Promoting Maternal and Child Health Through Health Text Messaging

An Evaluation of the Text4baby Program

Summary of Key Findings

U.S. Department of Health and Human Services
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Contents

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Background and Context

The health of mothers, infants, and children is a determinant of the well-being of a nation, both now and in the future (Healthypeople.gov 2013). Specifically, a nation's infant mortality rate is a leading indicator of the health of its population (Singh and van Dyck 2010). Despite declines in the U.S. infant mortality rate over the past decade, disparities by race/ethnicity persist, with more than a two-fold difference between non-Hispanic black women (12.40 per 1,000) and non-Hispanic white and Hispanic women (5.33 and 5.29 per 1,000, respectively) (Mathews and MacDorman 2013). Reduction of infant deaths is a high priority for the United States, with a special emphasis on reducing disparities by race/ethnicity and income (Secretary's Advisory Committee on Infant Mortality [SACIM] 2013). Continued progress in reducing infant mortality rates in the United States requires a multifaceted, innovative strategy, including "new, culturally congruent social marketing messages and modern communication strategies" (SACIM 2013). The Text4baby™ program is part of a new generation of health text messaging programs that take advantage of increasing cell phone ownership in the United States and the increasing popularity of text messaging (Rainie 2013).

What Is Text4baby?

Text4baby is a free text messaging program for pregnant women and new mothers with an infant up to one year of age, designed to improve maternal and child health (MCH) among underserved populations in the United States. It is the first free national health text messaging service, made possible through an arrangement between The Wireless Foundation and most U.S. mobile operators. Text4baby provides evidence-based, critical health and safety information targeted to traditionally underserved pregnant women and new mothers who are in need of services but are often beyond the reach of the health care system (Whitaker et al. 2012). The Text4baby program was implemented by using a public-private partnership model to develop the message content and conduct outreach. The partnership was led by the National Healthy Mothers, Healthy Babies Coalition (HMHB), a national coalition of MCH professional organizations; Voxiva, a mobile health (mHealth) company that provides the Text4baby software platform; The Wireless Foundation, representing the wireless carriers; and Grey Healthcare Group, which provides public relations and media support. Johnson & Johnson is the founding sponsor, providing direct financial and in-kind support to operate the program. The U.S. Department of Health and Human Services (HHS) is the lead federal government partner, assisting with outreach, developing and approving message content, and supporting an evaluation of Text4baby. More than 1,000 outreach partners support the promotion of Text4baby at the national, state, and local levels.

Text4baby is the largest health text messaging program in the United States in terms of the number of subscribers and messages sent. Since the program's launch in February 2010, more than 830,000 people have ever signed up for Text4baby (Text4baby Tuesday, February 3, 2015). To enroll in Text4baby, subscribers provide their due date (if they are pregnant) or infant's birth date (if they are new mothers with an infant up to one year of age), ZIP code, and language preference for receiving text messages (Spanish or English). When women sign up, they receive a "starter pack" of six messages that provide critical health information and encourage them to connect to care. Using the due date or birth date, the system places subscribers in a messaging protocol to receive three text messages per week timed to the stage of pregnancy or age of the infant. Subscribers can opt out of Text4baby at any time by responding "STOP." They will no longer receive messages or alerts after they unsubscribe. Text4baby does not collect health information on its user population and has instituted a privacy policy to protect user data at registration. In addition, Text4baby does not include advertisements in message content.

Overview of the Text4baby Evaluation

In September 2010, the Health Resources and Services Administration (HRSA) contracted with Mathematica Policy Research to conduct an evaluation of Text4baby. Mathematica and its subcontractor, Public Health Institute, evaluated the implementation and effectiveness of Text4baby, with a particular focus on women receiving health care from safety net providers. Evaluation questions addressed five domains to gauge how well Text4baby achieved its goals of (1) enrolling the target population, (2) promoting partnerships, (3) providing critical health information, (4) connecting women to recommended care, and (5) facilitating the scale-up and spread of Text4baby and other health text messaging programs. This report summarizes the results of the Text4baby evaluation.

The Text4baby evaluation used a mixed-method approach that relied on both quantitative and qualitative data sources.[1] Data collection took place at the national and community levels in order to understand the national roll-out of Text4baby as well as experiences in diverse communities. The national components—stakeholder interviews and secondary data analyses—characterized the implementation and evolution of the Text4baby program. The community components—safety net consumer survey, key informant interviews, and consumer focus groups—provided an understanding of Text4baby participation, satisfaction, use, and effects at the local level. A key feature of the evaluation was the selection of four community health centers (CHCs) to assess how Text4baby was implemented in safety net settings. The four CHCs are geographically and demographically diverse; each receives partial funding from HHS.

