Cambodia’s IDD program jeopardized by poorly iodized salt

Iodine deficiency disorders have long been recognized as a significant public health issue in Cambodia. In the late 1990s, a national survey showed that 17% of primary school children were affected by goiter (1). In 1996, the Royal Government of Cambodia established the National Sub-Committee for the Control of IDD (NSCIDDD), and Universal Salt Iodization has been the primary intervention to improve the population’s iodine status.

Introducing iodized salt
Salt is one of the main condiments used in Cambodia. The average consumption per capita is 15 g/day, which includes salt in fish sauce, pickles, and other processed foods. Roughly 85% of the salt is produced in Cambodia, mostly in solar plants by salt producers’ communities of Kampot and Kep. Solar evaporation forms “coarse salt,” i.e., large salt crystals with a diameter of 0.5–1 mm. It is either sold as-is, or it passes through refineries where it is boiled into shallow-well reservoirs to a finer grain. Coarse salt is iodized with potassium iodate by spraying while fine salt by a dry mixing method.

Iodized salt production in Cambodia began in 1999, but due to a lack of mandatory legislation and the production being spread across many small-to-medium plants, by 2000 the household coverage was only 13% (2). Lessons were learned, and mandatory legislation followed in 2003. Subsequently, the number of Cambodian households using iodized salt grew from 28% in 2004 to 70% in 2011 (3). Between 2004 and 2008, the median urinary iodine concentration among Cambodian schoolchildren remained adequate at 236 μg/L. But at the same time, the proportion of very high UI concentrations (above 500 μg/L) rose from 5.5% to 16.0%. Whether they were consuming too much salt or taking in iodine from other dietary sources is unclear.

In 2010, the Cambodian government and salt producers became responsible for the supply of potassium iodate, to ensure long-term sustainability of the iodization program. The recent Cambodian National Food Security and Nutrition Strategy (4) highlighted the importance of continuing a fortification program and of strengthening the quality control of fortified products.

Assessing compliance with salt iodization legislation
To assess the salt producers’ compliance with the law over the past 6 years, the authors took data from three recent salt surveys. Two surveys, conducted in 2008–2011, analyzed household salt from over 4600 schoolchildren aged 8 to 10 years in urban and rural areas across all 24 provinces. A third survey, conducted in 2014, analyzed 1862 salt samples available on the market. All three studies used the same methodology and equipment (a WYD iodine checker).
The analysis showed that the iodine levels in household salt did not change between 2008 and 2011, at 18.0 mg/kg in 2008 and 22.0 mg/kg in 2011. But by 2014, the median iodine content had dropped significantly to 0.0 mg/kg (IQR, 0.0–8.9 mg/kg) (p<0.001). In addition, the proportion of salt without any iodine increased from 1.3% in 2008 to 21% in 2011, and finally to 62.2% in 2014 (both p<0.001) (Figure 1).

According to the 2014 data, the prevalence of non-iodized salt (coarse and fine) varied significantly between provinces (p<0.001) (Figure 2). Surprisingly, the proportion of non-iodized salt on the market was high also in the salt-producing provinces of Kep and Kampot, which may be due to leakage of non-iodized salt from production areas. According to international food fortification guidelines, at least 80% of individual samples should meet the legal minimum level of iodization. If the minimum is not met, a warning should be issued, and more frequent inspection should be planned at the production site and at retail level.

Consequences of non-iodization
The dramatic rise in the prevalence of non-iodized salt in Cambodia demonstrates that the national iodization program is still fragile in the absence of help from development partners. The findings of this study contradict the results of internal monitoring performed by the local producers, who have consistently reported that in 2008–2014 (unpublished) more than 90% of 27,000 salt samples contained 20–60 mg/kg of iodine. The lack of external quality control since the last national survey is of great concern and could threaten the program’s sustainability.

The presence of non-iodized salt also raises a question about the possible impact of Vietnamese and Thai imported salt on Cambodia. The price variance between Cambodian domestic salt (US$65 per metric ton) and Vietnamese salt (US$30–40 per metric ton) encourages the influx of non-iodized salt across the border, aided by a lack of border controls and import monitoring. Vietnam stopped iodizing salt after the 2005 revised decree on the production of iodized salt failed to uphold the mandatory iodization requirement in Vietnam (5). The current mandated iodization range (30–59.9 mg/kg) in Cambodia could be seen as a burden for the salt industry due to the cost implication and the lack of import controls. If the program was appropriately implemented, with average iodization at 30 mg/kg, the consumption of 10–15 g of salt (i.e., actual Khmer consumption) would provide 300–450 μg of iodine per person per day. Therefore, by reducing the standard to 15–30 mg/kg, the Cambodian Government could pave the way for better compliance from the salt producers and still meet the recommended intake of 150 μg/day. Given the upcoming ASEAN free trade agreements, any updates to the standards should take into consideration the iodization levels in the neighboring countries.

The low coverage of iodized salt will definitely have an impact on the iodine status of the Cambodian population. A recent study, conducted in June 2014 (unpublished data), found that the median UIC among 2300 schoolchildren in Kampong Speu has declined to 167 μg/L from the previous median of 236 μg/L in 2008.

Conclusions and recommendations
Due to a lack of regular monitoring and enforcement from government agencies, salt iodization in Cambodia has gone from being well implemented to marginal within less than a decade. But the enactment of mandatory legislation is not sufficient on its own to ensure program sustainability, especially in the absence of funding from development partners. To ensure that iodine deficiency disorders do not re-emerge, Cambodia must implement a well-designed monitoring system for quality control and assurance.

In conclusion, the authors recommend to implement the following eight interventions:
1. Test the stability of iodine in different settings (production/market/household).
2. Assess the impact of low iodization on the population iodine status.
3. Assess the bottlenecks encountered by the salt producers.
4. Develop a monitoring system together with the Food Administration Authority to ensure that domestic and imported salt is iodized.
5. Allocate a national budget to the enforcement of the legislation.
6. Develop regional standards and regulations for iodized salt including penalties.
7. Ensure that fortification standards, including iodization, are integrated with industry licensing and registration.
8. Sensitize the population to fake labeling.

References
3. Conkle, J et al. Cambodia children have ample iodine intake but only 70% of households are covered by iodized salt. IDD News. 2013, 41, 4-7.