

IDD

NEWSLETTER



Special Issue:

Progress against IDD in West and Central Africa

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To contribute to the sustainable elimination of iodine deficiency disorders in West and Central Africa, the United Nations Children’s Fund (UNICEF) and the Iodine Global Network (IGN) formed a partnership to support national and regional efforts to scale up and sustain universal salt iodization (USI). One initiative involved carrying out a landscape analysis to develop a common understanding of the situation and of the bottlenecks at national and regional levels. In this special IDD Newsletter edition focusing on the iodine programming in West and Central Africa, some of the findings from this analysis are presented in a series of articles.

UNICEF’s West and Central Africa (WCA) region encompasses 24 countries that spread across semi-arid areas in the Sahel, large coastal areas on the Atlantic Ocean and along the Gulf of Guinea including a few islands, as well as tropical forests covering many countries (1). The region is defined by diverse economic, social, cultural, demographic, and geographical characteristics. It uses four official languages (English, French, Spanish and Portuguese), with over a thousand local languages. In 2018, the regional population was 520 million, and the population growth for the next 10 years was estimated at 2.6% compared to 0.9% for the rest of the world. With 12% of its population being under the age of 15, WCA has one of the youngest populations in the world (1). The region is also experiencing accelerated urbanisation, with urban centres hosting 48% of the population (2) and, due to the high level of violence and political tension, there are over 11.9 million people who are either internally displaced persons (IDPs), refugees, asylum-seekers or stateless (3).

Regional trends in iodine status and access to iodized salt

Globally, there has been tremendous progress over the past 25 years to prevent iodine deficiency through USI (4), with 88% of households consuming iodized salt (5); however, with a coverage of 76%, the WCA region has the lowest proportion of households consuming iodized salt (> 0 ppm) compared to other regions, with large discrepancies between countries. The level has remained the same over the last 20 years with very few improvements. As seen in *Figure 1*, only in eight countries

within the region, is the proportion of households consuming iodized salt (any iodine > 0 ppm) above 90%, and in three countries (Equatorial Guinea, Guinea Bissau and Mauritania) less than 40% of households have access to iodized salt. This data does not show coverage of adequately iodized salt (> 15 ppm); this can only be assessed by quantitative methods such as titration and spectrophotometry. In recent national surveys, only two surveys had a quantitative assessment of iodine adequacy in salt.

Currently, in the WCA region, school-age children’s median urinary iodine concentration (mUIC) varies greatly between countries (*Figure 2*). Optimal iodine status is observed in 16 countries, while three countries, Benin, Cameroon and Equatorial Guinea, have urinary iodine levels above 300 µg/L (indicating excessive iodine intake). Four countries, Burkina Faso, Central African Republic, The Gambia and Mali, have mUIC levels below 100 µg/L (indicating insufficient iodine intake). This data should, however, be interpreted with caution since, for 20 countries, the data is



Children having a meal in the kindergarten at the development action center of Guingreni, in the North of Côte d’Ivoire. © UNICEF/ UNIS72441/Frank Dejongh

over five years old. Of concern, is that two countries (Sao Tome y Principe and The Republic of Congo) do not have any data on their iodine status.

Furthermore, only four countries presented sub-national data, and only three countries provided disaggregation by urban/rural residence, which is important for exploring sub-national disparities and inequities. For most countries, the available data on iodine status is for school-aged children only; however, the situation of other subgroups in the population, particularly pregnant women, may differ. In fact, in a recent study to assess the burden of iodine deficiency in pregnancy in Africa using estimated a pregnancy median urinary iodine concentration based on school-age

FIGURE 1 Coverage of household iodized salt (any iodine)

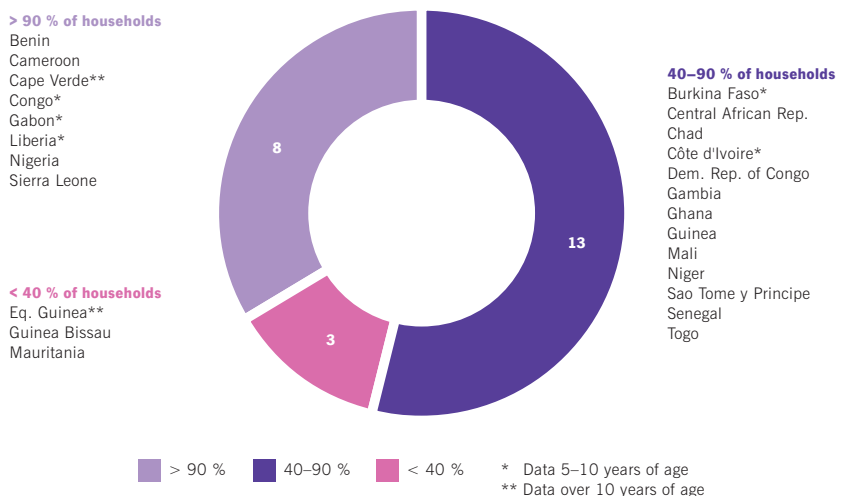
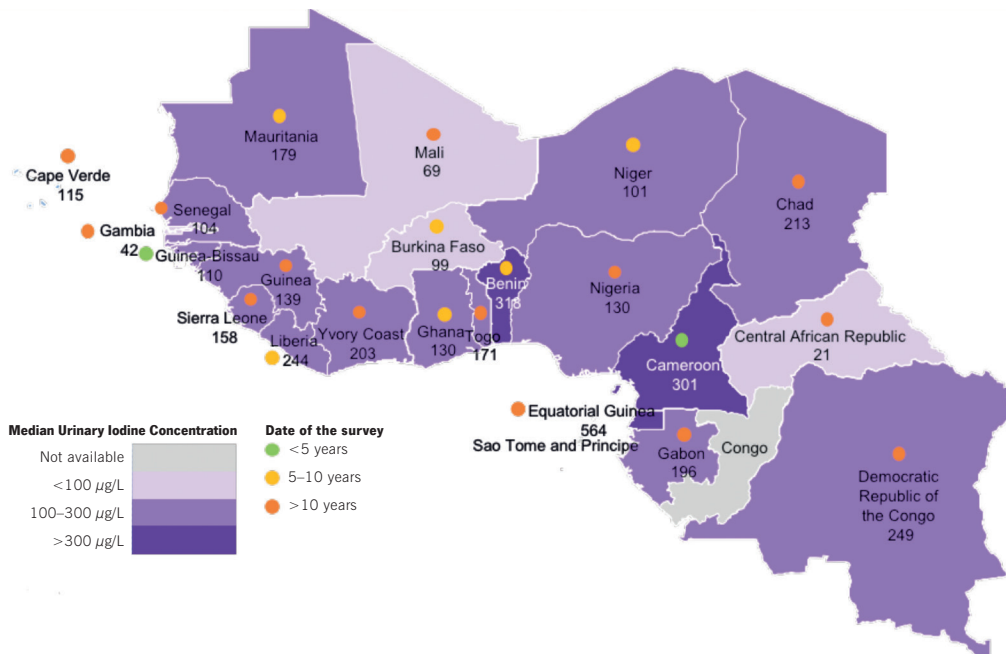


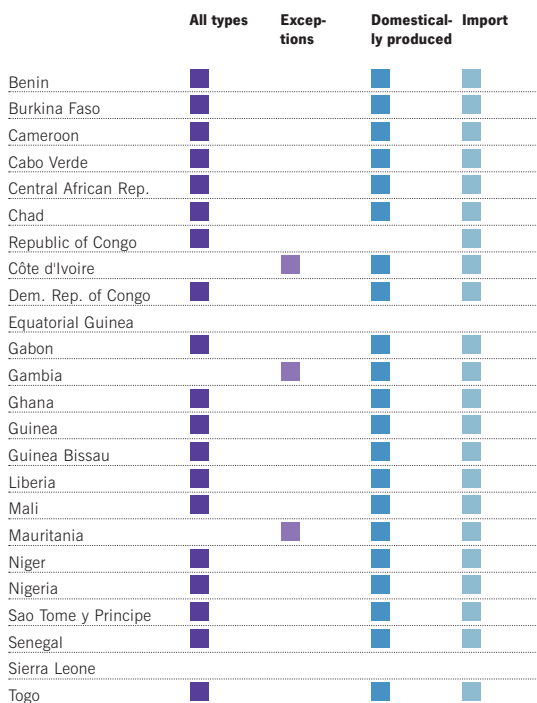
FIGURE 2 Median urinary iodine status of school-age children in West and Central Africa (6)



children data, a cut-off school-age mUIC $\leq 175 \mu\text{g/l}$ correlated with an insufficient iodine intake in pregnancy (mUIC $\leq 150 \mu\text{g/l}$) (7). In the WCA region, eight countries had a school-age mUIC $\leq 175 \mu\text{g/l}$, which suggests that although school-age children are iodine sufficient (8), pregnant women are possibly iodine deficient. With the increase in consumption of processed

foods it is significant to understand from where the iodine is sourced, that is, from iodized household salt or from processed food made with iodized salt; this distinction can be explored by stratifying mUIC by household access to iodized salt. However, in recent data only five national surveys included this stratification.

