Review Article

An overview of salt intake reduction efforts in the Gulf Cooperation Council countries

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Abstract: Globally, morbidity and mortality from non-communicable diseases (NCDs) are increasing steadily and at an alarming rate. High blood pressure is a major risk factor for cardiovascular disease (CVD) and salt reduction is an effective measure to decrease mortality rates. In the Eastern Mediterranean region, current salt intake is high, with an average intake of >12 g per person per day. Reducing the intake of salt has been identified as a priority intervention to reduce NCDs. Countries of the Gulf Cooperation Council (GCC) are showing a willingness to comply with the World Health Organization (WHO) recommendations and an eagerness to reduce the burden of NCDs. However, they face some challenges, including lack of political commitment, lack of experience, and shortage of qualified human resources. Salt intake reduction efforts vary in the GCC region, from achieving 20% salt reduction in bread, to the very early stages of planning.

Keywords: Global disease burden; non-communicable disease (NCD); cardiovascular disease (CVD); risk factor; salt reduction strategies; eastern mediterranean regional office; Gulf Cooperation Council (GCC)

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Introduction

Non-communicable diseases (NCDs) are the leading causes of premature death in the 21st century, and represent a threat to human health and economic growth (1). Currently, 39 million people die each year from NCDs, principally, cardiovascular disease (CVD), cancers, chronic respiratory disease, and diabetes. The main risk factor for the global disease burden is raised blood pressure and is estimated to cause 9.4 million deaths each year. This is more than half the estimated 17 million annual deaths caused by CVD (1,2).

The 2010 World Health Organization's (WHO) global status report on NCDs urged Member States to take immediate actions in reducing salt intake (1). Salt reduction was recommended as one of the top three priority actions to reduce premature mortality from NCDs by 25% by 2025 (3). To achieve this, the WHO recommended a 30% reduction in salt intake by 2025 with an eventual target of 5 g per day for adults and lower levels for children based on calorie intake (1). They also recommended reducing the salt content of food as an effective measure to achieve accelerated results in saving lives, preventing cases of disease, and avoiding costs (2,4). This position has since been endorsed by the 2011 Political Declaration of the UN High-Level Meeting (UN HLM) on NCDs (5) and has led to the development and adoption of the Global Monitoring Framework and Voluntary Global Targets for the Prevention and Control of NCDs. As a result, Member States have agreed upon a global target of a 30% gradual reduction in mean salt intake by 2025 (5,6).

The Gulf Cooperation Council (GCC) includes six countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE). In these countries populations lead a sedentary lifestyle, where high blood pressure (*Figure 1*) and obesity (*Figure 2*) are known to be major contributing risk factors to NCDs (7). Thus, it is not surprising that CVD is the main cause of morbidity and mortality in the Gulf region (8).

The estimated total deaths in GCC countries caused by NCDs range between 65% and 78%, with the highest estimates in Bahrain and Saudi Arabia and the lowest in Oman and Qatar, respectively (7). In the Eastern Mediterranean

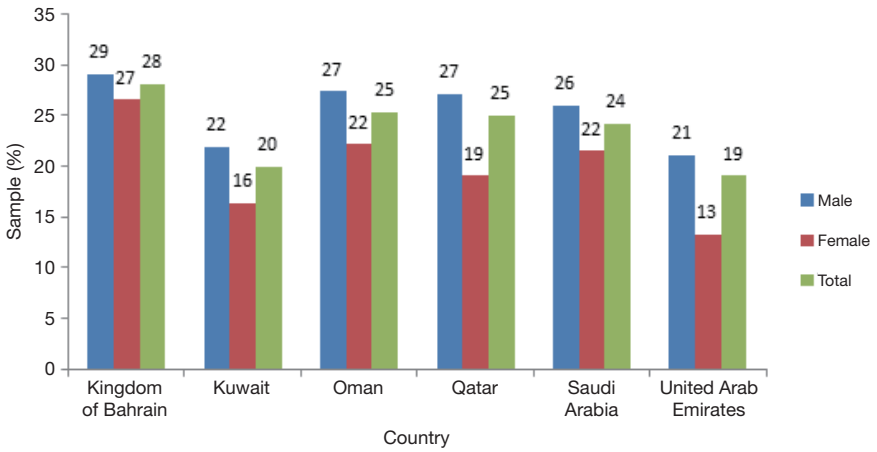

Figure 1 Prevalence of high blood pressure in GCC countries. GCC, Gulf Cooperation Council.

