SPOONSHOT®

HOLD THE SALT, PLEASE

SALT REDUCTION NEEDS TO COME OUT OF THE SHADOWS

EXPLORER SERIES

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EXECUTIVE SUMMARY

- Reducing salt intake is not as high on consumers' goals as reducing sugar, mainly because salt has not seen the same level of publicity. In addition, the health impact of excessive salt is a lot less obvious than in the case of sugar.

- Consuming too much salt puts us at greater risk for hypertension, heart disease, and stroke, the top two causes of death the world over. Other health issues linked to excessive salt consumption are gastric cancer, obesity/overweight, and lowered immunity.

- The simplest and cheapest solution to these health concerns is just reducing the amount of salt we eat, to under 5 grams a day, the recommended dose by the World Health Organization.

- But most people find it hard to reduce the amount of salt they add to their food, mainly because they are used to high-salt diets or they have no control of the amount of salt that goes into the packaged food they buy.

- To help consumers reduce their salt intake, there are a number of strategies that have been used, including stealth reduction, potassium chloride, and glutamates. However, these have not had the kind of promotions that sugar alternatives have had and thus are less well known.

- Recent innovations using new ingredient sources are offering solutions to help consumers reduce the amount of salt or sodium they consume, pointing to significant potential in such technologies.

- The harmful effects of sugar are very well known now by consumers, and it is time for them to become familiar with the pros and cons of salt. Stealth reduction has been successful in the past, but no longer will it do in an era of hyper-transparency.

- There is every indication that the time has come for salt alternatives[1] to overtly show that they are worth their salt.

1 https://www.foodnavigator.com/Article/2020/03/10/The-salty-truth-about-out-of-home-meals-risks-plant-based-consumer-backlash

SALT REDUCTION IS TAKEN WITH A PINCH OF SALT

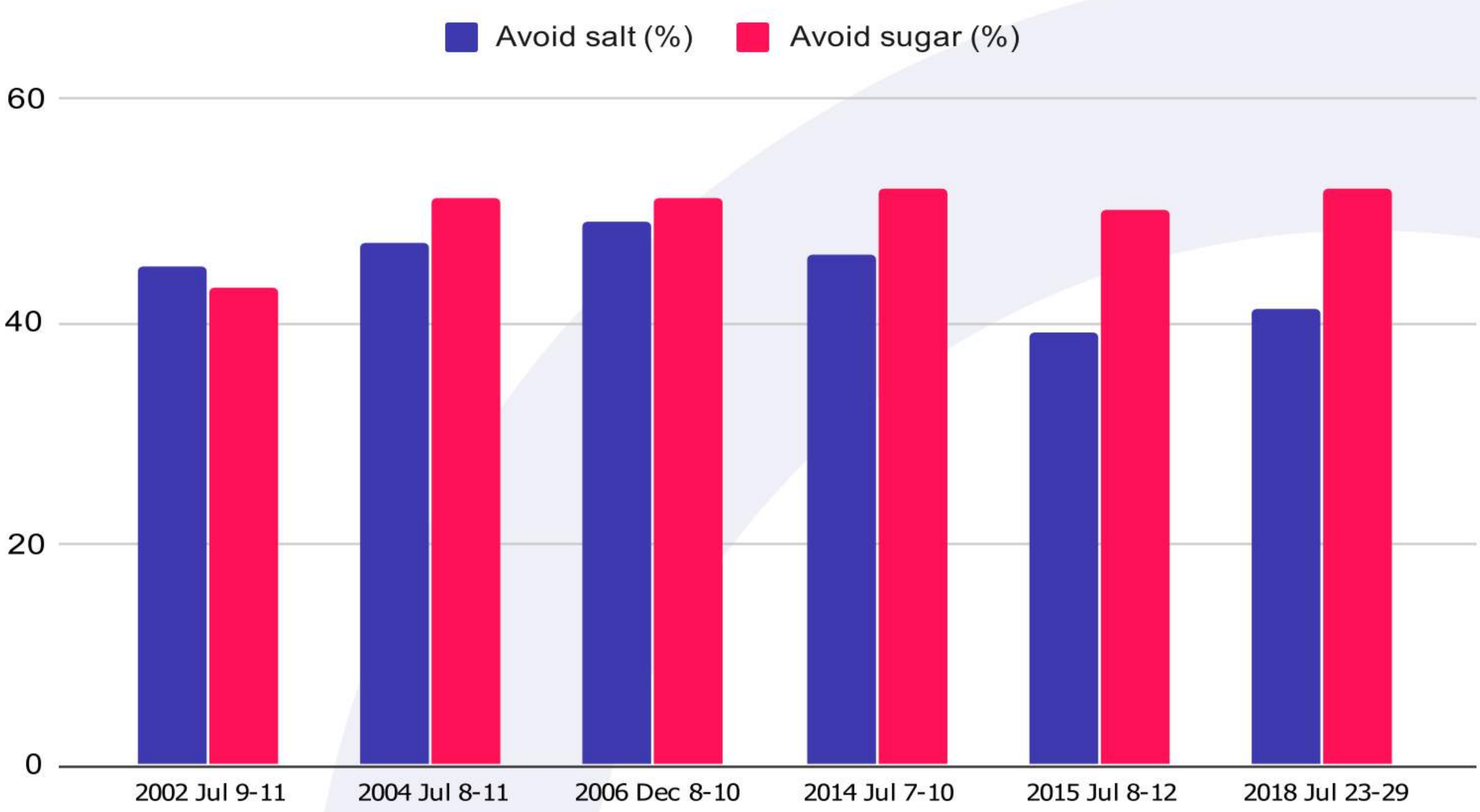
At some point in the recent past, you've probably resolved to cut down your sugar intake or given it up completely. And you've probably done so a few times. Well, you're not alone. The 2019 Food & Health Survey by the International Food Information Council (IFIC) found that **81% of consumers**[2] in the US are either trying to limit or avoid sugars in their diet. It's not too surprising. Sugar has gotten a lot of public denunciation over the last few years and it has pretty much become the bad boy of the food world – enticing and exciting but just terrible for your wellbeing.

