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Supplement—The Dietary Intake and Eating Habits of the Mexican Population: Results from the National Health and Nutrition Survey 2012

Overview of the Dietary Intakes of the Mexican Population: Results from the National Health and Nutrition Survey 2012[1–3]

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Abstract

Background: Mexico is facing the double burden of malnutrition: stunting and micronutrient deficiencies in young children, iron deficiency in pregnant women, and widespread obesity across age groups.

Objective: The aim was to summarize and discuss findings published in this supplement on dietary intakes and the eating habits of the Mexican population.

Methods: A 24-h recall questionnaire that used the multiple-pass method with a repeated measure in a fraction of the sample was applied in a nationally representative sample. We estimated mean intakes and percentages of inadequacy for macronutrients and micronutrients; mean intakes and percentages of the population who adhere to dietary recommendations for food groups; sources of added sugars; intakes of discretionary foods by mealtime, place, and activity; and mean dietary intakes in children <2 y old.

Results: Infant formula was consumed by almost half of infants aged <6 mo and sugar-sweetened beverages were consumed by two-thirds of children aged 12–23 mo. In the different age groups, a high proportion of the population had excessive intakes of added sugars (58–85%) and saturated fats (54–92%), whereas a high prevalence of insufficient intakes was found for fiber (65–87%), vitamin A (8–70%), folates (13–69%), calcium (26–88%), and iron (46–89%). Discretionary foods (nonbasic foods high in saturated fats and/or added sugars) contributed 26% of the population's total energy intake, whereas only 1–23% met recommendations for legumes, seafood, fruit, vegetables, and dairy foods.

Conclusions: High proportions of Mexicans consume diets that do not meet recommendations. Breastfeeding and complementary feeding diverged from recommendations, intakes of discretionary foods were high, and the prevalence of nutrient inadequacies and age groups not meeting intake recommendations of basic food groups were also high. The results are consistent with the high prevalence of the double burden of malnutrition and are useful to design food and nutrition policies. *J Nutr* 2016;146(Suppl):1851S–5S.

Keywords: Mexican population, national survey, dietary intake, diet, energy intake, dietary recommendations, nutrition policies

Here we introduce and present a brief summary and discussion of the findings described in the articles included in this supplement issue. These articles were part of a symposium entitled "The Dietary Intake and Eating Habits of the Mexican Population: Results from the National Health and Nutrition Survey 2012" presented during the 16th Public Health Research Congress held at the National Institute of Public Health (INSP by its Spanish acronym) in Cuernavaca, Mexico, on 6 March 2015. Furthermore, a summary of the symposium was presented in the workshop "Methodologies Used in Dietary Assessment: A Latin American Vision" in Buenos Aires, Argentina, 15–18 April 2015.

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All of the 8 original research articles included in this supplement are analyses from the 24-h recall automated multiple-pass method (24HR)[7] questionnaire applied to a nationally representative sample from the Mexican National Health and Nutrition Survey (ENSANUT) 2012. The 24HR questionnaire used was developed by an INSP research team in the form of software adapting the USDA automated multiple-pass method to the Mexican context (1). A second 24HR questionnaire, applied to a random subsample of 981 subjects (~9% of participants), allowed the estimation of usual dietary intakes by removing day-to-day variability from the total variance when estimating the prevalence of inadequate consumption (2). Energy adequacy was assessed by comparing individual intake to the person's Estimated Average Requirement (EAR). The EAR for each individual was calculated by using the equations proposed by the Institute of Medicine (IOM) (3).

Mexico is facing the double burden of malnutrition (stunting and micronutrient deficiencies in low-income young children, iron deficiency anemia in pregnant women, and widespread obesity in all age groups) and a high prevalence of noncommunicable chronic diseases (NCCDs) (4–7). The Mexican government has taken a lead role by implementing large-scale programs aimed at preventing stunting and micronutrient deficiencies in low-income children and pregnant and lactating women (8). Furthermore, there are public policies aimed at improving the food environment through reduction in the availability and affordability of unhealthy foods and beverages (e.g., through taxes, restricting presence in schools, and bans on advertisements to children) and through the promotion of healthy foods and physical activity (PA; e.g., through food and PA guidelines in primary health care) (9, 10).

An inadequate dietary intake is a key risk factor for malnutrition in all of its forms; therefore, dietary assessment of a representative sample of the Mexican population is fundamental to understanding the characteristics of the diet that explain the double burden of malnutrition. In addition, dietary assessment may be useful to document the effects of government efforts aimed at improving the diet throughout the life course.

