

Neural Tube Defects Along the Texas-Mexico Border and Opportunities for Primary Prevention

Task Force of Border Health Officials

December 11, 2024

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Outline

- I. Texas Birth Defects Registry background
- II. Folic acid recommendations
- III. Pregnancy Risk Assessment Monitoring System (PRAMS) survey
- IV. Neural tube defects in Texas
- V. Corn Masa market assessment in Bexar county
- VI. Folic acid health education video development
- VII. Conclusion

About the Texas Birth Defects Registry (TBDR)

- The Texas Birth Defects Registry (TBDR) is an active surveillance Registry managed by the Birth Defects Epidemiology and Surveillance Branch (BDESB) at the Texas Department of State Health Services (DSHS).
- The TBDR was established in 1993 by the Texas Birth Defects Act. It has been in operation since 1994. Statewide data became available in 1999.
- To be included in the TBDR the following criteria must be met:
 - The mother's residence at the time of delivery must be in Texas.
 - The infant/fetus must have a reportable structural defect or developmental disability.
 - The defect must be diagnosed prenatally or within one year after delivery.
- The TBDR conducts surveillance on over 1,000 birth defects.
- Approximately 25,000 cases are added to the TBDR each year.

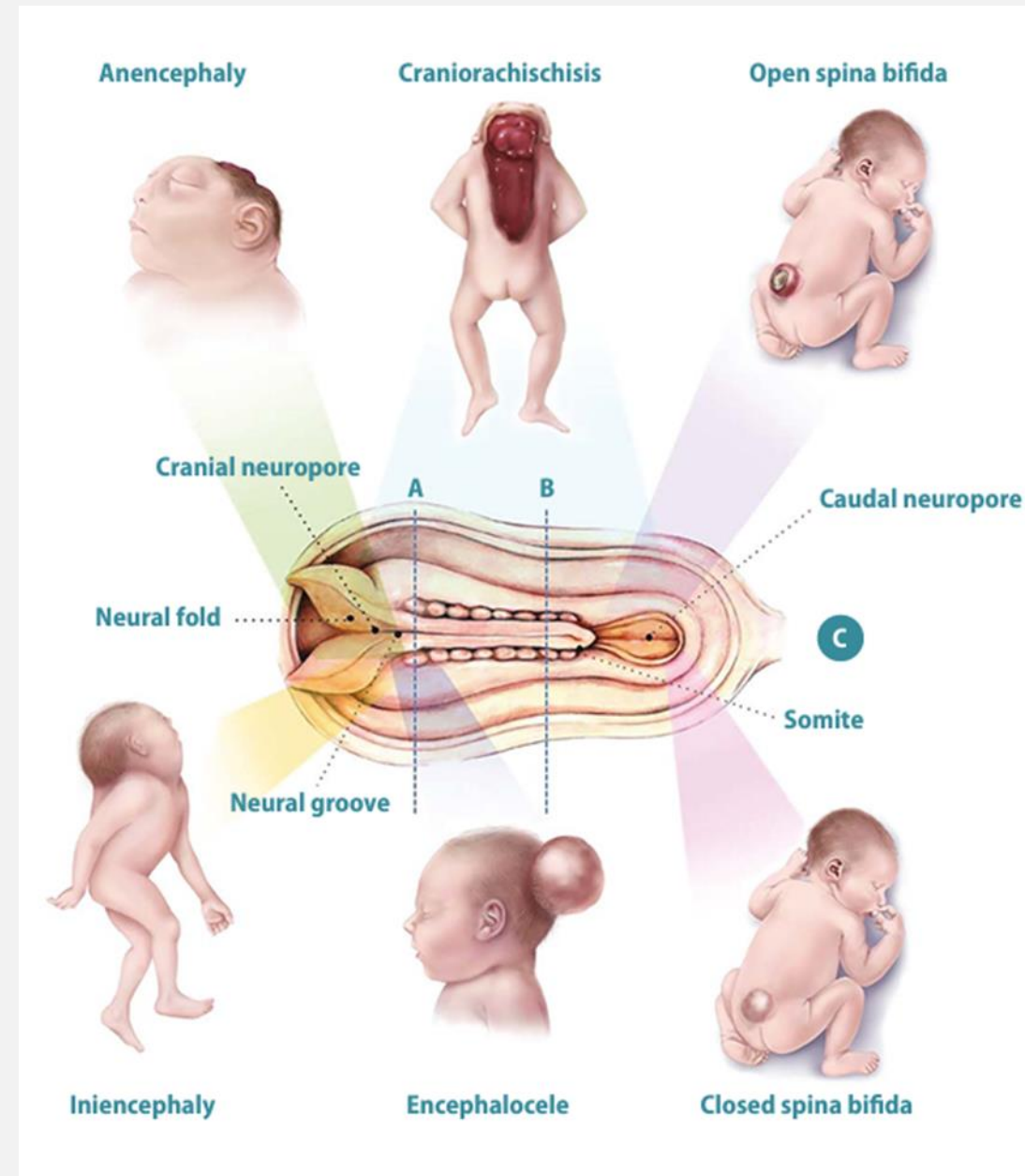
Our Mission:

To identify and describe the patterns and outcomes of children with birth defects in Texas, and to collaborate with others in research, prevention, and referral to services.



Neural Tube Defects (NTDs)

- Neural tube defects (NTDs) are severe birth defects of the brain and spine due to failure of neural tube closure.
- NTDs develop by day 28 of gestation, often before a woman knows she is pregnant.
- The most common NTDs are:
 - Spina bifida
 - Anencephaly
 - Encephalocele



Folic Acid

- Folic acid is a form of folate, which is a B vitamin, that helps the body make new cells.
- If a woman gets enough folic acid *before and during early pregnancy*, it can help prevent NTDs.
- The Centers for Disease Control and Prevention (CDC) recommends all women of childbearing age consume **400 micrograms (mcg)** of folic acid daily.

