



BRIGHTER FUTURES

Protecting early brain development through salt iodization

The UNICEF-GAIN Partnership Project

ACKNOWLEDGEMENTS

This report is the result of global collaboration among individuals from governments, the private sector and development agencies who recognize that iodine deficiency can be successfully and sustainably controlled as a public health problem. The report would not have been possible without the contributions of UNICEF and GAIN staff responsible for the development and implementation at national and regional levels of the approaches presented here. It is hoped that the experiences documented in this report stimulate iodine deficiency programmes and encourage them in moving forward. This work was supported by the grant 'Intensification of Business-Oriented Approaches towards the Global Elimination of Iodine Deficiency through Universal Salt Iodization' awarded to UNICEF and GAIN. UNICEF and GAIN thank the Foundation for this financial support and for the outstanding assistance throughout the project period.

© United Nations Children's Fund (UNICEF)
March 2018

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3 United Nations Plaza
New York, NY 10017

ISBN: 978-92-806-4943-7

<http://www.unicef.org/nutrition/>

For the latest data, please visit:
<https://data.unicef.org/topic/nutrition/iodine-deficiency/>

Suggested citation:

UNICEF, GAIN. *Brighter Futures: Protecting early brain development through salt iodization – The UNICEF-GAIN partnership project*.
New York: UNICEF; 2018

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ABBREVIATIONS

ASIN	Act for Salt Iodization Nationwide
CEE/CIS	Central and Eastern Europe and the Commonwealth of Independent States
CIDDP	Control of Iodine Deficiency Disorders Project
CIF	Central Iodization Facility
CLM	Cellule de Lutte contre la Malnutrition
ECOWAS	Economic Community of West African States
ECSA-HC	East, Central and Southern African Health Community
GAIN	Global Alliance for Improved Nutrition
ICDS	Integrated Child Development Services
IDD	iodine deficiency disorders
KIO ₃	potassium iodate
MT	metric tons
MUIC	median urinary iodine concentration
NGO	non-governmental organization
NIDDC	National Inter-Sectoral IDD Committee
PDS	Public Distribution System
SAARC	South Asian Association for Regional Cooperation
SUN	Scaling Up Nutrition Movement
UEMOA	Union économique et monétaire ouest-africaine
UNICEF	United Nations Children's Fund
USI	universal salt iodization
USSR	Former Union of Soviet Socialist Republics
WHO	World Health Organization

PREFACE

The global campaign to eliminate iodine deficiency

In September 1990, the largest gathering of world leaders ever assembled came to the United Nations in New York, adopting a Declaration on the Survival, Protection and Development of Children and a Plan of Action for implementing it over the next decade. An important part of the world leaders' vision was the virtual elimination of iodine deficiency, the world's leading cause of preventable mental impairment. Through a global movement to universally add iodine to edible salt, world leaders saw that they could protect the developing brains of children, adding billions of intelligence quotient points to the world.

Today, that goal has been achieved in many countries, with iodized salt now available to 86 per cent of the world's households¹ and increasingly in use throughout the food industry. This improvement in iodine nutrition translates into a near elimination globally of new cases of cretinism, the most serious form of iodine deficiency. It has decreased the incidence of goiter and adverse pregnancy outcomes such as stillbirths, while protecting the intellectual capacity of hundreds of millions of children worldwide, with a significant impact on the lives of future generations.

In the context of this global campaign, this report documents a part of that story: the work of the UNICEF-GAIN Partnership Project, funded by the Bill & Melinda Gates Foundation from 2008 to 2015, to improve iodine nutrition through salt iodization in 13 priority countries, as well as regionally and worldwide. The report highlights the success of the global effort to eliminate iodine deficiency disorders (IDD) as a public health problem. We hope that the report will provide insights on how to better target programme vulnerabilities, sustain our successes, and ensure that future generations are protected against the debilitating effects of IDD.





SUMMARY

Adapting programming to challenging contexts

The UNICEF-GAIN Partnership Project was implemented from 2008 to 2015 in 13 priority countries with large populations that were unprotected against iodine deficiency. Efforts to increase the use of iodized, food-grade salt in participating countries yielded important results. Over this period, an additional 466 million people consumed adequately iodized salt, and they are therefore now protected against iodine deficiency. This includes an estimated 18.2 million pregnant and lactating women, leading to the protection of newborn cognitive health, as well as 113 million children, aged 6 months to 15 years old, whose brains are protected against the devastating effects of iodine deficiency.

Over the grant period, the Partnership had to adapt its strategies to new programming contexts. At the outset, we focused our efforts on increasing the overall supply of adequately iodized salt and improving household consumption levels. It soon became apparent, however, that even in predominantly low- and middle-income countries, increasing amounts of salt were being consumed through processed foods and condiments, thus requiring these sources to be considered and monitored alongside household salt in national iodine programmes. Using World Health Organization (WHO) recommendations on these issues, the Partnership worked to capitalize on

commonalities between two mutually improving public health objectives. Working closely with the food industry and public health officials, we have reinforced the message that as sodium intakes decrease, salt iodine content can be adjusted to maintain optimal population iodine status.

Data from China also suggested that excessive intakes of iodine would need to be monitored and avoided alongside deficiency. As a result, the Partnership shifted its focus from merely preventing deficient iodine intakes to achieving optimal iodine intakes. This, in turn, informed many of the monitoring and communication activities designed as part of the project. Finally, with a changing global nutrition landscape, the Partnership had to position iodine nutrition programmes within a broadening and increasingly multi-sectoral nutrition agenda.

Progress has differed across the regions. In many countries in Europe and Central Asia, the salt industry has made iodization part of good manufacturing practices. In Russia and Ukraine – the two countries supported by the Partnership from this geographic region – the importance of the food industry's use of iodized salt for achieving adequate population iodine intake has become evident, but the absence of political commitment to mandatory legislation on salt iodization highlights the need for continued

advocacy to make iodine deficiency control a national priority.

In East Asia and the Pacific, strong policies and legislation helped establish iodized salt as the norm for households and industry. China established a robust monitoring and surveillance system that has documented greater than 90 per cent use of iodized salt, and achievement of adequate iodine intake throughout the country. In Indonesia, a focus on local production of salt and decentralization helped provinces improve household consumption of iodized salt, while in the Philippines a renewed focus on enforcement of existing regulations was created.

In Eastern and Southern Africa, salt iodization has become linked to the broader food fortification and nutrition agenda, with governments concentrating on all programme elements and building synergism with other nutrition initiatives. Ethiopia had to rebuild its programme after the conflict with Eritrea stopped its normal supply of iodized salt, and over the past years has effectively established a salt industry and dramatically increased the supply of iodized salt.

In the Middle East and North Africa, important progress was realized towards controlling iodine deficiency through strengthening of salt iodization programmes and the salt industry.

Egypt established effective coordination and oversight mechanisms and has thus made gains towards expanding the use of iodized salt and achieving adequate population iodine status.

In South Asia, salt iodization helped drive the broader nutrition agenda and effectively control IDD in all of the region's countries. In Bangladesh, effective iodine deficiency control is supported by a strong policy and legislative environment, and coordination among all key stakeholders. In India, vulnerable groups benefited from increased access to iodized salt through public distribution programmes, and the first ever national iodine survey validated that its 1.25 billion people receive adequate amounts of iodine. In Pakistan, new national legislation on salt iodization is being championed and complements efforts to increase iodized salt production and raise awareness about iodine deficiency.

In West and Central Africa, changing trade patterns have affected the salt industry, but there has been good regional cooperation in harmonizing standards, including those for iodized salt. In Ghana, seasoning cubes containing iodized salt show promise as a major source of iodine in the diet to prevent iodine deficiency. In the Niger, stakeholders have updated national legislation to address loopholes for imported salt that is not iodized and have drawn out a road map to ensure that imported salt meets national iodine needs. Senegal continues to explore the potential of the national salt industry, especially its small producers, to effectively control iodine deficiency, while recognizing that seasoning products and other processed foods are becoming increasingly important vehicles for salt and iodine in the food chain.

The groundwork has been set in the 13 Partnership countries. The structures and capacity have been strengthened to continue the path towards the sustainable achievement of optimal iodine nutrition through technical advances, improved government leadership in some countries, better commitment to monitoring, and enhanced public perceptions. At the same time, the rapidly shifting context in some Partnership countries required adjustment of targets throughout the project period.

Going forward, a number of constraints will need to be addressed in order to ensure the long-term sustainability of national iodine programmes. Iodine nutrition needs to be better linked to national nutrition and development priorities. There is a continued need to further strengthen regulatory monitoring systems as part of broader food control, and to refine performance measurement systems and metrics to improve the timely utilization of data for programme improvement. There is also a need to better understand salt consumption patterns, including the use of iodized salt by the food industry, and whether changes in consumption patterns call for programmatic adjustments. Finally, monitoring systems need to be modified to identify groups at risk for iodine deficiency and to improve their iodine status.

Nevertheless, global progress to control IDD is among the greatest public health successes of our time. Down from 113 countries in the 1990s before the onset of large-scale salt iodization programmes, there are now only 20 countries left in the world where iodine status is classified as insufficient.² We are in an unprecedented position – on the verge of being able to prevent iodine deficiency globally and sustain those efforts once and for all. But the experiences documented here clearly demonstrate the need

for flexibility, vigilance and, above all, strong partnership between all stakeholders to advance iodine nutrition and eliminate iodine deficiency. UNICEF and GAIN, working with governments, industries, donors and partners, are committed to maintaining their support to create a brighter future for mothers and children through salt iodization.

CHARTING THE GLOBAL SUCCESS OF UNIVERSAL SALT IODIZATION PROGRAMMES

The global effort to eliminate IDD and achieve optimal iodine nutrition status is a story of scientific discovery, policy development and public-private sector engagement that has led to one of the most successful – but little recognized – public health triumphs of the past 50 years.

A vast and devastating public health problem

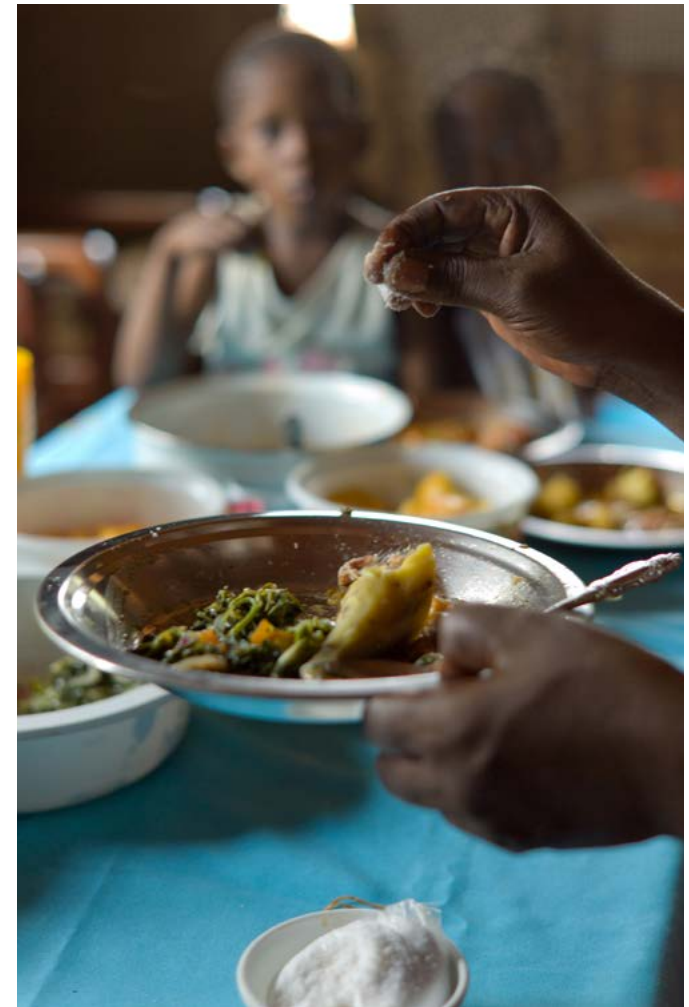
Thyroid enlargement, or goiter, the visible manifestation of inadequate iodine intake, has been documented as early as 2600 BC. The association of goiter with cretinism – the severe mental and physical consequence of iodine deficiency – was discovered in the fifteenth century. Iodine was discovered in the process of burning seaweed in 1811, and two years later, a Swiss physician successfully treated a patient with goiter using iodine.¹ By the late 1800s, goiter and cretinism were increasingly recognized as the result of iodine deficiency.²

Before widespread salt iodization, iodine deficiency stifled the human capital of entire countries. Switzerland was severely iodine deficient, as shown by a census ordered by Napoleon in 1800, which reported 4,000 cretins among the 70,000 inhabitants of the Canton Valais, in the Swiss Alps.³ In the United States,

studies in the 1920s in the state of Michigan showed that almost half of all schoolchildren had goiter,⁴ and in 1960, a WHO monograph estimated the global prevalence of endemic goiter to be about 200 million.⁵ The estimated global at-risk population was 800 million, among them 190 million with goiter, and more than 3 million affected by cretinism.⁶

The invisible damage caused by iodine deficiency

Iodine deficiency causes irreparable damage to the developing brain. Human and animal studies have refined understanding of the vast spectrum of mental disorders and loss of intellectual capacity associated with iodine deficiency.⁷ It wasn't until the 1980s, however, that the full global extent of the problem was understood and appreciated. A comprehensive 1993 WHO review estimated that 29 per cent of the world's population was at risk, with more than 110 countries classified with suboptimal iodine intake.⁸ This revelation stimulated a strong global response to eliminate iodine deficiency as a public health problem – and by then, iodine deficiency was being described as the leading preventable cause of intellectual impairment, affecting the population's educability and overall socio-economic development.



Transforming the landscape of iodine nutrition

At the same time, widespread international support was building for the elimination of iodine deficiency and was emphasized at the World Summit for Children in 1990, a landmark gathering of Heads of State and government driven by UNICEF and its charismatic leader, James Grant. The Summit adopted a plan of action in which world leaders united towards the goal of eliminating iodine deficiency.

In 1994, WHO and UNICEF recommended universal salt iodization (USI) as a safe, cost-effective and sustainable strategy to ensure sufficient intake of iodine by all individuals. They called on all countries to ensure access to iodized salt regardless of whether they had a documented IDD problem.⁹ In 2005, the World Health Assembly adopted a resolution committing to reporting on the global situation of IDD every three years.¹⁰ In 2013, the Assembly further recognized that IDD control contributes directly towards many Millennium Development Goals, including poverty alleviation, reduction of infant mortality, maternal health, education for all, gender equity and private-public partnership.¹¹

After a slow start, salt iodization programmes gained strength in the mid-1990s and the proportion of households consuming iodized salt increased from less than 20 per cent in the developing world in the early 1990s to 86 per cent globally today.¹² Over the same time period, the number of countries with iodine deficiency has decreased from more than 110 to 20.¹³ For most countries, these efforts have been positive and successful, though challenges remain for others – particularly those with large numbers of small-scale salt producers.

Charting the path towards sustainable iodine nutrition

This progress is the result of a comprehensive effort on the part of governments, the private sector and multiple partners; it is an effort that has included policy and legislation development, marketing and communication, private-sector technical and capitalization support, coordination among partners, and extensive monitoring. The public health success achieved with IDD control has been likened to the transformative successes of smallpox and polio eradication.¹⁴

The global context for eliminating iodine deficiency as a public health problem has also evolved. With the initial success of salt iodization, countries are putting the structures and systems in place to ensure that efforts are sustainable. In many countries, the use of iodized salt in the food industry is also making a significant contribution to iodine intake.

Lessons from two decades of action

The global progress towards controlling iodine deficiency demonstrates what is possible when clear scientific evidence documenting the severity of a problem is combined with the availability of a cost-effective, feasible intervention and is implemented through close partnerships and collaboration among multiple sectors to improve the health and nutrition of populations.

