

Elimination of iodine deficiency disorders from the Americas: a public health triumph

Historically, iodine deficiency disorders affected most countries of the Americas. But now, the American continent is celebrating the elimination of iodine deficiency disorders, a remarkable achievement highlighted at the Micronutrient Forum Global Conference in Cancun, Mexico, on Oct 24–28, 2016. The challenge now is to sustain this achievement.

Iodine deficiency causes goitre, impairs reproductive health and lowers IQ; this spectrum of disorders is termed the iodine deficiency disorders.¹ Iodine deficiency disorders were historically widespread in the Americas because of iodine-poor soils, particularly in mountainous areas. Reports during European colonisation described endemic goitre and cretinism in native Americans.² In the early 20th century, iodine deficiency disorders were recognised as a public health problem in most of the countries of the American continent. Endemic goitre was particularly severe in the mountain ranges extending from the Pacific northwest, through Mexico and Central America, and the Andes, to the southern tip of Chile. For example, in the goitre belt in the USA and Canada until the 1920s, which included the Pacific northwest, the midwest and the Appalachians, 26% to 70% of school-age children had goiter.² According to WHO,² based on surveys in Latin America in the 1930s to 1960s, most countries had regions where the goitre prevalence was higher than 50% (figure, A).²

Recognising the severity of the problem, the Pan American Health Organization (PAHO) and WHO founded the Technical Group on Research in Endemic Goiter in 1961, headed by Prof John Stanbury from Harvard University. In a series of meetings between 1963 and 1983, the group defined the diagnosis and health consequences of iodine deficiency disorders and made recommendations for prevention using iodised oil and iodised salt. Pioneering studies in the region identified iodine deficiency during pregnancy as a cause of irreversible foetal brain damage,³ and this led to a call for the elimination of iodine deficiency disorders as an urgent global health priority at the World Summit for Children in 1990. This spurred a commitment by national governments throughout Latin America, working in partnership with UNICEF, PAHO and WHO, and the

International Council for the Control of Iodine Deficiency Disorders (ICCIDD, now the Iodine Global Network). The active presence of ICCIDD in the region since the 1980s has been instrumental in establishing multi-stakeholder coalitions responsible for the sustained success of national universal salt iodisation programmes.

From the 1940s to the 1990s, most American countries passed legislation on iodised salt (table). Canada and Costa Rica were the first to mandate iodisation of table salt in the 1940s, and the iodised salt programme in Canada continues to provide adequate iodine to the population: today the national median urinary iodine concentration, the WHO-recommended biomarker of iodine status of populations, is 174 µg/L,⁴ indicating adequate iodine intake.¹ The Latin American ThyroMobil study in 2004⁵ documented the remarkable success of iodised salt programmes using standardised urinary iodine concentration methods and thyroid ultrasound: iodine deficiency disorders had been eliminated in all but one of the 13 countries surveyed in that year.⁵ Among the WHO regions, the Americas have had the highest proportion of households consuming well iodised salt for the past two decades.^{1,6} As a result, in 2016, the national median urinary iodine concentration

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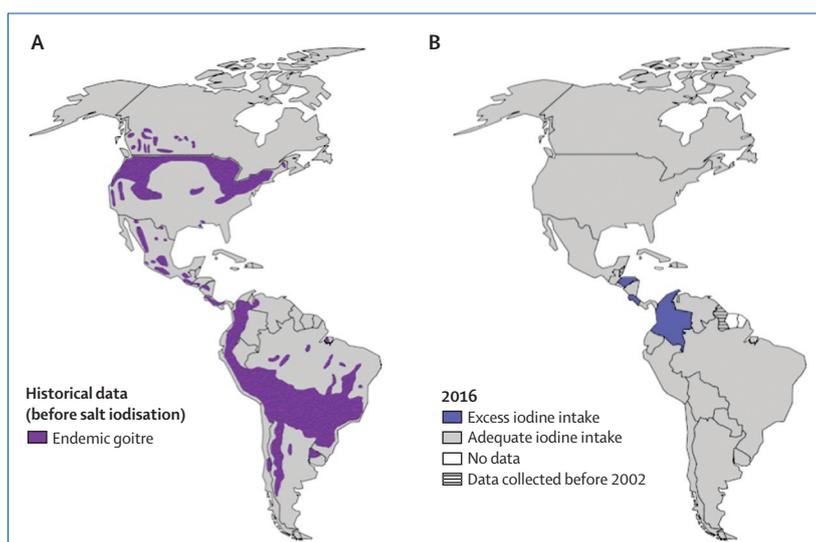


