



# HHS Public Access

Author manuscript

*J Womens Health (Larchmt)*. Author manuscript; available in PMC 2015 June 13.

Published in final edited form as:

*J Womens Health (Larchmt)*. 2014 June ; 23(6): 525–531. doi:10.1089/jwh.2013.4695.

## Promotora de Salud: Promoting Folic Acid Use Among Hispanic Women

Leslie deRosset, MPH<sup>1,2</sup>, Amy Mullenix, MSW, MSPH<sup>2</sup>, Alina Flores, MPH, CHES<sup>3</sup>, Daniel Mattia-Dewey, MPH<sup>3</sup>, and Cara T. Mai, MPH<sup>3</sup>

<sup>1</sup>Department of Maternal Child Health, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

<sup>2</sup>March of Dimes North Carolina Preconception Health Campaign, Raleigh, North Carolina

<sup>3</sup>National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia

### Abstract

**Background**—The U.S. Public Health Service recommends that all women in the United States capable of becoming pregnant consume 400  $\mu\text{g}$  of folic acid daily to reduce their risk of having a pregnancy affected by a neural tube defect (NTD). However, disparities exist in the consumption of folic acid, with Hispanic women having lower rates of folic acid consumption than non-Hispanic white women.

**Methods**—A community-based feasibility study was designed to assess the utility of the *promotora de salud* model to promote consumption of multivitamins containing folic acid for the prevention of NTDs among Spanish-speaking Hispanic women in North Carolina. The study consisted of an educational intervention given by a *promotora* (a lay, community health worker), with data collection occurring at baseline and four months post-intervention to measure changes in knowledge and behavior. Overall, 52% ( $n = 303$ ) of participants completed all components of the study.

**Results**—Self-reported daily multivitamin consumption increased from 24% at baseline to 71% four months post-intervention. During the same time frame, awareness of folic acid increased from 78% to 98% and knowledge of the role of folic acid in the prevention of birth defects increased from 82% to 92%.

**Conclusions**—The results of this study indicate that the *promotora de salud* model may be effective in reaching a subpopulation of women with the folic acid message. Additional studies with larger population sizes are warranted to validate these findings.

---

© Mary Ann Liebert, Inc.

Address correspondence to: Leslie deRosset, MPH, Department of Maternal Child Health, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 170 Roseanau Hall, CB 7400, 135 Dauer Drive, Chapel Hill, NC 27599, derosset@email.unc.edu.

#### Disclosure Statement

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention. No competing financial interests exist.

## Introduction

Neural tube defects (NTDs) occur within the first 28 days of pregnancy, most often before a woman knows she is pregnant.<sup>1</sup> The two most common NTDs are anencephaly, a fatal defect in which the cranial portion of the neural tube fails to close correctly, and spina bifida, a defect in which the caudal portion of the neural tube fails to close correctly. Spina bifida can cause lifelong complications ranging from paralysis of the lower extremities to lack of bladder and bowel control.

In 1992, the U.S. Public Health Service issued a recommendation that all women in the United States capable of becoming pregnant should consume 400  $\mu\text{g}$  of folic acid daily to reduce their risk of having an NTD-affected pregnancy. In 1998, the U.S. Food and Drug Administration mandated enrichment of cereal grain products with folic acid. Prior to the mandate, approximately 4,000 pregnancies per year were affected by a NTD in the United States. A 36% decrease in the NTD rate was observed from the period prior to fortification (1995–1996) to the period following fortification (1999–2000).<sup>2</sup> Although the rates of NTD-affected pregnancies have declined, rates are still higher among Hispanic women.<sup>3-5</sup> Nationally, Hispanic women have a rate of 4.17 per 10,000 for having a child affected by spina bifida compared with the rate for non-Hispanic white women (3.22 per 10,000) and the rate for non-Hispanic black women (2.64 per 10,000).<sup>6</sup> Disparities also exist in the consumption of folic acid, with 13% of Hispanic women reporting daily folic acid consumption compared to 31% of non-Hispanic white women.<sup>5</sup>

