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Malnutrition and the Role of the Soft Drink Industry in Improving Child Health in Sub-Saharan Africa

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Undernutrition is the single largest risk factor for disease and global child mortality, according to the World Health Organization. In childhood, growth is the most important indicator of health with undernutrition, or an inadequate intake of nutrients, resulting in underweight, wasting, or stunting.¹ Improving the world's nutrition is viewed as the most effective form of international aid.² The effects of undernutrition on childhood growth and development in the first 2 years of life are irreversible. Exclusive breast-feeding, appropriate complementary feeding, adequate nutrient intake by pregnant women, and micronutrient supplementation are viewed as some of the best preventive measures to reduce the incidence of undernutrition in children younger than 5 years.²

In the developing world, centralized fortification programs are being developed to address the most commonplace micronutrient deficiencies including vitamin A, iodine, and iron deficiencies.³ The most desired foods for fortification include foodstuffs that the majority of the population regularly consumes, particularly those at greater risk for deficiencies. Vehicles for fortification include wheat flour, maize meal, salt, sugar, and cooking oil. Some African countries have already attained high levels of iodized-salt coverage, and Nigeria and South Africa have begun an iron-fortification program with wheat flour.³ The long-term goal of fortification programs is to fortify multiple staples to have the greatest impact on raising micronutrient levels. Some fortification programs have been shown to have some success, including iron-fortified foods that have resulted in a 70% reduction in the prevalence of anemia in school-aged children and an increase in hemoglobin concentrations by 7.4 g/L in children provided with iron-fortified foods in comparison with control-group children.⁴ In Central America, vitamin A–fortified sugar contributes to more than 50% of the vitamin intake in preschool-aged children.⁵

However, one of the greatest roadblocks to successful African food-fortification programs is the limited reach of these programs in some areas due, in part, to the continued existence of small-scale production and home processing of staple foods such as wheat and flour. In some cases, only a small proportion of the population benefits from large-scale fortification programs.³ Other concerns include the stability of certain micronutrients, such as vitamin A in oils or sugar, that could be lost during the cooking process (particularly in the deep-frying that is common in many West African dishes) or during the storage process.⁶

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MALNUTRITION AND OBESITY IN CHILDREN

In developed, industrialized countries, the growing epidemic of childhood obesity, or overnutrition, which is another form of malnutrition, is now of primary concern. Public response includes removal of energy-dense foods of limited nutritional value and beverages such as soft drinks, including sugared drinks from many US school districts, and limiting consumption of these beverages for the general population. Such public-policy efforts are supported by the American Academy of Pediatrics, and pediatricians are encouraged to work with their school districts to address preventive measures for obesity.⁷ In the United States, physicians and public health officials are also at the forefront of policy changes to limit consumption of sweetened beverages, including recent efforts to push for state taxes on sugared beverages⁸ and limit television and other media⁹ advertising.

In contrast to the attention to overnutrition by physicians, media, and public officials in the industrialized world, few have questioned the possible adverse health effects from sweetened beverages and sodas that perpetuate problems of undernutrition in children, pregnant women, and other vulnerable populations in the developing world. In sub-Saharan Africa, for example, distribution of soft drinks and other beverages produced by soft drink companies is extensive, and consumption is high given the extensive poverty in this part of the world, but little attention is given to address the problem.

SOFT DRINK CONSUMPTION AND PRODUCTION IN SUB-SAHARAN AFRICA

Daily, ~78 million servings of Coca-Cola products are consumed in sub-Saharan Africa and sold by 900 000 retail partners.¹⁰ Coca-Cola is the largest supplier of carbonated beverages to African markets, whereas PepsiCo and Cadbury-Schweppes have smaller shares of the market. For example, annual per-capita consumption of Coca-Cola in 2008 was 27 servings of 8 oz of beverage in Nigeria, 36 servings in Kenya, and 252 servings in South Africa, compared with the world average of 85 servings per capita per year.¹¹ As points of reference, many European countries have consumption in the 100-to 200-serving range for Coca-Cola products. Poland is at 108, France is at 130, Italy is at 141, and Germany is at 179; China has a comparably lower consumption of 28 servings per year.¹¹ Annual consumption of all products from soft drink companies (including bottled water, carbonates, concentrates, fruit juices, and still drinks) reaches 35 L per person in Nigeria¹² and 116 L per person in South Africa¹³; the global average is 82.5 L per person.¹⁴ In some African markets, soft drink companies such as Coca-Cola Bottlers are also producing favorite local beverages such as nonalcoholic malt beverages in East Africa (Kenya, Tanzania, and Uganda).¹⁵ Costs of Coca-Cola products are kept low in African markets (~20–30 cents), less than a cost of a newspaper, so that they are affordable to the population.¹⁶

