Kyrgyz Republic

At the time of the MOH Ordinance of the USSR, detailed provincial surveys in the Kirghiz SSR had shown high goiter rates in the general population, with variations of 11-42% in the North and 55-61% in the South. The investigations also demonstrated a close relationship between the iodine content in the local water and food supply, and the extent and severity of goiter in the population (1). The centrally-directed Soviet prophylaxis approach with mandatory iodized salt from the AralTuz factory in the Kazakh SSR led to drastic reductions in the prevalence and severity of goiter in the population by the end of the 1960s. After the Soviet authorities abolished the prophylaxis approach during the early 1980s, the iodized salt supplies deteriorated along with the general decline of the economy. During 1985-89, surveys by the Kyrgyz Academy of Medical Sciences uncovered new evidence of moderate and severe iodine deficiency: the median UI values among 10-12y old school children in various provinces were 25-45µg/L; goiter prevalence varied from 33 to 86%, and rapid spot tests showed that the majority of salt consumed by the population was not iodized at that time (1).

After Independence in 1991, official concern about the poor iodine situation became first evident in a Decree of the Kyrgyz Government in 1994, named “National Program for Preventing Conditions related to Iodine Deficiency, 1994-2000”. UNICEF started assisting local salt processing enterprises in improved iodized salt manufacturing, and information activities were begun to inform the public and to insert the essential knowledge in the regular education curriculums. The sanitary-epidemiological services (SES) of MOH adopted rapid test kits and laboratory titration in regular spot checks at production and retail, and the capacities of researchers and salt manufacturers were strengthened in training workshops. While all these activities helped to boost the production by Kyrgyz enterprises (2), overall progress toward USI was uneven (3) and the aim to protect the population against IDD fell short of expectations. By 2000, only 27% of the salt consumed by the Kyrgyz population was adequately iodized (4).

In January 2001, the Kyrgyz Government enacted a Law on IDD prevention which prohibited the import and sale of non-iodized salt for human and animal consumption and prescribed the use of potassium iodate at 40±15mg iodine/kg salt, in line with the CIS Agreement. In the same year, the State Committee on Standardization and Metrology issued a normative standard for iodized salt and included the product in the list of foods for compulsory certification prior to its release on the markets. A multi-sector Kyrgyz delegation at the regional joint UNICEF-ADB Almaty Forum in October 2001 (4) developed an action plan to further develop the national capacities in salt iodization, law enforcement and monitoring of the salt supplies and population status, together with actions to raise the public’s acceptance and improve accountability by periodic public reporting. The plan was officially adopted by the Government in 2002, followed by the launch of the “National Program for Decreasing IDD in Kyrgyz Republic, 2003-2007”.

In March 2003, the small local salt enterprises coalesced in a Kyrgyz Association of Salt Producers, and Government decided to lift the previous import tariffs on fortificant and equipment. Nevertheless, illegal imports by domestic traders continued posing an obstacle to reaching USI by their persistent supply of non-iodized salt on the Kyrgyz markets. In view of the lenient enforcement practices, the Kyrgyz-Swiss-Swedish Health Project started supporting the village health committees and health workers of Naryn province in their use of rapid salt test kits as a tool to persuade the traders and retailers to accept only

iodized salt from their suppliers (3). During a 2-year campaign in households and retail outlets, a quantum increase occurred in the supply of iodized salt in the province. By using only test kits specific for potassium iodate, the testing campaign also helped shifting the share in the trade channels away from salt iodized with potassium iodide, the less stable fortificant. These campaigns have since then been extended to other provinces with similar success in raising the iodized salt supplies. In 2006, the Multiple Indicator Cluster Survey by the Kyrgyz National Statistical Committee found adequately iodized salt in 76% of the households (5).

