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WIC Nutrition Education Demonstration Study: Prenatal Intervention

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WIC Nutrition Education Demonstration Study: Prenatal Intervention

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WIC Nutrition Education Demonstration Study: Prenatal Demonstrations

Foreword

Social science studies of intervention programs strive for true experimental designs, but often cannot reach this standard after national program implementation due to ethical concern over withholding benefits. The WIC Nutrition Education Demonstration Study used an elegant design that achieves randomization without the withholding of WIC program benefits from the control group. It demonstrates a design approach that could be replicated in future studies of WIC and other programs.

However, nutrition education is a complex intervention that is often tailored to the needs of the specific client. In many WIC sites, the results of the nutrition risk assessment required for WIC certification are considered by the local WIC staff in selecting and tailoring nutrition education to the client's needs. In the innovative interventions included in the prenatal demonstrations, the participating women themselves had a strong influence on the content of the education they received from the interactive kiosks or facilitated group discussions.

In this context, the knowledge assessment tool used in this study has significant limitations that should be recognized by all readers. First, since the assessment tool focuses on knowledge, it would not detect changes in behavior, attitude or advances through the stages that precede behavioral change. Further, as a predefined test of fixed scope, it would not assess changes in knowledge in areas not covered by the test. Two examples help clarify these limitations.

- Consider a case where the nutrition education for the prenatal WIC participant focuses on the health benefits of breastfeeding and breastfeeding techniques. Even if the participant had been only vaguely considering breastfeeding, and later successfully breastfeeds for six months, the assessment tool used in this demonstration might find no change in nutrition knowledge, as it did not cover knowledge of breastfeeding.

- Consider a second case where a pregnant woman enters WIC knowing how much milk and dairy products she should consume during pregnancy, but is only occasionally consuming dairy products. If the WIC nutrition education intervention is tailored to this aspect of her needs, it could result in an increase in knowledge about acceptable ways to consume a variety of well-tolerated dairy foods, and a considerably improved diet. However, neither the increase in this type of knowledge nor the improved behavior would have been detected.

In order to effectively compare knowledge gains resulting from the innovative and traditional interventions, a standard assessment tool was developed and administered to all groups of women. This tool was tested for reliability and validity and did a good job at assessing knowledge in specific areas. However, as previously indicated, the prenatal participants strongly influenced the content of the nutrition education they received. Because of this influence, the content of nutrition education varied across sites, decreasing the ability of the standard assessment tool to detect changes in knowledge that might be attributed to the educational interventions used in this study. We hope that readers will neither take the findings of this study as a comprehensive assessment of WIC nutrition education nor lose sight of this study's contribution to WIC evaluation methodology. Further, this study provides useful information about implementing the types of innovative interventions selected for the demonstration.

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Acknowledgments

Most demonstrations take place in the real world of service delivery. Certainly, the *WIC Nutrition Education Demonstration Study* was firmly ensconced in local WIC clinics. We are tremendously grateful to the thousands of prenatal WIC women who participated in the demonstration and its evaluation.

Our debt to the WIC administrators and staff at the demonstration sites is also large. To preserve the anonymity of these local WIC agencies, we cannot list names of the WIC directors, nutritionists, nurses, and clerks who made this study possible.

We are most grateful for the collaboration and guidance of nutrition educators Laurie Sims and Jeannie MacKenzie. Leslie Christovich, Boyd Kowal, J.P. Passino, Janet Tognetti Schiller, and Jeffrey Wilde, from the Food and Nutrition Service, provided expert advice and guidance.

Several of our Abt colleagues also deserve our thanks: Amy Fowler, who, for many months, was an integral part of our project team; Barbara Goodson, whose advice and counsel considerably improved the quality of this report; and Tracy Olcott and Eileen McEnaney, who are responsible for this report's excellent production.

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Executive Summary

The *WIC Nutrition Education Demonstration Study* was conducted by Abt Associates Inc for the Food and Nutrition Service (FNS) of the US Department of Agriculture. The study evaluated the effectiveness of three innovative approaches to nutrition education in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Two of these education innovations were designed for educating prenatal women; the third focused on nutrition education for three-and-four-year-old WIC participants. This executive summary and report describe the evaluation and results of the educational interventions for prenatal women.

The WIC Program was established in 1972, as an amendment to the Child Nutrition Act of 1966, to counteract the negative effects of poor nutrition on the prenatal, postpartum, and pediatric health of low-income individuals. A combination of direct nutritional supplementation, nutrition education and counseling, and increased access to health care and social services is offered to pregnant, breastfeeding, and postpartum women; infants; and children up to the age of five years. WIC provides supplemental foods that are good sources of the nutrients most likely to be lacking in the diet of low-income populations—protein, iron, calcium, and vitamins A and C. In most States, WIC clients receive WIC food instruments (vouchers or checks) with which they purchase specific food items at participating retail stores.

To receive WIC benefits, an individual must be categorically eligible (a pregnant woman, for example); must reside in the State in which the application is filed; must be income eligible (usually defined as equal to or less than 185 percent of the federal poverty income guidelines); and must be at nutritional risk.

Nutrition education plays a critical role in WIC and is intended to influence participant nutrition- and health-related knowledge, attitudes, and behaviors. Federal WIC regulations require WIC service providers to offer participants, at no cost, at least two nutrition education sessions during each certification period. Although WIC participants are not required to attend nutrition education, local WIC agencies often schedule nutrition to coincide with food instrument issuance to encourage WIC clients to attend. Education on a variety of health and nutrition-related topics may be provided

in individual counseling sessions, through group classes, or via films and videos. Whatever the delivery form, education must stress the relationship between proper nutrition and good health.

Study Design and Objectives

This study had three primary components: developing nutrition education interventions; implementing these innovative methods of nutrition education at selected WIC sites; and designing and conducting a study to assess the relative effectiveness of traditional and innovative WIC nutrition education in increasing participant knowledge about nutrition.

This study was limited to assessing the effects of innovative approaches on nutrition knowledge of prenatal WIC participants. It did not address the important issue of changes in nutrition behavior that could result from nutrition education. While this issue is important, it was beyond the scope of this study and must be investigated elsewhere.

Developing Nutrition Education Interventions. The innovative nutrition education taught during the demonstration (1) contained nutrition information appropriate for prenatal women; and (2) employed teaching methods that made this information accessible and interesting to WIC participants. It was hypothesized that such innovations would be more effective than the traditional nutrition counseling and group education currently used in WIC clinics.

Specific nutritional concepts were identified by a review group including FNS staff, Abt staff, and several technical consultants. The primary objective was to define the broad scope of appropriate knowledge for prenatal women. However, for practical reasons—such as time available for nutrition education at local WIC agencies, the review group recommended, and FNS approved, limiting the focus of nutrition education to a common core of nutrition information on the topic, pregnancy and nutrition. This topic included five components: Food Guide Pyramid; diet for pregnancy; food choices: everyday versus sometimes foods; nutrients for healthy mother and baby; nutrients in WIC foods.

Two innovative nutrition education interventions were chosen to teach pregnant WIC participants about pregnancy and nutrition. Two different interventions were needed—one that employed individual counseling and a second for group education—because both educational forms are

currently used in the WIC Program, and the innovative interventions needed to match these traditional educational forms. The innovative individual intervention was a touch-screen video comprised of a five-module curriculum, *What to Eat When You're Pregnant*. This curriculum, prepared by FNS and the New England Technology Group, was based on a computer-assisted video developed by the Maine WIC Program. The innovative group intervention used a curriculum entitled *Eating for Two* developed by the Michigan WIC Program in cooperation with the United Dairy Council of Michigan. This curriculum was presented through "facilitated" group instruction, in which the nutritionist acted as a facilitator, not a lecturer, and in which the focus was on behavioral change rather than knowledge acquisition.

Implementing the Demonstration. The interventions were implemented in six WIC demonstration sites. Three sites offered individual nutrition education using the touch-screen video; three other sites applied the facilitated group intervention. FNS selected the demonstration sites and assigned them to individual or group nutrition education, matching each site's traditional mode of nutrition education for pregnant women with its demonstration intervention type. A key selection criterion was caseload size. A large caseload was essential in order to recruit sufficient numbers of respondents as demonstration participants in a reasonably short period of time.

FNS provided the demonstration sites with training and materials for the interventions. The sites implementing the innovative individual intervention received computer hardware and software for the touch-screen program. For the sites using facilitated group counseling, WIC staff attended a two-day training on implementation. The demonstration began in February 1996.

Implementation of the demonstration was documented through a process study conducted by Abt Associates. Information on traditional and innovative nutrition education was obtained through interviews with nutrition educators at local WIC agencies; review of materials used in traditional nutrition education sessions; and on-site observations of innovative and traditional nutrition education.

Designing the Research Study. An experimental design was implemented in each of the six demonstration sites, in which prenatal WIC applicants were randomly assigned to one of three groups: the traditional group, who received the nutrition education already being provided at that site: the innovative group, who received one of the innovative WIC nutrition education

models—individual counseling using the touch-screen video or facilitated group counseling; or a control group who received nutrition education after the intervention period ended. Information on this design appears in Exhibit E.1.

Exhibit E.1

Research Study Design

	Method of Nutrition Education Subsequent to Certification		
Demonstration Sites	**Traditional WIC Nutrition Education**	**Innovative WIC Nutrition Education**	**No WIC Nutrition Education**
Individual Sites (n=3)	One individual session	One touch-screen video session	No nutrition education during the intervention period
Group Sites (n=3)	One group session	One facilitated group instruction session	No nutrition education during the intervention period

The same procedures were used at all demonstration sites. Prenatal applicants who came to WIC to apply for benefits were recruited into the study and immediately pretested on their nutrition knowledge before they were certified for WIC benefits or received any nutrition counseling. The measure of knowledge was a test which was developed for this study and which focused on the core nutrition topics noted above. Subsequent to pretesting, each applicant who was certified as eligible for WIC benefits then received traditional individual nutrition counseling during the certification session. Every study subject, including members of the control group, received one individual nutrition education counseling session at this initial contact.

Each WIC participant was then scheduled for a subsequent (followup) nutrition education contact which usually coincided with food voucher/check issuance and occurred four to eight weeks after certification. Depending on group assignment, the followup contact consisted of either the traditional nutrition education provided at that site followed by a post-test; the innovative counseling/education at that site followed by a post-test; or, for each control subject, the post-test followed by nutrition education.

Applying a classic experimental design with randomization of subjects constructed groups that, except for the intervention, can be assumed to be statistically equivalent in all other respects. Applying this methodology means that, in this study, any differences in nutrition knowledge from pre- to post-test can be attributed to the educational intervention.

Developing the Test of Nutrition Knowledge. Abt staff developed the nutrition knowledge test, beginning with a pool of test items on pregnancy and nutrition. Through an iterative process, the original eighty questions on pregnancy and nutrition were carefully evaluated for their adequacy across precise criteria—item content must be linked to a specific topic, for example. Three rounds of pilot testing resulted in a third (and final) form of the test containing seventy-six items. Sixteen (21 percent) of the test items were specific to nutrition knowledge and pregnancy. The remainder measured general nutrition knowledge. The pilot test assessed reliability and validity to ensure that the test measured what it says it does and results in "true" scores for all participants. The acceptable items were placed into two forms of the test so that women would receive different tests at each of the two testing points. This step was deemed necessary because using the exact same test form in a period of less than two months might lead to a memory effect for respondents.

Analysis. The research study consisted of a repeated-measures design with two time points (pretest and post-test) and three groups (traditional, innovative, and control). The effect of nutrition education (post-test score in nutrition knowledge) was estimated using least squares regression which adjusted for each subject's nutrition knowledge pretest score, the WIC site, and five other demographic variables (age, ethnicity, education level, trimester at enrollment, previous WIC certification).

The Demonstration/Research Sample

Two issues are of import here:

- Using randomization to create statistically equivalent treatment and control groups in terms of demographic characteristics.
- Ensuring that the demonstration enrolled sufficient numbers of study participants to justify studying the effects of the nutrition education interventions.

Analyses of five demographic variables (age, trimester at enrollment in WIC, race/ethnicity, education level, and prior WIC participation) found that the three treatment groups (innovative, traditional, control) were statistically equivalent across sites. The final analysis sample consisted of 1,926 prenatal WIC participants who were eligible for WIC benefits, were judged to have low-risk pregnancies, attended followup nutrition education, and completed the post-test. (Exhibit E.2 summarizes, by site, the final analysis sample.)

Exhibit E.2

Final Analysis Sample

Site	Treatment Group			
	Innovative	Traditional	Control	Total
1	98	96	117	311
2	85	85	109	279
3	60	60	101	221
4	62	77	100	239
5	194	182	259	635
6	67	60	114	241
All sites	566	560	800	1,926

A problem faced in all of the demonstration agencies was low attendance at both innovative and traditional nutrition education. To offset these attendance difficulties, WIC and study staff performed extra recruiting efforts, and some sites offered additional incentives so that attendance rates at followup nutrition education increased to 85 percent. For the research study, the educational interventions were implemented at a sufficiently high level to ensure the validity of assessing demonstration impacts.

Findings

The first question addressed by the demonstration was whether or not the educational interventions were successfully implemented in local WIC agencies. Information from the implementation study

indicates that local WIC was able to put the interventions in place but that implementation was difficult. Some of these difficulties, as noted below, affected findings from the research study.

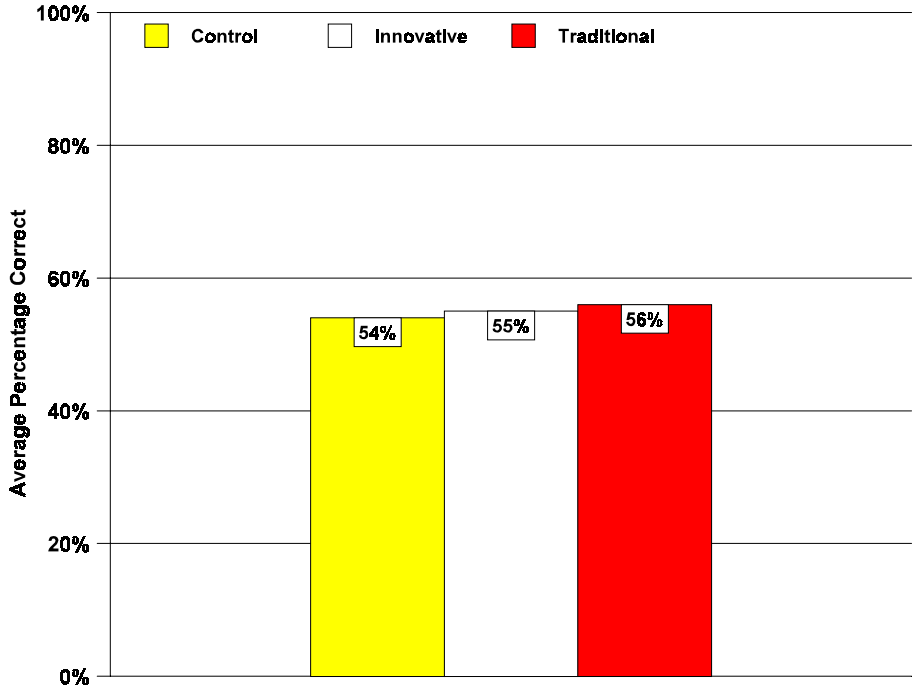
Finding 1. *Neither the innovative or traditional intervention increased nutrition knowledge among prenatal WIC participants.*

With one exception, post-test results indicated that there was no increase in nutrition knowledge among prenatal WIC clients who participated in the demonstration. In general, results were similar across types of interventions (innovative, traditional) and across nutrition topics. Moreover, control group test performance was equal to test results for innovative and traditional groups. (See Exhibit E.3.)

When adjusted mean post-test scores are compared across treatment groups, there is one significant finding. Women in the control group, who received no followup nutrition education, had an average

Exhibit E.3

Adjusted Mean Post-Test Total Score on Test of Nutrition Knowledge by Treatment Group



Note: *Indicates a significant difference between scores at the p ≤ .05 level.

post-test score of 54 percent, women in the traditional nutrition education group had an average post-test score of 55 percent, and the women in the innovative interventions (individual and group combined) had a mean post-test score of 56 percent. The difference between the innovative intervention group and the control group was statistically significant ($t = 2.36$, $p < .05$). However, the approximately two percentage point difference translates, on average, into only one additional correct test item for the innovative intervention group, which is probably not educationally significant. As noted above, there are no other significant between-group differences.

Several factors seem likely to have contributed to this finding.

- The content of the test did not necessarily correspond with the topics addressed by the nutrition education interventions. Questions on the test were based on a core content of nutrition knowledge considered essential to prenatal women and identified by a panel of experts convened by FNS. The interventions were developed separately and independently from the test. This lack of congruence between test questions and content of the interventions may at least partially explain participant test performance.

- Although nutrition education information was available to demonstration participants, it appears that many women did not avail themselves of these materials. Observation data suggest that women in the innovative individual education programs viewed only one or two modules of the five-module touch-screen video. Also, innovative group sessions often did not present all of the content in the instructional packages.

Finding 2. *Prior to attending nutrition education, demonstration participants possessed, on average, approximately 50 percent of nutrition knowledge covered by the knowledge test.*

Pretest results indicated that, prior to being certified for WIC benefits, demonstration participants correctly answered about half of the nutrition knowledge items on the test. It may be that limited time and resources are used to present and reinforce information already possessed by prenatal WIC participants while some areas go unaddressed. These issues particularly deserve consideration when we note that subjects previously certified for WIC did not achieve higher scores than first-time WIC participants.

Finding 3. *Until additional efforts were initiated, attendance at second contacts for WIC nutrition education was low across all demonstration sites.*

Participation in second contacts for nutrition education was low at all demonstration clinics. There is no requirement that WIC clients attend these second nutrition education contacts to receive benefits which may be a principal reason for the low participation rate. The availability of innovative nutrition education did not appear to increase attendance among prenatal WIC participants. In fact, in this study, WIC and research staff initiated extraordinary effort, using telephone and post card reminders, to increase attendance at nutrition education. Two demonstration sites employed monetary incentives to encourage attendance. Without these special efforts, it is unlikely that the demonstration would have achieved attendance levels of sufficient size for analysis.

Demonstration results also indicated that participation rates had no effect on nutrition knowledge. Participants at demonstration sites with high attendance at nutrition education did not score differently from individuals at sites with lower attendance.

Finding 4. *Innovative individual educational interventions were more difficult to implement than the group intervention chosen for this demonstration.*

Any form of individual nutrition education, including traditional one-to-one counseling, is difficult to implement, monitor, and maintain. Demonstration results suggested that individual nutrition education may require more planning and attention to implement as well as substantial resources to maintain and monitor participant learning. All of the demonstration sites using the touch-screen videos encountered considerable implementation and maintenance problems which may well have affected outcomes.

Chapter One

Overview of the WIC Nutrition Education Demonstration

The *WIC Nutrition Education Demonstration Study* was conducted by Abt Associates Inc. for the Food and Nutrition Service (FNS) of the US Department of Agriculture. The study evaluated the effectiveness of three innovative approaches to nutrition education in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Two of these educational innovations were directed toward prenatal women; the third focused on nutrition education for three-and-four-year-old WIC participants. This report describes the evaluation of the programs for prenatal women. A separate report describes the evaluation of the program for WIC children.

The WIC Program

WIC was established to counteract the negative effects of poor nutrition on the prenatal, postpartum, and pediatric health of low-income individuals. A combination of direct nutritional supplementation, nutrition education and counseling, and increased access to health care and social services is offered to pregnant, breastfeeding, and postpartum women; infants; and children up to the age of five years. Created in 1972 by an amendment to the Child Nutrition Act of 1966, WIC is administered by FNS.

To receive WIC benefits, an individual must meet four conditions. An applicant must be (1) a resident of the State in which s/he applies for WIC benefits; (2) categorically eligible (a pregnant woman, for example); (3) income eligible—most States set income limits as equal to or less than 185 percent of the federal poverty income guidelines; and (4) at nutritional risk. A competent professional authority (a registered nurse or a nutritionist, for example) assesses the medical or nutritional status of the WIC applicant to determine nutritional risk. WIC nutritional risks include such conditions as anemia, low weight for height, obesity, and inadequate nutrient intake.

Nutritional Supplementation. WIC provides supplemental foods that are good sources of the nutrients most likely to be lacking in the diet of low-income populations—protein, iron, calcium, and vitamins A and C. In most States, WIC clients receive WIC food instruments—vouchers or checks—with which they purchase specific food items at participating retail stores. The foods listed on these vouchers or checks meet the special additional nutritional requirements of pregnant and breastfeeding women; take

into account the developmental needs of infants; and provide the nutrients in recommended eating patterns for preschool children.

Access to Health and Social Services. The local WIC service provider also serves as a link between participants and appropriate health-care providers or systems. Each WIC agency is charged with assisting WIC participants to obtain and use preventive health-care services.

Nutrition Education and Counseling. Nutrition education plays a critical role in the WIC Program and is intended to influence participant nutrition- and health-related knowledge, attitudes, and behaviors. Federal WIC regulations require WIC service providers to offer participants at least two nutrition education sessions during each certification period. Certifications tend to occur every six months—with the exception of infants who may be certified for up to twelve months and prenatal women who may be certified for the duration of pregnancy. While WIC participants are not required to attend nutrition education, local service providers often schedule nutrition education to coincide with voucher or check issuance to encourage WIC clients to attend. Education on a variety of health and nutrition-related topics may be provided in individual counseling sessions, through group classes, or via films and videos. Whatever the delivery form, education must stress the relationship between proper nutrition and good health.

WIC Nutrition Education

Nutrition education is one of WIC's three primary benefits. In 1990, FNS issued regulations clarifying the objectives of WIC nutrition education.

- Nutrition education should stress the relationship between proper nutrition and good health with special emphasis on the nutritional needs of pregnant, postpartum, and breastfeeding women, infants, and children under five years of age.

- Nutrition education should assist the individual who is at nutritional risk in achieving a positive change in food habits, resulting in improved nutritional status and in the prevention of nutrition-related problems through optimal use of the supplemental foods and other nutritious foods.

Local agencies are required to make nutrition education available to all clients at no cost. The regulations establish the minimum number of nutrition education contacts that must be offered to participants but do not specify the form or the content of nutrition education. WIC service providers are

expected to consider the ethnic, cultural, and geographic preferences of participants, as well as their educational and environmental limitations, in determining appropriate nutrition education. Receipt of food vouchers or checks is not contingent upon attendance at nutrition education.

Previous Research on WIC Nutrition Education

Nutritional guidance for pregnant women is well-established as an essential part of prenatal care (AAP/ACOG, 1992; IOM, 1992). The broad goals of prenatal nutrition education are to achieve appropriate maternal weight gain, nutritional adequacy of maternal diet, and positive infant outcomes, such as satisfactory birthweight (Contento, *et al*., 1995). To improve maternal and infant health status in the United States, the Food and Nutrition Board of the Institute of Medicine (1990) recommends that all pregnant women receive basic nutrition services as part of their prenatal health care. In 1988, the IOM defined basic nutrition services as educational activities to promote adequate nutrition, early identification of nutrition-related risk factors, and interventions such as counseling, food or vitamin and mineral supplementation, and health-care referrals. WIC provides all of these services to low-income women who are at the highest risk of poor pregnancy outcomes (IOM, 1990).

FNS has completed a number of studies of WIC nutrition education. Some of these efforts have provided information on specific topics to State and local WIC agencies such as *A Study of Appropriate Methods of Drug Abuse Education for Use in the WIC Program* (USDA, 1990). Others have focused on program administration. *The Study of WIC Funds for Nutrition and Program Administration* (USDA, 1988) estimated the cost of providing nutrition education at local WIC agencies.

There has been limited examination of the effects of WIC nutrition education on participants. One FNS project, the *WIC Nutrition Education Assessment Study*, considered the impacts of WIC nutrition education. The study found that:

- Four of the six study sites experienced problems with attendance at nutrition education.
- At five of the six sites, most participants entered WIC with reasonably high levels of nutrition knowledge.
- Overall nutrition knowledge scores increased between initial and later surveys of these women. The project followed women from enrollment in WIC through their prenatal and postpartum periods.

- In five of the six study sites, overall nutrition knowledge scores at baseline for women who participated in WIC during a previous pregnancy were significantly higher than scores for women who had not previously participated.

Organization of This Report

Chapter Two presents the study design and objectives. Chapter Three describes development of the innovative nutrition education interventions and the test of nutrition knowledge that was used to measure the effectiveness of the interventions. Implementation of the demonstration is described in Chapter Four. Implementation problems and issues are the focus of Chapter Five. Chapter Six presents study results, and Chapter Seven discusses the implications of these findings.

Chapter Two

Study Design and Objectives

The *WIC Nutrition Education Demonstration Study* has three primary components:

- ***Development of Nutrition Education Interventions.*** Identifying a core content of nutrition education; developing a measure of nutrition knowledge about this core content; and developing curriculum modules on a subset of nutrition education topics and innovative methods of presenting this information to WIC participants.

- ***Demonstration.*** Implementing innovative methods of nutrition education at selected WIC sites.

- ***Research Study.*** Designing and conducting a study to assess the relative effectiveness of traditional and innovative WIC nutrition education interventions in increasing participant knowledge about nutrition. This study included developing of a measure to assess changes in nutrition knowledge.

This chapter provides an overview of these three study components. Subsequent chapters discuss each component in more detail. Chapter Three describes the development of the nutrition education interventions. Chapter Four describes implementation of the demonstration; Chapter Five describes the design of the research study and baseline characteristics of sites and subjects in the study; and Chapter Six presents the results of the research study.

Development of Nutrition Education Interventions

The first stage of the study involved developing or identifying innovative nutrition education interventions that (1) contained nutrition information appropriate for prenatal women; and (2) employed teaching methods that made the nutrition information accessible and interesting to WIC participants. It was hypothesized that such innovations would be more effective than the traditional nutrition counseling and group education methods currently used in WIC clinics. The process of developing the interventions followed these steps:

- Identifying fundamental nutrition information considered essential to prenatal women, using a panel of experts convened by FNS.

- Selecting a subset of topics from the core nutrition information, taking into account practical considerations such as amount of time available for nutrition education in local WIC agencies.

- Selecting strategies for effective transmission of the nutrition information to WIC participants.

- Developing a psychometrically sound measure to assess participant knowledge of the subset of nutrition topics.

Two innovative nutrition education interventions were adopted to teach pregnant WIC participants about pregnancy and nutrition. Two different interventions were needed—one for use in individual counseling and a second for group counseling—because both forms of counseling are currently used in the WIC Program and the innovative interventions needed to match these traditional educational forms. The innovative ***individual*** intervention used a touch-screen video system to present a five-module curriculum called *What To Eat When You're Pregnant.* This curriculum was based on a computer-assisted video developed by the Maine WIC Program. The innovative ***group*** intervention used a curriculum called *Eating for Two* developed by the Michigan WIC Program in cooperation with the United Dairy Council of Michigan. This curriculum was presented through "facilitated" group instruction, in which the nutritionist acted as a facilitator, not a lecturer, and in which the focus was on behavioral change rather than knowledge acquisition.

The Demonstration

The interventions were implemented in six WIC demonstration sites. Three sites implemented the individual nutrition education using the touch-screen video, and three other sites implemented the facilitated group intervention. FNS selected the demonstration sites and assigned them to individual or group nutrition education, matching each site's traditional mode of nutrition education for pregnant women with its demonstration intervention type. In each site, only low-risk prenatal participants were included in the demonstration because, at most local WIC agencies, high-risk clients are offered more intensive individual counseling.

FNS provided the demonstration sites with training and educational materials for the nutrition education interventions. The sites implementing the innovative individual intervention received the requisite computer hardware and software for the touch-screen program. For the sites using facilitated group counseling, WIC staff attended a two-day training on implementing the curriculum. The demonstration began in February 1996.

Implementation of the demonstration was documented through a process study conducted by Abt Associates Inc. Information on both traditional and innovative nutrition education was obtained from several sources: interviews with nutrition educators at the sites; on-site observation of nutrition education sessions; for the touch-screen video, computer logs included in the touch-screen software were also used to record the time participants spent viewing various segments of the video. Abt staff observed nutrition education at all sites, with observations beginning two to three months after the site had implemented its educational intervention to ensure that nutrition educators in local agencies were familiar with the innovative methodologies and that sessions were running smoothly. About forty observations were completed at each demonstration site. (Observation forms appear in Appendix A.) The process study provides information on the following characteristics of the demonstration implementation:

- Length of teaching sessions
- Type of nutrition educator
- Topics covered in the sessions
- Receipt of written materials by participants
- Staff/participant interactions
- Environmental factors (adequacy of space, privacy, lack of interruptions).

Information was collected to estimate the costs of providing innovative nutrition education. Staff activity recording forms were used to collect information on staff (or labor) costs, which were the basis for determining the cost components of implementing the interventions (development, staff training, and so on) and to compare the relative costs of the two types of intervention—individual or group counseling.