Sources of Folic Acid/Folate



Supplements
400 mcg Folic Acid



Fortified/Enriched
Foods

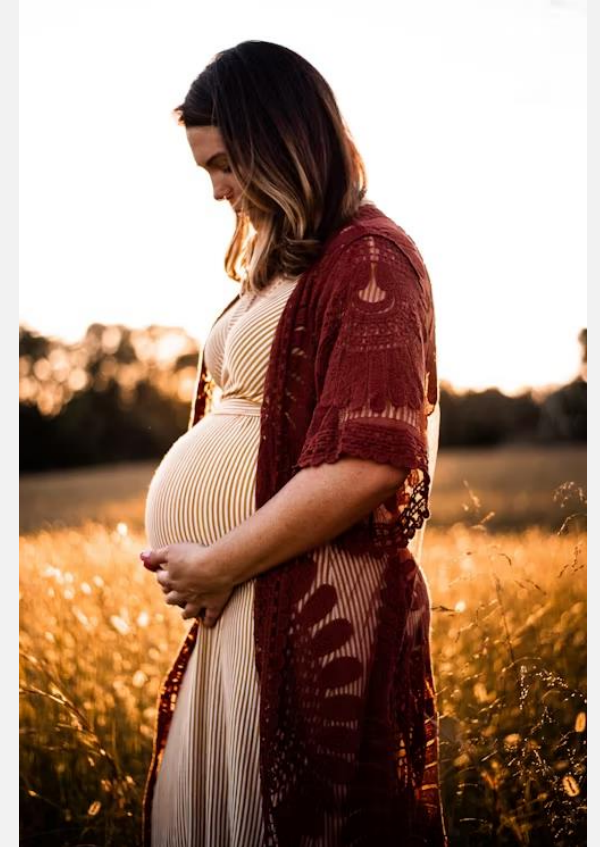


Folate

During the month before you got pregnant with your new baby, how many times a week did you take a multivitamin, a prenatal vitamin, or a folic acid vitamin?

- ***Did not take folic acid in the month before pregnancy – 54.0%***

Source: 2019-2021 Texas PRAMS, Texas Department of State Health Services





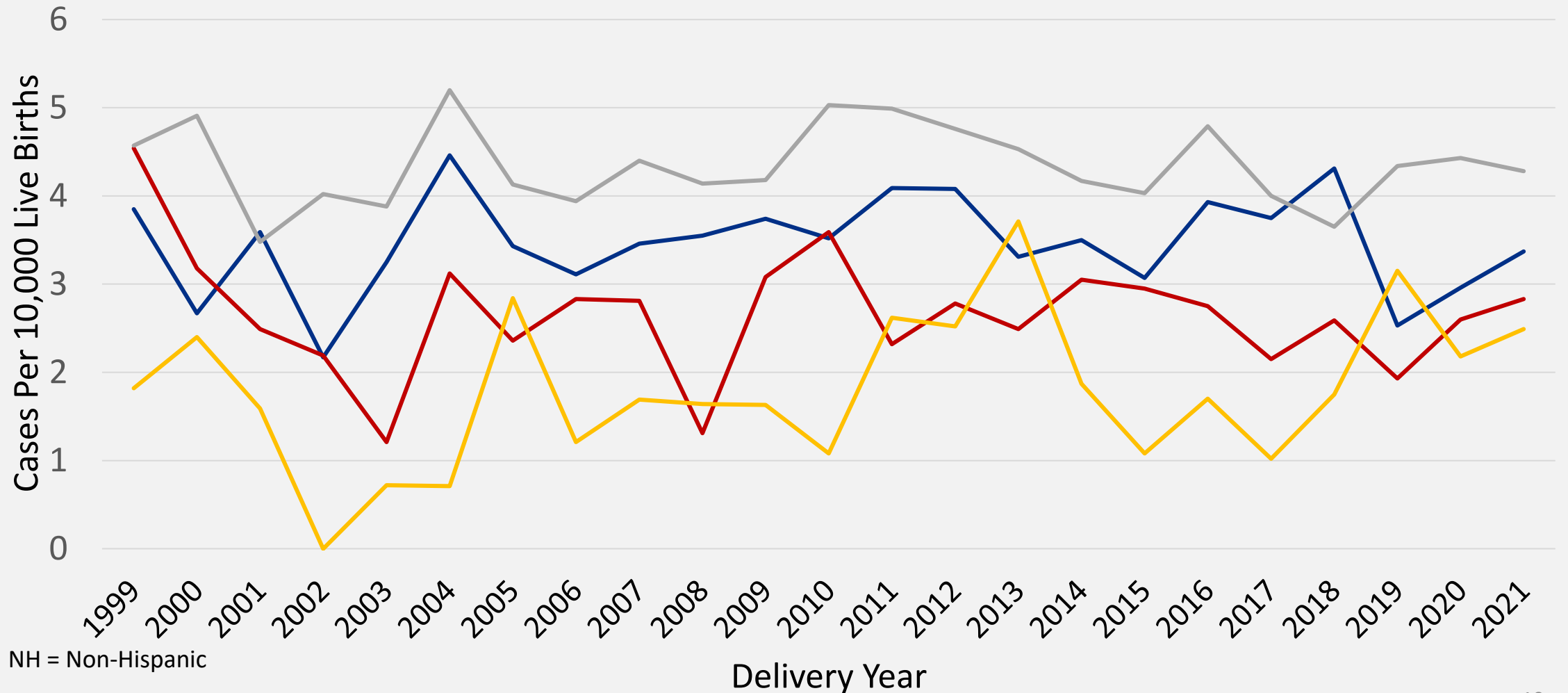
During any of your health care visits in the 12 months before you got pregnant, did a doctor, nurse, or other health care worker tell you to take a vitamin with folic acid?

- ***No, a healthcare provider did not tell me to take a vitamin with folic acid – 62.9%***

Source: 2019-2021 Texas PRAMS, Texas Department of State Health Services

Unadjusted Prevalence of Spina Bifida Cases in Texas, by Delivery Year and Maternal Race/Ethnicity, 1999-2021