There are no viable deposits of salt fit for human consumption in Kyrgyzstan. In 2000, 3 small companies had begun processing non-iodized salt imported from deposits in Kazakhstan, together supplying ±5,300 ton of iodized salt. Imported salt, mostly from Aral Tuz in Kazakhstan, covered 70 percent of the national salt requirement at that time. The technical, material and training support since that time by the Asian Development Bank and UNICEF have accompanied a gradual growth of the local processing industries and by 2006-2007, ±15 local salt enterprises were supplying 13,000 ton of iodized salt a year, or ±65% of the estimated national needs. At the same time, the Kyrgyz salt enterprises also started adopting self-reliant input procurement and quality assurance practices (6). The vigorous price competition in the market is testimony of a vibrant industry. Presently, ±25% of the national edible salt requirement of 16,000 – 18,000MT/y is imported as packed iodized salt from suppliers mainly in Kazakhstan (AralTuz) and Belarus (Polese), and from Tajikistan (Koni Namak) and Uzbekistan (various brands). The remaining 12,000 – 13,500MT/y is imported as non-iodized edible salt from salt deposits in Kazakhstan (mainly TarasTuz, Suzak and Balkash in Zhambyl Oblast) and Uzbekistan (Karakalpakstan and Sukhandarya). Some 15 small and medium-sized Kyrgyz enterprises are processing and iodizing this salt, with or without prior washing and/or drying. Salt for household use is packaged in LDPE of 800 - 1,000g for retail although also loose non-iodized salt is on sale in the markets. An unknown share of the national salt supply is purchased by the food industries which use salt in the manufacturing recipe. Among these industries, the bread bakeries are most important in view of the major role of bread in the common dietary consumption.

A national iodine survey was conducted at the end of the 2nd national program using the standard 30x30 design to collect population indicators of supply, consumption and impact (7). The regular school-based sampling of 8-10y old children was extended by also enrolling 20 pregnant women in prenatal clinics at close distance to each school. The 580 women in total were on average 22w pregnant; 146 (25%) women were in their 1st, 223 (38%) in their 2nd and 211 (36%) in their 3rd trimester of pregnancy. Sample and information collection included household salt and brand name, casual urine and thyroid volume by ultrasound. UI concentrations were analyzed in the Endocrinology Dispensary of Bishkek, accredited by EQUIP with UNICEF support (8).

The survey yielded 27 different salt brands, 21 of domestic origin. The iodine content in household salt brought by the children and the women were not significantly different. The median iodine content in all the salt samples (Figure 1) was 11.2mg/kg; 39.5% of the samples were ≥15mg/kg and only 15.0% fell in the compulsory range of 25-55mg/kg for supply. Imported salt made up 27% of the samples with a discernable brand name and the iodine content in imported salt brands was 22.7mg/kg, more than twice as high ($p<0.001$) as the median of 10.2mg/kg in domestic salt.

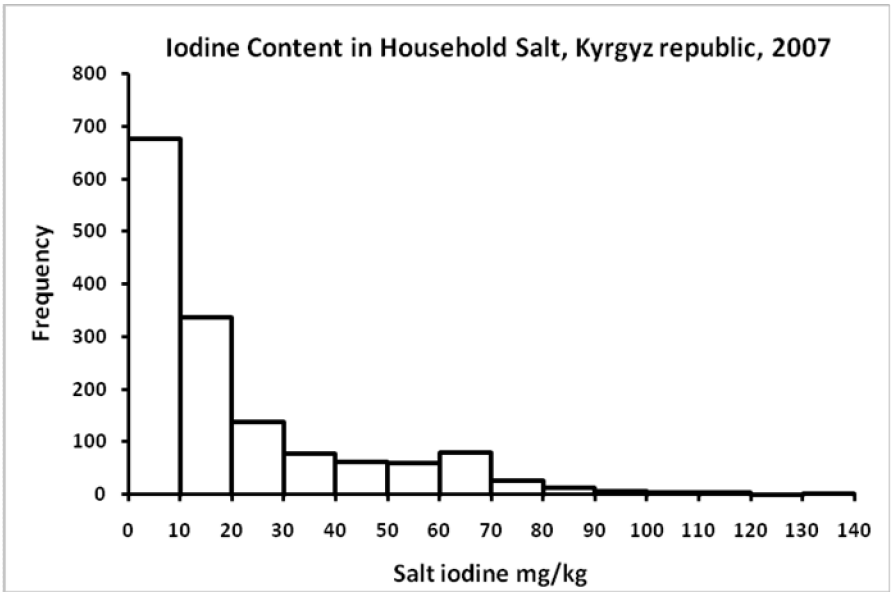

Figure 1: Histogram of iodine content in household salt, Kyrgyzstan, 2007

Analysis of salt iodine content by manufacturer (Figure 2) indicated that the difference was essentially attributable to the iodine content in one single imported salt brand (Polese of Mozyr Salt Company, Belarus, Code O in Figure 2).

