A FIELD EXPERIMENTAL EVALUATION OF SMOKING REDUCTION INTERVENTIONS FOR PREGNANT WOMEN

By

Jeffrey P. Mayer

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ABSTRACT

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Smoking behavior during pregnancy has been clearly associated with low birthweight, prematurity, greater infant mortality, and delayed child development. The present study employed a randomized pretest-posttest experimental design to compare the impact of three health education interventions on smoking behavior, knowledge, attitudes, and pregnancy outcome with a sample of pregnant women receiving public health clinic services. Following screening during the first clinic visit, 80.9% of eligible, smoking women were successfully recruited into the study. Although changes in attitudes, knowledge and pregnancy outcome were not significant, the intervention including behavior change skill components resulted in significantly higher abstinence rates at the last month of pregnancy than the interventions providing solely information about risk. At the postpartum period, the interventions that included personal counseling resulted in greater abstinence than the usual care group that received only printed information. These findings suggested that it is feasible to deliver smoking cessation intervention within a clinic setting, and that current health education approaches need to be strengthened. The results of a discriminant analysis indicated that intervention success was more likely among

women who received health education earlier in pregnancy, were light smokers prior to pregnancy, were smokers for fewer years, experienced fewer previous pregnancies, had a stronger desire to quit, and received better prenatal care. Given these findings, several suggestions for future research were prescribed. Measurement of treatment integrity, and the strengthening of intervention duration and intensity for heavy smokers and multiparous women was emphasized.

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CHAPTER 1

INTRODUCTION

During the past decade, it has become increasingly apparent that a woman's behavior and actions during pregnancy can influence the outcome of pregnancy. Diet and nutrition, exercise, seeking good prenatal care, substance abuse and smoking are all factors which have been associated with infant mortality, morbidity, prematurity, and birth weight (Institute of Medicine, 1985). Because many of these factors are amenable to change, many health educators and researchers have directed their advocacy and intervention efforts towards the actions and behaviors of pregnant women (Fielding, 1978; Hollinshead, 1979; Fielding and Yankaver, 1978; Baric, MacArthur and Sherwood, 1976).

This report describes an experimental evaluation of smoking cessation interventions delivered to low-income pregnant women. The research plan involved a comparison of two intervention groups to a control group on several dependent variables, including smoking behavior, pregnancy outcome, knowledge, and attitudes. The design of the research provided for a high level of internal validity, including random assignment of project participants to

alternative interventions, and multiple measurements occurring before and after treatment. Several recent investigators have demonstrated success in changing pregnant women's smoking behavior (Ershoff, Aaronsen, Danaher, and Wasserman, 1983; Windsor, et.al., 1985; Sexton and Hebel, 1984). According to the conclusions reached by a recent National Academy of Sciences Task Force (Institute of Medicine, 1985), further research in this area should receive high priority. The recommendations of the Task Force included the following:

(1) Anti-smoking advice should become a routine aspect of prenatal care;

(2) Research efforts should attempt to identify the components of effective intervention strategies;

(3) Research efforts should investigate what types of programs, (i.e, multi-component, group education, self-help) work best with what target groups (i.e., heavy vs. light smokers, multiparous vs. primiparous women, those entering prenatal care early in pregnancy vs. those entering care during the third trimester, etc.); and

(4) New intervention efforts should include the development and implementation of program evaluation methods.

Hence, given that poor health-related behavior during pregnancy can adversely effect outcome, the development and evaluation of health education programs is an important goal for researchers.

This document begins by discussing the research and literature surrounding smoking and pregnancy. First, the strong negative relationship between birthweight and infant

mortality is reviewed. Next, the effects of smoking during pregnancy are explored, including impacts on birth weight, prematurity and mortality rates, and child development. Following this discussion, the smoking cessation evaluation research literature will be reviewed. Particular emphasis is given to efforts specific to pregnant women target groups, and to several methodological issues.