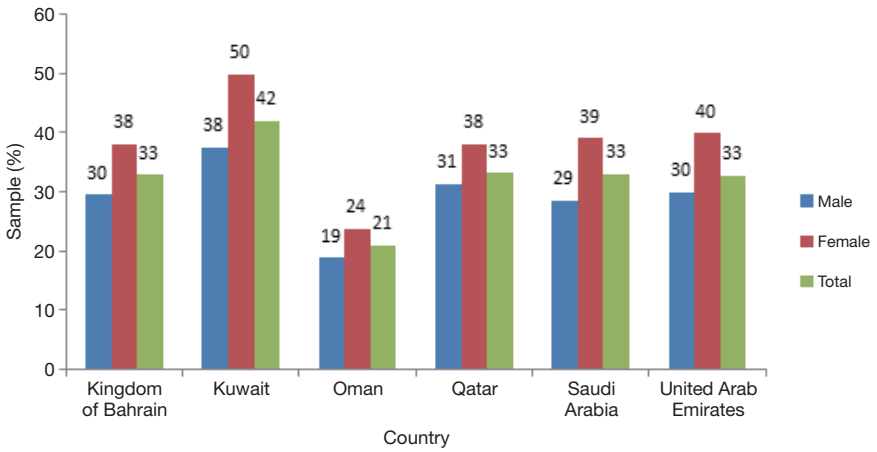

Figure 2 Prevalence of obesity in GCC countries. GCC, Gulf Cooperation Council.

Region (EMR), current salt intake is high, with an estimated average intake of >12 g per person per day in most countries. This is more than double the amount recommended by the WHO. Cereal products, in particular bread, are a popular staple food in GCC countries, and contribute a major part of salt in the diet. When bread (of the same type) was compared between countries in the EMR, a wide variation of salt content was observed (*Table S1*). Therefore, a reduction of the salt level in bread was sought as an effective means to reduce the NCD burden in the region. This article gives an overview of the efforts and initiatives taken by each country in the GCC region to reduce the salt intake and achieve WHO targets.

Salt reduction activities in GCC countries

In 2014, the GCC Executive Board of Health Ministers convened a meeting in Kuwait to discuss reducing the growing burden of NCDs in the region (8). The main risk factors addressed were salt and fat intake reductions to meet the 2025 targets. This meeting urged countries in the region to develop a framework of action with indicators that can be adopted, implemented, monitored and evaluated. The outcome of this meeting was the release of the *Kuwait Declaration for the Control of Non-Communicable Diseases* (8) in which Member States agreed to commit to its recommendations.

Kingdom of Bahrain

Bahrain is an island located near the western shores of the Arabian Gulf with a population of ~1,300,000 people. According to the WHO, CVDs account for 26% of

Table 1 Summary of national projects measuring sodium intake in Kuwait

Study	Sodium intake (mg)	Comments/limitations
Evidence for nutrition transition in Kuwait: over-consumption of macronutrients and obesity	Men: 3,466; women: 2,706 (~8 g salt)	The amount of sodium shown is probably an underestimate because not all foods containing sodium in Kuwait were included in the study
Acrylamide level in baked foods consumed in Kuwait	Adults: 4,000 (10 g salt)	The amount of sodium shown is probably an underestimate because not all foods containing sodium in Kuwait were included in the study

Source: Zaghloul *et al*., 2012 (12); Alomirah *et al*., 2008 (13).

the total deaths in Bahrain (7). The Nutrition Section, Ministry of Health (MOH), is the main governmental body responsible for salt intake reduction activities.