Summary of Key Findings

Lessons Learned from the Text4baby Public-Private Partnership

When the Text4baby program was developed in 2009 and launched in 2010, implementation through a public-private partnership was considered an innovative approach for the federal government's involvement in a new program. Overall, there is strong support for the Text4baby public-private partnership. Stakeholders universally agreed that the Text4baby public-private partnership facilitated a faster implementation timeline than would have been possible under sole public or private sponsorship. Private sector stakeholders also noted that federal government involvement lent credibility to the program. Federal government partners considered the public-private partnership model "unique," "a model for how we should increasingly be doing our work," and "absolutely critical to the success of the program." However, the Text4baby business model relies on in-kind contributions, voluntarism, and philanthropy, which are essential to the sustainability of Text4baby and may also be central to the success of future public-private partnerships in mHealth and public health. The viability of the Text4baby business model for future health text messaging programs should be considered further.

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[1] The Text4baby evaluation team also produced an environmental scan on "Using Health Text Messages to Improve Consumer Health Knowledge, Behavior, and Outcomes." The environmental scan is available online at: http://www.hrsa.gov/healthit/txt4tots/environmentalscan.pdf.

Trends in Text4baby Program Enrollment

The evaluation included an analysis of national Text4baby enrollment and retention, based on registration data supplied by HMHB as of September 30, 2013.[2] Figure 1 shows the cumulative number of subscribers ever enrolled in Text4baby, by month, through September 30, 2013.

Figure 1. Cumulative Number of Text4baby Subscribers, by Month and Protocol at Time of Registration, as of September 30, 2013
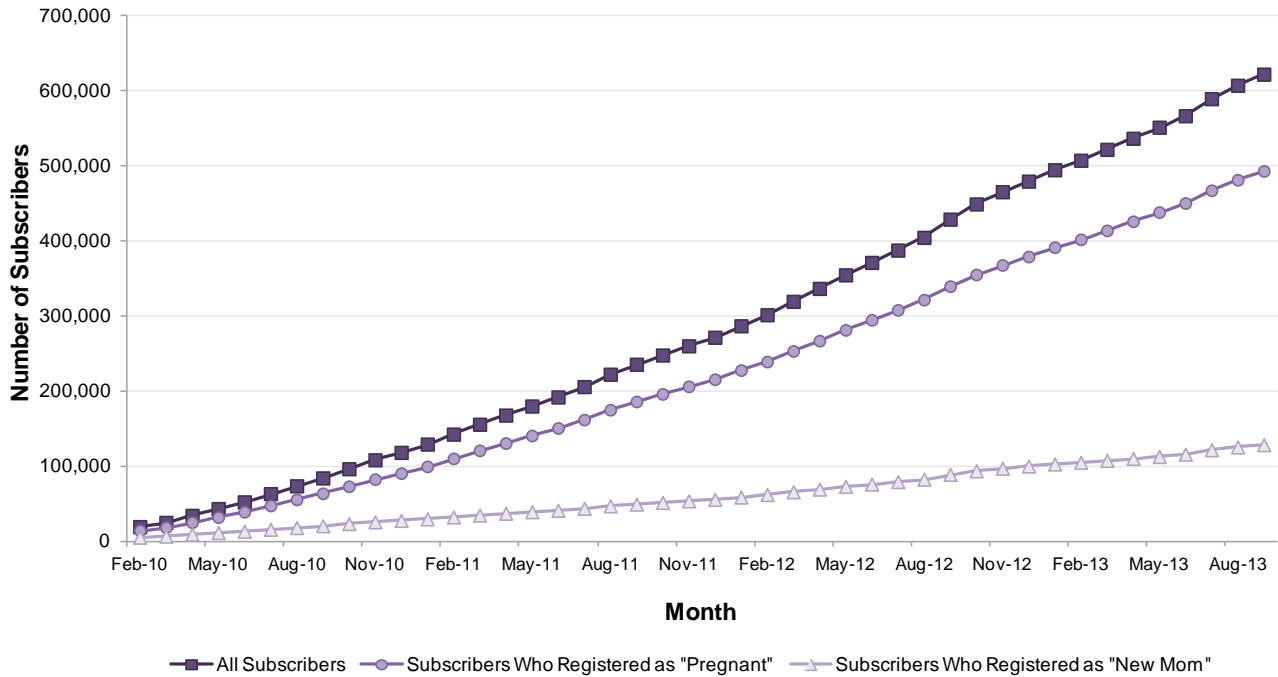
Source: HMHB, Participants Dataset, as of September 30, 2013, based on analysis conducted by Mathematica Policy Research.