In all of the analyses conducted, we stratified by sex, age categories, geographical regions, area of residence (urban or rural), and socioeconomic status, among other variables, according to the scope of each analysis. The results are presented in 8 articles (11–18). Overall, the results showed that the dietary quality of the Mexican population is poor. We summarize some of the main findings below.

Macronutrient Intakes and Inadequacies

The percentage of energy adequacy was obtained by dividing the total dietary energy intake by the estimated energy requirement with the use of the equations proposed by the IOM (3). The intake needed for maintaining current body weight is 100%. Mean energy adequacy ranged between 90% and 110% for all age and sex subgroups of children aged ≥5 y, adolescents, and adults. The percentage of energy adequacy for children aged 1–4 y was 120% (11).

More than 80% of children, 75% of adolescents, and 65% of adults had fiber intakes below the Adequate Intake established by the IOM according to sex and age (3). Between 58% and 85% of individuals in the different age categories consumed added sugars above the upper limit allowed by the WHO guidelines (10% of total energy intake); >80% of children, 75% of adolescents, and 65% of adults had saturated fat intakes above the limits established by the WHO (10% of total energy intake) (11, 17). The usual intakes of energy, animal protein, added sugars, and saturated fat were higher in urban areas, in the more affluent North region, and in the highest socioeconomic tertile, whereas fiber and complex carbohydrate intakes were higher in rural areas and in the less developed South region (11).

Added-Sugar Sources and Intakes

The mean energy intakes of total, intrinsic, and added sugars were 365, 127, and 238 kcal/d, respectively. Added sugars contributed ~2 times as much energy as intrinsic sugars (127 compared with 238 kcal/d), and to 12.5% of the total energy intake. Sugar-sweetened beverages (SSBs) were the main source of sugars, contributing 69% of added sugars and 45% of total sugar intake. Nonbasic food products that were high in saturated fat and/or added sugar (HSFAS) and mostly processed and packaged foods such as snacks, pastries, desserts, and confectionary foods were the other main sources of added sugars, contributing 25% of added-sugar and 16% of total sugar intakes (17).

Vitamin Intakes and Inadequacy

Vitamins D and E were the vitamins with the highest prevalences of inadequate intakes (i.e., intakes below the EAR) (19, 20), ranging between 77% and 99% in adults and adolescents and from 53% to 95% in children. Intakes of folate and vitamin A were moderately inadequate (47–70% in adults and adolescents, 15–23% in children aged 5–11 y, and 8–13% in children aged 1–4 y), whereas the lowest prevalences were for vitamins B-6, B-12, and C; thiamin; riboflavin; and niacin (0–37% in adults, 1–27% in adolescents, and 0–2.4% in children). For most of the vitamins, the highest prevalences of inadequate intakes were observed in adolescents and adults and in the least-developed strata, such as in rural areas, in the South region of the country, and in the lowest socioeconomic tertile (12).

Mineral Intakes and Inadequacy

Calcium and iron were the most inadequately consumed minerals for the overall population. For calcium, the prevalence of inadequate intakes in children aged 5–11 y, adolescents, and adults ranged from 55% to 88%, whereas in children aged 1–4 y, the prevalence was 26%.

Prevalences of low iron intake were estimated by using the full probability approach, because the distributions of iron requirements are not symmetrical for all population groups and hence intakes below the EAR do not represent the real prevalence of iron inadequacy (19). Iron inadequacies ranged from 62% to 89% among adolescents and adults and between 46% and 52% in children. Inadequacies were much lower when an assumption of high bioavailability (18% as in the US and Canadian population rather than 5.5–7.5% as estimated in 1999 for the Mexican population) was used, ranging from 1% to 22% in all age groups. We used 18% bioavailability as one of the alternatives because there is a segment of the population with diets similar to those of the US population. Otherwise, bioavailability in the Mexican population corresponds to the Mexican diet consumed mostly by rural and low-income

[7] Abbreviations used: EAR, Estimated Average Requirement; HSFAS, high in saturated fat and/or added sugar; IOM, Institute of Medicine; NCCD, noncommunicable chronic disease; PA, physical activity; SSB, sugar-sweetened beverage; 24HR, 24-hour recall automated multiple-pass method.

populations, which is low in animal protein and high in phytates and other dietary inhibitors of iron absorption (21, 22). The percentages of the population with inadequate intakes of zinc were <10% in preschool- and school-aged children and up to 22% in men; prevalences of inadequate magnesium intake were <5% in children and between 25% and 35% in adolescents and adults (13).