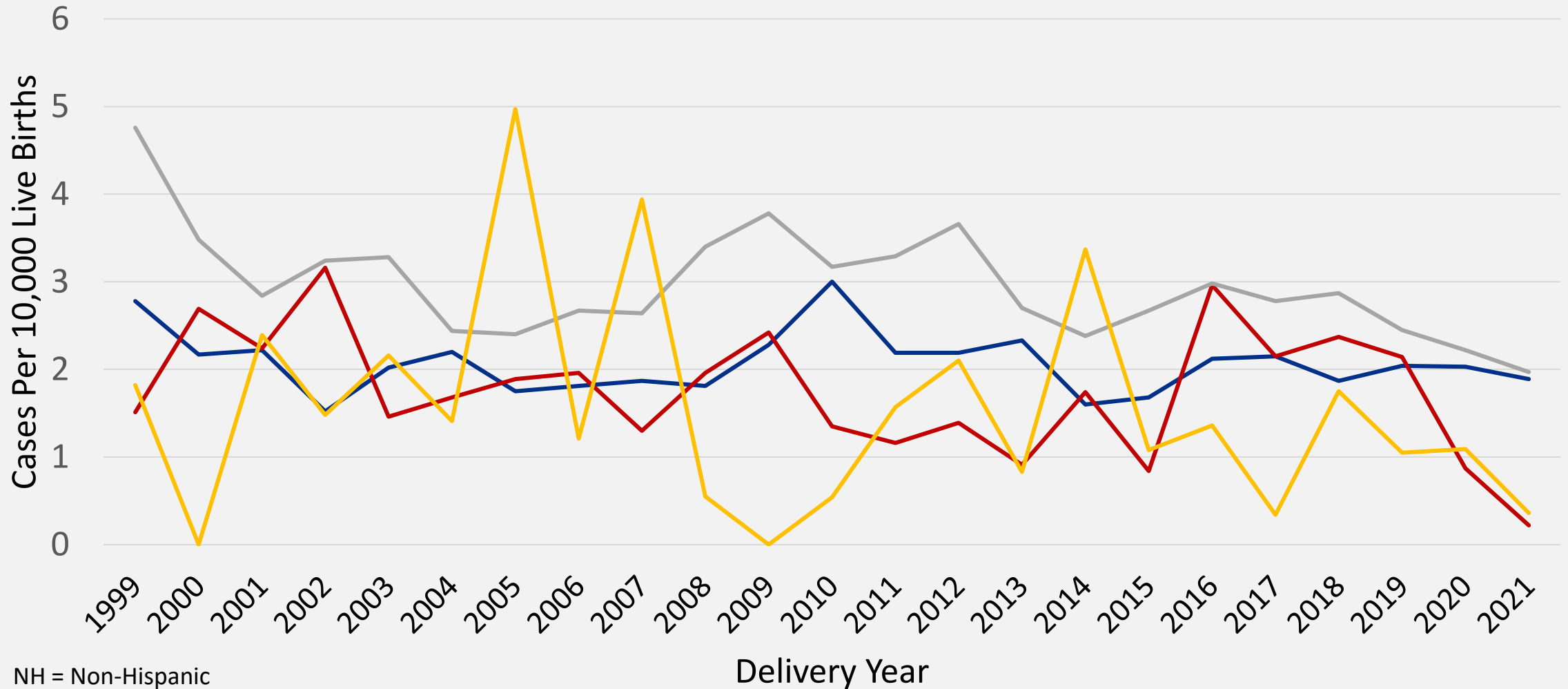
— NH White — NH Black — Hispanic — NH Additional Groups



NH = Non-Hispanic

Unadjusted Prevalence of Anencephaly Cases in Texas, by Delivery Year and Maternal Race/Ethnicity, 1999-2021

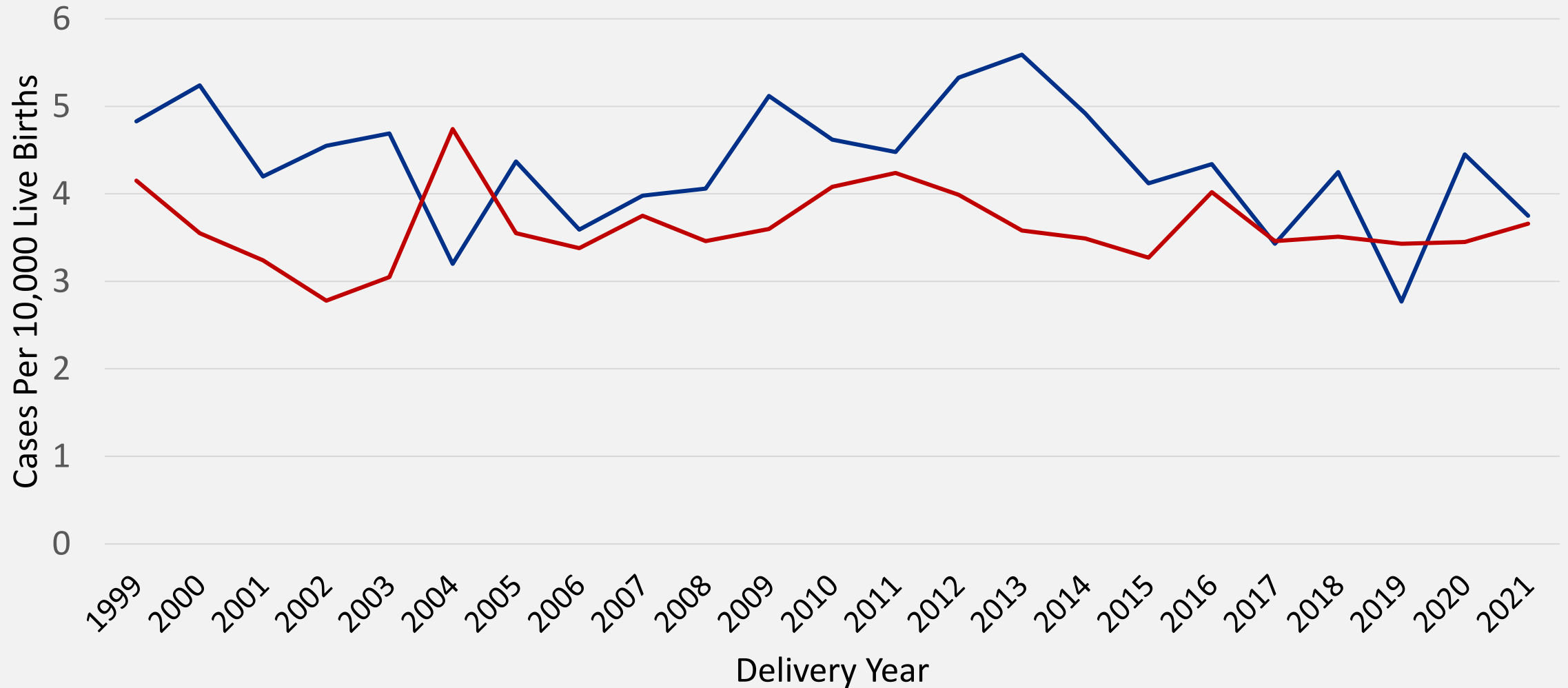
—NH White —NH Black —Hispanic —Nh Additional groups