FIGURE 3 Scope of salt iodization legislation in West and Central Africa (9)



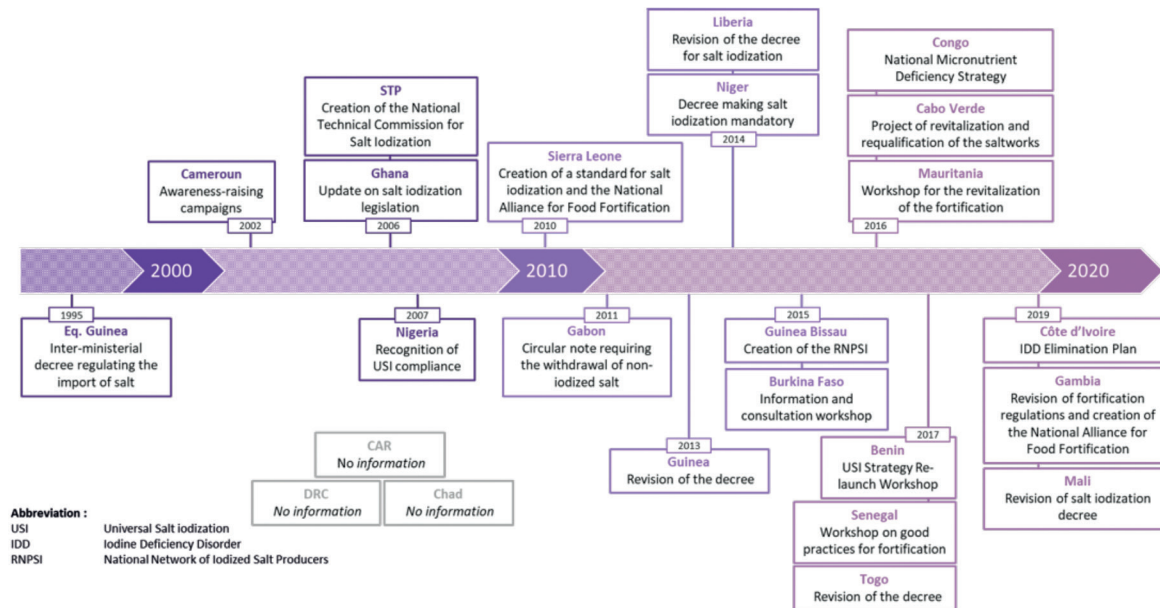
There is a lack of updated data in the region, and the available data has insufficient granularity for effective monitoring and evaluation of the USI program

In addition to the cost of large-scale surveys, one of the main barriers to assessing the population's iodine status is the lack of laboratory capacity. There are only two countries in Africa, namely, Tanzania and Madagascar, that are part of the CDC-run Ensuring the Quality of Iodine Procedures (EQUIP) program. This is one of the largest standardisation programs that addresses laboratory quality-assurance issues related to testing for iodine status. To increase access to quality laboratories, there is a need to increase the number of laboratories as part of the EQUIP program. These can act as reference laboratories for the region.

Policy landscape for USI and salt reduction

All but two countries (Sierra Leone and Equatorial Guinea) have adopted mandatory salt iodization. However, the legislation has not been updated in most countries since it was drafted and, therefore, is not in line with the Economic Community of West African States (ECOWAS) standards that were drafted in 2015 to facilitate trade of iodized salt between countries. With regard to the scope of the legislation/standards, of the 22 countries where salt iodization is mandatory, all specified that domestically produced and imported salt should be iodized, including salt for processed food; twenty mentioned iodized salt for animal feed (Figure 3).

Enforcement of the legislation remains weak in most WCA countries. In salt importing countries, the customs officers deal with lengthy and porous borders that facilitate the illegal import of non-iodized salt. In salt producing countries, the salt industry is fragmented, with multiple small and artisanal producers located in remote areas, making regular enforcement difficult to conduct. Many different agencies are involved in quality control management, inspection, compliance and control. However, roles and responsibilities among the numerous agencies are not clear and/or aligned in all countries, despite 15 countries having multi-sectoral alliances that guide and legislate fortification activities. Nevertheless, the recognition of the need for salt iodization is well expressed as part of the various country-level food and nutrition security policies, plans and programs, as well as in food fortification or micronutrient strategies and guidelines in the region. However, of the WCA regional countries, only two countries have active specific action plans/strategies/programs focusing on salt iodization (Gabon and Mauritania). The landscape exercise has reinvigorated the USI program in some countries as six new actions plans have been drafted (Chad, Burkina Faso, Ghana, Mali, Mauritania and Sao Tome et Principe). After 30 years of programming, the interest in USI has waned; Figure 3 shows a chronogram of the last national activity/event for USI in each country.

FIGURE 4 Last USI event per country in West and Central Africa

For some countries, the last major national activity/event dates to 2002; therefore, there is an urgent need to reinvigorate the regional interest in USI. Finally, countries are developing salt reduction strategies that should be implemented hand in hand with salt iodization. To date, in the WCA region, only four countries (Central African Republic, Guinea Bissau, Nigeria and Senegal) had salt reduction policies/strategies or programs, and none were linked to the USI program.

Salt production and trade

Only three countries have the natural resources to produce salt in large enough quantities to be exported. These are Ghana, Senegal and Mauritania; however, Senegal remains the largest exporter of salt in the region. Other countries in the region, namely Benin, Cape Verde, Chad, Gabon, Gambia, Guinea, Guinea Bissau, Mali, Niger, Nigeria and Sierra Leone, produce smaller quantities of salt that is for localised use only; this salt is often not iodized. Many producers in the region produce poor quality and poorly iodized salt, if iodized at all. This is mainly because the salt industry is fragmented and characterised by many small and artisanal producers that a) are not committed to salt iodization, or b) when they are, struggle to procure potassium iodate and iodization equipment. Frequently, they do not apply rigorous internal quality control procedures due to a lack of capacity and economic power to make the necessary investments. Coupled with weak

enforcement, there is no repercussion for their lack of iodising salt.

Details of the main salt producing countries are described in the text box. (10)

Salt production in Senegal

With a coastline of more than 700 km and a series of flooding inlets, Senegal has an enormous potential for salt production (10). Indeed, Senegal is one of the biggest salt producers and exporters in the sub region, however, the salt sector remains a very diversified and complex arena where a large single industrial mechanised producer and one medium-scale industrial factory are responsible for 50–60% of the total salt produced per year; the rest (30%) is produced by over 15,000 artisanal producers that often operate informally at many traditional collection sites. Iodization is carried out at the demand of the buyer purchase of the salt.

Salt production in Ghana

Ghana is one of ten salt-producing countries in Africa and with its coastline of 573 km the country has the potential to produce approximately 3,000,000–5,000,000 MT per annum; however, currently it is only producing 300,000–350,000 MT of which 60–70% is exported, mainly to Burkina Faso, Niger, Togo, Cote d'Ivoire and Benin. In 2013, 60 per cent of the salt output was processed through modern methods, mainly by the medium-scale and some of the small-scale producers who have the capacity to iodise, while the remaining 40 per cent was processed through artisanal methods. Across the medium, small-scale and artisanal categories of salt producers the preferred method for iodization is the knapsack sprayer method which does not allow for homogenous iodization of the salt.

Salt production in Mauritania

The main type of salt produced in Mauritania is rock salt which is extracted from three sites with an annual production of 31,000 tonnes per year. Wholesalers in Nouakchott can iodise the salt at the request of the buyer. However, iodization is rudimentary and is carried out using a plastic bottle with a hole in the top, so that iodine distribution is not homogeneous. Salt from Mauritania is mainly exported informally to Mali; however, there are talks to start exporting to other countries in the region (11).



Aerial view of the pink Lake Retba or Lac Rose in Senegal. Salt industry in West Africa. ©Photo by Curioso Photography on Unsplash

In addition to these main salt producing countries, Nigeria, Cameroon and Gabon procure raw salt, refine and iodise it, and then export the higher-grade salt to neighbouring countries and beyond. A more detailed description of the salt trade is available in this issue of the IDD Newsletter.(11)

Considering that most of the countries in WCA are salt importing, there is a need to develop a symbiotic relationship between salt importing and salt producing countries. Salt importing countries depend on the success of the salt iodization programs of the salt producing countries to supply quality iodized salt, and the salt producing countries depend on the success of the salt iodization programs in the importing countries to demand quality iodized salt (Figure 4).