Exhibit 2.1 summarizes strategies that were used to document the implementation process.

Research Study

An experimental design was implemented in each of the six demonstration sites, in which prenatal WIC applicants were randomly assigned to one of three groups: the traditional group, who received the nutrition education already being provided at that site; the innovative group, who received one of the innovative WIC nutrition education models—individual counseling using the touch-screen video

Exhibit 2.1

Data Collection Strategies by Study Objective

Objective	Data Collection Strategy
Process Study	
Describe local agency implementation of demonstration	Review of published materials On-site observation of nutrition education counseling and classes, both innovative and traditional In-person interviews with WIC staff
Describe local agency characteristics	Review of published materials In-person interviews with WIC staff and administrators
Research Study (Impact Study)	
Describe characteristics of prenatal study subjects	Abstraction of information from automated client information systems
Determine participant knowledge about nutrition and pregnancy	In-person pretest using nutrition knowledge measure Telephone post-test using nutrition knowledge measure In-person post-test followup with non-responding participants
Estimate costs of innovative nutrition education	Review of budgets and other accounting forms Activity recording forms (ARFs) completed by local WIC staff with nutrition education responsibilities

or facilitated group counseling; or a control group who received nutrition education ***after*** the intervention period ended. This design is summarized in Exhibit 2.2.

The same procedures were used in all demonstration sites. Prenatal applicants who came to WIC to apply for benefits were immediately pretested on their nutrition knowledge before they were certified for WIC benefits or received any nutrition counseling. The measure used at pretest was the nutrition knowledge test developed to assess the core nutrition topics described in Chapter Three. Subsequent to the testing, each applicant who was certified then received traditional individual nutrition

Exhibit 2.2

Research Study Design

	Method of Nutrition Education Subsequent to Certification		
Demonstration Sites	**Traditional WIC Nutrition Education**	**Innovative WIC Nutrition Education**	**No WIC Nutrition Education**
Individual Sites (n=3)	One individual session	One touch-screen video session	No nutrition education during the intervention period
Group Sites (n=3)	One group session	One facilitated group instruction session	No nutrition education during the intervention period

counseling at the certification session. Every subject in the study, including the control subjects, received one individual nutrition education counseling session at this initial contact.

Each WIC participant was then scheduled for a subsequent (followup) nutrition education contact, which usually coincided with food voucher/check issuance and occurred four to eight weeks after certification. Depending on group assignment, the followup contact consisted of either the traditional nutrition counseling provided at that site, followed by a post-test; the innovative counseling method at that site, followed by a post-test; or, in the case of a control subject, the post-test, followed by nutrition education.

The strength of an experimental study lies in the randomization of subjects which provides us with groups that, except for the intervention, can be assumed to be statistically equivalent in all other respects.[1] Applying this methodology means that, in the current study, any differences in nutrition knowledge between and among the study subjects who received traditional post-certification counseling, innovative post-certification counseling, or no post-certification counseling can be attributed to the educational intervention. The research questions addressed by the experimental study are:

- Did subjects who received followup nutrition education (traditional and innovative education groups combined) have more or less nutrition knowledge (as reflected by their test scores on a reliable and valid measure) than the subjects in the control group who did not have followup nutrition education prior to testing?

[1] This design is a classic true experimental design as described by Campbell and Stanley (1966), the most strongly recommended design for detecting an intervention effect.

- Did subjects in the innovative nutrition education group have more or less nutrition knowledge than subjects in the traditional education group?
- Did subjects in the innovative nutrition education group have more or less nutrition knowledge than subjects in the control group?
- Did subjects in the traditional nutrition education group have more or less nutrition knowledge than subjects in the control group?

Sample of Participants in the Research Study. In each of the demonstration sites, the sample of WIC participants was recruited from all prenatal applicants within a specified time period. High-risk applicants were excluded from the study. The final sample consisted of 1,926 women who were pregnant, were judged to have low-risk pregnancies, were eligible for WIC benefits, attended followup nutrition education, and completed the post-test. The distribution of the sample by site and treatment group is shown below in Exhibit 2.3.

Exhibit 2.3

Final Analysis Sample

Site	Treatment Group			
	Innovative	Traditional	Control	Total
1	98	96	117	311
2	85	85	109	279
3	60	60	101	221
4	62	77	100	239
5	194	182	259	635
6	67	60	114	241
All sites	566	560	800	1,926

Analysis. The study consists of a repeated-measures design with two timepoints (pretest and post-test) and three groups (traditional, innovative, and control). The effect of nutrition education was estimated using an ordinary least squares regression which predicted the outcome (post-test score on nutrition knowledge) adjusted for each subject's pretest nutrition knowledge score, the WIC site, and five other demographic variables, including age, ethnicity, education level, trimester at enrollment, previous WIC certification. Even though the treatment groups were randomly constructed, including covariates in the analyses provides statistical controls to compensate for any initial differences between groups that occurred by chance. Using a covariate model allows us to increase the precision of the estimate of impact by reducing some of the observed variance in the outcome variable. Chapter Six provides a more detailed description of analytic methods.

Chapter Three

Nutrition Education Interventions

There were two steps in designing the innovative nutrition education interventions. The first was to identify specific nutritional concepts considered essential for pregnant women to understand. The second was to select alternative approaches for transmitting this core information. It was hypothesized that these alternate methods would be more effective than traditional WIC nutrition counseling.

Specifying Core Nutrition Concepts

Specific nutritional concepts were identified by a review group including FNS staff, Abt staff, and several technical consultants.[1] The topics were determined based on a review of nutrition education materials from local WIC agencies participating in the demonstration and of other published materials used for prenatal education in WIC and in other health-care settings. The primary objective was to define the broad scope of appropriate knowledge for prenatal women. However, for practical reasons,[2] the review group recommended, and FNS approved, limiting the focus of the nutrition education, for both innovative and traditional nutrition education, to a common core of nutrition information on the topic of ***pregnancy and nutrition.*** This topic is addressed in five components which incorporated facts women need to make healthy nutritional choices during pregnancy. All of the core information was available in most local WIC clinics in an FNS brochure entitled *How WIC Helps: Eating for You and Your Baby*. Each of the five components is outlined below.

1. Food Guide Pyramid

The Food Guide Pyramid gives individuals the information they need to select healthy diets that include a variety of foods. The pyramid divides foods into five major groups: grains, vegetables, fruits, milk, and meat. The food pyramid illustrates the need for variety and moderation. Individuals should eat more servings of the food groups that are pictured at the base of the food pyramid (grains, vegetables, and

[1]The technical review group included: Jeffrey Wilde, Janet Tognetti Schiller, and J.P. Passino from the Food and Nutrition Service, USDA; Laura Sims from the University of Maryland at College Park; Jeannie McKenzie from Pennsylvania State University; and David Connell, Jenny Golay, Mary Kay Fox, Michael Puma, and Bonnie Randall from Abt Associates Inc.

[2]For example, most local WIC agencies had very short time periods (ten to thirty minutes) available for any type of nutrition education.

fruits). Likewise, most Americans need to eat fewer servings of the foods that are shown in the small space at the top of the pyramid (fats, oils, and sweets).

2. Diet for Pregnancy

While the Food Guide Pyramid is useful as a general guide for choosing a healthy diet, pregnant WIC participants need more detailed information on daily dietary needs. Types and amounts of food recommended for pregnant women on a daily basis are shown in Exhibit 3.1.

3. Food Choices: Everyday Versus Sometimes Foods

To avoid excessive weight gain and to obtain the necessary vitamins, minerals, and protein for a healthy pregnancy, it is best to avoid high calorie foods that are low in nutrients. Foods that contain a lot of fat, sugar, or both are often high in calories and low in other nutrients. It is best to eat these foods *sometimes* rather than every day. *Sometimes* foods include candy, cakes, cookies, other rich desserts, soda, and fried foods. *Everyday* foods are rich in nutrients but generally low or moderate in sugar and fat. *Everyday* foods that can and should be eaten daily include: low-fat dairy products; lean meats, poultry, and fish, legumes, nuts, or eggs; fruits and juices; vegetables; whole grain breads, cereals, pasta, and rice.

4. Nutrients for Healthy Mother and Baby

Key nutrients during pregnancy include: protein, iron, calcium, folic acid, vitamins A and C. Calorie intake is also important to promote appropriate weight gain. One logical—and useful—extension of the food-pyramid-food-choice discussion is explaining the value of the recommended foods for both the mother-to-be and the infant. See Exhibit 3.2.

5. Nutrients in WIC Foods

WIC's mission can be reinforced by highlighting the value of WIC foods to the prenatal client and her unborn infant, as show in the list below.

Calories	All WIC foods
Protein	Milk, cheese, eggs, peanut butter, legumes
Iron	WIC cereals, legumes, peanut butter, egg yolks
Calcium	Milk, cheese
Vitamin C	WIC juices

Exhibit 3.1

Recommended Diet for Pregnancy

Food Groups		Amount of Serving
Meat Group (protein foods)		**2-3 servings**
1 serving	=	3 oz. lean meat, fish, poultry***
		2 eggs
		1 cup cooked dried peas, beans, lentils***
		½ cup nuts and seeds
		4 Tbsp. peanut butter***
		5 oz. tofu (soybean curd)
Milk Group		**3 servings**
1 serving	=	1 cup (8 oz.) milk
		1 cup yogurt
		1-1 ½ oz. cheese
		2 cups cottage cheese
		½ cup ice cream
Bread Group (Cereals, grains)		**9 servings whole grain or enriched products**
1 serving	=	1 slice bread
		½ cup cooked cereal, rice, macaroni, spaghetti, noodles (WIC cereals***)
		3/4 cup ready-to-eat cereal (cold)
		½ roll, bun, bagel, English muffin
		1 medium pancake
		1 tortilla (corn or flour)
		3-4 crackers
Vegetable Group		**4 servings**
1 serving	=	½ cup bok choy, Swiss chard**
		1 stalk broccoli* **
		½ cup cabbage*
		½ cup carrots**
		½ med. pepper*
		1 med. baked potato*
		1 small sweet potato**
		½ cup winter squash**
		1 med. tomato* **
		1 cup tomato juice**
Fruit Group		**3 servings**
1 serving	=	1 med. apple
		½ cup applesauce
		1 small or ½ med. banana
		½ medium cantaloupe* **
		½ cup grapes
		½ grapefruit*
		1 med. orange*
		½ cup orange or grapefruit juice*
		1 cup papaya* **
		½ cup strawberries*

* Vitamin C-rich food. Need one or more daily.
** Vitamin A-rich food. Need one daily.
*** Iron-rich food. Need two or more daily. The iron in non-meat foods is absorbed much better when a Vitamin C food is eaten with it.

Exhibit 3.2

Nutrients for Healthy Mother and Baby

Calories. Pregnant women need additional calories (energy) for the growth of the baby and growth in the mom during a healthy pregnancy (breasts, uterus, increased tissue, extra blood).

Protein. During the prenatal period, women need protein for the growth of the baby's body and also for the enlarged blood supply of the mom. Food sources: meat group, milk group.

Iron. The pregnant woman needs iron for her extra blood supply and for the baby's blood supply. The fetus stores iron that is drawn upon after the baby is born. Food sources: pork, liver, other lean meat, poultry, fish, WIC and other iron-fortified cereals, dried beans and peas, dark green leafy vegetables, peanut butter.

Calcium. Both mother and baby need calcium to maintain healthy bones in mom and to develop healthy bones and teeth in the infant. Calcium will be drawn from the mother's bones for the baby's growing bones if calcium is lacking in the pregnant woman's diet. Food sources: milk group, large servings of dark green leafy vegetables, some tofu.

Folic acid. Folic acid is needed to create an extra supply of blood in the mother to ensure the baby's growth (used in DNA and RNA synthesis). It also helps protect against birth defects of the spinal cord and brain. Food sources: oranges, orange juice, pineapple juice, fortified cereals, dark green leafy vegetables, liver, yeast.

Vitamin A. A pregnant woman needs Vitamin A to maintain healthy skin and eyes. The infant needs Vitamin A to develop healthy tissues. Food sources: yellow and orange fruits and vegetables (carrots, sweet potatoes, winter squash, cantaloupe, mango), spinach and liver.

Vitamin C. The pregnant woman needs Vitamin C to maintain healthy gums and to aid iron absorption. Food sources: citrus fruits and juices, strawberries, cantaloupe, papaya, mango, broccoli, cabbage, baked potatoes, peppers.

Nutrition Education Interventions

Two innovative nutrition education interventions were selected by FNS for this demonstration, one appropriate for individually administered nutrition education and a second for group nutrition education. A touch-screen (computer-assisted) educational video on *What To Eat When You're Pregnant* was chosen for the individual intervention; *Eating for Two,* an existing facilitated discussion curriculum, was selected for the innovative group intervention. Local agencies participating in the demonstration

implemented one of these two innovative interventions, matched to the format in which they were providing traditional nutrition education prior to the demonstration. In addition, each agency continued to offer traditional nutrition education in the form of one-to-one counseling or group sessions.

The Innovative Individual Intervention

With guidance from FNS, the New England Technology Group (NETG) created a touch-screen educational program on pregnancy and nutrition. A computer-assisted video developed by the Maine WIC Program served as a starting point for this effort. The touchscreen video module, *What to Eat When You're Pregnant*, included thirteen segments in five modules: introduction, about three main topics: healthy eating, weight gain, common discomforts of pregnancy, and summary.[3]

The touch-screen program was housed in an enclosed box with a computer screen that could be comfortably viewed by three or four individuals. Hardware for the program included a 486 IBM-compatible computer, a color monitor (touch-screen), and a laser disc player. Grants from FNS to demonstration sites provided resources to purchase the equipment.

Touch-screen users initially accessed the *What to Eat When You're Pregnant* module by touching "buttons" arrayed in menus on the screen. Using this same technique, women could move between different segments, enter responses during interactive segments, and terminate the touch-screen session when finished. At the conclusion of a segment, the program user could choose to view other segments within the same module or to end that module and switch to a different one. The complete *What to Eat When You're Pregnant* module lasted about twenty-one minutes and included five interactive segments. For example, in the Healthy Eating segment, the participant could enter the previous day's food intake in terms of the five major food groups. Then, the Food Group Summary segment summarized the number of servings the woman received during the day for each food group and compared her intake with the Food Guide Pyramid's recommendations for pregnant women. The length of time spent on the interactive segments and the food summary segment could vary considerably, depending on the amount of time participants thought about their responses and/or the number and types of foods entered into the

[3]An existing *Breastfeeding* module, developed and used by the Maine WIC Program, was also installed into the touch-screen program but was not part of the post-testing. The *Breastfeeding* module contained information on three topics: checking for flat or inverted nipples, changes in the body during breastfeeding, and obtaining support for breastfeeding. Because this module was dropped from the post-testing, it is not discussed further in this report.

food group segments. Exhibit 3.3 summarizes information on topics, segment length, and interactive capabilities for the touch-screen video.

NETG also included an evaluation tool, the user log, in the touch-screen software. The user log recorded the amount of time each user spent on various segments of both modules. The user log recorded total time spent in each touch-screen segment in one of two ways: when the participant touched the "button" indicating she was finished with the segment or, if the woman did not sign off, an automatic "timeout" for the segment was provided by the user log after the screen was not touched for forty-five seconds. A potential source of error in the recording of time spent on each segment was that, if the screen was touched in any place before forty-five seconds elapsed, even by a child or a passerby, the timeout period began again. Because of this method of recording timeouts, the length of time recorded in the user log for program users who had timeouts sometimes exceeded the actual running time of the segment.

The Innovative Group Intervention

For the innovative group intervention, FNS selected an existing facilitated learning innovation—the Michigan WIC curriculum, *Eating for Two*. This curriculum was developed by the Michigan WIC Program in cooperation with the United Dairy Council of Michigan. Nutritionists from the demonstration sites attended a two-day training on implementing this intervention. FNS also provided sites with all requisite materials such as food models and handouts.

The *Eating for Two* training emphasized "facilitation," not content, and focused on changing behavior rather than on acquiring knowledge. The nutritionist acted as a facilitator, not a lecturer, who introduced concepts and encouraged participants to determine the direction of the group discussion.

The method of instruction superseded content, so topics of discussion and the length of the session varied among groups, depending on the interests of participants. To promote discussion, the facilitator focused on issues raised during discussion and redirected questions instead of giving closed-ended answers. Group members focused on "how" to change their diets, rather than on "why" diets should be changed.

Exhibit 3.3

Selected Characteristics of *What to Eat When You're Pregnant* Modules

Segment	Average Length[1] (minutes:seconds)	Interactive	Timed on User Log
What to Eat When You're Pregnant introduction	1:30	No	No[2]
Healthy eating introduction	1:50	No	No[2]
Breads	2:57	Yes	Yes
Vegetables	2:00	Yes	Yes
Fruits	1:38	Yes	Yes
Milk	2:00	Yes	Yes
Meat	1:50	Yes	Yes
Food group summary	0:25	No	Yes
Weight gain	2:35	No	Yes
Common discomforts of pregnancy introduction	0:30	No	No[2]
Nausea and vomiting	1:30	No	Yes
Constipation	1:35	No	Yes
What to Eat When You're Pregnant summary	0:35	No	Yes
Total	18:15		

[1] Abt staff conducted multiple timings of the touch-screen program to obtain segment times. The length of interactive segments may vary considerably depending on such factors as how long participants think about their responses and the number and types of foods entered into the five food group segments.

[2] Except for the food group summary, the user log did not record times spent on introductory or summary segments.

The concepts introduced in *Eating for Two* included the five food groups, daily servings recommended for each food group, portion sizes, and ways to assess the contributions of combination and "other" foods. Each group participant recorded food intake for the previous day and was then expected to:

- Identify at least one of her current strengths (food choices that helped her meet basic nutritional recommendations for pregnancy).
- Identify at least one food that she was willing to change to bring her overall diet closer to the recommendations for pregnancy.

The goal of the *Eating for Two* curriculum was to assist WIC participants in selecting foods that contribute to healthy, nutritionally balanced diets during pregnancy.

Traditional Nutrition Education

Each of the demonstration sites continued to provide traditional nutrition education, in either individual or group sessions. Information on the content of this nutrition education and the ways in which it was provided to participants was obtained through telephone interviews with nutrition educators, in-person interviews during site visits, and review of written materials provided by the demonstration agencies. All of the sites provided information on the basic food groups, nutrients in different types of food, and diet during pregnancy. Four of the sites offered one-to-one individual counseling at certification and at followup sessions. Two sites provided individual counseling at certification and group sessions at followup nutrition education. Staff at these sites reported using videos at many prenatal classes. All of the local agencies distributed print materials (brochures and flyers) to prenatal WIC participants.

Chapter Four

Implementing the Demonstration

A primary objective of the demonstration was assessing the feasibility of the two innovative nutrition education interventions—that is, answering the question of how well the interventions worked in WIC clinics. This information is critical for future decisions about implementing these interventions on a larger scale, should they be shown to be effective. A second objective was assessing whether or not the implementation of the two interventions was of sufficient strength to support an impact evaluation. That is, were the interventions successfully delivered to sufficient numbers of study participants to justify studying their effects? The answer to this question is critical for the research study because ineffective implementation of the interventions challenges the validity of examining impacts.

For the demonstration, six WIC agencies were selected by FNS to test the innovative interventions. The implementation study was conducted in these sites to answer questions about the feasibility of the interventions in the field and to ensure that the level of participation was adequate for the research study to consider impacts of the two interventions. This chapter describes implementation of the demonstration, beginning with information on the six demonstration sites. Succeeding sections describe demonstration participants and procedures for carrying out the demonstration. The final section discusses issues that arose during implementation and their ramifications for the impact study.

The Demonstration Sites

The six demonstration sites were selected and recruited by FNS. The primary selection criterion involved caseload. A large caseload was essential in order to recruit sufficient numbers of respondents to participate in the demonstration (and the research study) in a reasonably short period of time, to limit burden on local WIC agencies, and to conserve study resources. In addition to caseload size, the sites were selected to vary in terms of location (region, urbanicity) and type of nutrition education offered to WIC participants.

Exhibit 4.1 shows the characteristics of the demonstration sites. With the exception of Site 6, all sites had relatively large caseloads. (Most local WIC agencies serve fewer than 5,000 participants.) The sites are located in four States; four sites are located in urban areas, and three are in rural areas. All of the local agencies in the demonstration were sponsored by district, county, or community health agencies

Exhibit 4.1

Characteristics of Individual Demonstration Sites

	Site 1	Site 2	Site 3
FNS region	Northeast	Northeast	Southeast
Urban/rural	Urban	Rural	3 urban, 1 military base
Number of clinics in demonstration	3	2	4
Total caseload[1]	29,900	11,000	21,200
Total prenatal caseload[2]	3,080	1,170	2,470
Mode of followup nutrition education	Individual	Individual	Individual

	Site 4	Site 5	Site 6
FNS region	Southeast	Mountain Plains	Southeast
Urban/rural	Rural	Urban	2 urban, 1 military base
Number of clinics in demonstration	2	6	3
Total caseload[1]	10,600	8,700	3,000
Total prenatal caseload[2]	1,420	1,350	350
Mode of followup nutrition education	High-risk: Individual and group Low-risk: Group	High-risk: Individual and group Low-risk: Group	High-risk and low-risk (traditional): Individual High-risk (innovative): Individual and group Low-risk (innovative): Group

[1]Total caseloads were obtained from the *1994 Study of WIC Participant and Program Characteristics (PC94)*. Caseloads are reported at the local agency level.

[2]Prenatal caseloads are reported at the local agency level

and were co-located with various health services, usually prenatal and well-baby clinics. In terms of their approach to nutrition education, four sites offered individual counseling for all nutrition education contacts. The other two sites individually counseled WIC prenatal clients at certification and provided group education at followup sessions. A brief summary of each of the demonstration sites follows.

- Site 1 was located in two cities in a State in FNS' Northeast region. With a total caseload of nearly 29,900 WIC participants and a prenatal caseload of about 3,000 women, this site had the largest total caseload of any demonstration site. Three service delivery clinics participated in the demonstration. Nutrition education was provided through individual counseling both at certification and at followup.

- Site 2 was a rural local WIC agency located in the same northeastern State. This site was medium-sized with a total caseload of 11,000 WIC participants including about 1,200 prenatal women. Two service delivery clinics took part in the demonstration. Nutrition education at both prenatal certification and followup contacts was provided in individual counseling sessions.

- Site 3 was a large urban agency in the Southeast region. Four urban clinics participated in the demonstration. This site was the second largest of the demonstration sites, with a total caseload of 21,000 participants, about 2,500 of whom were prenatal women. Individual counseling was used for both prenatal certification and at followup.

- Site 4 was a rural agency in the same southeastern State. Two service delivery clinics were included in the demonstration. This agency had a WIC caseload of 10,600 participants of which 1,400 were prenatal women. At certification, staff provided individual nutrition education to pregnant women. For followup nutrition education, women designated as high-risk received in-depth individual counseling and also attended classes. Women who were not high-risk attended classes but did not receive individual counseling.

- Site 5, located in the Mountain-Plains region, had six clinics in the demonstration. The caseload was at the lower end of the spectrum for demonstration sites, with total participation of 8,700; 1,350 were pregnant women. Individual counseling was provided at prenatal certification; brief individual sessions were offered at followup contacts for women designated as high-risk. Both high-risk and low-risk prenatal participants attended group sessions for secondary nutrition education.

- Site 6, in the Southeast region, had three service delivery sites—two clinics located in small cities and one on a military base. Site 6 differed from the other demonstration sites. First, the site entered the demonstration several months after the study officially began. Second, it had the smallest caseload of any of the demonstration sites, serving approximately 3,000 WIC participants including 350 pregnant women.[1] Third, the nutrition education model for the demonstration was a hybrid. Prenatal WIC clients were individually counseled at certification and followup appointments. However, the innovative model for the demonstration at this site was group education. The local WIC agency hoped to increase participant attendance at secondary nutrition education sessions by introducing facilitated discussion groups. The site had very low attendance at followup appointments because these

[1]Caseload information for Site 6 was provided by staff in the State public health district.

appointments were not linked with food instrument issuance. The statewide food distribution system required participants to pick up WIC foods at distribution warehouses. Food acquisition appointments were entirely separate from followup nutrition education.

Characteristics of Demonstration Participants at Enrollment

Demographic information on study subjects was obtained from WIC agency records. Site-specific application or certification forms were photocopied and submitted with pretests. Information was collected on age, trimester of pregnancy, race/ethnicity, level of education, migrant status, and prior WIC participation.[2]

Exhibit 4.2 presents the demographic data obtained for respondents in the final analysis sample. Appendix B contains information for each of the six demonstration sites. Overall, the sample had the characteristics described below.

Age. The average age in the sample was 23 years. The majority of study participants were between 18 and 34 years old (80 percent). About 11 percent of the sample was between 15 and 17 years, and 5 percent was over 35 years of age. Less than 1 percent of the sample was under 15 years of age. The age distributions were very similar across the sites.

Trimester at Enrollment. About 40 percent of the women were in their first trimester at the time of enrollment, and 38 percent were in their second trimester. The majority of women in the demonstration had at least three months of their pregnancy remaining, and it is reasonable to assume that information on pregnancy and nutrition would be relevant to them.

There was considerable variation across sites in trimester at enrollment. The percentage of first trimester women ranged from 26 percent at Site 1 to 57 percent at Site 3; the range for second trimester was 22 percent at Site 3 to 51 percent at Site 1; and the third trimester percentage ranged from 7 percent at Site 4 to 27 percent at Site 5.

[2]Demographic information indicated only one woman could be classified as 'migrant,'so these data are not reported.

Exhibit 4.2

Percentage of Study Subjects by Characteristic and Treatment Type

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	8	1%	3	1%	0	0%	11	1%
15 - 17 years	69	12	60	11	89	11	218	11
18 - 34 years	445	79	459	82	645	81	1,549	80
35 or more years	29	5	23	4	41	5	93	5
Missing	15	3	15	3	25	3	55	3
Trimester at enrollment								
First trimester	220	39%	229	41%	317	40%	766	40%
Second trimester	221	39	208	37	301	38	730	38
Third trimester	91	16	93	17	137	17	321	17
Missing	34	6	30	5	45	6	109	6

Exhibit 4.2 (continued)

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
White (non-Hispanic)	308	54%	317	57%	433	54%	1,058	55%
Black (non-Hispanic)	193	34	187	33	268	34	648	34
Hispanic	42	7	39	7	52	7	133	7
American Indian or Alaskan Native	5	1	2	0	2	0	9	1
Asian or Pacific Islander	8	1	5	1	17	2	30	2
Missing	10	2	10	2	28	4	48	3
Education level completed								
< Elementary	2	0%	0	0%	0	0%	2	0%
Elementary	10	2	5	1	11	1	26	1
Middle	202	36	189	34	270	34	661	34
High	298	53	308	55	450	56	1,056	55
College	7	1	14	3	12	2	33	2
Graduate	0	0	0	0	0	0	0	0
Missing	47	8	44	8	57	7	148	8

Exhibit 4.2 (continued)

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	1	0%	0	0%	0	0%	1	0%
No	543	96	536	96	769	96	1,848	96
Missing	22	4	24	4	31	4	77	4
First WIC Certification								
Yes	519	92	507	90	714	89	1,740	90
No	47	8	53	10	86	12	186	10
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women[a]	566	100	560	100	800	100	1,926	100

[a] Based on the sample of 1,926 WIC participants who participated fully in the demonstration (completed pretest, followup nutrition education session, and post-test)

Race/Ethnicity. The majority of the study sample was white (55 percent). African-Americans accounted for 34 percent and Hispanics 7 percent of the sample. Less than 1 percent were American Indian/Alaskan Native, and less than 2 percent were Asian/Pacific Islander. Site variation for race/ethnicity reflected local populations.

Education Level. About 55 percent of the women in the sample had completed high school; over 34 percent completed middle school. Less than 2 percent of the women completed college; 1 percent reported the highest level as elementary; less than 1 percent reported never attending school.

There were small site differences in average level of education. At all sites, more than half the women attended high school. Site 2 reported slightly more women attended college. Sites 4 and 5 reported more women completing middle school as the highest level of education compared with the all-site average, and Sites 4 and 6 reported more women completing only elementary school, perhaps reflecting the rural nature of these sites.

Prior WIC Participation. The majority of WIC participants sampled for this demonstration (90 percent) were first-time WIC participants. This percentage is higher than the FNS estimate of 75 percent of prenatal WIC women as first-time participants. Because most demonstration respondents were first-time WIC participants, the study population was not the representative mix we would expect to observe in the WIC Program.

There was variation across sites. Information from Site 4 indicated that only 1 percent of demonstration respondents had previously participated in WIC. Sites 1 and 2 reported 5 percent and 4 percent returners respectively. Sites 5 and 6 more closely matched national proportions: Site 5 had 14 percent returning to WIC and Site 6 had 21 percent.