NH = Non-Hispanic

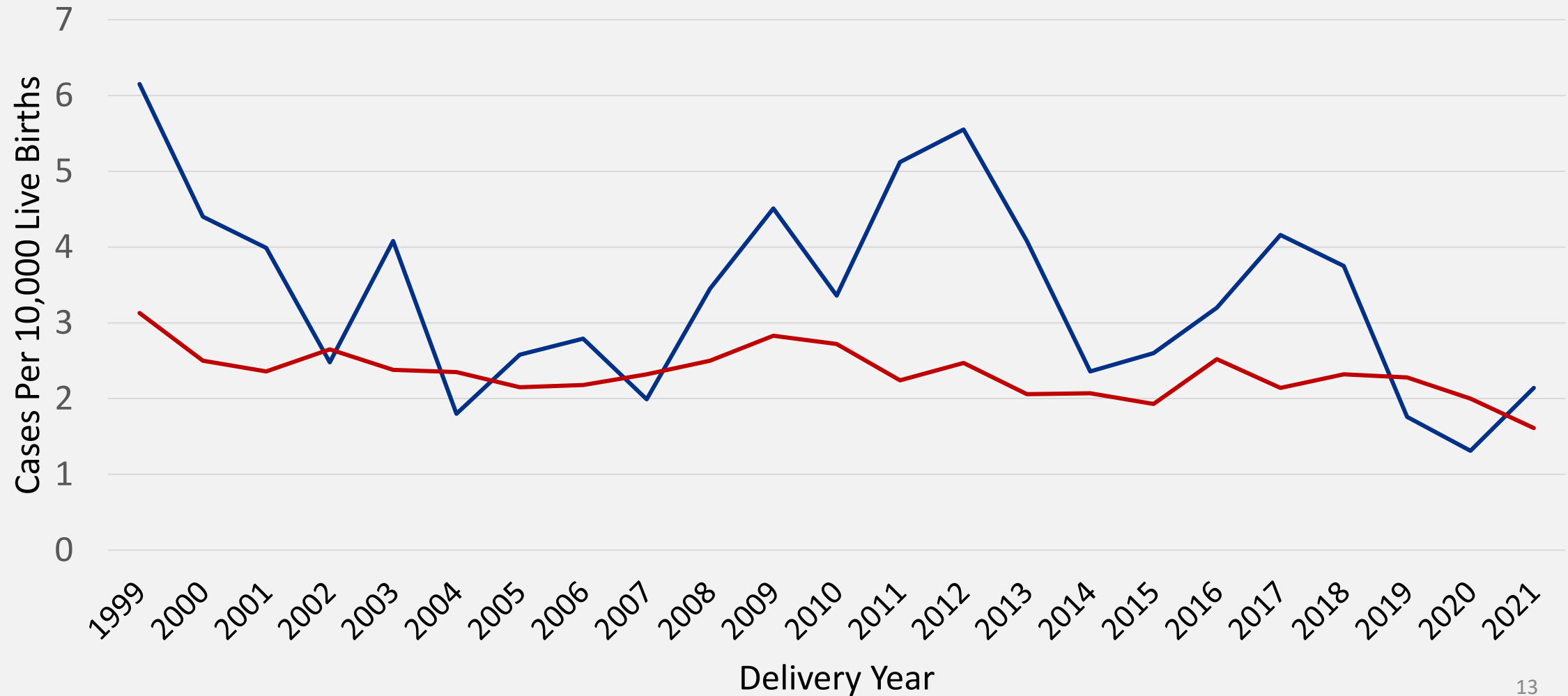
Unadjusted Prevalence of Spina Bifida Cases in Texas by Border vs. Non-Border Maternal Residence at Delivery, 1999-2021

— Border Prevalence — Non-Border Prevalence



Unadjusted Prevalence of Anencephaly in Texas, by Border vs. Non-Border Maternal Residence at Delivery, 1999-2021

— Border Prevalence — Non-Border Prevalence



Major Milestones in Folic Acid Policies

1992

US Public Health Service recommends all women of childbearing age take 400 mcg folic acid.

1998

Food and Drug Administration (FDA) **mandated** folic acid be added to enriched bread, rice, pasta, cereal, and other grain products.



2016

FDA authorized **voluntary** fortification of corn masa flour (CMF) with folic acid.



Corn Masa Flour (CMF) Market Assessment

- In May 2024, BDESB and DSHS Region 8, collaborated with the Food Fortification Initiative (FFI) to conduct a market assessment in Bexar county.
- Objective: Assess if CMF and other corn masa products were fortified with folic acid.
- Texas and California participated in this initiative.



Example of corn masa flour bags assessed

Corn Masa Flour (CMF) Market Assessment Methods

- A list of grocery stores in Bexar county was developed which included:
 - convenience stores
 - dollar stores
 - Hispanic grocery stores/markets
 - local chains and national chains
- A data collection team was trained on using CDC Epi Info Mobile tool questionnaire to collect data about products.
- Data collected for each product included:
 - brand, package size, serving size, and fortification levels, as applicable.

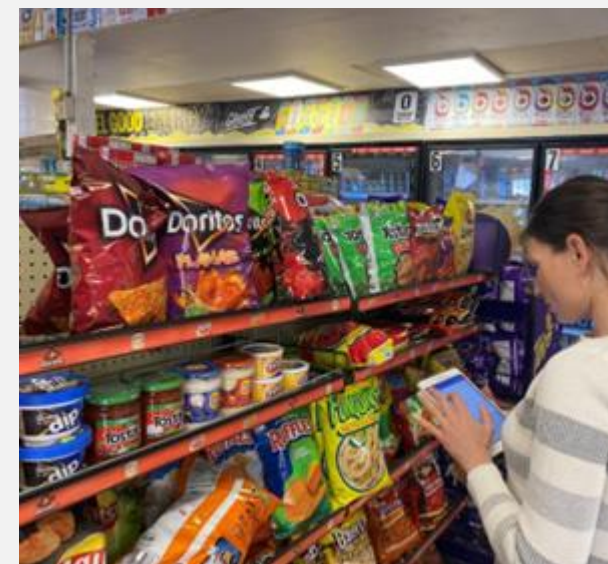
Nutrition Facts	
Serving Size (30g) Servings Per Container 30	
Amount Per Serving	
Calories 110 Calories from Fat 10	
%Daily Value**	
Total Fat 1.5g	2%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrates 23g	8%
Dietary Fiber 2g	7%
Sugars 0g	
Protein 2g	
Vitamin A* %	Vitamin C* %
Calcium 2%	Iron 2%
Potassium 2%	
Folate 66 mcg DFE (40 mcg Folic)	15%

*Contains less than 2% of the value of these nutrients.

