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Folic Acid Education for Hispanic Women: The *Promotora de Salud* Model

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Abstract

Background—Although rates of neural tube defects (NTDs) have declined in the United States since fortification, disparities still exist with Hispanic women having the highest risk of giving birth to a baby with a NTD. The *Promotora de Salud* model has been shown to be an effective tool for reaching Hispanics for a variety of health topics; however, literature on its effectiveness in folic acid interventions is limited.

Methods—An intervention using the *Promotora de Salud* model was implemented in four U.S. counties with large populations of Hispanic women. The study comprised: 1) a written pre-test survey to establish baseline levels of folic acid awareness, knowledge, and consumption; 2) a small group education intervention along with a 90-day supply of multivitamins; and 3) a post-intervention (post-test) assessment conducted four months following the intervention.

Results—Statistically significant differences in pre- and post-tests were observed for general awareness about folic acid and vitamins, and specific knowledge about the benefits of folic acid. Statistically significant changes were also seen in vitamin consumption and multivitamin consumption. Folic acid supplement consumption increased dramatically by the end of the study.

Conclusions—The *Promotora de Salud* model relies on interpersonal connections forged between promotoras and the communities they serve to help drive positive health behaviors. The findings underscore the positive impact that these interpersonal connections can have on increasing awareness, knowledge, and consumption of folic acid. Utilizing the *Promotora de Salud* model to reach targeted populations might help organizations successfully implement their programs in a culturally appropriate manner.

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"The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention."

Keywords

folic acid; neural tube defects; Promotora de Salud model; Hispanics

Background

In 1992, the U.S. Public Health Service (USPHS) recommended that all women capable of becoming pregnant consume 400 micrograms (μg) of folic acid for the prevention of neural tube defects (NTDs). NTDs, serious birth defects of the brain and spine, affect approximately 3,000 pregnancies every year in the U.S.[1] This represents a 36% decline since the implementation of folic acid fortification of enriched cereal grain products was mandated by the U.S. Food and Drug Administration in 1998.[2] Although overall NTD prevalence has declined in the U.S., Hispanic women remain at higher risk for having an NTD-affected birth than non-Hispanic white women.[3–5] Yang et al. found that 13% of Hispanic women consumed folic acid as compared to 31% of non-Hispanic White women.[6] In addition, studies have found that Hispanic women have lower knowledge regarding the benefits of folic acid and have lower folic acid consumption compared to women from other racial/ethnic groups.[6–9] Finally, Hispanic women report higher rates of unintended pregnancies resulting in births, and higher rates of mistimed pregnancies as compared to non-Hispanic white women.[10] Because NTDs occur by the first month of pregnancy, often before a woman knows she is pregnant, it is essential for Hispanic women to be aware of the importance of folic acid consumption prior to becoming pregnant.

The Hispanic population in the United States has been growing steadily, and is now the single largest minority group (17.1% of the U.S. population).[11] With growing numbers and a higher risk for an NTD-affected birth, there is a need for targeted, culturally appropriate health education interventions for this audience.

Promotoras de Salud

Promotoras, also known as community health workers, natural helpers or lay health educators, provide health education and information to members of their community on a range of health topics including diabetes, breast cancer screenings, cardiovascular disease, and smoking cessation.[12–15] The *Promotora de Salud* model incorporates a community outreach component, and thereby provides the community member with a direct connection to a health worker that allows for questions to be answered and follow-up to be provided.[16] Such programs have been successful in providing important information to sub-segments of the broader population in a culturally-appropriate manner.[17–21] A recent study examined the potential use of the *Promotora de Salud* model for reaching Hispanic women in North Carolina with the folic acid message,[7] and found it to be a successful model for NTD prevention education and outreach efforts. Building on the North Carolina pilot study, the objective of the current study was to examine the impact of the intervention in three additional counties in the United States.