Treatment Group Differences. Analyses were conducted to test whether or not the randomization successfully produced treatment groups who were statistically equivalent on the baseline demographic characteristics. Within each site, analyses compared subjects in the Innovative, Traditional, and Control groups on the five baseline characteristics.[3] Of the thirty tests comparing treatment and control groups

[3]The variables tested were age, education, race, trimester, and first-WIC certification.

in each site on the five demographic characteristics, only one was statistically significant at the .05 level, indicating that for one characteristic at one site the proportions were not the same across treatment types.[4] Because we would expect one test to yield significance by chance (.05x30 = 1.5 expected by chance), we feel confident in reporting that randomization resulted in statistically equivalent treatment and control groups in terms of demographic characteristics.

Demonstration Procedures

Similar recruitment procedures were followed at each of the WIC service clinics operated by the demonstration agencies. At each site, study subjects were recruited at their certification appointments. Most agencies required clients to sign in prior to their appointments so that recruiting began after sign-in.[5] The study design did not include capturing data on refusals.

Exhibit 4.3 is a graphic presentation of the flow of participants through the demonstration. Steps are summarized below.

- Participants were recruited on-site after signing in with WIC. They were randomly assigned to one of three groups: Innovative (I), Traditional (T), Control (C).[6] This information was given to WIC staff who scheduled secondary (followup) nutrition education sessions.[7]

- All study subjects completed a pretest of nutrition knowledge administered by field staff on-site ***prior*** to their WIC certification and ***prior*** to receiving any nutrition education. Clinics provided private spaces in which respondents were tested. Field interviewers, hired by Abt Associates, read the questions to applicants and recorded answers on paper questionnaires.

[4]This single test between group and education was significant in Site 4 ($t = 8.24$, $p < .01$).

[5]If a woman could not understand the data collector's initial explanation of the study, she was not recruited despite her WIC eligibility. The demonstration innovations were developed only in English-language versions.

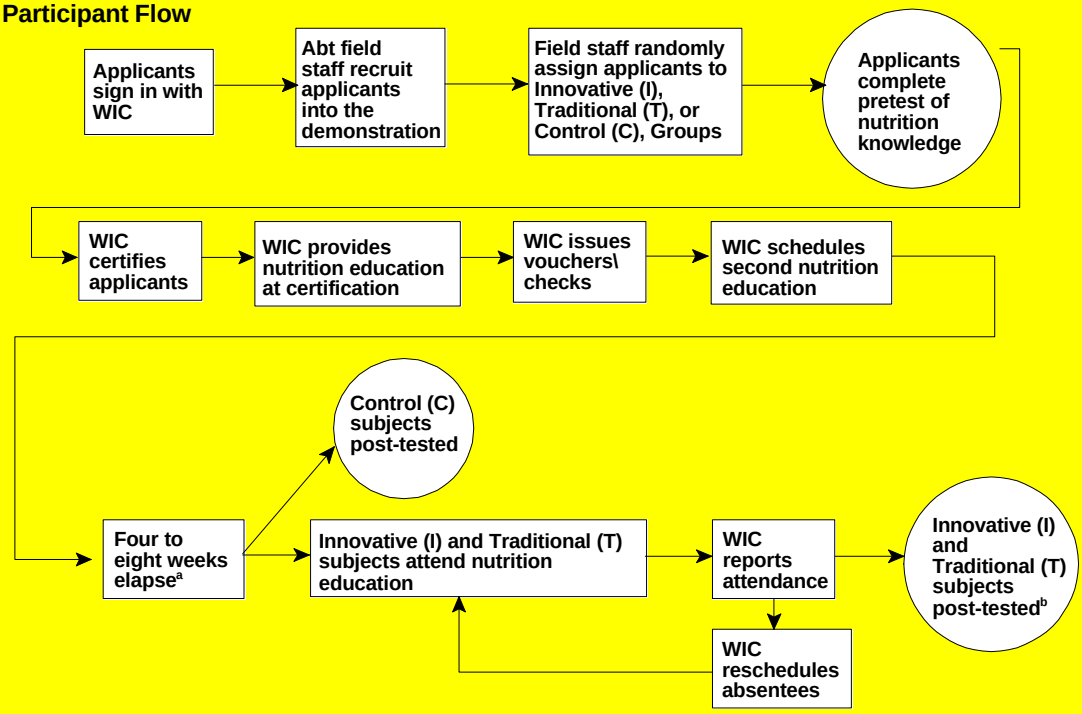
[6]The computerized random-assignment program, on laptop computers, also instructed data collectors to administer one of two test forms: Form A or Form B. Administration of the two test forms is described in Chapter Five.

[7]These appointments coincided with food instrument issuance. Group nutrition education scheduling was more complicated than scheduling individual sessions. During the demonstration, innovative and traditional nutrition education classes were offered on different days of the week, and at different times on those days, to avoid crossovers and to ensure that timing of instruction did not affect acquisition of information. No such differences were observed during the demonstration, and virtually no crossovers occurred.

- WIC staff certified applicants and provided nutrition education in the form of one-to-one counseling. This contact often involved a discussion of the WIC food package, breastfeeding, and any other individual issues that arose.

Exhibit 4.3

Participant Flow



[a] In many instances, women did not attend their originally scheduled nutrition education sessions. They were rescheduled—often two or three times—so that, on numerous occasions, there were more than eight weeks between certification and attendance at nutrition education.

[b] Demonstration clinics reported attendance to Abt's Survey Operations Center. The one-week time frame could be maintained only when attendance was reported in a timely fasion

- WIC staff then issued vouchers or checks and scheduled followup nutrition education contacts.

- After approximately four to eight weeks, participants in the Control group were post-tested by telephone prior to their attendance at scheduled followup nutrition education sessions. Telephone interviewers, using computer-assisted telephone interviewing (CATI), administered post-tests to respondents and recorded answers in the computerized system.

- At this same point in time, women in the Innovative and Traditional groups attended their followup nutrition education sessions. WIC clinics monitored attendance at these followup sessions and attempted to reschedule absentees. Attendance was reported on a form developed for the demonstration. These forms were faxed to Abt's Survey Operations Center so that post-test interviews could be scheduled.

- Innovative and Traditional subjects were post-tested by telephone within one week of confirmation of their attendance at nutrition education. Demonstration clinics were responsible for reporting attendance. If clinics did not provide information within the one-week window, post-tests did not occur within one week of attendance at nutrition education.

- When sample members could not be contacted by telephone after repeated efforts, field-based data collectors attempted to locate and post-test these individuals. These interviews were conducted in respondent homes, in WIC clinics, and by telephone. Field interviewers recorded respondent answers on paper questionnaires.

Effectiveness of the Demonstration

The first question addressed by the demonstration was whether or not the educational interventions were successfully implemented in local WIC agencies. Were the sites able to put the interventions into place and, if so, did WIC participants "take up" the interventions—that is, did they attend followup nutrition education sessions? Based on information collected during the implementation study, it appears that the interventions were not easily implemented in the field. First, for the touch-screen video, a number of logistical problems resulted in incomplete nutrition education sessions for some participants. Second, at all demonstration sites, both interventions faced problems of low attendance at followup appointments. To counteract these difficulties, WIC and research study staff initiated extra recruiting efforts, and some sites offered additional incentives to WIC participants, with the result that attendance rates at followup nutrition education increased to 86 percent. For the purposes of the research study, the interventions were implemented at a sufficiently high level to ensure the validity of assessing demonstration impacts.

Attendance at Followup Nutrition Education

Of the 1,730 WIC participants who were assigned to one of the two treatment groups, certified as eligible for WIC, and given appointments for followup nutrition education, 1,485 (86 percent) ultimately attended their followup sessions. This response rate was similar across the two treatment groups—86 percent of the women assigned to innovative interventions attended followup sessions compared with 85 percent of the women in the traditional group. These response rates were achieved only by applying substantial extra efforts by WIC and research staff any by offering incentives to WIC clients. Without these additional efforts, the percentages of women attending their scheduled followup nutrition education

was 54 percent for innovative women and 43 percent for traditional women. (Exhibit 5.1, in the next chapter, provides more information on attrition during the demonstration.)

As it became clear that women were not attending their followup appointments and that the attendance rates were considerably lower than the rates reported by local agencies during the design of this study, site and Abt staff instituted a number of recruiting strategies. These staff made reminder telephone calls and sent reminder postcards to ensure that women attended their followup nutrition education appointments. Both local agency and data collection staff expended considerable effort on telephone and post-card reminders to prenatal clients often making multiple contacts with individuals. Midway through the data collection period, incentives ($20 gift certificates) were offered to prenatal WIC clients, particularly in two of the sites. Further, with assistance from local WIC staff, Abt data collectors successfully located many prenatal clients who moved or changed telephone numbers.[8] Nonetheless, some women did not attend their scheduled, and often rescheduled, nutrition education sessions despite numerous reminders.

In this sense, the demonstration has to be considered less successful because out-of-the ordinary efforts had to be expended to convince women to participate in followup nutrition education. Also, the fact that sites instituted *differential* additional recruiting strategies is problematic for the cross-site analyses. There is some evidence that the different recruiting strategies had differential effectiveness: the two sites providing monetary incentives had the highest attendance rates. (Site-specific data on final attendance rates appear in Appendix C.) Sites may have served different types of respondents in the followup nutrition education sessions. That is, the sites offering incentives may have retained in their samples the harder-to-reach participants. The sites can no longer be considered to have followed identical procedures.

Delivery of Nutrition Education

In judging the effectiveness of implementation of the demonstration, it is also important to examine, for participants who attended nutrition education, whether or not the curricula were delivered as expected. Experiences with each of the nutrition education methods—the two innovative interventions (individual and group) and the two traditional approaches (individual and group) are discussed below.

[8]In addition, Abt locators checked local telephone listings; telephoned contacts listed by respondents on their pretests; and contacted post offices for help in forwarding information to respondents who moved.

Individual Innovative Nutrition Education. As noted above, a number of problems arose with the touch-screen video program, which hindered participants from full exposure to the information. One problem involved insufficient space for the touch-screen equipment at most clinics, making it difficult for clients to view the program. Another issue is the evidence that participants did not choose to look at all segments of the video program.

Physical Difficulties with the Touch-Screen Equipment. At the three individual nutrition education sites, placing the kiosks containing the touch-screen videos proved problematic. Most clinics did not have sufficient private space. Also, several clinics encountered technical difficulties with the equipment. This information is summarized in Exhibit 4.4.

At Site 1, data collectors reported difficulties implementing the innovation at all three clinics. At each clinic, the touch-screen kiosk was either located in the middle of the waiting room or faced into the waiting room. These locations were not private, and the waiting rooms were often noisy and crowded. At one location, WIC staff noted that the touch-screen program interfered with showing breastfeeding promotion or children's videos. At a second clinic, the television sat on top of the kiosk, and, to the annoyance of many in the waiting room, daytime television shows had to be turned off whenever the touch-screen program was used.

At Site 2, the rural agency in the same northeastern State, kiosks were located in nutrition staff offices. This placement worked well at Site 2A-1, where three nutritionists shared a large office. There seemed to be adequate privacy for using the touch-screen program; it was easy for participants to ask the nutritionists questions; and nutritionists provided toys for children. However, at Site 2A-2, the kiosk was located in a smaller office housing just one staff member. Privacy was a problem, and the audio from the touch-screen program appeared to interrupt the tasks of the staff person. Also, one computer had to be replaced so that the clinic could not offer the touch-screen intervention for about ten days.

Site 3 had four clinics in a large southeastern State. Staff at 3A-2 were especially enthusiastic about the touch-screen program, using it for all prenatal clients. Touch-screen use at this location was facilitated by kiosk location in a large hallway that was also private. At 3A-1 and 3B-1, the kiosks were located in waiting rooms. This placement did not seem to present a problem at 3A-1—the touch-screen program was well-used there. However, at 3B-1, it was difficult to use the touch-screen program because a row

Exhibit 4.4

Description of Touch-Screen Implementation—Individual Sites

Site	Location[1]	Notes on Touch-Screen Implementation	
1	1A	Kiosk Location	At end of room divider, facing into waiting room.
		NOTE	Waiting room often noisy and crowded in afternoon.
	1B-1	Kiosk Location	In middle of waiting room
		NOTES	Lack of privacy. Use of touch-screen reportedly interrupted breastfeeding promotion video or children's videos that were usually played.
	1B-2	Kiosk Location	In middle of waiting room
		NOTES	Television set kept on top of kiosk. Touch-screen program was reported to be loud and interfered with the television.
2	2A-1	Kiosk Location	In large room where three nutrition educators counsel WIC participants
		NOTES	Easy to ask nutritionist questions; toys available for children.
	2A-2	Kiosk Location	In nutrition staff person's office
		NOTES	Lack of privacy; seemed to interrupt staff person.
3	3A-1	Kiosk Location	In large waiting room
		NOTE	No problems noted.
	3A-2	Kiosk Location	In hallway with adequate space
		NOTES	No problems noted. Staff were enthusiastic about touch-screen and used it with all prenatal women.
	3B-1	Kiosk Location	In waiting room behind row of chairs
		NOTES	Top of kiosk used for storage. Could use touch-screen only by kneeling on chair or standing to the side of kiosk and leaning over the chairs in front of it.
	3B-2	Kiosk Location	In nutrition staff person's office
		NOTES	Could not use touch-screen when nutrition staff had other appointments scheduled. Used only for innovative study participants marked in appointment book. Staff reported problems with tracking demonstration participants.

[1] All service delivery sites within a demonstration site and from one local WIC Agency are denoted by the same letter. For example, for Site 1, there is one service delivery site from Agency A and there are two service delivery sites from Agency B.

of chairs was placed in front of the kiosk that forced program users to kneel on the chairs or to stand to the side of the kiosk and lean over the chairs to use the touch-screen. At 3B-2, the kiosk was located in the office of one nutrition staff person and could not be used during other counseling sessions—sometimes for an entire day at a time.

Participant Failure to View All Topics. The touch-screen video did not cover all topics in the test and, in addition, it offered considerable information that many participants did not choose to view. Across all sites, 92 percent of observed women spent some time on *What to Eat When You're Pregnant*. Observed women usually watched only one of the five modules comprising the video. The weight gain segment, watched by 57 percent of observed touch-screen users across all sites, was the most frequently viewed segment. The healthy eating section was the next most popular, with 37 percent of observed women viewing some portion of it. Only a few women input their diets into all five food group segments and watched the food group summary, so very few women completed dietary self-assessments. Less than one-third (29 percent) of women watched the segment dealing with some of the common discomforts of pregnancy.

Group Innovative Nutrition Education. Implementation issues also arose at the group innovative nutrition education sites. Problems tended to revolve around attendance and staffing.

Site 4 was located in the same southeastern State as Site 3. This rural site was somewhat different from other group sites in that, not only did the same nutritionist lead both the traditional and innovative groups at both clinics, but she also offered exactly the same material in both types of classes. The single difference between the two groups was the instructional method: lecture was primarily used in traditional groups and the facilitated learning approach was used in innovative groups. Innovative groups focused on an interactive activity, dietary self-assessment, that was not offered to traditional group participants. Participants at both study sites reportedly liked the innovative groups and often complimented the nutritionist on these sessions.

One problem the nutritionist at Site 4 encountered was that sessions ran over the allotted time when most women participated or when the group was large. At one clinic, staff were negative about the demonstration because they could not always leave work at the usual time. At the second clinic, group

sessions were scheduled earlier in the day, and WIC staff attitude toward the innovation was more positive.

Site 5 had six WIC clinics in the demonstration. This State classified virtually all prenatal WIC women as high risk. Although high-risk women did receive additional individual counseling, the content of these one-to-one sessions was primarily directed at the pregnant woman's specific problems (poor weight gain, anemia, smoking) and did not provide information on the items on the prenatal knowledge test. At Site 5, the traditional and innovative followup groups were distinctly different. Most traditional groups were led by nurses and consisted of ten-minute videos followed by little or no discussion. The agency also scheduled group sessions on breastfeeding. *Eating for Two* innovative groups were always led by nutritionists, used the facilitated learning approach, and included interactive activities.

Site 6 was located in a health district in a southeastern State. As previously noted, this site joined the demonstration several months after its startup, so the data collection period was shorter there. Because of the late entry, fewer innovative groups could be scheduled. Further, this study site typically offered individual traditional followup education, but the agency chose to offer group education during the demonstration. Finally, this site, by its own admission, had a significant problem with poor attendance at followup nutrition education. These appointments were not linked with WIC food distribution appointments. This problem continued during the demonstration, and several innovative sessions were canceled for lack of participants.

Individual Traditional Nutrition Education. At three of the sites, demonstration participants who were assigned to the traditional group received one-to-one nutrition counseling at their secondary nutrition education contacts. In general, sessions that we observed focused on a few specific topics relevant to individual women such as anemia, breastfeeding, smoking, or discomforts of pregnancy. Often, women did not receive any printed materials to take home. Staff-participant interactions were generally observed to be positive, as were environmental characteristics (privacy, lack of noise). An exception to the latter category was that, at followup nutrition education, many women were accompanied by their children, so we observed more interruptions to these sessions. (See Appendix D for site-specific information.)

Group Traditional Nutrition Education. Observations of traditional followup nutrition education led to the following conclusions:

- The primary mode of instruction in observed sessions was a lecture. At Site 5, videos were used in nearly half of the traditional groups.
- At Site 4, virtually every topic on the test was presented at all group sessions. Coverage was spotty at Sites 5 and 6.
- At least one pamphlet or brochure was distributed to women attending traditional group nutrition education.
- Staff-participant interaction was less positive in our observed traditional group sessions.
- Environmental factors (adequate space, privacy, lack of noise) were generally positive except, as noted above for traditional individual followup sessions, for interruptions by children who were more likely to accompany their mothers to these second sessions.

Appendix D contains site-specific information.

Chapter Five

The Research Study

While the implementation study assessed the effectiveness of the demonstration, the research study was designed to test the impact of the interventions—their success in increasing the nutrition knowledge of prenatal WIC participants. This chapter describes the design of the research study, including the development of the test of nutrition knowledge.

Study Design

The impact evaluation consisted of a true experiment in which prenatal WIC applicants in six demonstration sites were randomly assigned to one of three conditions: an innovative nutrition education intervention, a traditional nutrition education intervention, or no intervention. In all of the sites, the randomization was carried out with pregnant women who applied for WIC benefits during the recruiting period. Once an applicant was assigned to one of the treatment groups at that site, a pretest of nutrition knowledge was administered. Then, the normal certification process continued to determine the applicant's eligibility for WIC benefits—that is, did she meet the income requirements and was she actually pregnant? As part of certification, all women who were certified as eligible for WIC received individual nutrition counseling.

After certification, women were given appointments for followup nutrition education sessions within eight weeks (usually scheduled to coincide with issuance of food vouchers or checks). In the three sites in which traditional nutrition education was provided through individual counseling, women assigned to the innovative intervention were offered the touch-screen program. In the three sites in which the traditional nutrition education was conducted in group sessions, women assigned to the innovative intervention were offered facilitated group discussion. Nutrition education was provided by local WIC staff. In the sites where the innovative group intervention was tested, local staff were trained to implement the facilitated group education. After the followup nutrition education session, another test of nutrition knowledge was administered, this time by telephone. Women who were assigned to the control group were administered the test of nutrition knowledge at the end of the intervention. Then, they attended nutrition education.

Sample

The sample of respondents for the research study was the same sample for the demonstration—all women who applied for WIC benefits during the specified recruiting period, who were pregnant, English-speaking, eligible for WIC, and with low-risk pregnancies. All women who met these criteria were assigned to one of the treatment groups and then tested on their "baseline" (pre-intervention) nutrition knowledge. The sample was then restricted to women who were determined to be eligible for WIC benefits. As Exhibit 5.1 shows, approximately 10 percent of the applicants were ineligible for WIC benefits and were eliminated from the research study.

Exhibit 5.1

Participation Rates Among Subjects in Three Treatment Groups

	Innovative[a]		Traditional		Control		Total	
	n	% of eligible	n	% of eligible	n	% of eligible	n	% of eligible
Recruited/Assigned/ Pre-tested[b]	944		986		985		2,926	
Eligible for WIC	849		881		906		2,636	
Attended Nutrition Education	732	86	753	85	NA[c]		1,485	
Post-tested	566[d]	67	560[e]	64	800	88	1,926	73

NOTES

[a] The innovative category combines all women receiving either individual innovative education or group innovative education. The traditional category also combines individual and group traditional nutrition education.

[b] Includes women who were pretested but who were not post-tested.

[c] Demonstration sites did not record attendance for control group women.

[d] 166 subjects in the Innovative intervention group could not be located.

[e] 193 subjects in the Traditional intervention group could not be located.

Among the eligible subjects in the innovative and traditional nutrition education groups, 86 percent attended their followup sessions. Of this group of women, 76 percent were successfully post-tested. As the information in Exhibit 5.1 shows, the sample of women who completed all parts of the intervention (pretest; WIC eligibility; followup nutrition education session—except for Control group; and post-test) represented 66 percent of the eligible sample who were part of the original randomization. The post-test was completed on a substantially higher proportion of subjects in the control group (88 percent) than in

either the innovative intervention group (67 percent) or the traditional nutrition group (63 percent). This differential response rate means that at post-test, the three groups cannot be assumed to be statistically equivalent. One strategy we used to adjust for possible differences was including baseline covariates in the model for the impact analyses. This methodology controls for differences between and among groups on major demographic characteristics. This approach does not, however, control for possible differences between the groups on unmeasured variables such as motivation. It can be argued that, compared with the other two treatment groups, the control group comprised a wider variability on motivational/attitudinal variables because a larger proportion of the original control sample was successfully post-tested. The attrition from the innovative and traditional nutrition education groups likely occurred among the women who were least motivated to obtain nutrition information. Their primary concern may have been acquiring needed food items for themselves and their older children. The post-tested women in the nutrition education groups were perhaps more highly motivated to obtain nutrition information compared with the post-tested women in the control group, a bias that would favor the treatment groups in an impact analysis.

Test of Nutrition Knowledge

As part of the study, a test of nutrition knowledge was developed to assess the impact of the innovative interventions. The test measured knowledge about the five core topics on pregnancy and nutrition (described in Chapter Three). Abt staff prepared a pool of test items on pregnancy and nutrition, which were evaluated for their adequacy based on the following criteria:

- Item content must be linked to a specific topic—that is, one of the five topics identified by the review panel as important.
- Tested performance on the item *prior to instruction* must be low enough to allow for measurement of positive change in knowledge.
- Tested performance on the item must demonstrate some sensitivity to instruction.
- Both pre- and post-instruction testing must reveal a positive contribution to test reliability.

Eighty questions related to pregnancy and nutrition, including both multiple choice and true-false items, were pilot-tested. The pilot test process involved three segments: (1) a pretest where WIC participants completed tests in a pencil and paper format; (2) a thirty-minute instructional session on pregnancy and

nutrition; and (3) a paper-and-pencil post-test employing the same test items included in the pretest. Altogether, the process lasted about two hours.

The initial testing of ten women revealed that many of the items were answered correctly by all respondents prior to any instruction and that several other items were poorly worded and confusing. A second form of the test was then developed that included forty-two of the original questions and thirty-eight others that were modified from the original form. In most cases, modifications were adjustments to response categories or rewording of item stems. This second test form was administered to fifty-two women who also received the thirty-minute nutrition education intervention. A second review of test items based on the results from this group suggested that most items were working well. Minor adjustments created a third form of the test which was used with thirty-five women. This final form contained just seventy-six items related to pregnancy and nutrition, of which seventy-one had been included in the second test form and five were modified items for the third form only.

Assessing Reliability and Validity. Pilot testing addressed testing procedures, item content, and clarity, as well as the psychometric issues of reliability and validity. Technically, reliability is the degree to which the observed score on a test is representative of the "true" score—that is, a perfect assessment of the knowledge or skill for each participant at each point of administration. Validity refers to the meaningfulness of a measure—does it, in fact measure, what it says it does? In this instance, does the test asses core nutrition knowledge about pregnancy and nutrition. Test developers have generally considered that reliability can be assessed through test-retest correlations, correlations of alternate test forms (or split-half reliability), and tests of internal consistency. A determination of validity is frequently accomplished through simple examination of the content of the test; through correlation of scores on the measure with scores on another, established measure of the same or a related construct; or through examination of results of repeated examinations of scores when interventions designed to alter those scores occur between testing sessions.

For this demonstration, we conducted a pilot test involving administration of a complete test before and after a targeted intervention. Analyses of pilot test results included:

- Descriptive statistics for all test items. These statistics included item difficulties, item discrimination values, and item-total correlations.

- Estimation of the variance of the composite score and the covariance of tests comprising that score. This procedure assessed instrument reliability (or internal consistency).

- Diagnosis of item responses to identify which were the strongest items in terms of their ability to discriminate among respondents; best distribution of responses (neither too easy nor too hard); and inter-item correlations among related items.

As shown is Exhibit 5.2, pilot test scores increased from 65 percent in the pretest to 74 percent in the post-test. Test scores ranged from 33 percent to 86 percent in the pretest and 37 percent to 92 percent in the post-test. The pretest to post-test correlation was .88. The overall test scores increased significantly (equivalent to approximately four-fifths of the pooled standard deviation); both administrations were internally consistent; and a strong relationship between pretest and post-test scores was observed. On the basis of the pretest, it was determined that the items developed to test

Exhibit 5.2

Pilot Test Results

(N=97)

	Pretest	*Post-test*
Average percent correct	65%	74%
Median percent correct	66%	75%
Standard deviation	11	12
Cronbach's alpha	.82	.87

nutrition knowledge were sufficiently reliable and valid to justify using the test in the research study. (More detailed information on the pilot test appears in Appendix E.)

The final step in test development was creating two forms of the test of nutrition knowledge. This task was necessary because of the short time span between the pretest and the post-test in the research study. Using the exact same form of the test in a period of less than two months might lead to a memory effect for respondents, so it was preferable to use different items for the pretest and the post-test, if two forms of equal difficulty could be developed. That is, each form would be administered to half of the demonstration participants at pretest. After the nutrition contact, each prenatal WIC participant would be post-tested with the alternate test form. If a woman completed Form B when she was recruited and

pretested, she would receive Form A as the post-test, and vice versa. Two test forms, one administered at pretest and the other at post-test, avoided item familiarity.

After examining the overall results of the pretest data, we then selected items from that test and formed two subtests with roughly equal psychometric qualities including overall difficulty, test-retest correlations, internal consistency, and score increase following targeted nutrition education—that is, education targeted to the contents of the test. To create two test forms, the items employed in the pilot test were placed into alternate forms to meet the following criteria:

- All topics were represented in each form of the test.
- The two test forms were of approximately equal difficulty and variation at pretest and post-test.
- Each form was equally sensitive to nutrition education related to diet for pregnancy—that is, the overall positive change produced in the pilot test was equal for the two item sets.
- Each form had equivalent psychometrics (standard deviation, test-retest correlation, and Cronbach's alpha).

A total of fifty-four items were selected from the pilot test item pool for the two alternate test forms: six items were included in both forms and twenty-four items were unique to each form. Of the available test items, the following items were excluded from the final test forms:

- Those items with greater than 90 percent of respondents answering correctly at pretest.
- Those items where the percentage of correct responses declined more than 5 percent from pretest to post-test.

The two forms (Form A, Form B) of the test appear in Appendix F. Items selected for each form were balanced across each of the five topics described earlier in this chapter. Information on each test form is summarized in Exhibit 5.3. As the information in Exhibit 5.3 indicates, pilot test results for the two alternate test forms were similar across all computed statistics. As expected, post-test scores were lower because all questions with a 90 percent response rate at pretest were removed.[1] Yet, the pretest-post-test change was larger because the items that were removed could provide little or no increase in the overall

[1]An item that is known to more than 90 percent of respondents at pretest cannot, by definition, measure a gain in knowledge because the respondents already have the information. With regard to declines in percentages of correct responses from pretest to post-test, such declines indicate that a particular item on the test is confusing or poorly written or that information provided to respondents was not well-presented.

Exhibit 5.3

Psychometric Information on Test Forms

(N=97)

	Form A	Form B
Pretest		
Average percent correct	62%	61%
Standard deviation	14	13
Cronbach's alpha	.75	.73
Post-test		
Average percent correct	75%	75%
Standard deviation	15	13
Cronbach's alpha	.79	.77
Pretest-Post-test correlation	.74	.79

score. Although the pretest-post-test correlations were slightly lower than for the entire test, they remained high, as did the measure of internal consistency (Cronbach's alpha). Pilot test results suggested that the test was a reliable index of WIC participant knowledge about prenatal nutrition. The pre-to-post-test correlations and the measure of internal consistency of the test were adequate for a thirty-item test (Brown, 1980; Anastasi, 1982). Moreover, test results were highly sensitive to the introduction of relevant knowledge between administrations; the observed pretest to post-test change was approximately equivalent to one standard deviation for both forms of the test.