### Hispanics in North Carolina

The Hispanic population in North Carolina comprises 8.4% of the total population, an increase from 7.4% in 2000.<sup>7</sup> Seventy percent of Hispanics in the state emigrated from Mexico.<sup>8</sup> In North Carolina, the median age for Hispanics is 25 years, and 51% of Hispanics in the state have received a high school diploma.<sup>8</sup> In North Carolina, the median house-hold income for Hispanics is approximately half of that of non-Hispanic whites.<sup>8</sup>

Knowledge about the importance of folic acid consumption among Hispanic women in North Carolina is increasing to levels of non-Hispanic white women. In 2005, 86% of non-Hispanic white women and 79% of Hispanic women in North Carolina knew that taking folic acid could reduce some birth defects.<sup>9</sup> This disparity had been eliminated by 2008 when knowledge increased to 88% for both racial/ethnic groups.<sup>10</sup> Disparities in folic acid consumption still remain, however. In North Carolina, only 22% of Hispanic women versus 31% of non-Hispanic white women reported taking a daily multivitamin in the month prior to becoming pregnant.<sup>10</sup>

**Promotora de salud model**—Promotoras, also known as community health workers, lay health educators, lay health advisors, or natural helpers, have been employed by health programs to influence health behaviors among different racial and ethnic audiences.<sup>11-16</sup> Using promotoras in health promotion is often referred to as the *promotora de salud* model and is considered a cost-effective approach for reaching subsegments of the population.<sup>11</sup> The benefit of using promotoras, especially for the Hispanic population, lies in the trust that community members have in receiving culturally appropriate health education information

from a member of their community who is knowledgeable of their language, their customs, and their beliefs.<sup>13</sup>

The *promotora de salud* model has shown promise as a tool for delivering health education to Hispanics in the areas of cardiovascular disease, diabetes, smoking cessation, and breast cancer screenings<sup>13,17-19</sup> However, this model has been relatively unexplored and undocumented as a viable model for the prevention of NTDs. In 2009, the National Center on Birth Defects and Developmental Disabilities (NCBDDD) at the U.S. Centers for Disease Control and Prevention (CDC) funded the March of Dimes North Carolina Preconception Health Campaign to assess whether the *promotora de salud* model was effective in increasing knowledge and consumption of folic acid among Spanish-speaking Hispanic women in two counties in North Carolina.

## Materials and Methods

### Overview and study participants

The March of Dimes North Carolina Preconception Health Campaign (hereafter referred to as the Campaign) collaborated with the North Carolina Birth Defects Monitoring Program to identify counties with (1) a high prevalence of NTDs among the Hispanic population and (2) urban areas with large concentrations of Hispanic women. According to the U.S. Census (2000), 5% of Wake County and 8% of Johnston County residents identified themselves as Hispanic. In 2007, there were 3,101 births to Hispanic women in the two-county radius, an increase of 47% from 2003.<sup>20,21</sup> During 2003–2007, the combined prevalence of anencephaly and spina bifida for Hispanics in Wake and Johnston counties was 12.2 per 10,000 live births. For these reasons, Wake and Johnston counties in central North Carolina were chosen as intervention sites.

The promotora, hired by the Campaign, was a native Spanish speaker who resided in the targeted intervention area, and who had more than 5 years of experience working with the Hispanic community in North Carolina as a lay health worker. The promotora received approximately 60 hours of intensive training, including information on neural tube defects, folic acid and multivitamins, survey administration and completion, recruitment strategies, minimizing selection bias, and record keeping, as well as facilitation of participant education workshops. After the initial training, the promotora's outreach and education efforts were monitored by Campaign staff. The promotora met with Campaign staff biweekly to review and discuss progress.

The promotora was responsible for recruiting study participants. Individuals were eligible to participate in the study if they were female, non-pregnant but reported being capable of pregnancy, Spanish-speaking, between the ages of 18–45 years, living in either Wake or Johnston counties, and who reported not having received education from the Campaign within the year prior to the implementation of this intervention (2008–2009). The promotora utilized several approaches for recruitment. One approach was community recruitment, where she visited local stores, parks, neighborhoods, beauty salons, laundromats, community events aimed at Hispanics, and other public places where Spanish-speaking women were known to congregate. A second approach was agency/organizational

recruitment, where the promotora identified and contacted existing groups that included Spanish-speaking members, such as English as a Second Language classes, bible study groups, church groups, community-based organizations, community colleges, and cosmetology schools. Health departments and community health centers were also contacted. Other recruitment approaches included the use of the internet, word of mouth, zip code maps, personal connections, and existing outreach lists provided by the Campaign.

