Review

Setting targets for salt levels in foods: A five-step approach for low- and middle-income countries

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Abstract

Eighty percent of non-communicable diseases (NCDs) occur in low- and middle-income countries (LMICs). In the Global Action Plan to prevent and control NCDs, the World Health Organization has set a target to reduce mean population salt intakes by 30% by 2025. To achieve this target, salt levels in prepared and processed foods must be reduced. In this paper we propose a step-wise approach for setting targets for salt levels in foods for LMICs, as the basis for voluntary or mandatory policy interventions. The five steps are: (1) identifying the foods which contribute to salt in the diet; (2) agreeing which foods to set targets for; (3) establishing the target levels; (4) stakeholder engagement; (5) establishing monitoring mechanisms. A case study of the process of establishing regional targets in the Pacific Islands is also provided. LMICs with limited resources should establish maximum upper limits for salt for the product categories, which together contribute the majority of salt in the diet. Targets should be standardized (e.g., salt per 100 g of product) and have clear timelines. As well as being the basis for voluntary or mandatory levels for salt levels in foods, targets can also be used to inform labeling and taxation policy. In order to have the most significant effect on population salt intake in LMICs, these policy interventions will need to be combined with consumer-facing strategies aimed at changing behaviours and investment in research and development to support effective implementation.

Introduction

Heart disease and stroke cause one in four deaths worldwide (Lozano et al., 2012) and 80% of cardiovascular disease deaths occur in low- and middle-income countries (LMICs) (World Health Organization, 2010). In the most recent global burden of disease study, high blood pressure was the leading risk factor contributing to the global disease burden (Lim et al., 2012). A major risk factor for high blood pressure is excess dietary salt consumption (Elliott et al., 1996). Most populations worldwide consume high levels of dietary salt – often exceeding dietary recommendations (Brown et al., 2009). Although there has been recent controversy about the potential health consequences of salt reduction (Alderden and Cohen, 2012; Institute of Medicine, 2013), the majority of research demonstrates that reducing salt intake at the population level will have a significant public health impact (Whelton et al., 2012; Appel et al., 2011). Salt reduction has been shown to be a cost-effective way to reduce cardiovascular disease (Brown et al., 2009; Mason et al., 2014; Cobiac et al., 2010; Barton et al., 2011; Wang and Labarthe, 2011) and is considered a “best buy” for reducing the burden of non-communicable diseases (NCDs) in LMICs (World Economic Forum, 2011; World Bank, 2006).

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In May 2013 Member States approved the Global Monitoring Framework for NCD prevention and control at the World Health Organization General Assembly (World Health Organization, 2013a). The framework includes nine targets and 25 indicators aimed at achieving a 25% reduction in premature deaths from NCDs by 2025 (World Health Organization, 2013a). Of the nine targets, there was only one diet related target – a 30% relative reduction in mean population salt intakes1 (World Health Organization, 2013a). In order to accomplish this, the Global Action Plan for NCD prevention and control suggests developing “guidelines, recommendations or policy measures that engage different relevant sectors, such as food producers and processors, and other relevant commercial operators, as well as consumers, to reduce the level of salt/sodium added to food (prepared or processed)” (World Health Organization, 2013b).

In many high-income countries, approximately three quarters of dietary salt intake comes from prepared or processed foods; however, the main contributors to dietary salt consumption differ among countries (He et al., 2012). Although many LMIC populations continue to add significant amounts of salt to food while cooking or at the table, there has been an influx of processed foods in these countries in recent years (Stuckler et al., 2012). Therefore, in addition to ensuring that salt reduction initiatives are aimed at reducing salt added by the consumer, reducing salt levels in processed and prepared foods is imperative.

Prepared and processed foods often contain high amounts of salt (He et al., 2012). The salt found in these foods is often referred to as “hidden salt” given that consumers are often not aware of the high salt content. Where there are large amounts of hidden salt in the food supply, one of the most effective ways to reduce salt consumption may be to encourage the food industry to reduce salt in foods by setting targets or standards for salt levels in different categories of foods that all companies should meet (Vos et al., 2010).