**Percent Daily Values (DV) are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65 g	80 g
Saturated Fat	Less than	20 g	25 g
Cholesterol	Less than	300 mg	300 mg
Sodium	Less than	2,400 mg	2,400 mg
Total Carb.	Less than	300 g	375 g
Dietary Fiber	Less than	25 g	30 g

Calories per gram:
Fat 9 g • Carbohydrate 4 g • Protein 4 g



Are Corn Masa Flour (CMF) and CMF products being fortified with Folic Acid?

- A total of 90 stores were visited in Bexar County (TX) and Tulare County (CA)
- Among the products reviewed, the following percentages were found to list folic acid as an ingredient:
 - Corn masa flour (21/45) = 46.7%
 - Tortillas (1/167) = 0.6%
 - Tostadas (1/77) = 1.3%
 - Taco shells (0/23) = 0%



Opportunity for Primary Prevention with Corn Masa Flour (CMF)

- To increase awareness about voluntary fortification of CMF, FFI developed a communications toolkit that is available on their website: <https://www.ffinetwork.org>
- The toolkit contains communication resources tailored to producers, vendors, and consumers.
- There is a need for continued advocacy for fortification of CMF.



Fueling potential:
How Your Corn Masa Products Can Help Prevent Birth Defects Through Folic Acid

Folic acid (vitamin B9) can help prevent up to 70% of neural tube defects (NTDs) which are severe birth defects of the brain and spine.

Enriched cereal grain products in the US have been required to include folic acid since 1998, preventing over 1300 NTDs each year.

Unfortunately, only around 6% of corn masa is fortified, so individuals who eat masa instead of enriched wheat products are not getting the same protection from NTDs.

Fortifying corn masa products such as masa flour and tortillas can help provide this important vitamin to women on a regular basis and prevent birth defects.

More info: www.ffinetwork.org



Example handout from FFI toolkit

BDESB Effort to Address NTD Health Disparities

- Based on low levels of folic acid consumption reported in the PRAMS survey, patterns of health disparities in prevalence of NTDs based on TBDR data, and findings of low levels of voluntary corn masa fortification from the market assessment, BDESB identified a need to increase awareness about folic acid recommendations among women in Texas.
- In response, BDESB began developing a short health education video promoting folic acid. The objective of this folic acid health education video is to:
 - Introduce folic acid recommendations (400 mcg)
 - explain that folic acid reduces risk of birth defects, and
 - provide examples of fortified foods and natural sources of folate.

Multi-disciplinary Partnerships to Reach Target Audience

- The target audience for the folic acid health education video includes:
 - Young Hispanic/Latina women in Texas, ages 18+
 - Residing along the TX-Mexico border
 - Not currently planning a pregnancy
 - English or Spanish speaker
- BDESB partnered with health communication researchers from the University of Texas at Austin Center for Health Communication to design an evidence-based folic acid health education video.
- Registered dietitians from Texas Women Infants and Children Nutrition Program (WIC) also reviewed the content.



Folic Acid Health Education Video Development

- In addition to conducting a literature review, multiple surveys with women in Texas, ages 18-39, informed the design of the folic acid health education video at various stages of development, including:
 - May 2024 - Message pre-testing survey (n=200)
 - July 2024 - Focus Groups and key informant interviews (n=24)
 - August 2024 - Draft video testing survey (n=128)
 - October 2024 - Confirmatory testing of final video (n=411)
- In total, over 760 women in Texas were surveyed for input on the folic acid video.

Folic Acid Message Pre-Testing Methods

- The objective of the first survey was to measure motivators, barriers, beliefs, attitudes, and current behaviors toward using folic acid and vitamins.
- Additionally, the survey aimed to identify the type of folic acid messaging that would be most effective at creating behavior change.
- Previous campaigns that were identified in an environmental scan and the literature review informed the eight messages tested in the survey.

Select Folic Acid Messages Considered During Pre-Testing

Small step in a routine

“Adding folic acid to your daily routine is a small step with big benefits.”

Beauty benefits

“Folic acid helps your hair and nails grow”

Food/Diet

“By adjusting your diet, you can get health benefits from increased folic acid...”