Methods

The intervention sites and respective Hispanic populations were Harris county, Texas (40.8%), Hillsborough county, Florida (24.9%), Cook county, Illinois (24.0%), and Mecklenburg county, North Carolina (12.2%).[22] These counties were chosen due to their high numbers of Hispanics and the researchers' existing partnerships with outreach organizations in each area.

Recruitment

Recruitment sites were located throughout the county and included places where Hispanics were likely to congregate, such as churches, community centers, targeted health fairs, and other locations that offer community services. Promotoras' knowledge of the area in which they worked facilitated their recruitment efforts. Promotoras approached Spanish-speaking women at various locations to gauge their interest in the project and, once deemed eligible, registered them for an education session (intervention).

Promotora Training

Prior to the launch of the intervention, a training was held in Atlanta, Georgia for the promotoras. The training was held primarily in Spanish over an eight hour period and facilitated by the Centers for Disease Control and Prevention (CDC) and North Carolina staff. Each of the four study sites sent at least one promotora and one staff member to the training. Each promotora received a binder that consisted of the following: the folic acid and NTD educational presentation, sample copies of the workshop to be delivered in the county, workshop attendance sheets, sample educational materials (brochures in English and Spanish), and a CD of folic acid and NTD educational materials. In addition, each site received a flash drive with electronic versions of the documents so they could be modified to include their organizational logos prior to use in the field. Attendees were given opportunities at the training to practice using the materials as well as to ask questions about folic acid. Subsequent follow-up via monthly conference calls was conducted throughout the funding period to maintain coordinated efforts.

Eligibility

Hispanic women were eligible if they: 1) predominantly spoke Spanish, 2) lived in one of the selected counties, and 3) were between the ages of 18 and 45 years at the start of the study. In order to be considered a study participant, a woman had to take part in all portions of the study intervention including the baseline survey (pre-test), attend the education workshop, and respond to a four month follow-up post-intervention survey (post-test). The pre-test was administered in-person and mostly self-completed by the respondent. In situations where the respondent expressed a literacy issue, the promotora administered the pre-test orally. The majority of post-tests were administered over the telephone. Those women who met eligibility criteria but did not answer at least one question on both the pre- and post-test were identified as lost to follow up.

Intervention

The educational session consisted of at least two or more participants and lasted between one to two hours. At the start of the session, the promotora conducted an in-person baseline survey (pre-test) that included the participants' folic acid awareness, knowledge, and consumption, along with basic demographic questions. This survey was administered either written or orally, depending on the participants' preferred method. Upon survey completion, the promotora then presented information about folic acid and neural tube defects. A flip chart with photographs and illustrations of neural tube defects, sources of folic acid, and other relevant information was used to guide the discussions. The promotora would stop throughout the presentation to ask whether there were questions from the participants or to expand on particular topics. Although the sessions were similar in that all promotoras used the same tools and flip chart, the length and amount of discussion varied by session.

At the conclusion of the session, participants received a 90-day supply of multivitamins containing folic acid, along with a small thank you item for their time (e.g., a mirror/comb or keychain). The provision of the multivitamins as part of the study design was done to be consistent with the earlier North Carolina-based pilot intervention project mentioned above.[7] Finally, the promotora informed participants that she would follow-up via telephone at two months to confirm their contact information, and at four months to conduct a final assessment.

Data Entry and Statistical Methods

Each site was provided with a Microsoft Access© database for entering participant information and tracking progress with the study. The sites provided a file to a central location (North Carolina-based contractor), which was then transferred to CDC for data processing and cleaning. SAS 9.3© (Cary, NC) was used to perform the statistical tests. We used a pooled t-test for differences of population means, a Chi-square to test for variable independence, Fisher's exact test for small samples, and McNemar's/Bowker's test of symmetry for matched pairs.