Salt reduction initiatives that aim to reduce salt levels in foods can be either mandatory (salt standards) or voluntary (salt targets). Most salt reduction initiatives to date have taken a voluntary approach to reducing salt levels in foods (Webster et al., 2011); however, there have been a few exceptions where mandatory limits have been put into place. Bulgaria, Belgium, Hungary, the Netherlands and Portugal have mandatory salt standards for a small number of staple food products and Argentina and South Africa have set mandatory salt limits for a more extensive list of processed and, in Argentina’s case, restaurant foods (World Cancer Research Fund International, 2014; Webster et al., 2014).

The UK was the first country to establish comprehensive salt targets and between 2003 and 2011 dietary salt consumption decreased by 1.4 g in the UK (He et al., 2014). Throughout this period there was also a decline in stroke by 40% and ischemic heart disease by 42% – it is likely that salt reduction contributed to these declines (He et al., 2014). This suggests that salt targets could substantially contribute to the global goal to reduce population salt intakes by 30% and help reduce diet-related NCDs, even when they are voluntary.

LMICs may face additional challenges in setting targets for salt levels in foods due to a lack of available data for target development and perhaps, more importantly, a lack of capacity for implementation, enforcement and monitoring. For this reason, they will need to adopt a more practical approach to setting country or region-specific salt targets. The aim of this paper is to propose a step-by-step approach to setting and implementing targets for salt levels in foods for LMICs, which can then be used for voluntary or mandatory policy interventions. It also provides a case study of the application of this process in the Pacific Islands, where regional targets have now been endorsed.

An approach to setting salt targets in LMICs

We examined existing literature on setting salt targets and consulted with experts in the field to develop an approach to setting salt targets in LMICs. Fig. 1 outlines the proposed steps that should be taken to set salt reduction targets and provides different options to cater for countries and regions with fewer resources. The main steps include: (1) identifying the main sources of salt in the diet, (2) selecting foods for salt targets, (3) setting target levels in foods, (4) identifying strategies for engagement with stakeholders and (5) establishing mechanisms for monitoring. A brief discussion of the following steps is provided below.

Identifying the main sources of salt in the diet

Targets for salt levels in foods should be established for the food categories that contribute most to dietary salt consumption. Understanding the contribution of different foods to dietary salt intake is best done using national food consumption data. These data will identify the foods and consumption patterns that are associated with high salt intake. The main ways in which information about food intakes can be obtained are by using: food records, 24-h dietary recalls, food frequency questionnaires (FFQ), household budget surveys, food sales or import data (WHO/PAHO, 2013). The type of information used depends on the availability of existing data and country resources. The existing range of products and their current salt levels need to be obtained through surveys according to the protocol outlined by the Food Monitoring Group (Dunford et al., 2012). Where survey information is not available, and resources do not permit collecting data, information can be obtained through consultation with key stakeholders. A summary of the strengths and limitations of these different means of identifying the main sources of salt in the diet can be found elsewhere (WHO/PAHO, 2013).

Selecting foods for salt targets

There are two main approaches to selecting which foods should have salt targets: (1) setting targets for all processed food categories (which could also include restaurants) that contribute to salt in the diet and (2) prioritizing specific foods or categories based on salt contribution. Given the limited resources available in most LMICs, it will not always be feasible to set targets for all food categories that contribute to salt in the diet. The preferred approach may be to identify and establish targets for priority product categories based on a number of factors including contribution of salt to the diet and feasibility of making reductions.

Setting targets for salt levels in foods

As a general rule, if we are trying to reduce population salt intake by 30% and a significant amount of salt in the diet is coming from processed foods, then we need to reduce salt in processed foods by at least 30%, and even more where possible. However, simply setting a generic target to reduce salt levels in all foods by 30% would not be appropriate given that different product categories have specific requirements.

The main considerations to make when setting the target level for salt in foods include: the existing range of products and their current salt levels; how these compare to existing targets from other countries; technical, food safety and consumer acceptability.

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1 Sodium and salt are often used interchangeably when referring to dietary salt intake. When referring to dietary salt consumed and the quantity of salt in food we are primarily referring about sodium chloride (NaCl).
of changes in salt levels; and the extent to which products are locally produced or imported (Charlton et al., 2014).