For the impact analysis, scores are reported as percentages, with 100 percent representing a perfect score of 30 correctly answered questions. In addition to scoring each item and calculating a total score, scores were created for four subtests related to the diet in pregnancy content areas described earlier: The Food Guide Pyramid; Diet for Pregnancy; Food Choices: "Anytime" versus "Sometimes" Foods; and Nutrients in WIC Foods. Scoring is described in detail in Appendix G.

Comparing the Content of Nutrition Education and the Test of Nutrition Knowledge. One of the important questions for the study is whether or not the nutrition education interventions, both traditional and innovative, provide the information on which the test of nutrition knowledge was based. Were the five components of the pregnancy and nutrition topics identified by the nutrition experts included in the

nutrition education? This question was answered most easily about the traditional nutrition education being offered at the sites. Based on staff interviews and a review of written materials, it appeared that most topics were addressed during nutrition education sessions. The exception was "everyday" versus "sometimes" foods, a component which was not included in nutrition education at two of the demonstration sites. Exhibit 5.4 summarizes the information on pregnancy and nutrition routinely taught at demonstration agencies.

Exhibit 5.4

Topics Addressed in Traditional Nutrition Education in Demonstration Sites

Topics	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Food groups/Food Pyramid	X	X	X	X	X	X
Diet for pregnancy—recommended types and amounts of foods	X	X	X	X	X	X
"Empty" calories (everyday versus sometimes foods)	X			X	X	X
Nutrients for healthy mom and/or baby (calories, protein, iron, calcium, folic acid, vitamins A and C	X	X	X	X	X	X
Nutrients in WIC Foods	X	X	X	X	X	X

The answer to the question of matching curriculum and test content is less clear for the two innovative interventions. For the touch-screen video, *What to Eat When You're Pregnant,* comparing the topics covered in the video (shown in Exhibit 3.1) with the five components of the test of nutrition knowledge suggests at least a rough overlap. For the facilitated group curriculum, where the focus is on behavioral change rather than on acquisition of specific knowledge, it is difficult to estimate the extent to which the curriculum covered the content on which the test was based. The fact that one or both of the innovative interventions might not have directly addressed some of the topics on the test must be considered in interpreting the findings on impacts.

It is important to emphasize that the content of the test did not necessarily correspond with the topics addressed by nutrition education interventions. As just noted and as described in Chapter Three,

individual items on the test addressed the core content of nutrition knowledge considered essential to prenatal women. This information was identified by a panel of experts convened by FNS.

Comparing Test Content to Nutrition Education at Certification. Another concern about the research study involves the nutrition education provided to all subjects at certification, prior to nutrition education. Observations of the nutrition education provided at certification revealed that some of the test topics were at least briefly addressed during these counseling sessions. In particular, nutrition educators provided information on recommended daily servings by food group; nutrients needed during pregnancy; and foods containing these nutrients. Educators also reviewed WIC foods and the nutrients in WIC foods with study participants. Some learning may have occurred as a result of nutrition education at certification. If the control group shows gains in nutrition knowledge at post-test, it may be attributable to these initial nutrition education sessions. A possible problem with this aspect of the research design is that, if nutrition education at certification is very powerful and subjects markedly increase in their nutrition knowledge, the possible impact of the followup nutrition education is reduced.

Chapter Six

Impact of the Demonstration

The hypotheses being tested in the impact evaluation were that (1) nutrition education is effective in increasing nutrition knowledge among pregnant WIC participants; and (2) innovative nutrition education interventions are more effective in increasing nutrition knowledge, compared with traditional nutrition education offered at WIC sites. This chapter begins with a description of the analysis approach, including strategies employed to try to account for apparent weaknesses in the research design that had implications for the analysis. The findings from the impact analyses are then presented.

Analysis Approach

The impact of the innovative interventions was tested using a model that compared post-test scores on the test of nutrition knowledge (total score and four subscores), adjusted for the following covariates: each subject's pretest score, five demographic characteristics (age, ethnicity, level of education, trimester of pregnancy, and WIC certification status), and a variable indicating which of the six sites the subject came from.[1] The variable for site embodies multiple characteristics that differ across sites, including differences in implementation of the demonstration (See Chapter Four.), differences in regional/community mores and practices, differences in agency philosophies, and similar characteristics. The analyses cannot disentangle these different components of "site;" the model only allows us to assess the impact of the treatment once these multiple site differences are accounted or controlled for as a package. The impact analyses were conducted only on subjects who (1) attended their followup nutrition education sessions if assigned and (2) had matched pre- and post-tests.

As discussed in Chapter Five, a test of nutrition knowledge was developed for the research study, and substantial pilot-testing was done to ensure that the measure was psychometrically sound. In addition, two parallel forms of the test of nutrition knowledge (A and B) were developed; subjects were assigned to one form of the test at pretest and the other at post-test. That is, if a subject completed Form A at pretest, she received Form B at post-test and vice versa. This strategy was applied to insure that post-test scores were not inflated by knowledge gained during the testing process. The test data from the

[1] Analyses were performed within the framework of General Linear Models (GLM) for the ease of handling both continuous and categorical variables, to perform analysis of covariance combining regression and analysis of variance methods for more than one covariate, and to conduct tests on adjusted means. In addition, GLM is appropriate for unbalanced data. Regression models were also created to *estimate* effects.

research study were examined for evidence that the test, in fact, was a reliable measure for detecting impacts on nutrition knowledge.

Both of the demonstration test forms, although not equivalent in difficulty, provided consistent and relatively high pre- to post-test correlations across the two sample groups (treatment and control) and across the two test combinations (Exhibit 6.1). For each form, the measure of internal consistency (Cronbach's alpha) was adequate for a thirty-item test. Finally, the average percentage correct was significantly higher at post-test in the treatment group for each form, and the observed change was larger (although marginally so) for the combined treatment groups than for the control group. Based on these data, we concluded that the test could reliably measure moderate-to-large differences if they occurred.

Exhibit 6.1

Comparison of Nutrition Knowledge Test Forms A and B (N = 1,926)

	Form A		Form B	
	Control	**Treatment**	**Control**	**Treatment**
Pretest				
Average percentage correct	51.3%	51.6%	55.9%	54.7%
Standard deviation	13.7	13.8	12.2	12.6
Cronbach's alpha	.64	.66	.54	.56
Post-test				
Average percentage correct	53.2%	53.8%	56.3%	56.3%
Standard deviation	13.9	13.9	11.9	12.4
Cronbach's alpha	.65	.66	.53	.58
Pretest/Post-test Difference	+1.9%	+2.2%	+0.4%	+1.6%
	Control		***Treatment***	
Pretest A and Post-test B correlation (A/B)	.63		.62	
Pretest B and Post-test A correlation (B/A)	.61		.56	

NOTE

For the unmatched pretest group, the average score for pretest A is 49.7 percent (sd = 13.8) and for pretest B is 55.2 percent (sd = 12.0). Cronbach alpha values for this group are .66 (pretest A) and .53 (pretest B).

As discussed below, we were concerned that the pattern of test scores from the demonstration differed from the scores obtained in the pilot-test.

- Average percent correct was substantially lower for both test forms at both pre- and post-test.
- A smaller pre- to post-test difference was observed.
- Cronbach's alpha was lower for both test forms at both pre-and post-test.
- Pre- to post-test correlations were lower than for the pilot test.

Rather than attributing these differences to unreliability in the test, we hypothesized that these differences largely resulted from procedural variations in test administration in the pilot test and the demonstration. The following differences were observed.

- The pilot test sample of WIC recipients included a small number of post-partum women who had more information about nutrition and pregnancy than prenatal women in the demonstration.
- During the pilot test, there was *no delay* between administration of the pretest and the nutrition education session or between the education session and administration of the post-test. In the demonstration, there was a delay of at least eight weeks between pretest/initial education and the post-test and a delay of at least one week between followup nutrition education and post-test.
- The nutrition education for the pilot test focused on the same material (the WIC brochure, *How WIC Helps: Eating for You and Your Baby*) from which the test items were largely drawn. As noted earlier in this report, demonstration women did not receive nutrition education specifically tailored to test topics and items.
- Self-administered tests were employed in the pilot test for both pre- and post-test. In contrast, the demonstration used an in-person interview for the pretest and a telephone interview for the post-test. Self-administered tests provide respondents with the opportunity to revise earlier answers.
- The two test forms (A and B) were drawn from a common set of items answered by all pilot test participants. It may be that the measures of reliability and consistency for the pilot test were inflated by the "practice" effect of completing the same test twice. In contrast, each actual study participant was administered each item on only one occasion.

Because the differences in the test performance in the pilot testing and the research study could be attributed to procedural differences, and in light of the psychometric characteristics of the test in the demonstration, we assumed that the test was reliable and valid for detecting differences in nutrition knowledge.

There was a second concern raised by demonstration-test data. Although pilot test results indicated that the two versions of the test were roughly equivalent in terms of difficulty, data from the testing during the demonstration indicated otherwise. First, Form A was shown to be more internally consistent (reliable) than Form B, based on Cronbach's alpha. (See Exhibit 6.1.) Second, Form A was found to be slightly more difficult (by approximately four percentage points) than Form B. Third, and possibly as a result of the difference in test difficulty, the two sequences of test forms produced different results (despite the fact that the pre- to post-test correlations were consistent across tests and test combinations (A/B and B/A) . When the pretest A/post-test B sequence was administered, scores *increased* significantly from pre- to post-test among control and treatment women but *did not differ* between groups. By contrast, when the pretest B/post-test A sequence was administered, scores for both control and treatment women *decreased* from pre- to post-test. This decrease was significant only for the control group; there was no real difference in these scores for treatment women. Because the data suggested that the two test forms were not, in fact, equivalent, true differences between pre- and post-test performance could be masked as a result of the inclusion of the "easier" test in both pre- and post-test sequences. During analysis, statistical techniques were applied to control for the relative "easiness" of Form B.

Overall Demonstration Impacts

Analyses were conducted on the 1,926 subjects who completed all parts of the study—pretest, certification session, followup nutrition education (if assigned to innovative or traditional nutrition education groups), and post-test. Exhibit 6.2 shows pretest and post-test scores for each treatment group. At pretest, on three of the four topics, women in all three treatment groups answered more than half of the items correctly. The exception was the Food Guide Pyramid, about which women correctly answered about 46 percent of the items. This high level of pretest knowledge was not unexpected; high levels of baseline nutrition knowledge have been observed in other WIC studies[2] as well as on our pilot test. It is also worth noting here that prior participation in WIC, which could reasonably be hypothesized to produce higher test scores, did not lead to higher scores for these women. No differences in scores were observed between first-time recipients and women previously certified for WIC.

[2]See Maine's Original Multimedia System Evaluation (US Department of Agriculture and the Maine WIC Program, 1995)

Exhibit 6.2

Mean Percent Correct on Test of Nutrition Knowledge at Pretest and Post-test by Treatment Group

	Innovative (n=566)		Traditional (n=560)		Control (n=800)	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Pretest						
Food Guide Pyramid	47	15	46	15	47	15
Diet for pregnancy	56	19	56	18	57	19
Food choices	60	28	59	28	62	28
WIC foods	61	28	63	28	61	28
Post-test						
Food Guide Pyramid	49	16	47	15	47	15
Diet for pregnancy	58	19	57	19	57	19
Food choices	66	28	65	27	65	28
WIC foods	63	27	63	28	62	28

Exhibit 6.2 also shows that there was very little improvement in nutrition knowledge between pretest and post-test; unadjusted post-test scores for the three treatment groups are only slightly higher than the pretest scores. This absence of improvement is particularly striking because all study subjects received some nutrition information at certification—after pretesting but prior to post-testing. In addition, most of the WIC demonstration sites were in health agencies where other nutrition contacts could occur.[3]

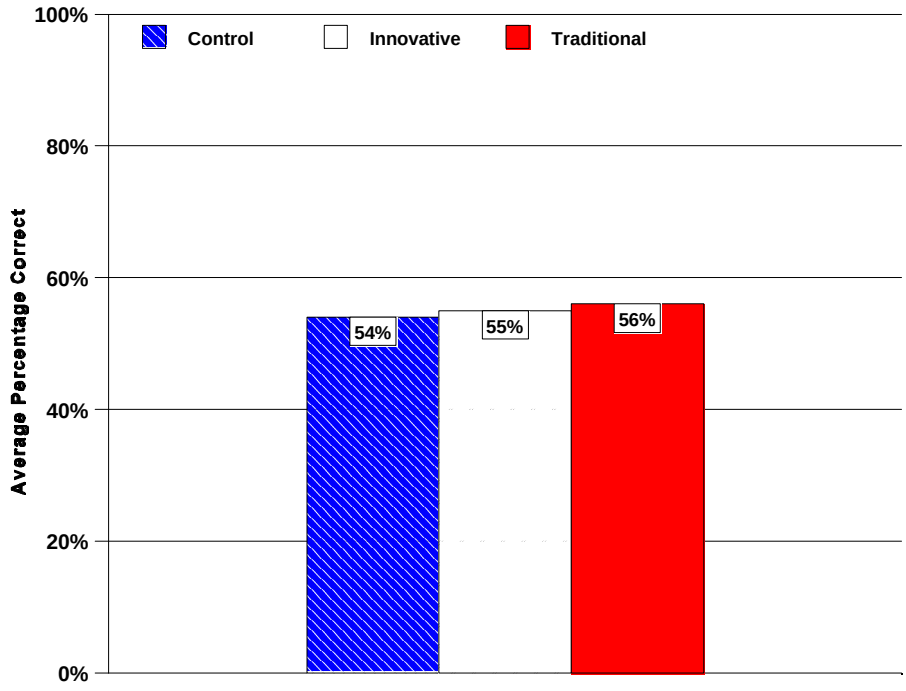
Exhibit 6.3 compares the *adjusted*[4] mean post-test scores for the three treatment groups. Women in the control group, who received no followup nutrition education, had an average post-test score of 54 percent, women in the traditional nutrition education group had an average post-test score of 55 percent, and the women in the innovative interventions (individual and group combined) had a mean post-test score of 56 percent. The difference between the innovative intervention group and the control group was

[3]The WIC Nutrition Education Assessment Study reported that at four of its six study sites there were problems with attendance at nutrition education. Moreover, at five of the six sites, most participants enrolled in WIC with reasonably high levels of nutrition knowledge. However, this study found that overall nutrition knowledge increased between baseline and followup testing and that women who previously participated in WIC had higher test scores than first-time enrollees.

[4]Adjusted for baseline demographic differences, pretest score, and form of the test.

Exhibit 6.3

Adjusted Mean Post-Test Total Score on Test of Nutrition Knowledge by Treatment Group



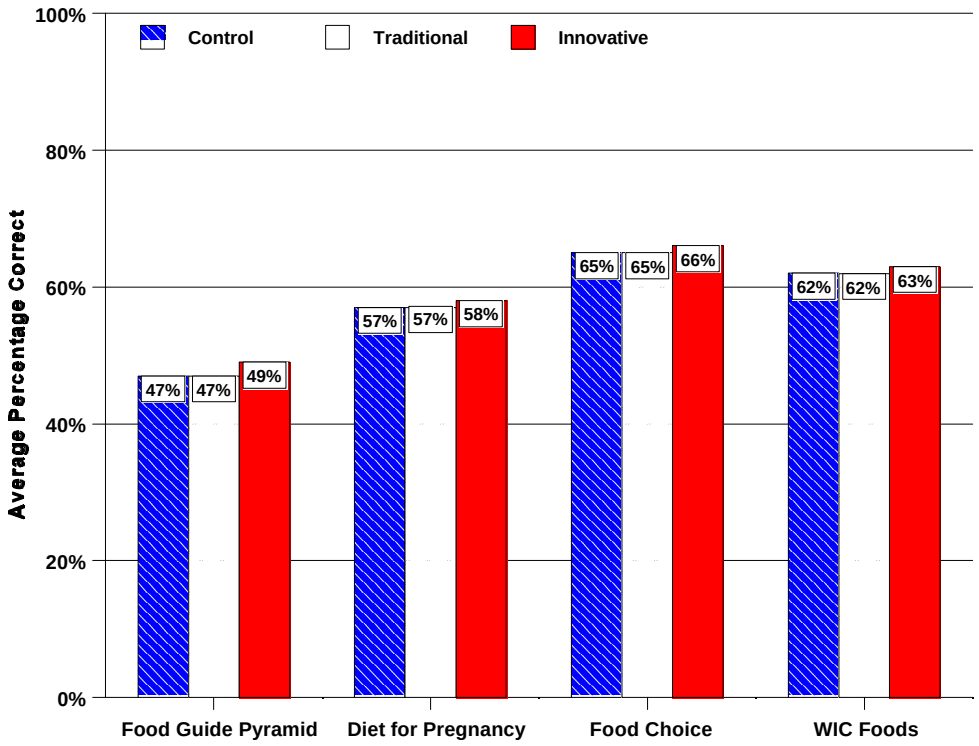
Note: There is a significant difference between scores for the control and innovative groups at the <0.05 level

statistically significant (t = 2.36, p < .05). However, the approximately two percentage point difference translates on average, into only one additional correct test item for the innovative intervention group, which is probably not educationally significant. Exhibit 6.4 compares the average post-test scores for the four subtests for the control group versus both the innovative groups. There are no significant between-group differences on any of the subtests.

Five of the six sites showed no effects; that is, the demonstration had no impact on nutrition knowledge as measured by this test. While the overall pattern indicates that no significant differences occurred, one site showed a significant impact. At Site 6, the adjusted mean post-test score for the innovative treatment group was significantly higher than the average score for the control group (t = 2.99, p<.01). The mean score for the control group in Site 6 was 53 percent compared with 58 percent for women in the innovative nutrition education group. The scores for innovative nutrition education were higher, on average, in Sites 3 and 5, but the differences were not statistically significant. (The means for each topic subtest in each site are shown in Appendix H.) We do not have a good explanation for the fact that there was a treatment effect in one site. Two other sites applying the same approach (innovative group

Exhibit 6.4

Adjusted Mean Post-Test Subtest Scores on Test of Nutrition Knowledge for All Treatment Groups



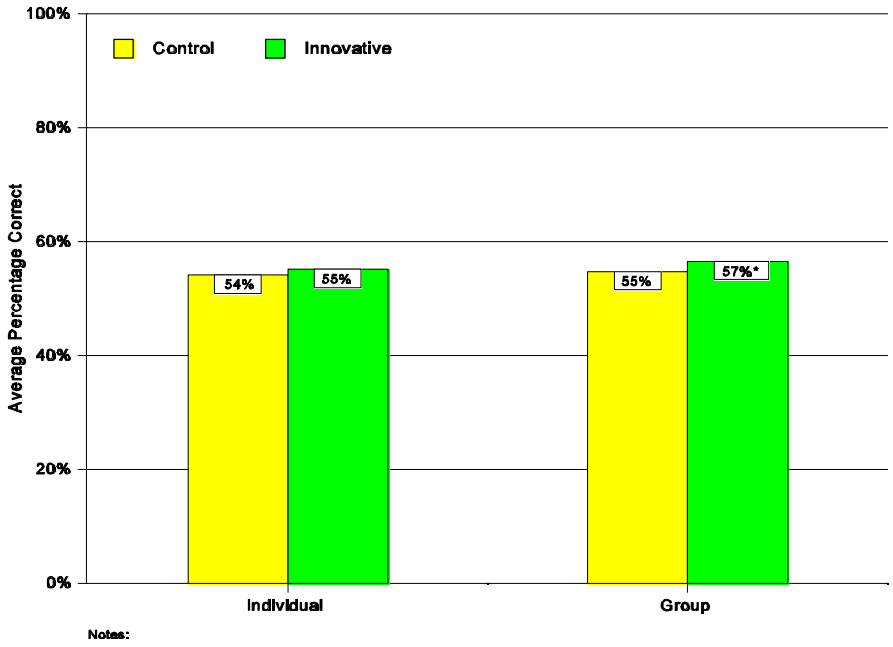
nutrition education) showed no significant differences. There were no implementation differences that would lead us to expect stronger effects in this site. Until this effect is replicated in some other site, we must conclude that the significant difference in Site 6 is attributable to chance.

Individual Versus Group Nutrition Education

Differences in the effectiveness of individual versus group nutrition education were tested separately for the innovative interventions and for traditional nutrition education. For the innovative interventions, the group instruction was more effective: The adjusted mean post-test score for the innovative individual intervention was 55 percent, compared with 57 percent for the innovative group intervention (Exhibit 6.5). When each innovative intervention was compared with the control group, the difference in post-test scores was significant only for the group intervention ($t = 2.26$, $p < .05$). Again, although the difference favoring group versus individual nutrition education is statistically significant, its practical significance is questionable.

Exhibit 6.5

Adjusted Mean Post-Test Total Score on Test of Nutrition Knowledge for Innovative Individual Nutrition Education and Innovative Group Nutrition Education



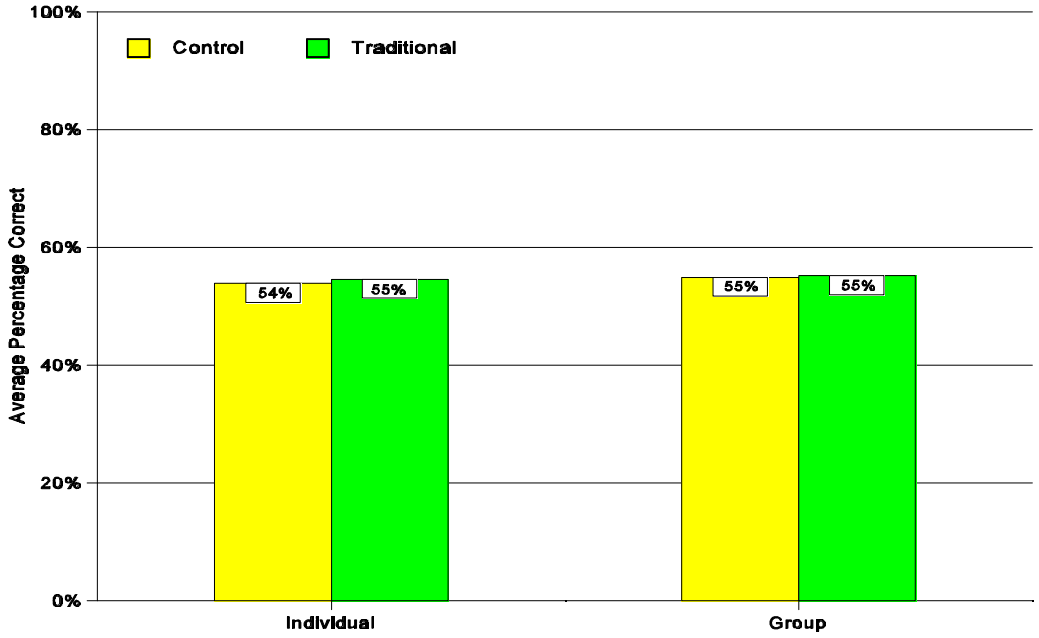
For traditional nutrition education, there was no difference between post-test scores for individual versus group counseling (Exhibit 6.6). There were no significant differences between average scores of traditional and control women for either *individual* (t = 0.84, n.s.) or *group sessions* (t = 0.31, n.s.). In fact, scores for traditional group and control women were virtually the same.

Costs of Nutrition Education

The original design of the *WIC Nutrition Education Demonstration Study* included a cost-effectiveness analysis in which demonstration-site-specific costs for nutrition education would be compared with increases in nutrition knowledge measured by the test developed for the demonstration. This design had to be modified because only one of the local WIC agencies participating in the demonstration was able to provide cost data that could be disaggregated to the service delivery level. It was then decided that we would attempt to collect information that could be used to estimate staff (or labor) costs of nutrition education at the clinic level. Five of the six demonstration sites agreed to participate in this effort. Site 6—the local agency that joined the study after the demonstration began—did not take part in this phase of the demonstration.

Exhibit 6.6

Adjusted Mean Post-Test Total Score on Test of Nutrition Knowledge for Traditional Individual Nutrition Education and Traditional Group Nutrition Education



Staff at the other demonstration sites were asked to complete activity recording forms. Only personnel involved in nutrition education participated in this effort. Each day, for twenty workdays, staff members were to record the amount of time they devoted to certification, nutrition education, management, non-casework, voucher/check issuance, and secondary program duties. We expected to obtain 2,520 activity recording forms from 126 staff persons. After four months of effort, data from 1,420 forms (56 percent of the expected total) from seventy-two staff members could be analyzed, and there were considerable problems with these data. For example, at virtually every WIC clinic, staff did not separate time for nutrition education from other activities such as certification. Despite considerable effort to resolve anomalies in the data, the completed analysis was not sufficiently reliable to report site-specific costs.

Several general points can be made about the costs of innovations in WIC nutrition education in this demonstration.

- **Development and initial implementation of an innovation accounted for the largest portion of costs.** In this demonstration, for example, working with a technology contractor to create the touch-screen video and acquiring the computers and other electronic equipment were the most expensive activities. FNS funded development costs.

- **Staff training was necessary and beneficial but also required an allocation of resources.** For the touch-screen video, staff sometimes needed assistance from the New England Technology Group, the developer of the video. Also, nutrition educators had to be trained to offer the facilitated learning group intervention. Grants from FNS defrayed these costs. Individual grants ranged from $22,000 to $47,000.

- **Individual nutrition education was more costly than group-based education.** It certainly seems a logical conclusion that one-to-one service provision would require more resources than less intensive provision of service, and our limited data support this assumption.

Chapter Seven

Conclusions

The results of the *WIC Nutrition Education Demonstration Study* indicate that none of the educational interventions, either innovative or traditional, increased nutrition knowledge among WIC participants. This body of knowledge was defined by a panel of experts, convened by FNS, as essential to appropriate dietary practices for pregnant WIC participants. Knowledge was measured using a test developed for the demonstration.

Finding 1. *No interventions, either innovative or traditional, increased nutrition knowledge among WIC participants.*

Post-test results indicated that there was no increase in nutrition knowledge among WIC clients who participated in the demonstration. Results were similar across types of interventions (innovative, traditional) and across nutrition topics. Moreover, control group test performance was equal to test results for innovative and traditional nutrition education groups.

Several factors may explain these results. First, the content of the test did not necessarily correspond with the topics addressed by the nutrition education interventions. Questions on the test were based on a core content of nutrition knowledge considered essential to prenatal women and identified by a panel of experts convened by FNS. The interventions were developed separately and independently from the test. While this process reflects current WIC practice for generating approaches to nutrition education, the lack of correspondence between test questions and content of the interventions may, in part, explain participant test performance.

Second, although nutrition education information was available to demonstration participants, it appears that many women did not avail themselves of these materials. Data from observations suggest that women in the innovative individual education programs viewed only one or two modules of the five-module touch-screen video. Also, innovative group education sessions often did not present all of the content included in the instructional packages.

Third, it may be that some of the content not mastered by demonstration participants was too difficult to be assimilated during limited nutrition education contacts. This explanation is partially supported by participant performance on test items focusing on specific topics or concepts.

Finally, it is also possible that demonstration participants benefited from nutrition education provided by other prenatal caregivers or from information presented in the media.

Finding 2. *Prior to attending nutrition education, demonstration participants possessed, on average, approximately 50 percent of nutrition knowledge defined by the panel of nutrition experts.*

Pretest results indicated that, prior to being certified for WIC benefits, demonstration participants correctly answered about half of the nutrition knowledge items on the test. Given this relatively high knowledge level, it may have been very difficult for a nutrition education intervention to increase post-test scores. It may also be that limited time and scarce resources are wasted presenting information already possessed by WIC participants.

An alternative could be using the test as a diagnostic as well as an assessment tool. With regard to the former, pretest results could be reviewed by nutrition educators who could then tailor interventions to the needs of participants. This approach could focus on nutrition topics about which participants lack knowledge or find difficult to understand.

Finding 3. *Attendance at WIC nutrition education sessions was low across all demonstration sites.*

Participation in nutrition education was low across all clinics in the demonstration reflecting participation in nutrition education in the WIC Program. There is no requirement to attend nutrition education to receive other benefits which may be a principal reason for the low participation rate. The availability of innovative nutrition education did not appear to increase attendance among prenatal WIC participants. In fact, in this study, WIC and research staff expended considerable effort, using telephone and postcard reminders, to increase attendance at nutrition education. Two demonstration sites employed monetary incentives to encourage attendance. Without these special efforts, it is unlikely that the demonstration would have achieved attendance levels of sufficient size for analysis.

Demonstration results also indicated that participation rates had no effect on nutrition knowledge. Participants at demonstration sites with high attendance at nutrition education did not score differently from individuals at sites with lower attendance.

Participation in nutrition education may be competing with other WIC participant priorities. The finding from this study suggests that, when they enroll in WIC, prenatal women possess a considerable amount of information about nutrition. They may not believe that additional education is necessary or worthwhile.

Finding 4. *Innovative individualized nutrition education interventions were more difficult to implement than the group intervention chosen for this demonstration*.