The chapters that follow provide a brief summary of actions taken within the context of the UNICEF-GAIN Universal Salt Iodization Partnership Project at global, regional and country levels to sustainably control iodine deficiency. These experiences illustrate the capacity of the global community to galvanize action on one of the most widespread and pressing threats to the health and well-being of people everywhere.

THE UNICEF-GAIN PARTNERSHIP

Global-level leadership and innovation for iodine nutrition programmes

The UNICEF-GAIN Partnership Project was implemented from 2008 to 2015 in 13 priority countries selected based on large populations that were unprotected against iodine deficiency. The project also supported work at global and regional levels.

The Partnership afforded countries a unique range of expertise that neither organization could have delivered independently. GAIN focused on innovative solutions in the salt industry and food control sectors to improve supply, bringing experiences from other sectors to the table, while UNICEF leveraged its policy and advocacy power to speak to national and regional leaders and stakeholders.

The following achievements were recorded among the participating country programmes:

- An additional 466 million people are now protected against the debilitating effects of iodine deficiency, including about 18.2 million pregnant and lactating women, and 113 million children aged 6 months to 15 years old.
- Household consumption of adequately iodized salt increased from 72.5 per cent to 75.0 per cent over the course of the project, which translates into an increased reach from 2.27 billion to 2.74 billion people.
- The proportion of the population consuming salt containing any iodine increased from 85.2 per cent to 89.8 per cent, reaching an additional 606 million people (from 2.67 billion to 3.27 billion people).

- Iodine status updates since the start of project were available for at least one age group in 10 of the partnership countries. Iodine status in school-age children was in the adequate range for all seven countries with available national-level data, while the iodine status in women of reproductive age was in the adequate range or more than adequate in six out of eight countries with data.

These achievements were supported by programme drivers in the areas of supply, advocacy and communication, and underpinned by targeted investments to strengthen monitoring and evaluation systems.

Box 1

Programme drivers of the UNICEF-GAIN Partnership Project

SUPPLY

- Improve quality control and regulatory monitoring
- Develop models for small-scale salt iodization
- Integrate iodized salt in processed foods
- Explore subsidized food distribution channels
- Design models for sustained potassium iodate (KIO₃) procurement

ADVOCACY

- Support and strengthen multi-sector coalitions
- Improve political commitment
- Integrate IDD into broader nutrition agenda
- Enhance programme management

COMMUNICATION

- Target communication along the salt supply chain
- Target consumers in low coverage areas
- Sustain communications to consumers, industry and health professionals

Box 2

Future Fortified: First Global Summit on Food Fortification

GAIN and UNICEF, alongside the Government of the United Republic of Tanzania, the Bill & Melinda Gates Foundation, the United States Agency for International Development, the Scaling Up Nutrition Secretariat, the African Union and the World Food Programme, brought together a wider group of donors, international non-governmental organizations (NGOs), United Nations agencies, academia and government agencies to organize and convene the first ever Global Summit dedicated to large-scale food fortification including iodization. This meeting aimed to reinvigorate interest, awareness and investment in food fortification. A Technical Advisory Group comprising 23 organizations working in nutrition formed in early 2015 supported the development of content for and planning of the event. The Future Fortified Summit was held in Arusha, United Republic of Tanzania, from 9 to 11 September 2015 and a number of lessons learned and results from the Partnership Project were presented. The event culminated in the Arusha Statement on Food Fortification outlining recommendations and joint priorities for fortification including iodization in low- and middle-income countries.



Shifting strategy to meet evolving needs

Over the grant period, the Partnership adapted its strategies to new programming contexts. At the outset, we focused on increasing the overall supply of adequately iodized salt and improving household consumption. However, it became apparent that even in the predominantly low- and middle-income countries, increasing amounts of salt were being consumed through processed foods and condiments, meaning that these sources would need to be considered and monitored alongside household salt in national iodine programmes. The Partnership also shifted its focus from merely preventing deficient iodine intakes to achieving optimal iodine intakes, in response to data gathered in China. This shift informed many of the monitoring and communication activities that were subsequently designed as part of the project, as well as the project metrics. Finally, with a changing global nutrition landscape, the Partnership positioned and guided the evolution of iodine nutrition programmes within a broadening and increasingly multi-sectoral nutrition agenda. As a sign of this leadership, the Partnership generated and disseminated more than 110 papers, publications and technical presentations on iodine nutrition.

Assessing the opportunity of processed foods

The Partnership collaborated with local market research companies to assess shifts in salt consumption patterns and determine the extent to which iodized salt was being used in processed foods and the reasons why food companies use iodized or non-iodized salt. Where possible, the research modelled the current and potential contribution of processed foods to iodine intake in Bangladesh, Pakistan,

the Philippines and Viet Nam.^{1,2} We also evaluated the feasibility of using iodized salt in the manufacture of condiments such as bouillon cubes.³

Based on these experiences, we translated this knowledge into programmatic adjustments and placed increasing emphasis on supporting countries in the use of adequately iodized salt in processed foods. Secondly, we advocated for regulations, standards and labelling instructions for specific food items to use iodized salt in order for food companies to fully comply. Lastly, we adjusted the project monitoring framework and developed revised programme guidance which considered all sources of iodine in the diet.

Action to reduce excessive salt intakes

High dietary intake of salt has been recognized as a major cause of increased blood pressure, a leading risk for death worldwide.⁴ In 2012, WHO issued recommendations to reduce intakes to <2 g/day sodium (corresponding to 5 g/day salt) among adults.⁵ The Partnership contributed to the harmonization of salt iodization and sodium reduction efforts, which led to consensus statements on the importance of aligning the two strategies. The Partnership provided input to a WHO/Pan American Health Organization consultation to consider how collaborative and synchronized programmes for salt iodization and dietary salt reduction could achieve two complementary goals: the optimal intakes of sodium and iodine to be of greatest public health benefit.⁶ Other efforts to align these two important public health strategies were pursued at regional and country levels.

Research to refine programming

The Partnership supported cutting-edge research showing that the range of optimal iodine intakes among school-age children was wider than previously recommended, providing programme managers with greater flexibility in setting standards for the iodine content in salt to meet the needs of different demographic groups.⁷ Preliminary findings from project-supported research show that salt containing an average iodine content of 25 ppm and having high household consumption of iodized salt provides adequate iodine intake to the general population and meets the physiological iodine requirements in infants, toddlers, and pregnant and non-pregnant women; a paper on this research has been accepted for publication.⁸

Emphasizing the value of good monitoring

The project addressed crucial data gaps by conducting national end-of-project surveys and collecting other programmatically relevant data to understand the main determinants of salt iodine content and iodine status. This was especially the case in Bangladesh, Egypt, Ghana, India and Senegal, where the Partnership supported comprehensive end-of-project surveys.

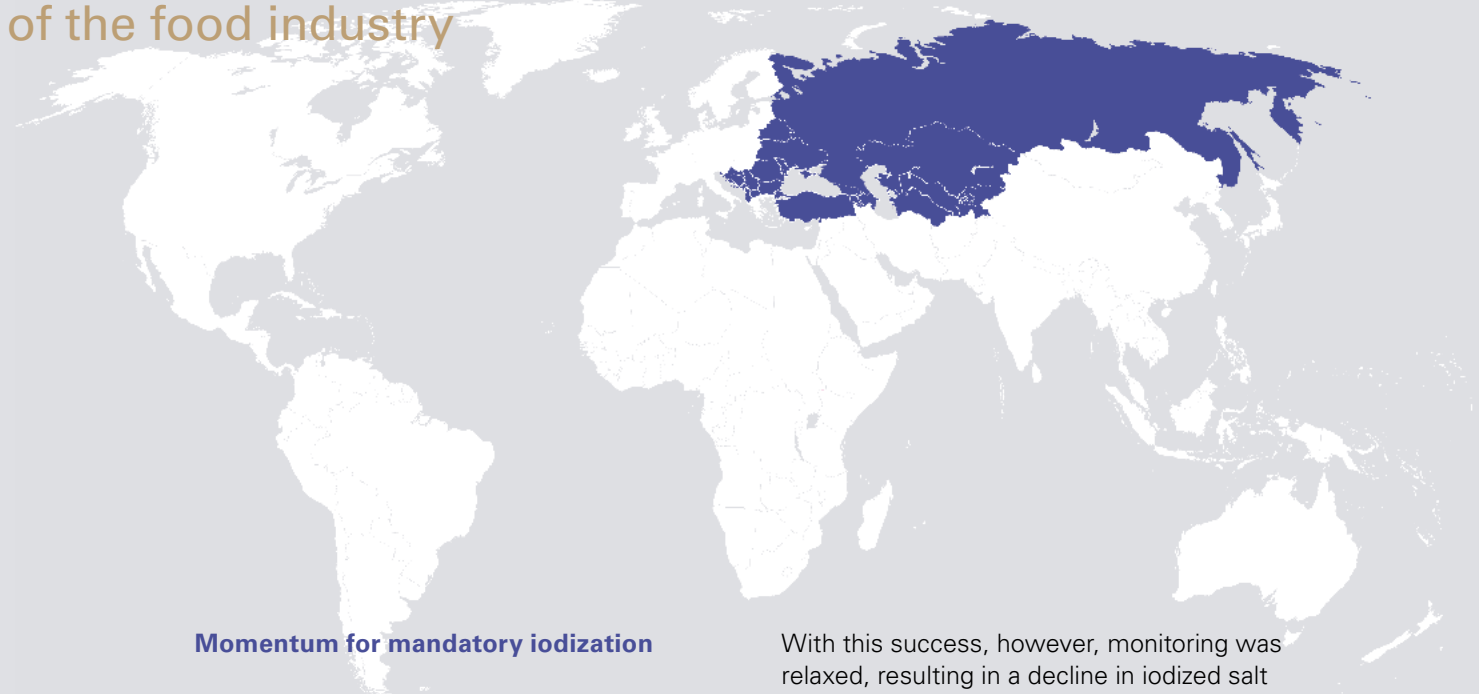


Case studies from regional and country programmes



EUROPE AND CENTRAL ASIA REGION

The driving force of the food industry



A time of turmoil and transition

In 1994, when UNICEF and WHO recommended USI as the preferred strategy for IDD elimination,¹ countries in Europe and Central Asia (ECAR) were in the midst of a period of political turmoil and economic transition. In 1991, Croatia and Slovenia declared independence from the Socialist Federal Republic of Yugoslavia, which was followed by the creation of successor states over the next two decades. And after the Union of Soviet Socialist Republics (USSR) split up in 1991, the newly independent states began a transition towards autonomous, market-based decisions. UNICEF established country offices throughout the region during the 1990s and began increasing its support for national efforts to achieve USI.²

Momentum for mandatory iodization

Iodine deficiency was recognized early in the region, with many studies published before 2000 demonstrating widespread problems of goiter and cretinism. Voluntary salt iodization was established in several countries as early as the 1950s. In Bulgaria and Yugoslavia, for example, when goiter rates did not decline, iodization was made mandatory for both household and food industry salt, which led to a dramatic decline in goiter over the next decade. In the former USSR, salt iodization was established by 1956, and with restrictions in trade of non-iodized salt, production of iodized salt increased significantly and goiter was practically eliminated.

With this success, however, monitoring was relaxed, resulting in a decline in iodized salt production. Over time, iodine deficiency began to reappear in several areas, and by 1994, surveys in the newly formed republics had confirmed its resurgence.³

The food industry as ally

By 2000, several countries had managed to demonstrate improvements in programme performance. Among 18 countries with USI legislation, 9 had achieved adequate iodine nutrition, and 6 others were very close. An assessment concluded that the main reasons for this marked success were 'the conscientious quality assurance practices in the salt factories and the due diligence in salt industry regulations by a State agency for Standardization and

Metrology, together with dependable salt inspection and release procedures, practiced by a Food Authority in particular in those countries that depend on salt import'.³

For the most successful countries, the salt industry has made iodization a standard, overseeing the quality of production as part of good manufacturing practices, which (in many countries) includes food industry use of iodized salt. Significant investments in demand-creation strategies were not critical, as there was good public acceptance of the need for iodine and, in most countries, acceptance of the use of iodized salt in the food industry – especially in bread production. Monitoring involved the usual mix of periodic household salt surveys and less-frequent surveys on iodine status and variable systems to enforce regulations, which are strict in some countries and more lenient in others. All contributed to a reasonable understanding of progress being made.³

Importance of political commitment

Political challenges have prevented national decisions on USI legislation in Russia and Ukraine. Regrettably, iodine deficiency remains widespread in both countries, and political will to address the problem remains low. This is in part due to difficulties establishing a strong legislative environment. In Russia, mandatory legislation has come close to passage, but has faced the challenge of differing views among ministries and persistent demands not to compromise consumer choice. In Ukraine, a major regional salt-supplying country, the legislative process was completely stalled in 2013, and further prospects are complicated by political turmoil. For both countries, the contribution of the food industry remains important.



Iodized salt contained in bread and foods makes important contributions to iodine status in many countries in Europe and Central Asia.





RUSSIA

A game-changing policy within reach

A shift from central control

In 1950, iodized salt began to be supplied through dispensaries in Russia and helped to sharply decrease goiter prevalence to less than 5 per cent in 1969.¹ Given the strong central control in the USSR, commodity control, monitoring and regulatory enforcement were well established and applied to salt iodization. With the emergence of the newly independent states in 1991, central production and supply lines were disrupted, regulations needed to be recreated, and oversight for monitoring and enforcement was weakened. As a result, the progress of many public health programmes stagnated, including efforts to iodize salt for household and food industry use.

Tackling roadblocks to effective legislation

By 2009, Russia had increased salt production with adequate capacity to meet national needs. However, despite strong support from UNICEF as early as 2005, no legislation had passed mandating iodization of salt. Several factors limited the political will to pass legislation, including concerns about limited consumer choice; beliefs in a more clinical approach to address goiter and concerns about contraindications; competition from other iodine products used for prevention; concerns about use of iodized salt in certain foods; and lack of full commitment by the Ministry of Health and some in the medical community.²⁻⁴

A new strategy was embraced to move towards mandating the use of iodized salt in the food industry, particularly for bread, and to promote this strategy, the Partnership supported the National Coalition for IDD. The communication strategy shifted from creating demand (among consumers for household iodized salt) to focusing

on the salt industry. At a forum in Belgrade in 2011, Russian and Ukrainian representatives from the food industry, salt industry, civil society and the government met to review strategies to improve iodine nutrition. Together, participants and colleagues from other countries committed to working with the Partnership to resolve the regulatory needs of the food industry.

The difficulties of enacting legislation

A series of advocacy meetings and events centred on a new food policy, with the aim of using fortification to address dietary insufficiencies, and ultimately led to initiating legislation on the mandatory use of iodized salt in the bread industry.³ As a result of advocacy efforts by different coalitions, consumer groups became increasingly concerned about the health impact of *not* including iodine. The Ministry of Health and several stakeholders moved to amend the Technical Regulation 'On Food Safety' of the Eurasian Economic Union. However, this had little impact as the Technical Regulation targeting food safety, and issues of food fortification were left to the discretion of member states.

In 2013, continued advocacy efforts resulted in the introduction of a bill 'On salt iodization in the Russian Federation' to the State Duma that required mandatory use of iodized salt in the bread baking industry. The bill had good key stakeholder support, was approved by the full Duma health committee, and was in the process of being approved with strong support from all key stakeholders – when it was retracted. In its place, a new amendment to public health law on the fortification of certain staple foods with micronutrients was introduced to the Parliament in October 2014. This amendment gives the Ministry of Health the power to enact

mandatory fortification of certain staple foods with essential micronutrients, going beyond salt iodization itself. Currently, the amendment is stalled in the Parliament due to differing positions of government ministries. However, the Ministry of Health remains committed to this amendment and is pushing for a decision at the Cabinet level.