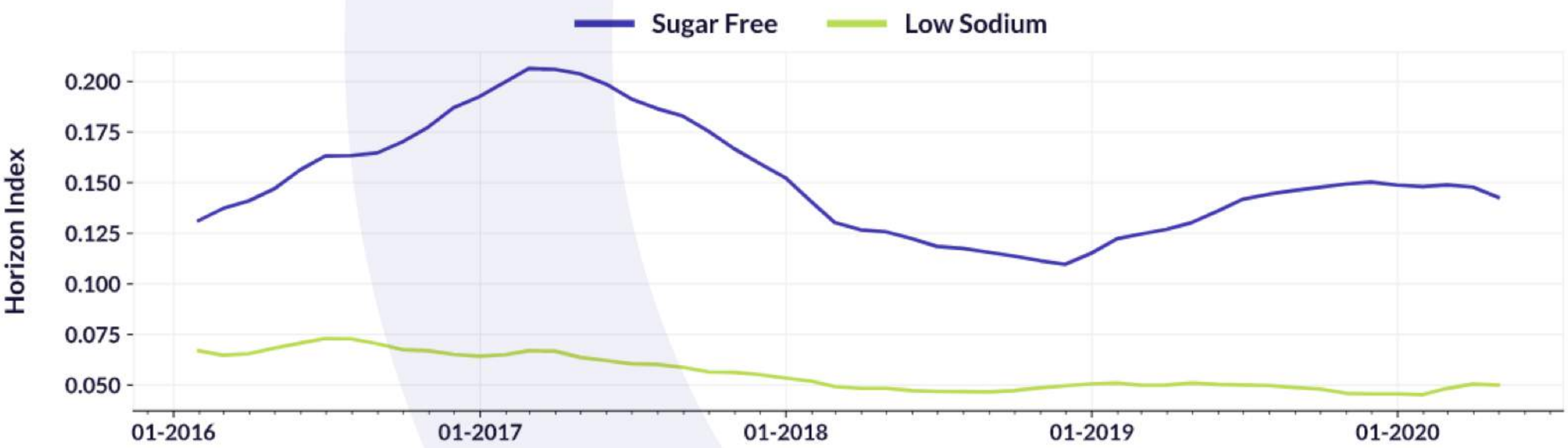
While all the focus is on sugar reduction, another ingredient that has the potential to be as harmful to health has slipped under the radar – sodium chloride or our everyday table salt. Go ahead, ask yourself, how often have you thought about cutting down on salt. It usually doesn't happen without the explicit instructions of a medical professional.

2 https://foodinsight.org/wp-content/uploads/2019/05/IFIC-Foundation-2019-Food-and-Health-Report-FINAL.pdf

Studies also indicate that consumers are less worried about their salt consumption than their sugar consumption. Take, for example, a Gallup poll tracking food data over 15 years in the US. While half the population has pretty much consistently tried to avoid sugar, there is less inclination to do so in the case of salt. A couple of likely reasons for this could be the following.

Percentage of US consumers who are trying to actively avoid sugar and salt, by year





Source: Spoonshot Data

1

We actually do need salt for our survival, since it is the most abundant source of sodium in our daily diets. Sodium is an electrolyte that regulates the amount of water in the body and also ensures the proper functioning of nerve impulses and muscle contractions. Low levels of sodium in the blood can cause electrolyte disorders like hyponatremia, whose symptoms include lethargy, confusion, seizures, and muscle twitches. But foregoing (refined or processed) sugar is not likely to do much damage in most cases, and instead is usually considered quite beneficial for health.

2

The impact of excessive salt consumption is less obvious than that of having too many sugary treats. Sugar can contribute to obesity and a number of other lifestyle diseases linked to being overweight. In simple terms, the physical effects of consuming too much sugar can become obvious fairly quickly, irrespective of age. On the other hand, the effects of a high-salt diet take a longer time to manifest, and it usually happens in adults.

3

In addition to all the negative publicity for sugar, it is mandatory for most processed foods to list the amount of sugar in it in almost every country. This makes consumers who look at the labels a little bit more careful about how much they are consuming. Salt has no such requirements. In many countries, disclosing salt content in nutrition labeling is voluntary, so consumers may not have any idea how much salt they are consuming.

4

Another driver for lack of interest in curbing salt consumption is that, over the last few years, salt has become quite a trendy ingredient. Salt is no longer the basic fine table salt but has gone upmarket, popularized by restaurants, chefs, and cooking shows. It now comes in numerous variants, such as Himalayan pink salt, desert salt, black salt, fleur de sel, finishing salts, and so on. Salts are classified and marketed by characteristics like geographic origin, method of preparation, impurities, or even what purpose they can be used for (like curing or preserving). This encourages consumers to give them a try and even can spread the misconception that these may be “healthier” than standard table salt.

EXCESSIVE SALT INTAKE AFFECTS HEART HEALTH

One of the most common effects of consuming excessive salt is hypertension. Too much salt causes elevated blood pressure, which in turn can increase the risk of developing cardiovascular disease. This can lead to heart disease and stroke, the leading causes of death worldwide.