Note: Cumulative number of subscribers includes the number ever enrolled, including those who unsubscribed. Protocol at time of registration is defined according to whether the subscriber registered before the due date ("pregnant") or on or after the birth date ("new mom").

As of September 30, 2013, 79 percent of Text4baby subscribers initially registered for the pregnancy protocol (that is, they signed up before their due date), and 21 percent registered for the new baby protocol (that is, after their baby's birth date).[3] About one-third of all subscribers signed up during the first trimester of pregnancy (based on the due date/birth date provided at registration). About 5.5 percent registered to receive Text4baby messages in Spanish. Early research suggested that about 40 percent of Text4baby subscribers resided in a medically underserved area, roughly proportional to the distribution of live births in such areas (Whitaker et al. 2013).

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[2] The results are based on Mathematica's primary analysis of Text4baby enrollment patterns drawn from data supplied by HMHB. The file contained data for all subscribers enrolled from February 2, 2010, through September 30, 2013. The file included information on date of registration, due date (for those who were pregnant) or baby's birth date (for those who enrolled or remained enrolled after their baby was born), and unsubscribed date (for those who texted "STOP" to discontinue the receipt of messages).

[3] Some of these people were not pregnant or new mothers when they enrolled. The Text4baby program began collecting information on "type of user" in March 2013; of the 355,302 people providing information on their status as of September 30, 2013, 94.4 percent indicated that they were pregnant or new mothers; the rest indicated that they were a father/parent (2.8 percent), health care provider/observer (1.1 percent), or a relative/friend (1.7 percent).

Retention in the Text4baby program is recognized as an issue by stakeholders, especially during periods with enrollment spikes (such as state enrollment contests). For example, among the women enrolling in July 2013, 22 percent disenrolled within 30 days (based on an analysis of national Text4baby enrollment data conducted as part of the evaluation). The rate was higher among those who enrolled while pregnant (24 percent) rather than as new mothers (13 percent). The rate of rapid disenrollment was also higher among those signing up for the English-language protocol (22 percent) rather than for the Spanish-language protocol (12 percent). As enrollment continues to increase, attention can focus on factors associated with disenrollment to ensure that subscribers receive the full benefit of Text4baby through the baby's first year.

Text4baby Awareness and Participation Among Women Receiving Prenatal Care from Four Community Health Centers

Text4baby awareness and participation rates varied across the four CHCs.[4] Awareness rates—that is, the percentage of CHC prenatal care patients that indicated they had heard about Text4baby—ranged from 8 to 38 percent across the four CHCs (Table 1). Participation rates—that is, the percentage of CHC prenatal care patients that reported they signed up for Text4baby—ranged from 2 to 16 percent across the four CHCs. The participation rate was substantially higher in the CHC with strong provider support, with Text4baby posters displayed in clinic waiting rooms, and with direct involvement of a statewide MCH coalition in supporting community activities. This model of multilevel promotion and outreach holds promise for expanding the reach of Text4baby in the future.

Table 1. Text4baby Awareness and Participation Among Pregnant Women, by Site, Four CHCs, 2012–2013

CHC	Percentage of Pregnant Women Who Heard of Text4baby	Percentage of Pregnant Women Who Signed Up for Text4baby
CHC 1	7.9	2.0
CHC 2	12.0	4.3
CHC 3	37.7	16.0
CHC 4	19.0	5.9

Source: Healthy Pregnancy and Parenting Survey, conducted by Mathematica Policy Research, December 2012 to April 2013. The survey included 707 pregnant women receiving prenatal care at four CHCs. The results have been weighted to account for the probability of selection and nonresponse.

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[4] Data are not available on the national level of Text4baby participation in CHCs. Therefore, the generalizability of the Text4baby enrollment experience in the four CHCs is unknown. However, the four CHCs illustrate varying "real world" experiences with Text4baby outreach and enrollment, ranging from no organized outreach in three CHCs to a proactive outreach and enrollment effort by one of the CHCs and its statewide MCH coalition.

The estimated rate of national Text4baby sign-up was 4.8 percent in 2012.[5] Text4baby enrollment nationally was lower than expected: in November 2010, the program set a goal to enroll "1 million moms" by the end of December 2012. The cumulative enrollment at the end of December 2012 was 480,000 (Figure 1).