Bread as a means of delivering iodine

Several studies have demonstrated the potential contribution of salt used in the food industry to dietary iodine intakes. In some contexts, 75 per cent of salt intake may come from processed food.⁵ In Russia, as in several neighbouring countries, bread consumption is high, and there is a history of using iodized salt in baking. In the face of continued difficulties passing legislation for mandatory iodization of all salt for human consumption, mandating its use in the baking industry was considered a viable option to improve population iodine status considerably – by one estimate, it could meet more than one third of iodine requirements.⁶ This was a critical opportunity given that survey data collected between 2000 and 2005 indicate widespread iodine deficiency throughout Russia.¹

The Russian context highlights the need to be flexible and to adapt to challenges of passing legislation mandating iodization. In this case, a change in strategy was prompted by success in the use of iodized salt in the food industry in neighbouring countries – a strategy that will hopefully re-establish adequate iodine nutrition in Russia.

Key contributions of the Partnership

- ◆ Sustained advocacy efforts to strengthen legislation, refocusing on use of iodized salt in the food industry;
- ◆ Strengthened the national pro-USI coalition;
- ◆ Provided technical assistance to the bread industry for use of iodized salt;
- ◆ Developed communications strategies directed towards policymakers and the food industry in support of revised legislation; and
- ◆ Commissioned assessments of the salt industry, iodized salt use in the food industry and other studies to expand the knowledge base.

UKRAINE

Challenges of policy evolution and political commitment

Strong export, weak in-country demand

Ukraine is a large producer of salt, mainly for export.¹ The majority of salt is produced by a single large producer ('Artyomsalt') with the capacity to meet quality standards for export to Europe and other countries. However, this strong production and export capacity has not translated into high household consumption of iodized salt in Ukraine or the consistent use of iodized salt by the food industry.

Despite widespread awareness about iodine deficiency in the country, demand and use of iodized salt remains low. Iodization is voluntary, including within the food industry, and while logos have been developed to help consumers recognize iodized products, they are not widely used.²

Pushing for industry partnership

Given the lack of mandatory legislation for salt iodization, advocacy efforts in Ukraine shifted focus towards the goal of targeted legislation on the use of iodized salt within the food industry. Studies on food sources of salt identified bread as a logical target for the use of iodized salt. These studies also explored the regulatory environment and motivations for bread producers to use iodized salt.

Subsequent advocacy efforts in Ukraine included regional workshops with stakeholders from various country programmes. Advocacy efforts focused on bread producers, and highlighted a report from Belarus, a country which had seen dramatic success from mandating the use of iodized salt in the production of bread and most processed foods. Ukrainian bread producers, however, remained difficult to convince.

Advocacy thwarted by political crisis

In 2013, the Partnership worked closely with key stakeholders to advocate for mandatory legislation. The Institute of Endocrinology and the Academy of Medical Sciences lobbied for legislation mandating the use of iodized salt in the food industry and public catering, including schools. These efforts gained support from the Deputy Prime Minister in charge of Social Affairs. During a meeting held in Kiev in November 2013, with the support of the Partnership and Iodine Global Network, draft USI legislation was presented by the Parliamentary Health Committee and received approval from key experts.³ Due to subsequent political instability, the draft legislation never reached the parliament floor and failed to receive formal approval from the government.



Today, the passage of critical legislation remains in limbo, despite the steadfast efforts of the Partnership and other advocates. The current economic and political situation has made it difficult for the government to give adequate attention to iodine deficiency. In addition, progress continues to be hindered by divisions among key policymakers and their advisors on the importance of mandatory iodization – even when restricted to the bread industry.



Key contributions of the Partnership:

- ◆ Supported advocacy efforts among policymakers, salt producers and consumers on the importance of iodine deficiency;
- ◆ Garnered support for establishing legislation on mandatory iodization, first for all salt for human consumption, then for salt used in the food industry;
- ◆ Helped expand the knowledge base on awareness of IDD, on food industry practices and attitudes towards the use of iodized salt, and on the current situation; and
- ◆ Initiated workshops and other interactions within the region to share successes and advocate for the application of successful approaches.

EAST ASIA AND PACIFIC REGION

The quest to keep universal salt iodization policies strong over the long haul



A region of contrasts

The East Asia and the Pacific region is home to one third of the world's population, with an estimated 580 million children. There are vast differences between countries and territories in the region: Niue has a population of 1,700, while China is home to 1.3 billion people; the region boasts some of the world's fastest-growing economies, while 10 of its countries are among the world's least developed.

The region has experienced remarkable improvements in iodine status, similar to those seen globally. However, some countries have yet to achieve optimal iodine nutrition, and the sustainability of IDD elimination is, or may be, at risk in several others. While some countries still strive to achieve high household consumption of adequately iodized salt, others face the risk of excessive iodine intakes. These contrasts need to be better understood.

Major disparities in iodine nutrition exist between the countries in the region. In China and Fiji, more than 90 per cent of households consume adequately iodized salt, and consumption in Mongolia, Papua New Guinea and Thailand is also high. In contrast, other countries are far from reaching USI, including Cambodia, the Democratic People's Republic of Korea, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines and Vanuatu. Moreover, while several countries have made tremendous progress towards the achievement of USI, some programmes have experienced backsliding due to complacency and lack of vigilance. Declines in household consumption of adequately iodized salt have been recorded in several countries, including Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam.

Tackling barriers to sustainability

Many countries have lost ground on iodine nutrition due to the absence (or removal) of mandatory legislation, poor internal and external monitoring, weak governmental support and coordination, and a lack of integration of USI into national strategies. In addition, the scarcity of up-to-date data from evaluation and surveillance systems is hindering innovation in policy development, timely programme modification, and adequate programme implementation and enforcement. There is also growing recognition in the region that the salt used in food processing is often not iodized, despite the fact that the major sources of salt in the diet are in condiments and processed foods rather than discretionary table salt. Other barriers to achieving USI include a fragmented salt industry and breakdowns in systems for accessing potassium iodate.

A close-up photograph of a person's hand raised in a meeting, holding a black pen. The background is blurred, showing other people in a room with colorful decorations.

Box 3

Lessons learned from the East Asia Pacific Regional Workshop on Achievement of Universal Salt Iodization for Optimal Iodine Nutrition

National, multi-sectoral alliances are necessary to guide salt iodization/food fortification programmes, taking into account the following:

- Salt iodization should be integrated into the wider food fortification and nutrition agenda;
- Partnerships with the food industry should be nurtured to include adequately iodized salt in food processing;
- Mandatory legislation is necessary for USI to achieve public health impact;
- Sufficient and effective regulatory monitoring systems are lacking in many countries;
- Understanding the structure of the salt industry is key to implementing an effective salt iodization programme;
- Surveillance and evaluation systems are necessary to assess impact, identify unreached groups and provide data to fine-tune future programmes; and
- While promoting the consumption of iodized salt is not necessary where mandatory iodization exists, it is important to continue educating the public about the benefits and safety of iodized salt.

Charting a path towards lasting iodine nutrition

Successful salt iodization programmes require strong, well-designed legislation that is appropriate to the situation, an effective monitoring and enforcement system that is feasible to implement with the resources available, and a salt industry that has the capacity to iodize as per the national standards and perceives the capacity and commitment of the authorities to enforce existing legislation.¹

These characteristics were recognized in a 2015 UNICEF review of the legislative environment for salt iodization in the region. The review gathered data from 22 countries in South Asia, East Asia and the Pacific with the goal of documenting existing legislation, identifying legislative weaknesses and strengths, and proposing opportunities to strengthen such legislation within countries.²

In 2015, the Partnership supported a regional workshop for representatives from 11 countries in the region to discuss how salt iodization programmes could be adjusted to sustain progress, achieve USI and prevent programme backsliding. Participants discussed strategies for leveraging the global momentum for nutrition by working to integrate salt iodization within national nutrition plans and the broader food fortification agenda. The workshop recognized the fact that it is important to monitor consumption of adequately iodized salt, not just at national levels, but also among sub-groups in order to achieve equity, as well as to monitor the salt consumed through processed foods and assess whether it is adequately iodized. Finally, the country teams recognized the necessity of aligning salt iodization with salt reduction approaches.¹



Box 4

Evidence to spark programme improvements in China

The Partnership Project helped generate an extensive range of scientific evidence to inform the national IDD control programme. Studies to assuage fears about excessive iodine intake showed that:

- A concerning number of individuals consumed less iodine than the WHO-recommended daily allowance, including 31.5 per cent of adult women. Most iodine in food came from salt, even in coastal areas where there had been assertions that iodine in seafood would be a major source. Salt iodization was the main factor assuring adequate population iodine status, and reducing the consumption of iodized salt would result in inadequate intakes. The risk of iodine excess was deemed to be low.¹
- In Shanghai Province, current dietary iodine intake was generally sufficient and safe, but insufficient in pregnant women; and, the prevalence of thyroid disease in Shanghai was no higher than in other developed settings.²
- A study called 'Salt Iodization: Meeting the needs of pregnancy, lactation and infancy' found that a well-implemented USI programme, such as that of China, achieves adequate iodine status and normal thyroid function in all population groups, including weaning infants, who are at high risk for deficiency (Dold et al., submitted for publication). These findings lend additional support to USI programmes worldwide.

CHINA

A global success story and a lesson in the power of monitoring

The ingredients of success

Before the implementation of its salt iodization programme, China bore the heaviest burden of iodine deficiency in the world. Studies in the 1990s demonstrated that 20 per cent of schoolchildren had enlarged thyroid glands as signs of iodine deficiency, and that 400 million Chinese were estimated to be at risk of IDD. In 1993, the Government of China launched the National Iodine Deficiency Disorders Elimination Program after the Minister of Health and other senior officials committed to taking action when research showed that even mild to moderate iodine deficiencies impair the intellectual development of children.³

Today, China has one of the most successful and elaborate IDD control programmes in the world. In 1994, the government addressed this national public health crisis with a national USI strategy which has been widely successful across the world's most populous country. Since 2005, national household consumption of adequately iodized salt has exceeded 90 per cent and has helped to eliminate cretinism and maintain goiter rates at below the national target of 5 per cent.

The components of China's robust programme are wide-ranging, and include:

- **Strong working mechanisms** extending from the national to the local level, outlining clear responsibilities for the health, finance, development and reform sectors, as well as salt industry supervision;
- **Comprehensive technical standards** wherein iodized salt is disseminated through a designated production and sales system to ensure a sufficient supply of quality iodized salt;
- **Designated manufacturers** that produce potassium iodate while the Ministry of Finance subsidizes the procurement of raw iodine to help manufacturers reduce production costs;
- **Subsidized iodized salt** is provided by the government to underdeveloped provinces with significant supplies of raw salt, including to Qinghai, Tibet and Xinjiang, and to ensure household use of iodized salt;
- **Women of reproductive age** living in high-risk areas with low household consumption of iodized salt receive iodized oil capsules as a short-term measure;
- **Local advocacy and education campaigns** (e.g., through National Annual IDD Days) raise public awareness about the negative impacts of IDD and the benefits of the USI programme; and
- **Management of excess iodine intake** in geographic areas with high water iodine concentrations (e.g., via the supply of non-iodized salt and water improvement measures).

Tracking coverage with care

China's IDD strategy is underpinned by an exemplary national monitoring and surveillance system, which tracks county-level iodized salt coverage annually and monitors population iodine nutrition and IDD prevalence every two to five years. The surveillance system consists of iodized salt monitoring at the household level, province-based iodine status and IDD surveillance, and high-risk area monitoring for the districts and counties with low household consumption of iodized salt (e.g., lower than 80 per cent in the past). In addition, a laboratory quality control network tests the iodine levels in salt, urine and water. This careful monitoring has had a direct impact on population health; in fact, the current IDD monitoring and surveillance system served as the basis for three adjustments of salt iodine levels to maintain population iodine status in the optimal range.

Managing an uncertain future

The edible salt industry in China was scheduled to be de-regulated in 2017, meaning that the government will no longer control production amounts, prices or distribution systems. These changes have left many advocates apprehensive about the continued success of salt iodization programmes in the country.

Key contributions of the Partnership:

- ◆ Generated scientific data to inform the national IDD control programme;
- ◆ Advocated for and provided guidance on measuring median urinary iodine concentration (MUIC) as part of the routine national monitoring and evaluation system, to better reflect the iodine status of high-risk populations;
- ◆ Advocated successfully with the National Health and Family Planning Commission to maintain until 2017 the government salt monopoly in the context of the salt industry reform; and
- ◆ Supported the organization of an international workshop on China's IDD prevention and control strategy to address concerns regarding iodine excess and to maintain support for mandatory salt iodization.

In a de-regulated system, iodization will no longer be mandated and as a result, both non-iodized and iodized salt will be available based on consumer demand. The shift in regulation stems from concerns raised by the public and some in the medical community.

Possible links between salt iodization and thyroid disease have been purported by the public and some medical practitioners, but the drivers of rising thyroid disease

incidence remain uncertain. Moreover, the benefits of iodized salt for the control of debilitating iodine deficiency are indisputable, and China has a proven track record in refining and adjusting its programme to maximize benefits and minimize potential risks. Going forward, close monitoring of the use of iodized salt and population iodine status will be more important than ever to detect any drops in coverage and to ensure that corrective actions are applied rapidly.



INDONESIA

Decentralizing universal salt iodization in the face of increasing domestic salt production

Early adopters of a new vision

Indonesia is a large, diverse country with more than 250 million people spread across 17,000 islands. Indonesia produces salt, with an estimated total need of 3.5 million metric tons (MT) (as of 2013), of which 1.5 million MT are for human consumption.¹ While Indonesia has a large salt industry, much of its salt comes from medium- and small-scale farmers with little processing capacity – a situation that, like in many countries, has complicated the achievement of USI.

Indonesia adopted the principal of USI early on, and crafted the language on USI for the 1990 World Summit for Children. In 1994, a presidential decree established mandatory iodization of all salt for human consumption, animal feed, fish preservation and food industry use. While there has been some controversy over the interpretation of this decree, the government interpretation is that iodization is mandatory. Household consumption of iodized salt increased quickly to achieve nearly 50 per cent in 1995, and by 2007, a national survey showed that 86 per cent of household salt was iodized and 63 per cent was adequately iodized.² Furthermore, the data on iodine status from school-age children illustrated that iodine deficiency was effectively being controlled among this age group.

Making USI part of the fabric of society

Indonesia is one of the few countries to explicitly link USI to the broader nutrition and development agenda. Salt iodization is included in national surveys as well as all nutrition, health and development plans. Programme coordination for USI is streamlined under a single umbrella body for food fortification. Since 2013, the government has been allocating its own funds for national activities and is no longer dependent on external donor funding. Ministry of Industry leads the salt mandate and has widely supported in country efforts to achieve salt self sufficiency.

Indonesia's decentralized governing structure transfers significant power to the district level. The Partnership supported the implementation of the Ministry of Home Affairs decree, which mandates provincial and district governments to control non-iodized salt supply. Along with provincial governments, the Partnership helped seven key salt-producing districts of Central Java build local capacity to pass iodization laws and create IDD teams to monitor and enforce them.

The Partnership also empowered civil society organizations, such as the national and sub-national Salt Producer Association, which

worked with district IDD teams and trained retail vendors to promote iodized salt in local markets. The Indonesian Consumer Protection Organization also conducted independent market monitoring in some districts.

In collaboration with the national Salt Producer Association, the Partnership helped to improve quality standards. In all, 41 large- and medium-scale producers developed and implemented standard operating procedures, established quality control teams, and made use of salt-testing miniature laboratories. These efforts were complemented by efforts to mobilize retailers and consumers to use iodized salt.