### Measures and processes

The study consisted of four components: a pre-intervention (baseline) survey, an educational intervention (workshop), a 2-month follow-up telephone call and a 4-month post-intervention survey. The baseline and post-intervention surveys included questions on current vitamin consumption as well as awareness (defined as having heard, read, or seen anything about folic acid) and knowledge (defined as being able to identify specifics about folic acid, such as correct timing and benefits for NTD prevention) about folic acid and NTDs. The baseline survey also contained demographic questions. The 2-month follow-up telephone call asked the participants about their current consumption of a multivitamin with folic acid and verified their contact information.

The promotora began the study by screening potential participants to ensure they met the eligibility criteria. Non-eligible women were thanked for their time and offered educational materials and a small promotional item. Those eligible for the study were invited to participate and asked to complete a contact information form. Participants then completed a baseline survey. If a participant had difficulty completing the survey on her own, the promotora administered the survey verbally and recorded the participant's responses. Following completion of the baseline survey, participants then participated in a 30- to 45-minute educational workshop, held at the recruitment site or at an alternative location at a later time. The majority of the baseline surveys and educational workshops did not take place at the same time as recruitment due to time constraints of the participants. The promotora spent an average of 1–3 hours per participant to arrange appointments to conduct the baseline survey and workshop.

The workshops ranged in size from one to 10 participants. During the educational workshop, the promotora used a color flipbook in Spanish that contained pictures with simple educational information about folic acid, vitamins, and the prevention of NTDs. Participants received Spanish-language educational brochures, a 90-day supply of multivitamins containing 400  $\mu\text{g}$  folic acid, and a small promotional item (pen, mirror and brush, etc.). Participants were informed that the promotora would contact them via telephone in two months and again in 4 months for a post-intervention survey.

Two-months following the intervention, the promotora telephoned each participant to ask whether she was currently taking the multivitamin with folic acid that she had been given and to update her contact information. The promotora reminded the participant that she would be calling again in two months to conduct the post-intervention survey. The post-intervention survey was identical to the baseline survey but excluded demographic questions.

Most of the post-intervention surveys were conducted verbally over the telephone, except in cases where the participant could not be reached or did not have a telephone. In these instances, the promotora went to the home of the participant to conduct the survey in person. The results from these paper surveys were then entered into a Microsoft Access database.

## Analyses

Descriptive statistics were computed for both participants who completed all components of the intervention and those who were lost to follow-up; chi-square and *t*-tests were used to examine differences between the groups. Additionally, changes in survey responses for those who completed both baseline and post-intervention surveys were calculated using McNemar's test and Bowker's test of symmetry. Statistical analyses were conducted using SAS 9.3 (SAS Institute, Cary, NC).

## Results

This feasibility pilot study comprised a total of 672 women who were recruited and assessed for eligibility between November 2009 and July 2010. Overall, 582 (87%) of these women were eligible to participate in the study, 386 (66% of eligible) completed the baseline survey and attended an educational workshop, and 303 (52%) participants finished all components of the study (including the 4-month post-intervention survey).

### Demographic characteristics

Demographic characteristics of the 303 women who completed all components of the study are shown in Table 1. The mean age was similar for the participants who completed the post-intervention survey and those who were lost to follow up (30 and 31 years respectively,  $p = 0.21$ ). However, when the distribution was examined by age categories (18–24, 25–31, 32–38, and 39–45 years), a higher proportion of lost to follow-up participants were 18–24 ( $n = 25$ , 30%) or 39–45 years old ( $n = 15$ , 18%) compared with those who completed the post-intervention survey (16% and 14% respectively), and this difference was statistically significant ( $p = 0.01$ ). No statistically significant differences were observed by county of residence, country of origin, residency in the United States > 10 years, educational attainment, employment status, marital status, or having had children between those who completed all components of the study components and those who were lost to follow-up (Table 1).