Other sources of iodine in the diet

Global guidance around salt iodization has mainly focused on adequate iodization of household salt. However, with accelerated urbanisation and rapid industrialisation, there is an increased consumption of industrially processed foods. This shift in dietary patterns has resulted in processed foods accounting for an increasing proportion of total salt intake and subsequently iodine intake if the salt is iodized. Even though, ultra-processed and processed foods should be minimised in household diets, legislation should ensure that the iodization standard should move from solely focusing

on table salt to ensure all salt for human consumption is iodized without exceptions. The presence and levels of iodine in salt used in processed foods are often unknown and should be monitored to ensure that salt consumption is regulated and iodine status remains within the optimal range (12). The results of a recent study (13), conducted by IGN to assess the consumption, production and supply chain dynamics of major sources of salt from processed foods in West Africa have significantly shown that, processed food made with iodized salt can greatly contribute to the iodine status of the population.

USI includes salt for animal feed; however, there is little information on the use of iodized salt for animal feed, which could also become an important source of iodine in the diet and improve the overall health and productivity of the animals. Further research is needed on the use of iodized salt (or supplementation) in industrially produced animal feed in the WCA region.

Regional efforts toward strengthening and sustaining USI

To increase their collective influence, countries within the WCA region have combined into several regional economic communities that could be leveraged to support USI. In West Africa, as the official health body of ECOWAS, the WAHO has been key to advancing food fortification since the USI resolution of 1994 (14). In addition, the West African Economic and Monetary Union (UEMOA), despite being a monetary union, has also been highly active in promoting food fortification, including USI (14). Details of the main regional activities are illustrated in Figure 5. Much of the regional work is limited to countries in ECOWAS and, in some cases, further limited to countries in UEMOA only. Little, if any, regional work has involved the countries in Central Africa; more engagement with the Economic Community of Central African States (ECCAS) is needed to ensure the supply of iodized salt from West to Central Africa.

The political will and commitment of regional health and economic bodies have been critical to launching food fortification across West Africa. Through the leadership shown by these bodies, national governments abided by resolutions and recommendations to initiate and mandate food

FIGURE 5 Symbiotic relationship between salt importing and salt producing countries in West and Central Africa

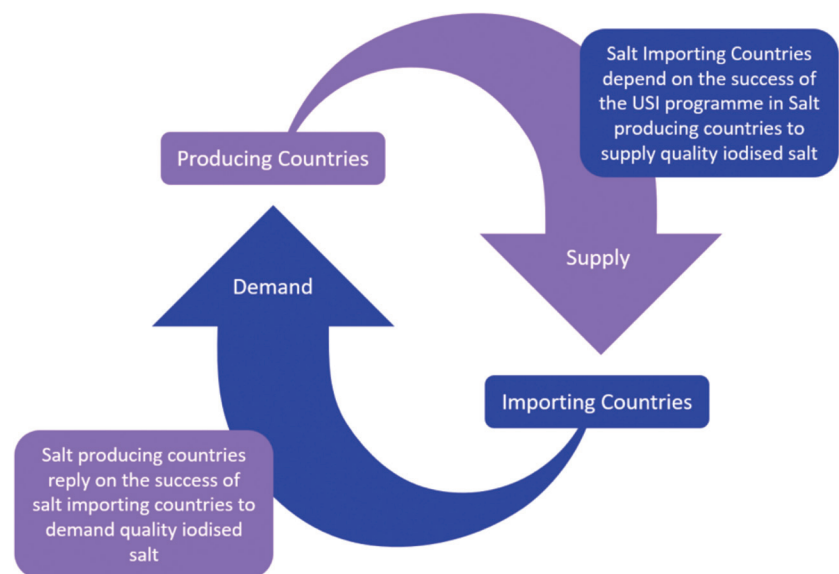
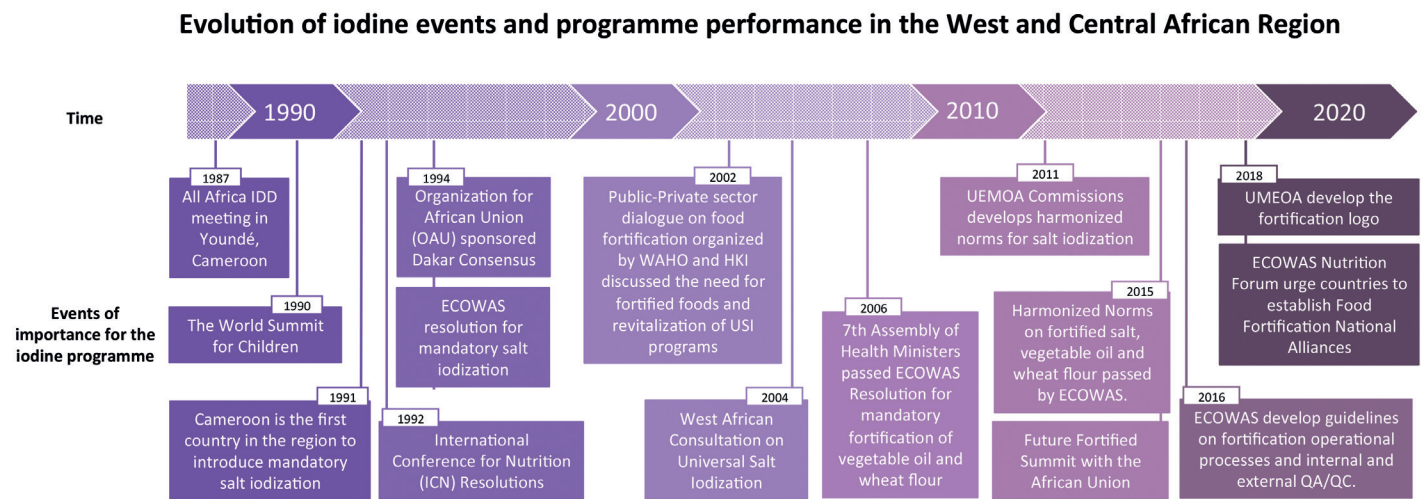


FIGURE 6 Chronology of key events that have helped to shape the iodine agenda in the West and Central African region



fortification, including USI (14). However, in the last 10 years, there has been limited regional coordination and management by these regional bodies in USI. Furthermore, the issue of salt iodization in WCA is more of a trade issue and, therefore, beyond the scope of health alone.

In conclusion, the high coverage of iodized salt and adequate iodine status has culminated from a series of country-level efforts spearheaded by regional support and enhanced by national capacity to monitor the USI program and enforce legislation. However, in the last 20 years, there has been little advancement in the USI program performance in the WCA region and little activity at the regional level in the last 10 years. There is a risk that the gains achieved to date may be reversed if a conscious effort on USI is not made considering the changes in the current situation and lessons from past experiences. There is a need to adopt an increased food systems approach to USI programming; an approach that considers all the elements along the whole salt supply chain, including their relationships and related causes and effects. This will enable program managers to address today's gaps and adjust to tomorrow's challenges through strengthening national positioning, improving program management, including monitoring, assuring a stable supply and demand for adequately iodized salt and focusing on regional networks.

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Potential for salt production in Mauritania

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Introduction

To contribute to the sustainable elimination of iodine deficiency disorders in West and Central Africa, the United Nations Children's Fund (UNICEF) and IGN established a partnership to support national and regional efforts to scale up and sustain universal salt iodization. One of the initiatives was to conduct a landscape analysis to develop a common understanding of the situation and bottlenecks at national and regional levels. Mauritania was selected for an in-depth analysis because of its significant local rock salt production and because it is one of the countries where a joint IGN/UNICEF rapid assessment is planned with the Ministry of Health. This analysis described the historical context of the salt iodization program, its evolution, and its status, as well as the main favorable and unfavorable factors for salt iodization in Mauritania. Specifically, the evaluation focused on the following elements of the program: national policies and strategies, legislation and regulations, management of the program, communication, use of iodized salt in processed foods, and monitoring. A mixed methodology was used to collect data and information on the status of "iodized nutrition" and on universal salt iodization policies and programs. This involved a literature review and interviews with resource persons. Relevant documents were collected through web searches, and from national and regional development partners. For the key informant interviews, we identified and interviewed national stakeholders from government, the private sector, academia, civil society, and development partners who have a direct role in the implementation of the iodine program. UNICEF country offices and other development partners assisted in identifying these stakeholders. (1).



Mauritanian salt producer on the production site of N'Teret (July 2019)

Background

Mauritania's commitment

For more than two decades, Mauritania has been committed to the fight against iodine deficiency, which was first identified in 1995. The official adoption of the IUS strategy by Mauritania was marked by the signing of Decree No. 2004-034 in April 2004, making iodization of all salt intended for human and animal consumption mandatory (2). This decree covers the entire supply chain and clearly defines the components used for fortification, packaging standards, impurity levels and penalties for infractions. The iodide or iodate iodization levels of salt are defined as follows for the different supply steps:

- Import and export: 80-100 ppm
- Production: 50-80 ppm
- Retail: 40 ppm for 25kg bags and 25 ppm for small quantities of salt.