Figure: Map of iodine status in the Americas

(A) Presence of endemic goitre before salt iodisation (adapted from maps in Kelly and Snedden²). (B) In 2016, median urinary iodine concentrations based on national or pooled subnational data in school-aged or preschool-age children.^{4,7}

indicates adequate iodine intake at the national level in nearly all countries in the region (table and figure, B).⁴

The great challenge now is sustainability. The key factors for sustaining optimal iodine nutrition in the Americas are: (1) government commitment to universal salt iodisation, including enforcement of mandatory legislation; (2) salt industry support to ensure sustained production of high-quality, well iodised salt; (3) use of iodised salt by the food industry; (4) regular monitoring of iodine status to identify programmes that are not working and require remedial action; (5) awareness of the consequences of iodine deficiency among governments, salt producers, and the general public; and (6) recognition that salt iodisation and salt reduction are compatible and synergistic health policies.⁸ At the same

time, excessive intake of iodine from overiodised salt can increase thyroid disorders (figure, B)⁹ and should be avoided through regular monitoring and adjustment of salt iodine content.¹ Elimination of iodine deficiency disorders from the Americas is a public health triumph, but complacency should be avoided, and national governments need to be reminded that iodine deficiency disorders will recur if iodised salt programmes falter.

Eduardo A Pretell, Elizabeth N Pearce, Sergio A Moreno, Omar Dary, Roland Kupka, Małgorzata Gizak, Jonathan Gorstein, Ruben Grajeda, *Michael B Zimmermann
 Universidad Peruana Cayetano Heredia, Lima, Peru (EAP); Section of Endocrinology, Diabetes & Nutrition, Boston University School of Medicine, Boston, MA, USA (ENP); Asociación Mexicana de la Industria Salinera AC, Mexico (SAM); Nutrition Division, Office of Maternal and Child Health and Nutrition, Bureau for Global Health, United States Agency for International Development, Washington, DC, USA (OD); Department of Nutrition, Harvard TH Chan School of Public Health, Boston, MA, USA (RK); UNICEF Headquarters, New York, NY, USA (RK); Laboratory of Human Nutrition, ETH Zürich CH-8092, Switzerland (MG, MBZ); Department of Global Health, University of Washington, Seattle, WA, USA (JG); Pan American Health Organization, Washington DC, USA (RG); and The Iodine Global Network, Ottawa, ON, Canada (EAP, ENP, SAM, OD, RK, MG, JG, MBZ)
 michael.zimmermann@hest.ethz.ch

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	Year of introduction of iodised salt legislation	Median urinary iodine concentration (µg/L) in school-aged children
Argentina	1967	123
Belize	..	184†
Bolivia	1968	191
Brazil	1953	277
Canada	1949	174‡
Chile	1959	252
Colombia	1955	415
Costa Rica	1941	314
Cuba	1990	176
Dominican Republic	1994	223
Ecuador	1968	162
El Salvador	1961	206
Guatemala	1954	144
Guyana	..	169†
Haiti	..	128¶
Honduras	1960	356
Mexico	1963	297
Nicaragua	1969	196
Panama	1955	291
Paraguay	1958	296
Peru	1969	262
Uruguay	1961	248
USA	1920s	213
Venezuela	1966	180

A median urinary iodine concentration of more than 100 µg/L indicates sufficient population iodine intake. *WHO countries with urinary iodine concentration data in school-age children from surveys conducted between 2002 and 2016.⁴ †Survey conducted before 2002. ‡Weighted average of median urinary iodine concentration in boys and in girls (calculated by MG at ETH Zurich). ¶Based on a 2016 subnational urinary iodine concentration study in preschool children.⁷ ..=legislation not introduced.

Table: Year of introduction of legislation* for iodised salt in the Americas and urinary iodine concentration in 2016, by country^{4,7}