Results

A total of 1,756 women from all county sites were eligible for inclusion in the study, i.e., women who met the geography, age, and language criteria. Approximately 81% (n=1,426) of the eligible women completed the study intervention and responded to both pre- and post-test surveys (hereafter referred to as participants). Table 1 presents demographic characteristics of eligible women by enrollment status (participant group versus lost to follow-up group). The lost to follow-up group had a lower overall mean age (31 years) than the participant group (33 years). This difference in age remained statistically significant ($p<0.0001$) when eligible women were grouped into younger and older age categories (<35 years and ≥35 years). Statistically significant differences between the two groups were also observed for women whose country of origin was Mexico or Puerto Rico ($p=0.02$). However, no statistically significant differences were observed for length of time lived in the United States, education level, children status, prior pregnancy intention, and previous pre-pregnancy doctor visit to discuss preconception health.

Vitamin Intake among the Participant Group

Vitamin intake among the participant group is shown in Table 2. We observed a statistically significant change ($p<0.0001$) in the reported use of any vitamin or mineral supplement between the pre-test and the post-test. Additionally, the use of folic acid as a supplement increased 11 fold, from 5% (n=69) of study participants on the pre-test to 55% (n=784) on the post-test. An increase was also seen for multivitamin use between the pre-test (n=266, 19%) and post-test (n=450, 32%). All other categories of vitamins and minerals, with the exception of the 'Other' category, showed decreases in use; however, some of the changes were minimal, e.g., 5% for calcium and 2% for iron and prenatal vitamins. This might have been due to the focus of the intervention being on folic acid intake. Differences in the proportions of participants in categories of 'How often do you take this vitamin or mineral supplement?' were observed ($p <0.0001$). For this question higher percentages were observed among participants who reported taking vitamins every day (pre-test: n=329, 23%, post-test: n=888, 62%).

Statistically significant differences were observed in all response categories of 'Where do you obtain/buy this vitamin or mineral supplement?', although this was likely due to the introduction of an additional option on the post-test which allowed participants to select 'From the promotora during the workshop' as a response. This was the most selected option for this question on the post-test (n=854, 60%). When asked 'Why do you take this vitamin or mineral supplement?', the most common response was 'Because the promotora had recommended it' (n=443, 31%). For this question increases in the number of participants who selected 'Because I want to get pregnant', 'To supplement my diet', 'For health reasons', 'To prevent illness' and the 'Other' category were observed. An additional question was asked of those who did not take a supplement regarding why they did not. The total number of participants who replied to this follow-up question dropped considerably on the post-test, and each possible answer showed statistically significant differences from pre-test to post-test (i.e., cost of vitamins). A similar pattern of decreased response from pre-test to post-test was observed among those who replied to the follow-up question 'For what reason would you start taking a vitamin?' with all answers showing significant changes in proportion.

Pregnancy Intention, Vitamin and Birth Defects Prevention Knowledge among the Participant Group

Regarding their pregnancy plans, a difference was seen in the proportions answering 'I want to now', 'Sometime in the future', 'Don't want to', and 'Don't know' (Table 3). Women in the participant group were also given an additional option on the post-test that indicated they were currently pregnant (n=40, 3%). Participants were also asked questions about their vitamin knowledge. When asked 'Which vitamins or mineral supplements do you think are very important to women of childbearing age?' a significantly different proportion of participants responded that folic acid ($p<0.001$) and multivitamins ($p<0.001$) were important in the post-test than in the pretest survey. Regarding awareness and knowledge of birth defects and vitamin use, statistically significant changes in response proportions were observed when participants were asked 'Do you think that consuming vitamins can reduce the risk of birth defects?' (increases were observed in 'Yes' response), 'Which birth defects

do you think might be prevented by consuming vitamins?' (increases were observed in 'Defects of the brain and spine'), and 'Have you ever read, heard, or seen anything about folic acid?' (increases were observed in 'Yes' response). When asked 'What have you read, seen or heard about folic acid?' we observed a statistically significant difference in the percentage of people who responded 'There are food and/or vitamins that contain folic acid', 'Helps prevent cancer', 'It prevents birth defects', 'It prevents diseases', and 'Other'. A decrease was observed across all answer categories of 'Where have you heard about folic acid?' except for the new answer choice introduced on the post-test, 'From the promotora'. A total of 1,344 (94%) participants selected this new answer. Statistically significant changes in the proportions of answers to 'When should a woman start taking folic acid?' were observed, with increases in the percentage of participants on the post-test choosing 'All the time'.