Data from the **Global Burden of Disease**[3] studies show how dangerous hypertension can be – it is, in fact, the largest single known risk factor for cardiovascular disease. In 2017, 10.44 million deaths worldwide were attributed to high blood pressure as a risk factor, compared to the 6.53 million deaths that were linked to high blood sugar. Often, the preference for a lot of salt in foods starts in childhood and continues through to adulthood, when it can be difficult to change tastes. Its health impact isn't often realized until quite late on, which is why among deaths linked to high blood pressure, 93% are over the age of 50 years.

https://ourworldindata.org/causes-of-death#what-do-people-die-from

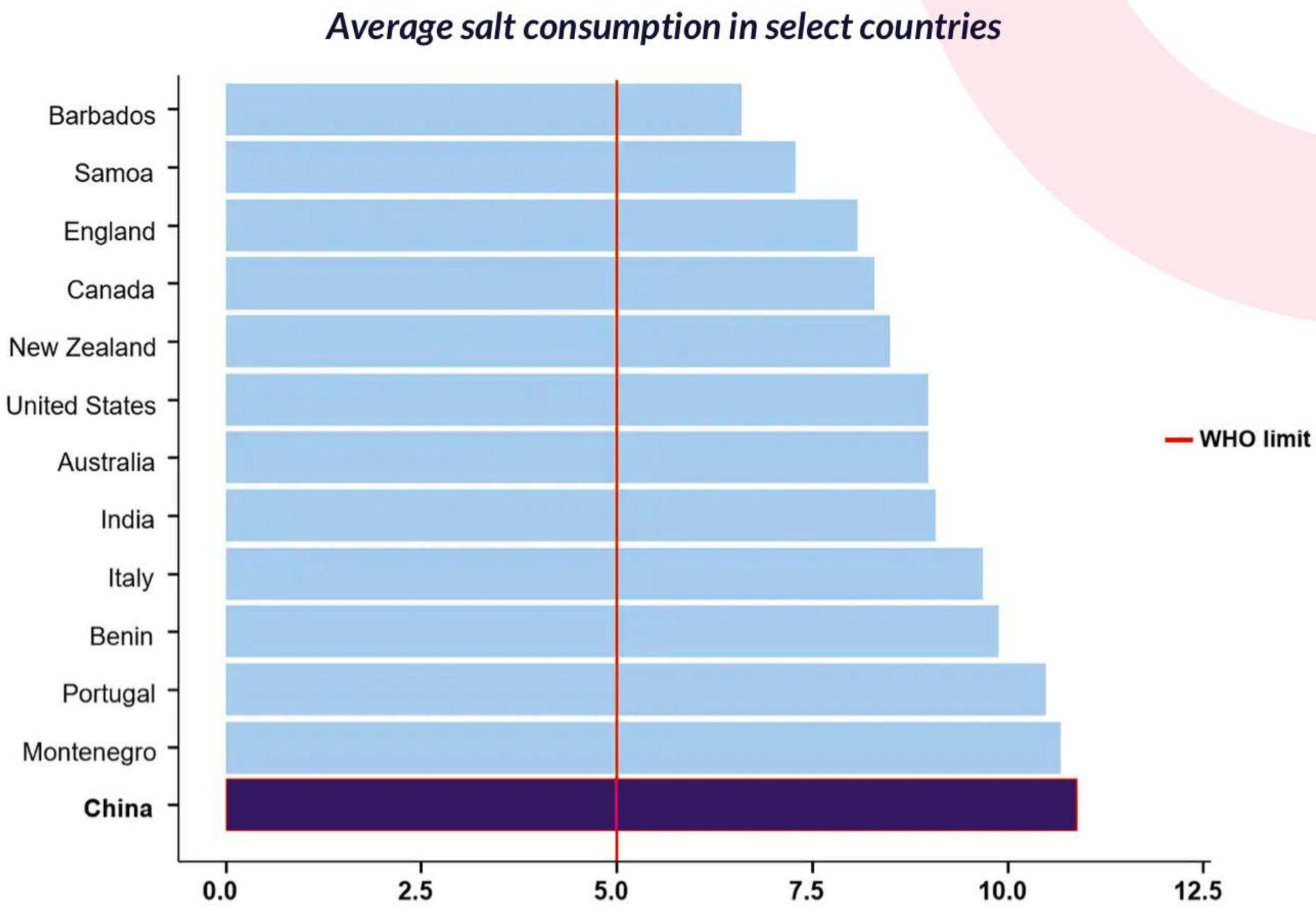
The effects of a high-salt diet are evident from the results of a comprehensive study of China's salt consumption, earning the country the distinction of having the **highest salt consumption**[4] in the world. Cardiovascular disease, including ischemic heart disease and stroke, currently account for 40% of deaths recorded in China – and this is being linked to the country's fondness for salty food. The best way to track salt intake is to measure the sodium excreted in urine over a 24-hour period.

The WHO recommends less than 5 grams of salt a day for adults (or around 2 grams of sodium). But in China, adults consumed 10.9 grams of salt a day on average – that's more than twice the daily recommended amount. Children and adolescents also consumed more salt than the limit set for adults. Kids aged 3-6 years consumed about 5 grams a day, while kids aged 6-16 years had an average of 8.7 grams per day. These results are based on 40 years' worth of data, indicating that the preference for a high-salt diet is a learned behavior.

In addition, the data showed that Southern China was actually seeing a growth in salt consumption, a result of more processed food and eating out of the home.