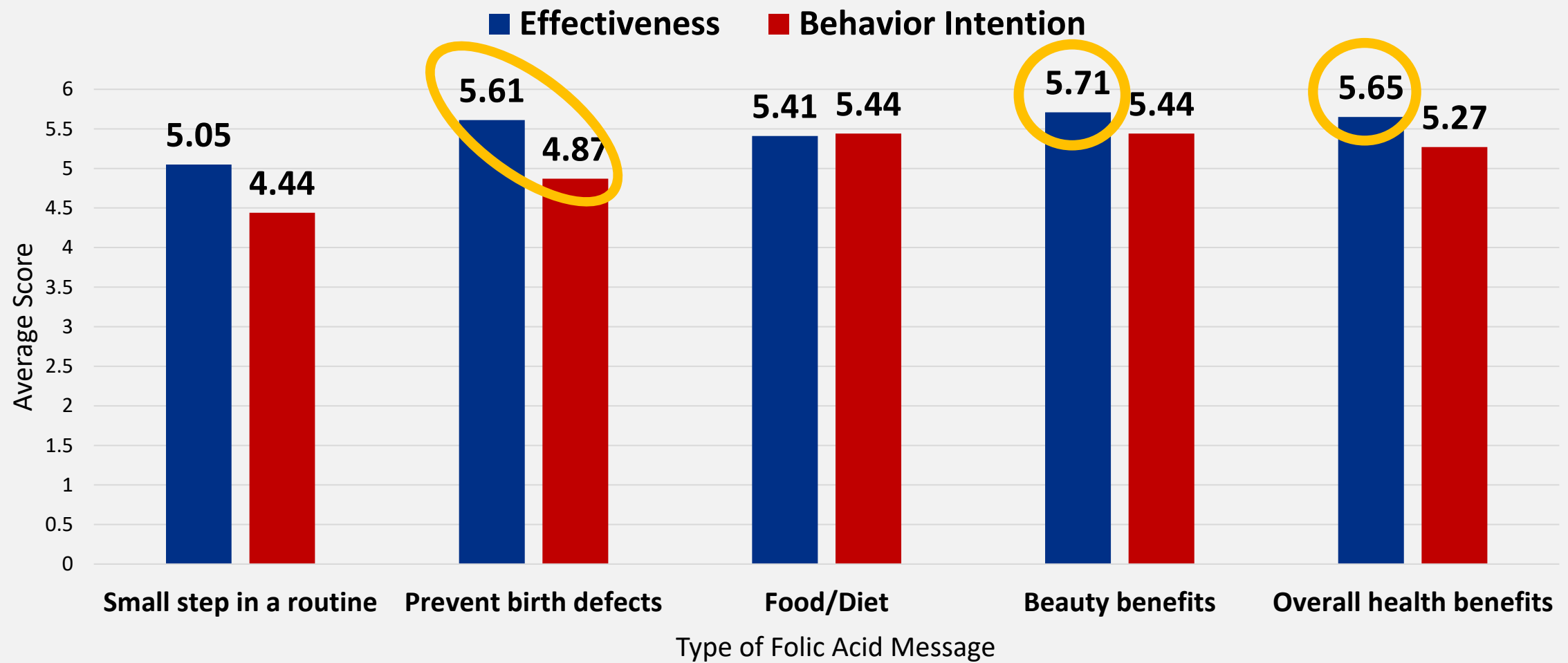
Prevent birth defects

“Folic acid is the only form of folate shown to help protect your baby against serious birth defects”

Overall health benefits

“Folic acid isn’t just for pregnancy. It’s a super vitamin for overall health”

Comparing Average Effectiveness and Behavior Intention Scores by Folic Acid Message (1=strongly disagree, 7=strongly agree) Among Women in Texas (N=200)

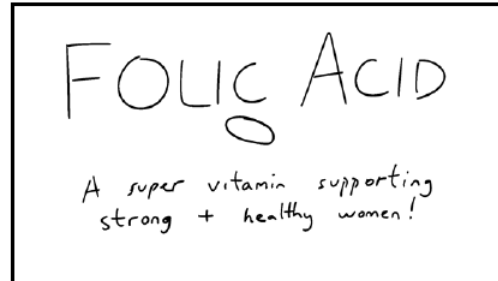


Source: survey conducted by the University of Texas at Austin Center for Health Communication

Focus Groups and Key Informant Interviews Methods

- Two versions of the storyboard were tested with focus groups and key informant interviews.
- One storyboard discussed pregnancy at the beginning, the other storyboard discussed pregnancy at the end.

FOLIC ACID Storyboards v02 ENG Beauty Value Prop



7. TITLE with tagline. We transition into:



8. LATE-20S MOM:
Folic acid was a game changer when I was ready for children.
We see a young Black mom talking to camera, selfie video style, as her young son plays in the background.



9. LATE-20S MOM:
It helped keep my baby healthy, and helped my hair ...
She looks over to her son at the mention of his health, and runs a hand through her hair, emphasizing its volume and shine.



10. LATE-20S MOM:
... and nails grow!
She beams as she shows us her sparkling, healthy nails. TikTok/Instagram Live UI has appeared at this point, and we can see heart reactions appear over her image.



11. LATE-20S MOM:
Folic Acid promotes healthy cell growth, making my wellness routine complete!
We zoom out of her video and see someone watching it on a phone screen.



12. NARRATOR:
So how much folic acid do we need?
A YOUNG WOMAN, Hispanic and college-age or early 20s, is curiously watching the video on her phone.

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Example of storyboard reviewed by focus groups

Results from Focus Groups and Interviews

- Nearly all participants preferred the storyboard version that discussed pregnancy last.
- Participants liked numerous elements and story lines from the video, especially:
 - the strong mother-daughter relationship portrayed
 - Showing diversity and generations over time.

“This pregnancy first version may not resonate if you don’t plan on being pregnant.”

–Asian focus group participant, age group 18-24

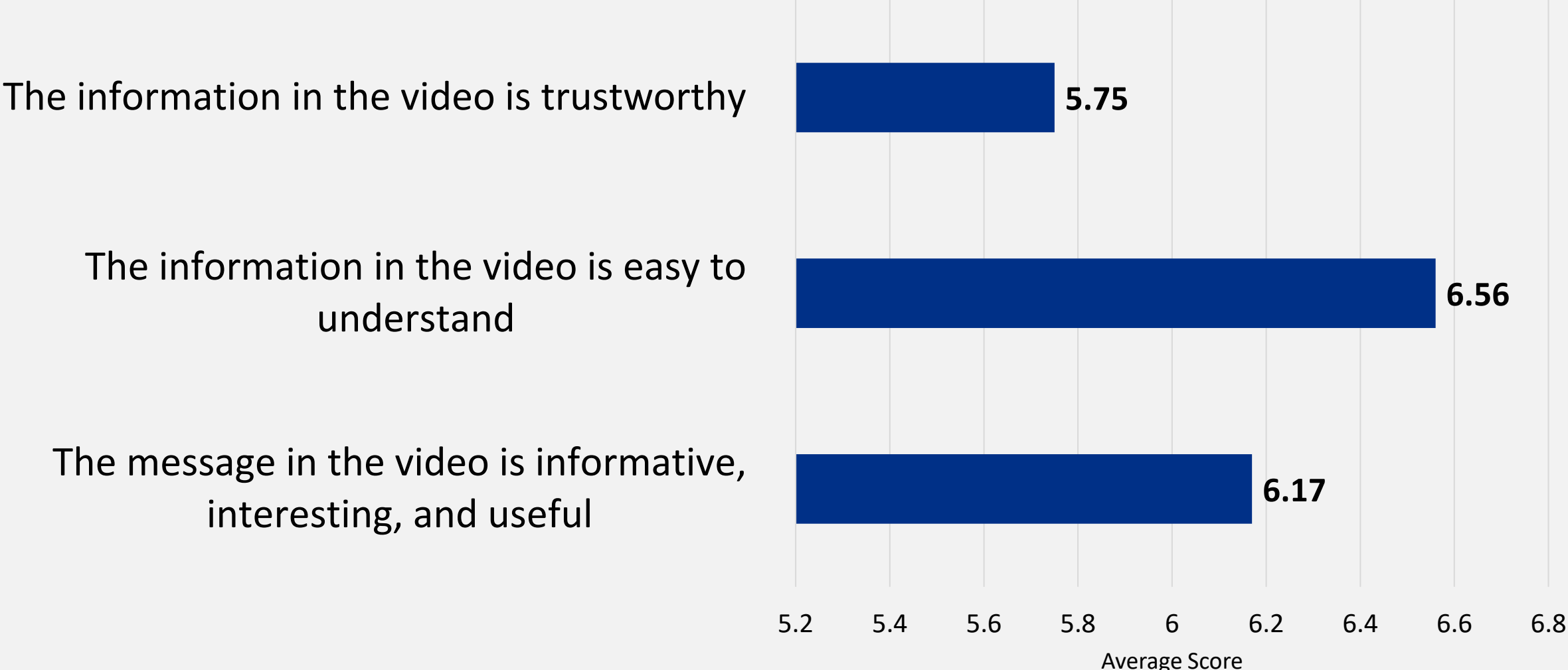
“This beauty/health first version makes more sense for all women..”