### Vitamin use, knowledge, and barriers

Self-reported multivitamin use significantly increased between the baseline survey and post-intervention survey, with the highest increase observed for the number of participants who reported daily vitamin consumption ( $p < 0.0001$ ) (Fig. 1). When asked “Why do you take this vitamin or mineral supplement?” the responses with the largest shifts were “to supplement my diet” and “to prevent illness.” Seventy-four percent of the participants indicated that they did so because of the promotora's recommendation during the workshop (post-test/post-intervention only) (Table 2).

Statistically significant increases in affirmative responses were observed when participants were asked “Do you think that consuming vitamins can reduce the risk of birth defects?”; “Which birth defects do you think might be prevented by consuming vitamins? (defects of the brain and spine, Down syndrome, heart defects, intellectual disability, other)”; and “Have you ever read, heard, or seen anything about folic acid?” (Table 2).

When asked “Which vitamin or mineral supplements do you think are important to women of childbearing age?” a significantly greater proportion of participants responded that folic acid was important in the post-intervention survey than in the baseline survey ( $p < 0.001$ ). Significantly more participants responded correctly to the following true or false questions: “You need a prescription from a doctor to obtain folic acid” ( $p < 0.001$ ) and “Latinas have more babies affected by birth defects of the brain and spine than other women” ( $p < 0.001$ ) in the post-intervention survey as compared to the baseline survey. However, no significant difference was seen between the baseline and post-intervention survey for the true or false question “Having a healthy baby guarantees that your future children will also be healthy” ( $p = 0.23$ ) (Table 2).

Between the baseline and post-intervention survey, all the barriers to vitamin consumption listed on the survey were significantly reduced except for “I have a balanced diet” (Table 2). The changes were most pronounced for cost, hunger, fear of weight gain, and forgetfulness.

No significant differences were found by educational attainment (less than high school graduate or more than high school graduate). Results were also relatively homogenous when participants were grouped by years of residency in the United States (data not shown).

## Discussion

This feasibility study showed a significant increase in the reported consumption of multivitamins containing folic acid among participants between baseline and 4 months following the intervention. In addition, there were significant increases in participants’ knowledge of folic acid and birth defects and awareness about which racial/ethnic group is at highest risk for a NTD-affected birth. Furthermore, barriers such as cost, fear of weight gain, and forgetfulness were significantly reduced following the intervention. These findings point to the potential effectiveness of the *promotora de salud* model when applied to folic acid promotion and NTD prevention efforts.

In the post-intervention survey, 92% of the participants recalled receiving information about folic acid from the promotora. Further, more participants recalled seeing folic acid messages on television when asked this question during the post-intervention survey as compared to when they were asked this same question prior to the intervention. Television as a health education tool, although often cost prohibitive, could be an effective way to reinforce a folic acid message.

This feasibility study indicates low levels of pregnancy planning among participants. This is consistent with the overall rate of unplanned pregnancies among all women in the United States.<sup>22</sup> The concern with unplanned pregnancies is that women might be engaged in unhealthy behaviors such as alcohol and tobacco use or not engaging in healthy behaviors

such as proper nutrition and folic acid consumption prior to conceiving. Although low levels of pregnancy planning in this study underscore the importance of educating Spanish-speaking Hispanic women of reproductive age about the consumption of folic acid prior to pregnancy, the need for this education is not limited to Hispanic women.<sup>22</sup>

Furthermore, of those participants who had a previous pregnancy, only 14% had discussed pregnancy with their healthcare provider prior to becoming pregnant. Although it is unknown whether this was due to a lack of access to care, lack of insurance coverage, language barriers, lack of awareness about the importance of preconception care, or other factors, it highlights the need for targeted information to meet the needs of this audience in a culturally appropriate manner. It underscores the importance of educating this population about preconceptional folic acid consumption and pregnancy planning and healthcare provider engagement.

In this feasibility study, the promotora did not appear to successfully communicate folic acid deficiency as an ongoing risk. No significant change in knowledge was found regarding the question “Having a healthy baby guarantees that your future children will also be healthy.” This finding demonstrates the need for continued education to Hispanic women about the importance of folic acid consumption regardless of whether they have had a previously healthy pregnancy.