4 https://www.chinadaily.com.cn/a/201907/12/WS5d27c45aa3105895c2e7d079.html

But China is by no means alone in terms of excessive salt intake. Most other countries also consume more salt than the suggested amount.



https://theconversation.com/salt-chinas-deadly-food-habit-120201

HIGH-SALT DIETS MIGHT IMPACT IMMUNITY, A NEW STUDY SHOWS

Heart disease isn't the only health issue linked to high salt intake.

There is some evidence to suggest that certain high-salt foods – particularly things like salt-preserved meat, fish, and vegetables – can cause **stomach cancer.**[5] This is based on studies in Asia, where a lot of foods are preserved by fermentation and salting.

There are also some studies that point to salt intake to be an independent risk factor for **obesity/overweight.**[6] In particular, a positive association was found between salt intake and BMI and the prevalence of obesity/overweight in Japan, China, the US, and the UK.

5 https://www.wcrf.org/int/blog/articles/2016/04/salt-shaking-link-stoma

6 https://academic.oup.com/ajcn/article-abstract/110/1/34/5492592?redi

A new **German study**[7] has found evidence linking high-salt diets with lowered immunity. Mice fed high-salt diets were found to suffer from much more severe bacterial infections. Human volunteers who consumed 6 grams over and above their daily intake also displayed signs of pronounced immune deficiencies. Within a week of increasing their salt intake, blood samples of the volunteers showed that immune cells coped much worse with bacteria.

While the researchers did not look at virus responses, the immunity link could interest consumers looking into ways to boost their immunity, especially in light of the COVID-19 pandemic. Lowering salt consumption is unlikely to cure COVID-19, but improving overall immunity (for those who need it) is likely to help cope with the disease in general and avoid preventable medical bills.

Given these factors, excessive salt consumption is as important a public health issue as excessive sugar consumption. And it needs to be addressed sooner rather than later.

7 https://www.foodnavigator.com/Article/2020/03/27/High-salt-intake-bad-for-the-immune-system-study

SALT REDUCTION IS A CHEAP, EASY STEP TO BETTER HEALTH

Awareness campaigns about the health implications of consuming too much sugar helped change consumer attitudes towards the ingredient and even resulted in vocal boycotts of several brands. It forced brands to change the way they deal with sugar and ramped up innovation in the sweetener segment. There are now numerous alternatives coming up that attempt to mimic the sensory aspects of sugar without the calorie count and health issues.

This points to the potential for salt alternatives and targeted strategies that can help consumers reduce their salt content. The health benefits of cutting salt are worth it – around **2.5 million**[8] **deaths** could be prevented annually if the global salt intake were brought down to under 5 grams a day. In fact, salt reduction is the simplest, most cost-effective measure to bring down the risk of developing heart diseases because of its high effectiveness and low cost of implementation. Studies have actually shown a **dose-response**[9] correlation between the reduction in salt intake and the drop in blood pressure.

The strategies to reduce salt intake depends on the food sources of sodium in our diets, and this varies from region to region. In countries where a bulk of meals are cooked from scratch, salt is added while cooking, at the table, or through sauces and preserved foods. In other countries, particularly developed or Western countries, an estimated **80%**[10] of the salt consumed is from processed foods, in which case consumers don't have much control over salt content.

8 https://www.who.int/news-room/fact-sheets/detail/salt-reduction

9 https://www.intechopen.com/books/salt-in-the-earth/systematic-reduction-of-excessive-salt-intake

10 http://www.worldactiononsalt.com/media/wash/resources/factsheets-/WASH-Factsheet-Reducing-salt-saving-lives-HR.pdf

Major dietary sources of sodium in select countries

	Source	% of Sodium
CHINA	Salt (added in-home cooking)	**75.8%**
	Soy sauce	**6.4%**
	Mustard, turnip greens, and cabbage	**3.6%**
	Noodles and bread	**3.8%**
	MSG	**0.6%**
JAPAN	Soy sauce	**20.0%**
	Soups	**16.4%**
	Salted fish, seafood, fish roe	**15.0%**
	Salted (pickled) vegetables and fruits	**9.8%**
	Salt added to foods during home cooking and at the table, and from the salt in fast foods and foods eaten at restaurants	**9.5%**
UK	Bread, grains, cereals	**34.6%**
	Commercially processed red meats, poultry, and eggs	**20.4%**
	Salted vegetables and vegetarian products	**8.2%**
	Dairy	**7.8%**
	Spices, flavorings, gravies, sauces, salt (added in-home cooking)	**5.0%**
US	Salt (from restaurants, fast foods, and home)	**29.0%**
	Commercially processed bread, grains, cereals	**19.5%**
	Commercially processed red meats, poultry, eggs	**12.0%**
	Gravies, seasonings, sauces, and salad dressings	**11.7%**
	Dairy products	**8.2%**
	Vegetables and textured vegetable protein	**3.3%**

***Note**: China was the only country in this study that showed significant regional differences in salt consumption*

***Source**: Dietary Sources of Sodium in China, Japan, the United Kingdom, and the United States, Women, and Men Aged 40 to 59 Years: The INTERMAP Study*

The best strategy to ensure low salt intake is to make it a habit right from childhood. However, in the absence of that, the following strategies have the potential to help consumers bring down their salt or sodium intake in the long run. These are not new strategies and some have been tried in the past with great success.

- Stealth reduction in processed foods
- Potassium as a sodium replacement or alternative
- Taste enhancers, like glutamates, spices, and yeast extracts

STEALTH REDUCTION HAS SEEN SUCCESS BUT CAN FIZZLE OUT WITHOUT A SUSTAINED PUSH

In many parts of the world, the food industry has taken a stealthy approach to salt reduction in packaged foods. This is perhaps one of the most effective strategies for salt reduction in packaged foods, mainly because it does not need any behavioral change from consumers, which is usually quite difficult to achieve.