Key contributions of the Partnership:

- ◆ Expanded the evidence base for USI and the use of iodized salt in the food industry;
- ◆ Provided technical support to strengthen legislation, coordination and planning;
- ◆ Helped implement the Ministry of Home Affairs decree to mandate provincial and district governments to control non-iodized salt supply;
- ◆ Supported quality assurance measures for medium- and large-scale producers and the iodization of non-processed salt among smaller producers; and
- ◆ Strengthened advocacy and communication activities at national, provincial and district levels.



From investments to results

Household consumption of iodized salt and iodine nutrition status were assessed in 2013 through a national survey. The data demonstrated that 92 per cent of households had iodized salt, subsequent analyses using titration demonstrated that 55% of salt was adequately iodized.^{3,4} Moreover, the iodine nutrition status of school-age children, women of reproductive age and pregnant women were all in the adequate range, illustrating effective control of iodine deficiency at the national level.

High household access to iodized salt has been critical to the effective control of iodine deficiency in Indonesia. Iodized salt used by the food industry is also an increasingly important contributor to salt intakes and population iodine status. This contribution of iodized salt used by the food industry may account for the apparent disconnect between decreasing household consumption of adequately iodized salt and optimal iodine status among all at-risk groups.

However, the regulatory environment for processed food remains unclear, with many food producers feeling that use of iodized salt is not required. Furthermore, difficulties in ensuring adequate iodization of salt for household, animal feed and fish preservation threaten the sustainability of IDD programmes, as do national efforts to increase domestic raw salt production but without sufficient links to salt iodization. Continued vigilance is therefore needed to maintain optimal iodine status in at-risk groups in Indonesia.

THE PHILIPPINES

Better enforcement to boost iodine nutrition

Strengthening the salt industry

The Philippines is a vast Pacific archipelago where four national firms own 24 salt production facilities, producing 80 per cent of the national salt supply. The country has a long history of engagement with the salt industry – and more recently, with the food industry – around issues of fortification, including the use of iodized salt in processed foods.

Salt iodization in the Philippines was established as early as 1995, with the passage of An Act for Salt Iodization Nationwide (ASIN). The ASIN law is exemplary in that it includes a set of measures to support the salt industry, such as support for upgrading production facilities, access to soft loans, assistance in forming cooperatives, iodization technology for smaller producers, and the protection of areas that are suitable for salt production.¹

A seal of approval

Findings from successive nutrition surveys helped the government to strengthen the rules of the ASIN law.² Furthermore, as a sign of an integrated approach to food fortification, the government created the Sangkap Pinoy Seal to promote the fortification of salt, rice, oil, sugar and flour. For years, this seal has been

promoted through the annual food fortification week and food fortification days.

The ASIN law and the Sangkap Pinoy Seal lay the groundwork for salt iodization at the national level. However, there has been limited enforcement of the ASIN law and the seal by the national Food and Drug Administration. To address these limitations at the central level, the Partnership engaged with local government at the regional, provincial and municipal levels in accordance with the decentralized governance system in the Philippines. To implement relevant regulatory mechanisms at local levels, the Partnership helped create the commitment in the form of local ordinances and regulations from the local government executives, primarily municipal mayors.

Advocacy and coordination to cover the last mile

As another advocacy gain, the Partnership helped the formation of a multi-sectoral National Salt Iodization Program Technical Working Group by the National Nutrition Council. This group developed the National Salt Iodization Strategic Plan (2011–2016), which outlined roles and responsibilities of members to implement strategic plan activities.

Country visits supported by the Partnership reviewed the programme in 2015 and highlighted the well-established policies and implementing structures for USI in the country. These structures, which continue to include representation from the salt and food industries, provide a sustainable mechanism through which to continue to address challenges in achieving optimal iodine status and access to iodized salt.³

Mobilizing for action

To support efforts at the local level and position salt iodization as part of the Scaling Up Nutrition movement in the country, the Partnership worked with the National Nutrition Council through a tripartite agreement to solicit the support of ‘lady’ municipal mayors throughout the country. The initiative resulted in 48 women mayors becoming champions to promote salt iodization across the first 1,000-day window in their municipalities through the creation of local ordinances and regulations. This involved organizing multi-sectoral forums and advocacy activities in eight pilot municipalities involving all relevant stakeholders – the local health council, municipal health and nutrition workers, barangay nutrition scholars and local police, among others.

Box 5

What facilitated the implementation of the national salt iodization law in the Philippines?

- Existence of a comprehensive ASIN law and its clear implementing rules and regulations;
- A well-established and comprehensive implementation structure in the form of the policy-level Salt Iodization Advisory Board and the National Salt Iodization Program Technical Working Group;
- Salt task forces created at the local level to support local government in implementing the ASIN law and monitor any violations;
- Engagement with the Lady Municipal Mayors Association of the Philippines to strengthen the enforcement of local ordinances on salt monitoring in local government;
- Creation of the Sangkap Pinoy Seal to promote salt iodization and food fortification;
- Public advocacy and structured dissemination platforms such as Food Fortification Days;
- Institutionalizing quality assurance measures through provision of portable testing equipment and facilitating tax incentive grants; and
- Engagement with supermarket chains to improve access to and availability of iodized salt with the Sangkap Pinoy Seal.



These local governance efforts were coupled with a communications campaign at the local level entailing the dissemination of information, education and communication materials and involving various stakeholders through multi-sectoral forums. The Partnership also supported work with local retail supermarket chains to gain their commitment to sell only salt with the Sangkap Pinoy Seal.⁴ Salt quality assurance measures were strengthened through the use of portable testing equipment and facilitating tax incentive grants.

Though much progress has been made through long and sustained efforts to eliminate IDD, key challenges remain. Principally among them is that the weak external regulatory monitoring system at the central level means that salt producers and re-packers are too often willing to sacrifice the quality of adequate iodization for the sake of greater profits. Furthermore, salt iodization practices among small

producers remain inadequate. Progress has been made, however, in working with the larger salt and food industry, as well as with supermarket chains, to improve both the supply and demand for iodized salt and the use of salt in the food industry. To illustrate, a Partnership study estimated that in the Philippines, an estimated 100 per cent of iodine needs for children and 85 per cent of needs for women could be met from processed food and dried fish.⁵

These efforts have allowed the country to reach adequate iodine nutrition, with some remaining concerns about levels for pregnant and lactating women even though the household consumption of adequately iodized table salt remains low.

Nearly two decades since the passage of the ASIN law and its decentralized implementation, the latest national estimates from the Philippines suggest a stagnation of household iodized salt consumption (26 per cent adequately iodized in 2013, essentially the same as in 2007), but improvements in population iodine nutrition. Among children 6–12 years old, MUIC went from 132 µg/L in 2008 to 168 µg/L in 2013, although the MUIC for pregnant women was only 105 µg/L against a target of 150–249 µg/L.⁶

Key contributions of the Partnership:

- ◆ Helped form a multi-sectoral National Salt Iodization Program Technical Working Group to coordinate the national USI programme;
- ◆ Assisted salt producers in instituting quality assurance measures through provision of portable testing equipment and facilitating tax incentive grants;
- ◆ Supported the Food and Drug Administration to adapt good manufacturing requirements for salt producers and processors;
- ◆ Analysed the contribution of iodized salt contained in processed foods to dietary iodine intakes; and
- ◆ Lobbied supermarkets to carry only salt with the Sangkap Pinoy Seal.

EASTERN AND SOUTHERN AFRICA REGION

The push for a place on the food fortification agenda



Strategizing for sustained coverage

By 2013, three quarters of all countries in the Eastern and Southern Africa region were benefiting from adequate iodine nutrition.¹ Regional advocates have worked to sustain the elimination of IDD by fostering engagement with the salt industry, lobbying for legislation and national commitments, facilitating strong coalition building, communicating effectively, improving monitoring, and pushing for USI to be included in regional and national nutrition strategies.

Integrating salt iodization into regional and national nutrition plans is critical to ensuring that measures to prevent iodine deficiency are not overlooked – and UNICEF and other partners have closely supported governments in this process. Importantly, UNICEF provided technical support towards the drafting of the African Regional Nutrition Strategy 2015–2025 that is to be adopted by the African Union, and

also facilitated the development of the first Intergovernmental Authority for Development Regional Nutrition Policy and Strategy.² The South African Development Community has a food and nutrition strategy paper that includes addressing iodine deficiency as part of the regional strategy.³ The launch of these strategies suggests that salt iodization and IDD are on the broader African agenda as a developmental issue, with ministers recognizing the value of iodine nutrition within the broader nutrition agenda.⁴

Fostering regional cooperation

Salt iodization is also included in the broader food fortification effort in the region, and significant progress has been made in creating harmony among standards. The East, Central and Southern African Health Community (ECSA-HC) is a regional inter-governmental health organization that promotes regional cooperation in health among its member states. As early as

2002, the ECSA-HC set a precedent by passing an initiative for food fortification that called for the harmonization of salt iodization standards. The ECSA-HC also developed a manual for the commercial inspection of fortified foods and a manual for inspection of fortified foods at importation sites, both of which included regional standards for iodized salt.⁵

Getting IDD on the broader nutrition and development agenda

Salt iodization programmes have a longstanding tradition of engagement with the salt industry, as well as multiple government sectors and civil society. This multi-sectoral approach has been reinforced by the global momentum to end stunting and other forms of malnutrition. The SUN movement, itself a multi-sectoral effort, devotes continued attention to USI and provides a platform that helps secure a place for IDD goals within the broader nutrition agenda.⁶



Box 6

Understanding high iodine status in Kenya and the United Republic of Tanzania

Over the past decade, there has been significant progress towards the elimination of iodine deficiency as a public health problem in Eastern and Southern Africa. At the same time, there have been reports of higher-than-required or even excessive iodine status in selected settings, and which may impair normal thyroid function. A collaborative study between the UNICEF Eastern and Southern Africa Regional Office and the Swiss Federal Institute of Technology Zurich explored the reasons for excessive iodine status among schoolchildren in Kenya and the United Republic of Tanzania. The salt iodine concentrations in the two countries were within national standard range. On the other hand, the study showed that even though many groundwater samples taken had negligible iodine concentrations, some sources, especially from boreholes, showed very high concentrations. These findings demonstrate that even though the exact origin of the high iodine status is uncertain, groundwater may be one contributory factor. Despite the indication of an excessive iodine status in both countries, the study findings reassured policymakers that there was no evidence of an elevated prevalence of thyroid disorders.



ETHIOPIA

The rise, fall and rebirth of iodine deficiency control

Commitment through political turmoil

Ethiopia has remained steadfast in its commitment to USI, despite conflict and massive political upheaval. The Ethiopia USI programme was initiated with the signing of the USI agreement at the World Summit for Children in 1990, and progressed rapidly – first with the passage of legislation banning non-iodized salt in 1996, and next when 80 per cent of households were shown to consume iodized salt in 1998. At the time of these achievements, virtually all salt in Ethiopia came from the Red Sea via Eritrea.¹

However, Ethiopia and Eritrea had a 30-year history of conflict, which culminated in a referendum that established Eritrea's independence and membership in the United Nations in 1993. Continual border conflicts became heated in 1998 with significant fighting, making normal trade between the two countries impossible. Since virtually all salt supplied to Ethiopia had traditionally come from what was now Eritrean territory, Ethiopia had to turn elsewhere for a supply of salt. Soon after the conflict with Eritrea eliminated all trade, Ethiopia looked to Djibouti as a source of salt, but then decided to exploit its own natural resources and establish a domestic salt industry. By 2002, the Afar Regional State was allegedly producing 180,000 MT of raw salt, but iodization remained a challenge.²

The political upheaval and change in salt supply resulted in the breakdown of the USI programme, as salt prices began to rise and the ban on non-iodized salt was abandoned, leading household consumption levels to drop below 5 per cent by 2005. A 2005 survey showed high goiter rates of 40 per cent in children and very low MUIC (25 µg/L), an indication of severe population iodine deficiency.³

Riding the salt wave

The government responded by providing incentives to encourage exploitation of salt from Lake Afdera in the Afar region, which led to a rush of investment by both Afari and other entrepreneurs. "This 'salt rush' led to significant over-capacity, with around 400 producers providing about twice as much edible salt as the country needed."¹ Investors retreated, prices dropped and production became inconsistent. The salt producers organized, forming the Afar Salt Producers Mutual Support Association to coordinate production and supply. This resulted in quotas and price fixing, which led to production inefficiencies over time, and offered little room for producers to add the cost of iodization to production costs in the absence of mandatory legislation.

From communication to legislation

To revamp the national salt iodization programme and accelerate progress, the government launched a phased communication strategy in 2009. At the outset, the strategy focused on building consumer awareness and demand, including via the first National Iodine Deficiency Disorders Day in 2010. This national event was repeated in later years. In addition, the strategy targeted policymakers to advance with the adoption of mandatory legislation.

During this time, the government responded to the continued IDD problem by creating national technical and steering committees to ensure adequate KIO_3 supply, improve capacity, and provide ongoing advocacy. In 2011, with support from the Micronutrient Initiative, legislation mandating the iodization of all salt for human consumption was passed, representing a turning point for the national programme. Such a turning point was sorely needed, as the national salt iodization capacity at that time only covered 15 per cent of national needs for iodized salt, which was mirrored by the findings of the 2011 Demographic and Health Survey, which indicated that merely 15 per cent of households were consuming salt with some amount of iodine.⁴

Partnering for mutual benefit

To increase production capacity for iodized salt, the Partnership procured salt iodization machines, generators and materials to repair existing machines that had previously been left idle. It provided training to salt producers on iodization processes, machine handling and maintenance. The Partnership also worked to improve quality assurance and control and laboratory capacity of salt producers.

However, one of the important contributions the Partnership made was successfully working with the Pharmaceuticals Fund and Supply Agency to

establish a fully viable cost recovery system for the procurement and distribution of KIO_3 . Until 2012, Ethiopia was dependent on donor funding for KIO_3 . The new cost recovery system and revolving fund allowed the agency to procure at cost the KIO_3 and distribute this to salt producers with a small margin to reclaim costs for the management of the fund.⁵ To lay the groundwork for the fund, the Partnership assessed national iodized salt demand and iodization capacity at production facilities throughout the country to determine the total annual need for KIO_3 .

Another key step for the national programme was the consolidation of salt producers in the Afar region through the creation of a Central Iodization Facility (CIF), aimed to increase the national supply of good quality and adequately iodized salt.⁶ The Partnership provided required advocacy support to enable the government and the private sector to agree on the establishment of a CIF. It also helped the sharing of successful experiences with local stakeholders, such as through a visit to a CIF in Azerbaijan.

First results

These efforts have been fruitful: a 2015 national survey indicated that 85 per cent of households consumed iodized salt. However, only 26 per cent of households consumed adequately iodized salt, which may point to gaps in ensuring quality iodization practices. The iodine status among school-age children (MUIC 106 $\mu\text{g/l}$) and women of reproductive age (MUIC 98 $\mu\text{g/l}$) indicates vast improvements in population iodine status that are allaying public concerns about widespread deficiency. Nevertheless, population iodine status remains low for both school-age children and women of reproductive age in several of the country's regions, indicating that further improvements to IDD control efforts are needed.⁷

Key contributions of the Partnership:

- ◆ Provided technical and financial support to the government since 2009;
- ◆ Advocated with government and industry on the merits of mandatory USI legislation;
- ◆ Helped align all partners in the design of a comprehensive national action plan with clearly defined roles and responsibilities;
- ◆ Developed comprehensive communication campaigns targeting key stakeholders;
- ◆ Worked to build the capacity of regulatory agencies;
- ◆ Established cost recovery system for the procurement and distribution of KIO_3 ;
- ◆ Strengthened the capacity of the salt industry and supported the establishment of a CIF; and
- ◆ Collected updated data on salt iodization coverage and population iodine status.