There were several limitations to this study. First, because this was designed as a small feasibility study, a control group was not included. Due to this, we are unable to draw comparisons to Hispanic women in North Carolina who were not involved in the intervention. Second, there was a high rate of loss to follow-up (48%) between recruitment and baseline data collection. It is unknown whether the participants who were lost during this period of recruitment differed demographically or otherwise from those who completed the study. The rates of loss to follow up also support the need to over-recruit the target population in *promotora de salud* interventions, in order to ensure a sufficient number of participants for a pre- and post-intervention study.

Third, although it is possible that other organizations aired folic acid messages during the time between the intervention and the four months following, it is also possible that the women who were given the intervention became more aware of folic acid and therefore more cognizant of the folic acid messages they saw on television post intervention.

Fourth, because the *promotora de salud* model can be labor intensive, having just one promotora for this pilot limited the scope of the effort. Other *promotora de salud* models have used as many as 16 promotoras, depending on the intervention.<sup>11-13</sup> Having just one promotora hinders the reach of the intervention, since the range of geographic coverage is limited. Further, during the time when the promotora was unable to work due either to vacation or illness, almost all activity ceased. It is possible that using more than one promotora could have decreased the percentage of loss to follow-up and potentially increased the total sample size. It would be important, however, that if more than one promotora is used, they are all trained to deliver health education information in a standardized manner.

Fifth, recruitment for the study began in late fall (November 2009), which posed some challenges. Given the season, the promotora often encountered inclement weather conditions that limited her recruitment locations. Also, the long holiday season limited the availability of the participants due to traveling and other holiday plans.

Many Hispanic women in North Carolina rely on public transportation, friends, families, or taxis to transport them to meetings and appointments, often making it difficult to travel to group education classes or programs. It is unknown how demographically or otherwise different the participants were from those who were unable to attend the program based on lack of transportation.

The results of this study might not be generalizable to a broader population. Eligibility was limited to a small geographic area, and the Hispanic women living in the two targeted counties might be different from those in other regions of the country. Further, over the past several years North Carolina has seen a rapid growth in its Hispanic population, and in this study, the majority of participants identified themselves as new immigrants (having lived in the United States < 10 years).<sup>24,25</sup> As a result, there could be differences between the Hispanics in this study and those living in longer established Hispanic communities found in states like Florida, California, and Texas.

Lastly, because interventions based on the *promotora de salud* model rely heavily on relationship building and one-on-one or small-group dynamics, response bias may have been a factor. All women were given a 90-day supply of multivitamins, and the interpersonal relationship could have affected the participants' positive response to multivitamin use.

## Conclusion

In this study, the *promotora de salud* model significantly increased folic acid awareness, knowledge, and consumption among participants during the project period. Because of the small size and limited scope of the intervention, this study should be replicated on a larger scale due to its success in North Carolina. Despite the limitations, increased awareness and knowledge as well as the increase in multivitamin consumption behaviors among study participants indicate the potential effectiveness of the model for promoting folic acid consumption among Hispanic women of childbearing age. Based on the findings of this study, the *promotora de salud* model appears to be effective in educating Hispanic women about the benefits of folic acid consumption for the prevention of neural tube defects.

## Acknowledgments

The authors would like to thank Ana Luisa Gutierrez, Perry Derrenbacher, Robert Meyer, and the North Carolina State Center for Health Statistics/Birth Defects Monitoring Program, and the community-based organizations and health departments in Wake and Johnston counties for their support and time, which made this intervention possible.