According to researchers at the **Harvard School of Public Health,** the human taste buds are not sensitive enough to notice a moderate (30%) reduction in salt, and most foods will not taste noticeably different. Salt preferences are an acquired taste and most people can adjust to reduced sodium in just a couple of weeks. The stealth aspect of this strategy is to counter any concerns over consumers interpreting claims of **"low salt", "reduced salt", or "low sodium"** to mean diminished taste, thereby avoiding such products.

In the UK, this unobtrusive measure resulted in as much as a **50% decrease**[11] in salt content in supermarket products between 2003 and 2013, with no major impact on sales. **Bread**,[12] in particular, has been quite successful – between 2001 and 2011, salt levels in bread declined from **1.23** grams per **100** grams (of bread) to **0.98** grams. More than **70%** of all bread products had achieved the set target of less than 1 gram of salt (per 100 grams of bread).

Unfortunately, since then, there has been little progress in a further salt reduction in processed food in the UK. According to data released by **Public Health England**,[11] there have been no "statistically significant changes in salt intake" between 2014 and 2018. The public health campaign 'Action on Salt' blamed this on lack of compliance by the food industry as well as lack of enforcement by the government. Salt reduction in packaged food requires a certain amount of reformulation to ensure no changes in taste, texture, or shelf life, which brands will see as costly.

Consumer concern about the amount of salt in food has also been falling, with May 2019 seeing the lowest levels of concern ever. The greater emphasis on sugar reduction in the last few years and a loss of momentum in the program is likely to be responsible.

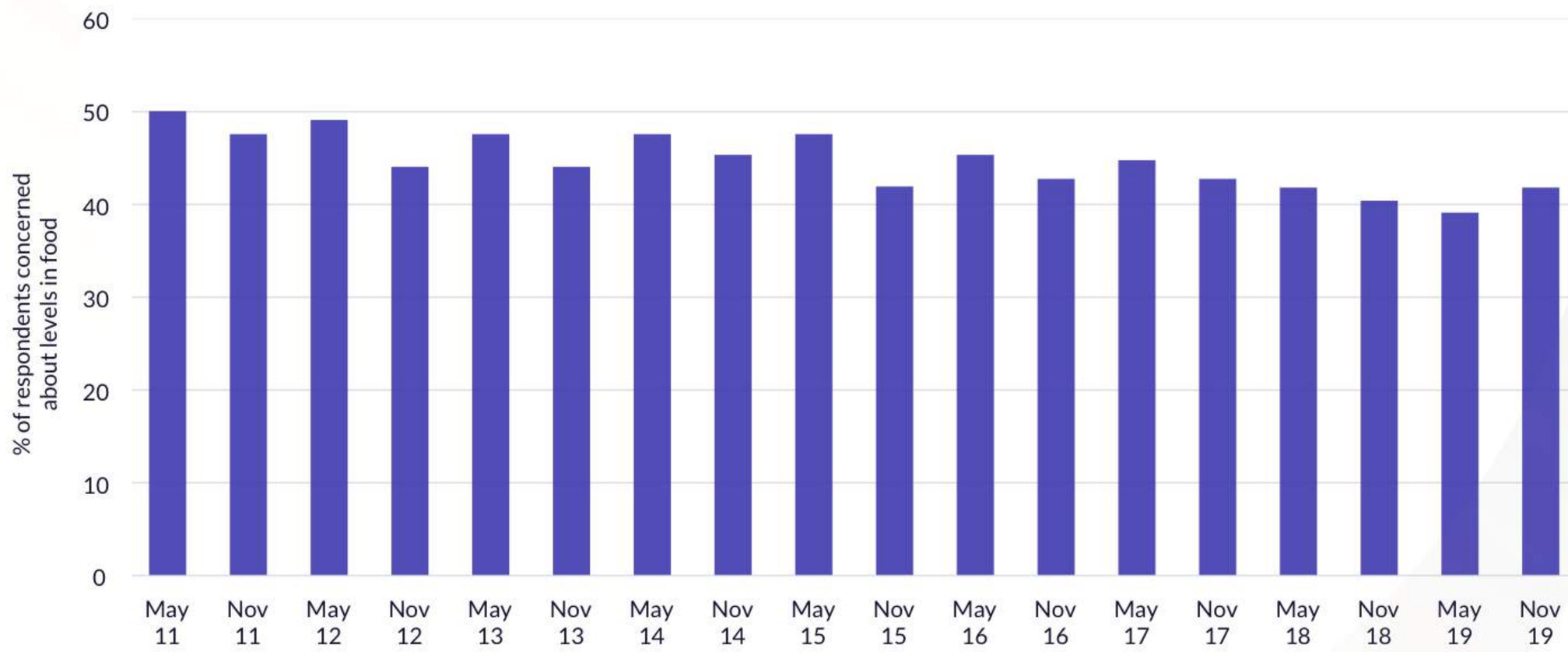
11 https://www.foodnavigator.com/Article/2020/03/25/Salt-campaigner-disappointed-as-report-finds-no-progress-on-reduction

12 https://www.ncbi.nlm.nih.gov/pubmed/23794567

This situation should not be taken as a failure of the approach. Instead, it highlights the importance of a combination of stealth reduction alongside sustained public messaging regarding the importance of consuming less salt. It is also important for brands to highlight their efforts in salt reduction – after the fact – and the benefits it has in terms of health for consumers.

This can help drive home the fact that small, gradual reductions in salt will not take away the enjoyment of food, and that it is a strategy that can be employed while cooking at home as well.