In their efforts to establish baseline data on sodium intake among the Bahraini population, a study was conducted by the Nutrition Section to assess urinary sodium levels. A spot urine test indicated an average of 136 mmol/L, and 122 mmol/L of urinary sodium among children (n=128) and adults (n=64), respectively (9). These results were inaccurate as the sample size was not representative of the population.

In 2014, a pilot study was conducted to determine the salt intake in a sample of 50 Bahraini adults aged 20-40 years, by collecting 24-hour urinary sodium (10). Results showed that only 8% of males and 10% of females were found to have relatively high concentration of urinary sodium. However, further analysis is needed due to the small sample size.

Furthermore, another pilot study was conducted, in collaboration with EMRO, to assess the salt content of bread (10). Twenty samples were collected from different bakeries throughout Bahrain. The average salt content was found to be approximately 90,000 ppm; this was much higher than the WHO recommended levels. The Nutrition Section has proposed an action plan for an annual 10% salt reduction in bread. This is awaiting approval from the MOH.

Approximately 70% of the bread in Bahrain is produced by the Bahrain Flour Mills Company (BFMC), which follows standardized recipes for the different types of bread produced. The smaller proportion of bread sold in the market is produced by privately owned bakers. No data is available on the amount of salt added to the bread. Salt is added to the flour before mixing the dough. The food labelling of bread is only included on bread produced by the BFMC. It includes the calories and macronutrient content but does not indicate the salt content.

A ministerial decree was formulated in 2014 to establish a multisectoral committee, which aims to reduce salt in bread products. The objective of this committee is to set up a strategy with an action plan that includes:

(I) Reducing salt in the bakery products;
(II) Enforcing food labeling to include salt content;
(III) Developing a legislation and monitoring its implementation.

Kuwait

Kuwait lies on the northwestern tip of the Arabian Gulf. The total population is ~4,100,000 million people (11). According to the WHO, CVDs account for 41% of the total deaths. The Food and Nutrition Administration (FNA) part of the Ministry of Health is the main governmental body in charge of overseeing salt reduction activities.

It is critical to determine the amount of salt consumed before any intervention is implemented. Two studies analyzing food consumption in Kuwait (12,13) found the average salt intake to be within 8-10 g per day. This range may be an underestimate as not all food items were included in the studies (*Table 1*).

Data from these studies provided information on the main food sources of salt in the Kuwaiti diet, indicating that salt was mainly added during food preparation at home. This was shown to be the main source of salt intake. They also showed that bread consumption was the second main source of salt (*Figure 3*). Further research is needed to ensure the accuracy of data for future actions. Kuwait is currently at the stage of designing a study to determine salt intake by using the gold standard of assessing 24-hour urinary sodium.

The majority of bread in Kuwait is produced locally by Kuwait Flour Mills and Bakeries Company (KFMBC). This factory accounts for 80% of the total bread production in Kuwait. The factory follows standardized recipes for the

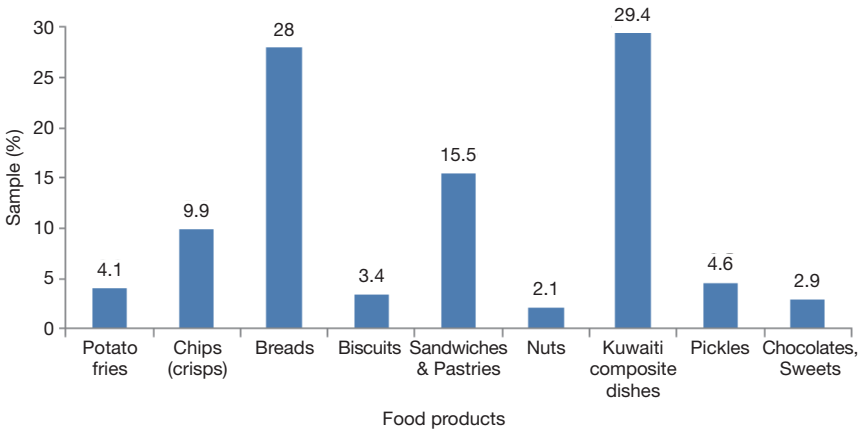

Figure 3 Major sources of salt in Kuwait.

different types of bread produced. Salt is mixed with the flour before water is added to make the dough. The food labelling is included on the bread produced by the company and only includes the calorie and macronutrient content.