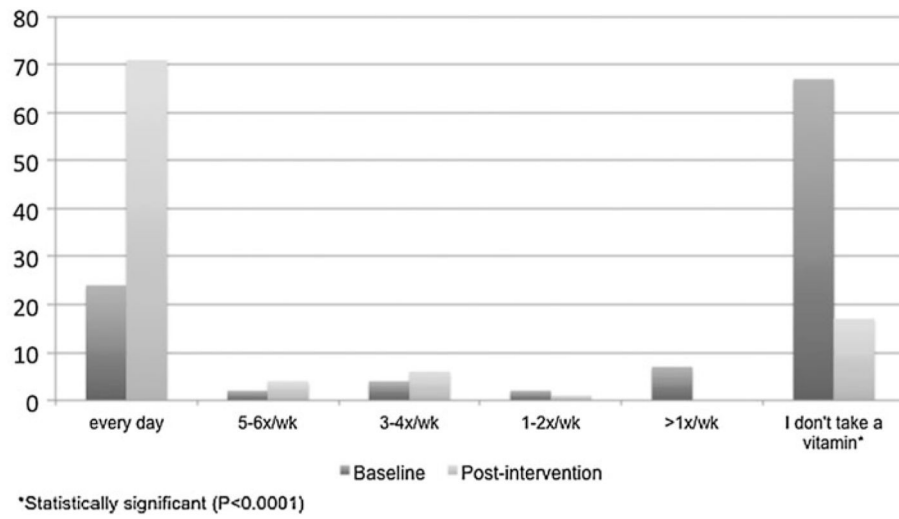
Funding for the project was obtained from the National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention and the North Carolina March of Dimes Chapter (Contract No. 200-2009-M-32674).



## References

1. De-Regil L, Fernández-Gaxiola AC, Dowswell T, Peña-Rosas J. Effects and safety of periconceptional folate supplementation for preventing birth defects. *Cochrane Database Syst Rev*. 2010;10CD007950.
2. Centers for Disease Control Prevention (CDC). CDC Grand rounds: Additional opportunities to prevent neural tube defects with folic acid fortification. *MMWR*. 2010; 59:980–984. [PubMed: 20703205]
3. Canfield M, Ramadhani T, Shaw G, et al. Anecephaly and spina bifida among Hispanics: Maternal, sociodemographic, and acculturation factors in the national birth defects prevention study. *Birth Defects Res A Clin Mol Teratol*. 2009; 85:637–646. [PubMed: 19334286]
4. William LJ, Rasmussen SA, Flores A, Kirby R, Edmonds DL. Decline in the prevalence of spina bifida and anecephaly by race/ethnicity. *Pediatrics*. 2005; 116:580–586. [PubMed: 16140696]
5. Yang QH, Carter HK, Mulinare J, Berry RJ, Friedman JM, Erickson DJ. Race-ethnic differences in folic acid intake in women of childbearing age in the United States after folic acid fortification: Findings from the National Health and Nutrition Examination Survey, 2001–2002. *Am J Clin Nutr*. 2007; 85:1409–1416. [PubMed: 17490980]
6. CDC. Spina bifida. Data and statistics: United States. CDC; 2011. Available at: <http://www.cdc.gov/ncbddd/spinabifida/data.html> [Accessed November 16, 2013]
7. United States Census Bureau. The Hispanic population: 2010, 2010 census briefs. U.S. Department of Commerce; 2011. Available at: [www.census.gov/prod/cen2010/briefs/c2010br-04.pdf](http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf) [Accessed November 16, 2013]
8. North Carolina State Center for Health Statistics. Racial and ethnic health disparities report card, 2010. Office of Minority Health and Health Disparities; 2010. Retrieved from [www.schs.state.nc.us/schs/data/minority.cfm](http://www.schs.state.nc.us/schs/data/minority.cfm) [Accessed November 16, 2013]
9. NC State Center for Health Statistics. Folic acid awareness: 2002 NC Pregnancy risk assessment monitoring system. NC Department of Health and Human Services; 2005. Retrieved from [www.schs.state.nc.us/SCHS/data/prams.cfm](http://www.schs.state.nc.us/SCHS/data/prams.cfm) [Accessed November 16, 2013]
10. NC State Center for Health Statistics. North Carolina PRAMS fact sheet: July 2011. Pregnancy Risk Assessment Monitoring System. NC Department of Health and Human Services; 2011. Retrieved from [www.epi.state.nc.us/SCHS/prams](http://www.epi.state.nc.us/SCHS/prams) [Accessed November 16, 2013]
11. Balcazar H, Alvarado M, Hollen M, Gonzalez-Cruz Y, Pedegron V. Evaluation of Salud Para Su Corazon (Health for Your Heart) – National Council of La Raza Promotora outreach program. *Prev Chronic Dis* [serial online]. 2005;2. Available at: [www.cdc.gov/pcd/issues/2005/jul/04\\_0130.htm](http://www.cdc.gov/pcd/issues/2005/jul/04_0130.htm).
12. Deitrick L, Paxton H, Rivera A, et al. Understanding the roles of the promotora in a Latino diabetes education program. *Qual Health Res*. 2010; 20:386–399. [PubMed: 20133505]
13. Kobetz E, Vatalaro K, Moore A, Earp JA. Taking the transtheoretical model into the field: A curriculum for lay health advisors. *Health Promot Pract*. 2005; 6:329–337. [PubMed: 16020627]
14. Lucio RL, Carrillo Zuniga G, Soel YH, et al. Incorporating what promotoras learn: Becoming role models to effect positive change. *J Community Health*. 2011; 37:1026–1031. [PubMed: 22160747]
15. Swider SM, Martin M, Lynas C, Rothschild S. Project Match: Training for a promotora intervention. *Diabetes Educ*. 2010; 36:98–108. [PubMed: 20008279]
16. Woodruff SL, Talavera GA, Elder JP. Evaluation of a culturally appropriate smoking cessation intervention for Latinos. *Tob Control*. 2002; 11:261–267.
17. Lujan J, Ostwalk SK, Ortiz M. Promotora diabetes intervention for Mexican Americans. *Diabetes Educ*. 2007; 33:660–670. [PubMed: 17684167]
18. Sausaia A, Min S, Lack D, Apodaca C, Osuna D, Stowe A. Church-based breast cancer screening education: Impact of two approaches on Latinas enrolled in public and private health insurance plans. *Prev Chronic Dis* [serial online]. 2007; 4:A99.
19. Staten LK, Scheu LL, Bronson D, Pena V, Elenes J. Pasos adelante: The effectiveness of a community-based chronic disease prevention program. *Prev Chronic Dis* [serial online]. 2005; 2:A18.