Meanwhile, for children younger than 5 years in sub-Saharan African countries (2000–2007), rates of stunting (38% [Nigeria], 30% [Kenya], and 25% [South Africa]) and moderate-to-severe underweight (29% [Nigeria], 20% [Kenya], and 12% [South Africa]) are high.¹⁷ Micronutrient deficiencies are common; for example, 67.6% of African preschool-aged children have iron-deficiency anemia,¹⁸ and 44.4% of preschool-aged children have vitamin A deficiency (<70 $\mu\text{mol/L}$).¹⁹ Inadequate zinc intake is also common throughout southern and central Africa; prevalence rates range from 37% to 62%.²⁰ Zinc supplementation is estimated to reduce stunting to 17.4% at 36 months,⁴ and vitamin A supplementation is associated with reduced risk of stunting and underweight.²¹

That consumption of Coca-Cola products is higher in South Africa compared with many European countries underscores the importance of intervening in soft drink companies'

marketing efforts before further increases in urbanization and economic transition occur in other African countries. Much of the consumption begins at an early age, particularly in the urban areas. Theron et al²² recently reported that cold, carbonated drinks such as Coca-Cola products were the third most commonly consumed food/drink item among urban South African children (aged 12–24 months), following maize meal and brewed tea but more than milk. In the urban area Ibadan, Nigeria, 16% of children aged 6 to 18 months were given soft drinks a minimum of 1 time per day as a weaning drink. In addition, 46% of mothers provided infants with chocolate beverages daily, and 45% gave fruit juices, which attests to the high consumption of sweetened beverages among very young children in certain areas of sub-Saharan Africa.²³ Similarly, Kiwanuka et al²⁴ found that 24% to 37% of older schoolchildren (aged 10–14 years) in the urban area of Kampala, Uganda, drank soda daily over the 5-day survey period. Consumption is also high in rural areas. For example, in remote rural areas in KwaZulu-Natal Province, South Africa, children between 4 and 24 months of age were consuming sodas 2 to 3 times per week.²⁵

Table 1 shows the relatively high soda-consumption levels in African countries of Coca-Cola products in relation to European and Asian countries, despite the poor child health outcomes and lower gross national income in the African countries. In addition, as described above, it is likely that consumption rates are higher in certain subsectors of the population, including children, and that overall total consumption of sweetened beverages is much higher when fruit juices and other sweetened beverages are included in overall consumption (in addition to carbonated products). Furthermore, Coca-Cola projects that the nonalcoholic ready-to-drink beverage industry will grow ~6% per year for the next 12 years; much of the growth will come from emerging markets. Retail sales are estimated to expand by more than \$600 billion by 2020.¹¹ Coca-Cola has also announced that it will double its investments in African markets in 2010 (up to US \$1 billion) and pay particular attention to bottled-water and fruit-juice products.²⁶

The sale of bottled water, in particular, is expected to grow rapidly in African markets, because of the poor quality of potable water in many areas, and may serve as an ideal vehicle for fortification.²⁷ In Nigeria, bottled-water sales have increased 90% since 2003 and are expected to grow an additional 43% by 2013.²⁷ In Kenya, bottled water accounts for 35% of the volume of beverages sold (after carbonated soft drinks) and is expected to grow 42% in the next 3 years.²⁸ Access to safe, clean, bottled water in sub-Saharan Africa also serves the dual purpose of providing water in areas where clean water may not be easily available. According to the United Nations Children's Fund (UNICEF), as of 2006, only 40% to 42% of rural Africans had access to improved drinking-water sources (including public standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater) in central/south and eastern Africa.²⁹

The consumption of soda and other sweetened beverages in sub-Saharan Africa has mostly escaped analysis, because attention has been focused on the economic investments these companies have made. For example, in sub-Saharan Africa, Coca-Cola has at least 60 000 employees, >160 bottling plants, and >900 000 retail outlets, which makes it the continent's largest private-sector employer.¹⁰ First established in Johannesburg, South Africa, Coca-Cola now operates in almost all sub-Saharan African markets, and much of its success in Africa can be attributed to its distribution scheme.

SODA COMPANIES: PART OF THE SOLUTION?

A paradigm shift is essential in approaching these companies, which are in an ideal position to address malnutrition in the developing world and assist with providing access to safe, clean water. In urban and periurban areas in Africa, Coca-Cola operates through manual

distribution centers (MDCs) (eg, using bicycles, pushcarts, and boats) to access individual sellers who are sometimes located in corner stores, kiosks, and small neighborhood restaurants or even street vendors in hard-to-reach areas.³⁰ The manual-distribution-center model has been praised in business circles for its success in helping to distribute products in remote locations and where classic models of distribution have not been effective.³⁰ Given the extensive distribution routes and infrastructure already present for distribution of beverages such as Coca-Cola products in sub-Saharan Africa, such soft drink companies are in a position to substantially and positively affect the problem of malnutrition in children and pregnant women. Similarly, the non-for-profit ColaLife (www.colalife.org) has been organized around the guiding principle that Coca-Cola's distribution routes are ideal for distributing medications to children in sub-Saharan Africa. The Bill Gates foundation recently partnered with Coca-Cola in Uganda to increase production and distribution of mango and passion fruit juice as a way to stimulate production of local mango and passion fruit juice and meet Coca-Cola's demand for increased fruit to stimulate sales; however, such a partnership should also ideally involve micronutrient fortification, because Coca-Cola estimates that this partnership will extend sales in coming years.³¹