Concern about the amount of salt in food, UK, May 2011-Nov 2019



Source: Food Standards Agency

Product examples: *"low sodium" and "no added salt" claims are becoming more prominent in bread*

SALT REPLACERS HAVE POTENTIAL AS AN ALTERNATIVE TO SODIUM

Salt replacers have significant scope to help consumers reduce their sodium intake, particularly if they don't make much of a difference in terms of taste. The most commonly used substitute for sodium chloride is potassium chloride due to the similarity in taste and functionalities (such as preservation). It is ideal for brands to use when reformulating their products to reduce sodium content, and is most effective in bread, processed fruit and vegetables, snacks, and processed meat.

Like sodium chloride, potassium chloride is a naturally occurring mineral salt that is extracted from rock and sea salts. The dietary consumption of potassium has the opposite effect of sodium – it reduces the risk of hypertension and helps improve blood pressure regulation. Unlike sodium, the average global potassium consumption is well below the WHO recommended dose. Thus, adding potassium to our diets is likely to be beneficial.

There are certain drawbacks to potassium chloride. It has to be used in limited quantities as too much of it can impact the saltiness and instead give it a bitter after-taste, though companies like **NuTek** may have technologies that help suppress this bitterness. Too much potassium could also be a health risk. A combination of the two minerals – with different proportions, depending on food and format – is probably the best way to reduce sodium and increase potassium in our diets without compromising on taste and texture of food.

An **extensive review**[13] of potassium-based sodium replacers found that the potential benefits of this measure far outweigh the risks. Replacing just **15% of sodium** in bread and **25% of sodium** in other commonly consumed foods can have a significantly positive impact on overall population health, according to the study.

13 http://www.actiononsalt.org.uk/about/position-statements/potassium-based-salt-replacers/

Various other salt substitutes are also used, including magnesium salt, calcium salt, potassium lactate, calcium citrate, among others. They are similar to regular table salt in some properties, making them ideal to at least partially replace sodium chloride.

*Potassium chloride blends in table salt: The WHO recommends a potassium intake of at least **3,510 mg/day for adults**. A serving of LoSalt contains **450mg** potassium.*

*Snacks are starting to add potassium chloride to bring down the amount of sodium they use. This product from Australia calls out "**Mineral Salt (Potassium Chloride)**" in its list of ingredients on-pack*

Heinz has extended its range of ketchup with low-salt and -sugar variants. This particular product says it has 96% less sodium than the regular variant and uses a salt alternative called AlsoSalt, whose main ingredient is potassium chloride

THE UMAMI FLAVOR OF TASTE ENHANCERS HELPS MASK LOW SALT

GLUTAMATES

Taste enhancers[14] can help reduce salt consumption by activating the umami taste receptors on the tongue and increasing the perception of **saltiness**.[15] Umami receptors can balance out the lack of sodium and enhance flavor, thereby decreasing the dependence on salt. One of the compounds that can generate the umami flavor is glutamic acid or glutamate, a non-essential amino acid also found naturally in foods like tomatoes, cheeses, mushrooms, seaweed, and soy.

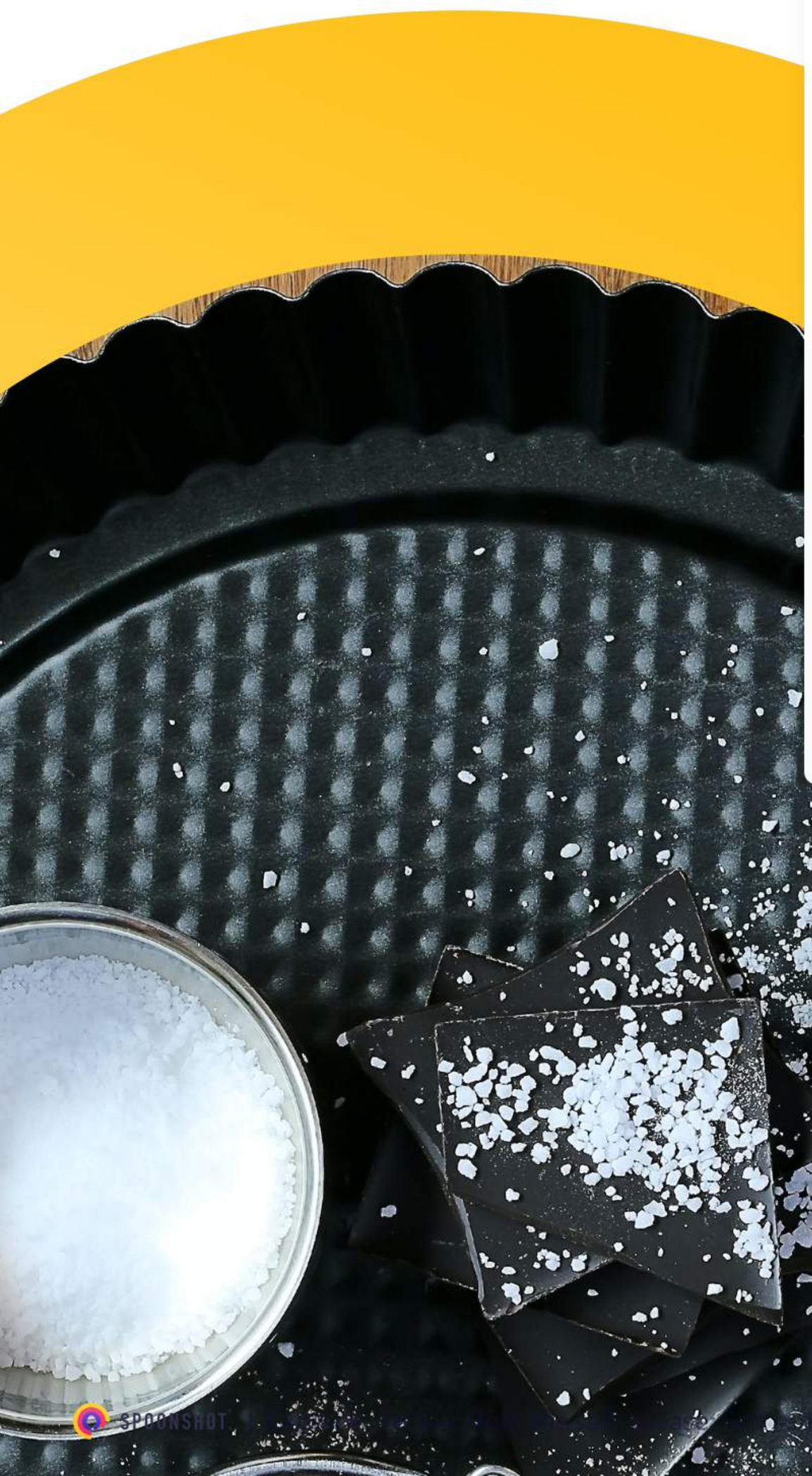
14 https://www.campdenbri.c… replacers-updated.pdf&acce… updated.pdf&hash=98c6b95… 587c49df1bb