Examining targets from other countries in relation to the range of products on the national market identified through the shop surveys is a good starting point for LMICs in terms of developing country or region-specific targets for salt levels in food. The UK, the United States, Canada, Australia and other countries worldwide have already established targets (Food Standards Agency, 2014; Health Canada, 2012; The New York City Department Of Health and Mental Hygiene, 2014; Australian Division of World Action on Salt and Health, 2011; Australian Government Department of Health, 2013), which have undergone an extensive consultation process and could be adopted as they stand or modified to reflect country or region-specific requirements. Moreover, mandatory salt standards adopted in Argentina and South Africa could also be a good starting point, particularly for countries in South America and Africa, respectively.

If a proportion of the products on the shelves already meet the international targets then reductions should be technically feasible for that product category. Salt targets can be set as maximum, average or sales weighted average (SWA) levels of salt in foods (WHO/PAHO, 2013). Average targets refer to the average salt levels of all the products in a given category, meaning that some products in the category can be higher as long as others are lower. SWAs refer to the average salt levels in a range of products within a given category, weighted by the sales of those products. The main strengths and limitations of the different approaches to setting targets are reported elsewhere (WHO/PAHO, 2013). Averages, whether SWA or not, allow flexibility in terms of the levels of salt in different products within the same food category (WHO/PAHO, 2013). This flexibility can be helpful in terms of accounting for the natural variation in the salt levels of some foods (WHO/PAHO, 2013); however, using averages makes it very difficult to hold individual companies to account and it can be extremely difficult (and often expensive) to gain access to sales data for both the setting and monitoring of sales weighted average targets. For this reason, setting targets as maximum salt levels in foods is likely the most feasible approach for LMICs where resources are limited. However, these could be combined with targets based on simple, non-weighted, averages as well, where there is appropriate data and expertise.

Targets should be set in a standardized way (e.g., salt per 100 g of the product) rather than per serving to enable comparisons across products. Moreover, products that require reconstitution of the product) rather than per serving to enable comparisons across products. Moreover, products that require reconstitution before consumption should specify whether the target applies to ‘as sold’ or ‘as prepared’ product (WHO/PAHO, 2013).

It is important that appropriate timelines for meeting the proposed targets are established. There is no set formula for setting timelines, as it will depend on the product category and extent of salt reduction. In the UK, where work with the food industry to reduce salt in foods has been very successful, reductions were in the range of 30% over three years so around 10% a year (Wyness et al., 2012). Over time, targets can be adjusted to ensure that the stealth reduction (incremental reductions to allow consumers to adapt to the change in taste) of salt levels in food continues once the initial targets have been met.

**Engagement with stakeholders**

In order to obtain relevant insight and create buy-in for proposed targets, it is important to consult with academics, health professionals, non-governmental organizations, government and the food industry. This will help increase engagement and ensure that targets are feasible within the context of the country or...
Establishing mechanisms for monitoring

Prior to implementing the targets, it is also important to establish robust and transparent mechanisms for monitoring industry’s progress towards meeting the salt targets. There are three main ways to monitor progress: (1) monitor salt levels in packaged foods through regular surveys or use of food market data that includes both market share and information about the salt content of foods (e.g., nutrition labels), (2) by conducting food analysis, particularly for foods that do not carry nutrition labels or (3) industry self-report of the salt levels in their foods. Countries may want to use a combination of these options, depending on resources and capacity. Retail food marketing data can be used to examine salt levels in foods, although the cost of these data may make this option prohibitive for most LMICs. For countries that rely heavily on imports (e.g., small island countries), trade flows should also be monitored particularly as trade becomes more liberalized and new trade and investment agreements are signed.

The most straightforward way of assessing the impact of targets is likely by monitoring salt levels in packaged foods over time. One way to do this is by conducting regular shop surveys, as outlined by the Global Food Monitoring Group (Dunford et al., 2012). However, whenever possible this should be combined with food analysis of a sample of products in each food category that includes both market share and information about the salt content of foods (e.g., nutrition labels). The assessment of sodium levels key contributors to dietary salt intakes in the region (Christoforou et al., 2015). The assessment of sodium levels in processed food was done through a five country survey of the nutrition content of foods co-ordinated by the Pacific Research Centre for the Prevention of Obesity and Non-communicable Diseases (C-POND) in 2011 (Snowdon et al., 2013). Information on sodium levels in locally produced bread within the region was not available but it was agreed that, as this was such an important product category, analysis of the sodium content of bread would be undertaken in the future and used to inform the implementation and monitoring of the targets.