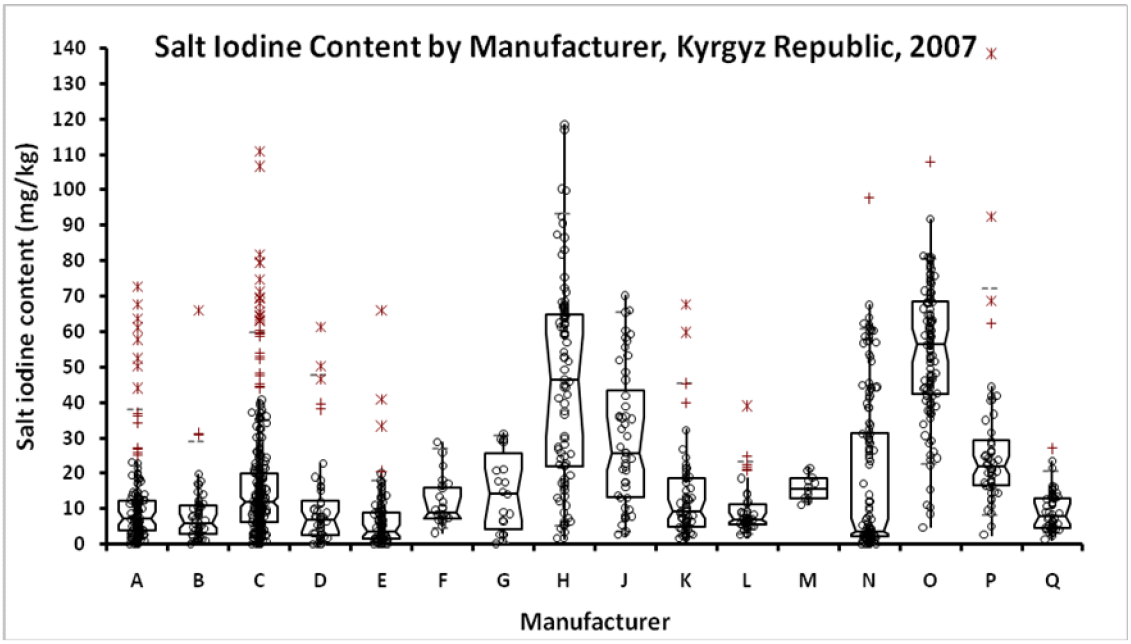

Figure 2: Comparison of iodine content in household salt by manufacturer, Kyrgyzstan, 2007. Domestic sources are coded A through M; N through Q are imported salt brands