The second chapter of this document will outline the research and implementation plan for the Smoking Cessation to Prevent Low Birthweight Project, including the research setting, evaluation design, intervention plan, and measurement. The final two chapters summarize the results of the analysis, and provide a discussion of the results within the context of other studies.

Birthweight and Mortality

A discussion of the relationship between birthweight and mortality benefits if a historical perspective is taken. Examining shifts in the proportion of infant deaths that are associated with low birthweight over time provides insight in defining current research and program priorities. This discussion borrows from a recent presentation of the historical trends offered by McCormick (1985) in the New England Journal of Medicine. The growing consensus among analysts seems to be that improvements in infant mortality in recent years are due to technological improvement in neonatal care for low birthweight babies,

rather than to an actual reduction in the incidence of low weight births.

In the first half of this century, the reduction in infant mortality can largely be attributed to a decline in post-neonatal deaths (Pharoh and Morris, 1979), and not to any substantial change in the low birthweight rate. The low birthweight rate and neonatal death rate remained largely unchanged during this time. This decline in the post-neonatal mortality rate was probably due to improvements in controlling infectious disease and in improving nutrition.

By 1950, approximately two-thirds of all infant deaths occurred during the neonatal period. Before 1950, post-neonatal deaths accounted for a large proportion of all infant deaths, a situation similar to that in developing countries today.

Since 1950, U.S. mortality rates have continued to decline at a steady rate, largely due to less neonatal deaths. However, there has not been a similar decline in the low birthweight rate during this same time period. Thus, the improvement in mortality rates in more recent years is attributable to the increased survivability of low birthweight infants (Lee, Paneth, Gartner, and Pearlman, 1980; Kessel, Villar, and Berendes, 1984; Williams and Chen, 1982; McCormick, Shapiro, and Starfield, 1984). Innovation in medical technologies and the delivery/distribution of specialized health care (i.e.,

perinatal regionalization) largely explain the improved neonatal mortality rate (Paneth, Kiely, Wallenstein, Marcus, Pakter and Susser, 1982; Harris, Isaman, and Giles, 1978; Eisner, Pratt, Hexter, Chabot, and Sayal, 1978).

The alternative strategy to providing intensive, high-tech and very expensive care to low birthweight infants is to reduce the incidence of low birthweight itself. Given recent declines in the rate of improvement in infant mortality in some localities (Children's Defense Fund, 1984; Food Research and Action Center, 1984), signaling a "ceiling effect" for the improvement attributable to neonatal intensive care, there has been renewed interest in the prevention of low birthweight. Efforts toward the prevention of low birth-weight have included the identification of high risk women (Hobel, Hyvarinen, Okada & Oh, 1973; Lilford & Chard, 1983), providing new health care services for high risk groups (Michigan Department of Public Health, 1984), the prevention of pre-term labor through education and tocolysis (Hemminki and Starfield, 1978; Herron, Katz & Creasy, 1982), and health education to reduce adverse behavioral, attitudinal, and environmental risks (Larson, 1980; Green, 1984).

Smoking and Pregnancy Outcome

The association between smoking and poor pregnancy outcome has been well documented. Early studies examined the bivariate relationship between smoking and pregnancy

outcome. For example, Simpson (1957) collected date on 7,499 obstetrical patients at three California hospitals. The information on smoking status and birthweight was gathered from birth certificates, questionnaires, and postpartum home visits by public health nurses. The results indicated that smokers had a significantly higher low birthweight rate than non-smokers (2,500 grams or less). Additionally, heavy smokers had lower birthweight infants than light smokers.

This birthweight difference has been replicated in many other settings, and with different patient groups (McMahon, Alpert, and Salber, 1966; Comstock, Shah, Meyer, and Abbey, 1971; Goldstein, 1972; Davies, Gray, Ellwood, and Abernathy, 1976; Lowe, 1959). The focus of some of these more recent studies has been to employ multi-variate approaches in order to control for the effects of likely moderators of the smoking-birthweight relationship. The advantages of multi-variate regression techniques over bivariate and cross-tabulation analyses have been discussed by several investigators (see Butler, Goldstein, and Ross, 1972; Dougherty and Jones, 1982). Even when controlling for the effects of several moderator variables, smokers have infants with birth weights 150 to 200 grams lighter than non-smokers (Fielding, 1978). The mortality ratio between smokers and non-smokers ranges up to 1.40.