The MOH in partnership with KFMBC decided to implement the WHO recommendations regarding reducing salt intake. A 10% reduction of salt in bread was achieved in March 2013. This was followed by another 10% reduction 6 months later, in August of the same year. By October, 2013 almost all types of bread produced by the company, with the exception of one traditional variety, had a 20% salt reduction. An example of the regular monitoring of salt in bread is shown in *Figure S1*.

Kuwait imports more than 95% of consumed food. Processed foods such as breakfast cereals, cheese, chips and meat, account for a significant amount of salt in the Kuwaiti diet. Some of these food items are sometimes highly consumed, for example, chips by children. This was recognized as an opportunity to further engage the private sector. A plan to advocate partnership and engage food companies with health awareness activities was put together. The major aims included:

(I) Introducing salt reduction strategies and its beneficial impact on the health of the population;
(II) Emphasizing the critical role of the private sector in the actions to be taken;
(III) Requesting information on the current level of salt in locally produced and imported foods;
(IV) Working with the private sector on an effective and applicable plan of action for the gradual reduction of salt.

A similar approach with the same aims was taken by meeting with the largest restaurant franchise operators in Kuwait. The objectives of the meeting were to open dialogue with the companies; to highlight the health benefits of salt reduction; and, to emphasize the feasibility with no financial losses. This is currently in progress.

Sultanate of Oman

Oman lies on the southeastern coast of the Arabian Peninsula. Its population size is approximately three million. According to the WHO, CVDs account for 33% of the total deaths (7). The Ministry of Health, Oman, is the main governmental body that oversees salt reduction activities.

The National Nutrition Survey based on the 24-hour dietary recall suggested the average intake of salt between 11-12 g per day (14). In order to reduce the consumption of salt to the levels specified by WHO, initiatives are being planned, though are still in their initial stages. Currently, the MOH is working towards reducing salt levels in commonly consumed foods; mainly focusing on highly salted foods such as bread, cheese, and processed meats.

According to the director of Nutrition, Ministry of Health, there is no standardized recipe for bread of the same kind, thus, the salt content varies within the same bakery chain (*Table S2*).

Future interventions for the reduction of salt include:

(I) Establishing a national taskforce for salt reduction;
(II) Achieving 10% reduction of salt in the bread within 6-8 months, 2014;
(III) Identifying of the main sources of salt in the diet;
(IV) Reviewing and revising national food standards for bread to reflect the recommended minimum levels

of salt content in bread;
(V) Conducting studies to monitor the intake of sodium using the 24-hour urinary assessment;
(VI) Establishing salt standards for compliance by all bakers.

Qatar

Qatar lies on the northeastern coast of the Arabian Peninsula. It has a population size of approximately 2 million people. According to WHO, CVDs account for 24% of total deaths (7). The Supreme Council of Health (SCH) is the main governmental body that oversees salt reduction activities in Qatar.

A national project by the SCH found that the main source of salt in the diet was from bread and other baked products (15). The council, in collaboration with EMRO planned initiatives to reduce salt in bread by 30% (*Table S3*).

The main national bakery (Mesaieed Bakery, or Qbake) was first contacted as it is the main producer of bread. It was requested to send the samples of the commonly consumed bread namely, the brown Arabic bread, small, (70 g × 4 pieces =280 g), white Arabic bread, small, (70 g × 10 pieces =700 g) and brown and white Lebanese bread, large, (140 g × 5 pieces =700 g) to the Central Food Laboratory. The results showed a 10% salt content reduction.