Individual nutrition education, like any other individualized intervention, has always been difficult to implement, monitor, and maintain. In this demonstration, the quality of this implementation varied across sites. Such variation is to be expected if this type of intervention were implemented on a broader scale.

Demonstration results suggested that individual nutrition education interventions may require more planning and attention to implement as well as substantial resources to maintain and to monitor participant learning. (Implementation costs at the individual education sites were more than twice the costs at the group sites.) To be properly implemented, the touch-screen videos used in this demonstration required dedicated space (including elimination of interference from competing activities) and sufficient technical support to ensure proper operation.

Finding 5. *The costs of implementing innovative interventions were considerable.*

The cost of implementing the innovative interventions ranged from $22,000 to $47,000 per site with the innovative individual sites being, on average, more expensive. Additional funding was required to develop software for the touch-screen video, the individual innovation. The innovative group nutrition education required substantially lower startup costs—two days of facilitation training for nutrition educators. The costs of implementing the innovative interventions were funded through grants from FNS to the participating local WIC agencies. Such costs represent outlays individual WIC agencies can expect to bear if they decide to implement similar interventions.

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Appendix A

Observation Protocols
Innovative and Traditional Nutrition Education
WIC Nutrition Education Demonstration Study

OBSERVATION CHECKLIST

Prenatal Group Session or Class

WIC Nutrition Education Demonstration Study

SESSION IDENTIFICATION

1. **Agency ID** |____|____| 2. **Site ID** |____|____| 3. **Field Observer ID** |____|____|____|

4. **Date of Observation** |____|____| |____|____| |____|____|
Month Day Year

5. **Start Time** |____|____|: |____|____|

6. **Type of Session**
Traditional 1
Innovative 2

7. **Provider Type**
Registered Dietitian 1
Nutritionist (not RD) 2
Paraprofessional 3
Registered Nurse (RN) 4
Other SPECIFY _____5
_____

Attendance

8. Expected attendance |____|____| 9. Actual attendance |____|____|

10. **Title/Topic**_____

INTRODUCTION

		Yes	No
11.	Group leader introduces self (name; not just "title")		
12.	Group leader has a name tag for identification		
13.	Group leader provides general overview of session		

METHOD OF INSTRUCTION

		Yes	No
14.	Lecture		
15.	Group discussion		
16.	Problem solving		
17.	Focus group		
18.	Other SPECIFY _____		

TOPICS COVERED

	Mentioned	Discussed	Written Material	Video	Not Covered
THE FOOD GUIDE PYRAMID/FOOD GROUPS					
19. Food Pyramid used in session					
20. Food items identified by food group					
21. Recommended daily servings by food group					
22. Reasons for eating a variety of foods					
23. Recommended number of servings relating to food group position on pyramid					
24. Portion sizes by food group					
25. Nutrients by food group					
NUTRIENTS FOR HEALTHY MOM/BABY					
26. Nutrients needed during pregnancy					
27. Foods containing needed nutrients					
FOOD CHOICES					
28. Everyday food defined					
29. Reasons these foods are everyday					
30. Sometimes foods defined					
31. Reasons these foods are sometimes foods					
NUTRIENTS IN WIC FOODS					
32. Review of WIC foods					
33. Nutrients in WIC foods					
OTHER TOPICS SPECIFY					
34.					
35.					
36.					
37.					
38.					
39.					

EDUCATIONAL AIDS/MATERIALS

	Yes	No	Relevant to Topic	
			Yes	No
40. Bulletin boards, flipcharts, posters				
41. Food packages				
42. Food demonstrations and/or tasting				
43. Videos				
44. Other SPECIFY _____				

	Number Reviewed During Session	Number Provided to Take Home	Relevant to Topic	
			Yes	No
45. Books				
46. Brochures, pamphlets, handouts				
47. Recipes				
48. Other written material SPECIFY _____				

VIDEOS (ONLY)

49. **Title/Topic**_____

50. **Start Time** |____|____|:|____|____| 51. **End time** |____|____|:|____|____|

52. In general, participants were attentive to video:

Consistently 1
Sometimes 2
Rarely 3
Never 4

53. Video was discussed:

Yes 1
No 2

ENVIRONMENT

54. Number of children present |____|

		Yes	No
55.	Space is of adequate size		
56.	Space is private enough so that others cannot easily overhear conversation		
57.	Temperature is comfortable: not too warm or too cold		
58.	Noise level is low enough that participants can converse easily without straining or distraction		
59.	Toys or other activities are available for children		
60.	Session is interrupted more than once by children		
61.	Session is interrupted more than once by telephone or other clinic staff		

STAFF/PARTICIPANT INTERACTION

		Yes	No
62.	Ice breaker used at beginning of session		
63.	Group leader investigates participant understanding of a majority of key concepts		
64.	Group leader provides opportunity for questions		
65.	Participants ask questions or initiate line of discussion more than two times		
66.	Group leader maintains a non-judgmental attitude at all times		
67.	Group leader addresses questions or concerns raised by participants in a supportive manner		
68.	One or more interactive activities are used		
69.	Pace of presentation is appropriate to material		
70.	Pace of presentation is appropriate for participants		

71. **End Time** |____|____|: |____|____|

COMMENTS

OBSERVATION CHECKLIST

Individual — Prenatal Counseling — Traditional

SESSION IDENTIFICATION

1. **Agency ID** |____|____| 2. **Site ID** |____|____| 3. **Field Observer ID** |____|____|____|

4. **Date of Observation** |____|____| |____|____| |____|____|
Month Day Year

5. **Start Time** |____|____|: |____|____|

6. **Client Risk Status**
High 1
Low 2

7. **Provider Type**
Registered Dietitian 1
Nutritionist (not RD) 2
Paraprofessional 3
Registered Nurse (RN) 4
Other SPECIFY _____5
_____

INTRODUCTION

During session. . .	Yes	No
8. Counselor introduces self (name; not just "title")		
9. Counselor has a name tag for identification		
10. Counselor provides general overview of session		

TOPICS COVERED

	Mentioned	Discussed	Written Material	Video	Not Covered
THE FOOD GUIDE PYRAMID/FOOD GROUPS 11. Food Pyramid used in session					
12. Food items identified by food group					
13. Recommended daily servings by food group					
14. Reasons for eating a variety of foods					
15. Recommended number of servings related to food group position on pyramid					
16. Portion sizes by food group					
17. Nutrients by food group					
NUTRIENTS FOR HEALTHY MOM/BABY 18. Nutrients needed during pregnancy					
19. Foods containing needed nutrients					
FOOD CHOICES 20. Everyday food defined					
21. Reasons these foods are everyday					
22. Sometimes foods defined					
23. Reasons these foods are sometimes foods					

	Mentioned	Discussed	Written Material	Video	Not Covered
NUTRIENTS IN WIC FOODS 24. Review of WIC foods					
25. Nutrients in WIC foods					
OTHER TOPICS SPECIFY 26.					
27.					
28.					
29.					
30.					
31.					

EDUCATIONAL AIDS/MATERIALS

	Yes	No	Relevant to Topic	
			Yes	No
32. Bulletin boards, flipcharts, posters				
33. Food packages				
34. Food demonstrations and/or tasting				
35. Videos				
36. Other SPECIFY _____				

	Number Reviewed During Session	Number Provided to Take Home	Relevant to Topic	
			Yes	No
37. Books				
38. Brochures, pamphlets, handouts				
39. Recipes				
40. Other written material SPECIFY _____				

VIDEOS (ONLY)

41. **Title/Topic**_____

42. **Start Time** |____|____|: |____|____| 43. **End Time** |____|____|: |____|____|

44. Participant is attentive to video:

Consistently 1
Sometimes 2
Rarely 3
Never 4

45. Video is discussed:

Yes 1
No 2

ENVIRONMENT

46. Number of children present |____|

		Yes	No
47.	Space is of adequate size		
48.	Space is private enough so that others cannot easily overhear conversation		
49.	Temperature is comfortable: not too warm or too cold		
50.	Noise level is low enough that participants can converse easily without straining or distraction		
51.	Toys or other activities are available for children		
52.	Session is interrupted more than once by children		
53.	Session is interrupted more than once by telephone or other clinic staff		

STAFF/PARTICIPANT INTERACTION

		Yes	No
54.	Counselor discusses all risk factors		
55.	Counselor investigates participant's understanding of a majority of key concepts		
56.	Counselor provides opportunity for questions		
57.	Participant asks questions or initiates line of discussion more than two times		
58.	Counselor addresses participant's questions or concerns in a supportive manner		
59.	Counselor maintains a non-judgmental attitude at all times		
60.	Pace of presentation is appropriate to material		
61.	Pace of presentation is appropriate for participant		

62. **End Time** |____|____|:|____|____|

COMMENTS

OBSERVATION CHECKLIST

Individual — Prenatal Counseling — Innovative

SESSION IDENTIFICATION

1. **Agency ID** |____|____| 2. **Site ID** |____|____| 3. **Field Observer ID** |____|____|____|

4. **Date of Observation** |____|____| |____|____| |____|____|
Month Day Year

5. **Start Time** |____|____|: |____|____|

INTRODUCTION

	Yes	No
6. Staff person shows participant to Kiosk		
7. Staff person provides general instructions		
8. Information to initiate touch-screen video is in Kiosk		

ENVIRONMENT

9. Number of children present |____|

	Yes	No
10. Space is of adequate size		
11. Space is private		
12. Temperature is comfortable: not too warm or too cold		
13. Noise level is low enough that participants can concentrate on touch-screen video		
14. Toys or other activities are available for children		
15. Session is interrupted more than once by children		
16. Session is otherwise interrupted more than once by clinic staff		

STAFF/PARTICIPANT INTERACTION

	Yes	No
17. Staff person checks on participant		
18. Staff person provides opportunity for questions		
19. Participant asks more than two questions		
20. Counselor addresses participant's questions or concerns in a supportive manner		

21. **End Time** |___|___|: |___|___|

COMMENTS

Appendix B

Demographic Data by Site
WIC Nutrition Education Demonstration Study

Exhibit B.1

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 1

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	0	0.0%	0	0.0%	0	0.0%	0	0.0%
15 - 17 years	12	12.2	10	10.4	14	12.0	36	11.6
18 - 34 years	79	80.6	81	84.4	92	78.6	252	81.0
35 or more years	7	7.1	4	4.2	10	8.5	21	6.8
Missing	0	0.0	1	1.0	1	0.9	2	0.6
Trimester at enrollment								
First trimester	25	25.5	31	32.3	24	20.5	80	25.7
Second trimester	53	54.1	42	43.8	65	55.6	160	51.4
Third trimester	18	18.4	19	19.8	19	16.2	56	18.0
Missing	2	2.0	4	4.2	9	7.7	15	4.8

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 1

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
American Indian or Alaskan Native	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asian or Pacific Islander	0	0.0	0	0.0	1	0.9	1	0.3
Black (non-Hispanic)	71	72.4	64	66.7	79	67.5	214	68.8
Hispanic	5	5.1	7	7.3	6	5.1	18	5.8
White (non-Hispanic)	20	20.4	22	22.9	24	20.5	66	21.2
Missing	2	2.0	3	3.1	7	6.0	12	3.9
Education level completed								
None	0	0.0	0	0.0	0	0.0	0	0.0
Elementary	0	0.0	0	0.0	0	0.0	0	0.0
Middle	35	35.7	30	31.3	40	34.2	105	33.8
High	55	56.1	58	60.4	66	56.4	179	57.6
College	0	0.0	4	4.2	2	1.7	6	1.9
Graduate	0	0.0	0	0.0	0	0.0	0	0.0
Missing	8	8.2	4	4.2	9	7.7	21	6.8

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 1

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No	89	90.8	94	97.9	109	93.2	292	93.9
Missing	9	0.2	2	2.1	8	6.8	19	6.1
First WIC certification								
Yes	95	97	89	93	111	95	295	95
No	3	3	7	7	6	5	16	5
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women	98	100.0	96	100.0	117	100.0	311	100.0

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 2

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	0	0.0%	0	0.0%	0	0.0%	0	0.0%
15 - 17 years	8	9.4	2	2.4	5	4.6	15	5.4
18 - 34 years	74	87.1	76	89.4	102	93.6	252	90.3
35 or more years	2	2.4	3	3.5	1	0.9	6	2.2
Missing	1	1.2	3	3.5	1	0.9	5	1.8
Trimester at enrollment								
First trimester	47	55.3	45	52.9	59	54.1	151	54.1
Second trimester	23	27.1	28	32.9	34	31.2	85	30.5
Third trimester	13	15.3	7	8.2	15	13.8	35	12.5
Missing	2	2.4	5	5.9	1	0.9	8	2.9

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 2

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
American Indian or Alaskan Native	0	0.0%	1	1.2%	0	0.0%	1	0.4%
Asian or Pacific Islander	1	1.2	0	0.0	0	0.0	1	0.4
Black (non-Hispanic)	4	4.7	3	3.5	12	11.0	19	6.8
Hispanic	1	1.2	4	4.7	5	4.6	10	3.6
White (non-Hispanic)	76	89.4	74	87.1	89	81.7	239	85.7
Missing	3	3.5	3	3.5	3	2.8	9	3.2
Education level completed								
None	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Elementary	2	2.4	0	0.0	0	0.0	2	0.7
Middle	15	17.6	17	20.0	23	21.1	55	19.7
High	50	58.8	46	54.1	66	60.6	162	58.1
College	1	1.2	4	4.7	4	3.7	9	3.2
Graduate	0	0.0	0	0.0	0	0.0	0	0.0
Missing	17	20.0	18	21.2	16	14.7	51	18.3

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 2

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	1	1.2%	0	0.0%	0	0.0%	1	0.4%
No	82	96.5	79	92.9	107	98.2	268	96.1
Missing	2	2.3	6	7.1	2	1.8	10	3.5
First WIC certification								
Yes	81	95	82	96	104	95	268	96
No	4	5	3	4	5	5	11	4
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women	85	100.0	85	100.0	109	100.0	279	100.0

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 3

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	0	0.0%	0	0.0%	0	0.0%	0	0.0%
15 - 17 years	3	5.0	5	8.3	10	9.9	18	8.1
18 - 34 years	50	83.3	48	80.0	71	70.3	169	76.5
35 or more years	2	3.3	2	3.3	4	4.0	8	3.6
Missing	5	8.3	5	8.3	16	15.8	26	11.8
Trimester at enrollment								
First trimester	37	61.7	36	60.0	52	51.5	125	56.6
Second trimester	13	21.7	14	23.3	23	22.8	50	22.6
Third trimester	4	6.7	5	8.3	10	9.9	19	8.6
Missing	6	10.0	5	8.3	16	15.8	27	12.2

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 3

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
American Indian or Alaskan Native	0	0.0%	0	0.0%	1	1.0%	1	0.5%
Asian or Pacific Islander	3	5.0	1	1.7	1	1.0	5	2.3
Black (non-Hispanic)	35	58.3	34	56.7	52	51.5	121	54.8
Hispanic	2	3.3	1	1.7	0	0.0	3	1.4
White (non-Hispanic)	20	33.3	24	40.0	43	42.6	87	39.4
Missing	0	0.0	0	0.0	4	4.0	4	1.8
Education level completed								
None	0	0.0	0	0.0	0	0.0	0	0.0
Elementary	0	0.0	0	0.0	1	1.0	1	0.5
Middle	16	26.7	12	20.0	24	23.8	52	23.5
High	27	45.0	29	48.3	56	55.4	112	50.7
College	1	1.7	1	1.7	0	0.0	2	0.9
Graduate	0	0.0	0	0.0	0	0.0	0	0.0
Missing	16	26.7	18	30.0	20	19.8	54	24.4

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 3

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No	56	93.3	58	96.7	92	91.1	206	93.2
Missing	4	6.7	2	3.3	9	8.9	15	6.8
First WIC certification								
Yes	54	90	55	91	92	91	201	91
No	6	10	5	9	9	9	20	9
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women	60	100.0	60	100.0	101	100.0	221	100.0

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 4

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	2	3.2%	0	0.0%	0	0.0%	2	0.8%
15 - 17 years	10	16.1	17	22.1	15	15.0	42	17.6
18 - 34 years	44	71.0	56	72.7	78	78.0	178	74.5
35 or more years	6	9.7	2	2.6	7	7.0	15	6.3
Missing	0	0.0	2	2.6	0	0.0	2	0.8
Trimester at enrollment								
First trimester	30	48.4	47	61.0	55	55.0	132	55.2
Second trimester	21	33.9	23	29.9	29	29.0	73	30.5
Third trimester	2	3.2	3	3.9	10	10.0	15	6.3
Missing	9	14.5	4	5.2	6	6.0	19	7.9

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 4

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
American Indian or Alaskan Native	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asian or Pacific Islander	0	0.0	0	0.0	0	0.0	0	0.0
Black (non-Hispanic)	18	29.0	28	36.4	38	38.0	84	35.1
Hispanic	0	0.0	0	0.0	2	2.0	2	0.8
White (non-Hispanic)	40	64.5	45	58.4	50	50.0	135	56.5
Missing	4	6.5	4	5.2	10	10.0	18	7.5
Education level completed								
None	1	1.6	0	0.0	0	0.0	1	0.4
Elementary	2	3.2	1	1.3	3	3.0	6	2.5
Middle	36	58.1	36	46.8	32	32.0	104	43.5
High	20	32.3	40	51.9	62	62.0	122	51.0
College	2	3.2	0	0.0	0	0.0	2	0.8
Graduate	0	0.0	0	0.0	0	0.0	0	0.0
Missing	1	1.6	0	0.0	3	3.0	4	1.7

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 4

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No	56	90.3	67	87.0	88	88.0	211	88.3
Missing	6	9.7	10	13.0	12	12.0	28	11.7
First WIC certification								
Yes	61	99	77	100	99	99	237	99
No	1	1	0	0	1	1	2	1
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women	62	100.0	77	100.0	100	100.0	239	100.0

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 5

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	5	2.6%	1	0.5%	0	0.0%	6	0.9%
15 - 17 years	26	13.4	19	10.4	30	11.6	75	11.8
18 - 34 years	147	75.8	149	81.9	208	80.3	504	79.4
35 or more years	10	5.2	10	5.5	17	6.6	37	5.8
Missing	6	3.1	3	1.6	4	1.5	13	2.0
Trimester at enrollment								
First trimester	53	27.3	46	25.3	76	29.3	175	27.6
Second trimester	86	44.3	77	42.3	114	44.0	277	43.6
Third trimester	48	24.7	53	29.1	67	25.9	168	26.5
Missing	7	3.6	6	3.3	2	0.8	15	2.4

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 5

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
American Indian or Alaskan Native	5	2.6%	1	0.5%	1	0.4%	7	1.1%
Asian or Pacific Islander	2	1.0	4	2.2	10	3.9	16	2.5
Black (non-Hispanic)	41	21.1	41	22.5	53	20.5	135	21.3
Hispanic	34	17.5	27	14.8	39	15.1	100	15.7
White (non-Hispanic)	111	57.2	109	59.9	153	59.1	373	58.7
Missing	1	0.5	0	0.0	3	1.2	4	0.6
Education level completed								
None								
Elementary	1	0.5	2	1.1	5	1.9	8	1.3
Middle	84	43.3	70	38.5	108	41.7	262	41.3
High	105	54.1	104	57.1	138	53.3	347	54.6
College	2	1.0	4	2.2	5	1.9	11	1.7
Graduate	0	0.0	0	0.0	0	0.0	0	0.0
Missing	2	1.0	2	1.1	3	1.2	7	1.1

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 5

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No	193	99.5	178	97.8	259	100.0	630	99.2
Missing	1	0.5	4	2.2	0	0.0	5	0.8
First WIC certification								
Yes	175	90	155	85	220	85	546	86
No	19	10	27	15	39	15	89	14
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women	194	100.0	182	100.0	259	100.0	635	100.0

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 6

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	1	1.5%	1	1.7%	0	0.0%	2	0.8%
15 - 17 years	10	14.9	7	11.7	15	13.2	32	13.3
18 - 34 years	51	76.1	49	81.7	94	82.5	194	80.5
35 or more years	2	3.0	2	3.3	2	1.8	6	2.5
Missing	3	4.5	1	1.7	3	2.6	7	2.9
Trimester at enrollment								
First trimester	28	41.8	24	40.0	51	44.7	103	42.7
Second trimester	25	37.3	24	40.0	36	31.6	85	35.3
Third trimester	6	9.0	6	10.0	16	14.0	28	11.6
Missing	8	11.9	6	10.0	11	9.6	25	10.4

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 6

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
American Indian or Alaskan Native	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asian or Pacific Islander	2	3.0	0	0.0	5	4.4	7	2.9
Black (non-Hispanic)	24	35.8	17	28.3	34	29.8	75	31.1
Hispanic	0	0.0	0	0.0	0	0.0	0	0.0
White (non-Hispanic)	41	61.2	43	71.7	74	64.9	158	65.6
Missing	0	0.0	0	0.0	1	0.9	1	0.4
Education level completed								
None	1	1.5	0	0.0	0	0.0	1	0.4
Elementary	5	7.5	2	3.3	2	1.8	9	3.7
Middle	16	23.9	24	40.0	43	37.7	83	34.4
High	41	61.2	31	51.7	62	54.4	134	55.6
College	1	1.5	1	1.7	1	0.9	3	1.2
Graduate	0	0.0	0	0.0	0	0.0	0	0.0
Missing	3	4.5	2	3.3	6	5.3	11	4.6

Exhibit B.1 (continued)

Characteristics of Prenatal WIC Women by Treatment Group by Site

Site 6

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No	67	100.0	60	100.0	114	100.0	241	100.0
Missing	0	0.0	0	0.0	0	0.0	0	0.0
First WIC certification								
Yes	56	83	49	81	83	73	190	79
No	11	17	11	19	31	27	51	21
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women	67	100.0	60	100.0	114	100.0	241	100.0

Exhibit B.2

Characteristics of Prenatal WIC Women with Unmatched Pretests by Treatment Group

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age								
Under 15 years	0	0.0%	0	0.0%	1	0.5%	1	0.1%
15 - 17 years	35	9.3	37	8.7	9	4.9	81	8.2
18 - 34 years	294	77.8	348	81.7	146	78.9	788	79.7
35 or more years	13	3.4	8	1.9	6	3.2	27	2.7
Missing	36	9.5	33	7.7	23	12.4	92	9.3
Trimester of enrollment								
First trimester	151	39.9%	155	36.4%	64	34.6%	370	37.4%
Second trimester	122	32.3	149	35.0	68	36.8	339	34.3
Third trimester	65	17.2	72	16.9	27	14.6	164	16.6
Missing	40	10.6	50	11.7	26	14.1	116	11.7

Exhibit B.2 (continued)

Characteristics of Prenatal WIC Women with Unmatched Pretests by Treatment Group

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Race/ethnicity								
American Indian or Alaskan Native	3	0.8%	0	0.0%	3	1.6%	6	0.6%
Asian or Pacific Islander	8	2.1	7	1.6	2	1.1	17	1.7
Black (non-Hispanic)	155	41.0	177	41.5	72	38.9	404	40.8
Hispanic	15	4.0	28	6.6	12	6.5	55	5.6
White (non-Hispanic)	183	48.4	205	48.1	95	51.4	483	48.8
Missing	14	3.7	9	2.1	1	0.5	24	2.4
Education level completed								
None								
Elementary	7	1.9%	3	0.7%	0	0.0%	10	1.0%
Middle	129	34.1	133	31.2	50	27.0	312	31.5
High	198	52.4	225	52.8	92	49.7	515	52.1
College	8	2.1	10	2.3	4	2.2	22	2.2
Graduate*	1	0.3	0	0.0	0	0.0	1	0.1
Missing	35	9.3	55	12.9	39	21.1	129	13.0

*Graduate school as the level of education completed is reported for less than 1/10 of a percent of all women in the unmatched pretest group. No women in the matched group reported this level.

Exhibit B.2 (continued)

Characteristics of Prenatal WIC Women with Unmatched Pretests by Treatment Group

Characteristic	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Migrant status								
Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
No	364	96.3	408	95.8	180	97.3	952	96.3
Missing	14	3.7	18	4.2	5	2.7	37	3.7
First WIC certification								
Yes	344	91	378	89	159	86	881	89
No	34	9	48	11	26	14	108	11
Missing	0	0	0	0	0	0	0	0
Total WIC prenatal women	378	100.0	426	100.0	185	100.0	989	100.0

Appendix C

Data on Demographic Sample and Attendance at Nutrition Education

WIC Nutrition Education Demonstration Study

Exhibit C.1

Total Completed Tests Among Prenatal WIC Women by Treatment Group by Site

Site 1

	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Pretest*	144	100.0%	148	100.0%	151	100.0%	443	100.0%
Post-test	98	68.1	96	64.9	117	77.5	311	70.2
Total prenatal WIC women	144	100.0	148	100.0	151	100.0	443	100.0

Site 2

	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Pretest*	126	100.0%	127	100.0%	129	100.0%	382	100.0%
Post-test	85	67.5	85	66.9	109	84.5	279	73.0
Total prenatal WIC women	126	100.0	127	100.0	129	100.0	382	100.0

*Includes unmatched pretests.

Exhibit C.1 (continued)

Total Completed Tests Among Prenatal WIC Women by Treatment Group by Site

Site 3

	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Pretest*	148	100.0%	171	100.0%	164	100.0%	483	100.0%
Post-test	60	40.5	60	35.1	101	61.6	221	45.8
Total prenatal WIC women	148	100.0	171	100.0	164	100.0	483	100.0

Site 4

	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Pretest*	102	100.0%	114	100.0%	114	100.0%	330	100.0%
Post-test	62	60.8	77	67.5	100	87.7	239	72.4
Total prenatal WIC women	102	100.0	114	100.0	114	100.0	330	100.0

*Includes unmatched pretests.

Exhibit C.1 (continued)

Total Completed Tests Among Prenatal WIC Women by Treatment Group by Site

Site 5

	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Pretest*	286	100.0%	291	100.0%	289	100.0%	866	100.0%
Post-test	194	67.8	182	62.5	259	89.6	635	73.3
Total prenatal WIC women	286	100.0	291	100.0	289	100.0	866	100.0

Site 6

	Innovative		Traditional		Control		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Pretest*	138	100.0%	135	100.0%	138	100.0%	411	100.0%
Post-test	67	48.6	60	44.4	114	82.6	241	58.6
Total prenatal WIC women	138	100.0	135	100.0	138	100.0	411	100.0

*Includes unmatched pretests.

Exhibit C.2

Nutrition Education Attendance Among Prenatal WIC Women by Site

Site 1

	Innovative		Traditional		Total	
	Number	Percent	Number	Percent	Number	Percent
Pretest*	144	100.0%	148	100.0%	292	100.0%
Attended Nutrition Education	122	84.7	121	81.8	243	83.2
Post-test	98	68.1	96	64.9	194	79.8

Site 2

	Innovative		Traditional		Total	
	Number	Percent	Number	Percent	Number	Percent
Pretest*	126	100.0%	127	100.0%	253	100.0%
Attended Nutrition Education	97	77.0	109	85.8	206	81.4
Post-test	85	67.5	85	66.9	170	82.5

Site 3

	Innovative		Traditional		Total	
	Number	Percent	Number	Percent	Number	Percent
Pretest*	148	100.0%	171	100.0%	319	100.0%
Attended Nutrition Education	91	61.5	95	55.6	186	58.3
Post-test	60	40.5	60	35.1	120	64.5

*Includes unmatched pretests.

NOTE
The study did not maintain attendance records for control group women following their post-tests.

Exhibit C.2 (continued)

Nutrition Education Attendance Among Prenatal WIC Women by Site

Site 4

	Innovative		Traditional		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Pretest*	102	100.0%	114	100.0%	216	100.0%
Attended Nutrition Education	98	96.1	108	94.7	206	95.4
Post-test	62	60.8	77	67.5	139	67.5

Site 5

	Innovative		Traditional		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Pretest*	286	100.0%	291	100.0%	577	100.0%
Attended Nutrition Education	234	81.8	227	78.0	461	79.9
Post-test	194	67.8	182	62.5	376	81.6

Site 6

	Innovative		Traditional		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Pretest*	138	100.0%	135	100.0%	273	100.0%
Attended Nutrition Education	90	65.2	93	68.9	183	67.0
Post-test	67	48.6	60	44.4	127	69.4

*Includes unmatched pretests.

NOTE
The study did not maintain attendance records for control group women following their post-tests.