Step 1 – Identifying the main sources of salt in the diets of PICs: The main sources of salt in the diet were established based on a dietary survey in Fiji (Institute for Health Metrics and Evaluation, 2004) followed by consultations in ten Pacific Island countries to identify other potential key contributors to dietary salt intakes in the region (Christoforou et al., 2015). The assessment of sodium levels in processed food was done through a five country survey of the nutrition content of foods co-ordinated by the Pacific Research Centre for the Prevention of Obesity and Non-communicable Diseases (C-POND) in 2011 (Snowdon et al., 2013). Information on sodium levels in locally produced bread within the region was not available but it was agreed that, as this was such an important product category, analysis of the sodium content of bread would be undertaken in the future and used to inform the implementation and monitoring of the targets.

Step 2 – Selecting foods for target setting in the PICs: It was agreed that targets should be set for the products that constituted the majority of salt in the diet. Regional targets were therefore proposed for bread, Asian sauces (soy and other Asian sauces), canned fish, canned meat, sausages, snack foods (crisps, extruded snacks, corn chips), biscuits (plain/breakfast, savoury and sweet) and flavoured noodles.

Step 3 – Selecting target levels for salt in PICs: Assess sodium medians and ranges for existing products: The median and ranges of sodium levels of existing products on the market were assessed. Median sodium levels (per 100 g) in different countries were compared for each product category to ensure that there were no major differences in the salt levels (Table 1). As no large discrepancies were apparent, regional targets were deemed appropriate.

Compare to existing targets: The median and ranges of different product categories were then compared with the UK and Australian targets (Table 2). Because it was posited that many products in the PICs would be imported from Australia these targets were deemed initially appropriate. Comparison of median salt levels in the PICs product categories to those in Australian products was also made to ensure that salt levels in foods were not disproportionately higher in the PICs.

Deciding the type of targets for PICs: Given the lack of comprehensive information on the salt levels of foods and their respective sales figures in the PICs, combined with limited resources for monitoring progress, maximum targets were deemed most practical for the Pacific.

Steps 4 – Stakeholder Consultations: The proposals for the regional targets were presented and agreed by representatives at the Pacific Islands NCD Forum in Auckland in September 2013 and further endorsed in principle at the Pacific Directors of Health meeting in Fiji in April 2014. It is expected that the targets will be formally endorsed at the Pacific Island Health and Finance Ministers meeting in 2015. In the meantime, Fiji has already adopted the targets and other PICs are being encouraged to start integrating the standards into the revision of food regulations.

Step 5 – Establishing Mechanisms for Monitoring: Comprehensive baseline assessments of salt levels in foods will be repeated in Fiji and Samoa in 2015 (Webster et al., 2014) and a broader country survey is being planned for 2020.
Implementing salt targets

Salt targets can be voluntary or mandatory and can be used to provide an impetus for product reformulation by the food industry. Governments can ask food companies to commit to voluntary targets and then monitor progress. In the absence of punishment for non-compliance they can publish the results and use these to raise consumer awareness as well as putting pressure on the food industry.

In addition to trying to reduce salt levels at the manufacturing level (through salt targets or standards), targets can be used as the basis for labelling and taxation policies. Different approaches to labeling include salt warnings (which was done in Finland), front-of-pack labelling such as traffic light labels which indicate whether foods are high (red), medium (amber) or low (green) in salt which is being used in the UK, or healthy choice symbols such as the Australian and New Zealand Heart Foundation Tick schemes (World Cancer Research Fund International, 2014; British Heart Foundation, 2013; Heart Foundation, 2014).