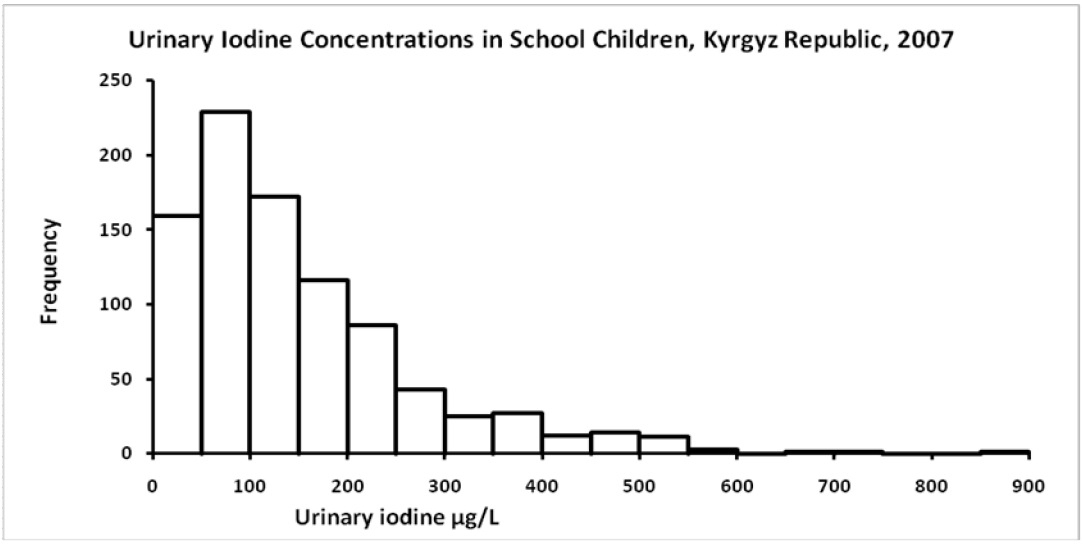

Figure 3: Histogram of UI concentrations in school children, Kyrgyzstan, 2007

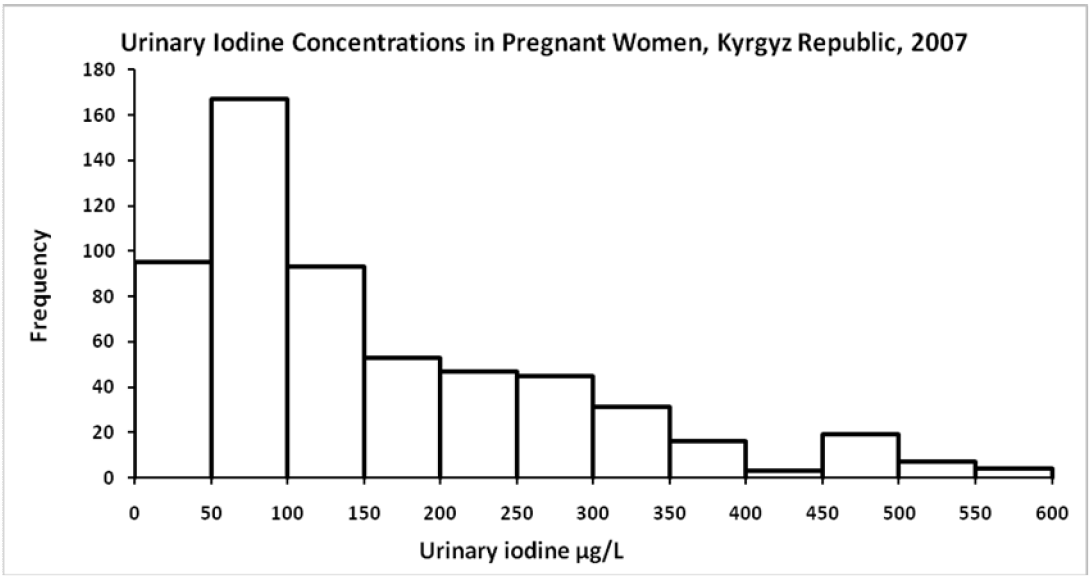

Figure 4: Histogram of UI concentrations in pregnant women, Kyrgyzstan, 2007

The UI concentrations among the children (median 114µg/L) and the pregnant women (111µg/L) were not significantly different. In children (Figure 3), 43.1% of the UI values were <100µg/L, 32.0% fell between 100 and 199µg/L and 24.9% had UI ≥200µg/L. In pregnant women (Figure 4), 61.2% of the UI concentrations were <150µg/L, 17.2% were in the range of 150-249µg/L and the remaining 21.6% was ≥250µg/L. The UI levels in women and children were strongly correlated ($r=0.63$; $p<0.001$).

The thyroid volume of the pregnant women (median 7.9ml) was significantly larger ($p<0.001$) than in the children (2.8ml). Based on the age-reference, the prevalence of elevated thyroid volume (i.e. goiter)

in children was 5.2%. An analysis by pregnancy semester revealed a significant (p<0.001) increase of the women's thyroid size with pregnancy duration Table 1).

Table 1: Thyroid volume (ml) in pregnant women by trimester, Kyrgyzstan, 2007

Stage of pregnancy	N	Median	95% CI
Up to 13 weeks	146	6.9	6.3 - 7.6
13 to 26 weeks	223	7.5	7.1 - 8.1
27 weeks and above	211	8.6	8.1 - 9.1

The UI concentration of the children as well as the women was strongly related to the supply source of the salt used in the households (Table 2). Compared to households with domestically produced salt, the UI of each group was higher by 30-40µg/L in households using imported salt.

