

THE IMPORTANCE OF FORTIFYING CORN MASA WITH FOLIC ACID TO REDUCE HEALTH DISPARITIES IN BIRTH OUTCOMES AMONG HISPANIC WOMEN

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While the incidence of neural tube defect has decreased substantially in the U.S. since the Food and Drug Administration (FDA) instituted fortification of grains and cereals with folic acid in 1998, racial/ethnic disparities persist. Hispanic women continue to experience the highest rates of neural tube defects, with rates highest among less-aculturated Mexican-origin women. The two most common neural tube defects are spina bifida, a spinal defect affecting lower extremity functioning, and anencephaly, in which the brain does not fully develop. Anencephaly is incompatible with life, and affected babies die shortly after birth. An investigation by the Washington State Department of Health reveals that three counties in central Washington state experienced a high rate of anencephaly 2010-2014, with 60% of the cases being births to Hispanic women. Extending folic acid fortification to corn masa flour could begin to address the racial/ethnic disparities in neural tube defects that persist nationwide.

Fortifying Grains with Folic Acid - A Public Health Policy Success Story

In 1996, the FDA added folate to the list of nutrients required for addition to enriched breads, flours and grains based on a 1992 CDC recommendation that all women of childbearing age consume folic acid prior to pregnancy to reduce the incidence of neural tube defects¹. There is widespread agreement that this policy has been successful in contributing to reductions in the overall incidence of neural tube defects in the U.S.², with the incidence decreasing approximately 37% from 1995-96 to 2005-06³. While not all cases may be prevented with folic acid fortification, fortification remains an impactful public health policy tool in the prevention of neural tube defects in the U.S.⁴.

Disparities Remain among Hispanic Women Nationwide and in Washington State

Despite the overall success of folic acid fortification, racial/ethnic disparities remain. Births to Hispanic women continue to experience the highest prevalence of neural tube defects in the U.S.⁵. Pregnancies of less acculturated Hispanic women, particularly Mexican-born women, appear to have the highest risk. One study found Mexican-born women in California to have a significant 2.4 times greater risk of a pregnancy with neural tube defect than white women⁶.

In September 2013 the Washington State Department of Health first reported on an apparent cluster of cases of anencephaly in a three-county region of central Washington (Yakima, Benton and Franklin Counties)⁷. Active case finding revealed 27 cases of neural tube defect occurring from January 2010-January 2013. Twenty-three of the cases were anencephaly, for an effective anencephaly rate of 8.4/10,000 births. Sixty percent of the cases were pregnancies to Hispanic women. It is worth noting that because Washington does not conduct active surveillance of neural tube defects, there is insufficient information to determine whether this rate represents a new phenomenon or not⁸. The majority of births in Franklin County have been to Hispanic women since 1990 and in Yakima County since 1993⁹. A case-control study failed to find any apparent proximal exposure factors that would explain the high rates of anencephaly, and the Department of Health is currently recommending that women of childbearing age in

this region attend to their pre-pregnancy folic acid consumption, seek early prenatal care, and have their water tested if they are on a private well¹⁰.

Extending Folic Acid Fortification to Corn Masa to Save Lives and Improve Health

Research suggests that extending current folic acid fortification to corn masa flour, as is done in some Latin American countries, could address part or all of the persistent disparity in neural tube defects among Hispanic women in the U.S. Corn masa flour is the primary ingredient in corn tortillas, tamales, and other corn-based Latin American foods, and is currently not fortified with folic acid in the U.S.⁵. Using nutrition data from dietary studies public health researchers estimate that fortification of corn masa flour with folic acid would increase the proportion of Mexican-American women achieving the recommended intake of folic acid by 6.0 to 8.2 percentage points, with the greater increase occurring among less-acclimated women¹¹.

In 2012 the March of Dimes, along with a coalition including the American Academy of Pediatrics, the Spina Bifida Association, National Council of La Raza, and Gruma Foods – petitioned the FDA to fortify corn masa flour with folic acid¹². The FDA recently reported that they are not able to move forward on the petition without the required food safety studies that they estimate would cost \$1.0 million¹³. Estimated lifetime direct costs associated with spina bifida are over \$0.5 million per case¹⁴.

¹ Backstrand, Jeffrey R. 2002. "The History and Future of Food Fortification in the United States: A Public Health Perspective." *Nutrition Reviews* 60(1):15-26.

² Osterhues, Anja, Nyima S. Ali and Karin B. Michels. 2013. "The Role of Folic Acid Fortification in Neural Tube Defects: A Review." *Critical Reviews in Food Science and Nutrition* 53(11):1180-1190.

³ CDC Public Health Grand Rounds, Feb 18 2010.

⁴ Hesecker, Helmut B., Joel B. Mason, Jacob Selhub, Irwin H. Rosenberg and Paul F. Jacques. 2009. "Not all Cases of Neural-Tube Defect can be Prevented by Increasing the Intake of Folic Acid." *Br J of Nutrition* 102:173-180.

⁵ Fleischman, Alan R. and Motoko Oinumu. 2011. "Fortification of Corn Masa Flour with Folic Acid in the United States." *AJPH* 101(8):1360-1364.

⁶ Shaw, Gary M., Ellen M. Velie and Cathy R. Wasserman. 1997. "Risk for Neural Tube Defect-Affected Pregnancies among Women of Mexican Descent and White Women in California." *AJPH* 87(9): 1467-1471.

⁷ Person, A., C. Spitters, G. Patrick, C. Wasserman, P. Vander Kelen, J. VanEenwyk, S. Gilboa, J. Kucik, R. Sorenson, E. Ailes and M. Stahre. 2013. "Investigation of a Cluster of Neural Tube Defects-Central Washington, 2010-2013." *MMWR* 62(35):728.

⁸ Report of Anencephaly Cluster Investigation, Central Washington. Advisory Committee Meeting June 16, 2014.

⁹ Washington State Dept. of Health Vital Statistics Data, Natality Table A13-Mother's Race/Ethnicity by County of Residence.

¹⁰ <http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/BirthDefects/AnencephalyInvestigation.aspx>

¹¹ Hamner, H.C., S.C. Tinker, A.L. Flores, J. Mulinare, A.P. Weakland and N.F. Dowling. 2013. "Modelling Fortification of Corn Masa Flour with Folic Acid and the Potential Impact on Mexican-American Women with Lower Acculturation." *Public Health Nutrition* 16(5):912-921.

¹² <http://www.marchofdimes.com/news/coalition-petitions-fda-to-fortify-corn-masa-flour-with-folic-acid.aspx>

¹³ <http://www.nbcnews.com/health/womens-health/mystery-birth-defect-cluster-diet-blame-n135026>

¹⁴ Grosse, S.D., L. Ouyang, J.S. Collins, D. Green, J.H. Dean and R.E. Stevenson. 2008. "Economic Evaluation of a Neural Tube Defect Recurrence-Prevention Program." *Am J Prev Med* 35(6):576-577.