In relation to taxation, sales taxes have been introduced in Hungary and Portugal as part of salt reduction strategies. Although it is too early to assess the impact of these taxes, a modeling study conducted in the US found that a sodium tax that increased the price of salty foods by 40% would reduce sodium consumption by 6% (Smith-Spangler et al., 2010). However, further research is needed to ensure that there are no unintended consequences of taxes with regards to substitution and further consideration should be given to subsidies on healthier products. For example, salt substitutes (e.g., low sodium table salt, low sodium soy and fish sauce, etc.) could be subsidised in countries where

**Table 1**

<table>
<thead>
<tr>
<th>Food Category</th>
<th>Salt Sub Category</th>
<th>Overall median (mean)</th>
<th>Fiji Median (n products)</th>
<th>Guam Median (n products)</th>
<th>Nauru Median (n products)</th>
<th>New Caledonia Median (n products)</th>
<th>Samoa Median (n products)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian Sauces</td>
<td>Soy Sauces</td>
<td>5476 (5461.7)</td>
<td>5209 (16)</td>
<td>4176.5 (3)</td>
<td>5400 (2)</td>
<td>6458 (3)</td>
<td>7529 (8)</td>
</tr>
<tr>
<td></td>
<td>Other Asian sauces</td>
<td>3300 (3374)</td>
<td>2020 (9)</td>
<td>3050 (43)</td>
<td>3940 (15)</td>
<td>6600 (10)</td>
<td>7260 (1)</td>
</tr>
<tr>
<td>Canned Fish</td>
<td>Other Canned Fish</td>
<td>420 (416)</td>
<td>474 (32)</td>
<td>398 (14)</td>
<td>470 (15)</td>
<td>385 (26)</td>
<td>606 (26)</td>
</tr>
<tr>
<td>Canned Meat</td>
<td>Other Canned Meat</td>
<td>715 (722.6)</td>
<td>770 (15)</td>
<td>835 (19)</td>
<td>776 (21)</td>
<td>640 (15)</td>
<td>726 (1)</td>
</tr>
<tr>
<td>Snacks</td>
<td>Other Snacks</td>
<td>808 (823.7)</td>
<td>853 (36)</td>
<td>428 (3)</td>
<td>717 (5)</td>
<td>520 (15)</td>
<td>210 (5)</td>
</tr>
<tr>
<td>Biscuits</td>
<td>Other Biscuits</td>
<td>546.1 (601.8)</td>
<td>616.7 (11)</td>
<td>671.5 (11)</td>
<td>677.5 (10)</td>
<td>196 (12)</td>
<td>196 (12)</td>
</tr>
<tr>
<td>Flavoured noodles</td>
<td>Other Flavoured noodles</td>
<td>546.1 (594.8)</td>
<td>616.7 (11)</td>
<td>671.5 (11)</td>
<td>677.5 (10)</td>
<td>196 (12)</td>
<td>196 (12)</td>
</tr>
</tbody>
</table>

**Fig. 2.** The step-wise approach used to set Pacific Island regional targets.
Table 2
Proposals for PIC targets for salt levels in foods.