Table 2: UI concentrations in children and women by supply source of salt in the household, Kyrgyzstan 2007

Salt supply source	School-age children				Pregnant women			
	N	Median	95% C.I.	*P*-value	N	Median	95% C.I.	*P*-value
Domestic	659	105	98 - 113	<0.001	391	102	92 - 120	<0.001
Imported	222	147	126 - 176		160	132	111 - 169	

Table 3: Associations between the iodine content in household salt and UI levels in school children and pregnant women, Kyrgyzstan, 2007

	Risks of low UI		
Iodine level in household salt	Odds Ratio	95% C.I.	*P*-value
School children, low UI <100µg/L			
0 -4.9mg/kg	1.36	1.11 - 1.65	<0.01
5 - 14.9mg/kg	1.41	1.18 - 1.69	<0.001
≥15mg/kg	1 (reference)		
Pregnant women, low UI <150µg/L			
0 -4.9mg/kg	1.46	1.25 - 1.71	<0.001
5 - 14.9mg/kg	1.23	1.05 - 1.45	<0.05
≥15mg/kg	1 (reference)		

A strong relationship existed between the UI levels of the household members and the salt used in the household (Table 3). Compared to households using adequately iodized salt (≥15mg/kg), the women as well as the children who were living in households with salt iodized at less than 15mg iodine/kg had significantly higher likelihoods of low UI concentrations.

Thus, the survey revealed a high dependence of the Kyrgyz population's iodine status on the iodization level of household salt. Virtually all the salt for household use was found iodized, but the amount of added iodine typically did not reach beyond 10-15mg/kg salt. While these levels are sufficient to ensure a positive reaction on rapid testing, they fall clearly below the legislated level of 25-55mg/kg. Of the ±30 salt brands collected in the survey, only two (one domestic and one imported) reached the mandated level on average. The dietary iodine consumption by pregnant women fell short by some 25-30% of their RDA. That the pregnant women were indeed iodine deficient was confirmed by finding an increase in thyroid gland volume (goiter) with the duration of pregnancy.

Therefore, for reaching the goal of IDD elimination in Kyrgyzstan, it had increasingly become important to make sure that all the Kyrgyz enterprises iodize the salt supply at the legally required levels. This central issue has been increasingly recognized by the partners in Kyrgyzstan. During 2008, a quick salt situation analysis among the major salt enterprises led to specific recommendations to improve the iodization practices (9), with particular reference to the systematic use of technology and the provision of training in quality assured production, which was in large part accomplished.

Figure 5: Salt iodine measurement with the WYD spectrophotometer

To re-invigorate the collaboration among partners, an assessment of the practices in the salt enterprises was undertaken during fall 2009, followed by a Round Table in Bishkek to jointly consider the next steps (10). The assessment revealed that the 3 medium-scale Kyrgyz salt enterprises apply a washing -drying step prior to crushing and iodization, but no small enterprise has this capacity. All the enterprises use a screw-conveyor for mixing crushed salt with the added potassium iodate solution and, therefore, mixing quality of the end product is not an issue of significance. Salt producers report obtaining the fortificant mostly through intermediary traders in China, Uzbekistan, Kazakhstan and/or among each other. The purchase price quotes range typically from 1,300 to 1,800 Som/kg (30-40US$). This compares to world prices f.o.b. from reputable producers that fluctuate around 22.5-25US$. All the managers expressed concern about the difficult access to reliable (certified) KIO_3. In only one case was the KIO_3 observed to have been certified by the original source. Six enterprises were found to be in possession of a WYD

spectrophotometer (Figure 5) and all of these, except one, had a technician who was trained in the procedures of internal quality assurance. Of the 6 enterprises that did possess a WYD, only 3 were found to use it properly, and systematically record the data in a logbook, and use the measurement results for adjustment of the amount of iodate solution added in production.

Figure 6: A Tandoori bread baker in Bishkek uses iodized salt

In terms of the use of iodized salt in commercial food processing, the mission observed that the tandoori bread bakeries were generally using iodized salt (Figure 6), which was sourced from the same markets where the households do their shopping. In their own words, the bakers did not wish "putting the good quality of their bread at risk by using bad quality salt". The bread bakers considered this a regular and justified expense for their business which then is recouped in the bread price for the customers. Large bread factories in Bishkek (Aral Tuz salt) and Jalalabad (AkTuz) were also found to use iodized salt but a large bread factory in Osh used non-iodized salt, in contravention of legal requirements.