For example, Dougherty and Jones (1982) used multiple regression analysis to examine the independent effects of

several explanatory variables on birthweight, including sex of infant, parity, maternal age, marital status, maternal weight, and smoking. While holding the effects of the other variables constant, smokers (n=225) delivered infants weighing 107 grams lighter than non-smokers (n=739). Heavy smokers (greater than 16 cigarettes per day) had infants weighing 158 grams lighter than non-smokers.

The certainty of the relationship between smoking and birthweight has not been without controversy. Several researchers have suggested that correlational methods could not demonstrate causality (Yerushalmy, 1964; Yerushalmy, 1971; Yerushalmy, 1972, Goldstein, 1977), despite the variety of "third" variables that have been statistically controlled for. The emergence of this controversy prompted several investigators to examine differences between smokers who quit during pregnancy and those who continued to smoke throughout pregnancy (Wainwright, 1983; McMahon, Alpert and Salber, 1966; Butler, Goldstein and Ross, 1972). If the birth weight of infants born to women who stopped smoking during pregnancy were no different than non-smokers, then it would be highly likely that "pre-dispositional" factors intrinsic to smokers were not responsible for greater low birthweight rates, hence solving the embroglio over causation. The results of these investigations bolstered the argument that smoking caused low birthweight; women who quit had infants with birthweights similar to non-smokers, while significant

differences persisted for those who continued to smoke during pregnancy.

For example, Butler, Goldstein and Ross (1972) using data from the British Perinatal Mortality Survey (n=21,788), found that the birthweight of infants born to smokers who had quit by the fourth month of gestation was no different from that of non-smokers. The birth weight of smokers' infants was 170 grams lighter than the birth weight of non-smokers' infants.

A recent study has demonstrated that maternal smoking also has implications for the frequency of preterm births. Shiono, Klebanoff, and Rhoads (1986) abstracted medical records and collected self-report data on smoking and alcohol related behavior on 30,596 women receiving prenatal care from 1974 through 1977 at a large health maintanance organization in Northern California. The analysis included only live-born singleton births of 24 or more weeks gestation and at least of 500 grams birthweight.

While the preterm birth rate (<37 weeks gestation) was 6.8% for non-smokers, it was 8.4% for those smoking less than one pack per day, and 8.1% for those smoking more than one pack per day. When adjustments were made for maternal age, education, ethnicity, time prenatal care began, alcohol consumption during pregnancy, and eight other medical conditions, the odds ratio for preterm birth was 1.1 for those smoking less than one pack per day, and 1.2 for those smoking one pack or more per day. When

considering very preterm births (<33 weeks gestation), the odds ratios were 1.1 for those women wmoking less than one pack, and 1.6 for those women smoking one pack or more. Hence, preterm births were 20% more common among heavy smokers, and very preterm births were 60% more common among heavy smokers. Other investigators have reported even higher odds ratios, but these studies did not control for the large variety of maternal characteristics included here, and were plagued by other sample selection problems (Guzick, Daikoku, and Kaltreider, 1984; Fredrick and Anderson, 1976; Mulcahy and Murphy, 1972).

Other investigators have concluded that maternal smoking has long-term impacts on infant growth and development. Butler and Goldstein (1973), in a longitudinal follow-up study of children involved in the British Perinatal Mortality Survey, found differences on height and reading and mathematics comprehension at seven and eleven years of age for children of smokers versus non-smokers. Although the magnitude of the differences decreased when adjustments were made for several maternal characteristics, they remained statistically significant.