The data show that a sizable proportion of CHC prenatal care patients who heard of Text4baby decided not to sign up. The majority of women who heard of Text4baby but did not sign up said that they had other sources of health information; a sizable proportion (one-third) said they were not comfortable with text messaging.

The analysis has implications for refining the way Text4baby is marketed to women who may have other sources of health information during pregnancy. The findings suggest that Text4baby could be promoted as a complement to other sources of information, encouraging women to integrate its use with information from health care providers, family members and friends, and other media (such as books and Internet sources).

Health Information, Knowledge, and Behavior Among Women Receiving Prenatal Care from Four Community Health Centers

The goal of the Text4baby program is to help women have healthy pregnancies and healthy babies by sharing high-priority health information, increasing their health knowledge, promoting healthy behaviors, and improving access through referrals to health resources. The evaluation examined the type of health information received, level of health knowledge, selected preventive health behaviors, and referrals to health resources.

Receipt of High-Priority Health Information. As shown in Figure 2, women who heard of Text4baby (regardless of whether they signed up) were significantly more likely to report receiving health information on 14 high-priority topics compared to women who never heard of Text4baby. In particular, women who had heard of Text4baby were significantly more likely to report they received information about exercising (93 versus 84 percent), avoiding stress (90 versus 77 percent), getting a flu shot (88 versus 76 percent), seeing a dentist (83 versus 74 percent), and calling a help line if they were depressed (81 versus 65 percent). When asked about their unmet needs for health information, women who never heard of Text4baby frequently mentioned critical topics included in the Text4baby message protocol, such as information about Medicaid, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), breastfeeding and nutrition, and mental health issues. There were no significant differences in the receipt of health information between women who signed up for Text4baby and those who heard of Text4baby but decided not to sign up. The results suggest that women who decided not to sign up for Text4baby relied on other sources of health information (consistent with women's reasons for not signing up for Text4baby).

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[5] We calculated a national rate of Text4baby participation by using a methodology similar to the one HMHB uses to determine the winners of its annual Text4baby state enrollment contest. The 2012 national participation rate is a ratio of the number of Text4baby subscribers with a due date or birth date in 2012 (numerator) to the total number of live births in the United States in 2012 (denominator). Calculation of the number of Text4baby subscribers with a due date or birth date in 2012 was based on data provided by HMHB. The number of live births in 2012 comes from the CDC (Hamilton et al. 2013). A similar method was used to calculate participation rates for 2010 and 2011. This method may overstate the national Text4baby participation rate among those delivering in a given year because the numerator includes an unknown number of subscribers who were family members, providers, or observers. In addition, approximately 20 percent of subscribers disenroll within 30 days, suggesting a minimal level of participation in Text4baby.

Figure 2. Receipt of Health Information on High-Priority Health Topics, by Text4baby Participation Status, Four CHCs, 2012–2013
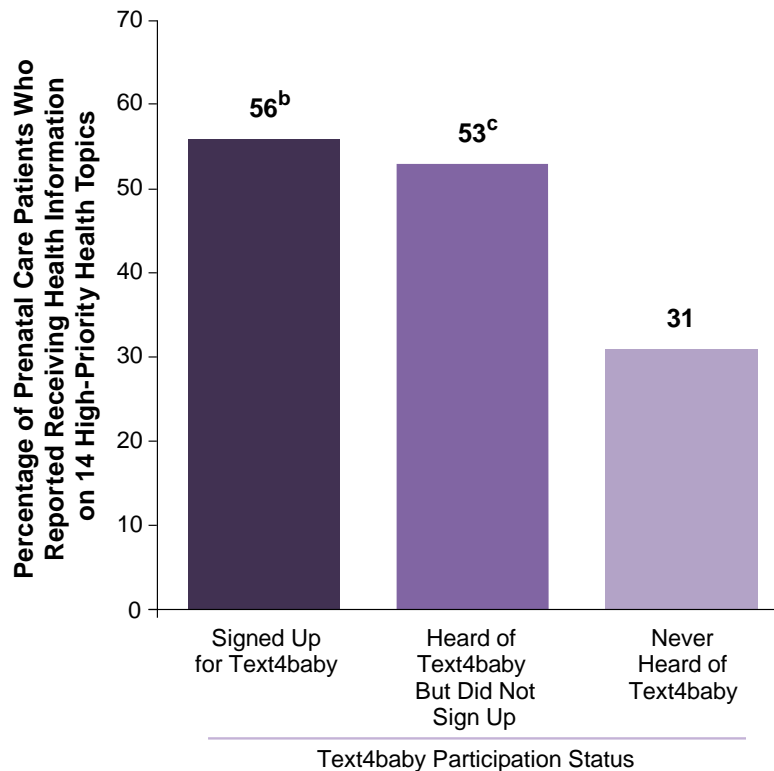
Source: Healthy Pregnancy and Parenting Survey, conducted by Mathematica Policy Research, December 2012 to May 2013. The survey included 707 pregnant women receiving prenatal care at four CHCs. The results have been weighted to account for the probability of selection and nonresponse.