15 https://en.angelyeast.co… sodium.html

The best-known glutamate is monosodium glutamate or MSG (glutamic acid combined with sodium) and it is a popular flavor enhancer in Asian cuisine producing the umami taste. MSG has a bit of a bad reputation in certain parts of the world as harmful to health. While some people may have adverse reactions to the ingredient, there is not enough evidence linking MSG (in moderate quantities) with health issues.

In fact, a recent study published[16] in the journal Nutrients found that using MSG and other glutamates as salt substitutes could help reduce sodium consumption by up to **7-8%** while not diminishing palatability. This is mainly due to the umami flavor that MSG imparts. The potential for using MSG and other glutamates as salt substitutes in popular foods such as cured meats, meat-based frozen meals, soups, and crackers could benefit a significant share of the population in countries where the main source of salt is in processed foods. In addition, MSG has just **12%** sodium, while table salt has **39%**.

MSG has quite a few benefits that make it ideal in mass food production – it is cheap, easy to make, and can be used in low concentrations for a significant flavor boost. But for those who want to avoid MSG, other sources of glutamates include yeast, soy, seaweed, and vegetable proteins, which can be called out on pack to highlight natural umami flavoring.

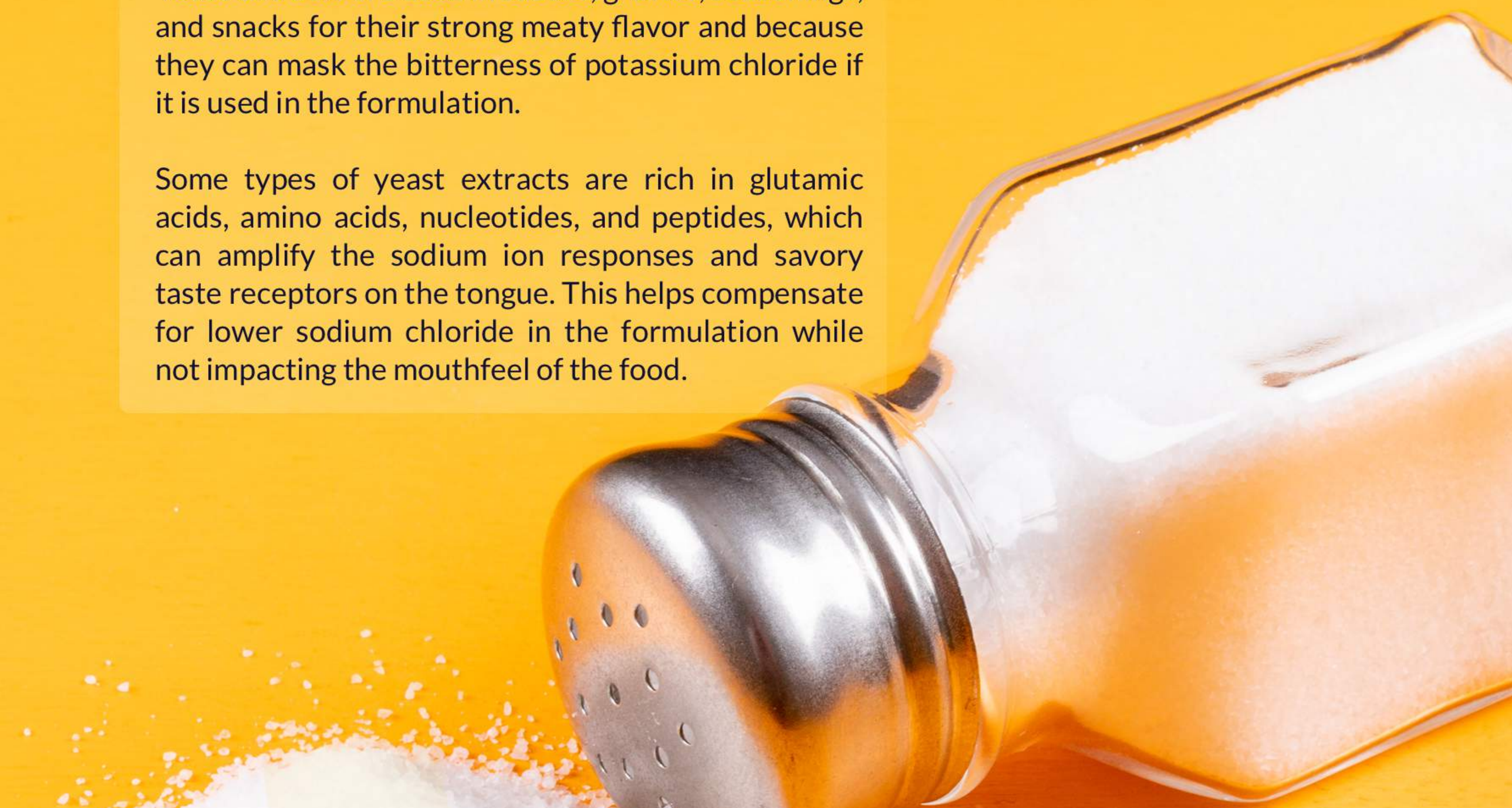


16 https://specialty.medicaldialogues.in/substituting-salt-with-msg-can-reduce-sodium-intake-monosodium-glutamate

YEAST EXTRACTS

Natural yeast extracts have been used quite a bit as replacements for MSG and other artificial taste enhancers. They are low in sodium and contain “free” glutamic acid, which gives them the umami taste. Yeast extracts are used in sauces, gravies, seasonings, and snacks for their strong meaty flavor and because they can mask the bitterness of potassium chloride if it is used in the formulation.

Some types of yeast extracts are rich in glutamic acids, amino acids, nucleotides, and peptides, which can amplify the sodium ion responses and savory taste receptors on the tongue. This helps compensate for lower sodium chloride in the formulation while not impacting the mouthfeel of the food.



HERBS AND SPICES

Salt can also be replaced by using a range of herbs and spices as flavor enhancers in food. Spices like paprika, chili, dill, mint, oregano, and basil have the ability to enhance the flavor of seasoning, even when the salt has been reduced. It is an ideal technique to be used in meat products, snack seasonings, and sauces, with the additional benefit of some amount of preservative properties as well. Using herbs and spices are not only a cost-effective way of increasing flavor but also a natural one, which consumers have been demanding more of. One problem of using these ingredients is their own rather strong flavor.

Product examples: *"low sodium" and "no added salt" claims are becoming more prominent in bread*

WHAT'S NEXT?

There are a number of other ways already in use or being explored by researchers in the goal to help reduce consumer salt intake.

- **Alternative preservation techniques:** Reducing moisture through drying or using preservatives like sorbate, benzoate, nisin, or herbs (for clean label products)

- **Reducing the size of the salt particles:** This can give a faster perception of saltiness, meaning that a lower amount of salt is needed. This works best where salt is added dry, such as in snacks.

- **Modifying the structure of salt:** There is potential for coming up with new structures of salt crystals that dissolve more efficiently while eating, which in turn will help companies reduce their use of sodium in foods without losing out on taste.