The World Economic Forum recommends fortification of food and beverages by private companies as an approach to reduce malnutrition, to boost a productive workforce, and to stimulate the global economy.³² Data have already suggested that micronutrient-fortified beverages can be well-accepted by African communities.³³ The annual cost of selected micronutrients ranges from \$0.01 (for zinc) to \$0.14 (for vitamin A) per person, which makes these fortification programs relatively inexpensive for private industry.³⁴ PepsiCo, which has a much smaller presence in African markets, has already proposed development of a nutritional product for children for its markets in India, South Africa, and Nigeria.³⁵ Although current levels of African consumption of beverages produced by Coca-Cola and other companies are insufficient to be the primary vehicle for addressing malnutrition problems (with the possible exception of South Africa), fortification of select beverages, possibly the bottled waters, could be part of a larger fortification program that includes other common foodstuffs such as wheat or maize flour. One benefit of fortifying drinks produced by Coca-Cola and other large-scale bottlers is the centralization of bottling that occurs for their products. For example, the Nigerian Bottling company manages all bottling of Coca-Cola and associated products in Nigeria at 13 bottling facilities; it distributes and sells 1.8 billion bottles per year.

Care needs to be taken, however, to select which beverages will be fortified and which will be marketed to children. In areas such as South Africa, which are already experiencing relatively high levels of child obesity in certain sectors,³⁶ fortification of low-calorie drinks such as bottled waters or other beverages (owned by Coca-Cola or PepsiCo) that would not concomitantly contribute to the obesity epidemic would be the avenue of choice. According to market forecasts, Coca-Cola plans to increase investment specifically in bottled-water and fruit-juice products in Africa in the coming years, which presents the possibility that these products will reach a greater number of individuals. Furthermore, looking ahead for many of these African areas and markets, public health officials should put pressure on beverage companies to provide a product that both does not contribute to the obesity epidemic and has the potential to provide nutritional benefit. Fortifying bottled waters would also have the added benefit of providing access to safe, clean water in areas that may not have easy availability.

At present, because many of the beverages produced by Coca-Cola and other soft drink companies provide no nutritional value, physicians and public health practitioners working in the developing world need to counsel patients, parents, and the public on the limited nutritional value of sweetened beverages as they are currently formulated. Although calls to

action have emerged to encourage preventive actions against overconsumption, much of this effort reflects the developed world's focus on obesity.³⁷ The documented expanding profits of the soft drink industry in the last quarter of 2009, primarily a result of increased demand and sales volume in the developing world including sub-Saharan Africa, stresses the importance for action by public health representatives and pediatricians to advocate on behalf of children to impact the activities of these companies. Organized societies such as the South African Medical Association and the Kenyan Medical Association need to address the importance of limiting consumption of sweetened beverages in African communities to address all forms of malnutrition, including undernutrition and overnutrition, while pressuring these companies to change their products to provide micronutrient fortification and, specifically, to fortify products such as bottled water, which will not simultaneously contribute to the obesity epidemic.

Furthermore, the American Academy of Pediatrics, the American Academy of Family Physicians, the American Medical Association, and other societies in the developed world should work in tandem with professional and public leaders in developing countries to create appropriate and innovative international/global policies aimed at preventing both undernutrition and overnutrition. Concerted actions are especially important and timely in light of the anticipated expansion of these beverage companies in markets in sub-Saharan Africa and other developing countries.

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Demographic Variables and Child Health Indicators in Relation to Per-Capita Coca-Cola Consumption for Select European, Asian, and African Countries

TABLE 1

Country	GNI (2006), US \$	Mortality Rate ^a	Stunting in Children <5 y Old, %	Underweight in Children <5 y Old, % ^b	Per-Capita Coca-Cola Consumption, No. of Servings ^c
Europe					
France	36 550	4	—	—	130
Italy	32 020	4	—	—	141
Germany	36 620	4	—	—	179
Asia					
China	2740	21	11	7	28
Africa					
South Africa	5390	69	25	12	252
Nigeria	640	191	38	29	27
Kenya	580	121	20	30	26

Data are from the United Nations Children's Fund (2008).¹⁷ GNI indicates gross national income; —, data not available.

^aPer 1000 live births.

^bModerate or severe underweight.

^cBased on a US 8-fl oz beverage. Data are from Coca-Cola's 2008 annual review.¹¹