Appendix D

Observations of Nutrition Education
WIC Nutrition Education Demonstration Study

Exhibit D.1

Receipt of Written Materials in Nutrition Education Sessions—Individual Sites

Certification Sessions	Site 1 (n=14)		Site 2 (n=8)		Site 3 (n=9)		All Sites (n=31)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Total handouts received	8.2	1-14	4.9	1-6	5.2	1-10	6.5	1-14
Total handouts reviewed with participant	1.6	0-11	3.1	0-6	4.9	1-10	2.9	0-11
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Received *How WIC Helps - Eating for You and Your Baby* brochure	10	71	4	50	1	11	15	48
Received *Guide to Good Eating/ Food Guide Pyramid* handout	4	29	2	25	2	22	8	26

Traditional Followup Sessions	Site 1 (n=33)		Site 2 (n=20)		Site 3 (n=21)		All Sites (n=74)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Total handouts received	1.7	0-9	1.7	0-6	6.2	0-10	3.0	0-10
Total handouts reviewed with participant	0.5	0-4	0.6	0-2	6.4	0-10	2.2	0-10
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Received *How WIC Helps - Eating for You and Your Baby* brochure	3	9	0	0	0	0	3	4
Received *Guide to Good Eating/ Food Guide Pyramid* handout	6	18	2	10	7	33	15	20

Exhibit D.2

Staff/Participant Interaction in Certification Sessions—Individual Sites

	Site 1 (n=14)		Site 2 (n=8)		Site 3 (n=9)		All Sites (n=31)	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Introduction								
Counselor introduces self	9	64%	4	50%	8	89%	21	68%
Counselor has a name tag for identification	0	0	2	25	2	22	4	13
Counselor provides general overview of session	8	57	4	50	4	44	16	52
Staff/Participant Interaction								
Counselor discusses all risk factors	11	79	5[1]	71	5	56	21[1]	70
Counselor investigates participant's understanding of a majority of key concepts	11	79	4	50	6	67	21	68
Counselor provides opportunity for questions	14	100	4	50	8	89	26	84
Participant asks questions or initiates line of discussion more than two times	1	7	1	12	4	44	6	19
Counselor addresses participant's questions or concerns in a supportive manner	14[2]	100	4[1,2]	100	8[2]	89	26[1,2]	96
Counselor maintains a non-judgmental attitude at all times	14	100	7	88	9	100	30	97
Pace of presentation is appropriate to material	11	79	6	75	9	100	26	84
Pace of presentation is appropriate for participants	12	86	6	75	9	100	27	87

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2] Base includes only sessions in which participants expressed questions or concerns.

Exhibit D.2 (continued)

Staff/Participant Interaction in Traditional Followup Sessions—Individual Sites

	Site 1 (n=33)		Site 2 (n=20)		Site 3 (n=21)		All Sites (n=74)	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Introduction								
Counselor introduces self	25	76%	9	45%	15	71%	49	66%
Counselor has a name tag for identification	0	0	0[1]	0	10	48	10[1]	14
Counselor provides general overview of session	16[1]	50	0[1]	0	5	24	21[1]	29
Staff/Participant Interaction								
Counselor discusses all risk factors	23	70	5[1]	26	8	38	36[1]	49
Counselor investigates participant's understanding of a majority of key concepts	23	70	6[1]	32	15	71	44	60
Counselor provides opportunity for questions	33	100	13	65	21	100	67	91
Participant asks questions or initiates line of discussion more than two times	10	30	7	35	14[1]	70	31[1]	42
Counselor addresses questions or concerns raised by participant in a supportive manner	33[2]	100	10[1,2]	100	21	100	64[1,2]	100
Counselor maintains a non-judgmental attitude at all times	33	100	18	90	20	95	71	96
Pace of presentation is appropriate to material	32	97	19	95	21	100	72	97
Pace of presentation is appropriate for participant	32	97	20	100	21	100	73	99

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2] Base includes only sessions in which participants expressed questions or concerns.

Exhibit D.2 (continued)

Staff/Participant Interaction in Innovative Followup Sessions—Individual Sites

	Site 1 (n=19)		Site 2 (n=13)		Site 3 (n=17)		All Sites (n=49)	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Introduction								
Staff person shows participant to kiosk	19	100%	13	100%	9	53%	41	84%
Staff person provides general instructions	18	95	10	77	8	47	36	73
Information to initiate touch-screen video is in kiosk	16	84	13	100	13	76	42	86
Staff/Participant Interaction								
Staff person checks on participant	9	47	1	8	9	53	19	39
Staff person provides opportunity for questions	7[1]	39	2	15	8[1]	50	17[1]	36
Participant asks more than two questions	2	11	0	0	7[1]	44	9[1]	19
Counselor addresses participant's questions or concerns in a supportive manner	10[1,2]	83	1[1,2]	50	6[1,2]	67	17[1]	74

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2] Base includes only sessions in which participants expressed questions or concerns.

Exhibit D.3

Environmental Characteristics of Certification Sessions—Individual Sites

	Site 1 (n=14)		Site 2 (n=8)		Site 3 (n=9)		All Sites (n=31)	
Environmental Characteristics	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Space is of adequate size	14	100%	8	100%	9	100%	31	100%
Space is private enough so that others cannot overhear conversation	14	100	8	100	7	78	29	94
Temperature is comfortable: not too warm or too cold	12	86	8	100	8	89	28	90
Noise level is low enough that participants can converse easily without straining or distraction	14	100	8	100	8	89	30	97
Session is not interrupted more than once by telephone or other WIC staff	13	93	7	88	6	67	26	84
Session is not interrupted more than once by children	2[1,2]	33	0[1,2]	0	0[1,2]	0	2[1,2]	22
Toys or other activities are available for children	1[1,2]	17	1[1,2]	100	1[1,2]	50	3[1,2]	33

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2]Base includes only sessions in which children were present.

Exhibit D.3 (continued)

Environmental Characteristics of Traditional Followup Sessions—Individual Sites

	Site 1 (n=33)		Site 2 (n=20)		Site 3 (n=21)		All Sites (n=74)	
Environmental Characteristics	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Space is of adequate size	33	100%	18[1]	100%	21	100%	72[1]	100%
Space is private enough so that others cannot overhear conversation	30	91	18[1]	100	19	90	67[1]	93
Temperature is comfortable: not too warm or too cold	33	100	18[1]	100	19	90	70[1]	97
Noise level is low enough that participants can converse easily without straining or distraction	30	91	17	85	20	95	67	91
Session is not interrupted more than once by telephone or other WIC staff	32	97	18[1]	100	18	86	68[1]	94
Session is not interrupted more than once by children	1[1,2]	33	3[1,2]	60	2[1,2]	67	6[1,2]	55
Toys or other activities are available for children	0[1,2]	0	2[1,2]	40	0[1,2]	0	2[1,2]	18

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2]Base includes only sessions in which children were present.

Exhibit D.3 (continued)

Environmental Characteristics of Innovative Followup Sessions—Individual Sites

	Site 1 (n=19)		Site 2 (n=13)		Site 3 (n=17)		All Sites (n=49)	
Environmental Characteristics	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Space is of adequate size	18	95%	13	100%	13	76%	44	90%
Space is private	0	0	13	100	12	71	25	51
Temperature is comfortable: not too warm or too cold	18	95	12	92	15	94	45	94
Noise level is low enough that participants can concentrate on touch-screen video	15	79	11	85	14	82	40	82
Session is not interrupted more than once by telephone or other WIC staff	18	95	12[1]	100	16	94	46[1]	96
Session is not interrupted more than once by children	5[1,2]	62	1[1,2]	50	1[1,2]	25	7[1,2]	50
Toys or other activities are available for children	6[1,2]	75	1[1,2]	50	0[1,2]	0	7[1,2]	50

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2]Base includes only sessions in which children were present.

Exhibit D.4

Receipt of Written Materials in Nutrition Education Sessions—Group Sites

Certification Sessions	**Site 4 (n=8)**		**Site 5 (n=26)**		**Site 6 (n=13)**		**All Sites (n=47)**	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Total handouts received	10.9	2-23	5.0	1-16	7.5[1]	1-16	6.7[1]	1-23
Total handouts reviewed with participant	3.0	1-5	4.4	1-16	1.5	0-3	3.4	0-16
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Received *How WIC Helps - Eating for You and Your Baby* brochure	7	88%	14	52%	5	38%	26	55%
Received *Guide to Good Eating/ Food Guide Pyramid* handout	3	38	10	38	1	8	14	30
Traditional Followup Sessions[2]	**Site 4 (n=17)**		**Site 5 (n=32)**		**Site 6 (n=10)**		**All Sites (n=59)**	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Total handouts received	3.9	2-5	1.5	0-8	2.3	0-4	2.3	0-8
Total handouts reviewed with participant	2.9	1-5	1.1	0-5	1.7	0-3	1.7	1-5
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Received *How WIC Helps - Eating for You and Your Baby* brochure	6	35%	1	3%	0	0%	7	12%
Received *Guide to Good Eating/ Food Guide Pyramid* handout	17	100	5	16	5	50	27	46
Innovative Followup Sessions	**Site 4 (n=14)**		**Site 5 (n=35)**		**Site 6 (n=9)**		**All Sites (n=58)**	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Total handouts received	4.0	3-5	3.9	1-6	4.6	1-7	4.0	1-7
Total handouts reviewed with participant	4.2	1-5	4.1	2-6	3.8	2-7	4.1	1-7
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Received *How WIC Helps - Eating for You and Your Baby* brochure	7	50%	1	3%	6	67%	14	24%
Received *Guide to Good Eating/ Food Guide Pyramid* handout	14	100	33	94	8	89	55	95

[1]Base number of responses for this item is less than the total sample size for the site(s).
[2]Data for Sites 4 and 5 are from group followup sessions. Data for Site 6, however, are from individual counseling sessions because this is the site's traditional form of followup education.

Exhibit D.5

Staff/Participant Interaction in Certification Sessions—Group Sites

	Site 4 (n=8)		Site 5 (n=26)		Site 6 (n=13)		All Sites (n=47)	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Introduction								
Counselor introduces self	2	25%	2	8%	13	100%	17	36%
Counselor has a name tag for identification	6	75	1	4	6	46	13	28
Counselor provides general overview of session	5	62	4	15	0	0	9	19
Staff/Participant Interaction								
Counselor discusses all risk factors	7	88	21	81	11[1]	92	39[1]	85
Counselor investigates participant's understanding of a majority of key concepts	4	50	14[1]	56	5	38	23[1]	50
Counselor provides opportunity for questions	7	88	25	96	10	77	42	89
Participant asks questions or initiates line of discussion more than two times	5	62	13	50	7	54	25	53
Counselor addresses participant's questions or concerns in a supportive manner	6[1,2]	100	21[1,2]	95	9[1,2]	90	36[1,2]	95
Counselor maintains a non-judgmental attitude at all times	7	88	25	96	12	92	44	94
Pace of presentation is appropriate to material	8	100	22	85	13	100	43	91
Pace of presentation is appropriate for participants	8	100	23	88	13	100	44	94

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2] Base includes only sessions in which participants expressed questions or concerns.

Exhibit D.5 (continued)

Staff/Participant Interaction in Traditional Followup Sessions—Group Sites[1]

	Site 4 (n=17)		Site 5 (n=32)		Site 6 (n=10)		All Sites (n=59)	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Introduction								
Group leader/counselor introduces self	17	100%	10	31%	6	60%	33	56%
Group leader/counselor has a name tag for identification	16	94	3	9	9	90	28	47
Group leader/counselor provides general overview of session	16	94	16	50	1	10	33	56
Staff/Participant Interaction								
Counselor discusses all risk factors	N/A[2]	N/A[2]	N/A[2]	N/A[2]	8[4]	100	8[2,3]	100
Ice breaker is used at beginning of session	10	59	6	19	N/A[4]	N/A[4]	16[3,4]	33
Group leader/counselor investigates participant understanding of a majority of key concepts	11	69	11	34	5	50	27	47
Group leader/counselor provides opportunity for questions	17	100	29	91	4	40	50	85
Participant(s) ask(s) questions or initiate(s) line of discussion more than two times	5	29	8[3]	27	6	60	19[3]	33
Group leader/counselor addresses questions or concerns raised by participant(s) in a supportive manner	8[3,5]	100	22[3,5]	100	7[3,5]	100	37[3,5]	100
Group educator/counselor maintains a non-judgmental attitude at all times	17	100	28	88	6	60	51	86
One or more interactive activities are used	0[3]	0	2[3]	7	N/A[4]	N/A[4]	2[3,4]	4
Pace of presentation is appropriate to material	17	100	31	97	9	90	57	97
Pace of presentation is appropriate for participant(s)	17	100	30	94	10	100	57	97

[1] Data for Sites 4 and 5 are from group followup classes. Data for Site 6, however, are from individual counseling sessions because this method is the site's traditional form of followup education.
[2] Data on this item were collected only in individual counseling sessions.
[3] The base number of responses for this item is less than the total sample size for the site(s).
[4] Data on this item were collected only in group education sessions
[5] Base includes only sessions in which participants expressed questions or concerns.

Exhibit D.5 (continued)

Staff/Participant Interaction in Innovative Followup Sessions—Group Sites

	Site 4 (n=14)		Site 5 (n=35)		Site 6 (n=9)		All Sites (n=58)	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Introduction								
Group leader introduces self	14	100%	25	71%	8	89%	47	81%
Group leader has a name tag for identification	14	100	16	46	5	56	35	60
Group leader provides general overview of session	10	77	27	77	5	56	42	74
Staff/Participant Interaction								
Ice breaker is used at beginning of session	14	100	27	77	6	67	47	81
Group leader investigates participant's understanding of a majority of key concepts	13	93	29	83	6	67	48	83
Group leader provides opportunity for questions	14	100	34[1]	100	9	100	57[1]	100
Participants ask questions or initiates line of discussion more than two times	11	79	27[1]	82	8	89	46[1]	82
Group leader addresses questions or concerns raised by participants in a supportive manner	12[1,2]	100	33[1,2]	100	8[2]	89	53[1, 2]	98
Group leader maintains a non-judgmental attitude at all times	14	100	35	100	7	78	56	97
One or more interactive activities are used	13[1]	100	35	100	9	100	57[1]	100
Pace of presentation is appropriate to material	14	100	34	97	9	100	57	98
Pace of presentation is appropriate for participants	14	100	34	97	9	100	57	98

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2] Base includes only sessions in which participants expressed questions or concerns.

Exhibit D.6

Environmental Characteristics of Certification Sessions—Group Sites

	Site 4 (n=8)		Site 5 (n=26)		Site 6 (n=13)		All Sites (n=47)	
Environmental Characteristics	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Space is of adequate size	8	100%	26	100%	13	100%	47	100%
Space is private enough so that others cannot overhear conversation	8	100	24	92	9	69	41	87
Temperature is comfortable: not too warm or too cold	8	100	25	96	13	100	47	98
Noise level is low enough that participants can converse easily without straining or distraction	8	100	24	92	12	92	44	94
Session is not interrupted more than once by telephone or other WIC staff	7	88	24	96	12	92	43	93
Session is not interrupted more than once by children	N/A[1]	N/A[1]	4[2,3]	57	0[2,3]	0	4[2,3]	44
Toys or other activities are available for children	N/A[1]	N/A[1]	3[2,3]	43	1[2,3]	50	4[2,3]	44

[1]No children were present during any of the observed certification sessions at Site 4.
[2]The base number of responses for this item is less than the total sample size for the site(s).
[3]Base includes only sessions in which children were present.

Exhibit D.6 (continued)

Environmental Characteristics of Traditional Followup Sessions—Group Sites[1]

	Site 4 (n=17)		Site 5 (n=32)		Site 6 (n=10)		All Sites (n=59)	
Environmental Characteristics	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Space is of adequate size	17	100%	31	97%	10	100%	58	98%
Space is private enough so that others cannot overhear conversation	17	100	27	84	9	90	53	90
Temperature is comfortable: not too warm or too cold	17	100	31	97	10	100	58	98
Noise level is low enough that participants can converse easily without straining or distraction	17	100	26[2]	87	10	100	53[2]	93
Session is not interrupted more than once by telephone or other WIC staff	17	100	29	91	10	100	56	95
Session is not interrupted more than once by children	9[2,3]	90	14[2,3]	67	2[2,3]	100	25[2,3]	76
Toys or other activities are available for children	3[2,3]	30	3[2,3]	14	0[2,3]	0	6[2,3]	19

[1]Data for sites 4 and 5 are from group followup sessions. Data for site 6, however, are from individual counseling sessions because this method is the site's traditional form of followup education.
[2]The base number of responses for this item is less than the total sample size for the site(s).
[3]Base includes only sessions in which children were present.

Exhibit D.6 (continued)

Environmental Characteristics of Innovative Followup Sessions—Group Sites

	Site 4 (n=14)		Site 5 (n=35)		Site 6 (n=9)		All Sites (n=58)	
Environmental Characteristics	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Space is of adequate size	14	100%	35	100%	9	100%	58	100%
Space is private enough so that others cannot overhear conversation	14	100	29	83	7	78	50	86
Temperature is comfortable: not too warm or too cold	14	100	35	100	9	100	58	100
Noise level is low enough that participants can converse easily without straining or distraction	14	100	32	91	9	100	55	95
Session is not interrupted more than once by telephone or other WIC staff	14	100	32	91	8	89	54	93
Session is not interrupted more than once by children	8[1,2]	80	14[1,2]	70	4[1,2]	67	26[1,2]	72
Toys or other activities are available for children	9[1,2]	90	4[1,2]	20	2[1,2]	33	15[1,2]	42

[1]The base number of responses for this item is less than the total sample size for the site(s).
[2]Base includes only sessions in which children were present.

Appendix E

Pilot Test Results
WIC Nutrition Education Demonstration Study

The prenatal measure of nutrition knowledge was pilot tested in local WIC agencies in Massachusetts during July and August 1995. The prenatal testing was conducted in two-hour sessions comprised of pretests followed by nutrition education and post-tests. The pilot-test nutrition education sessions were taught by the project nutritionist and covered the information on the topic, *pregnancy and nutrition.* The general outline for these sessions was:

- 10 to 15 minutes for latecomers to arrive
- 30 minutes for introduction and pretest
- 10 to 15 minutes for break and snack
- 35 to 45 minutes for "ice breaker" and nutrition education
- 20 to 30 minutes for post-test
- 10 minutes to distribute incentives ($20 per participant)

The nutrition education for women was based on the demonstration's five educational objectives: food groups/the Food Guide Pyramid; diet for pregnancy; food choices—*anytime* versus *sometimes* foods; nutrients for a healthy mother and baby; and nutrients in WIC foods. Each session began with an ice breaker designed to involve the women and increase the relevance of the topic of diet and pregnancy for the attendees. The nutrition education session incorporated adult learning techniques to keep the participants actively involved. The USDA pamphlet, *How WIC Helps*, was used as a reference for one of the educational activities and given to the participants to take home.

Percentage Change from Pretest to Post-test

Change scores were recorded for eighty-seven pilot test participants. Only three individuals scored lower on the post-test than on the pretest. The largest increase from pretest to post-test was 21.1 percent. Percentage increases from pretest to post-test are summarized in Exhibit E.1.

Significant increases in diet and pregnancy test scores were observed from pretest to post-test. Pretest and post-test scores, as well as score changes from pretest to post-test, were normally distributed with no evidence of ceiling or floor effects.

Exhibit E.1
Percentage of Participants by Change in Score
(N=87)

Range of score change	
Less than 0 percent	3%
0-5 percent	21
5-10 percent	35
10-15 percent	23
15-20 percent	17
More than 20 percent	1

Individual Item Analysis

Detailed information for each of the seventy-six diet and pregnancy items that remained in the pilot test was calculated including percent of respondents answering each item correctly on pretest and post-test, the item-total correlation of each item at pre- and post-test, and the percent change for each item from pre- to post-test. Item difficulty information is summarized in Exhibit E.2

Exhibit E.2
Number of Items by Difficulty Range
(Total= 76 items)

Score range	Pretest	Post-test
0-50 percent	18	8
50-60 percent	10	7
60-70 percent	8	9
70-80 percent	15	14
80-90 percent	13	27
90-100 percent	12	11

There was little indication of a ceiling effect at post-test. Of course, for the twelve items where over 90

percent of the participants provided correct responses in the pretest, little positive change could be observed. Of those items, only four had any gain, and the average increase in correct response from pretest to post-test was less than 2 percent. Those twelve items, then, were of little use for observing knowledge gains and were not included in the final version of the prenatal test. Changes in percentages of items correct from pretest to post-test are shown in Exhibit E.3.

Exhibit E.3

Number of Items by Change in Percent of Participants Responding Correctly (N=76)

8 percent decline or greater	5
3 to 8 percent decline	8
0 to 3 percent decline	7
Up to 3 percent gain	15
3 to 8 percent gain	12
More than 8 percent	29

Positive change was recorded for fifty-six of the remaining seventy-six items. Declines of greater than 3 percent were found for thirteen of the seventy-six items.

Appendix F

Forms A and B
Test of Nutrition Knowledge
WIC Nutrition Education Demonstration Study

PLACE STICKER HERE

Pregnancy and Nutrition

Test for Prenatal WIC Clients

Form A

Agency ID	|___|___|
Site ID	|___|___|
Tester ID	|___|___|
Date	|___|___|___|___|___|___|

INTRODUCTION Hello, My name is GIVE YOUR NAME. I am calling from Abt Associates. You probably remember that in MONTH OF PRETEST, we interviewed you at your WIC office. At that time we asked you some questions about nutrition. We also told you that we would call you to ask you some more questions about nutrition. I am calling to ask those questions. Before we begin, do you have any questions for me? ANSWER QUESTIONS. OK, let's begin.

These questions are about the Food Pyramid which you may have seen in the WIC office and about the foods and nutrients that a woman should try to eat while she is pregnant. The first section has questions with three choices. I will read the question to you. Then, I will read three possible answers. Please tell me your answer.

A.1 Which food of the list I will read to you is found in the same Food Pyramid group as **tuna fish**?

(a) Pasta
(b) Peanuts
(c) Rice

A.2 How many servings should a pregnant woman eat each day from the Food Pyramid group with **meat** in it?

(a) 2 to 3
(b) 3 to 4
(c) 4 to 5

A.3 How many servings should a pregnant woman eat each day from the Food Pyramid group with **potatoes** in it?

(a) 3
(b) 4
(c) 5

A.4 How many servings should a pregnant woman eat each day from the Food Pyramid group with **bread** in it?

(a) 7
(b) 8
(c) 9

A.5 Why does the group with bread in it have a larger section on the Food Pyramid than the group with milk in it?

(a) Bread is more important than milk for pregnant women.

(b) Each day, a person should eat more servings from the group with bread in it than the group with milk in it.

(c) There are more foods in the group with bread in it than the group with milk in it.

A.6 How many cups of cooked vegetables equal one serving for the Vegetable Group according to the Food Pyramid?

(a) 1/2
(b) 1
(c) 1-1/2

A.7 How many slices of bread equals one serving for the Bread Group in the Food Pyramid?

(a) 1
(b) 1-1/2
(c) 2

INSTRUCTION The next few questions are about the nutrients in the food that pregnant women should eat.

A.8 Why is it important to increase your intake of iron while you are pregnant?

(a) It helps build your baby's blood supply.
(b) It helps your baby's muscles develop.
(c) It helps your baby's bones grow.

A.9 What is one important reason to eat foods that are rich in vitamin C?

(a) To aid iron absorption
(b) To lower cholesterol
(c) To prevent constipation

A.10 What is one reason to eat foods that are rich in vitamin A while you are pregnant?

(a) To help your bones to be strong
(b) To protect you and the baby against infection
(c) To prevent nausea

A.11 What is one reason that carbohydrates are important for your diet while you are pregnant?

(a) They help prevent excess weight gain.
(b) They help promote normal digestion.
(c) They help the body make the best use of other nutrients.

A.12 What is one reason that Vitamin A is important for your diet when you are pregnant?

(a) It builds your blood supply.
(b) It helps blood clot.
(c) It helps keep your skin healthy.

A.13 What is one reason that dietary fiber is important for you while you are pregnant?

(a) It helps you have an easy delivery.
(b) It helps your body form red blood cells.
(c) It helps keep your digestive tract healthy.

A.14 What is one reason that protein is important for your diet while you are pregnant?

(a) It helps muscles perform normally.
(b) It helps keep teeth and gums healthy.
(c) It helps blood clot.

A.15 Which one of the following foods is a good source of iron for a woman who is pregnant?

(a) Beets
(b) Red meats
(c) Raisins

A.16 Which one of the following foods is a good source of folate for a woman who is pregnant?

(a) Corn
(b) Carrots
(c) Spinach

A.17 Which one of the following foods is a good source of Vitamin C for a woman who is pregnant?

(a) Cantaloupe
(b) Milk
(c) Apples

A.18 Which one of the following foods is a good source of protein for a woman who is pregnant?

(a) Cream cheese
(b) Popcorn
(c) Almonds

A.19 Which of the following foods is a "sometimes" food?

(a) Lentils
(b) French fries
(c) Baked potato

A.20 Which WIC food is a good source of protein for pregnant women?

(a) Cereal
(b) Apple juice
(c) Eggs

A.21 Which WIC food is a good source of calcium for pregnant women?

(a) Cheese
(b) Cereal
(c) Dried beans and peas

INSTRUCTION The next question has two choices for the answer. Please tell me which response you think is correct.

A.22 If you had a choice between a bacon, lettuce, and tomato sandwich or cheese pizza for lunch, which is a better choice for every day?

(a) Bacon, lettuce, and tomato sandwich
(b) Cheese pizza

INSTRUCTION Some of the statements I am going to read to you are **true**. Some are **false**. After I read each statement, please tell me whether you think it is true or false.

A.23 Variety in your diet means eating something from every food group at every meal.

T F

A.24 Pregnant women must eat kidney beans or other dried beans to get enough protein.

T F

A.25 It is a good idea to eat more foods from the food groups that are the smallest on the Food Pyramid because they are the healthiest foods.

T F

A.26 Many foods in the Milk Group are good sources of iron.

T F

A.27 Many foods in the Vegetable Group contain Vitamin C.

T F

A.28 "Everyday" foods supply a lot of nutrients without a lot of extra fat, sugar, or salt.

T F

A.29 "Everyday" foods should be eaten every day because they have more nutrients than "sometimes" foods.

T F

A.30 Milk is a good source of iron.

T F

INSTRUCTION Now, I'd like to ask you some questions about WIC.

A.31 First, are you, personally, still receiving WIC benefits at PRETEST SITE?

Yes SKIP TO QA.32 1
No ASK QA.31A 2
Don't know SKIP TO QA.32 3

A.31a When did you stop receiving WIC benefits at PRETEST SITE?

DATE ___/___/_____

A.32 Think about your contacts with WIC staff since MONTH OF PRETEST. Have you . . .

	Yes	No	Don't know
Picked up vouchers or checks?	1	2	3
Talked one-to-one with a WIC staff member about nutrition?	1	2	3
Attended a group meeting or class about nutrition?	1	2	3
Learned about nutrition through WIC in any other way?	1	2	3

SPECIFY _____

_____

A.33 Has WIC provided you with information about . . .

	Yes	No	Don't know
The Food Guide Pyramid?	1	2	3
Recommended daily servings for the major food groups?	1	2	3
Portion sizes that represent one serving for various foods?	1	2	3
The nutrients that pregnant women should eat regularly?	1	2	3
Food sources that contain important nutrients for pregnant women?	1	2	3
The benefits of breastfeeding?	1	2	3

A.34 Now think about all the nutrition information you got at WIC since we talked with you in MONTH OF PRETEST. I will read a list of statements. Please tell me whether or not you agree or disagree.

Do you . . .

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
My questions about nutrition were answered	1	2	3	4	5
Information about nutrition was explained in ways that I could understand	1	2	3	4	5
I am confused about the nutrition information I received from WIC	1	2	3	4	5
I enjoyed the nutrition education WIC provided	1	2	3	4	5
I learned a lot about nutrition from WIC	1	2	3	4	5
I am satisfied with WIC nutrition education	1	2	3	4	5
I can use the information about nutrition to improve my own diet	1	2	3	4	5

PLACE STICKER HERE

Pregnancy and Nutrition

Test for Prenatal WIC Clients

Form B

Agency ID	|___|___|
Site ID	|___|___|
Tester ID	|___|___|
Date	|___|___|___|___|___|___|

INTRODUCTION Hello, My name is GIVE YOUR NAME. I am calling from Abt Associates. You probably remember that in MONTH OF PRETEST, we interviewed you at your WIC office. At that time we asked you some questions about nutrition. We also told you that we would call you to ask you some more questions about nutrition. I am calling to ask those questions. Before we begin, do you have any questions for me? ANSWER QUESTIONS. OK, let's begin.

These questions are about the Food Pyramid which you may have seen in the WIC office and about the foods and nutrients that a woman should try to eat while she is pregnant. The first section has questions with three choices. I will read the question to you. Then, I will read three possible answers. Please tell me your answer.

B.1 Which food of the list I will read to you is found in the same Food Pyramid group as **tuna fish**?

(a) Pasta
(b) Peanuts
(c) Rice

B.2 Which food in the list below is found in the same Food Pyramid group as **broccoli**?

(a) Raisins
(b) Sunflower seeds
(c) Potatoes

B.3 How many servings should a pregnant woman eat each day from the Food Pyramid group with **milk** in it?

(a) 2
(b) 3
(c) 4

B.4 How many servings should a pregnant woman eat each day from the Food Pyramid group with **apples** in it?