Before implementing another 10% reduction in salt content, the SCH is testing if a 20% salt reduction in different types of bread will have an effect on taste and palatability (to reach 0.90 kg per 100 kg for all bread types). Samples showed a wide range of salt levels between the different bakeries (the results ranged between 0.20% and 1.80% sodium content). Bakeries have been notified to reduce the salt content by 10% and the samples are now being tested to see if this has been achieved. This would establish a baseline for the gradual reduction of the added salt by 30%.

Kingdom of Saudi Arabia (KSA)

Saudi Arabia is the largest Arab state in Western Asia, constituting the bulk of the Arabian Peninsula. It has a population size of approximately 28 million people. Data reported in the WHO NCD country profile showed that CVDs account for 46% of the total deaths in the country (7). The Ministry of Health, is the main governmental body that oversees salt reduction activities.

During the recent Gulf Nutrition Committee Meeting held in Kuwait (February 2015), Saudi Arabia reported that salt intake reduction efforts are in their preliminary stages. Similar to other GCC countries, reduction of the salt content in bread is being targeted. As a result, the MOH proposed to pass a decree aiming to reduce salt by 10% annually until a target of 30% reduction is achieved. Bakeries in the country were contacted and several workshops were held to introduce this initiative. The MOH expressed challenges of reducing salt in the popular traditional breads as it is often added according to the baker's preference. Therefore, while initial steps are underway, coverage and monitoring of implementation will remain a challenge.

The United Arab Emirates (UAE)

The UAE is located on the southeast end of the Arabian Peninsula, and has a total population of approximately nine million people (7). According to the WHO, CVDs account for 30% of the total deaths in the UAE. The Ministry of Health, UAE is the main governmental body in charge of overseeing salt reduction activities.

The MOH is in its initial stages of implementing its salt intake reduction strategy. Currently it is identifying the main producers of bread to review the current situation regarding bread production, distribution, and the use of standardized recipes. The aim is to set a plan of action for the gradual reduction of salt in bread.

Conclusions

Countries of the GCC are showing willingness to comply with the WHO recommendations to reduce salt intake so as to reach the overall goal of reducing the burden of NCDs. However, there are challenges faced, including lack of political commitment, inexperience and shortage of qualified human resources. They are at the early stages of salt intake reduction. The efforts in the GCC countries range from the 20-30% salt reduction strategy in bread, to building partnerships with the private sector, to the very early stages of planning.

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Supplementary

Table S1 Content of salt in bread highly consumed in Eastern Mediterranean region

Countries	Type of bread	No. of samples	Sodium content in wet basis (ppm)	Salt content in g/1,000 g	Salt content in g/100 g	Daily intake of salt in grams from bread (300 g/d/p)	Estimated daily salt intake g/d/p	Percentage of bread contribution to total salt intake
Bahrain	Sliced bread	5	2,631.9	6.58	0.66	–	–	–
	Arabic bread	5	2,634.9	6.59	0.66	–	–	–
	Flat bread	10	5,260.7	13.15	1.32	–	–	–
	Average		3,509.2	8.77	0.88	2.6	13.5	19.5
Oman	Sliced bread (white)	5	3,662.2	9.16	0.92	–	–	–
	Samoon bread	4	4,701.9	11.75	1.18	–	–	–
	Lebanani flat bread	6	2,312.5	5.78	0.58	–	–	–
	Average		3,558.9	8.90	0.89	2.7	9.5	28.1
Egypt	Baladi refined bread	5	1,582.5	3.96	0.40	–	–	–
	Baladi ordinary	5	2,010.1	5.03	0.50	–	–	–
	Average		1,796.3	4.49	0.45	1.3	9.2	14.6
Kuwait	Flat Arabic thin bread (brown)	3	3,319.4	8.30	0.83	–	–	–
	Flat thin Arabic bread	4	3,330.6	8.33	0.83	–	–	–
	Flat Arabic bread	4	6,087.5	15.22	1.52	–	–	–
	Flat Arabic bread (brown)	2	4,516.5	11.29	1.13	–	–	–
	Average		4,313.5	10.78	1.08	3.2	9.7	33.4
Tunisia	French bread	10	4,881.7	12.20	1.22	2.4	11.1	22.0
Qatar	Arabic bread (small)	5	2,714.1	6.79	0.68	–	–	–
	Arabic bread (large)	5	1,677.3	4.19	0.42	–	–	–
	Arabic bread (brown)	5	1,790.0	4.48	0.45	–	–	–
	Lebanese bread	5	1,680.0	4.20	0.42	–	–	–
	Lebanese bread (brown)	5	2,468.3	6.17	0.62	–	–	–
	Average		2,065.9	5.16	0.52	1.5	10.5	14.8
Jordan	White bread (small)	4	1,114.6	2.79	0.28	–	–	–
	White bread (large)	8	2,256.3	5.64	0.56	–	–	–
	Average		1,685.5	4.21	0.42	1.3	10.3	12.3
Morrocco	Morocco bread (round, thick)				1.47	5.88	10.9	53.9
UAE	Rqaq bread		6,052.49	15.1	1.51	–	–	–
	Rqaq bread		5,901.32	14.8	1.48	–	–	–
	Samoon bread		2,695.52	6.7	0.67	–	–	–
	Samoon bread		2,619.6	6.5	0.65	–	–	–
	Toast bread		3,145.14	7.9	0.79	–	–	–
	Toast bread		3,145.45	7.9	0.79	–	–	–
	Lebnani bread		1,960.99	4.9	0.49	–	–	–
	Lebnani bread		1,914.76	4.8	0.48	–	–	–
	Average		3,429.4	8.6	0.86	2.6	9.2	28.0
Lebanon	Arabic bread (white)		2,190	5.5	0.55	1.6	9	18.3