–White focus group participant, age group 30-34

Draft Folic Acid Health Education Video Testing Methods

- Based on the message testing survey, focus groups, and key informant interviews, a draft folic acid video was developed.
- Survey participants watched the draft folic acid video and then answered questions related to their:
 - attitude towards folic acid,
 - source credibility, and
 - behavior intentions after watching the video.
- Participants rated their agreement with statements on a Likert scale and provided open-ended feedback.

Average Agreement Scores for Draft Video (1=Strongly Disagree, 7=Strongly Agree) Among Women in Texas (N=128)



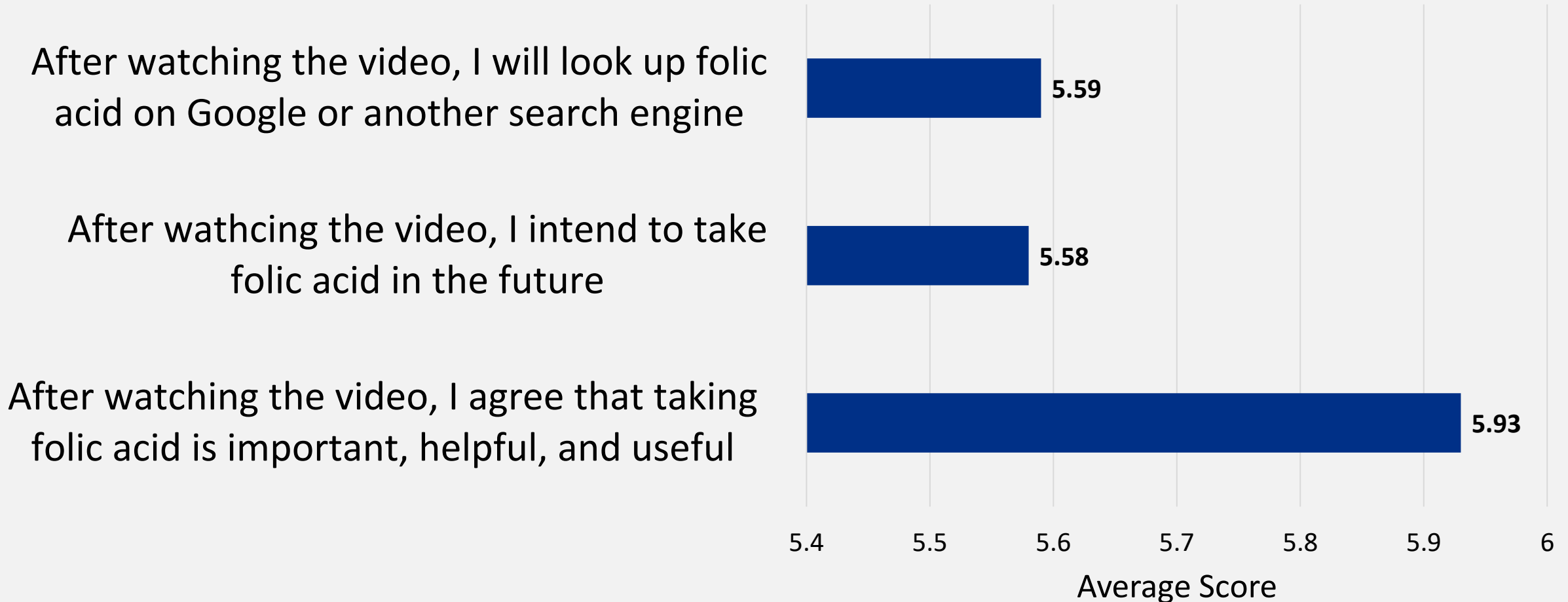
Source: survey conducted by the University of Texas at Austin Center for Health Communication



- English Video: https://youtu.be/czpO_V-7jSo?si=yAExbrNTJwald5uz
- Spanish Video: <https://www.youtube.com/watch?v=OPLivj1oLl4>

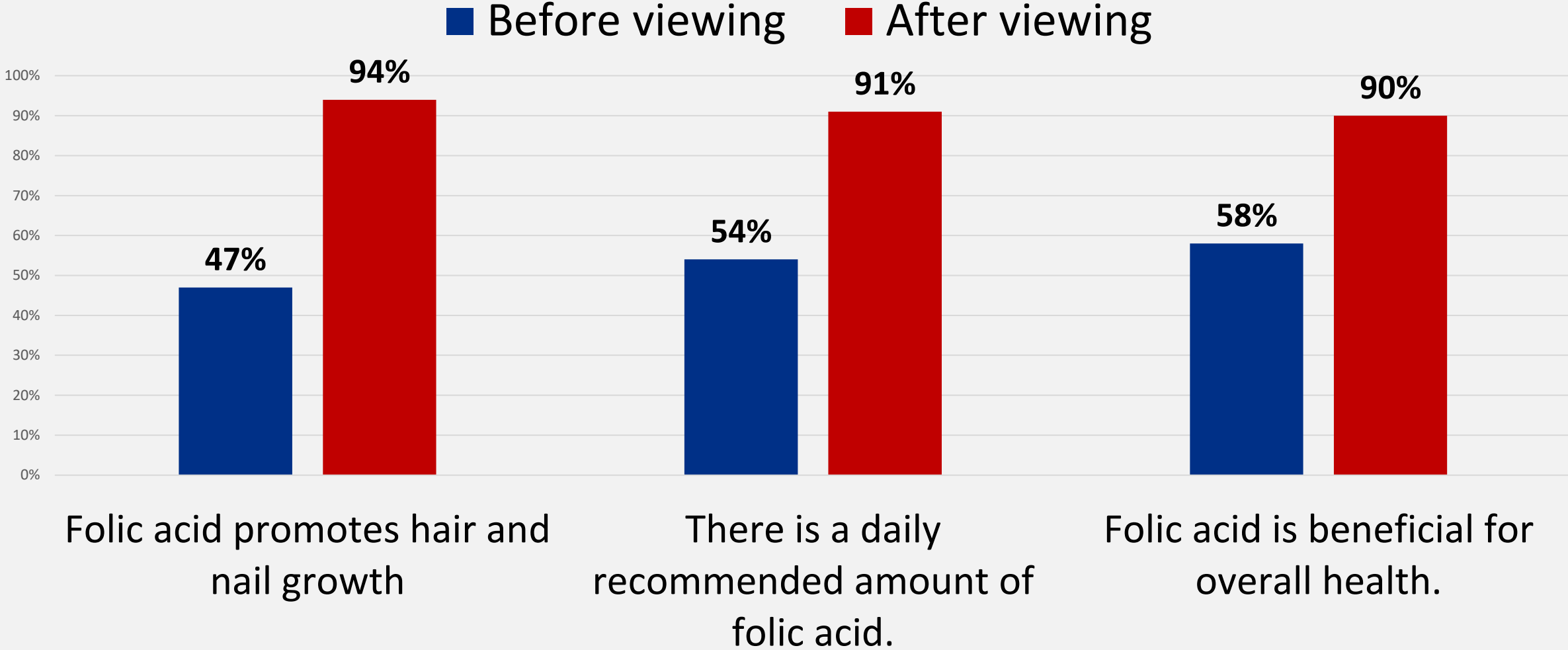
In addition to the full-length video, shorter 30-second versions are also available.

