	<ul style="list-style-type: none"> » National Institutes of Health, Ministry of Health » Academia 	Number of papers published	5 scientific papers per year
STRATEGY: AWARENESS (A)			
4. Health promotion and education	<ul style="list-style-type: none"> » Health Education Division » Disease Control Division » Nutrition Division » Malaysian Health Promotion Board (MySihat) » Professional Associations » NGOs » State Health Department 	Number of resource toolkit	Reports published in 2016 and 2020
5. Incorporating salt reduction interventions into KOSPEN	<ul style="list-style-type: none"> » Disease Control Division 	Resource toolkit	Published by 2017
6. Promotion through mass media and social media	<ul style="list-style-type: none"> » National Institutes of Health, Ministry of Health » Academia 	KAP survey in target groups	Toolkit published annually
STRATEGY: PRODUCTS (P)			
7. Product reformulation of high-salt content processed foods	<ul style="list-style-type: none"> » Nutrition Division » Federation of Malaysian Manufacturers 	Number of products with reduced salt/sodium content	5 products per year
8. Labelling of sodium content processed foods	<ul style="list-style-type: none"> » Food, Quality & Safety Division 	Compulsory labelling	2018

Source: Salt Reduction Strategy to Prevent and Control NCD for Malaysia (2015–2020).

ANNEX 2. Recommended framework for ongoing process evaluation of the Malaysian Salt Reduction Strategy

MONITORING		AWARENESS		PRODUCTS		
Population survey of salt intake	Database of salt levels in foods for consumers	Health promotion and education	Incorporating salt reduction into KOSPEN	Promotion through mass media and social media	Product reformulation of high-salt foods	Labelling of sodium content in processed foods
DOMAIN: REACH						
Number or proportion of the target audience aware of excess salt intake S	Number or proportion of target audience aware of the online database of nutrition information S	Number of people exposed to salt reduction education or promotion RD	Number of people educated on salt reduction through KOSPEN RD	Number or proportion of target audience that has seen/heard the salt reduction media campaigns RD, S		
DOMAIN: DOSE OR ADOPTION						
	Number of website views or proportion of consumers that use MyFCD Number of food companies and products with nutrient data inputted in database RD, S	Number of salt education or health promotion events Number of health professionals trained on salt reduction RD	Number of sessions where salt reduction was promoted through KOSPEN Number of community leaders trained/mobilized to educate the public on salt reduction RD	Number of mass or social media promotions in the different channels of communication RD	Number of food products reformulated Number of food companies committed to salt reduction RD	Proportion of food products with sodium content labelled Number or proportion of products with Healthier Choice logo or low-sodium nutrient claim RD

MONITORING		AWARENESS		PRODUCTS			
Population survey of salt intake	Database of salt levels in foods for consumers	Health promotion and education	Incorporating salt reduction into KOSPEN	Promotion through mass media and social media	Product reformulation of high-salt foods	Labelling of sodium content in processed foods	
DOMAIN: FIDELITY							
Accuracy and generalizability of salt intake data collected Qual	Quality of salt content data collected Usability of MyFCD Qual	Quality and relevance of research undertaken to target audience Qual	Quality (easy to understand/culturally specific) usability of education resource and material Qual	Quality (easy to understand/culturally specific) and usability of the KOSPEN salt reduction toolkit Qual	Quality (easy to understand/relevant/context-specific) of salt reduction messages Qual	Amount or share of sodium reduction in foods and level of contribution to population salt intake (market share of product and level of contribution) RD	Quality of the sodium labelling legislation (e.g. comprehensive, requires clear labelling, strategy for monitoring accuracy and enforcement of legislation) Qual

S: population survey; **RD:** routinely collected data (e.g. meeting minutes, administrative data, publicly available information); **Qual:** semi-structured interviews and focus groups



Ministry of Health Malaysia



**World Health
Organization**

Representative Office
for Malaysia, Brunei Darussalam,
and Singapore

ISBN 978-967-2173-90-8



9 789672 173908