The Mauritanian government has also signaled its commitment to addressing iodine deficiency by including it in national nutrition policies, plans and strategies. However, there is no longer an updated roadmap on how salt iodization should be

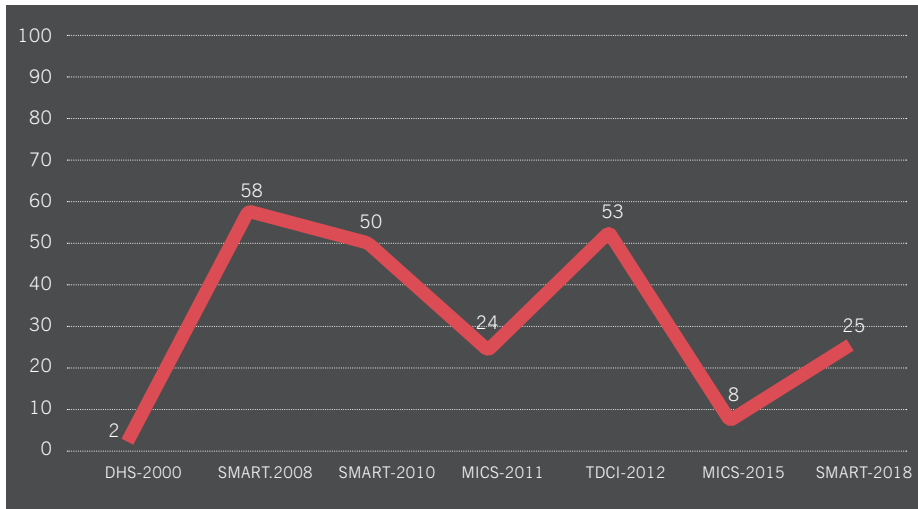
achieved. Only the National Strategy for Accelerated Growth and Shared Prosperity SCAPP (2016-2030) and Multisectoral Strategic Plan for Nutrition 2016-2025 are still active. On the other hand, there is no national strategy to reduce salt consumption.

At the same time, many actions have been taken to support universal salt iodization: different actors have been trained, materials have been provided to producers and to the services in charge of the control of iodization, an association of salt producers in Mauritania has been formed, and the Alliance for Food Fortification in Mauritania (AFAM) has been created but has not yet been formalized (1).

Population status

To ensure surveillance at the household level, qualitative analysis of household salt using rapid test kits have been included in the national SMART surveys. However, national laboratories are not able to perform urinary iodine analysis to determine the iodine status of the population.

FIGURE 1 Trends of household iodized salt (>0ppm) coverage between 2000 and 2018



According to the latest Iodine Deficiency Disorders Survey in 2012, the median urinary iodine level of school-aged children was 179µg/L suggesting iodine adequacy at a national level. Regarding household iodized salt coverage, Mauritania has experienced many fluctuations as illustrated in *Figure 1*. The latest available data indicate that 25 % of households are covered with iodized salt (> 0 ppm). The same survey showed considerable variation in the proportions of households with iodized salt by place of residence or wealth quintile. Households residing in urban areas were more likely to have iodized salt, and by wealth quintile, the wealthiest households were three times more likely to use iodized salt (1).

Opportunities

Salt resources

Mauritania has a large salt resource with an annual production that covers more than its salt needs. The country is able to produce two types of edible salt on its territory, namely rock salt, which constitutes 80% of the total production, and sea salt through its 600 km of coastline.

Sea salt production is mainly located around Nouadhibou and annual production amounts to 5,000 MT. Rock salt extraction is carried out on 3 main production sites whose access is often difficult and infrastructure limited. The annual production of rock salt amounts to 31,000 MT, which is more than double the country's salt needs (3). The Association of Salt Producers of Mauritania (APSM)

was created in 2005, and then the personnel of the 3 main salt production sites were trained in salt iodization. Today, the APSM is still functioning and continues to be committed to salt iodization but believes that the lack of government control and the importation of non-iodized salt from neighboring countries creates unequal conditions and discourages its members from iodizing their salt.

However, given that the number of rock salt producers is limited and that most salt is centralized in the capital, this represents a real opportunity for salt consolidation and iodization.

Demand from neighboring countries

Due to salt production exceeding the country's needs, Mauritania can export part of its production. The main importers of Mauritanian salt are Côte d'Ivoire and Mali, and negotiations are underway to expand exports to the Democratic Republic of Congo.

Mauritania, which was a founding member of the Economic Community of West African States (ECOWAS) in 1975, withdrew in December 2000 but recently signed a new partnership in August 2017. This new agreement offers an interesting opportunity to strengthen Mauritania's trade agreements with neighboring countries and to benefit from harmonized standards on iodized salt in the region. This could allow Mauritania to develop exports of its salt stocks to neighboring countries (1).

Implementation of an action plan

Following the landscape analysis carried out in the context of the partnership between ING and UNICEF, a workshop was held in Nouakchott, bringing together the main actors in salt iodization. After the presentation of the situation and discussions between the different decision makers, an Action Plan for a sustainable revitalization of the salt iodization and iodine nutrition program in Mauritania was developed (4). The main key messages of this action plan have been detailed in the box below. This action plan is an opportunity to revitalize salt iodization activities and renews the government's commitment to include salt iodization as a priority objective.

Obstacles and possible improvements

Quality of salt

Although salt resources are important, the quality of salt is not sufficient. The precarious conditions of the production sites do not allow for proper iodization of the salt. Once the salt blocks are extracted manually from the deposits, they are transported to Nouakchott to be crushed and stored in 25 kg bags. Nouakchott wholesalers can iodize salt on demand from customers, but iodization is not systematic. In addition, the iodization units provided by UNICEF are obsolete and works in fits and starts, so wholesalers perform rudimentary iodization using a pierced bottle that does not allow for homogeneous iodization of the salt (3).

Considering the centralization of salt in Nouakchott and transportation along three main routes that intersect before Nouakchott, the government is studying the possibility of setting up a centralized iodization facility to consolidate, process and iodize salt from the main producers. On the other hand, there is unfair competition as producers sell non-iodized sea salt and rock salt at low prices but of poor quality. Producers do not see the point or the constraint of iodizing their salt if they can sell it non-iodized (1).

Sustainable financing

The Accelerated Growth Plan requires individual ministries to establish their own budget line for food fortification, including salt iodization. However, funding for the salt iodization program relies on donors such as UNICEF and in the past by the World Bank and the United Nations Industrial Development Organization (UNIDO). In 2020, the Ministry of Commerce, Industry and Tourism tried to allocate funds to USI for an awareness campaign, but COVID did not allow this project to proceed (1). It is important to encourage other relevant ministries to include a budget line in the USI program.

Rock salt purchase and use habits

The consumption habits of Mauritanian households constitute a challenge in opposition to the opportunity. Mauritanian diets do not include powdered salt; women cook directly with rock salt.

Key Message of the Action Plan

Policy, strategy and coordination

- Advocacy for the inclusion of salt iodization in national sectoral programs.
- Organization of a data collection system (HHIS and mUIC).
- Update legislation.
- Define roles, responsibilities, and budgetary needs.

Salt production and iodization process

- Promote the creation of three economic interest groups in the production areas.
- Promote the establishment of a centralized industrial iodization facility.

Monitoring and control

- Clarify the roles and responsibilities of the institutions involved in monitoring.
- Inform customs officers about the legislation
- Require certification from exporting countries to allow salt entry.
- Involve national laboratories in the control and monitoring system.

Awareness and Advocacy

- Formalize the Food Fortification Alliance and include the Salt Iodization Committee.
- Communicate the importance of salt iodization and legislation to retailers, wholesalers and importers.



Rock salt extraction basin in N'teret (2019)

In a focus group conducted in 2019, women stated that they do not know how to cook with powdered salt and find that iodized salt has a bitter taste (3). These statements indicate a need to raise awareness among the population about the use of iodized salt to increase the demand for local iodized salt among retailers.

Legislation

There are weaknesses in the current legislation, a revision of this decree would be necessary to include: the use of iodized salt in processed foods, the use of only

one type of iodine compound for fortification, the protocol of the method of quantitative evaluation of iodine, the quality certification and for the removal of all exceptions for the use of non-iodized salt (1).

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Salt trade in West and Central Africa

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Trade is crucial for economic growth and food security. West and Central Africa (WCA) have huge potential for trade in global and intra-regional terms. This is particularly true for salt because of its natural resource endowment and intra-regional complementarities (salt-producing and salt-importing countries). In the WCA region, only three countries have the natural resources to produce salt in large enough quantities to be exported. These are Ghana, Senegal, and Mauritania. However, Senegal remains the largest exporter of salt in the region.