Contribution of Food Groups to Energy Intake and Adherence to Recommendations

Analyses of energy intakes from items classified into 8 food groups—6 basic food groups (cereals, legumes, milk and dairy, meats and animal products, fruit and vegetables, fats and oils) and 2 discretionary food groups (SSBs and HSFAS products)—revealed important findings. Results showed that SSBs and HSFAS products contributed 9.8% and 16% of total energy, respectively, in the overall Mexican population, which amounts to one-quarter of the total energy from discretionary foods, well above the maximum limit (10%) allowed by the Mexican Dietary Guidelines (14, 23).

Among basic food groups, the highest dietary energy contribution came from non- or minimally processed cereals (33%), followed by meat and animal products (14%), fats and oils (8.5%), fruit and vegetables (5.7%), and legumes (3.8%). The consumption of legumes, fruit, and vegetables was between 53% and 68% of recommended intakes by the Mexican Dietary Guidelines (14, 23).

In terms of the percentage of the population who adhered to recommendations for key food groups (15), we found that only between 1% and 23% of the overall population met recommendations for legumes, seafood, fruit and vegetables, and dairy. Furthermore, the upper limits of recommendations for SSBs, HSFAS products, and processed meats were exceeded by 78–90%, 58–76%, and 50–91% of the population, respectively, depending on the age and sex group (15).

Intake of Discretionary Foods

With regard to the factors surrounding the intakes of discretionary foods, we found that, compared with breakfast, the dietary energy contribution of HSFAS products to total intake was higher during midafternoon snacks and lower during lunch and *almuerzo* (a brunch or heavy breakfast consumed late in the morning), whereas the energy contribution of SSBs was higher during midmorning snacks. Compared with eating only while seated, the percentage of energy from HSFAS products was higher when watching television. Compared with eating at home, the percentage of energy from HSFAS products was higher when eating on the street, and the percentage of energy from SSBs was higher when eating at school or at work (16).

Food and Beverage Intakes in Children Aged <2 y

More than 50% of children aged <24 mo consumed plain water and meat products and between 42% and 49% consumed fruit and vegetables, maize-based foods, sweetened cereals, sweet bread and cookies, and broths and soups. Results by age subgroups showed that 77.7% of infants aged <6 mo, 48.5% of infants aged 6–11 mo, and 13.6% of children aged 12–23 mo were breastfed. Exclusive breastfeeding was rare; only 14.4% of infants <6 mo old were exclusively breastfed, and 25% of this age group were predominantly breastfed (human milk and nonnutritive liquids). Infant formula was consumed by 47.6% of infants <6 mo old, 33.1% of infants aged 6–11 mo, and 17.9% of children aged 12–23 mo. Nondairy SSBs were consumed by 11.9% of infants aged <6 mo, 35.7% of infants aged 6–11 mo, and 64.7% of children aged 12–23 mo. Snacks and desserts, meat products, maize-based foods, and broths and soups were consumed mostly by infants and children older than 6 mo (18).

Supplement Conclusions

The main conclusion from the set of articles that comprise the present supplement issue is that a high proportion of Mexicans from all of the studied age groups consume diets that do not meet several recommendations and requirements. These results are consistent with the high prevalences of high BMIs (4, 5) and NCCDs (24, 25) in all age groups, which coexist with undernutrition in relatively large proportions of children and women (6, 26, 27).

The results describe a picture of inadequate complementary feeding practices in the first 2 y of life (28) along with high intakes of SSBs and HSFAS products and low intakes of nonprocessed basic foods such as whole-grain cereals, legumes, vegetables, and fruit in all age groups (14, 15). These dietary patterns that favor processed, nutrient-poor foods at the expense of nonprocessed or minimally processed basic foods result not only in high intakes of added sugars and saturated fats but also in low intakes of minerals, vitamins, and fiber. These findings might partially explain the double burden of undernutrition and high BMIs characteristic of the Mexican population (29). The results also show the large degree by which infant feeding practices depart from WHO recommendations (18, 30), with negative implications for their nutrition and health.