Between the pre-test and post-test assessments, more participants responded correctly to the following true or false questions: 'You need a prescription from a doctor to buy folic acid' (pre-test: n=846, 59%; post-test: n=1,353, 95%), 'Latinas have more babies affected by birth defects of the brain and spine than other women' (pre-test: n=333, 23%; post-test: n=1,183, 83%), and 'Having a healthy baby guarantees that your future children will also be healthy' (pre-test: n=564, 40%; post-test: n=1,197, 84%).

Similar findings were observed for the responses in Table 3 when stratifying the questions by maternal country of origin (Mexico vs. all other countries), maternal age (<35 years and ≥35 years), or intention to become pregnant ('Want to become pregnant now or in the future' and 'Do not want to become pregnant') (data not shown).

Discussion

This study demonstrated an overall increase in reported vitamin, multivitamin, and folic acid use, and in knowledge and awareness of birth defects from pre-test to post-test. Although due to the study design, questions about the influence of the promotora on behavior and knowledge were only asked post-test, the frequency of positive responses related to the influence of the promotora suggests the potential effectiveness of this model for folic acid and NTD education initiatives.

Statistically significant changes were observed for reported vitamin, folic acid supplement, and multivitamin consumption from pre-test to post-test. The most drastically observed increase was in folic acid supplement consumption, which increased from 5% to 55%. Although this is a very large increase, it would be expected that there would be an increase given that fewer participants were knowledgeable about the benefits of folic acid consumption prior to the start of the study. Further, the women who received the intervention were provided with a 90-day supply of multivitamin supplements. The cost of vitamins was mentioned in the pre-test as a barrier to vitamin use in both this study as well as in the earlier North Carolina-based pilot study,[7] and has been noted as a barrier in other studies as well.[23] The distribution of free supplements, then, provided a convenient way for these women to obtain supplements, while also removing the potential barrier of the cost of purchasing them. Finally, the regular communication that the promotoras had with the women could have also

helped to increase compliance. Nonetheless, these findings were very encouraging and lend credence to a central role the promotora can play in influencing health behavior.

Statistically significant differences in knowledge about the importance of both folic acid and multivitamin consumption for participants were also encouraging, and could further point to the positive impact of a more individualized educational intervention and the influence of a promotora. The respondents in this study participated in a small group educational intervention, which included a flipchart of colorful visuals of supplement bottles showing the nutrition label with the appropriate folic acid dosage, and visuals of the specific neural tube defects that can be prevented with folic acid consumption. The small sessions allowed for questions and discussion. It is possible that this more personalized educational approach allowed for a greater understanding of the material being presented.

Most of the participants (87%) reported having already had children, and more than half (53%) of them indicated not actively trying to become pregnant before their last pregnancy. Moreover, of those who had children already, only 17% reported having seen their doctor to discuss pregnancy prior to becoming pregnant. This low percent might be a reflection of the high number of participants who were not actively trying to become pregnant during their last pregnancy. In order to be effective in preventing neural tube defects, folic acid must be taken prior to the close of the neural tube at approximately three weeks of gestation; therefore, it is critical that women take folic acid if there is a chance of becoming pregnant. Since women might not see their providers until they become pregnant, providers should take every opportunity to discuss folic acid consumption with their reproductive age patients regardless of pregnancy intention. Further, because promotoras are familiar with the women of reproductive age in the communities they serve, they can provide tailored folic acid messages to these women, encourage them to visit and discuss pregnancy with their providers, and promote consumption of supplements prior to pregnancy.