Average Agreement Scores for Final Folic Acid Health Education Videos (1=strongly disagree, 7=strongly agree) Among Women in Texas (N=411)



Source: survey conducted by the University of Texas at Austin Center for Health Communication

Knowledge of Folic Acid Before and After Viewing Folic Acid Promotion Video Among Women in Texas (N=411)



Source: survey conducted by the University of Texas at Austin Center for Health Communication

Opportunity for Primary Prevention with Folic Acid Video

- The final folic acid video is currently available on DSHS YouTube.
- Folic acid health education video can be shared on your organization's social media accounts or with other public health partners, especially those who work with young women in Texas.
- BDESB has developed a handout to accompany the video that is available at: dshs.texas.gov/folicacid

FOLIC ACID

A SUPER VITAMIN SUPPORTING STRONG AND HEALTHY WOMEN.

WHAT IS FOLIC ACID?
Folic acid is a form of folate, which is a B-vitamin that helps our bodies make new cells. The Centers for Disease Control and Prevention (CDC) recommends all women capable of becoming pregnant get 400 micrograms (mcg) of folic acid every day.
Folic acid promotes healthy cell growth and can help your hair and nails grow. And, when you are ready to have a baby, taking folic acid before and during early pregnancy can help prevent neural tube defects (NTDs). NTDs are severe birth defects of the brain and spine.

HOW DO I GET ENOUGH FOLIC ACID?
Multivitamins: Taking a multivitamin with 400 mcg of folic acid daily.
Fortified foods: Eating foods that have been fortified with folic acid, such as enriched breakfast cereal, enriched pasta, enriched bread.
Folate-rich foods: Eating foods that are naturally high in folate, such as dark leafy vegetables, eggs, beans, legumes.

FOLIC ACID VS. FOLATE – WHAT IS THE DIFFERENCE?
The terms folic acid and folate are sometimes used interchangeably. Folic acid is a form of folate. Folic acid is more stable than folates found naturally in foods.

HOW DO I CHOOSE THE RIGHT MULTIVITAMIN?
Look for vitamins that say "(400 mcg Folic Acid)" on the label in parenthesis.
Vitamins with other forms of folate might not work as well as folic acid.
There are many different brands of multivitamins that contain 400 mcg of folic acid.

FOLIC ACID EFFECTIVENESS
• Multiple trials have found folic acid to be safe and effective at the recommended amounts.
• Some people may have concerns about unmetabolized folic acid. Unmetabolized folic acid is folic acid that is not used by the body and remains circulating in the blood stream. However, no confirmed health risks from unmetabolized folic acid have been found.
References: CDC. (2024, May 15). About Folic Acid. Folic Acid. [cdc.gov/folio-acid/about/index.html](https://www.cdc.gov/folio-acid/about/index.html)

CHECK OUT OUR FOLIC ACID VIDEO AT: bit.ly/4g3d07r

LEARN MORE ABOUT THE BENEFITS OF FOLIC ACID AT: [DSHS.TEXAS.GOV/FOLICACID](https://dshs.texas.gov/folicacid)

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Folic Acid Handout

Conclusion

- In recent years, approximately half of women in Texas report not taking folic acid before pregnancy and not being informed of folic acid recommendations by a healthcare provider.
- A higher prevalence of NTDs is seen among Hispanic/Latina women and women residing in a county along the Texas-Mexico border at the time of delivery.
- Corn masa is a staple in the diet of many Hispanic/Latina women, but less than half of CMF products were being fortified with folic acid.
- Opportunities for ongoing primary prevention of NTDs include raising awareness about voluntary fortification of corn masa flour (CMF), advocating for mandatory fortification of CMF, and distributing the folic acid video.

Acknowledgements

- This work was supported in part by the Centers for Disease Control and Prevention (CDC) Enhancing partnerships to address birth defects, infant disorders and related conditions, and the health of pregnant and postpartum people Grant Award Number: NU01DD0000036
- Charles Shumate, DrPH, Director, Birth Defects Epidemiology and Surveillance Branch
- Caitlyn Yantz, MSPO, Research Specialist, Birth Defects Epidemiology and Surveillance Branch
- Sharon Bustrak, MPH, Food Fortification Initiative (FFI)
- Katherine Velasquez, PhD, Texas DSHS Region 8, Community Health Improvement Division
- Connie Cheng, MS, RD, Texas Health and Human Services, WIC program
- Stephanie Holland, RD, Texas Health and Human Services, WIC program
- Michael Mackert, PhD, Director, University of Texas at Austin, Center for Health Communications (CHC)
- Lindsay Bouchacourt, PhD, University of Texas at Austin, Center for Health Communications (CHC)
- Jessica Hughes Wagner, MPH, University of Texas at Austin, Center for Health Communications (CHC)
- Myra Spector
- Katie Friel and Texas DSHS Communications Team

Thank you!

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