MIDDLE EAST AND NORTH AFRICA REGION

An unfinished agenda



Garnering government support for USI

In the Middle East and North Africa region, iodine deficiency came to the forefront as a public health priority in the 1980s, when an IDD survey in Iran catalysed other countries to review their status. The 1988 WHO guidelines helped countries initiate programmes, and a series of advocacy workshops highlighted the seriousness of the problem. By 2000, the majority of countries had established salt iodization programmes.¹

Of the 20 countries in region, many have made significant strides towards overcoming iodine deficiency, despite political instability. By 2012, there was strong government commitment for USI in many countries, with an increasing number mandating iodization of salt for human consumption.² In Iran, for example, after an early programme faltered, the government responded by focusing on improving monitoring and quality assurance. This in turn improved the adequacy of iodine in salt, and subsequently, enhanced the population's iodine nutrition.³

Sustaining progress amidst political strife

However, conflict and political strife have presented challenges in sustaining improvements in iodine nutrition in other countries. In 2008, a UNICEF report revealed that in 3 out of 11 countries in the region, household consumption of iodized salt was below 50 per cent. At the time, these three countries – Iraq, the Sudan and Yemen – were experiencing significant political and social upheaval.⁴ In Iraq, for example, conflict inhibited progress as households shifted from imported, packaged salt that was well iodized to locally produced, generally non-iodized salt.⁵ Algeria, Lebanon, Morocco and the Sudan remain iodine deficient today.⁶ The fight against iodine deficiency in the region therefore remains ongoing and urgent.



Box 7

Workshops in the Middle East and North Africa to develop national action plans for the prevention of iodine deficiency disorders

The Iodine Global Network and UNICEF organized two workshops designed to strengthen IDD control programmes in the region. In March 2015, a workshop in Dubai convened 48 participants from Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, the United Arab Emirates, Oman, Qatar, Saudi Arabia, the State of Palestine, the Sudan and the Syrian Arab Republic. In June 2015, a similar workshop was hosted in Morocco, with participants from Arabic- and French-speaking countries in North, West and Central Africa including Algeria, Djibouti, Egypt, Mauritania, Morocco, the Niger, Senegal, Togo and Tunisia. As a result of these workshops, many countries revised action plans to tackle country-specific hurdles to achieving IDD elimination goals.

EGYPT

Collaboration and oversight to drive results

A strong framework for coordination and action

Widespread iodine deficiency was first reported in Egypt more than 90 years ago.¹ Subsequent studies conducted in the 1990s confirmed continued widespread iodine deficiency in the country and high estimates of goiter among schoolchildren.²⁻⁴ In response, Egypt passed mandatory legislation for salt iodization in 1996 and, 10 years later, the government conducted its first nationwide survey among primary schoolchildren. The survey revealed a national MUIC in the adequate range,⁵ illustrating the clear impact of salt iodization on population iodine nutrition.

Despite an unstable political environment and major crises associated with the 'Arab Spring' which took place during the Partnership project, household consumption of adequately iodized salt rose to 75 per cent in 2015, and MUIC remained in the optimal range among the population.⁶ These favourable results were made possible through the revitalization of the National Micronutrient Committee and establishment of a National IDD Secretariat in 2009. With support of the Partnership and relevant ministries and government agencies, international partners and the salt industry, the Secretariat coordinated the USI planning process and directly supported a range of activities that sustained high household iodized salt coverage and enabled further progress.

The programme now has sufficient momentum to push towards the sustainable elimination of IDD. The fact that the national salt iodization programme was able to maintain high levels of performance and even increase its reach during a time of political transition is a remarkable accomplishment.

Box 8

Actions taken by the Partnership-supported National IDD Secretariat in Egypt

ADVOCACY FOR LEGISLATION

- Secured support for modifying legislation to close loopholes in animal and industrial salt supply and to reformulate recommended iodization ranges.
- Extended the iodization mandate and penalties to small-scale producers and salt re-packers.
- Reviewed licensing regulations for salt re-packers, and storage areas/warehouses and mandating the use of an iodization logo on all salt packages.

TECHNICAL ASSISTANCE TO INDUSTRY

- Collaborated with the salt producers' association and the Salt Alliance Group, thereby opening channels to ensure the full participation of industry in USI capacity-building activities. Supported by the government, the association is now the major channel for KIO₃ distribution.
- Supported the Salt Producers and Processing Society to develop a logo for marketing of adequately iodized salt.
- Supported the industry in the development of a customized quality assurance/quality control manual that has been adopted by all producers and salt inspectors affiliated with the Ministry of Health and Population.
- Introduced portable testing equipment to determine salt iodine content for smaller-scale industries.

- Coordinated a participatory process to develop a cost-sharing plan to gradually shift KIO₃ financing to private producers prior to the expiry of a current Ministry of Health and Population subsidy in 2020.

BUILDING THE CAPACITY OF THE NATIONAL REGULATORY AGENCY

- Built the capacity of the Ministry of Health and Population's Department of Food Inspection to conduct regular inspections at the point of production.
- Developed a management information system to provide up-to-date information on regulatory activities and make information on KIO₃ distribution, stocks and salt iodization easily accessible.
- Built capacity of intermediate- and small-scale producers on quality control and quality assurance procedures.

PRIORITIZING PUBLIC EDUCATION

- Coordinated a social marketing campaign based on market research that identified seven highly vulnerable governorates. The campaign targeted consumers, salt retailers, NGOs and community and political leaders. The campaign included radio spots, health visits by community health workers, and regular community meetings.



Key contributions of the Partnership:

- ◆ Developed a comprehensive communication strategy with government using text messages, school platforms and religious leaders;
- ◆ Supported the work of the national coalition and IDD secretariat;
- ◆ Strengthened the national capacity of the salt industry on QC/QA of iodized salt;
- ◆ Helped revise the iodized salt decree and iodized salt specifications and standards;
- ◆ Strengthened quality monitoring and the use of iodized salt in the food industry; and
- ◆ Supported the design and implementation of a national iodine survey, which provided updated evidence on progress and highlighted remaining gaps.

SOUTH ASIA REGION

Making universal salt iodization count in the broader nutrition agenda

Economic growth against the backdrop of undernutrition

The eight countries in the South Asia region have a long, intertwined history that contributes to some cultural similarities and disparate economic growth patterns. These factors affect how established public health programmes evolve, and the ability of governments to sustain their commitment for USI. Despite rapid economic growth in many countries in the region, undernutrition rates in children and women remain high. Many governments have responded by scaling up nutrition programming, which has provided an opportunity to integrate USI efforts into the broader nutrition agenda.

A framework for action

There is broad regional consensus on the need for a multi-sectoral approach in improving nutrition, with a particular focus on the reduction of chronic undernutrition. The South Asian Association for Regional Cooperation (SAARC)

has developed a Regional Action Framework for Nutrition, which focuses on the prevention of child stunting as the overarching outcome indicator. The framework is based on a number of long-standing SAARC country commitments, including the Universal Declaration of Human Rights, the Convention on the Rights of the Child, and the Declaration on World Food Security, among others. The framework focuses on four pillars, including government commitment, scaling up known interventions, increased capacity, and monitoring. USI is highlighted as one of the known interventions.

Leveraging shared strengths

The framework praises the potential of the region: 'What these countries have in common is a coherent set of elements such as political commitment at the highest level, national policies and programmes based on sound situation analysis, addressing undernutrition through a multi-sectoral approach, adequate capacity at national and sub-national level,

community involvement and participation sustained by effective communication and advocacy, and a strong monitoring and accountability system'.¹

These elements have proved critical to addressing IDD: all eight countries have achieved adequate iodine nutrition, as shown by MUIC in the recommended range. However, most of them face continued challenges with ensuring access to adequately iodized salt for the entire population, with only two countries reaching 80 per cent or higher household coverage.² This discrepancy underlines the importance of continued efforts to ensure that gains in iodine nutrition are sustained, making it all the more important to incorporate food fortification – and USI in particular – into the broader nutrition agenda.

Aligning salt reduction and salt iodization agendas

The region has started efforts to lower population salt intakes, given that high salt consumption raises blood pressure, and high blood pressure is a major risk factor for heart disease and stroke. In 2014, a WHO-sponsored regional workshop on this topic looked at reducing salt intakes while sustaining salt iodization programmes.³ The workshop guided participants in approaching salt reduction and salt iodization as compatible public health approaches.⁴

While all countries in the region have had successful salt iodization programmes, several face challenges in ensuring that these achievements are sustained, and that the USI strategy extends to the routine use of iodized salt in the food industry. The inclusion of IDD control into the broader nutrition agenda will be crucial to sustain and further expand the achievements made on IDD control and guarantee all citizens access to adequately iodized salt.



BANGLADESH

Success backed by a legacy of robust policy

Setting the stage for mainstreaming iodine nutrition in national nutrition policies

Bangladesh has a long history of strong nutrition policies and its constitution affirms that the State 'shall regard the raising of the level of nutrition and improvement of public health as among its primary duties'¹. Bangladesh made universal salt iodization mandatory in 1989, and additional regulations were passed in 1995.

Bangladesh is known for its strong policy environment for nutrition, evidenced by its high ranking in the Hunger and Nutrition Commitment Index, particularly with regard to the visibility of nutrition in multiple national development policies, inclusion of a separate budget line for nutrition in the national budget, and a multi-sectoral approach with time-bound goals.² Currently, the National Nutrition Policy 2015 focuses on the necessity of increased efforts to improve use of iodized salt by the Bangladeshi population, and includes household consumption of iodized salt as one of the important indicators in measuring improved nutritional status.³ In addition, the government has developed a National Strategy on Prevention and Control of Micronutrient Deficiencies, Bangladesh (2015–2024), which provides a summary of the situation of iodine

deficiency in Bangladesh and exposes gaps in the current programme.⁴

The Control of Iodine Deficiency Disorders Project (CIDDP) was established in the early 1990s to build and support industrial capacity for quality iodization. At that time, UNICEF helped procure 267 salt iodization facilities for both large- and medium-scale producers as well as the more than 42,000 small-scale salt farmers. In 2009, the CIDDP, in collaboration with the Partnership project and other partners, adopted a five-year plan of action and several years later set an objective of achieving 75 per cent coverage with adequately iodized salt through a range of activities, many supported by the Partnership.

At the policy level, the CIDDP submitted draft amendments to revise legislation with provisions to apply to salt imports and processed foods, deter trade in non-packaged raw salt, and strengthen penalties for non-compliance. The government ruled that the proposed amendments constituted more than a revision and required passage of new legislation; a new draft has been submitted and is pending. The Partnership provided support to strengthen the enforcement of current regulations through local salt ordinances and mobile courts.





Supporting producers, educating the public

The Partnership helped establish a revolving fund and a centralized procurement system, which removed freight costs and value-added tax. It also refurbished 200 salt iodization plants and provided 50 per cent cost sharing for producers purchasing equipment to improve salt quality, such as dryers and centrifuges.

Quality assurance manuals developed by the Partnership were adopted by both industry and institutional laboratories. The project provided incentives to improve iodization quality via an industry recognition programme which included monthly salt quality monitoring, sharing information on performance, biannual performance review meetings, identifying top performing producers and reward events with associated media and communications.

With Partnership support, the CIDDP disseminated national radio and TV broadcasts along with social mobilization in 20 high vulnerability districts. More than half a million citizens were reached by IDD education and promotional events, including 1,200 primary schoolteachers, 228 religious leaders and

Key contributions of the Partnership:

- ◆ Developed a comprehensive communication strategy with government;
- ◆ Supported the work of the national coalition and IDD secretariat;
- ◆ Strengthened the national capacity of the salt industry on QC/QA of iodized salt;
- ◆ Advocated for the revision of the iodized salt decree and iodized salt specifications and standards;
- ◆ Developed technical guidance and resource material for public health practitioners, retailers, and government officials;
- ◆ Strengthened quality monitoring and the use of iodized salt in the food industry; and
- ◆ Supported the design and implementation of a national iodine survey, which provided updated evidence on progress and highlighted remaining gaps.



thousands of children, families and retailers mobilized through the use of rapid test kits. Across 20 districts, public awareness about iodized salt reached more than 70 per cent.

Strategizing to close the gap

Importantly, however, a midpoint survey in 2011 showed that the iodine status of women and schoolchildren was in the optimal range at the national level.⁵ These findings indicate that through current efforts, enough iodine is being supplied to the Bangladeshi population. Yet coverage of adequately iodized salt remained unchanged at around 50 per cent over the Partnership period, suggesting that there were subgroups that were not being reached and may not be protected against IDD.

The 2011 survey found that higher quality salt in sealed retail packs (as opposed to coarse 'open' salt) was the most significant predictor of adequate iodine content— and households purchasing this higher-quality packed salt were much more likely to have optimal iodine status. Legislation and incentives to upgrade processing and shift the market to higher-quality salt in sealed consumer packs may offer the best returns on future programme investments, and ensure that Bangladesh remains on track to eliminate iodine deficiency.

INDIA

Better iodine nutrition for more than 1 billion

Advocacy for nationwide regulation

India began its salt iodization programme in 1962 following studies demonstrating the links between goiter and iodine deficiency. After an initial period of low political priority, strong government support began to emerge in 1983, when the elimination of goiter was included in the national development plan. Momentum for USI began to mount, including engagement with the private sector to produce iodized salt, which in India is tightly regulated and controlled by a special Salt Commissioner.

The sale of non-iodized salt for human consumption was banned nationally in 1997, but the ban was later revoked in 2000. Most states already had their own bans in place throughout this time, and the majority maintained them despite the change at the national level. However, the states of Orissa and Gujarat (which account for about three quarters of national production) revoked their bans, sparking substantial drops in coverage throughout the country. After five years of intensive advocacy with the central government, a nationwide ban on the sale of non-iodized salt was reinstated in 2005.^{1,2} A similar threat to the national programme emerged during the Partnership project.

Coordination and collaboration

The Partnership supported India in sustaining progress, averting threats to USI legislation, and working to improve the situation for the most vulnerable populations. The Partnership supported the National Coalition for Sustained Optimal Iodine Intake to serve as a high-level advocacy channel and to provide a platform for regular dialogue among partners.³ In 2009–2010, the Partnership and Coalition mobilized advocacy and technical support to address threats to mandatory iodization which were raised at the Supreme Court. Decentralized coordination bodies, along with USI cells, have been established in states with a high burden of undernutrition. USI cells provide laboratory analysis, sensitize the supply chain, document trade dynamics, monitor the quality of salt, and use the results with the Salt Department and Department of Food and Drug Administration to implement non-punitive actions against manufacturers producing non-iodized salt.

Building better capacity for government and industry

The Partnership worked to strengthen commitment and build the capacities of India's Salt Department and Salt Commissioner, which has in turn opened legal, technical and high-

level advocacy channels to both government and industry. The Partnership engaged regulators, traders and iodized salt producers at national and regional levels in order to help strengthen the supply chain of adequately iodized salt. It also helped introduce an innovative management information system to continuously monitor the quality of iodized salt across India. The system provides real-time access to salt production, distribution, quality and iodization data.

The Partnership helped form the India Salt Services Cooperative Federation, a platform mobilizing 450 government and industry stakeholders in activities to encourage innovative collaborative approaches to industry modernization, mechanization and consolidation. A proposed 'Technology Upgrade Fund' provided investment support to small and medium-sized enterprises to upgrade technology and consolidate operations.