(a) 3
(b) 4
(c) 5

B.5 How many servings should a pregnant woman eat each day from the Food Pyramid group with **rice** in it?

(a) 8
(b) 9
(c) 10

B.6 How many eight-ounce cups of milk are equal to one serving for the Milk Group according to the Food Pyramid?

(a) 1
(b) 3
(c) 5

B.7 How many ounces of meat, fish, or poultry equal one serving for the Meat Group according to the Food Pyramid?

(a) 1 to 2
(b) 2 to 3
(c) 3 to 4

INSTRUCTION The next few questions are about the nutrients in the food that pregnant women should eat.

B.8 What is one important reason to increase your intake of folate while you are pregnant?

(a) To avoid water retention
(b) To keep hair and skin healthy
(c) To build blood cells

B.9 Why is it important to increase your intake of iron while you are pregnant?

(a) It helps build your baby's blood supply.
(b) It helps your baby's muscles develop.
(c) It helps your baby's bones grow.

B.10 Why is it important to increase your intake of folate early in your pregnancy?

(a) It makes your baby kick less.
(b) It helps to prevent spinal cord abnormalities in your baby.
(c) It helps to prevent Down's Syndrome.

B.11 What is one reason to eat foods that are rich in vitamin A while you are pregnant?

(a) To help your bones to be strong
(b) To protect you and the baby against infection
(c) To prevent nausea

B.12 What is one reason that protein is important for your diet while you are pregnant?

(a) It helps build and repair body tissue.
(b) It helps prevent insomnia.
(c) It helps digestion during pregnancy.

B.13 What is one reason that Vitamin C is important for your diet while you are pregnant?

(a) It helps your keep your eyes healthy.
(b) It helps keep your bones and teeth strong.
(c) It helps your body resist infection.

B.14 What is one reason that iron is important for your diet while you are pregnant?

(a) It helps prevent bloating.
(b) It helps keep your blood pressure under control.
(c) It helps protect you against infection.

B.15 Which one of the following foods is a good source of protein for a woman who is pregnant?

(a) Applesauce
(b) Potatoes
(c) Chicken

B.16 Which one of the following foods is a good source of calcium for a woman who is pregnant?

(a) Broccoli
(b) Cauliflower
(c) Potatoes

B.17 Which one of the following foods is a good source of protein for a woman who is pregnant?

(a) Cream cheese
(b) Popcorn
(c) Almonds

B.18 Which one of the following foods is a good source of iron for a woman who is pregnant?

(a) Dried beans and peas
(b) Apple juice
(c) Green beans

B.19 Which of the following foods is an "everyday" food?

(a) A slice of bacon
(b) An English muffin
(c) A dish of ice cream

B.20 Which one of the following foods is a "sometimes" food?

(a) Popcorn
(b) Potato chips
(c) Graham crackers

B.21 Which WIC food is a good source of iron for pregnant women?

(a) Peanut butter
(b) Cheese
(c) Juice

B.22 Which WIC food is a good source of calcium for pregnant women?

(a) Cheese
(b) Cereal
(c) Dried beans and peas

B.23 Which WIC food is a good source of Vitamin A for pregnant women?

(a) Cheese
(b) Milk
(c) Dried beans

INSTRUCTION The next question has two choices for the answer. Please tell me the response you think is correct.

B.24 If you had a choice between angel food cake or a doughnut for a snack, which is a better choice for every day?

(a) Angel food cake
(b) Doughnut

INSTRUCTION Some of the statements I am going to read to you are **true**. Some are **false**. After I read the statement to you, please tell me whether you think it is true or false.

B.25 Variety in your diet means eating foods like broccoli that contain many different nutrients.

T F

B.26 Six servings from the Bread Group will provide all the nutrients needed by a pregnant woman for one day.

T F

B.27 It is a good idea to eat more foods from the food groups that are the smallest on the Food Pyramid because they are the healthiest foods.

T F

B.28 The Bread Group has the largest area on the Food Pyramid because it contains the most foods.

T F

B.29 Many foods in the Fruit Group are good sources of calcium.

T F

B.30 Many foods in the Bread Group are good sources of fiber.

T F

INSTRUCTION Now, I'd like to ask you some questions about WIC.

B.31 First, are you, personally, still receiving WIC benefits at PRETEST SITE?

Yes SKIP TO QB.32 1
No ASK QB.31A 2
Don't know SKIP TO QB.32 3

B.31a When did you stop receiving WIC benefits at PRETEST SITE?

DATE ___/___/_____

B.32 Think about your contacts with WIC staff since MONTH OF PRETEST. Have you . . .

	Yes	No	Don't know
Picked up vouchers or checks?	1	2	3
Talked one-to-one with a WIC staff member about nutrition?	1	2	3
Attended a group meeting or class about nutrition?	1	2	3
Learned about nutrition through WIC in any other way?	1	2	3

SPECIFY _____

_____

B.33 Has WIC provided you with information about . . .

	Yes	No	Don't know
The Food Guide Pyramid?	1	2	3
Recommended daily servings for the major food groups?	1	2	3
Portion sizes that represent one serving for various foods?	1	2	3
The nutrients that pregnant women should eat regularly?	1	2	3
Food sources that contain important nutrients for pregnant women?	1	2	3
The benefits of breastfeeding?	1	2	3

B.34 Now think about all the nutrition information you got at WIC since we talked with you in MONTH OF PRETEST. I will read a list of statements. Please tell me whether or not you agree or disagree.

Do you . . .

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
My questions about nutrition were answered	1	2	3	4	5
Information about nutrition was explained in ways that I could understand	1	2	3	4	5
I am confused about the nutrition information I received from WIC	1	2	3	4	5
I enjoyed the nutrition education WIC provided	1	2	3	4	5
I learned a lot about nutrition from WIC	1	2	3	4	5
I am satisfied with WIC nutrition education	1	2	3	4	5
I can use the information about nutrition to improve my own diet	1	2	3	4	5

Appendix G

Test Scoring and Analysis
Test Objectives and Item Map Adjusting Mean Test Scores
WIC Nutrition Education Demonstration Study

In this appendix, we explain test-scoring, including a listing of test objectives and our item map, and our methodology for adjusting mean test scores.

Scoring

Scaled scores were calculated for the thirty comparison items included on both the pre- and post-tests. Each item was assigned a maximum score of 1.0; each test has a maximum total score of 30.0. Scores are then reported as percentages, with 100 percent representing a perfect score of 30.0. There are three possible responses for Items 1 to 21 on Form A and for Items 1 to 23 on Form B. For Items 22 to 30 on Form A and Items 24 to 30 on Form B, one of two responses can be selected. Only correct responses receive credit, so each item is scored dichotomously as 0 or 1. (Correct item responses can be found in Appendix F.) As explained in Chapter Five, the majority of items on each test form are unique. In fact, only six of the thirty comparison items are included on both Forms A and B. The remaining twenty-four items are unique to each form.

In addition to scoring each item and calculating a total score, scores were created for each objective category. The four topics related to *pregnancy and nutrition* (described in Chapter Three) are:

I. The Food Guide Pyramid
II. Diet for Pregnancy
III. Food Choices: "Anytime" versus "Sometimes" Foods
IV. Nutrients in WIC Foods.

Each objective category, or topic, is composed of several test items that relate specifically to that topic. A test objective and item map appears in this appendix. There are twelve questions on the pretest that measure baseline breastfeeding knowledge and four questions on the post-test that assess respondents perceptions of WIC nutrition education. The "breastfeeding" items, Items 31 to 42, are questions that appear on both pretest Form A and B. Responses and scores for these items appear in Appendix F. The "perception" items, Items 31 to 34, appear on both post-test Forms A and B. Three of the four perception items contain sub-questions.

Overall Results: Form A and Form B

Exhibit G.1 summarizes the results by test form and combined treatment type. Pre- and post-test scores appear to be significantly different *within* the control and treatment types but not *between*

Exhibit G.1

Comparison of Prenatal Test Forms A and B

	Form A		Form B	
	Control	**Treatment**	**Control**	**Treatment**
Pretest				
Average percentage correct	51.3%	51.6%	55.9%	54.7%
Standard deviation	13.7	13.8	12.2	12.6
Cronbach alpha	.64	.66	.54	.56
Post-test*				
Average percentage correct	53.2%	53.8%	56.3%	56.3%
Standard deviation	13.9	13.9	11.9	12.4
Cronbach alpha	.65	.66	.53	.58

	Control	***Treatment***
Pretest A and Post-test B correlation (A/B)	.63	.62
Pretest B and Post-test A correlation (B/A)	.61	.56**

NOTES

* Pre- and post-test scores differ significantly for all groups with the exception of the pretest B/post-test A sequence for the treatment group, and they are lower rather than higher for this sequence in the control group.

** Pretest B appears to be an "easier" test.

[1] For the unmatched pretest group, the average score for pretest A is 49.7 percent (sd = 13.8) and for pretest B is 55.2 percent (sd = 12.0). Cronbach alpha values for this group are .66 (pretest A) and .53 (pretest B).

[2] Cronbach alpha standardized values differ from the raw values reported here by 1/10 of a percentage point.

types.[1] Increases in total score were observed from pre- to post-test for women receiving the pretest *A* and post-test *B* sequence.[2] Scores *increased* by approximately 5 percentage points for the control group ($t = 8.80$, $p < .0001$) and by approximately 4 percentage points for the treatment group ($t = 9.98$, $p < .0001$).[3] However, there is no real difference between the two types when pre- to post-test changes are

1 All scores are reported for prenatal women on *average*.

2 Again, women who received Form A at pretest received Form B at post-test and vice versa.

3 Paired-difference t-tests were performed to compare the paired groups. All tests are conducted at the .05 significance/95 percent confidence level.

compared. Conversely, scores declined for women receiving the pretest *B* and post-test *A* sequence. Scores *decreased* by approximately 3 percentage points for the control group ($t = -4.81$, $p < .0001$) and by approximately 1 percentage point for the treatment group ($t = -1.74$, $p < .10$). Scores at post-test appear to drop significantly from pretest scores for control women but not for treatment women. Again, there is no real difference between the two groups when pre- to post-test changes are compared. The standard deviations for all group scores and forms are similar.

In other words, when the pretest A/post-test B sequence was administered, scores *increased* significantly from pre- to post-test among control and treatment women but did *not* differ between groups. By contrast, when the pretest B/post-test A sequence was administered the scores for both control and treatment women *decreased* from pre- to post-test. This decrease was significant only for the control group; there was no real difference in these scores for treatment women. In sum, women's test scores in the control group and in combined treatment (innovative and traditional) do not differ.

Although scores do not markedly differ between control and treatment women, the scores for Form A and Form B do significantly differ within treatment types. The comparison of average pretest A and pretest B scores indicates differences in the control ($t = -5.03$, $p < .001$), treatment ($t = -3.97$, $p < .001$) and in the unmatched pretest group ($t = -6.70$, $p < .001$). In addition, the comparison of average post-test A and post-test B scores indicates differences between the two in the control ($t = 3.43$, $p < .001$) and treatment types ($t = 3.22$, $p < .01$).[4]

On average, Form B scores are higher than Form A scores for control, treatment, and unmatched pretest types. The Cronbach alpha—an index of internal consistency and test reliability based on the contribution of each item score to the total score—is .66 for Form A and .56 for Form B at pretest and .66 for Form A and .58 for Form B at post-test for treatment women. This disparity signifies that Form A and Form B differ despite pilot test results. The two forms do not appear to be of approximately equal difficulty.[5] Reassuringly, correlations between pre- and post-tests within each test are fairly high, which indicates a strong relationship between pre- and -post scores for each sequence.[6]

4 The post-test form comparison is applicable only for these groups.

5 See Chapter Three for a discussion of the development of these forms.

6 The correlation coefficients are similar to the Cronbach alpha values.

Analysis

The final analytic database contains only observations with matched pre- and post-tests. Our goal is determining whether or not nutrition education affected scores by examining differences between pre- and post-test scores. To *accurately* compare the pre- and post-test scores, we need to control for other "interference" in the sample, specifically, the differences in difficulty of test forms and in demographics across sites.

The model we selected examines variation attributable to differences between the treatment and control group and to variation due to error. The variation due to error is defined as occurring naturally or due to other factors not included in our model.[7] We determine if differences between groups are significant—larger than expected by chance. The effect of the nutrition education sessions was estimated by entering the outcome (post-test score) into an ordinary least squares regression based on all cases in the analytic sample (n = 1,926) with a total of 12 parameters: an intercept, 6 covariates (pretest score and other demographic variables), and 5 site-level variables.[8]

Although groups for each treatment type were randomly constructed, we are using statistical controls to compensate for any initial differences that occur by chance.[9] Covariates are included in the model to (1) help adjust for any initial differences in the sample; (2) to counteract any biasing effects of attrition as outlined in Chapters Four and Five; and, (3) to increase the precision of estimates by reducing some of the observed variance in the outcome variables. Including the covariates allows us to attribute any differences observed between treatment and control women to the effect of nutrition education rather than to other externalities.

7 Analyses were performed within the framework of General Linear Models (GLM) for the ease of handling both continuous and categorical variables to perform analysis of covariance combining regression and analysis of variance methods for more than one covariate, and to conduct tests on adjusted means. In addition, GLM is appropriate for unbalanced data. Regression models were also created to estimate effects.

8 Under this formulation, only five site-level coefficients are estimated for six sites. The intercept represents the estimate for the excluded site.

9 In this study, site comparisons are also confounded by educational conditions which include the testers, instructors, staff, and facilities. See our discussion of observation data in Chapter Four.

Covariates for this model include continuous variables (pretest score) and categorical variables (all demographic variables and site).[10] Conducting this analysis of covariance allows us to combine features of regression and analysis of variance. We include pretest score as a covariate to account for the difference between test forms and to obtain adjusted post-test scores for individuals based on their pretest scores. The demographic variables in the model are race/ethnicity, education level completed, age, and trimester at enrollment. Any additional site effects are also considered in the model through the inclusion of the individual sites as covariates. We do not include site by treatment type interactions because we believe colinearity between the two was avoided as a result of the randomization conducted *within* site. Interactions between pretest score and treatment group are not included because they are not significant.[11]

The same covariates are used in all models. No attempt has been made to interpret the coefficients of the covariates. They are helpful for obtaining the most accurate possible estimates of the overall effect of nutrition education.

In addition to determining any differences between treatment types, our models include adjusted means which control for pretest score, site, and all other demographic characteristics.[12] Although our model estimates determine differences between treatment types, these same differences can be detected by comparing the weighted-covariate adjusted means for each treatment type.[13] Both methods ascertain whether or not the covariate-adjusted mean post-test scores differ significantly between treatments.

10 Correlations between variables and between the outcome were conducted to determine the appropriateness of each variables inclusion in the model. Observations with missing data for each characteristic included in the model are automatically omitted—this is, of course, a tradeoff for more precise estimates.

11 Comparisons determined the significance of interactions between group and pretest score—control/combined treatment group and pretest ($f = .09$, p = n.s.); control/innovative treatment group and pretest ($f = .21$, p = n.s.); and control/traditional treatment group and pretest ($f = .00$, p = n.s.). None was significant.

12 Adjusted means are applicable only for post-test scores because they are based on the inclusion of pretest scores as a covariate.

13 This comparison cannot be conducted using normal multiple comparison procedures (t-tests, Bonferroni t-tests, Tukey test) because we are using adjusted means. However, we can compare groups using the t-test equivalent for adjusted means testing the hypothesis Ho: LSM(i)=LSM(j) and the corresponding probabilities.

Exhibit G.2

Prenatal Test: Test Objectives and Item Map

TOPIC I **The Food guide Pyramid**

Objective 1 *Clients will be able to identify food items and recommended daily servings for each of the five major food groups.*

Test Items
Form A: 1, 2, 3, 4
Form B: 1, 2, 3, 4, 5

Objective 2 *Clients should be able to accurately identify reasons for eating a variety of different foods.*

Test Items
Form A: 23
Form B: 25, 26

Objective 3 *Clients will understand that food selection (in number of servings) should be related to the relative size of each food group section on the Food Pyramid.*

Test Items
Form A: 5, 25
Form B: 27, 28

Objective 4 *Clients will be able to identify the portion size that represents one serving for various foods.*

Test Items
Form A: 6, 7
Form B: 6, 7

Objective 5 *Clients will be able to identify the major nutrients supplied by each food group.*

Test Items
Form A: 26, 27
Form B: 29, 30

Exhibit G.2 (continued)

TOPIC II **Diet for Pregnancy**

Objective 1 *Clients will be able to identify the nutrients that pregnant women need to consume regularly and the reasons that they are necessary.*

Test Items
Form A: 8, 9, 10, 11, 12, 13, 14
Form B: 8, 9, 10, 11, 12, 13, 14

Objective 2 *Clients will be able to identify sources of the nutrients that are important for their own health and their babies' health.*

Test Items
Form A: 15, 16, 17, 18, 24
Form B: 15, 16, 17, 18

TOPIC III **Food Choices ("Everyday" Versus "Sometimes" Foods)**

Objectives 1-2 *Clients will be able to identify the characteristics of foods that should be eaten "everyday" (rich in nutrients, low or moderate in fat and sugar), and "sometimes" (high fat, high sugar, or both).*

Test Items
Form A: 28, 29
Form B: none

Objective 3 *Clients will be able to classify foods into "everyday" and "sometimes" categories.*

Test Items
Form A: 19
Form B: 19, 20

Objective 4 *Clients will recognize that "everyday" foods should be eaten first and more often than "sometimes" foods.*

Test Items
Form A: 22
Form B: 24

Exhibit G.2 (continued)

TOPIC IV **Nutrients in WIC Foods**

Objective 1 *Clients will be able to identify the items in the WIC food package that supply various important nutrients.*

Test Items	
Form A:	20, 21, 30
Form B:	21, 22, 23

Appendix H

Discussion of Site-Specific Results
Adjusted and Unadjusted Mean Test Scores by Site
Detail on Test Results for Traditional Nutrition Education
WIC Nutrition Education Demonstration Study

Analytic Approach

The analytic model we selected examined variation attributable to differences between the treatment (innovative and traditional nutrition education) and control groups and to variation due to error. Variation due to error was defined as occurring naturally or due to factors not included in our analytic model. General Linear Models (GLM) approach was used to: handle both continuous and categorical variables; perform analysis of covariance combining regression and analysis of variance methods for more than one covariate; and conduct tests on adjusted mean scores. In addition, GLM was appropriate for unbalanced data. Regression models were also created to estimate effects.

We determined whether or not differences between pre- and post-test scores for each group (innovative, traditional, or control) were significant—larger than expected by chance. The effect of WIC nutrition education was estimated by entering the outcomes (post-test scores) into an ordinary least squares regression which included all women in the analytic sample and which had a total of twelve parameters: an intercept, six covariates (pretest score and other demographic variables), and five site-level variables.

Even though the innovative, traditional, and control groups were randomly constructed, we used statistical controls to compensate for initial differences that occurred by chance.[1] Covariates were included in the analytic model to (1) help adjust for any initial differences in the sample; (2) counteract any biasing effects of attrition; and (3) increase the precision of estimates by reducing some of the observed variance in the outcome variables. Including covariates in the analysis allowed us to attribute any observed differences between treatment (innovative or traditional education) and control women to the effect of nutrition education rather than to other external factors.

Covariates for our analytic model included continuous variables (pretest score) and categorical variables (all demographic variables and site.)[2] Including an analysis of covariance allowed us to combine features of regression and variance analyses.[3] The demographic variables were race/ethnicity, education, age,

[1] Site comparisons are also confounded by educational conditions which include instructors, testers, staff, and facilities.

[2] Correlations between variables and the outcome determined the appropriateness of including each variable in the analysis. Observations with missing data were automatically omitted to improve the precision of our estimates.

[3] Pretest score was included as a covariate to account for differences between test forms (discussed in Chapter Three) and to obtain adjusted post-test scores for individuals based on their pretest scores.

trimester of enrollment in WIC, and prior WIC participation. Any additional site effects were considered by including the individual demonstration sites as covariates. We did not include an interaction term for site by treatment type (innovative/traditional/control) because colinearity between these variables was avoided by randomization of respondents within each site. Similarly, interactions between pretest score and treatment group were not included because they were not statistically significant.[4]

In addition to determining differences between/among innovative, traditional, and control groups, our analytic models included adjusted means which controlled for pretest score, site, and all other demographic characteristics.[5] Our estimates determined differences between treatment types. These same differences can be detected by comparing the weighted-covariate adjusted mean test scores for innovative, traditional, and control groups.[6] Both statistical methods ascertain whether or not the covariate-adjusted mean post-test scores differ significantly across the three groups.

Test Results by Site

With one exception, the analysis of site data mirrored the treatment type analyses described in Chapter Six and Appendix H: site variables were not included in the model.[7]

Innovative Nutrition Education by Site

Average scores, controlling for covariates, were significantly different for the control and innovative treatment types within one site—Site 6 ($t = 2.99$, $p < .01$).[8] See Exhibit H.1. The mean score for women in the control group in Site 6 was 53 percent compared with 58 percent for women receiving innovative nutrition education, a 5 percentage point difference in average scores in favor of the

[4] Comparisons determined the significance of interactions between treatment group and pretest score: control/combined treatment group and pretest ($f = .09$, p = n.s.); control/innovative treatment group and pretest ($f = .21$, p = n.s.); and control/traditional treatment group and pretest ($f = .00$, p = n.s.). None was significant.

[5] Adjusted means are applicable only for post-test scores because they are based on the inclusion of pretest scores as a covariate.

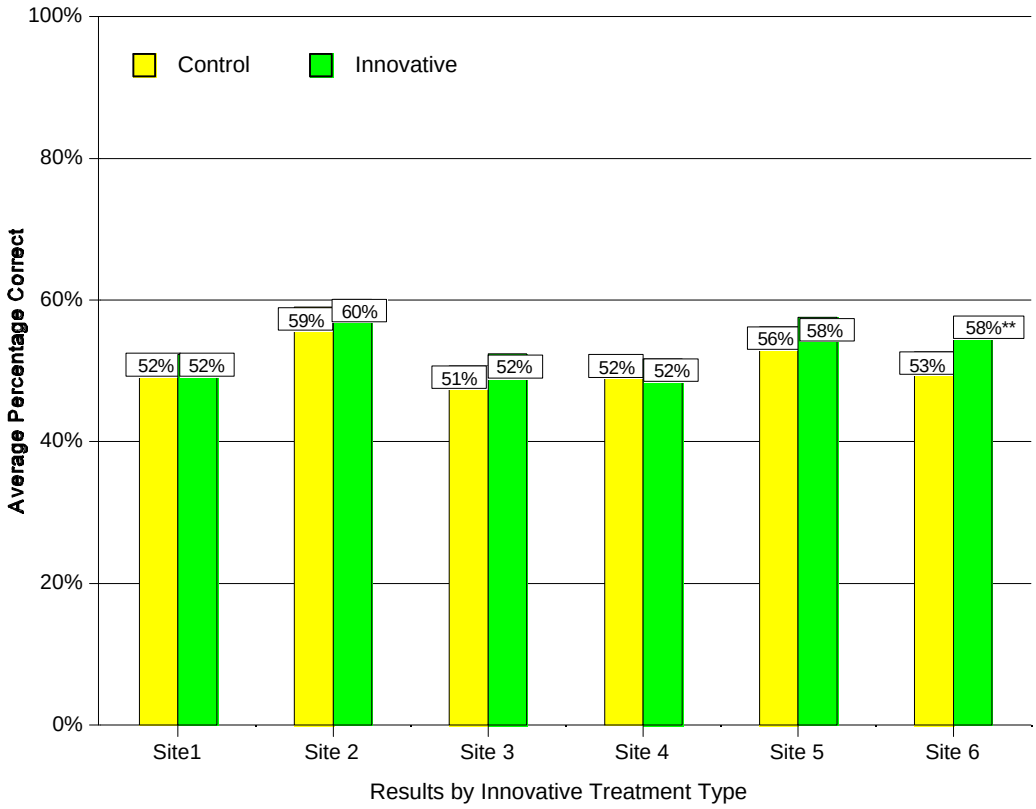
[6] This comparison cannot be conducted using normal multiple comparison procedures (t-tests, Bonferroni t-tests, Tukey test) because we are using adjusted means. However, we can compare treatment groups using the t-test equivalent for adjusted means testing the hypothesis H_o LSM(I)=LSM(j) and the corresponding probabilities.

[7] Site variables were excluded when we examined within site differences because models were within site.

[8] In other words—average post-test scores were significantly different for the women in innovative education and women in the control group in Site 6, controlling for average pretest scores and other demographic variables.

Exhibit H.1

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Innovative Nutrition Education by Site



** Indicates a significant difference between scores at the p < .01 level.

innovative group. Nutrition education in Site 6 differed from other sites because only women in innovative education received followup group sessions.[9] Scores for innovative nutrition education were higher on average at Sites 3 and 5; however, the differences were not significant.[10] Based on observation data presented in Chapter Four, *pregnancy and nutrition* topics were covered thoroughly at Sites 5 and 6. At Site 3, an individual nutrition education site, the majority of women did not view all touchscreen topics relevant to the test. Even so, scores were higher for women in this site, on average.

At the topic level, for the Food Guide Pyramid, the 6 percentage point difference between control and

[9]Women assigned to traditional nutrition education attended individual counseling sessions.

[10]The control group average score in Site 3 was 50.7, and the average score for traditional education was 52.4 (t = -.91, n.s.); the control group average score in Site 5 was 56.2, and the traditional group average score was 57.6 (t = -1.36, n.s.).

innovative groups within Site 3 was statistically significant ($t = 2.41$, $p < .05$), as was the 4 percentage point difference within Site 6 ($t = -1.93$, $p < .05$).[11] For both sites, this difference favored innovative nutrition education. Observation data indicated only 35 percent of the women at Site 3 viewed concepts, on the touch-screen video, relevant to tested objectives, and no additional handouts were provided. However, this topic was covered extensively during all observed certification sessions (78 percent).[12] Perhaps previously received information was reinforced by the touch-screen video. This topic was presented in all observed sessions at Site 6, and print materials specifically related to test content were distributed. The remaining sites had modest differences between the control and innovative groups for this topic, but none was significant at the .05 level.

There were no significant, site-level differences among groups for the second topic, diet for pregnancy, although there were differences for Sites 1, 4, and 6. This topic was covered extensively in these sites.[13] A significant difference between the control and innovative group was observed for the third topic, food choices, at Site 6 ($t = 2.27$, $p < .05$). Women receiving innovative nutrition education scored 9 percentage points higher, on average, than women in the control group. This topic was discussed in the majority of sessions observed (78 percent) at Site 6 but was not introduced at all at Sites 1, 2, and 3.[14] At Site 5 ($t = 2.26$, $p < .05$), a difference was observed for the fourth topic, WIC foods. For this comparison, innovative women scored 5 percentage points higher than women in the control group, on average. Innovative-control differences at Sites 3 and 6 were extremely close to significance for this topic; the difference at Site 6 was significant at the .10 level. Observations indicated this topic was discussed in the majority of nutrition education sessions at these sites.

[11]Reported percentage point differences favored the treatment group.

[12]All reference to topics or content covered during sessions was based on a small, non-representative sample of observation data discussed in Chapter Four.

[13]Although only 33 percent of women watched relevant material in Site 1, this topic was covered extensively in observed certification sessions and may have been reinforced by the touch-screen video.

[14]The innovative nutrition education does not include information specifically related to the food choices topic.