KUWAIT FLOUR MILLS & BAKERIES CO.
QUALITY CONTROL DEPARTMENT
BAKERIES LABORATORY

DATE: 29/10/2014
TO: MANAGER OF QC AND LABS DEPT
FROM: HEAD OF BAKERIES LABORATORY

SUBJECT : SALT REDUCTION IN THICK ARABIC BREAD WHITE

Referred to objective of salt reduction in **Thick White Arabic Bread** bakeries lab has started gradual decrease in salt amount since Feb 2013. The salt amount has been reduced to 20 % approximately in current formulation as compared to previous formulation. Now the salt and sodium contents in one piece of thick white Arabic bread as per analysis done on 19/10/2014 are as under:

The salt amount in Thick White Arabic Bread : 939.8 mg per piece
The Sodium content in Thick White Arabic Bread : 370 mg per piece

Summary of calculation and analysis results conducted in our labs are detailed below

A- CALCULATION

PARAMETERS	PREVIOUS RECIPE	RECENT RECIPE	REDUCTION IN SALT	
			amount	%
Salt % added in dough	1.263	1.013		19.8
Salt in bread - mg	1199	962	237 mg	19.8
Sodium in bread - mg	472	378.7	93.3 mg	19.8

B- ANALYSIS RESULTS

Parameters	Analysis Results	calculation
Sodium content per bread	370 mg / piece	378.7 mg/piece
Salt contents per bread	939.8 mg/ piece	962 mg/piece

Notes :

Sodium Daily intake recommended by FDA = not more than 2300 mg/day
1 piece of thick white Arabic bread provides sodium : 370 mg = 16.1 % of DV

Best regards,

NADIAH A BOURESLI
HEAD OF BAKERIES LAB

Figure S1 Kuwait.