Targeting the most vulnerable

Households with limited access to iodized salt are predominantly rural and low income, and more likely reside in Southern India states. The salt that these households receive is largely supplied by small producers mainly from Tamil Nadu, and tends to be low quality. To improve access for vulnerable groups, the Partnership worked with state governments to promote the use of iodized salt in the Public Distribution System (PDS), a programme that distributes subsidized food and non-food items to India's poor, the Mid-Day Meal Scheme, a school meal programme, as well as the Integrated Child Development Services (ICDS), a government welfare programme that provides food, preschool education and primary health-care to children under 6 years of age and their mothers. To improve uptake in PDS, the Partnership

Key contributions of the Partnership:

- ◆ Supported the National Coalition for Sustained Optimal Iodine Intake to serve as a high-level advocacy channel and provide a platform for regular dialogue among partners;
- ◆ Helped form the India Salt Services Cooperative Federation to spur innovative collaborative approaches to industry modernization, mechanization and consolidation;
- ◆ Worked with state governments to promote the use of adequately iodized salt in the PDS and the ICDS programmes in underserved areas; and
- ◆ Provided financial and technical support for the first-ever national survey to assess the consumption of adequately iodized salt, estimate salt intake in India, and determine nutritional iodine status among women of reproductive age.



provided technical assistance to Tamil Nadu's state salt company and undertook sensitization and capacity building along the PDS supply chain to enable a doubling of the iodized salt supply. In Madhya Pradesh, the Partnership was successful in advocating for the inclusion of adequately iodized salt in the ICDS and midday meal scheme.

The scorecard of success

In 2014, the Partnership provided financial and technical support for the first-ever national survey to assess the consumption of adequately iodized salt, estimate salt intake in India, and determine nutritional iodine status among women of reproductive age. The results were remarkable: household coverage with iodized salt was 92 per cent, and 78 per cent with adequately iodized salt. In addition, the MUIC at the national level was 158 µg/L in women of reproductive age, a

sign of optimal iodine nutrition in India. Iodine status was also found to be adequate across all zones and in both urban and rural areas. The survey also illustrated the need to reduce total salt consumption, as 90 per cent of respondents consumed more than the recommended 5 g/day.⁴

Beyond helping to support the significant improvements in salt coverage between 2009 and 2015, the Partnership activities sustained and possibly accelerated industry trends expanding market share for higher quality and iodized salt. Future USI programming will work to sustain current achievements strengthen the Salt Department, support increased market shares for higher-quality refined and washed salt sold in small consumer packages, and continue to increase and monitor access in low-coverage regions and among the poor.

Box 9

Reaching the poor in Madhya Pradesh

Madhya Pradesh, a state in central India, is home to a substantial portion of India's most marginalized and vulnerable population. There are great disparities in coverage of iodized salt between rich and poor households: in 2009, coverage in the region was nearly 90 per cent among the richest households, but only about 50 per cent among the poorest. To better reach the most vulnerable, the state launched an initiative through the Supplementary Nutrition Programme of the Integrated Child Development Services and the Midday Meal Scheme – two national flagship nutrition programmes. Programme staff at participating schools and Anganwadi centres (which provide basic health services and nutrition counselling) learned how to monitor salt iodine content and correctly store salt, while field monitors assessed iodized salt use in food. As a result, 89 per cent of more than 12 million children aged 3 to 6 years enrolled in Anganwadi centres received two hot meals prepared with adequately iodized salt, while 78 per cent of children in primary school (approximately 4.4 million) and 79 per cent of children in secondary school (about 2.1 million) received one meal with adequately iodized salt. The experience shows that these targeted investments helped reach millions of vulnerable children with adequately iodized salt. As a result, both national and state policies should mainstream the use of adequately iodized salt in these programmes.⁵



PAKISTAN

Strengthening USI for every state

Setting the scene for better iodine health

In Pakistan, early efforts to increase access to adequately iodized salt had only limited success: household consumption remained below 20 per cent through 2003 and iodine deficiency was prevalent among school-age children and women of reproductive age. Subsequently, advocates worked in 20 pilot districts to support KIO₃ supply and logistics, create demand, and provide technical assistance to producers. The programme was later expanded to 100 districts, which led to an increase in household consumption of iodized salt to 69 per cent and a reduction in iodine deficiency at national levels, as observed in the 2011 National Nutrition Survey.¹

In 2009, the Partnership's advocacy sparked the development of an IDD Control Act and National Implementation Plan. However, this achievement was thwarted by constitutional amendments in 2011 that decentralized health and food control functions to the provincial level and annulled federal iodization standards and enforcement mechanisms. In this new environment, the Partnership needed to shift focus and supported a process to clarify stakeholder roles and responsibilities and develop commitment and leadership at the sub-national level.

Championing new legislation

A new federal IDD Control Act was presented to the National Assembly in 2015, after intensive advocacy by the Partnership. However, continued support is required, as the act required amendments and thus had not passed by late 2016. In parallel, the Partnership conducted advocacy and supported the submission of IDD legislation in all provincial assemblies. To date, these have been enacted in Sindh and Gilgi-Baltistan Provinces, and final approval is pending in Punjab. The Partnership collaborated with government health agencies as well as NGOs such as the Network for Consumer Protection, to promote the initiative to policymakers at federal and provincial levels. It also helped secured excellent coverage in the print and electronic media.

In pursuit of quality

External quality control is key to ensuring that legislation is effective. The Partnership thus worked to build government capacity to monitor and enforce iodization regulations. Meanwhile, a network of IDD focal points, supported by the Micronutrient Initiative, visited large parts of the nation's 1,500 salt producers on a bi-weekly basis, collecting data on iodization, providing

technical assistance and collecting salt samples for analysis. The Partnership built capacity for iodine analysis at the Pakistan Standard and Quality Control Authority laboratories in Punjab and Sindh.

The Partnership worked with the 20 largest salt producers to: secure consensus on a capacity-building plan; customize training materials and tools; conduct training workshops; and follow up with individual producers to offer technical assistance. Following these training activities, a production-level evaluation found that 90 per cent of salt was being iodized, but only 36 per cent of it was adequately iodized.

The Partnership, along with the Micronutrient Initiative and the World Food Programme, set up a revolving fund for KIO₃ distribution. Currently, the Micronutrient Initiative handles the import of KIO₃; logistics to the district level are managed by a private firm; and the distribution and payment from salt producers is handled by focal points from local IDD committees. Despite withdrawal of KIO₃ subsidy, a full market mechanism was not yet considered feasible due to high import duties and taxes, limited capacity of local institutions to import and ensure supply chain management, continuing lack of clarity regarding potential profits of KIO₃ distribution, and uncertainty of producer demand.



Getting the message out

Public education was ongoing throughout the Partnership period. District IDD committees raised the awareness of local officials, community and religious leaders and local salt producer and distributors. Commercial promotions targeted large salt customers, including food processors, airlines, hotels and utility stores. The Partnership also worked to improve public awareness by supporting training and distributing materials via a number of channels, including health-care facilities, the Lady Health Worker outreach programme,

primary schools and teaching institutes. A national survey showed an improvement in the public's knowledge about iodized salt.

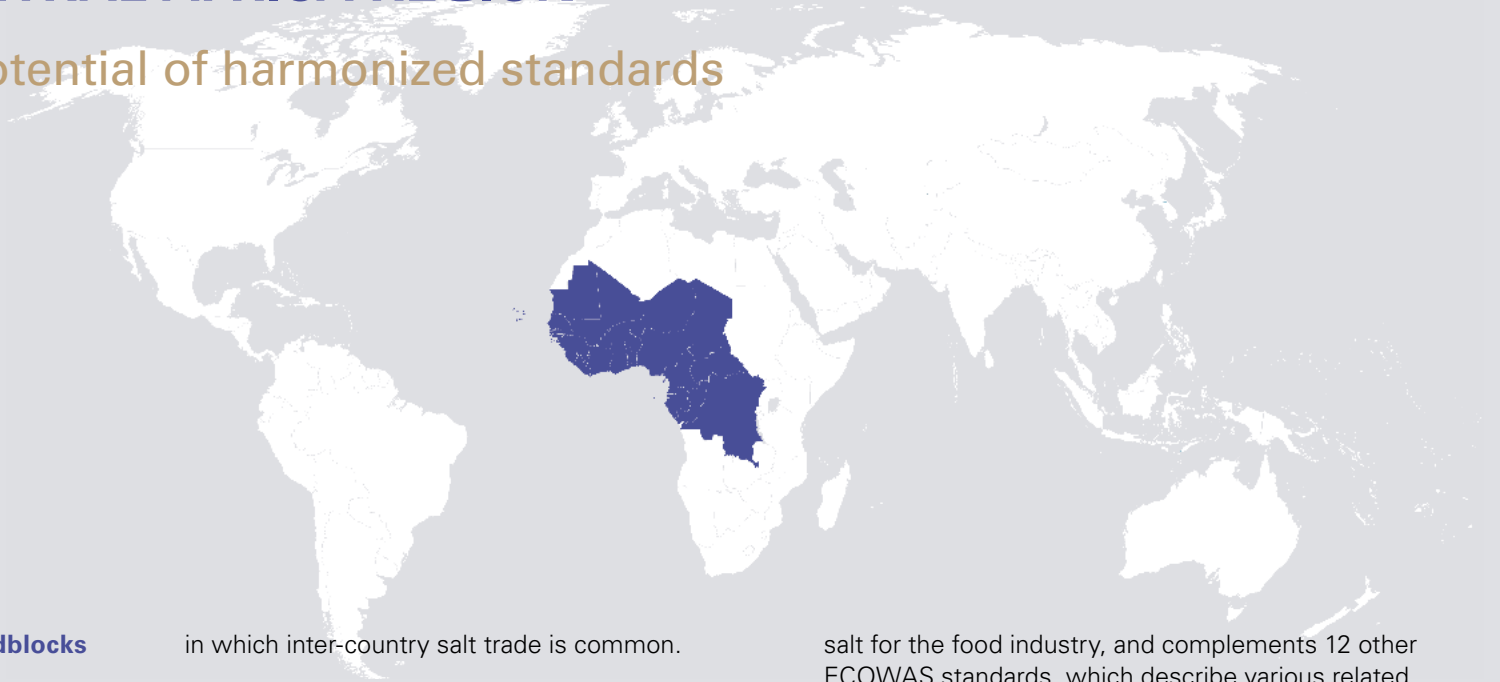
While iodized salt coverage improved in districts with active involvement of local authorities in monitoring of USI activities, at the provincial level for the country's two most populous provinces where 2014 data are available, Sindh and Punjab, coverage of adequately iodized salt remained largely unchanged. This lack of significant improvement was largely attributed to erosion of the regulatory framework as well as withdrawal of KIO_3 subsidies.

Key contributions of the Partnership:

- ◆ Strengthened national and provincial legislation and regulation and provided support for district implementation;
- ◆ Addressed technical constraints to iodized salt production, including barriers for sustainable KIO_3 access;
- ◆ Built national and provincial capacity to monitor and enforce iodization regulations; and
- ◆ Designed targeted communications campaigns to increase demand and improve stakeholder engagement.
- ◆ Media alliances to accelerate the momentum for legislation

WEST AND CENTRAL AFRICA REGION

The power and potential of harmonized standards



Commitments hampered by roadblocks

There has been long-standing political support for IDD elimination in West Africa, starting with West African Heads of State endorsing USI in 1994.¹ As a sign of this commitment, all eight countries comprising the West African Economic and Monetary Union (UEMOA) have mandatory legislation in place on salt iodization.

Despite political commitment, the presence of large numbers of small producers in Ghana and Senegal, the main salt producers in West Africa, coupled with poor monitoring and enforcement of the legislation, has blocked progress, and the household consumption of iodized salt remains suboptimal.² Efforts to enforce legislation have been hampered by inconsistencies in the level of iodization required at the production, export and import stages. This in turn burdens salt producers, exporters and importers in a region

in which inter-country salt trade is common.

Striving for common standards

In an effort to address this problem, the Partnership and Micronutrient Initiative strategized with the UEMOA Technical Committee for Food Products in 2010 to develop regional salt standards. Through a regional workshop conducted in 2010, the partners were able to develop a harmonized technical standard for all UEMOA countries.³ Subsequent efforts focused on extending these UEMOA-wide standards to the wider, 15-country Economic Community of West African States (ECOWAS) region. These efforts paid off when an ECOWAS-wide standard for iodized salt was enacted in 2015.

The adoption of a harmonized regional standard for food-grade salt facilitates trade not only within ECOWAS but internationally. The standard applies to salt used in food, including household salt and

salt for the food industry, and complements 12 other ECOWAS standards, which describe various related issues for salt quality, labelling and assessment techniques.⁴

A unique opportunity for the future of iodine nutrition

Harmonization of salt standards for these countries could, over time, prove invaluable in guaranteeing adequate iodine status. Given the complexity of salt production in many countries in the area, and the reliance on imported salt from other countries, harmonization may help improve USI and make iodization a standard manufacturing practice. Given the important contribution of iodized salt used in the food industry, harmonization may help ensure that all countries in the region achieve adequate iodine nutrition.



- West African Economic and Monetary Union (UEMOA)
- Economic Community of West African States (ECOWAS)

Member countries of the West African Economic and Monetary Union (UEMOA) and the Economic Community of West African States (ECOWAS).

Note: All UEMOA countries are also part of ECOWAS.

GHANA

The promise of processed foods to deliver iodine

A salt production powerhouse

Ghana is a major salt producing and exporting country. More than half of all production is exported, giving Ghana the potential to play a pivotal role in achieving West Africa's salt iodization goals. The country currently produces about 300,000 MT of salt every year, of which 75 per cent comes from about 40 medium-sized producers. There are also more than 50,000 artisanal producers who are responsible for the remaining quarter of the edible salt supply.

The salt sector in Ghana has the potential to significantly expand total production; its capacity has been estimated at 2.2 million MT per year.¹ To better leverage this opportunity, the Partnership supported a range of efforts to expand and improve the quality of iodization, both for export or national consumption.

The Partnership played a critical role in programme management and advocacy, pushing to widen responsibility for the USI programme from resting solely with the Ministry of Health to include the Ministries of Trade & Industry and the Ministry of Local Government. The government financed much of its own programme coordination.

Honing the salt business model

A significant focus of the Partnership was on the development of business-oriented models to harness the collective inputs from small-scale salt producers. For example, the Partnership pilot-tested a cooperative production and business model with the potential to expand to Ghana's thousands of small salt producers, many of whom employ traditional salt production methods, using sub-standard salt with impurities and high moisture content, ineffective manual iodization methods and limited management capacity. Crucial lessons were learned through these efforts, but producer participation lagged, management issues were complex, revenue fell below expectations, and the pilot model was not sustained.

The Partnership supported a private local company in establishing and operating KIO_3 distribution and a revolving fund, which sold KIO_3 to small- and medium-scale producers sufficient to reach more than 20 per cent of the population with iodized salt. Furthermore, it developed recommendations and provided training on quality control, which were adopted by the seven largest salt companies.



Strengthening the capacity to regulate

The Partnership worked to strengthen government capacity and performance by reforming the national strategy and technical regulations, developing local USI regulations in 8 of 13 salt production districts, and building the capacity of the Ghana Food and Drugs Authority to enforce mandatory requirements. While the programme mobilized local and national political partners, enforcement by the Ghana Food and Drugs Authority remained limited, and long-term solutions may involve modernizing the salt industry. However, modernization is not without costs; significant investment and political will are vital to fully revamp the salt industry.



The 2015 survey also demonstrated that the iodine status in the surveyed population of women of reproductive age was not indicative of deficiency (the MUIC was 202 µg/L, which indicates more than adequate iodine status). Given that the coverage of adequately iodized salt at household levels remained low at 29 per cent², sources other than household iodized salt must have contributed to improvements in population iodine status. The main source was likely the iodized salt used in processed foods and condiments. Although working with the processed food industry was not identified as a challenge area, the Environmental Health and Sanitation Officers both monitored and promoted the use of iodized salt by the food industry, food vendors and restaurants. In addition, the Partnership demonstrated that consumption of bouillon seasoning cubes is common in Ghana,³ and that this product may meet two thirds of dietary iodine needs in northern Ghana.⁴

The complexities of small-scale production in Ghana have made it difficult to achieve the goal of >90 per cent coverage of adequately iodized salt at household levels. At the same time, the situation in Ghana illustrates the rapidly changing programming context for IDD and the potential for processed foods to make a significant contribution to iodine status.