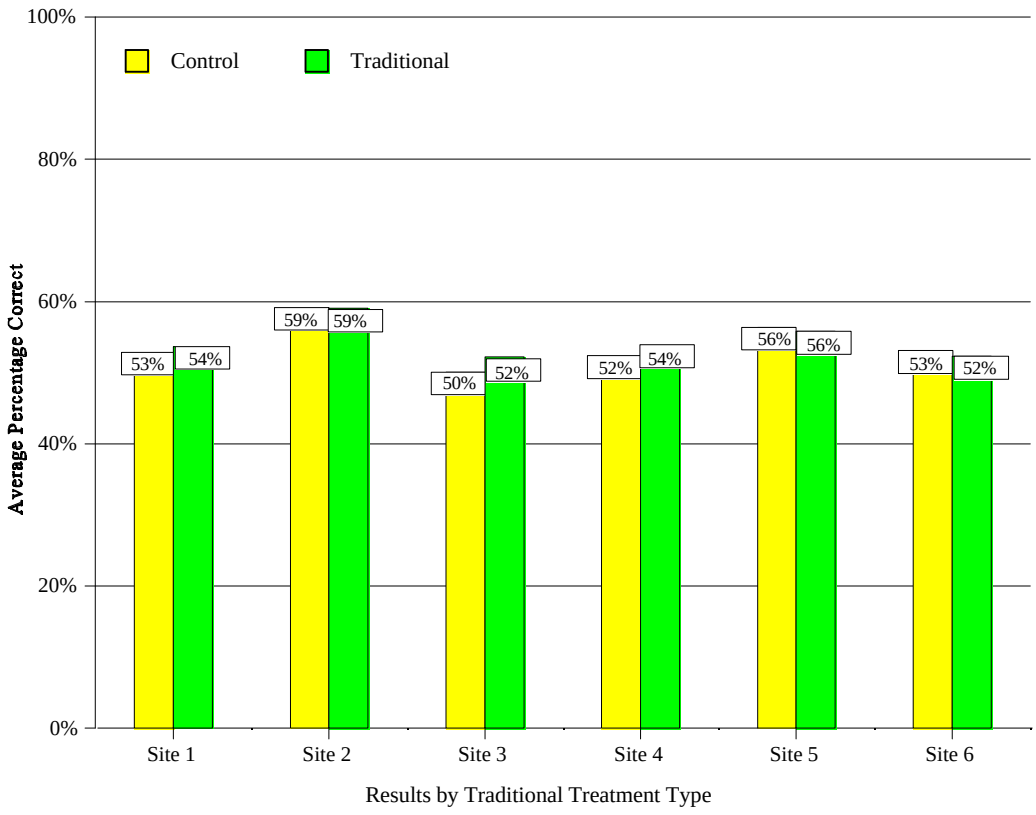
Traditional Nutrition Education by Site

Scores did not significantly differ between the traditional and control groups within any site. See Exhibit H.2. There were differences between groups at Sites 3 and 4, but they were not significant at the level selected for this study. The average score was 50 percent for control women at Site 3 and 52 percent for innovative women (t = 1.07, n.s.). At Site 4, the scores were 52 percent and 54 percent, respectively (t = 1.11, n.s.). Although none of these differences was significant, they were all higher for traditional women.

There were no significant differences across groups and within site for the first topic, Food Guide Pyramid. For the second topic, diet in pregnancy, a statistically significant 5 percentage point difference was observed between groups at Site 1 ($t = 2.09$, $p < .05$). Again, the differences favored traditional nutrition education. No significant differences can be reported within site for the third topic, food

Exhibit H.2

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Traditional Nutrition Education by Site



choices. For this topic, scores at Sites 1, 3, and 4 were higher for women receiving traditional nutrition education by 4 and 5 percentage points. This topic was covered extensively at Site 4; less often at Sites 1 and 3. No differences between the traditional and control groups were observed for the fourth topic, WIC foods.

Exhibit H.3 presents site-specific bar charts of adjusted scores. Exhibit H.4 presents unadjusted scores by topic for each site.)

Exhibit H.3

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Innovative and Traditional Nutrition Education

Site 1

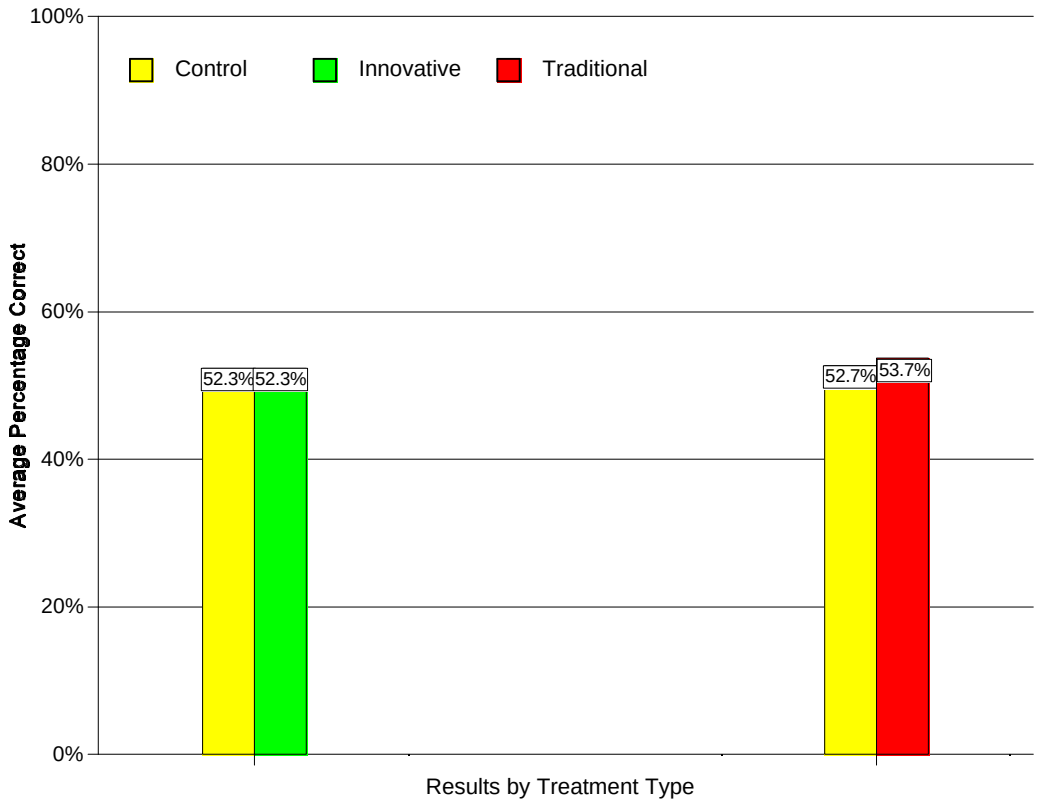


Exhibit H.3 (continued)

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Innovative and Traditional Nutrition Education

Site 2

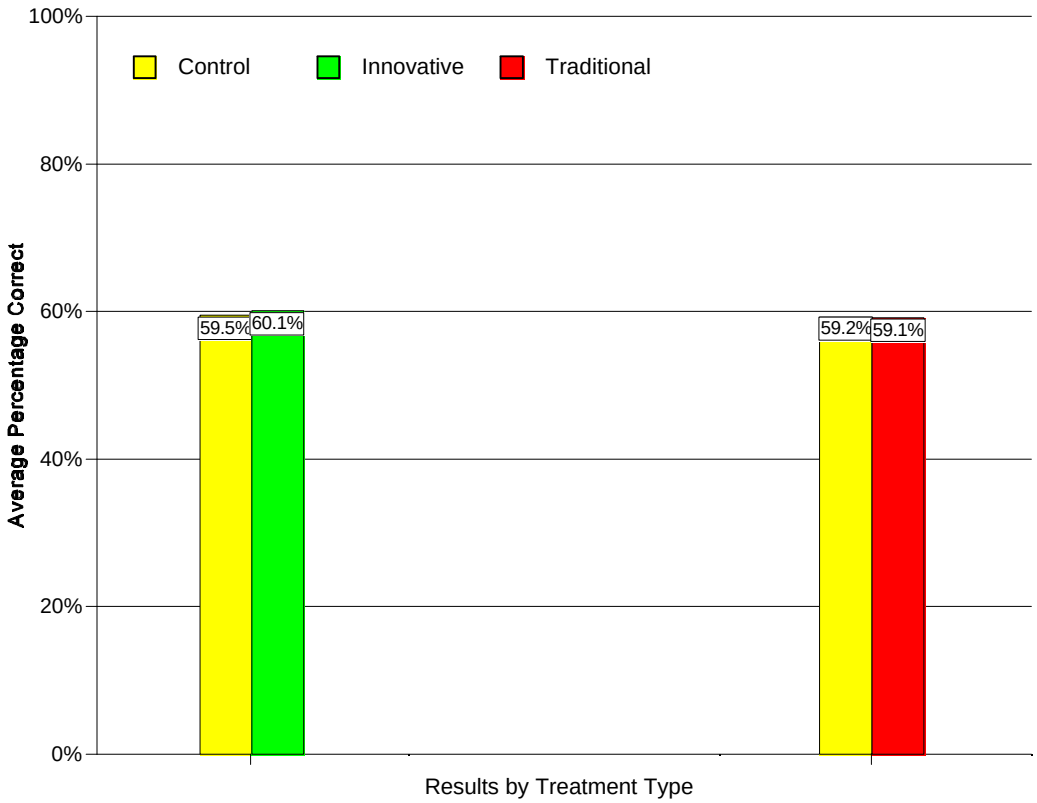


Exhibit H.3 (continued)

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Innovative and Traditional Nutrition Education

Site 3

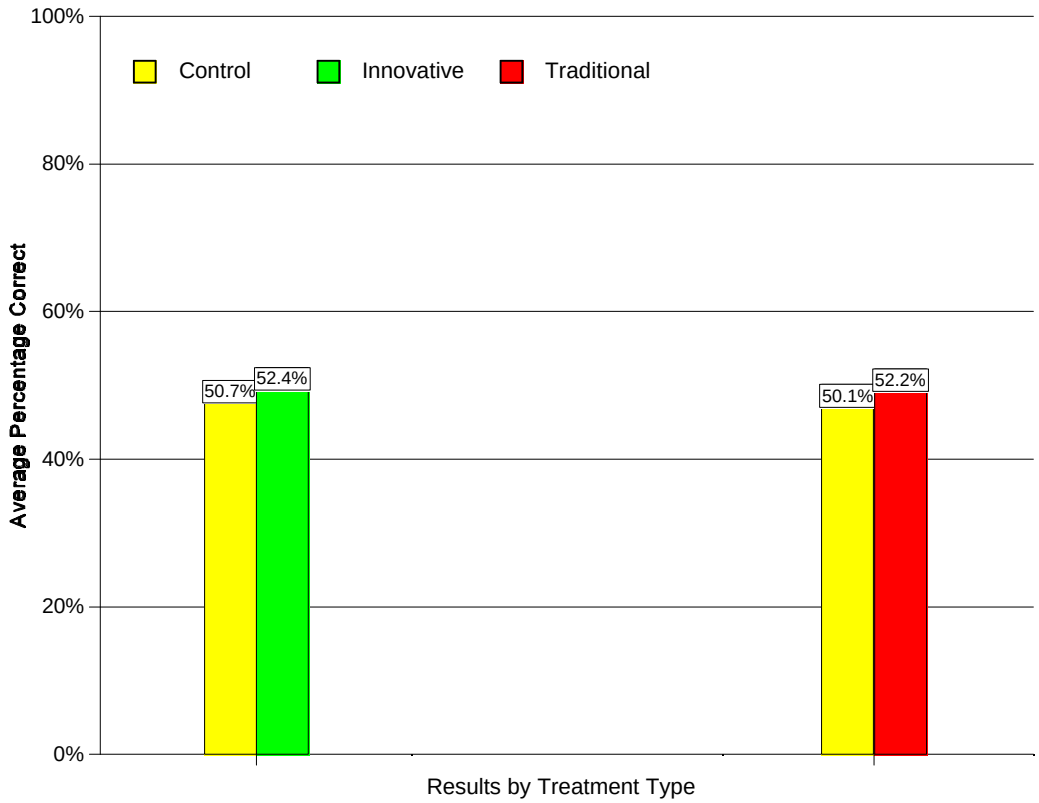


Exhibit H.3 (continued)

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Innovative and Traditional Nutrition Education

Site 4

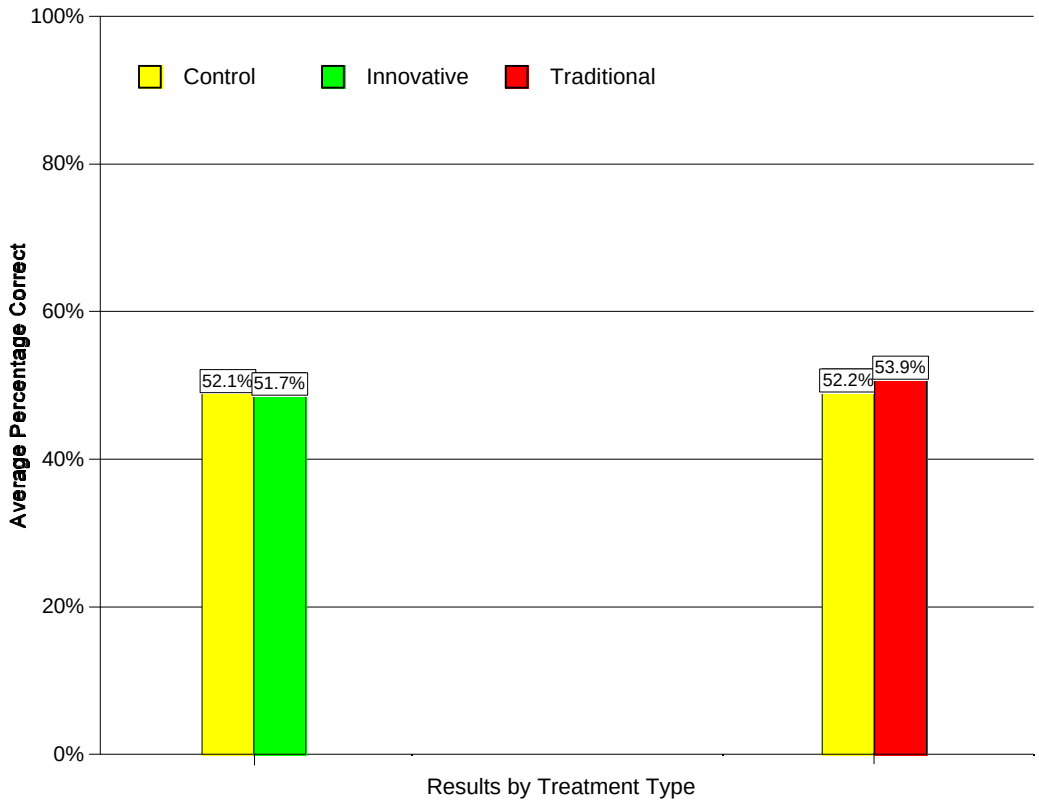


Exhibit H.3 (continued)

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Innovative and Traditional Nutrition Education

Site 5

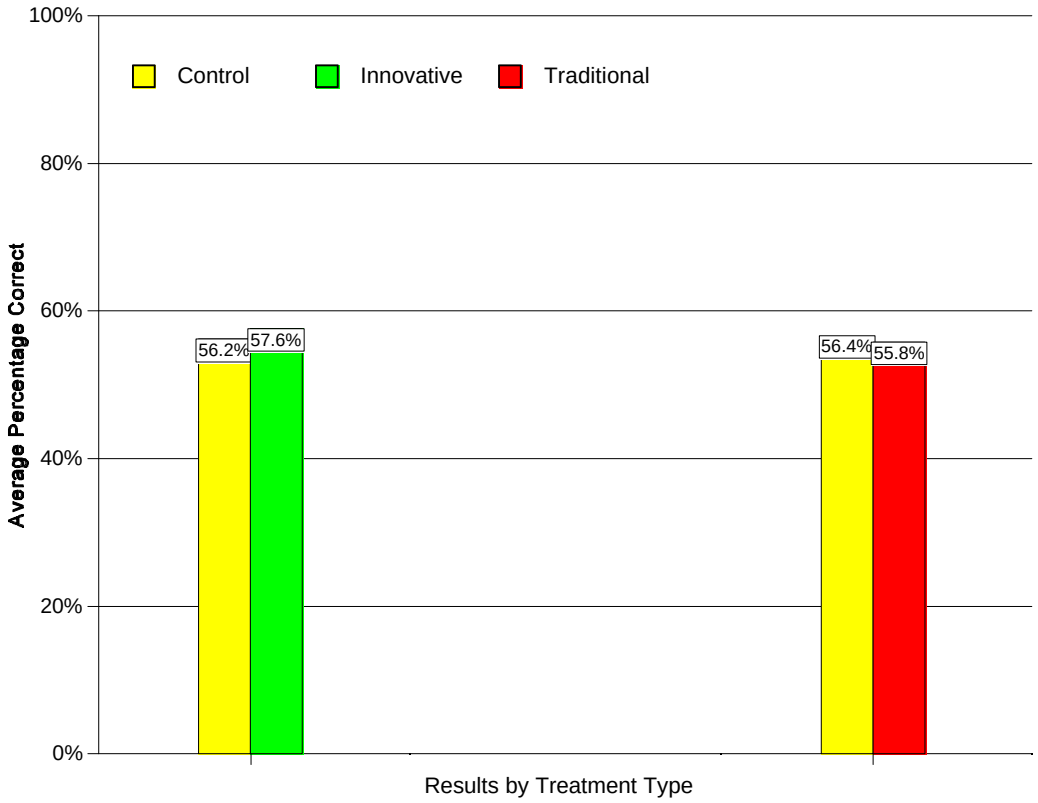
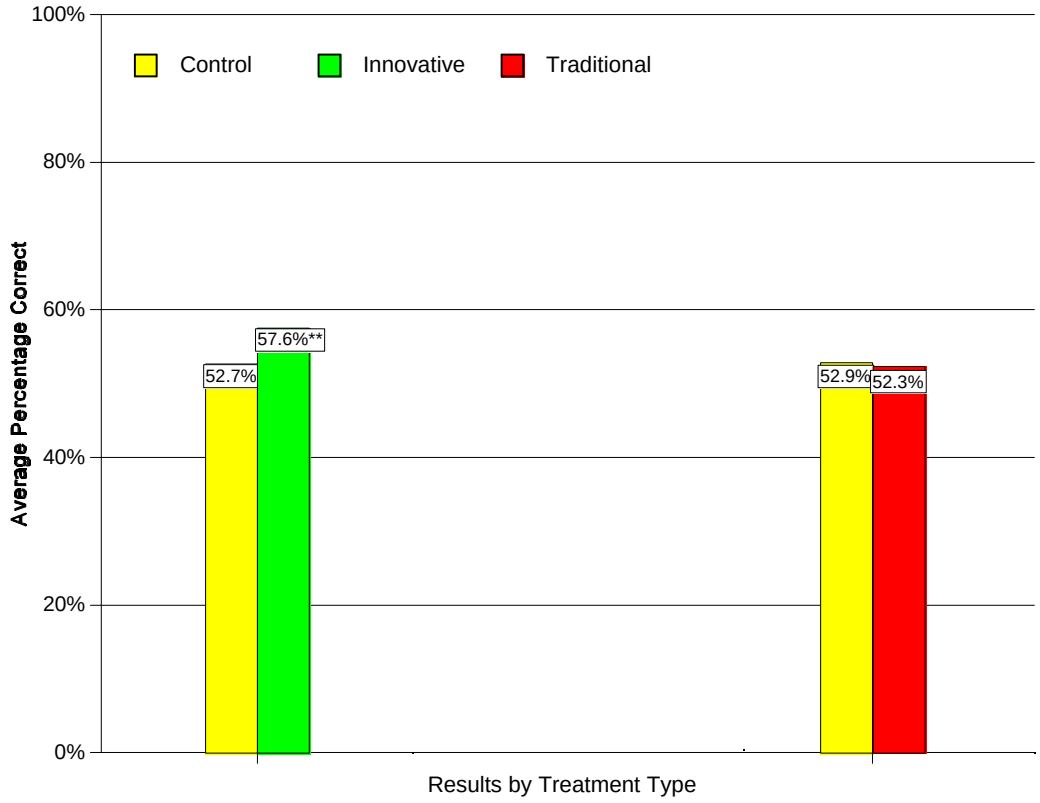


Exhibit H.3 (continued)

Adjusted Mean Post-Test Scores for Prenatal WIC Women Receiving Innovative and Traditional Nutrition Education

Site 6



**Indicates a significant difference between scores at the p < .01 level.

Exhibit H.4

Mean Test Scores for Prenatal WIC Women by Site by Treatment Type

Site 1

	Innovative (n=566)		Traditional (n=560)		Control (N=800)	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Pretest						
Food Guide Pyramid	44.8	14.5	46.0	13.8	44.3	12.9
Diet for pregnancy	52.5	18.1	53.4	19.1	55.9	18.3
Food choices	58.2	26.0	62.8	25.0	63.2	26.0
WIC foods	59.2	30.8	65.6	24.4	61.3	25.5
Post-test						
Food Guide Pyramid	44.4	13.0	43.8	14.3	46.9	12.7
Diet for pregnancy	54.9	18.0	57.3	18.1	54.3	18.0
Food choices	60.5	27.9	66.9	27.3	63.2	27.8
WIC foods	60.2	29.0	63.2	28.0	61.5	27.9

Exhibit H.4 (continued)

Mean Test Scores for Prenatal WIC Women by Site by Treatment Type

Site 2

	Innovative (n=566)		Traditional (n=560)		Control (n=800)	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Pretest						
Food Guide Pyramid	53.1	14.9	51.2	14.6	50.5	15.0
Diet for pregnancy	61.7	17.6	62.5	17.1	62.7	17.6
Food choices	71.3	24.9	70.7	24.1	70.5	22.7
WIC foods	69.4	24.8	69.8	26.5	68.2	24.6
Post-test						
Food Guide Pyramid	54.6	17.2	49.9	14.9	51.2	14.1
Diet for pregnancy	61.5	21.2	63.1	17.8	62.7	16.8
Food choices	75.1	24.0	72.0	25.5	72.9	28.0
WIC foods	67.1	24.9	67.8	25.4	66.4	27.4

Exhibit H.4 (continued)

Mean Test Scores for Prenatal WIC Women by Site by Treatment Type

Site 3

	Innovative (n=566)		Traditional (n=560)		Control (n=800)	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Pretest						
Food Guide Pyramid	44.4	14.1	42.3	15.3	44.8	15.3
Diet for pregnancy	54.9	19.2	48.2	17.8	51.7	20.0
Food choices	56.4	24.6	47.4	29.3	54.3	28.1
WIC foods	58.3	27.2	57.8	31.8	53.3	27.1
Post-test						
Food Guide Pyramid	47.4	17.2	45.5	14.7	41.3	14.8
Diet for pregnancy	54.9	14.4	52.3	17.4	54.3	17.5
Food choices	61.3	28.4	64.6	28.2	59.7	29.3
WIC foods	55.0	29.3	54.7	32.3	61.1	25.9

Exhibit H.4 (continued)

Mean Test Scores for Prenatal WIC Women by Site by Treatment Type

Site 4

	Innovative (n=566)		Traditional (n=560)		Control (n=800)	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Pretest						
Food Guide Pyramid	44.2	17.1	42.6	16.4	45.7	14.3
Diet for pregnancy	46.5	16.7	52.1	17.3	51.7	18.3
Food choices	48.9	28.2	42.4	29.9	49.6	32.5
WIC foods	50.0	27.5	55.4	29.9	55.3	30.4
Post-test						
Food Guide Pyramid	43.1	14.1	48.0	13.8	46.4	14.7
Diet for pregnancy	53.8	16.9	53.6	18.8	54.7	20.1
Food choices	58.1	29.6	63.5	26.9	59.9	26.6
WIC foods	55.9	26.8	60.2	26.5	59.7	31.9

Exhibit H.4 (continued)

Mean Test Scores for Prenatal WIC Women by Site by Treatment Type

Site 5

	Innovative (n=566)		Traditional (n=560)		Control (n=800)	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Pretest						
Food Guide Pyramid	47.9	14.0	47.8	14.9	48.3	15.2
Diet for pregnancy	58.1	18.5	58.8	16.7	58.6	18.7
Food choices	62.1	28.8	61.4	26.6	64.7	27.5
WIC foods	62.5	28.1	64.6	26.7	62.8	28.5
Post-test						
Food Guide Pyramid	50.4	15.7	48.4	15.5	49.2	15.7
Diet for pregnancy	59.1	18.4	58.4	19.0	59.3	18.7
Food choices	66.8	26.9	64.2	25.9	68.2	28.3
WIC foods	68.2	25.7	65.2	27.3	62.7	27.6

Exhibit H.4 (continued)

Mean Test Scores for Prenatal WIC Women by Site by Treatment Type

Site 6

	Innovative (n=566)		Traditional (n=560)		Control (n=800)	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Pretest						
Food Guide Pyramid	43.2	15.6	41.1	15.3	46.7	13.2
Diet for pregnancy	54.4	21.3	55.3	20.3	55.2	18.0
Food choices	56.8	27.1	61.4	25.9	60.8	27.5
WIC foods	57.7	26.3	56.1	27.8	58.0	26.2
Post-test						
Food Guide Pyramid	48.3	15.6	46.1	14.3	45.0	14.5
Diet for pregnancy	61.2	19.6	55.1	18.1	58.3	18.6
Food choices	69.0	27.1	60.7	29.3	60.8	25.9
WIC foods	63.2	26.0	58.3	26.5	55.8	27.2

Overall Topic Scores

Exhibit H.5 displays unadjusted percentages by topic and treatment type for women receiving *individual* nutrition education. Exhibit H.6 presents these unadjusted percentages for women receiving *group* nutrition education.

Exhibit H.5

Mean Topic Test Scores for Prenatal WIC Women Receiving *Individual* Nutrition Education by Treatment Type

	Innovative		Traditional		Control	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Pretest						
Food Guide Pyramid	48	15	46	15	47	14
Diet for pregnancy	56	19	55	19	57	19
Food choices	62	26	62	27	63	26
WIC foods	63	28	63	28	61	27
Post-test						
Food Guide Pyramid	49	16	46	15	47	14
Diet for pregnancy	57	19	58	18	57	18
Food choices	66	28	67	28	64	28
WIC foods	61	28	62	28	62	28

Exhibit H.6

Mean Topic Test Scores for Prenatal WIC Women Receiving *Group* Nutrition Education by Treatment Type

	Innovative		Traditional		Control	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Pretest						
Food Guide Pyramid	46	15	46	16	47	15
Diet for pregnancy	55	19	57	17	57	19
Food choices	59	29	56	29	60	30
WIC foods	59	28	62	28	60	29
Post-test						
Food Guide Pyramid	49	16	48	15	48	16
Diet for pregnancy	59	19	57	19	58	19
Food choices	66	28	64	26	66	28
WIC foods	65	26	64	27	61	28

Exhibits H.7 and H.8 contain adjusted percentage scores of individual session women and group session women. For *individual session* women, average scores were not significantly higher for the traditional treatment. Scores for the fourth topic, WIC foods, were lower for women in traditional individual sessions as they were for women in the innovative individual sessions.

No significant effects of traditional nutrition education were observed for women in the individual sessions; nor were they observed for women in the *group sessions*, on average. In fact, for the topics, diet for pregnancy and food choices, women in traditional group sessions scored lower than the control women. Observations indicated less in-depth topic coverage occurred in the traditional group sessions than in the traditional individual sessions.

Exhibit H.7

Adjusted Mean Topic Post-Test Scores for Prenatal WIC Women Receiving *Traditional* Nutrition Education in *Individual* Sessions

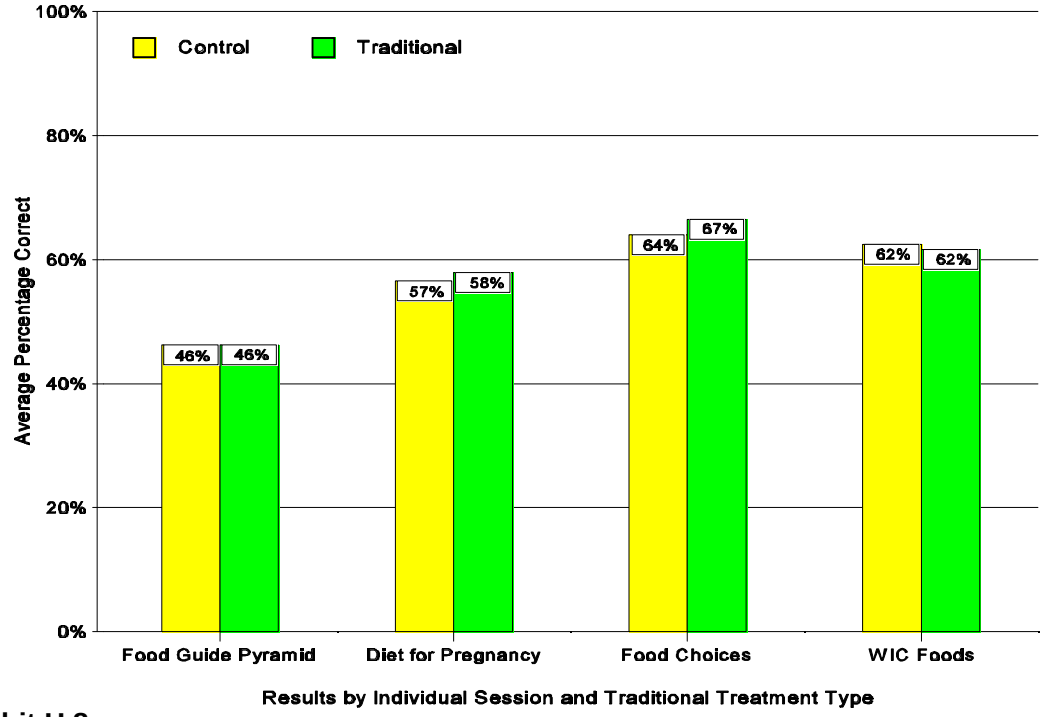


Exhibit H.8

Adjusted Mean Topic Post-Test Scores for Prenatal WIC Women Receiving *Traditional* Nutrition Education in *Group* Sessions