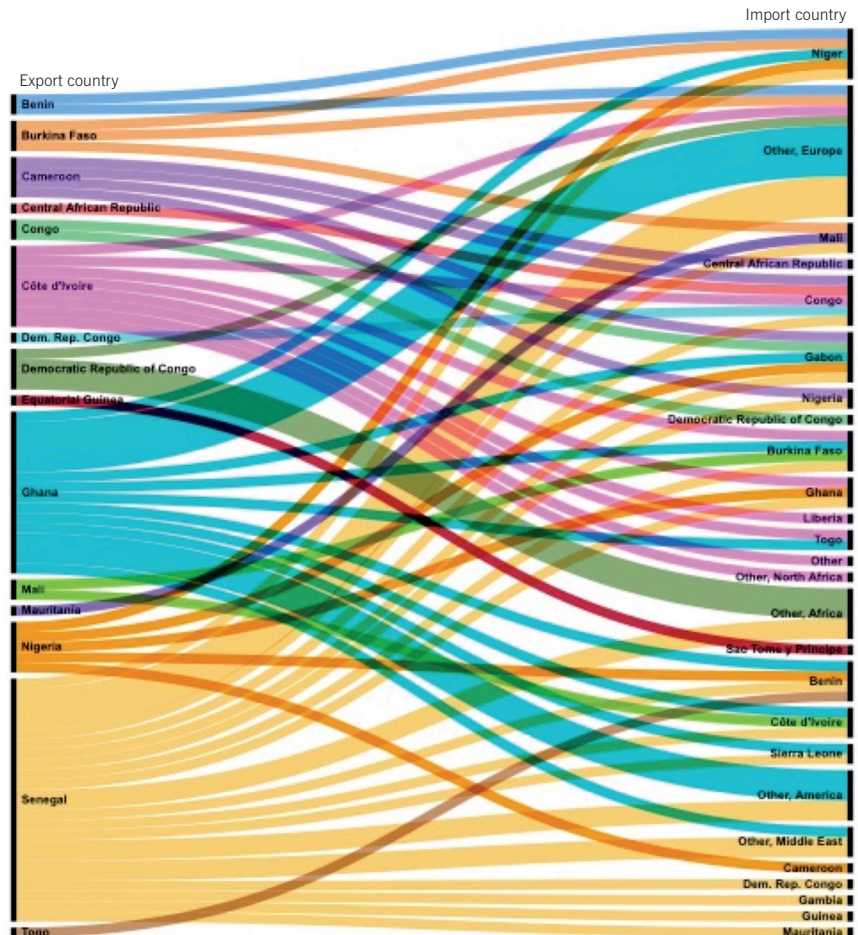
In addition to above mentioned main producing countries, Nigeria, Cameroon, and Gabon procure raw salt, refine and iodise it to export the higher quality salt to neighbouring countries and beyond. Lastly, many countries are involved in 're-exportation', which involves exporting goods they imported without altering them. This is particularly true of salt transported from coastal to landlocked countries in the region, which are subject to multiple border checks. The trade of salt from countries in WCA and their destination is illustrated in *Figure 1*.

A study on the potential of food trade in the Economic Community of West African States (ECOWAS) region found that food export by all the member countries represented only 5% of the ECOWAS intraregional trade. Moreover, the study concluded that all countries of the region are yet to fully exploit their potential in the trade of food commodities within the region (1). In the case of salt, despite having sufficient natural resources within the region to supply salt, many countries import from outside the region. Of the 1.2 million tons of salt formally declared and traded in the WCA region in 2020, just under half was from a WCA country, the remaining from outside the region (*table 1*). Nigeria, the biggest importer of salt, imported USD\$77 million worth of salt in 2020 (2). It prefers to import its salt from outside the region, most likely due to the ability of the region to produce enough high-quality salt and, in some cases, due to existing trade dynamics.



Salt truck in South Africa (Photo by Nelson Gono on Unsplash)

FIGURE 1 Trade of Salt from Countries in West and Central Africa



Adapted from UN COMTRADE

Nigeria imports the majority of its salt from Brazil (3).

However, it is important to note that 75% of intra-regional trade is informal (4). Informality occurs due to efforts to avoid regulatory and transaction costs and the deep fragmentation of supply chains, as is the case in the salt-producing industry in Senegal and Ghana. This informal trade faces high uncertainty and costs and therefore is not economical, preventing investment and economies of scale. Furthermore, informal intra-regional trade is not subjected to quality controls to ensure that the salt is adequately iodised (4).

allows for the flow of salt from salt-producing countries/areas to salt-importing countries/areas. Finally, improving intra-regional trade has also been shown to increase foreign direct investment (5,6), which for the salt industry would increase the supply of quality iodised salt circulating in the region for both the household level and the food industry.

Regional trade facilitation and barriers

African countries and the WCA countries have long been collaborating on regional trade agreements as part of a broader

case for salt, where differences in norms and standards (in iodine levels and quality of salt) and lengthy and costly laboratory testing of salt at the borders can act as important non-tariff barriers (7).

The intra-regional trade of salt has not been examined in depth. However, in 2016, the European Centre for Development Policy Management reviewed the agricultural and food trade in ECOWAS. The review found that part of intra-regional trade flows through main regional corridors. This main West African transport network (i.e., the West-East Trans-Saharan Highway between Dakar and Ndjamena, the Trans-Coastal highway between Dakar and Lagos and the inter-connecting North-South corridors) serves extra-regional, intra-regional and national trade. Therefore, the smooth functioning of these corridors is of great importance for trade in the region. Additionally, they also found considerable intra-regional trade flow outside these main regional corridors. This applies to trade that occurs around border areas and where production basins are not in the direct vicinity of a corridor, as is often the case for salt.

Finally, the time it takes to get goods from a producer to a buyer is an important determinant of trade costs (8). According to the World Bank's annual Doing Business report, trading in several African countries requires three times as many days, nearly twice as many documents and six times as many procedures compared to high-income economies (9). Every extra day it takes in Africa to get a consignment to its destination is equivalent to a 1.5% additional tax (9). This increase in cost will increase the cost of iodised salt that is formally imported and increase the informal trade of salt that is more likely to be inadequately iodised.

Therefore, to increase the availability of quality iodised salt in the region, a more in-depth analysis of the trade barriers and facilitators is needed to design and implement policies to promote intra-regional trade, identify trade facilitation initiatives and support value chain development of iodised salt (9).

Harmonisation of salt standards

As mentioned above, standards and norms can act as an important non-tariff barrier to trade. Therefore, to facilitate the regional trade and distribution of iodised salt, a workshop was organised in late 2013 to reach a consensus on and plan the process

TABLE 1 Import of salt into West and Central African countries from within and outside the region in 2019 (2)

From (Region)	Quantity (MT)	To (Countries)
Senegal	402,419	Burkina Faso, The Congo, Côte d'Ivoire, Democratic Republic of Congo, Gabon, Gambia, Ghana, Guinea, Mali, Mauritania, Niger, Nigeria, Sierra Leone
Ghana	130,550	Benin, Burkina Faso, Côte d'Ivoire, Gabon, Niger, Sierra Leone, Togo
Mauritania	1,285	Mali
Other WCA country	4,628	Benin, Burkina Faso, Cameroon, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic of Congo, Gabon, Ghana, Liberia, Mali, Niger, Nigeria, Sao Tome and Principe
Sub-Total WCA region	538,882	
Africa (not WCA region)	118,495	Angola, Ethiopia, Kenya, Mauritius, Namibia, Rwanda, South Africa, Uganda, Zambia
The Americas	376,438	Antigua and Barbuda, Brazil, Canada, Chile, USA
Asia	35,367	Bangladesh, China, India, Japan, Korea, Malaysia, Pakistan, Singapore, Sri Lanka, Thailand, Turkey
Europe	14,723	Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Iceland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Switzerland, United Kingdom
Middle East	35,097	Bahrain, Israel, Lebanon, Oman, Saudi Arabia, United Arab Emirates
North Africa	26,446	Algeria, Egypt, Libya, Morocco, Tunisia,
Oceania	25,039	Australia
Others	0.28	Others
Sub-Total Non-WCA region	631,605	
Total	1,170,487	

Enhancing intra-regional trade along with value chain development (through increased production of quality salt and value addition through iodisation) will not only improve the availability of quality iodised salt, but it is also believed to contribute to economic growth and sustainable development, as indicated in key regional and pan African policy frameworks (4). This stems from the fact that it creates opportunities for economies of scale and

strategy for strengthening trade ties. The removal of formal tariff barriers should, in theory, lead to a significant increase in trade flows. However, much of the focus has been put on tariff barriers to trade, leaving out non-tariff barriers that could, in some cases, be associated with more constraints to trade than the formal tariffs. A non-tariff barrier is any measure other than a customs tariff that acts as a barrier to international trade(7). This is likely the

for harmonising standards for fortified wheat flour, vegetable oil and iodised salt across the entire 15-member ECOWAS community through the ECOWAS Harmonization Model (ECOSHAM), the framework for aligning commodity standards in the region (10). Furthermore, in 2015, ECOWAS published its salt iodisation norms (ECOSTAND 48:2015), stating that adopting a harmonised regional standard for food-grade salt would facilitate trade globally and within ECOWAS.

The ECOWAS norm states the maximum and minimum levels for the iodisation of food-grade salt along the supply chain. Iodine in salt must not be less than 50 mg/kg at the point of production, 30 to 60 mg/kg at importation/exportation and 20 to 60 mg/kg at wholesale and retail levels.