The findings showed that >50% of the population had fiber intakes lower than recommended and intakes of added sugars and saturated fats above recommendations; approximately one-quarter of total energy intake was contributed by SSBs and HSFAS. The contribution of these products to >95% of total added sugars also shows inadequate dietary patterns in older children, adolescents, and adults, which may contribute to the high prevalences of obesity and NCCDs in the population. Some of the contextual factors associated with higher intakes of SSBs and HSFAS products were snacking, watching television, playing video games, and eating at work or school or on the street.

To our knowledge, this is the first publication thoroughly describing dietary behavior using ENSANUT 2012, which for the first time used the 24HR multiple-pass method questionnaire and a repeated 24HR measure in a fraction of the sample. A limitation of the 24HR questionnaire is that day-to-day variability is not captured in the reported intake of a single day; therefore, collecting a second 24HR questionnaire on a nonconsecutive day allowed us to account for day-to-day variability when assessing the usual distribution of intakes beyond the mean. In addition, the multiple-pass method is useful to obtain a more accurate recall with less systematic error (31). Energy adequacy results indicate that, for most of the population, the Mexican 24HR instrument collected reliable dietary energy intake information. Energy adequacy estimations were based on IOM equations of energy expenditure to maintain current body weight and PA level, with consideration of energy used for growth in children and by assuming PA levels (3). Because these equations were computed at the individual level for each study subject on the basis of his or her current weight, height, age, and sex, the expectation was to find energy adequacy values of

~100%, and large deviations from this value are likely to be the result of unreliability of the dietary energy intake information collected or poorly estimated PA levels. With the exception of children aged 1–4 y, results of energy adequacy in the rest of the population are within the range of values (±10%) considered to be reliable for dietary instruments (32), although some degree of under- and overestimation may occur. The energy adequacy in children aged 1–4 y was 120%, indicating overestimation of energy intake in this age group. Overall, these results suggest that, for most age groups, the dietary data obtained by using our 24HR instrument are reliable.

These results are useful to inform food and nutrition policies aimed at improving the Mexican diet and support the need to improve the dietary intake of the population throughout life, beginning with actions to promote infant feeding practices recommended by the WHO. These practices include the implementation of the Global Strategy for Infant and Young Child Feeding (30) and strengthening the Baby-Friendly Hospital Initiative (33). The latter initiative was previously successful in Mexico but requires repositioning and reinforcement, monitoring adherence to the International Code of Marketing of Breast-milk Substitutes (34), and legislation to support breastfeeding for working mothers (30). All of these strategies can greatly increase breastfeeding success rates, as has been the case in countries that have implemented these strategies (35).

Furthermore, in view of the inadequate complementary feeding patterns observed in children <2 y of age, strategies such as the nutrition component (Comprehensive Strategy for Nutrition Care; ESiAN by its Spanish acronym) of the Mexican conditional cash transfer program (Prospera, formerly Oportunidades) should be reinforced and evaluated to improve effectiveness (6).

In addition to the promotion of sound infant feeding and young child feeding practices, government policies and strategies aimed at preventing obesity and NCCDs should be reinforced and improved (10). These strategies include the following: *1*) maintaining and strengthening current fiscal policies (e.g., taxing SSBs and HSFAS products) that are effective in reducing purchases of these products (9, 36), *2*) using revenue from fiscal policies for obesity prevention, and *3*) improving the design or implementation of existing policies [e.g., banning unhealthy products (SSBs and HSFAS products) in schools and banning marketing of unhealthy foods to children]. Moreover, given that the mean intake of added sugars is well above WHO recommendations and more than two-thirds of total sugars are added sugars (11, 17), clearer food labels to warn the public about the content of sugars in foods and beverages should be implemented. One recommendation is to reduce the upper limit of total sugar content in foods and beverages allowed in the existing food-labeling guidelines, from the current 18% of total energy to between 5% and 10% according to WHO guidelines (17, 37, 38).

We also recommend that the Mexican Dietary Guidelines, which were recently released by the Mexican Academy of Medicine (23, 39), should be the basis for a national campaign to promote a healthy diet consisting mainly of non- or minimally processed foods, particularly vegetables, fruit, legumes, and whole grains over processed food products and to warn about the negative health effects of the intake of unhealthy products. The results should also be used by sectors other than health and social development, such as agriculture, trade, finance, and education, to design health-oriented public policies that promote the supply of healthy food (production, commercialization, distribution to low-income settings), the use of subsidies to support the supply of healthy food and incorporation of food, and nutrition education in the school curriculum (40).

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