From 2004 onward, large-scale rapid salt testing in the households and market channels of all Oblasts have succeeded in moving the salt supply to almost universally iodized. Working with the NGO AYKIN, the Swiss Red Cross has recently started to devise salt sampling schemes in consumer markets for salt iodine measurements. The planned next step is to widely publish and spread information among the public each quarter on the quality of the iodized salt brands, thereby exposing the non-performing enterprises and influencing consumer preferences.

The Round Table in Bishkek in September 2009 drew participants from all relevant partners –salt producers, officials of SES, MOH, Standardization & Metrology, NGOs, UNICEF and Swiss Red Cross, as

well as the press and several Parliamentarians. The meeting was chaired by the Chief Public Health Inspector, MOH. Major immediate issues for presentation and discussion included:

a. Secure and stable access by all the Kyrgyz salt enterprises to quality-assured, affordable KIO_3
b. Complete the development of QA capacity for quality iodized salt production in all the Kyrgyz salt enterprises
c. Revive the National Coalition for oversight and decision-making on USI for IDD elimination

The Chief Public Health Inspector took this re-invigoration seriously. In October 2009, he chaired a meeting with all salt enterprises in which next steps were announced in facilitating easier access to the fortificant through a reputed national trading firm. At the same meeting, a new (female) Chairperson was elected for the Kyrgyz salt Producers Association who started working with SES to complete the capacity building of all enterprises in improved quality assurance practices.

Concluding, the experience of progress to reach USI in the Kyrgyz Republic is one of intermittent public-private-civic collaboration, accompanied by tentative official follow-through in enforcement of the agreed-upon norms and standards laid down in a principle USI law. All the salt for human consumption in Kyrgyzstan is imported; one quarter in the form of packed iodized salt from different origins, one of which is properly iodized. The remainder of the national iodized salt supply is processed in approx. 15 domestic enterprises that have sufficient technological and managerial capacity for proper iodization but generally minimize the amount of iodine added in their salt supplies due to difficult access to the fortificant. A major factor in the improved iodized salt supplies has been the ongoing community-based rapid salt testing throughout Kyrgyzstan which denies a market to those traders who continue supplying non-iodized salt. Small food producers, such as tandoori bread bakers, are using iodized salt which they source from the consumer markets, but it is unknown whether the large bakeries and other food manufacturers are using iodized salt. Although the official monitoring of the iodized salt supplies at import, production and retail has continuously been weak and hesitant, Kyrgyzstan has strong capacity for population consumption and impact monitoring by the scientific community. A multi-sector national coalition which was established at the start of the national program 2003-2007 was recently revived, as has a Kyrgyz Association of Salt Producers, thereby rekindling the hope for accelerated progress to reach the USI goal for IDD elimination in the near future.

Participation of national officers in UNICEF-supported regional and international meetings:

- Joint Workshop on the Elimination of Iodine Deficiency Disorders, Ashgabad, Turkmenistan, Economic Cooperation Organization, UNICEF, WHO, June 1994
- Almaty Forum, 2001: Launch of the JFPR project “Improving nutrition of poor mothers and children in Asian countries in transition”. Almaty, Kazakhstan, October 2001 (Asian Development Bank and UNICEF)
- Mini-Round Table on fortification standards, regulation, quality assurance and control. Tashkent, Uzbekistan, June 2002 (Asian Development Bank and UNICEF)

- Workshop on Strengthening Strategies for the Elimination of Micronutrient Malnutrition in CARK. Almaty, March 2003 (UNICEF, CDC and Asian Development Bank)
- Regional Workshop for Salt Producers of Central Asia and Mongolia. Bishkek, Kyrgyzstan, July 2004 (Asian Development Bank and UNICEF)
- Almaty Forum, 2004: Sustainable Food Fortification in Central Asia and Mongolia. Almaty, Kazakhstan, September 2004 (Asian Development Bank and UNICEF)
- Training workshop to improve the monitoring and evaluation of micronutrient fortification of salt and flour in Central Asia Republics and Kazakhstan (CARK). Almaty, Kazakhstan, October 2004 (UNICEF, Asian Development Bank, CDC and MOST)
- Second Regional Conference of Salt Producers of Central Asia and Mongolia. Tashkent, Uzbekistan, November 2005 (Asian Development Bank and UNICEF)
- Almaty Forum, 2007: Towards Sustainable Food Fortification in Central Asia and Mongolia. Almaty, Kazakhstan, October 2007 (Asian Development Bank and UNICEF)

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