The ECOWAS norm also provides compositional and quality specifications for fortified food grade salt. These include the moisture level, sodium chloride level (to define purity) and limits of impurities. Hygienic conditions under which salt should be produced and handled throughout its distribution, packaging materials, labelling and methods for testing compliance are also provided. The ECOWAS norm recommends that food-grade iodised salt be produced only by producers with the requisite knowledge and necessary equipment for processing quality salt, dosing with iodine and ensuring thorough mixing to obtain a homogeneous mixture.

The ECOWAS member states were encouraged to adopt the regional ECOWAS norm on fortified food grade salt, replacing their existing legislation/standard/norms. However, only Senegal has adopted the ECOWAS norm. There is no clarity why the other countries have not adopted the ECOWAS norms, and many have remained faithful to the WAEMU norm, which has slightly different iodine levels along the supply chain (Figure 2).

The import level of iodine (along with the quality parameters) is significant in the trade of iodised salt. Figure 3 shows the difference in the import level of iodine. For most countries, there is an overlap in the iodine level; therefore, harmonising the standards regarding iodine level and quality of salt would not significantly change the amount of iodine in the salt in each country and could remove a potentially difficult non-tariff barrier to trade.

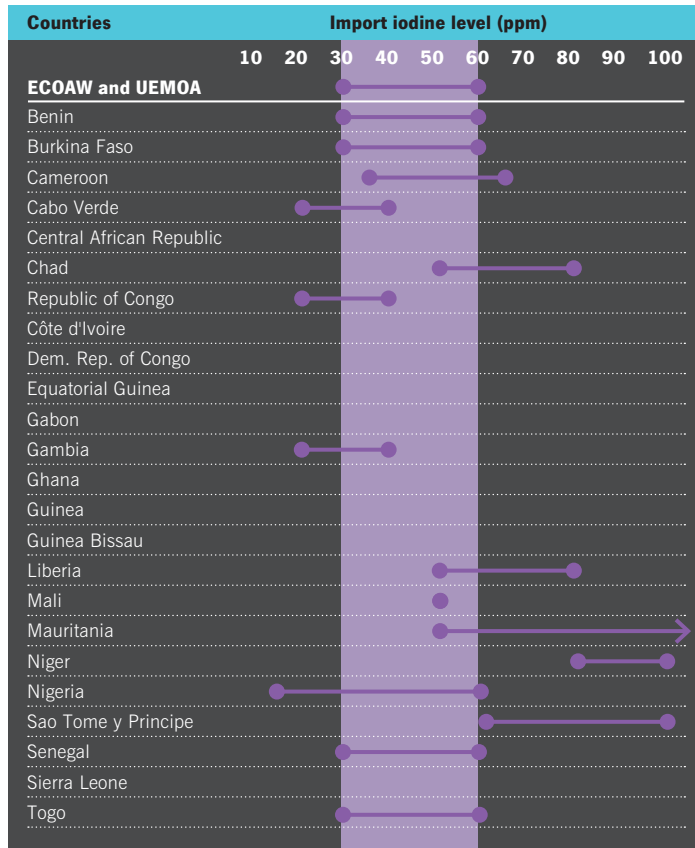


FIGURE 2 ECOWAS and UEMOA norms at the production, import and retail levels

	Production	Importation	Wholehouse/ Retail
ECOWAS	> 50 ppm	30–60 ppm	20–60 ppm
WAEMU	30–60 ppm	30–60 ppm	20–60 ppm



FIGURE 3 Comparison of iodine levels for imported salt by country in West and Central Africa



ECOWAS is currently developing a certification project to identify products that comply with its norms. However, salt is presently not part of this project. Combining this regional certification system with innovative technology such as blockchain technology could help salt producers obtain iodine levels and salt quality certification. The certificate can be verified along the supply chain, assuring salt buyers that the salt has been approved. This could minimise the need to assess the salt at each border.

In summary, most WCA countries import iodised salt to meet their national salt requirements, and the region can meet these needs. However, the intra-regional trade of salt is below its potential. Therefore, a more in-depth assessment of the trade barriers and facilitators is needed to design and implement policies to promote intra-regional trade, identify trade facilitation initiatives and support the value chain development of iodised salt (9).

Improving the intra-regional trade will contribute to the regional economy and could improve the supply and demand of iodised salt both for salt-producing countries and salt-importing countries due to the symbiotic relationship between the countries.

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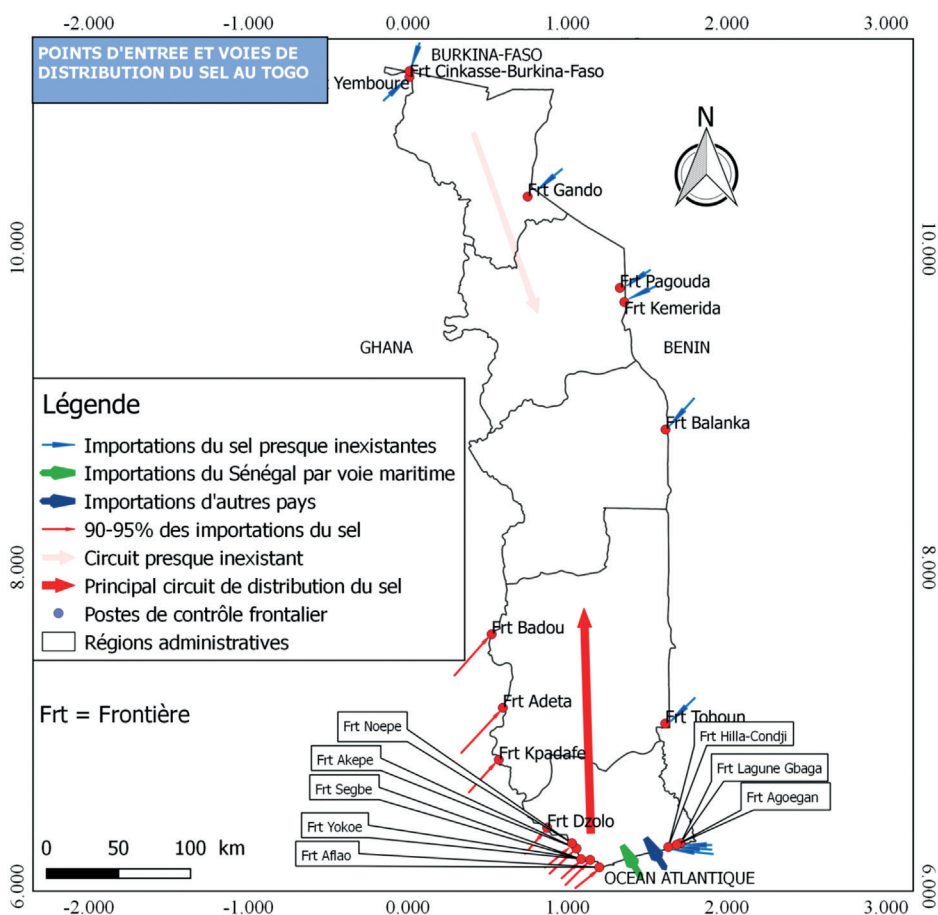
Lessons from Togo on sustainable USI

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Togo, a francophone country located on the Gulf of Guinea, does not produce sufficient salt but imports it mainly from neighboring Ghana. The first national survey on the situation of iodine deficiency was carried out between 1982 and 1986, and showed a goiter prevalence of 18% among the Togolese population (1). This alarming rate prompted the generalized distribution of iodized oil in the period 1990-95 to prevent Iodine Deficiency Disorder (IDD). National legislation on universal salt iodization (USI) was adopted in 1996 (Arrêté interministériel N°76/MSP/MCPT, 1991), and updated in 2017 (Arrêté N°124/2017/MSPS/MCPS/MEPSFP/MEF) to comply with the new Economic Community of West African States (ECOWAS) standards. Results of the USI program until 2005 were remarkable, thanks to consistent funding, strong multisectoral coordination and leadership by the Ministry of Health. In just ten years the household coverage of iodized salt, which was almost nonexistent in 1995 (at 1%), was universal by 2005 (at 92%) (2,3).

Consequently, the median urinary iodine concentration (mUIC) measured through a national survey in 2005, revealed a mUIC of 171,4µg/l in school age children, which is considered to be in the adequate range (2). Unfortunately, this is the only existing data on iodine status and no survey has taken place since. As of 2005 the situation started to reverse. Following a fall in financing by partners, monitoring and sensitization activities became more difficult to maintain. This proved a barrier to the sustainability of the program, and there was a steady decline in the general trend of household coverage of iodised salt, which decreased to 81% in 2010 and 63% in 2017 (4,5).

FIGURE 1 Location and distribution of the main salt import and distribution routes in Togo (7)



A stocktaking exercise undertaken by the Nutrition Division in 2013 showed a lack of surveillance of salt iodization at borders and the necessity to clarify roles and responsibilities of different stakeholders (6). This prompted the development of guidelines for the surveillance of iodized salt, the supply of portable WYD spectrometers for the quantitative assessment of iodine in salt at the border and of laboratory equipment for the national reference laboratory (6).