Table S2 Food chemistry analysis

NO	COA NO.	Sample details	Salt content (%)	Ash (%)	Comparison with EMR research (Oman)-averages
1	F141130008	Dhahabi Lebanese brown bread	0.19	1.10	
2	F141130009	Dhahabi Lebanese white bread	0.13	0.70	
3	F141130010	Dhahabi white sliced bread	1.01	1.62	0.92
4	F141130011	Dhahabi buns bread	1.03	1.69	
5	F141130012	Dhahabi samoon rolls bread	1.06	1.67	
6	F141130013	Switt modern Oman bakery Lebanese white bread	0.06	0.55	0.58
7	F141130014	Switt modern Oman bakery Lebanese brown bread	0.04	0.93	
8	F141130015	Switt modern Oman bakery sliced milk bread	0.78	1.88	
9	F141130016	Carrefour mini roll bread	0.63	1.26	
10	F141130017	Carrefour Arabic bread	0.27	0.76	
11	F141119004	Al Emarates bakeries-Arabic bread	0.15	0.76	
12	F141119005	Al Emarates bakeries-Arabic brown bread	0.27	1.2	
13	F141119006	Al Emarates bakeries-samoon bread	0.38	0.94	1.18
14	F141119007	Al Emarates bakeries-buns bread	0.38	0.95	
15	F141119008	Sohar Beach bakery-buns bread	0.87	1.52	
16	F141119009	Sohar Beach bakery-samoon bread	0.93	1.59	
17	F141119010	Sohar Beach bakery-Arabic bread	0.54	1.13	

Table S3 GCC salt reduction plan and action for bread

Country	Plan		Decree number and date	Starting date for implementation of decree	Salt level (g/100 g)			Summary of the plan[#]
	M*	V**			At starting point	Current	Target	
Qatar	Decrease salt levels in all bakeries around Qatar by 30%	Decreasing salt levels further according to bakery preference	Agreement for commencing salt reduction plan 30th May 2013 (agreement attached) Official letter sent to Qatar Central Laboratory 26th March 2014 (letter attached)	28 July 2013 (Qbake) 3 April 2014 (major national bakeries)	Qbake Lebanese bread (white) =0.650 White big Arabic bread =0.630 White small Arabic bread =0.810 Brown Arabic bread =0.800 Other bakeries (mean) White Arabic bread =0.756 Brown Arabic bread =0.740 White Lebanese bread =0.575 Brown Lebanese bread =1.115 White sliced bread =1.190 Brown sliced bread =1.218 White dinner rolls =0.987 White burger buns =1.110 White hotdog buns =1.004 Brown hotdog buns =1.225 Rotti =1.15	Lebanese bread (white) =0.490 White big Arabic bread =0.540 White small Arabic bread =0.600 Brown Arabic bread =0.690 White Arabic bread =0.615 Brown Arabic bread =0.690 White Lebanese bread =0.355 Brown Lebanese bread =0.690 White sliced bread =0.865 Brown sliced bread = pending White dinner rolls = pending White burger buns = pending White hotdog buns = Pending Brown hotdog buns = pending Rotti = pending	Decrease salt levels in all bakeries around Qatar by 30%	The initiative has started in collaboration with the WHO EMRO in response to studies done that showed the main source of sodium in an average person's diet comes from bread and baked products In order to ensure positive results and collaboration by local bakeries, they were contacted individually and attended two meetings each, where it was agreed to send original bread samples to the SCH Central Food Laboratory, then further to reduce the added amount of salt by 30% in three phases (I) The main national bakery (Mesaieed Bakery-or Qbake) was contacted by the SCH and according to request, the following was done ● Control samples were sent to the SCH Central Food Laboratory that included the original recipes, samples sent were brown and white Arabic bread (small) and brown and white Lebanese bread (large). The above bread types are the most commonly sold types of bread ● The recipes for all four bread types mentioned above had the salt added decreased by 10%, and currently in process for decreasing further 10% ● Currently testing to see the applicability for decreasing sodium levels in all types of bread produced by the bakery by more than 20% for some (to reach 0.90 kg per 100 kg for all bread types) (II) Local bakeries around the state of Qatar have been contacted by the SCH and original samples (recipes) by all have been sent to the Central Food Laboratory for testing ● Original samples sent showed a wide range of sodium levels between the different bakeries (the results ranged between 0.20% and 1.80% sodium content) ● Bakeries have been notified with results on salt content and have now reduced salt content added to recipes by 10% - currently testing

*, mandatory; **, voluntary; #, summary of the plan may include (I) bread types included in salt reduction; (II) time frame for gradual reduction; (III) the percentage of daily bread consumption. GCC, Gulf Cooperation Council; SCH, Supreme Council of Health.