This study had a relatively low (approximately 19%) loss to follow-up from the start of the pre-test to completion of the intervention (post-test). This could be due in large part to the short time frame of four months from the onset to the completion of the study period. The ‘check in’ conducted by the promotoras at a two-month interval could also have played a role in helping to ensure that participants remained engaged in the study.

There were some limitations to this study. First, study findings are not generalizable to a larger population for several reasons. Two-thirds of respondents were of Mexican origin. Although this is representative of the broader U.S. Hispanic population, very few respondents were from other countries of origin. Further, because only four sites were chosen, the findings cannot be deemed representative of Hispanic women in other counties or states. Moreover, in order to recruit women for the study, the promotoras approached them at various locations and spoke with them about the project to gauge their interest. Those who were interested in learning more about the topic were then screened for eligibility. It is unknown, then, whether our findings based on a motivated population are applicable to a broader population of Hispanic women. Finally, data are only available for those women who responded to either the pre-test, post-test or both. No data are available for how many women were recruited. It is possible that the women who were recruited and

were not eligible for the study, or those women who did not complete the study, were significantly different from those who fully participated in the study. This highlights an important lesson learned; namely, that multi-site studies should meticulously keep track of potential and enrolled participants during all stages of the study, from recruitment to final assessment.

Second, providing women with a 90-day supply of multivitamins can be viewed as both a strength and a limitation to the study. Clearly, the high reported supplement use in the post-test was a very positive finding, and lends support to the impact that providing supplements directly to women can have on consumption. However, it is unclear whether this behavior would have continued in the absence of promotora visits or without the provision of supplements. Further, because of the short time frame of the study, it is unclear whether participants would have continued to purchase and consume supplements several months after the end of the study. In order for it to be effective in preventing neural tube defects, folic acid must be taken prior to and throughout the first few weeks of pregnancy[24] – requiring sustained consumption. Although providing women with free supplements appears to have been effective in getting many women to begin consuming supplements, it is unknown whether this consumption would have been sustained over the longer term.

Finally, the promotoras conducted the post-test and therefore were the ones to ask the participants whether they were consuming folic acid. A positive response in this case could have been due to response bias, with participants feeling inclined to respond positively to please the promotora. This could have been avoided by having a different staff member conduct the post-test.

Conclusion

The *Promotora de Salud* model relies on the interpersonal connections forged between promotoras and the communities they serve. At the center of this model is established evidence that these relationships can help drive positive health behaviors. A review of several prospective population studies found associations between interpersonal relationships and various positive health outcomes.[25] The findings outlined in this paper underscore the positive impact that these interpersonal connections can have on knowledge, behavior change, and, ultimately, health outcomes, particularly among motivated women. Further, designing programs that utilize both interpersonal connections and also remove barriers to behavior change, such as having promotoras provide free supplements in this study, can be one way to maximize efforts and increase potential for success.

Promotoras by definition are lay health workers and the focus of their work is serving the communities in which they live. They are usually members of the target audience and serve as a bridge between hard-to-reach populations and the healthcare system. As members of the target audience, they are able to establish influential relationships with their peers allowing for the effective delivery of health messages. Further, the close proximity of the promotora to the target audience allows for continued follow-up and message reinforcement. Programmatic efforts embedded in state and local public health departments and federal agencies aiming to reach Hispanic populations can possibly benefit from using the

Promotora de Salud model to implement their activities. This model might help organizations successfully reach targeted populations in a culturally appropriate manner.