USI program can be highly dependent on synergy between the different sectors involved. A dedicated domestic budget line will help avoid dependence on funding from partners. Effective monitoring associated with actions are essential and there must be strong linkage between the USI coordinating team and the importers. These are important elements to consider in developing and implementing a successful sustainable USI strategy.

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However, these efforts were not sustained, the WYD spectrometers was provided to official entry points only, while there is illegal entry of salt via the multiple dirt roads along the 600 KM border with Ghana (7) (see figure 1). Furthermore, when controls were conducted, their results were not necessarily used by the decision makers and leaders of the USI program.

In 2021, as part of the IGN/UNICEF regional partnership, a situational analysis of the iodization program in Togo was conducted together with the Government to understand the low availability of iodized salt in the savanna regions. The study included 21 importers/wholesalers and 61 retailers in the markets as well as the collection of 82 samples of cooking salt. Findings show that more than one in two respondent (58%) does not know about the legislation on salt iodization. For 20% of retailers, color was the quality criterion for iodized salt, while for wholesalers, color (18%), price and iodine content (18%) were the determining factors. Iodine content was important only for 7% of retailers and 4.5% of wholesalers. A staggering nine in ten (93%) retailer and one in two wholesaler (54%) does not control the quality of salt, including iodine level, before purchase.

Retailers declare that 43.3% of purchased salt is iodized, while it reaches 56.7% for wholesalers, the adequacy of the iodine level was not possible as only qualitative assessments were possible at the purchase sites. However, the overall

mean iodine content of all samples (up to 12.94 ppm) was below requirements (of at least 20 ppm in Togo). Labelling is unreliable as salt is repackaged by 83% of respondents. The main conclusions of the situation analysis show that to revitalize the USI program in Togo, driving demand for iodized salt while ensuring the supply of quality imported iodized salt by importers and its control at borders will be instrumental. Continuation of sensitization of all stakeholders will also be necessary to ensure adequate household coverage of iodized salt.

From the Togolese experience, it is clear that the sustainable success of the



Salt value chain analysis in Nigeria

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Introduction

Numerous studies have clearly established that fortification of salt with iodine is an effective means of controlling iodine deficiency. Since the effective introduction of salt iodization in Nigeria in 1993, the sustained salt iodization program has ensured an adequate iodine status among the whole population. Nigeria achieved global recognition in 2007 as the first African country to be compliant with universal salt iodization (USI) due to sustained high levels of salt iodization coverage (from a level of <40% in 1993) to 95% or higher. Despite the reference to salt for food processing in the original definition of universal salt iodization (USI), Nigeria's USI program does not explicitly address food industry salt. This may affect program impact and sustainability, given the increasing consumption of processed foods triggered by higher income, urbanization, and lifestyle changes. This affects the source of salt and potentially iodized salt among the population. It is against this backdrop that a salt value chain analysis was conducted. It had as objective: (a) assessment of the contribution of salt contained in industrially processed foods to salt and iodized salt consumption of the population; and (b) to identify the possibilities of expanding the salt iodization strategy to include processed foods.

Methodology

The methods used include a review of reports and other documents and key informant interviews (KII). Documents that were reviewed include government agency and partners' reports on the salt situation. Structured face-to-face interviews with food manufacturers and in-depth interviews with processed food wholesalers and retailers were conducted and food labels were checked in the supermarkets and local markets.

Key findings

Even though Nigeria has large salt deposits in some states including Benue, Cross River, Ebonyi, Abia, Taraba and Nasarawa states, there is no large-scale mining



of these salt deposits. As such, most salt manufacturers import salt from Brazil, Namibia, South Africa, China, Australia, India and the USA. Nigeria's imported

salt worth increased from N4.5bn to N4.8bn (1). Nigeria imports from Brazil were estimated at US\$33.79 million during 2019 (2).

TABLE 1 Manufacturers, Marketers and Distributors of Salt in Nigeria

Name of Industry	Production Capacity	Product	Domestic Market	Export Market
NASCON	2450MT/Day	Table Salt Industrial Salt	Nigeria	Benin
Royal Salt	300,000MT	Table Salt Industrial Salt	Nigeria	
Mr Chef	N/A	Table Salt	Nigeria	
JOF Salt	108,000 MT/Month	Industrial Salt	Nigeria	Ghana

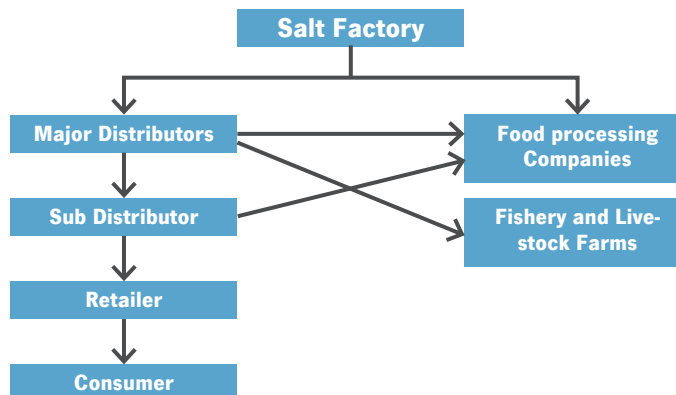
Raw salt is imported by major salt manufacturers from Brazil, Australia, Tunisia, and Namibia. All salt imported from Brazil, Tunisia and Namibia is not iodized and so it is the responsibility of the repackaging companies to fortify imported salt with iodine before selling to the consumers. Countries of export for salt from Nigeria include Benin Republic, Niger Republic, Cameroon, Ghana, and Chad. All food grade salt produced for domestic use and export is iodized.

There are three major salt manufacturers producing salt in Nigeria for commercial purposes (Dangote Salt, Royal Salt, and Mr. Chef Salt) and one that produces salt for food industries (JOF) (Table 1). Dangote and Royal Salt produce table salt and industrial salt while Mr. Chef only produces table salt. JOF salt, at the time of the assessment, did not have salt in the open market but only produced industrial salt that was supplied to food companies for cornflakes, bouillon, and seasoning production, with Nestle Foods as a major client.

There are two major channels of salt distribution in Nigeria. One is direct from the factory to the large consumers, such as the food processing industries and livestock farms. The second channel is from the factory to major distributors or wholesalers who also sell to retailers and who in turn sell to consumers. Interestingly, medium- and small-scale industries as well as fisheries and livestock farms also procure salt from major distributors and subdistributors. As shown in Figure 1, salt is procured from the factory by major distributors who are often referred to as dealers who move the supplies to their warehouses and outlets. Subdistributors and wholesalers also procure from the major distributors for display in their stores/shops. At times they supply directly to their clients on request. Retailers procure salt from subdistributors or distributors and then sell to the consumers. Distributors and subdistributors at times supply salt directly to food processing companies and fishery and livestock farm.

The survey indicates that food processing companies, wholesale distributors and marketers are the major consumer of salt from the industries. As shown in Table 2, food processing companies procure about 26% of the salt. Wholesale distributors also constitute about 26% of the salt consumers while supermarket/mall,

FIGURE 1 Salt distribution channel



retailers and livestock farms were less than 20% each. Supermarkets, malls, and stores are the major salt procurement clients, followed by fisheries and livestock farms.

Iodized salt constitutes about 99% of the salt in the market while non-iodized salt is about 1% and are not displayed

supermarkets, and shopping malls while the export market is in Benin Republic. For industrial salt, the local market includes soap manufacturers, seasoning companies, noodle producers, margarine producers and animal feed manufacturers.

TABLE 2 Major Consumers of Salt (Survey 2021)

Name	Frequency (n)	Percentages (%)
Food Processing Industries	10	25.6
Pharmaceuticals	0	0
Supermarket/Mall	7	17.9
Wholesale Distributors	10	25.7
Retailers	6	15.4
Livestock	6	15.4

openly for sale. Dangote Salt (50kg) sold for N4400 - N5000 while Royal Salt (50kg) sold for N4300 - N4900. The salt procurement capacity of distributors and marketers of salt varies, and ranges between 1000 and 50,000 bags for a range of 1 to 6 times per month. The majority (70%) of the distributors and marketers procure less than 5000 bags while others constitute 10% each. Dangote Salt, Mr. Chef Salt and Royal Salt continue to dominate the market in Nigeria as they were ranked first, second and third, respectively (Table 3). Although, clients in Lagos ranked Mr. Chef salt first and Dangote Salt second, indicating that ranking of salt is location specific.