Key contributions of the Partnership:

- ◆ Strengthened national-level coordination and advocacy to sustain government commitment to USI goals;
- ◆ Led the development of communications strategies to increase demand and build awareness among producers;
- ◆ Supported the establishment of the Salt Producers Association and developed plans to address obstacles to improved production and quality assurance;
- ◆ Tested the concept of a 'salt bank' to help small producers comply with iodized salt regulations;
- ◆ Generated evidence on the role of salt contained in processed foods and condiments in meeting population iodine needs; and
- ◆ Helped design the third national USI strategy to capitalize on lessons learned from the Partnership project.

THE NIGER

A road map to make imported salt work for the national good

Boosting import quality

Niger is a landlocked country facing political instability along with periodic food and nutrition crises. Virtually all of the Niger's salt supply is imported, mainly from Algeria, Ghana and Senegal, and, as a result, iodized salt supply depends on the iodization capabilities of producers in those nations. At the launch of the Partnership in the Niger, 78 per cent of household salt was iodized, while 46 per cent of the salt was adequately iodized.¹ In 2012, the Partnership helped to revitalize a National Inter-Sectoral IDD Committee (NIDDC) that had been inactive since its inception in 1998. Four key Ministries and the Office of the President participated regularly in the NIDDC, along with private-sector representatives, consumer organizations and development partners. In the same year, the Partnership led assessments to trace salt flows and identify key players along the supply chain, which informed the 2013–2015 NIDDC USI Roadmap.

In the context of this road map, the Partnership supported the following activities:

- Updated national legislation to include all types of imported salt, in an effort to strengthen the control of salt imports and to stop the leakage of non-iodized industrial salt into markets selling salt for human consumption;²

- Met with key players in the supply chain, including the Niger's eight main salt importers and 32 wholesalers, to raise awareness and secure commitments to purchase salt only from a certified iodized salt producer in Ghana (after the Ministry Trade had identified the appropriate suppliers);
- Built regulatory capacity by holding, with the NIDCC, eight regional workshops to clarify roles and responsibilities for customs, health and local officials; nearly 300 relevant officials from Ministry of Trade and Agriculture were trained; and
- Launched national education campaigns about USI, channelled largely through health workers; as a result, about one third of salt retailers and about half of consumers were able to recognize the importance of iodized salt.

Challenges in moving forward

The Partnership generated relevant evidence and renewed commitment in the Niger that enabled the NIDDC to progress towards USI including: advocating for the creation of a government budget line for USI activities, strengthening the salt border control monitoring system, and expanding regional activities with neighbouring countries to influence the quality of imported salt at the point of production.

While these gains have set the stage for future achievements, they have not yet translated into increased use of adequately iodized salt at the household level. The 2014 Partnership endline assessment found that 69 per cent of households were using iodized salt, but the majority (62 per cent) of all salt was iodized with insufficient iodine content.³ While no data were collected on iodine status, there is concern that some segments of the Nigerien population remain unprotected against iodine deficiency. In fact, small-scale studies published in 2014 indicated that pregnant women in Niamey had insufficient iodine status; however, in Dosso Region, iodine status among children and adults was in the adequate range, despite the region's history of severe iodine deficiency.^{4,5}

As is the case in other West African countries, there is increasing recognition that iodized salt used in condiments such as bouillon and tomato paste can potentially make a major contribution to iodine status, but this has yet to be included as part of the Niger National IDD programme. NIDDC recognizes that controlling the salt trade across the Niger's porous borders remains an overall governance challenge that applies to all of the nation imports.



Key contributions of the Partnership:

- ◆ Reinvigorated the National Inter-Sectoral IDD Committee for overall coordination;
- ◆ Advocated successfully to revise the national legislation on salt iodization;
- ◆ Collaborated with key players in the salt supply chain in an effort to increase the supply of adequately iodized salt; and
- ◆ Enhanced regulatory capacity to stem the importation of inadequate salt.



Box 10

Iodine contained in bouillon cubes is stable and may help meet population requirements

In Senegal and other West African countries, seasoning products in the form of bouillon cubes and powders are popular cooking ingredients. These products are composed of 50–70 per cent salt alongside dehydrated stock, solid vegetable fat, spices, and flavour enhancers, usually in the form of monosodium glutamate. Given the high salt content of these products, they may be a significant source of iodine if they were produced with adequately iodized salt. To address this hypothesis, the

Partnership led a research study to determine the iodine content and retention in 13 bouillon brands commercially available in Senegal.¹ The study showed that the iodine content ranged from 14 to 243 µg iodine, which corresponded to 2.0–33.4 mg/kg iodine in salt used to manufacture the bouillon. Importantly, the iodine content of bouillon was not substantially affected by storage time, and was virtually unaffected by cooking conditions.

In models using estimated average daily bouillon consumption of 8.6 g in urban areas and 4.3 g in rural areas, it was found that bouillon may be an important source of iodine in Senegal. To illustrate, bouillon may provide from 50 per cent to more than 100 per cent of dietary iodine in many urban areas, and up to 57 per cent in selected rural areas. The study concluded that regulations defining the iodine content used in bouillon are needed in Senegal to ensure a stable supply of iodine

to the consumer. The findings may also inform salt iodization standards and regulation in other countries with similar bouillon consumption levels. The implications of this study are indeed far-reaching, as they demonstrate that the salt contained in these seasoning products may be an effective tool to address iodine deficiency in many settings, especially where efforts to increase supply of adequately iodized salt from small producers are not yielding desired results.

SENEGAL

The untapped potential of small-scale producers

A country steeped in the salt industry

Senegal is Africa's largest salt producer, exporting salt to Europe and throughout Africa. The country produces an estimated 450,000 MT of salt annually, easily meeting the country's annual need of ~45,000 MT for human consumption. One large and one medium-size producer account for an estimated 280,000 MT, primarily for export, while more than 15,000 small artisanal producers account for the remaining 170,000 MT annually.² Salt represents a significant trade commodity, and the Government of Senegal has a long history of collaboration with the salt industry.

Keeping good salt close to home

Salt iodization is mandatory, and the National Committee for Salt Iodization (NCSI) is committed to expanding the use of adequately iodized salt among the Senegalese population. However, Senegal has struggled to achieve this goal. In 2010, the first country-wide IDD survey showed that 56 per cent of household salt was iodized,³ while titration analyses from a subsample revealed that 48 per cent was iodized at ≥ 15 ppm. Iodine deficiency was also highlighted as a concern, with the survey showing a MUIC of 92 $\mu\text{g/l}$ among women

of reproductive age, and a MUIC of 100 $\mu\text{g/l}$ among schoolchildren – which indicated that iodine status was slightly lower than recommended.

To increase the supply of adequately iodized salt to households throughout the country, the Partnership helped strengthen the NCSI within the National Unit for the Fight Against Malnutrition (CLM or Cellule de Lutte contre la Malnutrition). The CLM was housed in the Office of the President and was coordinating all nutrition relevant projects and overseeing policy implementation. The advocacy undertaken secured visible high-level support. For example, the Prime Minister issued instructions to prioritize IDD and members of parliament regularly questioned ministries on progress towards USI. The increased resources from the Partnership enabled the CLM to reach salt production areas with six full-time staff who facilitated the work of 8 regional USI committees and 16 local committees.

Forty-eight local government authorities were trained on their role in monitoring and financing. An inspection manual was adopted by the Ministry of Commerce and Ministry of Trade, inspection checkpoints were equipped, staff members were trained and now conduct regular

quality checks at point of import, roadside controls in distribution, roadside markets and production sites. In just one quarter of 2015, the Ministry of Commerce reported 68 tons of inadequately iodized salt impounded from production sites and distribution channels.

Pushing the potential of small producers

The Partnership focused attention to enhance the business practices and viability of small salt producers with support to produce and market iodized salt. This work included developing a technical manual specially tailored to the needs of small producers, providing initial capital for a revolving fund to provide easier access to KIO_3 , building the business and financial skills of small producers, and opening new sales channels to the processed food industry.

Mass media campaigns conducted in 2012 targeted the general population, while quarterly social mobilization events reached all salt production communities. The Ministry of Education included IDD in school curricula and supported a range of activities to strengthen knowledge among students and teachers, particularly in salt production areas.

Key contributions of the Partnership:

- ◆ Promoted national and district-level coordination;
- ◆ Contributed to the drafting of a national communication strategic plan and national nutrition policy;
- ◆ Strengthened the capacity of small-scale salt producers to improve production efficiency and quality assurance; helped small producers form cooperatives and ensured adequate supply of potassium iodate;
- ◆ Strengthened quality assurance and quality control measures for medium and large producers; and
- ◆ Improved the evidence base for USI efforts by conducting the 2014 endline survey and exploring the potential contribution of bouillon cubes to iodine intake.

Facing the small producer challenge

In 2014, the Ministries of Commerce and Trade demonstrated that 92 per cent of salt in the distribution channel and 83 per cent of salt at the production level (from medium- and large-scale producers) met iodization standards. However, the Partnership endline survey conducted in 2014 demonstrated that women of reproductive age were borderline iodine deficient (MUIC 98 µg/l), while pregnant women (assessed in a sub-sample) were in the deficient range (MUIC 86 µg/l). Compared with the 2010 survey, household iodized salt consumption increased to 68 per cent, yet only 37 per cent of household salt was adequately iodized.⁴

The significant gap between the supply chain results and household surveys suggests that a considerable amount of low-quality salt is being leaked from small producers into the local markets. New approaches to motivate and build capacity among small-scale producers to produce higher-quality salt and iodization, including options to consolidate or restructure the industry, are ongoing.



ENDNOTES

Charting the global success of universal salt iodization programmes

1. Zimmermann, M.B., 'Research on Iodine Deficiency and Goiter in the 19th and Early 20th Centuries', *Journal of Nutrition*, vol. 138, no. 11, 2008, pp. 2060–2063.
2. Hetzel, B.S., *The Story of Iodine Deficiency: An international challenge in nutrition*, Oxford University Press, New York, 1989.
3. Quack Lötscher, K.C., *Iodine Supply in Switzerland: Current status and recommendations*. Federal Office of Public Health, Berne, 2013.
4. Markel, H., 'When It Rains it Pours': Endemic goiter, iodized salt, and David Murray Cowie, MD', *American Journal of Public Health*, vol. 77, no. 2, 1987, pp. 219–229.
5. Clements, F.W., et al., *Endemic Goitre*, WHO, Geneva, 1960.
6. Hetzel, B.S., J. T. Dunn, and J. B. Stanbury, J.B., *The Prevention and Control of Iodine Deficiency Disorders*, Elsevier Science Ltd., Amsterdam, 1987.
7. Stanbury, J.B., *The Damaged Brain of Iodine Deficiency: Cognitive, behavioral, neuromotor, educative aspects*, Cognizant Communication Corporation, New York, 1994.
8. World Health Organization, *Global Prevalence of Iodine Deficiency Disorders*, MDIS working paper, no. 1, ed. Micronutrient Deficiency Information System Project, WHO, Geneva, 1993.
9. UNICEF and WHO Joint Committee on Health Policy, *World Summit for Children Mid-Decade Goal: adequate iodine nutrition during the first 1000 days: A cross-sectional multicenter study*. *In press*, *J Nutr*.

- Iodine deficiency disorders (IDD)*, UNICEF–WHO Joint Committee on Health Policy Special Session, 27–28 January 1994, (JCHPSS/94/2.7), WHO, Geneva, 1994.
10. Resolution WHA58/2005/REC/1, *Sustaining the elimination of iodine deficiency disorders, Resolutions and decisions*, in Fifty-Eighth World Health Assembly, Geneva, 16–25 May 2005, WHO, Geneva, 2005.
 11. Resolution WHA65.11, *Nutrition. Maternal, infant and young child nutrition: Draft comprehensive implementation plan, Report by the Secretariat*, in Sixty-Fifth World Health Assembly, Geneva, 21–26 May 2012, Resolutions and decisions, list of participants, WHO, Geneva, 2012:5–23 (A65/11).
 12. United Nations Children's Fund, *Preliminary Estimates of UNICEF Global Databases*, UNICEF, New York, 2017.
 13. Iodine Global Network, *Global Iodine Nutrition Scorecard 2016*, Iodine Global Network, Zurich, 2016.
 14. Pincock, S., Basil Hetzel: Vanquishing iodine deficiency disorders, *The Lancet*, vol. 381, no. 9868, 2013, pp. 717.

The UNICEF-GAIN Partnership: Global-level leadership and innovation for iodine nutrition programmes

1. Spohrer, R., et al., 'Processed Foods as an Integral Part of Universal Salt Iodization Programs: A review of global experience and analyses of Bangladesh and Pakistan', *Food Nutrition Bulletin*, vol. 33, no. 4 suppl., 2013, pp. S272–S280.
2. Spohrer, R., et al., 'The Growing Importance of Staple Foods and Condiments Used as Ingredients in the Food Industry and Implications for Large-Scale Food Fortification programs in Southeast Asia', *Food Nutrition Bulletin*, vol. 34, no. 2 suppl., 2013, pp. S50–S61.
3. Spohrer, R., et al., 'Estimation of Population Iodine Intake from Iodized Salt Consumed through Bouillon Seasoning in Senegal', *Ann N Y Acad Sci*, vol. 1357, no. 1, 2015, pp. 43–52.
4. Bromfield, S. and P. Muntner, 'High Blood Pressure: The leading global burden of disease risk factor and the need for worldwide prevention programs', *Curr Hypertens Rep*, vol. 15, no. 3, 2013, pp. 134–136.
5. World Health Organization, *Guideline: Sodium intake for adults and children*, WHO, Geneva, 2012.
6. Pan American Health Organization, *Position Document to Improve Public Health by Optimizing Salt and Iodine Intakes*. Pan American Health Organization, Washington, D.C., 2011.
7. Zimmermann, M.B., et al., 'Thyroglobulin is a Sensitive Measure of Both Deficient and Excess Iodine Intakes in Children and Indicates no Adverse Effects on Thyroid Function in the UIC Range of 100–299 µg/L: A UNICEF/ICCIDD study group report', *J Clin Endocrinol Metab*, vol. 98, no. 3, 2013, pp. 1271–1280.
8. Dold S, Zimmermann MB, Jukic T, Kusic Z, Jia Q, Sang Z, Quirino A., San Luis T.O.L, Fingerhut R, Kupka R, Timmer A, Garrett GS, Andersson M. Universal salt iodization provides sufficient dietary iodine to achieve

Case studies from regional and country programmes

Europe and Central Asia region

1. UNICEF and WHO Joint Committee on Health Policy, *World Summit for Children Mid-Decade Goal: Iodine deficiency disorders (IDD)*, UNICEF–WHO Joint Committee on Health Policy Special Session, 27–28 January 1994, (JCHPSS/94/2.7), WHO, Geneva, 1994.
2. UNICEF, *Universal Salt Iodization in Central and Eastern Europe and the Commonwealth of Independent States*, UNICEF, Geneva, 2011.
3. van der Haar, F., et al., 'Universal Salt Iodization in the Central and Eastern Europe, Commonwealth of Independent States (CEE/CIS) Region during the Decade 2000–09: Experiences, achievements, and lessons learned', *Food Nutrition Bulletin*, vol. 32, no. 4 suppl., 2011, pp. S175–S294.

Russia

1. Gerasimov, G., *IDD Elimination in Russia: Challenges and solutions*, IDD Newsletter, May 2008.
2. Gerasimov, G., and F. van der Haar, *Review of Progress Made by the USI Partnership Project in the Russian Federation (2009–2013)*, UNICEF Central and Eastern Europe Commonwealth of Independent States Regional Office, Geneva, 2014.