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Table 1

Selected Demographic and Prior Pregnancy Intention by Enrollment Status, Four County Sites [*, †] (n=1756)

	Participants		Lost to follow-up		
Questions	**Number**	**(Percent)**	**Number**	**(Percent)**	**P value[§]**
Totals	1426	(81)	330	(19)	
What is your age (years)?					
<35	816	(57)	228	(69)	<0.0001
≥35	610	(43)	102	(31)	
Mean Age (years)	Mean=33		Mean=31		<0.0001 [**]
What is your county of residence?					
Cook, Illinois	348	(24)	95	(29)	<0.0001
Harris, Texas	507	(36)	33	(10)	
Hillsborough county, Florida	293	(21)	11	(3)	
Mecklenburg, North Carolina	278	(19)	191	(58)	
What Region(s)/Country(ies) are you and your family from? [‡]					
Mexico	947	(66)	197	(60)	0.02
Central America	238	(17)	57	(17)	0.8
South America	72	(5)	21	(6)	0.3
Puerto Rico/USA	138	(10)	18	(5)	0.02
Cuba	18	(1)	2	(1)	0.1 [¶]
Spain	2	(<1)	1	(<1)	0.3 [¶]
Other	57	(4)	24	(7)	0.01
Lived in the United States for 10 years or less?					
Less than 10 years	767	(54)	161	(49)	0.6
Greater than 10 years	600	(42)	136	(41)	
What is the last grade you completed in school?					

Questions	Participants Number	(Percent)	Lost to follow-up Number	(Percent)	P value§
Primary School	400	(28)	91	(28)	0.8
Graduated Secondary School	518	(36)	114	(35)	
Some College	315	(22)	62	(19)	
Graduated College	148	(10)	28	(8)	
Have you ever had any children?					
Yes	1242	(87)	263	(80)	0.4
No	172	(12)	43	(13)	
Which of the following best describes your last pregnancy? (answered 'Yes' above) §§					
I was trying to get pregnant	374	(30)	82	(31)	0.9
I wasn't trying to get pregnant or trying to keep from getting pregnant	461	(37)	95	(36)	
I was trying to keep from getting pregnant but was not trying very hard	201	(16)	44	(17)	
In relation to your last pregnancy, did your see your doctor to discuss pregnancy before you got pregnant? (answered 'Yes' to 'Have you ever had any children?') §§					
Yes	240	(17)	58	(18)	0.4
No	946	(66)	200	(61)	
During these visits, did you doctor discuss ways in which you might help to have a healthy baby and reduce your child's risk of birth defects? (answered 'Yes' above) ¶¶					
Yes	205	(85)	54	(93)	0.4
No	24	(10)	4	(7)	

*Four Counties participating in the study: Cook, Illinois; Harris, Texas; Hillsborough, Florida; Mecklenburg, North Carolina;

†Missings and responses of ‘Don’t know’ are not reported

§Unless otherwise noted a Chi-square test for difference in proportion was used to evaluate statistical significance. Values of ‘Don't know/Missing’ were excluded from the test

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¶ Fisher's exact test

** Pooled T-test

‡ Respondents were instructed to mark all answers that applied

§§ The denominator for this question is limited to respondents who answered 'Yes' to 'Have you ever had any children?'

¶¶ The denominator for this question is limited to respondents who answered 'Yes' to 'In relation to your last pregnancy, did you see your doctor to discuss pregnancy before you got pregnant?'

Table 2

Vitamin Intake of Participants Before and After Intervention, Four County Sites[*, †] (N=1426)