The major consumers of salt in Nigeria are food processing industries, supermarkets and malls, wholesale distributors, retailers, and livestock industries (Table 4). For table salt, the domestic market for the product can be found in all local markets,

TABLE 3 Salt Ranking by Marketers and Distributors (Survey 2021)

Salt Product	1st (n)	%	2nd (n)	%	3rd (n)	%
Dangote Salt	7	70	3	30	–	–
MR. Cheff Salt	3	30	3	30	4	40
Royal Salt	–	–	4	40	4	40
Total	10	100	10	100	8	100

TABLE 4 Large Scale Salt Procurement Clients (Survey 2021)

Name	Frequency (n)	Percentage (%)
Cosmetics Industries	1	2.5
Biscuit and Sweet Industries	2	5
Kitchen and Restaurant	8	20
Hotels	2	5
Bread and Bakery Industries	6	15
Supermarkets, Malls and Stores	12	30
Fisheries and Livestock Farms	9	22.5

ries and livestock farms. There is a need to encourage more salt manufacturers in the market to increase competition, adequate monitoring of industries to ensure compliance and regulate price of salt to prevent fluctuation. However, the contribution of industrially processed foods to salt and iodine intake and the possible impact of salt reduction on iodized salt intake remain to be quantified. To improve Nigerian USI programs, further data are required on processed food consumption across population groups, iodine contents of food products, and the contribution of processed foods to iodine nutrition.

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Conclusion

Although food grade salt is being produced by four salt manufacturers in Nigeria, there is a need for adequate policy to address fortification compliance and fluctuation in price. Challenges faced by marketers and distributors ranges from high pricing, untimely delivery by the manufacturers and logistics problems. The Standard Organization of Nigeria (SON) and the National Agency for Food, Drug Administration and Control (NAFDAC) are the agencies involved in the monitoring of salt business in the major salt markets. Salt distribution follows two major channels; from factory to major distributors who procure salt from factories and

supply either directly to food processing companies and or Sub- distributors and wholesalers who supply to retailers and then finally to consumers.

The analysis also revealed that some factories also supply direct to food processing companies indicating that food processing companies, wholesale distributors and marketers are the major consumers of salt while supermarkets, malls and stores are the major salt procurement clients, followed by Fisheries and livestock farms. Various industries that procure salt, cut across cosmetics industries, Biscuits and sweet industries, hotels, kitchen and restaurant, bread and bakery industries, supermarkets, malls and stores and fish-



Salt iodization in Chad

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Chad is a landlocked country and almost all salt consumed is imported from Cameroon, Egypt, Libya and/or Sudan with small artisanal salt producers in the northern part of the country. A national survey conducted in 1994 showed a goiter prevalence of 63% and that 1% of the population was affected by cretinism. Iodine deficiency was hence declared a public health issue and iodization of salt for human and animal use was made mandatory. However, the lack of financial means has impeded the application of legislation. With the declaration of iodine deficiency as a public health issue in 1994, legislation was put in place, defining the level of iodization, monitoring, and surveillance of household salt. Iodization is mandatory for all salt for human and animal consumption, but since the legislation does not specifically mention locally produced salt and salt for export, many erroneously believe these salts do not need to be iodized.

Universal Salt Iodization was integrated in several national nutrition policies and plans. Decisions related to iodine nutrition are deliberated at the

level of the National Council of Food and Nutrition which meets once a quarter and implemented by the executive body, the Permanent Technical Committee on Nutrition and Food, which is housed in the National Directorate of Nutrition and Food Technology (DNNTA). The DNNTA is an organ of the Ministry of Public Health and National Solidarity, who oversees the coordination, follow-up, and monitoring of iodine nutrition actions.

The demographic and health surveys, as well as the SMART surveys undertaken in the country since 2000 show an upward trend for the period 2000–2014, when the use of household iodized salt increased from 58% in 2000 to 82%. This had direct consequences on the iodine status of the population. The latest data on iodine status dates to 2003 and showed that school aged children (aged 6–12 years) had an adequate iodine status, with a mUIC of 213µg/L. Between 2014 and 2019 there was a sharp fall in the use of iodized salt, down to 65%, before it slowly went up again, to reach 70% in 2021 (Figure 1).

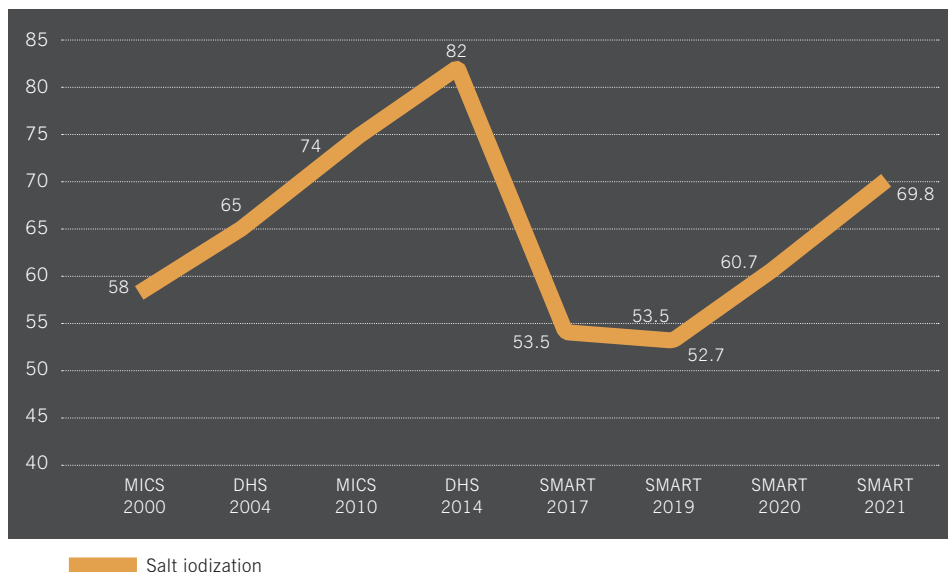


Clumps of non-iodized salt from Boudo

An iodized salt evaluation mission conducted in 2014, shows that salt from Cameroon and Egypt transiting through Cameroon was correctly iodized, while salt imported from Sudan or locally produced was either poorly iodized or not iodized at all. Recent surveys have found little variation in access to iodized salt by urban/rural but did find variation by region due to the origin of the salt. For example, in the East, the salt comes from Sudan, where it is not iodized, leading to low use of iodized salt in this region. The 2019 MICS did show differences per wealth quintile, with the richest households more likely to use adequately iodized salt. Domestic production of non-iodized salt is growing significantly in the provinces of Borkou, Ennedi and Tibesti, but unfortunately no action is undertaken to ensure compliance with the country's salt iodization legislation.

While the general population has some level of awareness of the importance of iodized salt, there is some confusion as some bags of salt are

FIGURE 1 Availability of iodized salt at household level through different surveys in Chad



■ Salt iodization



Iodized salt for a bright future for children in Chad

falsely labelled as iodized and charged at a higher price than non-iodized salt from Sudan. Through the community health agent network who promote optimal maternal nutrition and infant and young child feeding practices, control of salt iodization is promoted at household and community level, using the UNICEF provided iodine tester kits.

Following the 2021 situation analysis, the resulting roadmap for strengthening the salt iodization program (2022-2025) offers promising prospects in revitalizing the USI program. The first axis of the

roadmap focuses on the legislative aspect of USI and aims to ensure knowledge and application of regulatory texts, including on local production, and improve accessibility of iodized salt and its control. The operational axis of the roadmap will aim to train all USI stakeholders and develop a communication strategy on salt iodization coupled with the reduction of salt consumption. The last axis will evolve around a feasibility study on domestic salt production, support to salt producers and the establishment of a coordination structure to promote iodized salt.

History of the salt trade in Chad

Local production and salt trade has been linked to caravanners, who would insure the transport of salt across long distances. The entire salt route was controlled by the Gorane and Toubou populations, who owned camel herds, and would drive the large caravans. At the time of independence, the Government tried to formalize the exploitation of salt mines but without success, and the artisanal production of salt has continued to this day.

Different types of salts are produced in the country and in different forms such as rock salt, sometimes called halite, whose formation dates back millions of years. It is the remains of the Paleo-Chadian sea that disappeared several thousand years ago, leaving giant underground reservoirs at a depth of several hundred meters, also called salt domes.

The two main local rock salt production sites in Chad include the Boudo site, which is an open-pit salt mine, and the Dimé (Dyi) site. The latter is a group of about fifty lakes, remnants of a larger lake that occupied the basin, supporting a wide diversity of aquatic habitats, vegetation, and wetlands, as well as highly contrasting salinity, ranging from freshwater to hyper-saline.

THE IDD NEWSLETTER is published quarterly by the Iodine Global Network and distributed free of charge in bulk by international agencies and by individual mailing. The Newsletter is also distributed to email subscribers and appears on the Iodine Global Network's website (www.ign.org). The Newsletter welcomes comments, new information, and relevant articles on all aspects of iodine nutrition, as well as human interest stories on IDD elimination in countries.

For further details about the IDD Newsletter, please contact: Michael B. Zimmermann, M.D., the editor of the Newsletter, at the Human Nutrition Laboratory, Swiss Federal Institute of Technology Zürich, newsletter@ign.org.

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