20. NC State Center for Health Statistics. NC live birth data: 2003. NC Department of Health and Human Services; 2003. Retrieved from [www.schs.state.nc.us/schs/data/births/bd.cfm](http://www.schs.state.nc.us/schs/data/births/bd.cfm) [Accessed November 16, 2013]
21. NC State Center for Health Statistics. NC live birth data: 2007. NC Department of Health and Human Services; 2007. Retrieved from [www.schs.state.nc.us/schs/data/births/bd.cfm](http://www.schs.state.nc.us/schs/data/births/bd.cfm) [Accessed November 16, 2013]
22. Finer LR, Zolna MR. Unintended pregnancy in the United States: Incidence and disparities, 2006. *Contraception*. 2011; 84:478–485. [PubMed: 22018121]
23. NC State Center for Health Statistics. North Carolina minority health facts: Hispanics/Latinos. Office of Minority Health and Health Disparities, NC Department of Health and Human Services; 1999. Retrieved from [www.schs.state.nc.us/schs/data/minority.cfm](http://www.schs.state.nc.us/schs/data/minority.cfm) [Accessed November 16, 2013]
24. NC State Center for Health Statistics. North Carolina vital health facts: Population health data by race and ethnicity, 2005-2009. Office of Minority Health and Health Disparities NC Department of Health and Human Services; 2010. Retrieved from [www.schs.state.nc.us/schs/data/minority.cfm](http://www.schs.state.nc.us/schs/data/minority.cfm) [Accessed November 16, 2013]



**FIG. 1.** Frequency of multivitamin use before and after study intervention.

**Table 1**

Demographic Characteristics of Participants Who Completed All Study Components and Those Who Were Lost to Follow-Up