	Pre-test		Post-test		
Questions	**Number**	**(Percent)**	**Number**	**(Percent)**	**P value**
Are you taking a vitamin or mineral supplement? [§]					
Yes	470	(33)	1162	(81)	<0.0001
No	944	(66)	255	(18)	
			10		
What type of vitamin or mineral supplement do you take? [¶,**]					
Calcium	141	(10)	75	(5)	<0.0001
Folic Acid	69	(5)	784	(55)	<0.0001
Iron	69	(5)	43	(3)	0.004
Multivitamin	266	(19)	450	(32)	<0.0001
Prenatal vitamins	69	(5)	45	(3)	0.008
Other	61	(4)	49	(3)	0.2
How often do you take this vitamin or mineral supplement? [§]					
Every day	329	(23)	888	(62)	<0.0001
3–6 times per week	88	(6)	226	(16)	
Less than once to two times per week	57	(4)	47	(3)	
Where do you obtain/buy this vitamin or mineral supplement? [¶,**]					
From the promotora during the workshop			854	(60)	
Pharmacy	180	(13)	121	(8)	0.0002
Grocery Stores	48	(3)	23	(2)	0.0009
Super Stores (Target, Walmart, Sam's)	174	(12)	127	(9)	0.002
Other	95	(7)	42	(3)	<0.0001
Why do you take this vitamin or mineral supplement? [¶,**]					

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Questions	Pre-test Number	Pre-test (Percent)	Post-test Number	Post-test (Percent)	P value
Because a health care provider recommended it	172	(12)	175	(12)	0.8
Because I want to get pregnant	31	(2)	59	(4)	0.001
To supplement my diet	156	(11)	355	(25)	<0.0001
For health reasons	41	(3)	54	(4)	0.1
To prevent illness	143	(10)	456	(32)	<0.0001
Other	70	(5)	166	(12)	<0.0001
Because the promotora had recommended it			443	(31)	
*Is there a reason you do not take a vitamin? ¶,***					
Costs too much	142	(10)	8	(1)	<0.0001
They are too big	50	(4)	4	(<1)	<0.0001
They make me hungry	82	(6)	12	(1)	<0.0001
I don't want to gain weight	159	(11)	14	(1)	<0.0001
I don't need them	45	(3)	30	(2)	0.07
I don't like taking pills	123	(9)	31	(2)	<0.0001
I have a balanced diet	25	(2)	15	(1)	0.1
I forget to take them	382	(27)	144	(10)	<0.0001
Other	157	(11)	103	(7)	0.0002
*For what reason would you start taking a vitamin? ¶,***					
To have more energy	677	(47)	173	(12)	<0.0001
To have a healthy pregnancy	216	(15)	66	(5)	<0.0001
If a doctor recommended	372	(26)	164	(12)	<0.0001
If I was deficient in something	129	(9)	70	(5)	<0.0001
If I didn't eat well	150	(11)	51	(4)	<0.0001
If I was sick	212	(15)	94	(7)	<0.0001
If it were recommended by a relative or friend	72	(5)	25	(2)	<0.0001
Other	72	(5)	21	(1)	<0.0001

*Four Counties participating in the study: Cook, Illinois; Harris, Texas; Hillsborough, Florida; Mecklenburg, North Carolina;

†Missings and responses of ‘Don’t know’ are not reported

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[§] Bowker's Test of Symmetry

[¶] Each subcategory, with the exception of answers that could only be selected for one of the interventions, is tested using McNemar's Test

[**] Respondents were instructed to mark all answers that applied

Table 3

Pregnancy Intention, Vitamin and Birth Defects Prevention Knowledge of Participants Before and After Intervention, Four County Sites[*, †] (N=1426)

	Pre-test		Post-test		
Questions	**Number**	**(Percent)**	**Number**	**(Percent)**	**P value**
Which of the following statements best describes your pregnancy plans?[§]					
I want to now	175	(12)	114	(8)	<0.0001
Sometime in future	494	(35)	553	(39)	
Don't want to	543	(38)	680	(48)	
Don't know	188	(13)	35	(2)	
I am currently pregnant			40	(3)	
Which vitamins or mineral supplements do you think are very important to women of childbearing age?[¶,**]					
Calcium	865	(61)	442	(31)	<0.0001
Folic Acid	1065	(75)	1314	(92)	<0.0001
Iron	800	(56)	409	(29)	<0.0001
Multivitamin	534	(37)	661	(46)	<0.0001
Prenatal vitamins	889	(62)	655	(46)	<0.0001
Vitamin C	364	(26)	165	(12)	<0.0001
Vitamin D	342	(24)	155	(11)	<0.0001
Vitamin E	333	(23)	145	(10)	<0.0001
Other	23	(2)	6	(<1)	0.001
Don't know	86	(6)	14	(1)	<0.0001
Do you think that consuming vitamins can reduce the risk of birth defects?[§]					
Yes	1072	(75)	1371	(96)	<0.0001
No	150	(11)	23	(2)	
Don't know	188	(13)	20	(1)	
Which birth defects do you think might be prevented by consuming					