As mentioned earlier, these strategies mentioned above are not new and have been researched for commercial use, if not actually used in mass production. However, salt reduction in processed foods has been largely ignored or neglected due to the lack of any enforced regulation. For salt reduction to work effectively, it needs to be a combined effort by the government, brands, and consumers.

The stealth health approach, which saw a significant amount of success in the UK, may no longer be as relevant where people are demanding greater transparency in terms of their food ingredients and production processes. In addition, claims of reduced-sodium may actually be worth highlighting now, particularly as immunity will become an important selling point. Consumers will also start to show greater interest in sodium alternatives, similar to what happened in the case with sugar.

In the coming years, we expect to see a greater push from consumers towards lowered salt in their food and options for salty ingredients that help them do so. Two innovations introduced in early 2020 show significant potential for new methods of salt reduction and the possibility of looking at new sources for alternatives.

PhytoSalt

South Korean start-up **Phyto Corporation** has developed an entire range of products using a seawater crop called Salicornia. The range includes what the company is calling the "world's first plant-based salt" under the brand name **PhytoSalt**. **Salicornia** is a halophyte or salt-accumulating plant but has thus far not been used for food as it was considered too salty. The company has been able to use a patented desalination technique that allows the salt to be extracted.

PhytoSalt is said to be naturally low in sodium and could reduce sodium intake by **20%**. The salt alternative also has other mineral salts like potassium chloride, magnesium chloride, and calcium chloride which add to the saltiness, in addition to glutamic acid.

Nutralys L85M

French ingredient company **Roquette** launched this ingredient – made from pea protein – specifically aimed at reducing the amount of salt used in plant-based meats at the time of formulation. Tests showed that **L85M** offered a **25%-30%** reduction in various products. This will allow companies to call out a "reduced sodium" claim in the US and a "reduced salt" claim in Europe.

As lower salt consumption becomes linked with immunity, we can expect to see more innovative launches in the space of salt and sodium alternatives. Much like sweeteners and sugar alternatives, there will be growing interest in ingredients and ingredient sources that offer the same taste and mouthfeel as salt but without the health problems.

ABOUT SPOONSHOT

Spoonshot is a food AI company that is raising the bar for insight-led innovation. Spoonshot's belief is that exploration is the catalyst behind the novel, successful products, the very fuel to help food and beverage companies shape the future, to set the trend.

Spoonshot equips the food and beverage industry with unprecedented foresight of emerging market needs. By transforming long-tail, open information from diverse, authentic sources, Spoonshot's proprietary food science infused algorithms connect disparate data sets, to deliver personalized insights, predict trends, and identify novel opportunities. Today, Spoonshot is supporting the world's best-known brands in meeting the future needs of its customers. For more information, please visit **https://spoonshot.com**

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