3. Stracansky, P., *HEALTH: Market Interests Fight Iodized Salt*, in *Inter Press Service News Agency*, Belgrade, 2011.
4. UNICEF, *Elimination of Iodine Deficiency Disorders through Universal Salt Iodization in the Russian Federation*, UNICEF, Moscow, 2005.
5. Gerasimov, G., *Increasing Iodine Intakes in Populations through the Use of Iodized Salt in Bread Baking*, IDD Newsletter, August 2009.
6. Knowles, J., et al., Iodine Intake through Processed Food: Case Studies from Egypt, Indonesia, the Philippines, the Russian Federation and Ukraine, 2010-2015. *Nutrients*, vol. 9, no. 8, 2017, p. 797.

Ukraine

1. Stracansky, P., *HEALTH: Market Interests Fight Iodized Salt*, in *Inter Press Service News Agency*, Belgrade, 2011.
2. Gerasimov, G., *Selling Iodized Salt: How a public health campaign fell short in Ukraine*, IDD Newsletter, November 2015.
3. Anonymous, *Advocacy Meetings on Salt Iodization in Russia and Ukraine: Breakthroughs on the horizon?*, IDD Newsletter, February 2014.

East Asia and the Pacific region

1. UNICEF East Asia and Pacific Regional Office, *Meeting Report: The East Asia Pacific Regional workshop on achievement of universal salt iodization for optimal iodine nutrition*, UNICEF East Asia and the Pacific Regional Office, Bangkok, 2015.
2. UNICEF, *Review of National Legislation for Universal Salt Iodization: South and East Asia and the Pacific*, UNICEF, Bangkok, 2015.

China

1. Wu, Y., et al., Variable Iodine Intake Persists in the Context of Universal Salt Iodization in China, *Journal of Nutrition*, vol. 142, no. 9, 2012, pp. 1728–1734.
2. Zou, S., et al., 'Iodine Nutrition and the Prevalence of Thyroid Disease after Salt Iodization: A cross-sectional survey in Shanghai, a coastal area in China', *PLoS One*, vol. 7, no. 7, 2012, p. e40718.
3. Levine, R., *Preventing Iodine Deficiency Disease in China*, Center for Global Development, Washington, D.C., 2007.

Indonesia

1. UNICEF, *Review of Progress towards the Sustained Elimination of Iodine Deficiency Disorders in Indonesia*, UNICEF, Jakarta, 2014.
2. Ministry of Health and National Institute of Health Research and Development, *Basic Health Survey, Riskesdas*, Jakarta, 2007.
3. Ministry of Health and National Institute of Health Research and Development, *Basic Health Survey, Riskesdas*, Jakarta, 2013.
4. Knowles, J. M., et al., Household Coverage with Adequately Iodized Salt Varies Greatly between Countries and by Residence Type and Socioeconomic Status within Countries: Results from 10 National Coverage Surveys, *Journal of Nutrition*, vol. 147, no. 5, 2017, pp.1004S-1014S.

Philippines

1. Government of the Philippines, *An Act Promoting Salt Iodization Nationwide and for Related Purposes (Republic Act No. 8172)*, Government of the Philippines, Manila, 1995.

2. Republic Of the Philippines, *Guidelines for Salt Manufacturers, Importers, Wholesalers, Repackers and Distributors to Ensure Adequate Iodization of Iodized Salt, and for Other Purposes. No. 2013-042*, Food And Drug Administration Memorandum Circular, Manila, 2013.
3. GAIN and Nutrition Center of the Philippines, *Survey of Food Processors Utilizing Iodized Salt*, GAIN, Geneva, 2015.
4. Republic of the Philippines, Department of Health, *DOH Launches Quality Seal for Salt*, Department of Health, Manila, 2015.
5. Spohrer, R., et al., The Growing Importance of Staple Foods and Condiments Used as Ingredients in the Food Industry and Implications for Large-Scale Food Fortification programs in Southeast Asia, *Food Nutrition Bulletin*, vol. 34, no. 2 suppl., pp. S50–S61.

Eastern and Southern Africa region

1. Zimmermann, M., 'Iodine Deficiency and Excess in Children: Worldwide status in 2013', *Endocrine Practice*, vol. 19, no. 5, 2013, pp. 839–846.
2. UNICEF Eastern and Southern Africa Regional Office, *UNICEF Eastern and Southern Africa Regional Analysis Report 2014*, UNICEF Eastern and Southern Africa Regional Office, Nairobi, 2015.
3. Southern African Development Community Secretariat, *Food and Nutrition Security Strategy*, Southern African Development Community Secretariat, Gaborone, 2014.
4. Mebrahtu, S., *Food and Nutrition Security discussion paper*, in April 2010 African Health Ministers' Conference and July 2010 AU Heads of State and Government Summit, Kampala, 2010.

5. Tom, C., *Developments in ECSCA Regional Standards and the Food Control Manuals in Flour Fortification Training Workshop on QC/QA*, East Central and Southern African Health Community (ECSA-HC), Dar es Salaam, April 2011.
6. Scaling Up Nutrition Movement Secretariat, *SUN Movement Annual Progress Report*, Scaling Up Nutrition Movement Secretariat, Rome, 2015.

Ethiopia

1. Chuko, T., J. Bagriansky and A. Tucker Brown, *Ethiopia's Long Road to USI*, IDD Newsletter, May 2015.
2. *Ethiopia Makes Efforts to Raise Salt Production*, *Panapress*, Addis Ababa, August 2002.
3. Ethiopian Health and Nutrition Research Institute (EHNRI), Federal Ministry of Health (FMoH) and UNICEF, *Iodine Deficiency Disorders (IDD) National Survey in Ethiopia*, EHNRI, FMoH and UNICEF, Addis Ababa, 2005.
4. Central Statistical Agency [Ethiopia] and ICF International. *Ethiopia Demographic and Health Survey 2011, 2012*, Central Statistical Agency and ICF International, Addis Ababa and Maryland, 2012.
5. Garrett, G.S., C.L. Luthringer and P. Mkambula, 'Improving Nutritious Food Systems by Establishing National Micronutrient Premix Supply Systems', *Sight and Life*, vol. 10, no. 1, pp. 62–68.
6. Bagriansky, J., *Situation Analysis and Proposed Communication Plan to Support of Government of Ethiopia in Development of a Central Iodization Facility in Afar*, UNICEF, Addis Ababa, 2014.

7. Belay, A., et al., *Magnitude of Iodine Deficiency Disorder in Reproductive Age Women and School Age Children and Iodized Salt Coverage in Ethiopia*, 2016 Micronutrient Forum, Cancun, 2016.

Middle East and North Africa region

1. Mehran, F.A.L., Experiences in the Prevention, Control and Elimination of Iodine Deficiency Disorders: A regional perspective, *Eastern Mediterranean Health Journal*, vol. 10, no. 6, 2004.
2. Mirmiran, P., et al., 'Iron, Iodine and Vitamin A in the Middle East: A systematic review of deficiency and food fortification', *Iranian Journal of Public Health*, vol. 41, no. 8, August 2012, pp. 8–19.
3. Kousha, A., et al., 'Monitoring and Enforcement of the Salt Iodization Programme in Tabriz, Islamic Republic of Iran: A successful experience', *Eastern Mediterranean Health Journal*, vol. 16, no. 5, 2010.
4. UNICEF, *Sustainable Elimination of Iodine Deficiency* UNICEF, New York, May 2008.
5. Muhammed, S.M.E.N.K., 'Consumption of Iodized Salt among Households of Basra City, South Iraq', *Eastern Mediterranean Health Journal*, vol. 18, no. 9, 2012.
6. Iodine Global Network, *Global Iodine Nutrition Scorecard 2016*, Iodine Global Network, Zurich, 2016.

Egypt

1. Dolbey, R., and M. Omar, 'A Note Concerning the Incidence of Goitre in Egypt: An analysis of 216 cases', *The Lancet*, vol. 204, no. 5272, 1924, pp. 549–550.

2. UNICEF and the High Institute of Public Health (HIPH), *Report on the Assessment of the Prevalence of Iodine Deficiency Disorders in Aswan Governorate*, UNICEF and HIPH, Alexandria, 1995.
3. UNICEF and the High Institute of Public Health (HIPH), *Report on Assessment of the Prevalence of IDD in El-Minia, Assuit, Sohag and Kafr- El-Sheikh Governorates*, Alexandria University, Alexandria, 1996.
4. UNICEF and the High Institute of Public Health (HIPH), *Report on Assessment of the Prevalence of IDD in New Valley Governorate*, Alexandria University, Alexandria, 2001.
5. UNICEF and the Ministry of Health and Population Egypt, *Report on the National Iodine Nutrition Survey 2006–2007*, UNICEF and the Ministry of Health Egypt, Cairo, 2007.
6. Ministry of Health and Population, UNICEF and GAIN, *National Survey of Household Iodized Salt Use and Iodine Status among Primary School Children and Pregnant Women, Egypt, 2014/2015*, Ministry of Health and Population, Cairo, 2016.

South Asia region

1. South Asian Association for Regional Cooperation (SAARC), *South Asia Regional Action Framework for Nutrition*, SAARC, Kathmandu, 2014.
2. Iodine Global Network, *Global Iodine Nutrition Scorecard 2016*, Iodine Global Network, Zurich, 2016.
3. WHO Regional Office for South-East Asia, *Sodium Intake and Iodized Salt in the South-East Asia Region: Report of a regional workshop*, WHO, New Delhi, India, September 2014.

4. World Health Organization, *Guideline: Sodium intake for adults and children*, WHO, Geneva, 2012.

Bangladesh

1. Zakir Hussain, A.M., M.Q.K. Talukder and T. Ahmed, *Nutrition Background Paper to inform the preparation of the 7th Five Year Plan*, Bangladesh Planning Commission, Dhaka, 2015.
2. Global Alliance for Improved Nutrition, *Universal Salt Iodization: India as a case study for optimizing the production, distribution and use of iodized salt*, GAIN/UNICEF USI Partnership Annual Report vol. 5., GAIN, Geneva, 2014.
3. Institute of Public Health Nutrition, *National Nutrition Policy 2015*, IPHN, Dhaka, 2015.
4. Institute of Public Health Nutrition Directorate General of Health Services, Ministry of Health and Family Welfare, and Government of the People's Republic of Bangladesh, *National Strategy on Prevention and Control of Micronutrient Deficiencies, Bangladesh (2015–2024)*, Institute of Public Health Nutrition Directorate General of Health Services, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh, Dhaka, December 2015.
5. Institute of Public Health Nutrition, UNICEF Bangladesh, International Centre for Diarrheal Diseases Research, and GAIN, *National Micronutrient Survey 2011–12: Final Report*, IPHN, Dhaka, 2014.

India

1. Rah, J.H., et al., 'Towards Universal Salt Iodisation in India: Achievements, challenges and future actions', *Matern Child Nutr*, vol. 11, no. 4, 2015, pp. 483–496.

2. Pandav C.S., et al., *National Iodine Deficiency Disorders Control Programme, National Health Programme Series 5*, National Institute of Health and Family Welfare, New Delhi, 2003.
3. Yadav, K., et al., 'The National Coalition for Sustained Optimal Iodine intake (NSOI): A case study of a successful experience from India', *Asia Pac J Clin Nutr*, vol. 23, suppl. 1, 2014, pp. S38–S45.
4. Pandav, C.S., et al., *National Iodine and Salt Intake Survey (NISI) 2014–2015: Executive Summary*, All India Institute of Medical Science and Iodine Global Network, New Delhi, 2015.
5. Rah, J.H., et al., 'Reaching the Poor with Adequately Iodized Salt through the Supplementary Nutrition Programme and Midday Meal Scheme in Madhya Pradesh, India', *Bulletin of the World Health Organization*, vol. 91, no. 7, 2013, pp. 540–544.

Pakistan

1. Aga Khan University, Pakistan Medical Research Council (PMRC) and Nutrition Wing, Cabinet Division, Government of Pakistan, *National Nutrition Survey Pakistan*, Aga Khan University, Karachi, 2011.

West and Central Africa region

1. Resolution WHA43.2 of the World Health Assembly, Geneva 1990, *World Declaration on the Survival, Protection and Development of Children, and Plan of Action*, United Nations, New York, 1990.
2. Lantum, D.N., *Background and Challenges on Universal Salt Iodization in West Africa, ICCIDD paper prepared for the Eleventh Nutrition Forum of ECOWAS, Freetown, Sierra Leone*, 2008.

3. Kupka, R., B. Ndiaye and P. Jooste, *Regional Standards on Salt Iodization in West Africa*, IDD Newsletter, May 2011.
4. Economic Community of West African States (ECOWAS), *Standard for Fortified Food Grade Salt*, ECOSTAND 048, 2015(E), ECOWAS, Abuja, 2015.
4. Sadou, H., et al., 'Inadequate Status of Iodine Nutrition among Pregnant Women Residing in Three Districts of Niamey, the Niger Republic's capital', *Matern Child Nutrition*, vol. 10, no. 4, 2014, pp. 650–656.
5. Sadou, H., et al., 'Iodine Deficiency Disorders after Sixteen Years of Universal Dietary Salt Iodization in a Severe Iodine Deficiency Village in Niger', *The Open Nutrition Journal*, vol. 8, 2014, pp. 8-12.

Ghana

1. Houston, R., *Regional Review of Salt Iodization in Ghana and the Importing Countries of Togo, Niger and Burkina Faso*, 2015.
2. Ghana Health Services, GAIN and UNICEF, *Draft Report of the 2014–15 National Iodine Nutrition Survey in Ghana*, Ghana Health Services, Accra, 2015.
3. GAIN, *Ghana Street Food Iodized Salt Survey*, GAIN, Geneva, 2012.
4. Abizari, A.R., et al., 'More Than Two-Thirds of Dietary Iodine in Children in Northern Ghana is Obtained from Bouillon Cubes Containing Iodized Salt', *Public Health Nutrition*, vol. 20, no. 6, 2017, pp.1107-1113.

The Niger

1. Institut National de la Statistique – INS/Niger and Macro International, *Enquête Démographique et de Santé et à Indicateurs Multiples du Niger 2006*, INS/Niger and Macro International, Calverton, Maryland, 2007.
2. Issa, B., *Niger: Ensuring the quality of iodized imported salt*, IDD Newsletter, February 2015.
3. Knowles, J., *Niger SMART Survey 2014: Salt Iodine Component (unpublished)*, 2016.

Senegal

1. Spohrer, R., et al., 'Estimation of Population Iodine Intake from Iodized Salt Consumed through Bouillon Seasoning in Senegal', *Ann N Y Acad Sci*, vol. 1357, no. 1, 2015, pp. 43–52.
2. Kupka, R., et al., *Senegal Struggles to Control Iodine Deficiency*, IDD Newsletter, May 2012.
3. Ministère de la santé et de la prévention médicale, Université Cheikh Anta Diop and Micronutrient Initiative, *Etude sur les troubles dus à la carence en iode au Sénégal*, Ministère de la santé et de la prévention médicale, Dakar, 2010.
4. Cellule de Lutte contre la Malnutrition, GAIN, MI, UNICEF and Ministère de la Santé et de l'Action Sociale, *Enquete nationale sur l'utilisation du sel adéquatement iode et des bouillons par les menages et sur le statut en iode des femmes enceintes et en age de procreer*, Institut de Population, Développement et Santé de la Reproduction (IPDSR), Dakar, Senegal, 2016.

© United Nations Children's Fund (UNICEF)
March 2018

Nutrition Section
Programme Division
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3 United Nations Plaza
New York, NY 10017

ISBN: 978-92-806-4943-7

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