<table>
<thead>
<tr>
<th>Category</th>
<th>PIC Sodium Median (Range)</th>
<th>FSA 2012 target Mg/100 g</th>
<th>AWASH 2012 and Food and Health Dialogue (FHD) Targets’ Mg/100 g</th>
<th>Number of products in PICs food composition database currently meeting targets</th>
<th>Proposed PIC target</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread and Roti</td>
<td>No information available</td>
<td>400</td>
<td>NA</td>
<td>8/32 products meet AWASH target</td>
<td>4840</td>
<td></td>
</tr>
<tr>
<td>Asian sauces – Soy Sauce, fish sauce, etc.</td>
<td>5688 (680-9999)</td>
<td>NA</td>
<td>AWASH: 4840 FHD: 15% reduction in Asian sauces exceeded 680 mg/100 g</td>
<td>47/87 products meet AWASH target</td>
<td>430</td>
<td></td>
</tr>
<tr>
<td>Canned Fish (including tuna, salmon, sardines, mackerel and other canned fish)</td>
<td>420 (147-840)</td>
<td>370</td>
<td>AWASH: 430</td>
<td>2/6 products meet AWASH target</td>
<td>540</td>
<td></td>
</tr>
<tr>
<td>Canned Meat</td>
<td>715 (280-1100)</td>
<td>NA</td>
<td>AWASH: 540</td>
<td>5/38 products meet AWASH target</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Sausages</td>
<td>808 (260-1400)</td>
<td>450 (uncooked) 600 (cooked)</td>
<td>AWASH: 600</td>
<td>37/63 products meet AWASH target</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Snack foods – Crisps</td>
<td>570 (45-1594.0)</td>
<td>650 (550)</td>
<td>AWASH: 600</td>
<td>30/63 products meet FSA and FHD average target</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Snack foods – Extruded Snacks</td>
<td>786 (164-1603.0)</td>
<td>1000 (750)</td>
<td>AWASH: 1000</td>
<td>36/50 products meet FHD average target</td>
<td>950</td>
<td>FHD target</td>
</tr>
<tr>
<td>Snack foods- Corn Chips</td>
<td>607 (214-961)</td>
<td>900</td>
<td>AWASH: 560</td>
<td>5/13 products meet AWASH target</td>
<td>560</td>
<td></td>
</tr>
<tr>
<td>Biscuits-Plain Biscuits/ crackers</td>
<td>546 (130-1267)</td>
<td>NA</td>
<td>AWASH: 610</td>
<td>28/44 products meet AWASH target</td>
<td>610</td>
<td></td>
</tr>
<tr>
<td>Biscuits-Savoury Biscuits</td>
<td>713 (310-1545)</td>
<td>800 (550)</td>
<td>AWASH: 800</td>
<td>34/47 products meet AWASH target</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Biscuits- Sweet Biscuits Filled and unfilled</td>
<td>271 (17-1486)</td>
<td>450 (270)</td>
<td>AWASH: 270</td>
<td>13/47 products meet FSA average target</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Flavoured Noodles</td>
<td>1861 (278-4440)</td>
<td>NA</td>
<td>AWASH: 370</td>
<td>95/196 products meet AWASH target</td>
<td>1600</td>
<td></td>
</tr>
</tbody>
</table>

a All sodium data were obtained from the C-POND database which includes information from shop surveys conducted in: Fiji, Guam, Nauru, New Caledonia and Samoa. Future work will also look at existing sodium information obtained from shop surveys in additional Pacific Island Countries.
b When both maximum and average targets were available, reported as: maximum target (average target).
c When Australian Food and Health Dialogue target was available it is also reported.

Table salt or high salt sauces are the main contributor to the dietary salt consumption in order to ensure that they are comparably priced to the higher salt alternatives, as salt substitutes have been found to be an effective means of lowering blood pressure (China Salt Substitute Study Collaborative Group, 2007).

Although there are several uses for salt targets, it is important to acknowledge their shortfalls in LMIC contexts. In many LMICs, many processed foods are produced and sold in the informal sector (Food and Agriculture Organization, 2007). These foods escape regulation, including those related to standards, labeling and taxation. In order to address salt levels in these foods, a broader approach to salt reduction will be required. Targeting the small and medium scale enterprises that make up the informal manufacturing sector will be necessary in combination with the aforementioned policy approaches to reduce salt levels in foods. In order to accomplish this, it will be necessary to engage with these manufacturers to
increase their awareness related to salt levels in foods and their capacity to reformulate their products using technological approaches that concomitantly retain food safety and organoleptic properties.

Conclusions
In order to achieve the global recommendation to reduce population salt intakes by 30%, LMICs will need to take action to reduce salt levels in foods. Setting targets for the main contributors to dietary salt intake is an important first step. LMICs with limited resources should select maximum targets for the main contributors of salt in the diet and use existing targets as the starting point for country or region-specific target development. In addition to setting targets that can be used for setting voluntary or mandatory levels of salt in processed packaged foods, labelling or taxation, interventions at the consumer level are also required. In some LMICs, a large proportion of dietary salt comes from salt added at the table or by high sodium sauces such as soy or fish sauce. In these cases, targets need to be complemented with both initiatives aimed at increasing consumer awareness and investment in research and development to find ways of manufacturing affordable substitutes for table salt, soy and fish sauce that have the organoleptic properties that consumers demand. Governments should consider subsidising these low salt alternatives to encourage their uptake by both consumers and manufacturers.

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