Note: T-tests were conducted to determine statistical significance of differences between groups (p < 0.10). Statistically significant differences are denoted as follows:
a = women who signed up for Text4baby versus women who heard of Text4baby but did not sign up (no significant difference found)
b = women who signed up for Text4baby versus women who never heard of Text4baby
c = women who heard of Text4baby but did not sign up versus women who never heard of Text4baby

Level of Health Knowledge. The evaluation assessed women's health knowledge along four dimensions: how women plan to feed their babies, how they plan to lay their babies down to sleep, what they consider to be the best time to deliver when there are no medical problems in the pregnancy, and when they view a pregnancy to be full-term. All of these health knowledge topics are part of large public health campaigns to promote evidence-based practices related to infant feeding, safe sleeping, and optimal delivery time. Among the CHC prenatal care patients, 90 percent reported that they plan to breastfeed their baby, 57 percent indicated that they plan to lay their baby down to sleep on his or her back, 69 percent responded that the best time to deliver when there are no medical problems is 39 to 40 weeks, and 60 percent were aware that pregnancy is considered to be full-term at 39 to 40 weeks. Eighty-one percent of women who signed up for Text4baby responded "correctly" to at least three of the four knowledge items, versus 60 to 62 percent of other CHC prenatal care patients (Figure 3).

Figure 3. Level of Health Knowledge Among Prenatal Care Patients, Four CHCs, 2012–2013
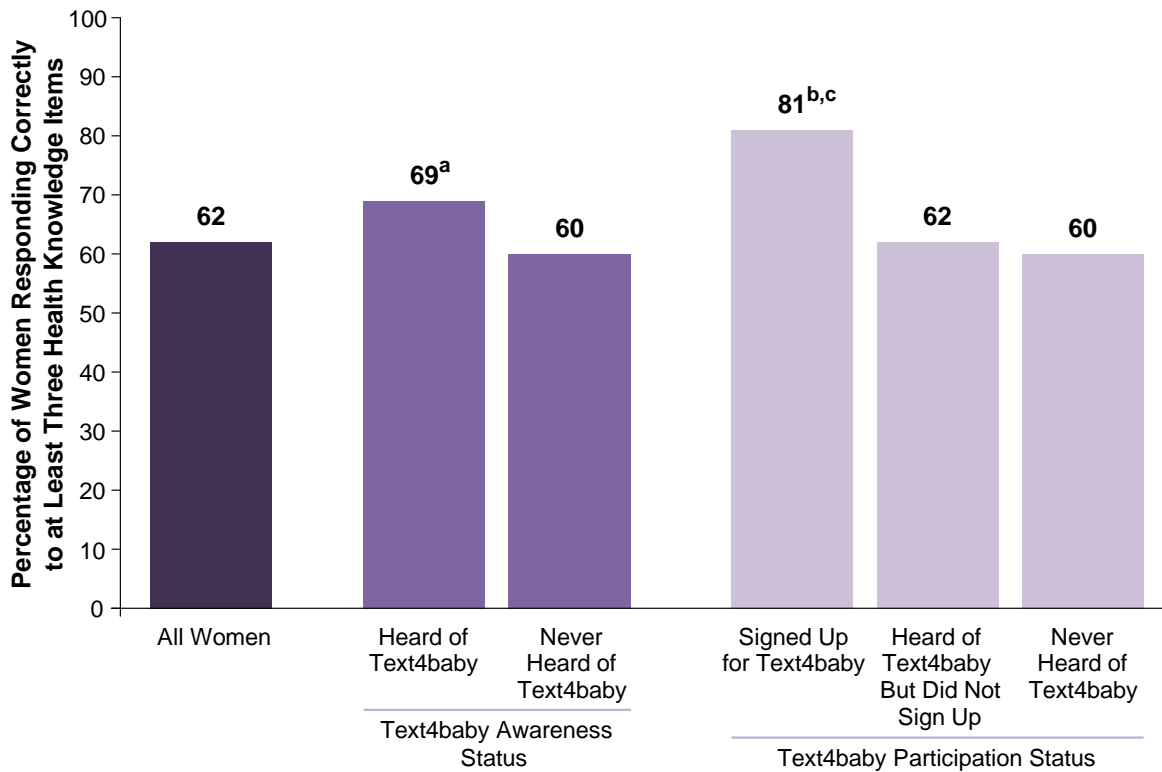
Source: Healthy Pregnancy and Parenting Survey, conducted by Mathematica Policy Research, December 2012 to May 2013. The survey included 707 pregnant women receiving prenatal care at four CHCs. The results have been weighted to account for the probability of selection and nonresponse.

Notes: The composite level of health knowledge is measured based on the percentage of women responding "correctly" to at least three of the four items related to: (1) their infant feeding plan, (2) infant sleeping position, (3) optimal delivery time, and (4) definition of full term. T-tests were conducted to determine statistical significance of differences between groups ($p < 0.10$). Statistically significant differences are denoted as follows:
a = women who heard of Text4baby versus women who never heard of Text4baby
b = women who signed up for Text4baby versus women who heard of Text4baby but did not sign up
c = women who signed up for Text4baby versus women who never heard of Text4baby

Preventive Health Behaviors. The evaluation assessed four preventive health behaviors: flu shot in the past year, daily prenatal vitamin use, preventive dental visit in the past year, and regular seatbelt use. These behaviors are associated with positive health outcomes during pregnancy and beyond. More than 80 percent of CHC prenatal care patients reported they always used a seatbelt in the car (86 percent) or took a prenatal vitamin daily (82 percent). Only about half had a flu shot (55 percent) or a preventive dental visit (51 percent) in the past year. The percentage for each of these preventive health behaviors differed significantly according to whether women indicated they had received health information on the topic from any source (Figure 4). For example, 67 percent of women who received information on getting a flu shot reported they had a flu shot in the past year versus only 13 percent of those who did not receive such information. However, these differences are not directly attributable to participation in the Text4baby program.

Referrals to Health Resources. A recent enhancement to the Text4baby service is the provision of telephone numbers that subscribers can call for more information about a specific topic. Most women who signed up for Text4baby (86 percent) said they signed up to receive telephone numbers for more information (among other reasons for subscribing). Few Text4baby subscribers (6 percent) indicated they had ever called a telephone number included in a message. However, more than half (53 percent) indicated they had saved a telephone number to use in the future if they needed more information. The telephone

numbers direct subscribers to helplines that are tied to the content of Text4baby messages, such as safe sleep, health insurance coverage, smoking cessation, breastfeeding, and substance abuse treatment. The majority of the helplines are sponsored by the U.S. government.

Figure 4. Prenatal Care Patients' Preventive Health Behaviors, by Receipt of Health Information, Four CHCs, 2012–2013
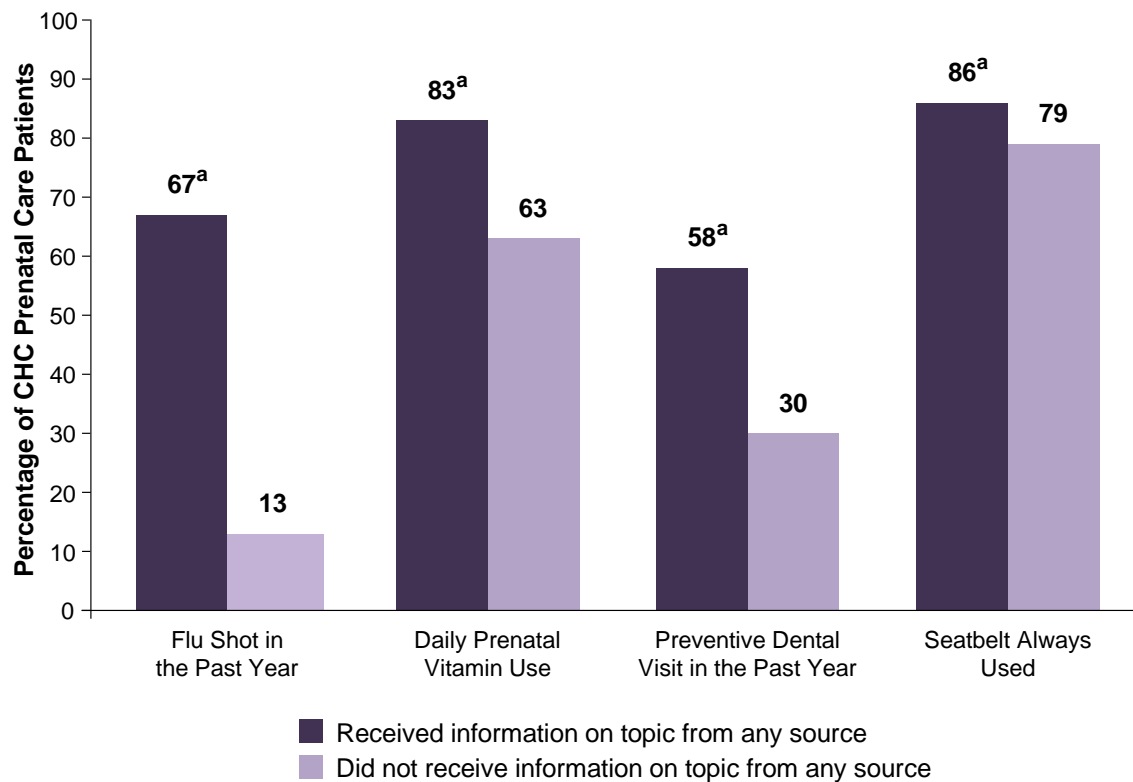
Source: Healthy Pregnancy and Parenting Survey, conducted by Mathematica Policy Research, December 2012 to May 2013. The survey included 707 pregnant women receiving prenatal care at four CHCs. The results have been weighted to account for the probability of selection and nonresponse.

Note: T-tests were conducted to determine statistical significance of differences between groups (p < 0.10). Statistically significant differences are denoted as follows:
a = women who received information on topic from any source versus women who did not receive information on topic from any source

Limitations of the Text4baby Evaluation

This evaluation involved a mixed-method study of the implementation of Text4baby and a more in-depth analysis of experiences of safety net providers and prenatal care patients in four CHCs. The community components—safety net consumer survey, key informant interviews, and consumer focus groups—provided an understanding of Text4baby participation, satisfaction, use, and effects at the local level. The use of a mixed-method design with qualitative and quantitative components at the national and local levels provided a comprehensive picture of the implementation and effects of Text4baby. However, several limitations should be acknowledged because they may affect the interpretation of results.

Generalizability of Results. Even though a data-driven approach guided the selection of the four CHCs, the findings are not generalizable to all CHCs, to all communities with CHCs, or to all populations served by CHCs. Instead, they are illustrative of provider and consumer experiences within the four CHCs,

specifically as they pertain to awareness of and participation in Text4baby, receipt of health information, level of health knowledge, and adherence to recommended preventive health behaviors.

Small Sample Sizes. For two reasons, the survey involved smaller sample sizes than planned. First, the number of women who signed up for Text4baby or even heard of Text4baby was smaller than expected; second, it was more challenging to recruit women for the survey than expected. Similar studies have experienced slower-than-expected recruitment (Evans et al. 2012). In addition, slower-than-expected Text4baby enrollment nationally was a factor in small Text4baby sample sizes at the local level. As a result, statistical power was weaker than expected, particularly for detecting differences between Text4baby subscribers and nonsubscribers. Moreover, the evaluation was not able to examine the impact of the length of Text4baby participation among those who signed up (that is, the dose-response relationship).

Cross-Sectional Design. The survey used a cross-sectional design with a "natural" assignment to three analytic groups based on self-reported Text4baby awareness and participation status. Women were asked if they had ever heard of Text4baby and, if so, whether they had signed up. Based on their responses, the women were classified into three groups: (1) signed up for Text4baby; (2) heard of Text4baby but did not sign up; and (3) never heard of Text4baby. By differentiating those who heard of Text4baby and decided not to sign up from those who decided to sign up, the evaluation shows that the majority of women who decided not to sign up had other sources of health information (although their level of health knowledge was below that of Text4baby subscribers). This evaluation also compared women who had heard of Text4baby to those who had not heard of Text4baby. Those who had not heard of Text4baby received less health information and demonstrated lower levels of health knowledge. The results can help shape future efforts to improve the effectiveness of Text4baby outreach and enrollment.

Lack of a Control/Comparison Group. In the absence of a control group or external comparison group and given the potential for self-selection among women who decided to sign up for Text4baby, differences between and among groups cannot be attributed to the effects of Text4baby. However, significant differences may suggest associations with Text4baby participation status. In addition, because the survey took place at one time point, it is not possible to examine changes in knowledge or behavior over time (for example, before and after enrollment in Text4baby).

Focus on the Prenatal Period. The cornerstone of the analysis of Text4baby's effects on women's health information, knowledge, and behavior is the Healthy Pregnancy and Parenting Survey. The survey focused on the effects of Text4baby during pregnancy. However, this focus is consistent with Text4baby's goal to engage women early in pregnancy before their baby is born. Text4baby enrollment data show that 79 percent of subscribers registered before their due date and received the pregnancy protocol.

Unknown Effect of Program Changes. Text4baby is a dynamic program. The qualitative components reflect stakeholder perspectives on the evolution of the program, including the underlying rationale, challenges, and lessons learned. The survey took place between December 2012 and May 2013; subscribers may have experienced variations in features depending on when they enrolled, but the sample sizes are too small to isolate any effects of changes in the Text4baby product over time. It is unknown whether changes in message content or features affected any of the outcomes measured in the survey.

Despite these caveats, much has been learned about Text4baby from a variety of stakeholder perspectives (Text4baby partners, providers, and consumers). The evaluation highlights experiences nationally and across four diverse communities as well as at the individual and system levels. It recognizes that Text4baby affects not only women and their infants but also the MCH system designed to serve them. Moreover, the evaluation provides a unique opportunity to understand the experiences of women who

signed up for Text4baby as well as those who did not and, in particular, variations in their health information, health knowledge, and preventive health behaviors.

Concluding Remarks

Stakeholders widely agree that the public-private partnership was a driving force in the successful launch of Text4baby in February 2010. Although the participation rate was lower than expected, women who signed up for Text4baby valued the program: 99 percent of the Text4baby subscribers who received prenatal care from the four CHCs indicated they would recommend Text4baby to a friend or family member. The lessons learned are being applied to improve program operations, enhance the Text4baby product, and refine the outreach strategy in order to expand the program's coverage. In particular, the focus on integrating Text4baby promotion within existing health programs may hold promise for increasing the program's reach to a broader population.

The evaluation also sheds light on the health information and health knowledge of women who received prenatal care from CHCs. Compared to CHC prenatal care patients who never heard of Text4baby, subscribers were significantly more likely to receive health information on high-priority topics during pregnancy. The data suggest that women who never heard of Text4baby are hard to reach with health information in general.

In addition, as measured by their composite responses to four questions regarding knowledge of recommended health practices, women who signed up for Text4baby exhibited a significantly higher level of health knowledge than the other two groups of prenatal care users (women who had never heard of Text4baby and women who had heard of Text4baby but did not sign up). Text4baby's emphasis on delivering evidence-based health information via short, easy-to-understand messages may have contributed to the higher level of health knowledge among subscribers.

The findings suggest that integration of Text4baby with the delivery of prenatal services in existing health programs offers the potential to expand access to health information during pregnancy and improve knowledge about significant public health topics. The low enrollment in Text4baby made it challenging to assess the effectiveness of the Text4baby program, and in particular, its effect on health behaviors and outcomes. Further research is needed to obtain a more definitive assessment of the effect of Text4baby on health behaviors and outcomes. In addition, the viability of the Text4baby business model for future health text messaging programs (that is, reliance on in-kind contributions, voluntarism, and philanthropy) should be considered further.

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Text4baby National Evaluation Technical Advisory Group (TAG)

In September 2010, following consultation with the Text4baby National Evaluation Technical Advisory Group (TAG), the Health Resources and Services Administration awarded a contract to conduct an evaluation of the Text4baby program. The ongoing commitment, engagement, and contribution of the TAG have been critical to the success of this effort. The TAG is composed of representatives from several U.S. Department of Health and Human Services agencies, the U.S. Department of Agriculture, and the White House Office of Science and Technology Policy. Throughout the course of the evaluation, the TAG has provided invaluable guidance on the development of the key evaluation questions, methodology, implementation, analysis, and summary report of findings.

Participating Organizations

U.S. Department of Agriculture

U.S. Department of Health and Human Services Agencies

    Administration for Children and Families

    Agency for Healthcare Research and Quality

    Centers for Disease Control and Prevention (TAG co-chair)

    Centers for Medicare & Medicaid Services

    Health Resources and Services Administration (TAG co-chair)

    Indian Health Service

    National Institutes of Health

    Office of Adolescent Health (HHS)

    Office of the Assistant Secretary for Planning and Evaluation (HHS)

    Office on Women's Health (HHS)

    Substance Abuse and Mental Health Services Administration

White House Office of Science and Technology Policy