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Questions	Pre-test Number	Pre-test (Percent)	Post-test Number	Post-test (Percent)	P value
*vitamins? ¶,***					
Defects of the brain and spine	816	(57)	1344	(94)	<0.0001
Down Syndrome	370	(26)	196	(14)	<0.0001
Heart defects	319	(22)	198	(14)	<0.0001
Mental retardation	353	(25)	137	(10)	<0.0001
Other	25	(2)	4	(<1)	<0.0001
Don't know	215	(15)	21	(1)	<0.0001
Have you ever read, heard, or seen anything about folic acid? §					
Yes	874	(61)	1385	(97)	<0.0001
No	480	(34)	8	(1)	
Don't know	56	(4)	10	(1)	
*What have you read, seen or heard about folic acid? ¶,***					
There are food and/or vitamins that contain folic acid	392	(27)	793	(56)	<0.0001
Helps prevent cancer	99	(7)	342	(24)	<0.0001
It causes memory loss	53	(4)	29	(2)	0.008
It helps women get pregnant	153	(11)	114	(8)	0.008
It is bad for you	10	(1)	1	(<1)	0.007
It prevents birth defects	583	(41)	1178	(83)	<0.0001
It prevents diseases	167	(12)	632	(44)	<0.0001
Women need/needed for pregnancy	551	(39)	554	(39)	0.9
Other	65	(5)	122	(9)	<0.0001
Don't know	38	(3)	7	(<1)	<0.0001
*Where have you heard about folic acid? ¶,***					
From the promotora			1344	(94)	
From my doctor	486	(34)	259	(18)	<0.0001
In a brochure or poster	233	(16)	179	(13)	0.003

	Pre-test		Post-test		
Questions	**Number**	**(Percent)**	**Number**	**(Percent)**	**P value**
In a health clinic	285	(20)	171	(12)	<0.0001
At a health fair	89	(6)	69	(5)	0.09
From a friend or relative	146	(10)	47	(3)	<0.0001
In a magazine or newspaper article	104	(7)	47	(3)	<0.0001
On the radio	46	(3)	30	(2)	0.05
On television	181	(13)	135	(9)	0.003
Other	63	(4)	18	(1)	<0.0001
When should a woman start taking folic acid [§]					
All the time	357	(25)	785	(55)	<0.0001
When she begins to menstruate	60	(4)	198	(14)	
Before she is pregnant	458	(32)	401	(28)	
When she finds out she is pregnant	172	(12)	13	(1)	
At some point during pregnancy	30	(2)	4	(<1)	
Don't know	286	(20)	4	(<1)	
True or False: You need a prescription from a doctor to buy folic acid [§]					
True	130	(9)	36	(3)	<0.0001
False	846	(59)	1353	(95)	
Don't know	433	(30)	23	(2)	
True or False: Latinas have more babies affected by birth defects of the brain and spine than other women [§]					
True	333	(23)	1183	(83)	<0.0001
False	232	(16)	108	(8)	
Don't know	837	(59)	118	(8)	
True or False: Having a healthy baby guarantees that your future children will also be healthy [§]					
True	467	(33)	147	(10)	<0.0001

	Pre-test		Post-test		
Questions	Number	(Percent)	Number	(Percent)	P value
False	564	(40)	1197	(84)	
Don't know	369	(26)	70	(5)	

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