	<i>Participants who completed all study components n = 303</i>	<i>Participants LTFU n = 83</i>	<b>p</b>
Age			
18–24	16%	30%	0.01
25–31	35%	22%	
32–38	35%	30%	
39–45	14%	18%	
	Mean = 30; SD = 7.6	Mean = 31; SD = 6.6	
Have you lived in the United States for 10 years or less?			
Yes	65%	69%	
No	35%	31%	0.67
County of residence			
Wake	72%	65%	0.20
Johnston	28%	35%	
Country of origin *			
Mexico	86%	87%	0.85
Central America	12%	13%	0.69
South America	5%	2%	0.47
Educational attainment			
Primary school or less	39%	33%	0.09
Graduated from high school	37%	48%	
Some college/technical/university	18%	18%	
Graduated college/university/technical	7%	0%	
Employment *			
Full-time	28%	24%	0.47
Part-time	19%	17%	0.69
Housewife	65%	65%	0.95
Student	10%	17%	0.10
Unemployed	5%	11%	0.05
Have you ever had children?			
Yes	87%	84%	0.46
No	13%	16%	
Marital Status			
Married	59%	50%	
Living with partner	24%	29%	
Divorced	1%	0%	0.22
Separated	15%	7%	
Never married/single	8%	30%	
Widowed	2%	0%	

SD, standard deviation; LTFU, lost to follow-up.

\* Multiple answers allowed.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**Table 2**

Vitamin Use, Knowledge, and Barriers Among Participants Who Completed All Study Components\*

	<i>Pre-test/baseline</i> (n = 303)	<i>Post-test/post-intervention</i> (n = 303)	<b>p</b>
<b><i>Why do you take this vitamin or mineral supplement?</i></b>			
Because a health care provider recommended it	13%	18%	0.02
Because I want to get pregnant	2%	11%	< 0.0001
To supplement my diet	10%	42%	< 0.0001
For health reasons	3%	18%	< 0.0001
To prevent illness	9%	53%	< 0.0001
Recommendation of the promotora during workshop	–	74%	
<b><i>Do you think that consuming vitamins can reduce the risk of birth defects?</i></b>			
Yes	82%	92%	0.01
No	12%	6%	
<b><i>Which birth defects do you think might be prevented by consuming vitamins?</i></b>			
Defects of the brain and spine	68%	92%	< 0.0001
Down syndrome	35%	53%	< 0.0001
Heart defects	26%	61%	< 0.0001
Intellectual disabilities	30%	52%	< 0.0001
<b><i>Have you ever read, heard, or seen anything about folic acid?</i></b>			
Yes	78%	98%	< 0.0001
No	20%	2%	
<b><i>Where have you heard about folic acid?</i></b>			
From my doctor	40%	20%	< 0.0001
In a brochure or poster	20%	11%	0.0007
In a health clinic	33%	25%	0.03
At a health fair	7%	2%	0.003
From a friend or relative	10%	4%	0.002
In a magazine or newspaper article	5%	5%	0.04
On the radio	12%	13%	0.67
On television	35%	45%	0.004
Promotora	–	92%	
<b><i>Which vitamins or mineral supplements do you think are very important to women of childbearing age?</i></b>			
Calcium	66%	46%	< 0.0001
Folic acid	85%	94%	0.0005
Iron	57%	41%	< 0.0001
Multivitamins	43%	40%	0.47
Prenatal vitamins	57%	13%	< 0.0001
Vitamin C	28%	11%	< 0.0001
Vitamin D	25%	10%	< 0.0001
Vitamin E	24%	9%	< 0.0001
<b><i>You need a prescription from a doctor to obtain folic acid.</i></b>			
True ( <i>incorrect</i> )	12%	2%	< 0.0001

	<i>Pre-test/baseline</i> (n = 303)	<i>Post-test/post-intervention</i> (n = 303)	<b>p</b>
False ( <i>correct</i> )	71%	97%	
<b><i>Latinas have more babies affected by birth defects of the brain and spine than other women.</i></b>			
True ( <i>correct</i> )	33%	89%	< 0.0001
False ( <i>incorrect</i> )	37%	42%	
<b><i>Is there a reason you do not take a vitamin?</i></b>			
Costs too much	9%	1%	< 0.0001
They are too big	4%	0	< 0.0001
They make me hungry	10%	1%	< 0.0001
I don't want to gain weight	18%	1%	< 0.0001
I don't need them	5%	1%	0.01
I don't like taking pills	10%	2%	< 0.0001
I have a balanced diet	2%	1%	0.29
I forget to take them	29%	6%	< 0.0001

\* Multiple answers allowed; excludes "other" and "don't know."

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript