

Preparing to Parent
NEWSLETTERS: DO THEY HELP
PARENTS HAVE A HEALTHIER
PREGNANCY AND BIRTH?

A Report by University of Wisconsin-Extension

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October 2007

ACKNOWLEDGMENTS

The *Preparing to Parent* instructional newsletter project could not have been completed without the assistance and support of the following:

- Community collaborators who have committed time, energy and funding into making *Preparing to Parent* available to families. They include the Badger County Department of Health and Human Services, the Badger County WIC Program, and the Community Memorial Hospital and Clinics– Badger Falls, Wisconsin.
- Support staff in the Badger County UW-Extension office.
- Sheila Etheridge for text and graphic production at UW-Madison.
- The 113 families, who took time out of their busy schedules to complete the evaluation survey.

The authors gratefully acknowledge the support and contribution of all these groups and individuals. As the authors, we assume full responsibility for the accuracy, conclusions, and any shortcomings of this report.

EXECUTIVE SUMMARY

The Extension strategic planning committee has identified parenting education as a high priority need for Badger County families. Parenting education should begin during the prenatal period, especially considering the relatively high numbers of premature and low birth weight babies in the county, and the high incidence of child abuse and neglect.

A newsletter series project, *Preparing to Parent*, was implemented in Badger County starting in 2006 to address prenatal parent education needs. The series includes four newsletters, with one issue for each trimester of pregnancy, and one issue for the time around birth. It was written by UW-Extension to accomplish three goals: to help expectant parents have a healthy pregnancy and baby, to encourage competent parenting, and to reduce the incidence of child abuse and neglect.

An evaluation of the newsletter project, utilizing a questionnaire survey, received a participation rate of sixty percent. It indicated the newsletter series was rated “very useful” as a source of parenting information by sixty-four percent of respondents, which was only ex-

ceeded by the rating for physicians and nurses, and was higher than other information sources, including relatives, other parents, and other written materials.

Most parents reported that reading the newsletters caused them to change their behaviors in six key areas, each of which is predictive of healthy prenatal and child development. Of special interest, first time parents and those in risk categories (e.g. low-income mothers) reported the most positive change.

Continued support and funding of this parent education project is recommended.

INTRODUCTION

The prenatal period and early months of life are physiologically and psychologically critical periods when the infant is developing, laying a foundation for later child development. The first months are also a critical period when new parents establish their patterns of child rearing.

If we want to help parents do their best at promoting healthy child development and raising intelligent school children, the best strategy might be to go all the way back to the beginning, the prenatal period, helping new parents establish healthy pregnancy and child-rearing behaviors right from the start.

Many factors influence one's pregnancy behaviors and child-rearing style. These range from the kind of parenting one received as a child, to the stresses one currently faces in life, to one's current life style. Most of these sources of influence are extremely difficult to change, but one exception is *information* that comes in written form. Printed matter is a preferred form of information about pregnancy and child rearing for most parents. Expectant parents usually list health care professionals or printed materials as their first or second choice for sources of prenatal information, although family is often a second or third choice (Aaronson, Mural, & Pfoutz, 1988; Eiser, C. & Eiser, J. R., 1985; Lewallen, 2004). Research confirms that most parents would rather read a pamphlet at their leisure than attend a meeting on the same parenting topic (Clarke-Stewart, 1978; Simpson, 1997; Sparling & Lohman, 1983). This is true regardless of the parent's socioeconomic level, educational level (excepting those who cannot read), and race (Gotta et al., 1977; Cudaback et al., 1985).

We know that pregnant women who lack information are more likely to engage in unhealthy behaviors during their pregnancy, such as using alcohol, tobacco or other drugs, not

consuming a healthy diet, and not seeking early prenatal care. These behaviors put both themselves and their unborn child at risk. In fact, discussing more health education topics during prenatal visits is associated with healthier pregnancy behavior (Vonderheid, Norr, & Handler, 2007); and women at higher risk for unhealthy behavior benefit most from receiving the recommended prenatal advice (Kogan, Alexander, Kotelchuck, & Nagey, 1994).

We also know that highly incompetent parents—in particular those who abuse their children—have inaccurate beliefs about children's abilities. They lack knowledge about what children are really like, and often have beliefs that are harmful to competent parenting, when compared to non-abusing parents (Okagaki & Divecha, 1993; Steele, 1980; Stevens, 1984). For example, they sometimes become angry when a baby wakes up crying at night, or wants to eat every two hours, because they believe this behavior is unusual or manipulative.

Since lack of knowledge is one cause of unhealthy pregnancy behavior and incompetent parenting, and since expectant and new parents seek advice from printed materials, perhaps we could use a newsletter to fill these deficits in knowledge and beliefs. This was the insight that led to UW-Extension's prenatal instructional newsletter project.

A newsletter has a number of advantages as a prenatal education method for both expectant parents and health care providers. Since this newsletter is keyed to each stage of pregnancy

(age-paced) and offers small amounts of information at a time, it reaches expectant parents at a “teachable moment.” Because of its low cost, health care professionals can afford to provide these newsletters free to their clients. And the prenatal newsletter series can help supplement prenatal visits by: 1) reinforcing the advice given by the health care provider, 2) helping expectant parents remember the advice, thus aiding compliance, 3) going into greater detail than is possible, given limited physician time, 4) answering questions not discussed during the visit, and 5) allowing expectant parents to share the information with members of their social network, thus enhancing impact.

Prior to the writing of the *Preparing to Parent* series, UW-Extension’s *Parenting the First Year* newsletters were proven to be an

effective approach to providing valuable information to parents during those first important months of their child’s life (Keane, et al., 2005; Riley, 1997; Riley, Meinhardt, Nelson, Salisbury, & Winnett, 1991; Riley, Salisbury, Walker, & Steinberg, 1996; Riley & Walker, 2001). A large field experiment showed that parents who received the newsletter series, compared to those who did not, had beliefs that were significantly less like those of child abusing parents; and they also reported actually striking their babies significantly fewer times per week. However, the *Parenting the First Year* newsletter misses the critical prenatal period, arriving too late to prevent negative outcomes such as Fetal Alcohol Syndrome or low birth weight associated with maternal smoking, or to encourage mothers to start breast-feeding. This was the rationale that led to the development of the *Preparing to Parent* prenatal newsletter series.

THE NEWSLETTER

Preparing to Parent is a four-issue set of 16-page newsletters, with one issue for each trimester of pregnancy and one issue for the time around birth.

Based on the latest research, but written in simple and engaging language, the *Preparing to Parent* newsletters provide information on known behavioral and environmental factors that affect developing infants from early pregnancy through birth and the early months of life. Each issue of the newsletter addresses topics such as the importance of prenatal care, healthy nutrition and exercise, choosing a doctor or nurse, avoiding alcohol, tobacco, drugs and environmental toxins, breast feeding, family and money matters, quality child care, and the physical and emotional changes that occur during pregnancy. The newsletters encourage behaviors that will optimize pregnancy outcomes and optimize early parenting.

The newsletters were written by University of Wisconsin-Extension, with three goals: (1) helping expectant parents to have a healthy pregnancy and baby, (2) encouraging competent parenting, and (3) preventing abusive parenting. Like our earlier newsletter series, this prenatal series is written at the fifth-grade reading level (as estimated by the Flesch formula, 1948) so that ninety-one percent of American adults can read them, and in an engaging style that parents come to love and trust. The newsletters are periodically reviewed and updated. The editorial advisory panel for *Preparing to Parent* included obstetricians, public health nurses, pediatricians, developmental psychologists, nutrition scientists and educators, and public health educators.

THE BADGER COUNTY PROJECT

The Badger County UW-Extension strategic planning committee in 2005 identified the need for providing parenting education for new parents, which included concerns with the numbers of low birth weight infants and preterm births, and with child abuse in the county.

A partnership of UW-Extension, Badger Memorial Hospital, and the Badger Kiwanis Club have distributed the *Parenting the First Year* newsletter series to area parents since 1996. For the current expansion of the project to the prenatal period, the UW-Extension office in Badger County recruited local partners who were interested in providing this prenatal newsletter series to their clients. Working in a collaborative effort, in the summer of 2006 the Badger County Department of Health and Human Services, the Community Memorial Hospital and Clinics of Badger Falls, and the Badger County WIC Program began distributing the *Preparing to Parent* newsletter to expectant parents through their prenatal services.

Approximately 300 expectant parents have received the newsletters since the summer of 2006. Participating health care professionals provide the newsletters directly to expectant parents when they come in for their prenatal clinic visits. The cost of the newsletter project was initially funded through a grant from the XYZ Foundation, and now is funded by a partnership between the Badger County Health and Human Services Department, the Community Memorial Hospital, and the Badger County WIC Program.

Given the considerable effort to produce and distribute these newsletters, we should cautiously ask if our effort is worth it. Do these newsletters, in fact, encourage expectant parents in Badger County to adopt healthier behaviors that give their infants a healthy start in life?

With that question in mind, the evaluation reported here was begun in 2007 by providing a self-report questionnaire and stamped, return envelope to new parents (who received the complete set of *Preparing to Parent* newsletters during their pregnancy) when they came in for their first postnatal clinic visit. A total of 188 questionnaires were distributed, and 113 returned, for a sixty percent return rate. Compared to most questionnaire surveys this is a good participation rate, allowing us to say that the results reported here are not due to a small, vocal minority of parents, but rather are representative of most new parents in Badger County.

Electronic data entry was completed in the Badger County Extension Office. Statistical analyses were conducted at UW-Madison, and this report was co-authored by faculty from Extension and the Madison campus.

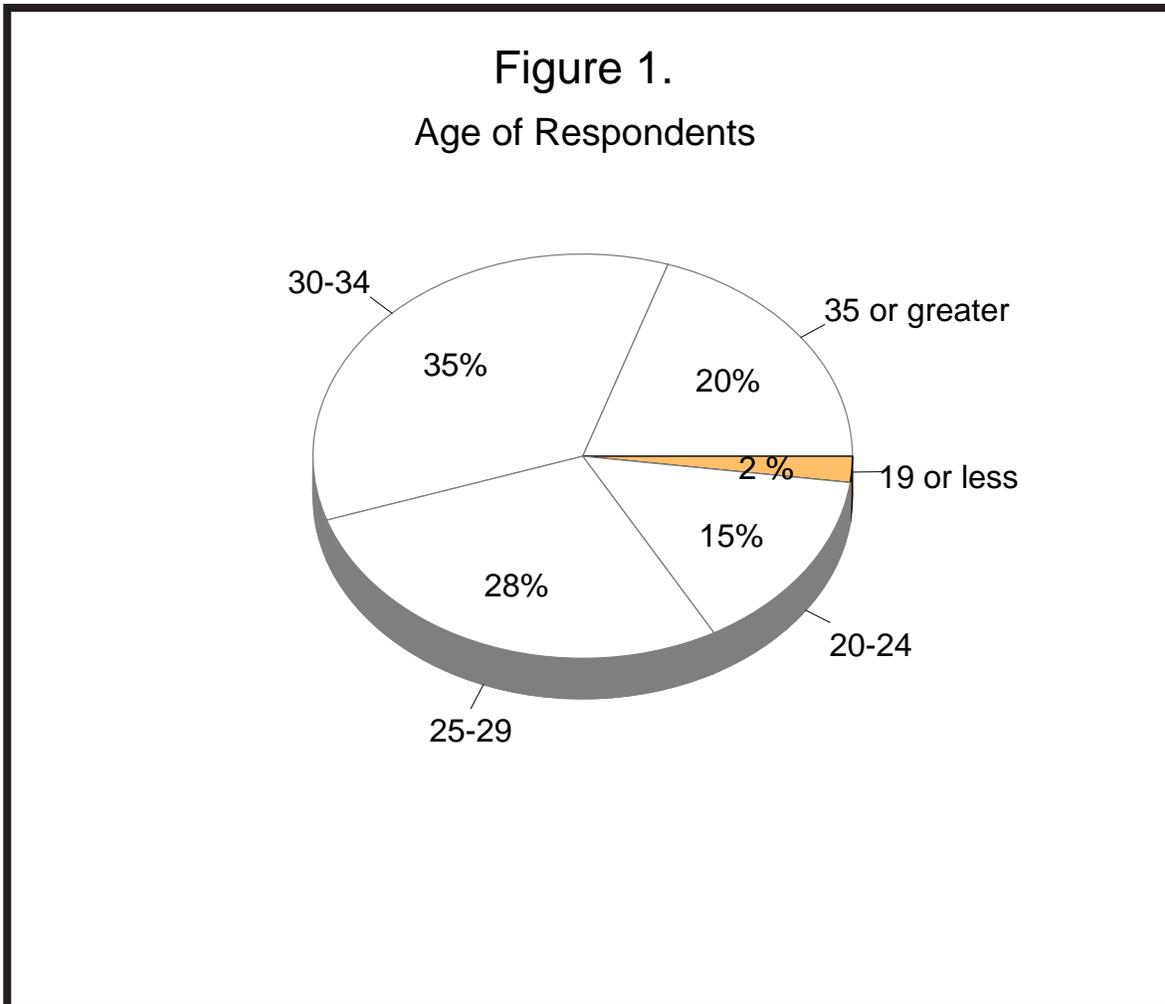
RESULTS

Prior to looking at the results, it is useful to take a look at the kinds of families who answered the survey.

All of the respondents were mothers. They ranged in age from 18 to 43, with a median age of 31. Two percent were teenagers, while three percent were aged 40 or older. Nearly two-thirds (63%) were in the age range from 25 to 34. See Figure 1.

All but two parents (2%) had at least a high school diploma. See Figure 2. One fourth of the respondents had stopped their education

at high school graduation, while at the other extreme forty-four percent had a 4-year college degree (or more). Figure 3 shows that two percent of the sample reported family incomes (for 2006) of less than \$14,000, and another six percent reported less than \$20,000, approximately the poverty threshold for a family of four. Half of respondents (50%) reported incomes of \$50,000 or more.

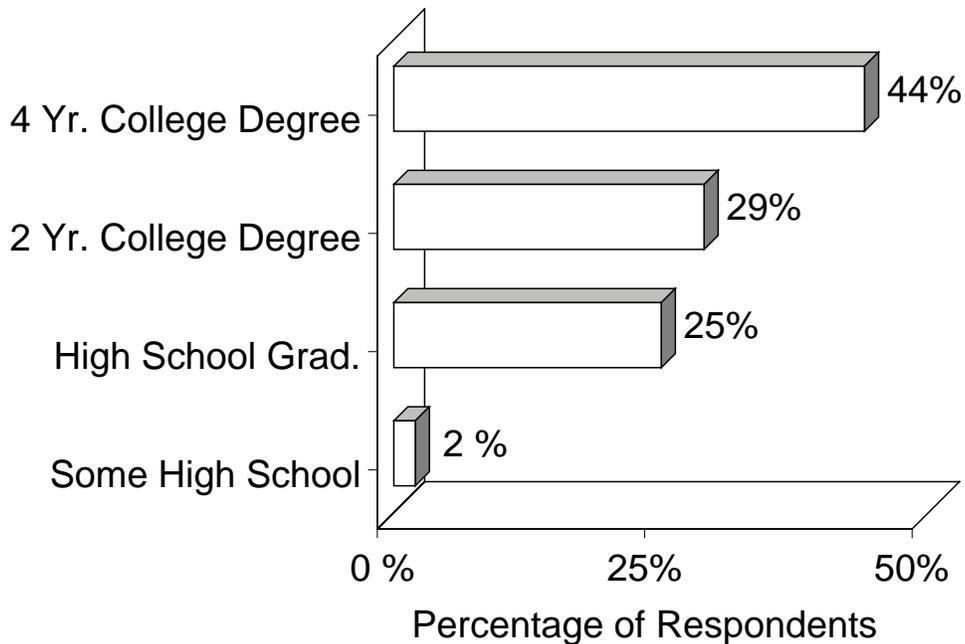


Fully ninety-five percent of the sample families were composed of spouses living together (whether married or not). Of the single parents, two lived with the baby's grandparents, and four lived alone.

For over one third of the sample (38%), the baby was the first child. At the time of the survey, thirty-five percent of respondents had two children, and the remaining twenty-seven percent had from three to five children.

Figure 2.

Parents' Formal Education

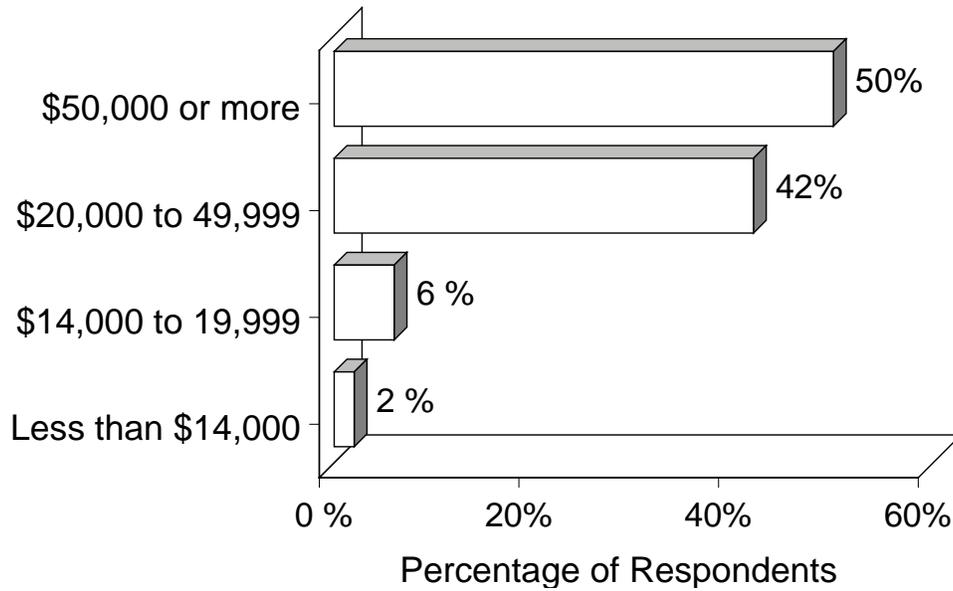


Compared to figures from the 2006 Census for Badger County, the sample who responded to the survey differed from the expected population. Most particularly, 95% of the current sample were parents living with a spouse or mate, while the 2006 Census for Badger County showed that 82% of families raising children (under age 18) were married couple families.

Because of the differences in how these groups were defined (e.g. age of children and marital status), these two numbers are not exactly comparable. But they suggest the likelihood that the current sample (and therefore the results) may under-represent the single parents in Badger County.

Figure 3.

Family Incomes, 2006



How Useful Are the Newsletters:

The parents were asked to rate the usefulness of a number of common sources of prenatal and parenting advice, all on the same 3-point scale (not useful — somewhat useful — very useful).

The *Preparing to Parent* newsletter was included last on this list, so that its usefulness would be clearly gauged in relation to the other sources. Figure 4 charts the percentage of parents who answered that each source was “very useful.”

Surprisingly, the newsletter was rated very useful by nearly as many parents as was advice from physicians or nurses, and more often than advice from one’s relatives, friends and other written materials. A total of sixty-four percent said the newsletter was “very useful.” Parents wrote comments on the questionnaires that were consistent with this finding:

“The Newsletter is the best source of prenatal information that I have come across. It helped me realize that I can nurse my baby, even when I go back to work. Thank you for the wonderful newsletter.”

“The newsletter was full of so much helpful information. It really helped to know what foods were not safe for me to eat during my pregnancy, like certain types of fish and soft cheeses.”

“The newsletters really helped me understand the importance of seeing my doctor on a regular basis, even though I was feeling fine.”

One question asked parents to specifically compare the newsletter to other educational literature supplied by their health care provider. Figure 5 shows that most parents (70%) found *Preparing to Parent* somewhat or much more useful than “other information I received from my health clinic or hospital.” This could be due, at least in part, to the newsletter being keyed to a specific stage of pregnancy, upon which some parents commented:

“It was very helpful to receive the newsletter when I was at that stage of my pregnancy. I liked the page showing what my baby’s development was like then and how I would be feeling.”

“I liked getting the newsletter for each point in my pregnancy. It helped me think about what I needed to do at that time to keep me and my baby healthy.”

“I liked that I got the newsletter from my doctor during each trimester. It helped me remember what my doctor said, so I wasn’t always calling and bothering her with questions.”

Figure 4.

According to new parents, how useful for parenting information is each of the following sources?

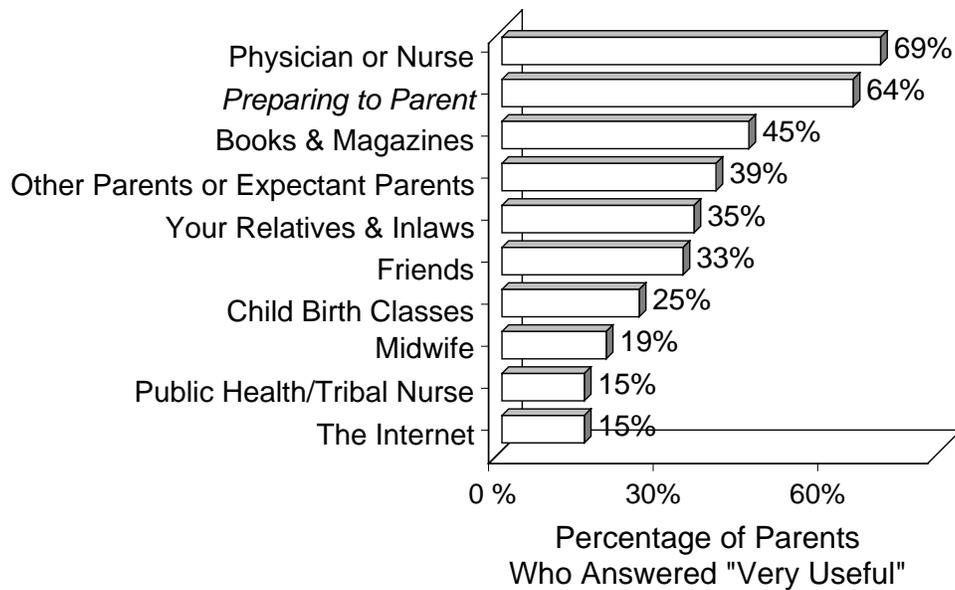
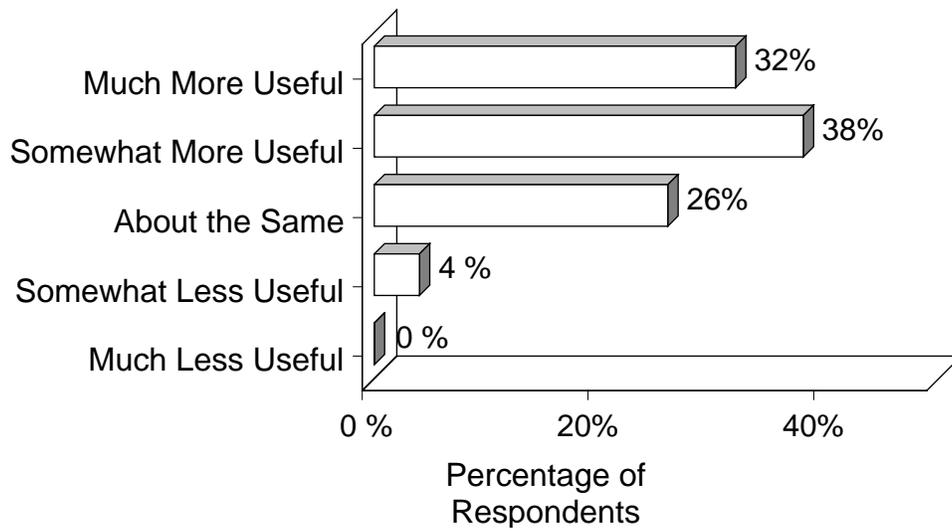


Figure 5.

Compared to other information I received from my health clinic or hospital, the *Preparing to Parent* newsletters were:



Utilization of the Newsletters:

Almost two-thirds of parents (63%) reported they read “all articles in all issues” of the newsletters.

When parents were next asked, “What do you usually do with the newsletters?” half (50%) said they “keep them,” and thirteen percent said they give them to someone else to read. One third (34%) said they throw them away.

When asked if anyone else reads their copy of the newsletter, sixty-five percent of respondents said yes. The most common subsequent readers are shown in Figure 6. In nearly three-quarters of the families (73%), the spouse or partner reads the newsletters. Many of the questionnaires had comments on this point:

“I really liked having the newsletter to read and share with my husband. He didn’t have time to read other information, but liked the short newsletter. Thanks!”

“My husband really liked reading the newsletters. He especially liked the articles that were specific for fathers-to-be. I think it’s helped him feel more involved in my pregnancy.”

“My baby’s grandmother read the newsletters during my pregnancy so she could learn how things have changed since she had her babies.”

The newsletters were read by the baby’s grandparents in thirteen percent of cases and by other relatives or friends nineteen percent of the time. In all, at least 225 readers were reported for the 112 newsletters, indicating that readership doubled by sharing.

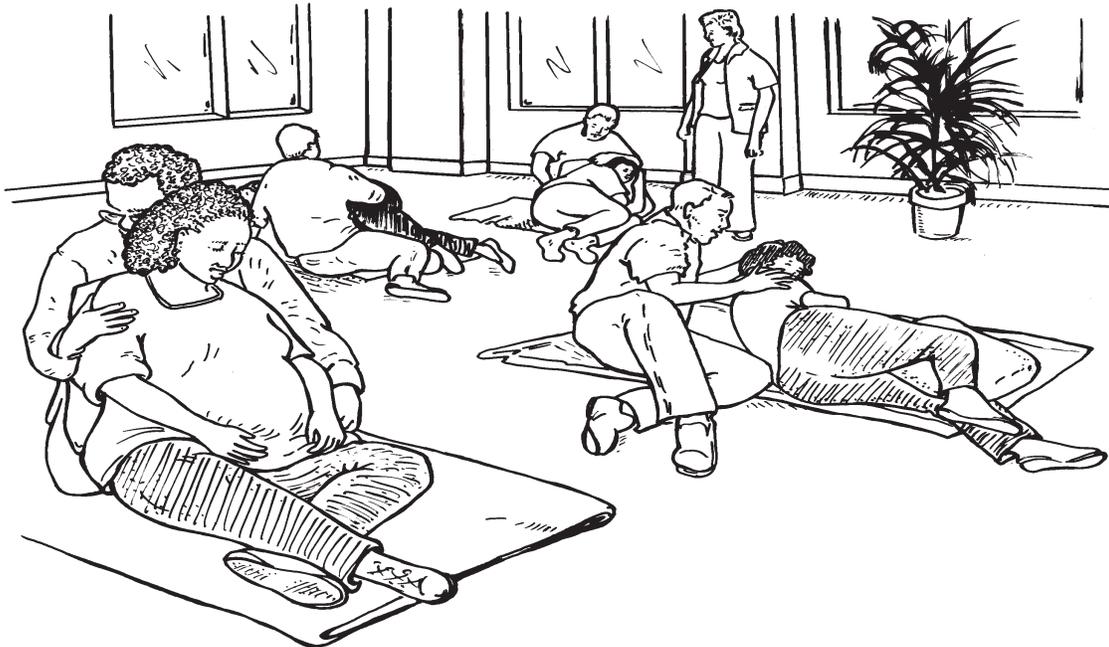
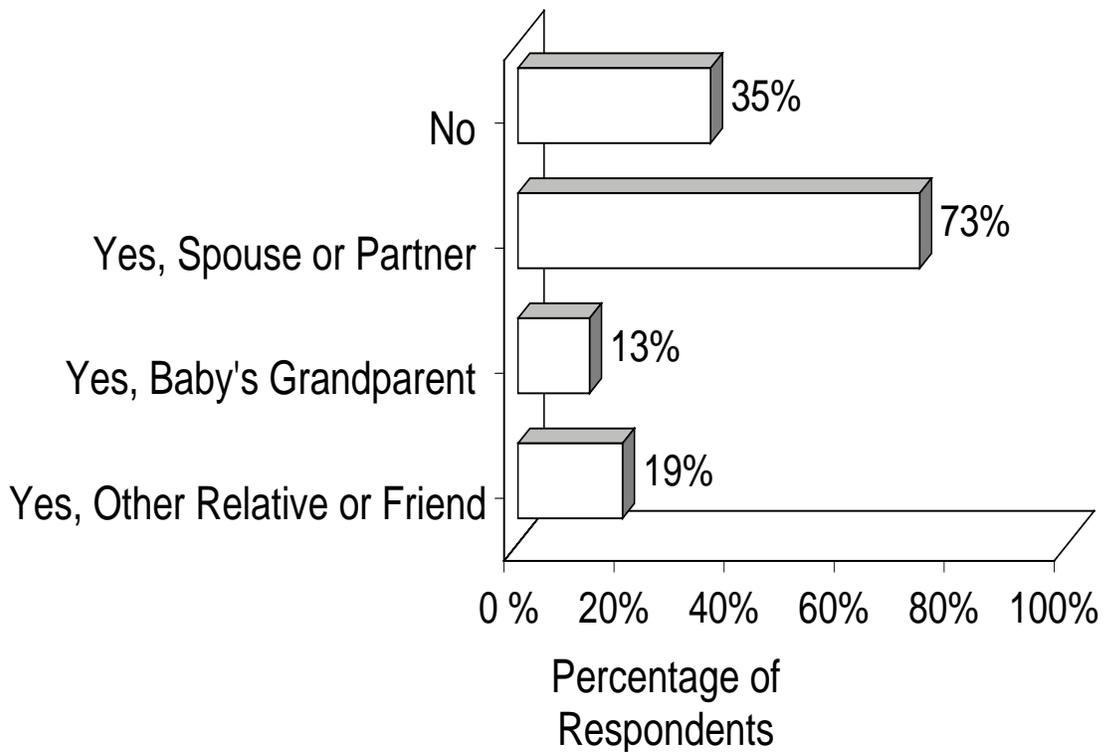


Figure 6.

Does anyone else read your copy of the newsletters?



Note: Percentages add to greater than 100% because respondents could share newsletter with multiple people.

Have the Newsletters Caused Improvement in Prenatal and Early Parenting Behaviors?

One of the major goals in distributing the newsletters was to influence positive behavior changes in expectant and new parents. Before asking parents any specific questions, we first asked them to tell us in their own words, "Have you tried to do anything differently, after reading the newsletters?" Most parents (68%) responded to this prompt, telling us about a wide variety of things they believed they had learned from the newsletters. Here is a small sampling of the kinds of things they wrote:

"I quit eating soft cheeses like feta and goat cheese, and didn't drink any alcohol."

"I didn't realize that cleaning the cat's litter box could be dangerous. After reading about that my husband took over that job."

"I really liked all the nutritional information in the newsletters. It really helped me when planning what I could and should eat during my pregnancy."

"Reading the newsletters convinced me about the importance of breastfeeding. I didn't know how good it was for both my baby and me. I also learned how it was possible to keep on breastfeeding even when I returned to work. "

Parents' comments were consistently about topics that had, in fact, been addressed by the newsletters. For example, the newsletters contain information on healthy eating and exercise during pregnancy, including what foods to avoid. They also emphasize the importance of stopping the use of alcohol, tobacco and other drugs, as well as avoiding environmental hazards such as litter boxes (danger of toxoplasmosis) and lead paint that can harm the developing

baby. In addition, there are a number of articles on early parenting topics, such as the benefits of breastfeeding, safe sleeping for baby, choosing quality childcare, and preparing siblings for baby's arrival.

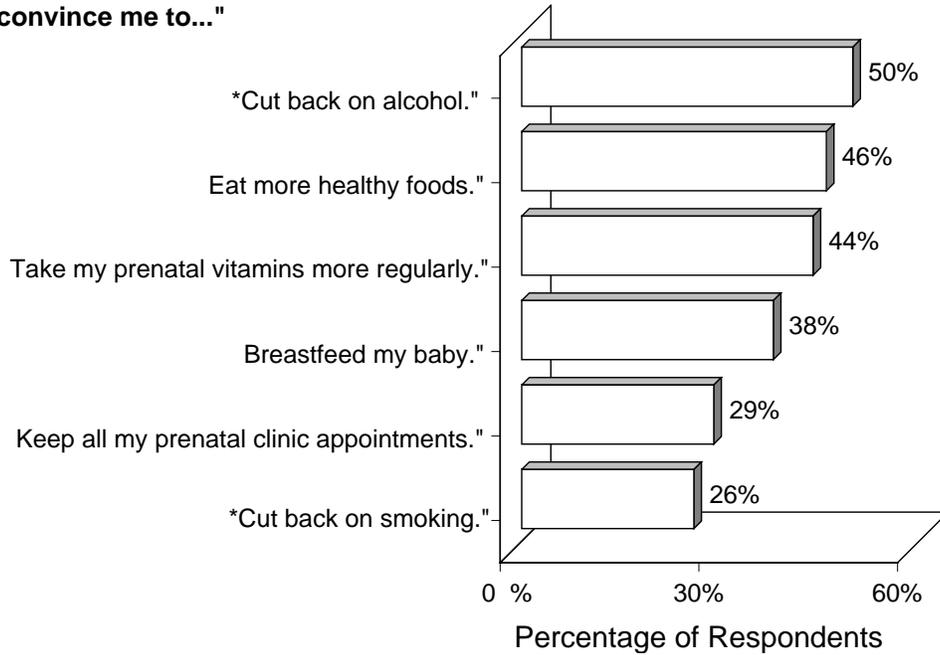
Parents were next asked if "you believe the newsletters influenced your behavior during your pregnancy or after" in six key areas. These six specific prenatal and early parenting behaviors were selected because prior research has shown they predict healthier birth outcomes and early childhood development. These behaviors relate to obtaining regular prenatal care, consuming a healthy diet and prenatal vitamin supplements, avoiding alcohol and tobacco, and choosing to breastfeed.

The self-report items are listed in Figure 7 on the next page, which shows the percent of parents who reported the newsletter caused each positive behavior change. As can be seen, approximately one-quarter to one-half of the respondents felt they were doing more of each behavior as a result of reading the newsletters. The importance of each of these behaviors will be described on the following pages.

Figure 7.

Self Reported Behavior Change

"Reading the newsletters helped convince me to..."



Note: * Percent of those who did drink alcohol or smoke.

1. Benefits of Reducing Alcohol Use.

Among those expectant mothers who did drink alcoholic beverages, the newsletters convinced half (50%) “to cut back on alcohol.” This is critical since prenatal alcohol use is regarded as one of the most preventable causes of birth defects and developmental problems in the United States (AAP Committee on Substance Abuse and Committee on Children With Disabilities, 2000).

The research background on alcohol use during pregnancy.

Because of this, official guidelines from the Surgeon General, the Department of Health and Human Services, the American College of Obstetricians and Gynecologists, and the American Academy of Pediatrics recommend that women who are trying to get pregnant or are already pregnant not drink any alcohol (Floyd, et al., 2005).

Alcohol exposure during pregnancy leads to numerous problems for the developing child, including fetal alcohol syndrome (FAS) and other neurodevelopmental problems (AAP Committee on Substance Abuse and Committee on Children With Disabilities, 2000). In the United States, approximately 1 in 100 children are estimated to have symptoms of prenatal alcohol exposure, with between 1/2 and 2 per 1,000 children diagnosed with FAS (May & Gossage, 2001). Children with FAS exhibit numerous physical, behavioral and cognitive abnormalities, such as growth and facial abnormalities, mental retardation, memory and attentional deficits, impulsivity, hyperactivity, and conduct problems.

No amount of alcohol is considered safe during pregnancy, since even very light drinking (average of one drink per week) can affect cognition, fine motor coordination and language skills (Jacobson, J. & Jacobson, S., 1994). One drink per day increases the severity of problems (Jacobson, J. & Jacobson, S., 1994; Mills, Graubard, Harley, Rhoads, & Berendes,

1984), and evidence shows that the more alcohol consumed the greater the harm to the child (Jacobson, J. & Jacobson, S., 1994; Larroque, et al., 1995). Consumption of two or more alcoholic drinks per week (average of 4) during the first trimester was found to result in significant reductions in infant birth weight (Shu, Hatch, Mills, Clemens, & Susser, 1995).

More than half of women of childbearing age drink alcohol (CDC, 2002; Floyd, Ebrahim, Tsai, O’Connor, & Sokol, 2006). Most women quit or cut down on alcohol use when they are pregnant, although more than 12% continue to consume alcohol (CDC, 2002; Floyd, Decouflé, & Hungerford, 1999). However, substantial numbers of women are unaware of their pregnancy in the early weeks so they may continue to drink at their usual level (Floyd, et al., 1999). Using data from a national survey, Floyd, et al. (1999) found that 60% of women who were frequent drinkers did not realize they were pregnant at four weeks into their pregnancy, while one-third did not realize they were pregnant at six weeks. Moreover, drinking habits prior to pregnancy are a stronger predictor of prenatal alcohol consumption than knowledge of healthy pregnancy behaviors (Chang, McNamara, Orav, & Wilkins-Haug, 2006).

The surgeon general suggests that all health care providers routinely assess the alcohol consumption of women of childbearing age, provide them with information about the risks of

drinking alcohol during pregnancy, and advise them against drinking (DHHS, 2005). Research shows that providing educational information about healthy pregnancy choices, and helping pregnant women with strategies to quit drinking, can have a positive influence. In a randomized experiment of 304 pregnant women, a brief intervention about prenatal alcohol use was shown to reduce alcohol consumption during pregnancy, especially for those women who consumed the most alcohol (Chang, et al., 2005). Benefits increased significantly when the women's partners also took part in the intervention. Given that low socioeconomic status is one risk factor for FAS (May & Gossage, 2001), a recent study investigated the effectiveness of a brief intervention for low income pregnant women, where health centers were randomly assigned to assessment only or brief intervention (O'Connor & Whaley, 2007). Women in the intervention group were 5 times more likely to have quit drinking by the third trimester assessment, compared with those in the control group. Moreover, for women with higher initial alcohol consumption, those in the intervention group had infants who were higher in birth weight and length. Infant mortality rates were also lower in the intervention group.

The newsletters' advice on alcohol use during pregnancy

The *Preparing to Parent* newsletters are an educational intervention that health care providers can use with expectant parents to help reinforce the message that prenatal alcohol consumption is harmful to developing infants. In the first issue of the newsletter, parents learn that "Drinking alcohol during pregnancy can hurt your baby's brain and body – forever. The more you drink, the more damage to baby's brain when it is first growing. Even an occasional drink can harm your baby."

The newsletters acknowledge that it can be hard to stop drinking, and suggest that expectant parents seek help from a medical professional if quitting is difficult. Support from spouses or partners is also encouraged to help expectant mothers abstain from alcohol. The newsletters suggest "being good to yourself" and finding fun things to do instead of drinking. They also tell expectant parents to "imagine holding your beautiful, healthy baby in your arms" and let them know that by stopping drinking they are doing "the right thing."



Parents let us know they took this advice seriously:

“I didn’t realize that even one drink could harm my baby. After reading that I quit altogether. It’s just not worth my baby’s health!”

“After reading in the newsletters that drinking any alcohol can hurt my baby for life I decided to not drink while I was pregnant. I don’t think most of my friends realize this.”

“I never was a big drinker, but the newsletters convinced me that even one drink could be dangerous, so I never had any alcohol while I was pregnant.”



2. Benefits of Eating Healthy Foods and Taking Prenatal Vitamins.

According to nearly half of parents (46%), the newsletters helped convince them to “eat more healthy foods” and (44%) “take my prenatal vitamins more regularly.” This is critical since good nutrition during pregnancy is so important for both mother and child.

The research background on nutrition

A recent review of the research indicated the importance of expectant mothers gaining the appropriate amount of weight during pregnancy (Vause, et al., 2006). Pregnant women who gain too little weight are more likely to have preterm births or small for gestational age infants, while those who put on excess weight are at higher risk for remaining overweight and for developing type II diabetes. Pregnancy also increases women’s need for certain nutrients, including Calcium, Vitamin D, Iron and Folic Acid.

Research on a large, nationally representative sample in Denmark revealed three different eating patterns during pregnancy: pattern one (Western diet) included more red and processed meats, refined grains, high-fat dairy, and fewer fruits and vegetables; pattern two (Health Conscious diet) included more fruits, vegetables, fish, and poultry; pattern three (Intermediate diet) represented a balance of those diets (Knudsen, et al., 2007). The Western diet, compared to the Health Conscious and Intermediate diets, significantly increased the risk for infants being small for gestational age (SGA) and lower in birth weight (no significant differences in risk were found between the Health Conscious and Intermediate diets). The authors suggested that the higher saturated/trans fat content in the Western diet, as well as the presumable higher vitamin and mineral content of the Health Conscious diet, might have played a role in these findings. Interestingly, a recent study showed

that higher seafood consumption (omega-3 fatty acids) by pregnant women was significantly associated with higher verbal IQ scores for children eight year later (Hibbeln, et al., 2007).

Other research has focused on the effect of specific nutrients on birth weight, and results have been inconsistent. For instance, one prospective study showed that higher carbohydrate consumption in early pregnancy and lower protein intake in late pregnancy were significantly associated with lower birth weight (Godfrey, Robinson, Barker, Osmond, & Cox, 1996), while another showed that protein intake in early (but not late) pregnancy was positively associated with birth weight (Moore, Davies, Willson, Worsley, & Robinson, 2004). A third prospective study failed to find any relation between these nutrients and birth weight, although Vitamin C intake in early pregnancy was positively related to birth weight (Matthews, Yudkin, & Neil, 1999).

A number of other child outcomes have been linked to specific nutrients. For instance, higher intake of Vitamin D during pregnancy was associated with a lower incidence of wheezing symptoms in children at age 3 years (Camarago, et al., 2007) and age 5 years (Devereux, et al., 2007), even after controlling for other potential risk factors such as maternal smoking. Recent research in the Northeastern United States showed that a large percentage of pregnant

women either get an insufficient amount or are deficient in Vitamin D intake, even though 90% reported taking prenatal supplements (Bodnar, et al., 2007). Black women were significantly less likely to be sufficient in Vitamin D status compared to white women, and a similar difference was seen in their newborns. For example, at 37 to 42 weeks gestation only 17% of Black women, but 54% of white women, had sufficient amounts of Vitamin D. The authors point out the importance of Vitamin D in preventing the incidence of rickets in children, which has been on the rise in recent years. In a randomized controlled study of pregnant adolescents, those who ate 4 servings of dairy each day, compared to controls (regular diet) and those who consumed calcium fortified orange juice, had more Vitamin D and folate at delivery and gave birth to infants who weighed more (but did not have more fat mass) and had higher levels of Vitamin D (Chan, McElligott, McNaught, & Gill, 2006). Infants of mothers who got their calcium from dairy also had higher total body calcium compared to controls.

A review of the research showed that iron deficiency in early pregnancy, as well as too much iron in late pregnancy, has been associated with a higher risk for preterm birth, although iron deficiency in late pregnancy was not a risk factor (Scholl & Reilly, 2000). A recent study showed that weekly, as compared to daily, iron supplementation reduced the risk of too much iron by late pregnancy, which lowered the risk of preterm delivery and low birth weight (Casaneva, et al., 2006).

One important nutritional finding involves the impact of folic acid on the reduction of neural tube defects. According to the National Institute of Child Health and Human Development (NICHD, 2007), neural tube defects are "birth defects of the brain and spinal cord". For example, in Spina bifida the spinal cord tube does not close completely, while in anenceph-

aly portions of the brain fail to develop. Neural tube defects develop early in pregnancy when many women are unaware they are pregnant. In the United States, prior to the introduction of folic acid into the food supply, about 4000 infants were affected with neural tube defects each year (CDC, 1992).

Because of research showing the benefits of folic acid in preventing neural tube defects, the United States Food and Drug Administration (FDA) authorized that folic acid be added to enriched grain products starting in 1996, and mandated this course of action by January 1998 (CDC, 2000, 2007). Honein, et al., (2001) compared the incidence of neural tube defects in the U.S. population before and after the FDA mandate on folic acid, and found that the prevalence of these birth defects declined by 19%. The U.S. Public Health Service (NICHD, 2007) recommends that women who may become pregnant take 400 micrograms of folic acid each day. However, the fortification of food with folic acid is a critical preventive measure since many pregnancies are not planned.

The British Medical Research Council conducted a landmark clinical trial, which included women considered at high risk since they had a prior pregnancy that resulted in neural tube defects (MRC Vitamin Study Research Group, 1991). In a seven country (33 site), randomized double-blind study (neither doctor or patient knew group status), women who took folic acid before conception and during the first 12 weeks of pregnancy had a significantly decreased risk of giving birth to an infant with a neural tube defect (72% were prevented), compared with women who did not take folic acid. Women who took other vitamins, without folic acid, did not experience this same protective effect against neural tube defects. Given the strength of the results, the clinical trial ended early with the recommendation that all women of childbearing age take folic acid supplements.

A recent population-wide study of nearly 6 million women in California showed that folic acid also reduces the incidence of preterm births and low birth weight, although the effect is small (Shaw, Carmichael, Nelson, Selvin, & Schaffer, 2004).

While folic acid is effective at reducing neural tube defects, researchers have also looked at the effect of multivitamins in reducing other types of birth defects. A recent meta-analysis, that combined data from 41 studies, showed that consumption of multivitamins with folic acid reduced not only the incidence of neural tube defects, but also cardiovascular and limb defects (Goh, et al., 2006). There was also some evidence for a lower incidence of oral cleft (with or without cleft palate), urinary tract defects and congenital hydrocephalus. In a large randomized clinical trial, mothers who took multivitamins (with folic acid) for one month before and at least two months after conception had infants with significantly fewer birth defects compared to control group mothers who took a supplement of “trace elements” (Czeizel, 1993). When neural tube and genetic defects were not considered, there were nearly twice as many major birth defects in the control group (58) compared to the multivitamin supplementation group (31), a significant difference. In a large case-control study, Werler, Hayes, Louik, Shapiro, and Mitchell (1999) found that multivitamin supplementation significantly reduced the incidence of certain types of birth defects (other than neural tube defects). Timing of supplementation affected these results. For instance, mothers who started multivitamins by the second month of pregnancy had significant reductions in cleft palate (alone) and urinary tract defects, while those who started multivitamins preconceptually or in the first month had significant reductions in limb reduction defects. The researchers point out that, except for folic acid, it is not known which vitamins (or combination of vitamins) may help prevent which birth defects.

Although most women reported that they received advice about taking prenatal vitamin supplements, in a nationally representative survey, those mothers who were younger, less educated, unmarried, African American, and participated in the Women, Infants and Children’s Program (WIC), were significantly less likely to take the recommended vitamin supplements (Yu, Keppel, Singh, & Kessel, 1996). (Surprisingly, smokers were more likely to take supplements than nonsmokers, perhaps in the hope of offsetting some of the negative effects of smoking.) In a recent study that analyzed data from the National Health and Nutrition Examination Survey, 2001-2002, Yang, et al. (2007) found that only 8% of non-pregnant women of childbearing age get the recommended amount of folic acid from fortified foods, while 26% get the recommended amount from supplements (only one-third overall consumed the recommended amount). For both supplemental and total folic acid intake, non-Hispanic Black women and Hispanic women were significantly less likely than non-Hispanic white women to get the recommended amount. Pregnant adolescents also often have diets that are inadequate in meeting the nutritional requirements of pregnancy (Derbyshire, 2007)

The newsletters’ advice on nutrition

The *Preparing to Parent* prenatal newsletters help to reinforce the advice on prenatal nutrition that health care professionals provide, which may be particularly important for those at higher risk for not taking vitamins supplements, or for those with less healthy eating patterns.

Preparing to Parent newsletters encourage expectant parents to eat healthy foods and a balanced diet. Examples of healthy meals are given, as are ideas for healthy snacks, such as blending fruit and yogurt for a smoothie. A guide is provided showing how much of each

food group (milk, meats and beans, fruits, vegetables, and grains) goes into a healthy, balanced diet.

The newsletters also point out what is safe eating for you and your baby. For example, tips include: “choose pasteurized milk and juices, choose cheeses carefully (avoid these cheeses – soft cheeses like feta, etc.), cook eggs well, cook meat fully, and take care with fish and shellfish.” They list what fish is safe and healthy to eat (and how much), and what fish pregnant women should avoid because of toxins. Expectant mothers are also advised to take their prenatal vitamins to get the iron, folic acid and other nutrients they need to prevent problems for themselves and their babies. In addition, the newsletters provide tips on safe drinking water, and where to get your water tested.

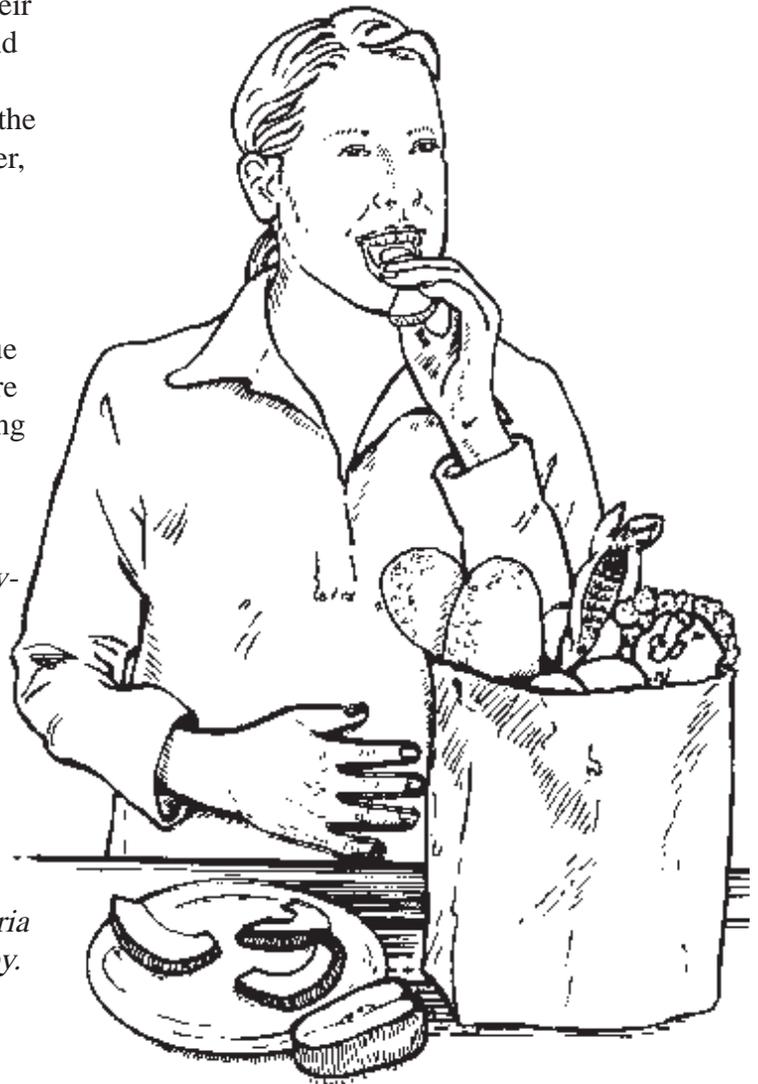
The newsletters also advise pregnant women to gain the recommended amount of weight during their pregnancy, and to continue staying active. Safe ways of staying active are provided. Parents made comments about eating a healthier diet and taking their prenatal vitamins:

“In the newsletters there was a chart showing how much of each kind of food I should eat during my pregnancy with examples of what a serving is. This was really useful in making healthy meal plans.”

“It was so helpful knowing what foods I needed to avoid while I was pregnant. I didn’t know soft cheese could have bacteria that might make me sick and hurt my baby. Thanks for the valuable info!”

“We eat a lot of fish and it was good to know what kinds to avoid. My doctor didn’t give me this information.”

“After reading the newsletters I started running my cold tap water for a couple of minutes every morning to make sure to flush out any possible lead. Thanks for the tip. I also plan to have our water tested before my baby starts drinking it.”



3. Benefits of Breastfeeding

More than one-third of the parents (38%) reported that “reading the newsletters helped me decide to breastfeed my baby.” Breastfeeding has so many important benefits for both mothers and babies. A number of mothers commented that they had already decided to breastfeed, but the newsletters confirmed for them why breastfeeding is best.

The research background on the benefits of breastfeeding

A survey completed by the Centers for Disease Control and Prevention in 2005 showed that nearly three-quarters of women start breastfeeding (73%), but only 39% are still breastfeeding by 6 months, and 20% at one year (CDC, 2005). Exclusive breastfeeding rates are lower, with just 59% exclusively breastfeeding at 7 days and 14% at 6 months.

Given the substantial body of research showing the benefits of breastfeeding for both mothers and infants (DHHS, 2007), the U. S. Department of Health and Human Services, the Surgeon General, the American College of Obstetricians and Gynecologists, and the American Academy of Pediatrics have all put out position statements that support breastfeeding (AAP Section on Breastfeeding, 2005; ACOG, 2007; DHHS, 2000; Surgeon General’s Blueprint for Action on Breastfeeding, 2001). Each of these policy statements promotes exclusive breastfeeding for the first six months and continued breastfeeding for at least the first year. In addition, they include action plans for how medical professionals can promote and support mothers and families in their decision to breastfeed. Educating parents before and after birth about the benefits of breastfeeding is recommended, as is helping mothers get breastfeeding established.

Breastfeeding provides numerous benefits to the infant, particularly in preventing certain diseases or reducing their severity (AAP Section on Breastfeeding, 2005; DHHS, 2007).

For instance, there is good evidence to show that breastfeeding reduces the risk of ear infections (otitis media), gastrointestinal infections, respiratory tract infections, necrotizing enterocolitis (in preterm infants), urinary tract infections, bacterial meningitis, and bacteremia. In addition, some evidence also suggests a reduction in Sudden Infant Death Syndrome (SIDS), in both type 1 and type 2 diabetes, obesity, and in childhood leukemia. For example, recent studies in Turkey and the United Arab Emirates found that breastfeeding for more than 6 months reduced the risk of childhood acute leukemia, compared to breastfeeding for 6 months or less (Altinkaynak, Selimoglu, Turgut, Kilicaslan, & Ertekin, 2006; Bener, Denic, & Galadari, 2001). With regard to obesity, Gillman, et al. (2001) showed that infants who had been exclusively or mostly breastfed in the first six months of life were significantly less likely to be obese in early adolescence (ages 9 to 14), compared to children who had been exclusively or mostly formula fed. Moreover, longer duration of breastfeeding (7 or more months compared to 3 or fewer months) also reduced the odds of being overweight. In the United States, postnatal mortality rates are 21% lower in breastfed infants, and developmental outcomes for pre-term infants are improved (AAP Section on Breastfeeding, 2005).

A study that analyzed data from the National Maternal and Infant Health Survey, found that exclusive breastfeeding in the first six months provided the most protection from

respiratory (including ear infections) and gastrointestinal infections (vomiting, diarrhea) compared to no breastfeeding (Raisler, Alexander, & O'Campo, 1999). Most or equal amount of breastfeeding (relative to other) also provided protection against some infections, while less breastfeeding (relative to other) did not reduce the rate of infection compared to no breastfeeding. Moreover, the effects of different breastfeeding amounts on infection rates were similar at all income levels. Dewey, Heinig and Nommsen-Rivers (1995) investigated the benefits of breastfeeding in a high socioeconomic group, and found that infants who were breastfed for at least the first year experienced half the incidence of diarrheal illness and significantly fewer ear infections, compared to formula fed infants. Ear infections were also of significantly shorter duration for breastfed infants, and the reduction in the number of ear infections (and duration) continued into the second year of life. In another study of infants in a large HMO, those who were exclusively breastfed for at least 4 months had half the number of ear infections, compared to non-breastfed infants, during their first year of life (Duncan, et al., 1993). The longer infants were breastfed the less likely they were to have recurrent ear infections. For infants who were exclusively breastfed for at least 6 months, the rate for recurrent ear infections was half that of infants who were never breastfed or breastfed less than 4 months.

A recent study provides evidence that the antibodies present in early breast milk (colostrum) may be particularly important in reducing the likelihood of infants getting enterovirus infections (Sadeharju, et al., 2007). Breastfeeding exclusively for more than 2 weeks significantly reduced the number of enterovirus infections in the first year, compared to breastfeeding for 2 weeks or less. Enteroviruses are very common and easily spread through respiratory secretions and bowel movements; everyone is susceptible, but especially those with less previous exposure and fewer antibodies like infants, children or

adolescents (CDC, 2007). While the viruses usually cause mild cold or flu-like symptoms, in some cases, there can be serious complications like infections in major organs (e.g. heart, brain or liver).

Besides the benefits for children, breastfeeding also provides many benefits for the nursing mother, such as decreased postpartum bleeding and quicker return of the uterus to prepregnancy size, as well as reduced risks for breast cancer (primarily for premenopausal women), ovarian cancer, and type 2 diabetes (AAP Section on Breastfeeding, 2005; DHHS, 2007). Given the benefits of breastfeeding for both mothers and infants, it's important to increase both the rate and duration of breastfeeding. A recent study indicates that most obstetricians and pediatricians believed they had provided advice on breastfeeding duration and continuing breastfeeding when mothers return to work, however, significantly smaller percentages of mothers reported receiving advice on these



topics at routine clinic visits (Taveras, et al., 2004). Clearly, this represents a gap in effective medical communication. Women who were less likely to breastfeed had less knowledge about the benefits of breastfeeding, less perceived social support, as well as less experience and confidence about breastfeeding (Mitra, Khoury, Hinton, & Carothers, 2004).

The newsletters' advice on breastfeeding

Written educational materials such as the *Preparing to Parent* newsletters, may help physicians remember to provide information on the benefits of breastfeeding, and provide the knowledge and support that women need to encourage them to breastfeed. The newsletters may also help parents remember what is discussed and reinforce the advice given at the clinic visit. One explanation for the findings on health communications is that physicians and nurses may be discussing breastfeeding with expectant parents who forget the discussion. A written newsletter, carried home and read later, can reinforce the messages of health care providers, making them more effective.

Each issue of the *Preparing to Parent* newsletters provides information about breastfeeding. In the first issue, the benefits for both baby and mother are listed: "Breastfed babies get sick less often, have fewer painful ear infections, allergies, stomach problems and colds...Breastfeeding helps mom recover from labor and birthing...makes life easier...reduces the risk of getting some forms of cancer later in life."

The newsletters also let moms know that "most women can breastfeed, even with small breasts or twins...even after a cesarean birth...even if baby is born early." Women are advised to talk with their health care provider about breastfeeding, to talk with other moms

who have breastfed their babies, and to contact the Le Leche League for more information and support. While starting to breastfeed may not always be easy, moms are informed that advice and support can really be helpful.

Expectant parents learn that breastfeeding even for a short time is really helpful for baby because of the **colostrum** or early breast milk, but that nursing for the first full year is recommended. The newsletters even cover the topic of breastfeeding in public and how some moms can feel uncomfortable. They suggest using a blanket to drape over your breastfeeding baby, and using a nursing bra, to make it easier for breastfeeding around others. For moms who want to return to work or school (or have dad help with feedings), the *Preparing to Parent* newsletters offer advice on pumping and storing breast milk safely, so baby can continue to receive breast milk (in bottles) from other caretakers.

The final newsletter issue gives many tips on how to get breastfeeding started - for instance, using a lactation consultant, breastfeeding as soon as possible after birth, positioning baby to face you, helping baby latch on correctly, and breastfeeding before baby cries. Parents are also advised to stick to breastfeeding alone for at least the first few weeks. Baby needs time to get used to nursing from the breast, and using bottles or pacifiers may be confusing to baby.

From their comments, parents told us they understood the importance of breastfeeding:

"I kind of knew breastfeeding was good for baby, but I didn't realize all the benefits for both me and my baby until I read about them in the newsletter. After that I decided to breastfeed for a whole year."

"I had already decided to breastfeed, but my husband wasn't so sure. After we read the newsletter even he got on board with my decision. Thanks!"

"I knew breastfeeding was good for my baby but I didn't know how I was going to keep breastfeeding when I went back to work. The newsletters really were helpful in telling me just how I could succeed at breastfeeding and working. Thanks so much for the help!"

"I started breastfeeding but was having some difficulties. I read in the newsletter that it's not supposed to hurt and to ask for help. That made all the difference. Thanks!"



4. Benefits of Regular Prenatal Visits.

More than one-quarter of parents also reported that the newsletters encouraged them to “keep all my prenatal appointments” (29%). Prenatal care is viewed as an important part of preventive care for pregnant women (Alexander & Kotelchuck, 2001). Early and regular prenatal care provides necessary screening and treatment for medical conditions during pregnancy, as well as information concerning behaviors (such as alcohol consumption or smoking) that may impact maternal and infant well-being.

The research background on prenatal health care

According to the March of Dimes Perinatal Statistics (2007), in 2004 approximately 11.2% of infants (live births) in the United States were born to mothers who received inadequate prenatal care, with 3.6% born to women who received late (third trimester) or no prenatal care. In a large-scale study, using data from the National Center for Health Statistics (1995-1997), women who received no prenatal care had significantly worse birth outcomes compared to those who received any care (Taylor, et al., 2005).

Disparities in the use of prenatal care exist for different groups. A study of women who used Midwife services (and delivered full-term infants) showed that White women were significantly more likely to initiate prenatal care earlier and attend more prenatal visits, compared to non-White women (Park, Vincent, & Hastings-Tolsma, 2007). More educated women (compared to less educated) were also more likely to start care early and complete more visits. Although highly educated white women were more likely to seek early and consistent prenatal care than less educated white women, no difference in the timing or consistency of prenatal care by educational level was seen for non-White women. In a large national study, two-thirds of women who received no care were Black or Hispanic, and were likely to be less educated (Taylor, et al., 2005).

The Adequacy of Prenatal Care Utilization Index (APNCU), developed by Kotelchuck (1994) bases adequacy of care on both timing of initial prenatal visit (broken into 4 time periods: months 1 and 2, 3 and 4, 5 and 6, and 7 through 9) and ratio of actual number of prenatal visits to recommended number (as recommended by the College of Obstetrics and Gynecology, and adjusted for gestational age). The index includes four levels of care utilization: inadequate, intermediate, adequate and adequate plus. Inadequate utilization is prenatal care that begins after month 4 or includes less than half the number of recommended visits, while the other categories require care to begin before month 4 and then are based on percentage of recommended visits (for example, “intermediate” requires 50% to 79%).

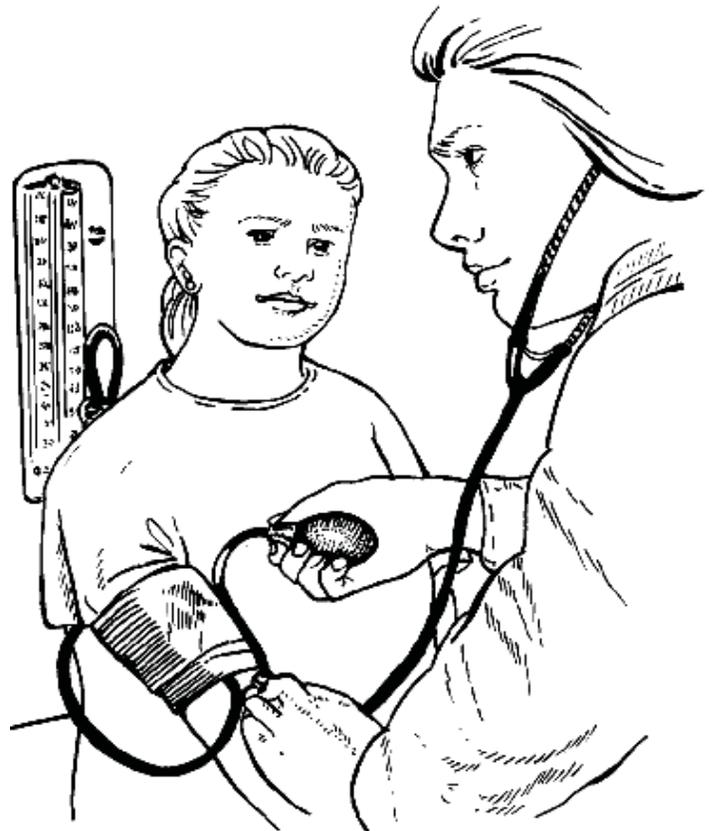
Adequate or intermediate levels of prenatal care have been shown to reduce the risk for potentially avoidable pregnancy complications, compared with inadequate care (Laditka, S.B., Laditka, J.N., Mastanduno, Laurie, & Foster, 2005). Moreover, adequate care, compared to intermediate care, also significantly reduced the risk of complications, which indicates that as the amount of prenatal care increases the risk of avoidable complications decreases. (The adequate plus category ($\geq 110\%$ of recommended visits) was not included in the analyses because it may represent high-risk cases where complications are not necessarily avoidable.) Poten-

tially avoidable complications are those that may be prevented with proper prenatal care and the healthy behaviors that medical professionals recommend. Laditka, et al's (2005) study found that potentially avoidable pregnancy complications are significantly higher for African Americans (compared to non-Hispanic whites), Medicaid recipients and the uninsured (compared to those with insurance), which may reflect differences in access to health care.

Research findings on the effectiveness of prenatal care in reducing pre-term or low birth-weight births have been equivocal (Alexander & Korenbrot, 1995; Alexander & Kotelchuck, 2001). Between 1981 and 1995, the percent of U.S. women who received inadequate prenatal care fell while the percent of pre-term and low birth-weight births increased (Alexander & Kotelchuck, 2001). However, infant mortality rates declined during that same time period. Research efforts have been hampered by things such as selection bias (who chooses to use prenatal care) and how to measure adequate care (timing, number of visits, content, interactions with provider, etc.). The authors suggest that more research needs to be done in assessing the effectiveness of various components of prenatal care, such as education about nutrition and smoking cessation, which may be effective in reducing rates of low birth weight or pre-term births. In fact, a recent study showed that high risk women who participated in at least 10 prenatal care coordination sessions targeting specific problems (smoking, adequate weight gain, psychosocial problems) were significantly more likely to resolve these pregnancy risks, and resolving one or more risks significantly reduced their chance for having a low birth weight infant (compared to not resolving any risks) (Ricketts, Murray, & Schwalberg, 2005).

Some studies have looked at the impact of specific content areas on birth outcomes. In an early study of women who sought prenatal care at some point in their pregnancy, those who received education on the signs of pre-term labor were significantly less likely to have low birth weight infants, compared to those who did not receive this educational intervention (Taren & Graven, 1991). This finding also held for women with high-risk pregnancies. Similarly, a recent study by White, Fraser- Lee, Tough and Newborn-Cook (2006) found that not receiving information about the signs of pre-term labor nearly doubled the risk of having a premature infant.

Using data from the National Maternal and Infant Health Survey, Kogan, et al. (1994) found that women who did not receive all the prenatal health advice recommended by the U.S



Public Health Service guidelines (7 items) were more likely to have low birth weight infants, compared to those who did receive all the advice. Women at higher risk for problems (for example, teenagers, smokers, those with previous negative outcomes) benefited the most from receiving all the recommended advice. In contrast, White, et al. (2006) found that women who did not receive all the recommended health information (22 items - Canadian clinical practice guidelines) were not more likely to have pre-term births. Nevertheless, women with pre-term deliveries reported being less satisfied with their prenatal care, and felt that they were less well informed and that their questions had not been satisfactorily answered. Between 30% and 55% of women said they received information on just half of the health advice/education topics recommended. Although most women reported receiving information about a healthy diet (81.3%) and prenatal vitamins (93.1%), only 58.6% were advised about the risks of alcohol, tobacco and drug use, unless they were smokers (only 25% of smokers received advice on how to quit). Asian or non-Caucasian women, single women, and those in the age range from 20-34 were significantly less likely to receive education on healthy pregnancy behaviors. In a sample of low-income African American and Mexican American women, those with healthier pregnancy behaviors reported discussing more health education topics during prenatal clinic visits (Vonderheid, et al., 2007).

The research suggests that the health education component may be one indicator of quality of prenatal care and the amount of time medical professionals spend in providing information to their patients (Kogan, et al., 1994; Taren & Graven, 1991). According to White, et al. (2006), prenatal care providers are doing a good job of meeting the medical needs of pregnant women, but must focus on providing more health education and advice to their clients.

The newsletters' advice on prenatal health care

The *Preparing to Parent* prenatal newsletters are one educational tool that medical professionals can use to reinforce the health behavior advice they provide during prenatal visits. By reinforcing the advice delivered at prenatal health care visits, the newsletters aim to make those visits more effective. In addition, each of the newsletters also encourages readers to actually schedule and attend prenatal health care visits. The newsletters give advice on how to choose a doctor or nurse for prenatal care and provide a checklist of questions that help expectant parents know what to look for (for example: "Does this person explain things clearly?"; "Does he or she listen to you and respect your concerns?"; "Will you see this same person most visits?"). In addition, the newsletters tell parents-to-be what will happen during checkups, such as listening to the baby's heartbeat, recording your weight and height, checking the level of sugar, proteins, or bacteria in your urine, and answering questions about childbirth and breastfeeding.

Preparing to Parent newsletters also explain the importance of regular prenatal visits, even if the expectant mother is feeling fine. "Checkups can catch a problem like diabetes or anemia before it harms you or your baby." In addition, they let expectant parents know to ask their health care provider if testing for birth defects is recommended. The newsletters also provide a list of mid-pregnancy and late-pregnancy warning signs – that signal the need to call the doctor or nurse right away.

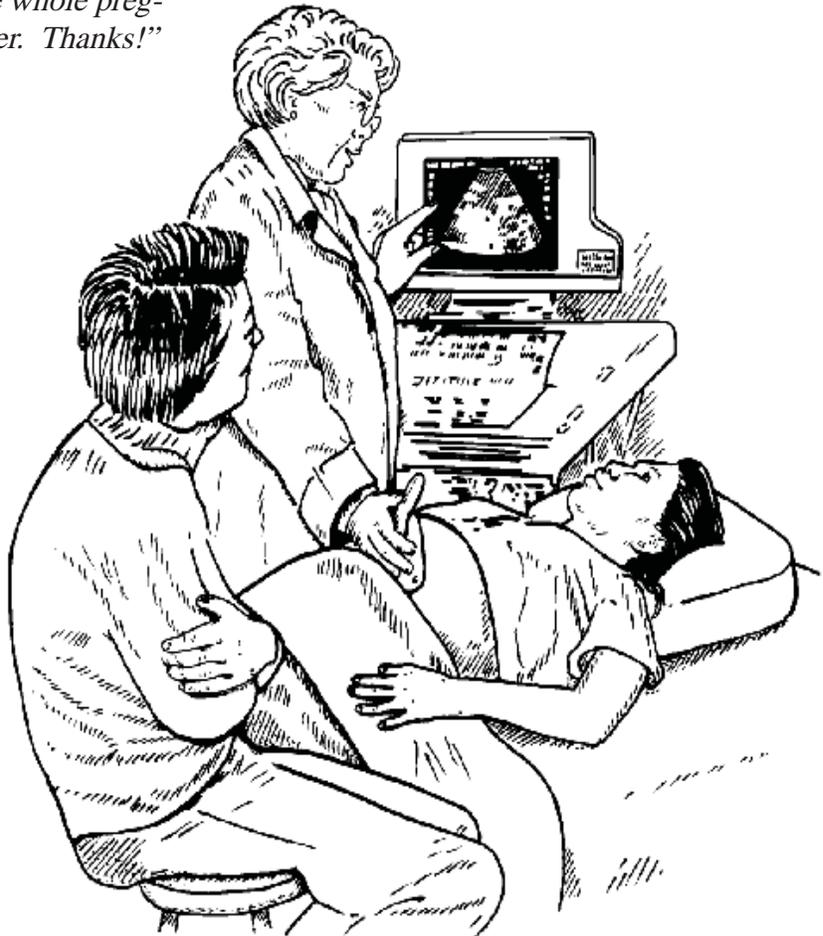
For those without health insurance, the newsletters give information on where expectant parents can receive free or low cost prenatal care, such as through their local WIC clinic or health department.

Parents let us know that the *Preparing to Parent* newsletters prompted them to keep their regular prenatal visits:

“I didn’t realize how important it was to keep all my doctor appointments until I read the newsletter. After that I never missed one.”

“I read in the newsletter that a back ache could be a sign of problems. I decided to call my doctor and it turned out I was having some contractions. The doctor gave me some medicine and put me on bed rest. He said if I hadn’t come in when I did, the baby might have come too early. Thank you!”

“I appreciated the checklist of things to look for in a doctor. I didn’t feel like my doctor really listened to my concerns, so I got another doctor. It has made the whole pregnancy experience so much better. Thanks!”



5. Benefits of Stopping Smoking

Of those expectant parents who were smokers, just over one-fourth (26%) reported that, “reading the newsletters helped convince me to cut back on smoking.” This is an important finding since “smoking during pregnancy is the single most preventable cause of illness and death among mothers and infants,” according to the Centers for Disease Control and Prevention (CDC, 2007).

The research background on smoking during pregnancy

Maternal smoking during pregnancy is associated with negative outcomes such as low infant birth weight and pre-term birth (Bernstein, et al., 2005; Burguet, et al., 2004; Lieberman, Gremy, Lang & Cohen, 1994; Shah & Bracken, 2000; Shu, et al., 1995). Shu et al. (1995) found that the more pregnant women smoked the greater the reduction in birth weight, but even low to moderate amounts of smoking (< 15 cigarettes per day) led to significant reductions in birth weight. Even when women stopped smoking early in their pregnancy, infant birth weight was substantially lower compared with nonsmoking women. However, other studies have shown that maternal smoking during the third trimester is the strongest predictor of low birth weight, suggesting that stopping smoking earlier in pregnancy could reduce the risks (Bernstein, et al., 2005; England, et al., 2001; Lieberman, et al., 1994). For women who are unwilling or unable to quit smoking, reducing cigarette use to less than 8 cigarettes per day during the third trimester may decrease the risks for low birth weight (England, et al., 2001). Bernstein, et al. (2005) found that for every additional cigarette smoked per day during the third trimester there was a 27 gram decrease in birth weight. A meta-analysis of 20 prospective studies showed that smoking is a significant risk factor for pre-term birth (Shah & Bracken, 2000). Both low to moderate and high levels of smoking during pregnancy put mothers at significantly greater risk for very pre-term deliveries (Burguet, et al., 2004).

Besides the risks for pre-term birth and

low birth weight, there is evidence that maternal prenatal smoking may put infants at risk for obesity (Sowan & Stember, 2000). Sowan and Stember (2000) found that once infants whose mother smoked catch-up in weight, they were more likely to be obese during the 6 to 14 months age period, compared with infants of mothers who did not smoke during pregnancy. Since obesity in infancy may lead to obesity in childhood and adulthood, the authors point out the importance of prenatal educational efforts that encourage smoking cessation.

Prenatal smoke exposure is also associated with Attention Deficit Hyperactivity Disorder (ADHD) or hyperactivity in children, as well as behavior problems (Braun, Kahn, Froehlich, Auinger, & Lanphear 2006; Day, Richardson, Goldschmidt, & Cornelius, 2000; Fergusson, Horwood, & Lynskey, 1993; Kotimaa, et al., 2003; Thapar, et al, 2003). Thapar, et al. (2003) showed that even when the effects of genetic factors, and other likely confounding variables, were taken into account prenatal smoking remained significantly associated with ADHD in a sample of twins from 5 to 16 years of age. In their population-based, prospective longitudinal study, Kotimaa, et al. (2003) found that smoking during pregnancy increased the risk for hyperactivity when children were eight years old. Moreover, as the level of maternal prenatal smoking increased, so did the rate of child hyperactivity. Using data from a nationally representative sample (National Health and Nutrition Examination survey 1999-2002), Braun, et al. (2006) confirmed this relationship between pre-

natal smoking and ADHD. A large, longitudinal study in New Zealand showed that at ages 8, 10, and 12 years of age, children whose mothers smoked during pregnancy were at significantly higher risk for behavior problems, including conduct disorder, disruptive behavior and attention deficit, than children of mothers who did not smoke prenatally (Fergusson, et al., 1993).

Prenatal smoking also affects children's language and cognitive development. In a study of one-to-three day old infants (matched on birth weight, gestational age, Apgar scores, and socioeconomic factors), those born to smoking mothers were slower at processing speech sounds and less able to discriminate between different sounds, compared with infants who were not exposed to smoke prenatally (Key, et al., 2007). In a prospective longitudinal study, 10-year-old children whose mothers smoked during pregnancy scored lower on measures of verbal learning and memory, compared to children of non-smokers, even when controlling for socioeconomic factors and other alcohol/drug use (Cornelius, Ryan, Day, Goldschmidt, & Willford, 2001). In clinical terms, children of mothers who did not smoke during pregnancy or were light smokers, scored within the normal range on verbal and memory tests, while children of heavy smokers scored well below average.

From all of these findings it is clear that maternal prenatal smoking can have life long consequences for children. These consequences may involve behavioral and learning problems, as well as the physical problems associated with prematurity or low birth weight and obesity. A review of smoking cessation programs for pregnant women indicates that nurse managed programs, which include counseling and follow-up support, as well as education about the negative effects of smoking, are some of the most useful for getting pregnant women to stop smoking (Barron, Petrilli, Strath, & McCaffrey, 2007).

The newsletters' advice on smoking during pregnancy

The prenatal newsletter, *Preparing to Parent*, helps reinforce the educational message of health care professionals about the consequences of smoking. In the first issue of the newsletter parents find out that "smoking during pregnancy can lead to premature birth, miscarriage, or stillbirth, Sudden Infant Death Syndrome (SIDS), asthma in children and future problems in school." Expectant parents are also informed about the dangers of second-hand smoke, how it can harm their growing baby, and that having a "smoke-free home...will help baby grow up healthy."

The newsletters acknowledge that quitting can be hard, and suggest that expectant parents seek assistance from medical professionals to help them with quitting. The risks of using over the counter nicotine gum or patches are mentioned, with the recommendation to ask their pharmacist or doctor for advice.



Expectant parents are advised to find enjoyable things to do instead of smoking, and to avoid places where other people are smoking. The newsletters remind parents to “take it one day at a time. Each cigarette you don’t smoke is one less for baby as well.” Spouses or partners are also encouraged to make quitting a family affair, and to support their partner in her efforts to quit.

Parents’ comments suggested they heard this advice:

“I’ve smoked for so long that quitting seemed impossible. But I did cut way down on the number of cigarettes I smoked each day. Now that my baby’s here I try to only smoke outside.”

“Reading about all the negative things that could happen to my baby was the final thing that made me want to quit. I started working with my doctor to cut down gradually, and stopped smoking completely by my third trimester.”

“I never did smoke, but my husband was prompted to quit by reading about how bad smoking is for babies. Thanks!”



Which Expectant Parents Need Our Help Most?

We have special concern for some expectant parents. Prior research has shown that expectant parents in particular socioeconomic categories may start prenatal care later in pregnancy or receive no prenatal care (Park, et al., 2007; Taylor, et al., 2005), and may be more likely to engage in unhealthy pregnancy

behaviors (Kost, Landry, & Darroch, 1998; Leonardson & Loudenburg, 2003; Muhajarine, D’Arcy, & Edouard, 1997; Walker, Cooney, & Riggs, 1999). They may also be less likely to breastfeed their infants (Mitra, et al., 2004). These categories are defined, and the numbers of parents in each category are shown below:

1. First time parent.
2. Low education (less than high school diploma).
3. Low family income (less than \$14,000 previous year).
4. Single parent (whether married or not).
5. Socially isolated (defined as not having “friends who are expecting a baby or have young children”).

If any of these conditions was true of a parent, we placed them in the “risk” category. We then contrasted the self-reported behavior changes of risk-group and non-risk parents.

Category	Number	Percentage
Non-Risk	52	46
Risk-Group	60	54

Effects on “At-Risk” and “First-Time” Expectant Parents

The risk-group parents reported more positive influence from the newsletters than the non-risk parents, in all six key areas of behavior change.

In two areas, these differences were statistically significant. Risk group parents were 23% more likely than non-risk parents to say that reading the newsletter convinced them “to cut back on alcohol”. They were 20% more likely to say that reading the newsletter convinced them “to eat more healthy foods”. See Figure 8.

Risk group parents, who may be less educated, single, low income, and/or socially isolated are more likely to have limited knowledge of healthy pregnancy behaviors (Kost, et al., 1998; Leonardson & Loudenburg, 2003; Muhajarine, et al., 1997; Walker, et al., 1999), as well as parenting beliefs and behaviors that are less optimal for children’s development (Okagaki & Divecha, 1993). They also may lack the support they need to give up unhealthy behavior (such as smoking or drinking) and adopt healthier pregnancy behaviors. The newsletters appear to be an effective way to provide knowledge about healthy pregnancy and early parenting behaviors to expectant parents most in need of this information. In addition, the newsletters may increase expectant parents’ awareness of the benefits that healthy pregnancy and early parenting behaviors (i.e. breastfeeding) can have on their baby’s development. This is suggested by the self-reported changes in parenting of risk-group parents.

Do the first-time parents differ from the other parents in the risk group? A monthly newsletter is a very small intervention in a parent’s life when compared to the impact of living on a small income, or without a spouse. While the differences were not large, we found that risk-group parents were 11% more likely

than first-time parents to report the newsletter convinced them “to eat more healthy foods”. They were also 8% more likely to report that the newsletter convinced them “to cut back on alcohol.” So, where differences existed, the risk-group parents reported even more benefit from the newsletters than the first-time parents.

First-time expectant parents are inexperienced, and therefore it is no surprise they appreciated the newsletters. In fact, some parents’ comments seemed to be telling us that the newsletters were helpful because they were first-time parents.

“My husband and I enjoyed receiving your newsletter! It was very useful and informational, since it was my first pregnancy.”

“I really liked the newsletter. It helped me remember all the information my doctor gave me - when sometimes it seemed like too much information. Since this is my first baby, I needed answers to so many questions – some things my doctor didn’t talk about!”

But other, experienced parents told us it was helpful to them too:

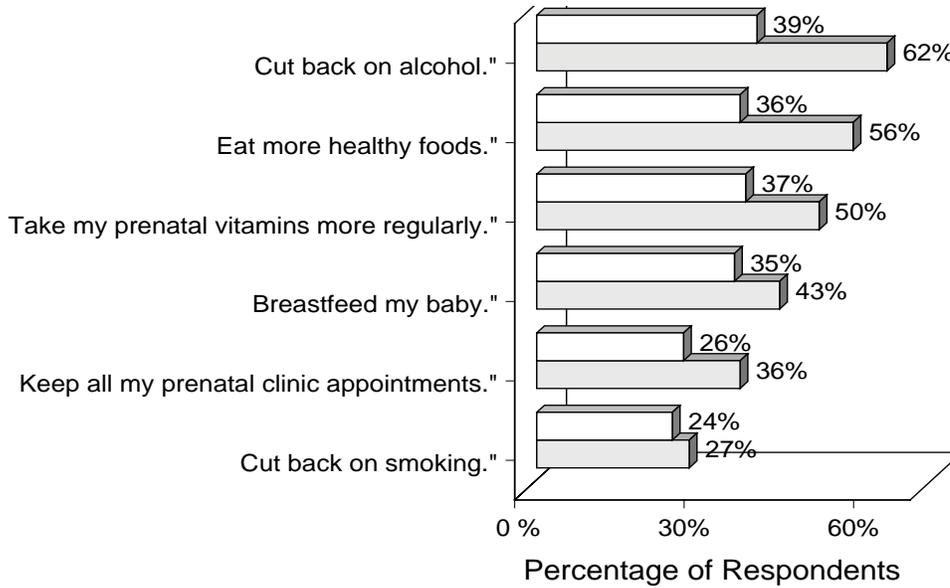
“Even though this is my second pregnancy, the newsletter had information I didn’t know, like not cleaning the cat’s litter box and certain fish not to eat.”

“I enjoy the newsletter. Even though this is my 3rd child, some things change. The newsletter is short and concise, so I have time to read it.”

Figure 8.

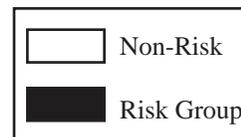
Effect of *Preparing to Parent* Newsletters on “Risk Group” parents as Compared to Non-Risk Parents

“Reading the newsletters helped convince me to...”



Note: The contrasts of “cut back on alcohol” and “eat more healthy foods” are statistically significant at $p < .05$.

Note: The percentages for alcohol consumption and smoking are for those who did drink or smoke.



Can We Trust These Results?

How reliable are self-report answers, where people answer questions about themselves?

We know that such questions, if phrased carefully, can be accurate, but can also be prone to some well-known sources of inaccuracy.

The two most common sources of error are Response Set and Social Desirability Bias. “Response Set” refers to the tendency of some respondents to answer all questions the same way, for example with a “yes” response. “Social Desirability Bias” is the tendency of respondents to exaggerate their favorable attributes or pleasing responses (people like to report “good news” in their questionnaire responses). Depending upon how they are worded, questions can elicit greater or lesser amounts of this bias. People also differ in this regard: some are more likely to exaggerate their answers so as to provide a more pleasing answer, while others are less susceptible to this bias.

One way to check for the intrusion of response set and social desirability bias into our results is with a “lie scale.” Using this method, we inserted two items into our list of outcome

questions. Each item asked about something that might have been in the newsletters, but wasn’t. Here are the two items:

“Reading the newsletters helped me avoid getting stretch marks on my stomach.”

“Reading the newsletters helped me decide what kind of diapers to use for my baby.”

If a respondent reported (incorrectly) having learned about both of these topics in the newsletters, then we would strongly suspect that their answers to these and all other questions were biased by either response set or social desirability bias, or by both biases.

In fact, only one respondent answered “yes” to both items, which suggests a low intrusion of these biases into our results. Data for this respondent were removed before completing the statistical analyses, to increase the accuracy of our results.

Conclusions

Based on the evidence presented in this report, we advance the following conclusions:

1. Parents who responded to the survey found the newsletters useful. Most reported they read every article in every issue, and then kept and filed them. They found the newsletters were very useful nearly as frequently as information from physicians and nurses and were very helpful more frequently than other sources of advice we asked about, including relatives and friends.
2. The newsletters were not only used by the expectant mother, but were passed on to others as well. In about three-fourths of households, an additional person (most often the expectant father) regularly read the newsletter. The fact that expectant parents would pass their newsletters along to others is confirmation that they find them useful. Multiple readership of each newsletter also argues for multiplication of effect, and cost efficiency of this method of prenatal education.
3. Parents reported that reading the newsletters led them to change their pregnancy and early parenting behaviors in six key areas, each of which is predictive of healthy child development. Of greater interest, the parents who most often reported behavior changes were those in greatest need: first-time parents and expectant parents living in “risk” situations. This suggests that the impact of the newsletters is greatest where the need is greatest.
4. Besides encouraging healthy pregnancy behaviors, the newsletters may especially be promoting healthy eating habits, including a reduction in alcohol use. This may be particularly true for at-risk expectant parents who reported eating more healthy foods and reducing their alcohol consumption, compared to non-risk parents. Less alcohol reduces the risk of Fetal Alcohol Syndrome and other related neurodevelopmental problems, and healthier eating decreases the risk of problems associated with the lack of specific nutrients, such as neural tube defects (folic acid deficiency) and rickets (Vitamin D deficiency).

Recommendations

The continued distribution of the *Preparing to Parent* newsletters in Badger County seems well warranted by the evidence of this evaluation.

Families in Badger County are fortunate to have the Badger County Department of Health and Human Services, the Badger County WIC Program, and Community Memorial Hospital and Clinics of Badger Falls working together (with Badger County UW-Extension) to provide the newsletter. This collaborative effort will require periodic communication to insure continuous delivery of prenatal and early parenting information that meets the needs of Badger County families.

For families requiring additional information, programs including Community Memorial Hospital and Clinics prenatal classes, prenatal phone calls by the Department of Health and Human Services, and others should continue.

Perhaps several agencies and organizations, especially those involved in the newsletter project and new parents, could form a coalition to explore other forms of support and information for expectant parents. We also note that some families need interventions far more intensive than this educational resource.

A Spanish language edition of the newsletter is available. If identification of families preferring this edition were made a routine part of prenatal clinic procedures, then this important subpopulation could also be reached.

A continuation of the newsletter into the first, second, and third years of the child's life is available from UW-Extension. Funding to continue distribution of the parenting newsletters is being sought.

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