In summary, the evidence suggests that smoking during pregnancy increases the probability of low birthweight, prematurity and slowed childhood development. Given the available evidence, some analysts have even called for declaring a new medical condition, namely, the "fetal tobacco syndrome", to be applied to abnormalities in

infants born to mothers who smoked during pregnancy (Nieburg, Marks, McLaren and Remington, 1985). The studies, conducted with diverse groups of pregnant women and across many settings, and statistically controlling for many variables which might offer an alternative explanation, have indicated the following:

(1) Smokers have infants with lower birthweights and a larger incidence of prematurity than non-smokers;

(2) A "dose-response" relationship exists between smoking and pregnancy (the effects on birthweight are more pronounced with heavy smokers); and

(3) Smokers who quit during pregnancy have infants with birthweights similar to non-smokers; and

(4) Children of smokers are at higher risk for delayed growth and development.

Fielding (1978) concluded "differences in birth weight are in direct proportion to the number of cigarettes smoked and are independent of other infant and maternal factors known to influence birth weight" (p.337).

The third point listed above, besides providing an important logical advance in the causation argument, has implications for health education. If programs can be successfully developed to convince pregnant women to stop smoking, then an important behavioral risk factor can be reduced. If successful intervention models can be identified and disseminated, it would imply a large-scale

improvement in infant birthweight, and thus neonatal mortality. This discussion will continue with a look at research concerned with smoking cessation strategies.

Smoking Cessation

Programs designed to help people quit smoking have been in existence since the 1950's. Most of the evaluation research in this area has involved programs for a general population; not many efforts have focused on the special case of pregnant women. Following a review of several smoking cessation strategies, several recent studies dealing with smoking intervention among pregnant women will be described.

Clinic Approaches. Clinics with groups of participants has been a widely used approach to smoking cessation in use since the 1950's. Schwartz (1969) provides an excellent study-by-study description of many clinic programs. Some of these studies have employed drug therapies, such as lobeline (e.g., London, 1963; Edwards, 1964; Leone, Muskika, Albala, and McGurk, 1968). Supposedly, lobeline acts as a nicotine "substitute," and, therefore, helps eliminate the negative side effects which typically accompany smoking withdrawal. These drug-based treatments have largely been carried out by physicians in medical settings such as hospitals and outpatient clinics. Lobeline has been administered by both injection and in oral form. Schwartz (1969) concluded that lobeline and

other drug treatments have a median success rate of 30%, although it seemed that treatment effects became weaker over time. To the author's knowledge, no research has examined the potential for negative side effects of lobeline or other nicotine substitutes during pregnancy.

Other clinic approaches have focused upon "social/ behavioral" treatments, and have been disseminated on a broad scale to volunteer smokers. The two most significant programs of this type are the Seventh-Day Adventist's Five-Day Plan and the American Lung Association's Freedom From Smoking Clinic. These programs have been established throughout the United States and Europe, and large numbers of volunteers have participated.

Guilford (1972) conducted a quasi-experimental evaluation of the Five-Day Plan program. The experimental group (n=173) was composed of volunteers for a five session program conducted in a hospital setting. The Five-Day Plan included several components including films, lectures, printed materials, and suggestions for change in both diet and daily routine. The control group (n=175) consisted of smokers who responded to media advertising. These subjects were screened by telephone interview, and matched to experimental group subjects on several variables (i.e., age, sex, marital status, education, occupational level, and frequency of smoking). The only treatment provided to control group subjects consisted of the signing of a "pledge card" that was provided through the mail.

"Success" was defined as a 90% reduction in smoking from pre-treatment levels. At a six month follow-up, 28% of experimental group participants were successes, whereas only 17% of control group subjects were successes. These results reflected a loss in effectiveness over time. At the three month follow-up the success rate was 34% for the Five-Day Plan participants. A treatment-by-sex interaction was discovered. Females had a significantly greater success rate than males at both post-measurement periods. Other researchers have found similar, modest success for the Five-Day Plan, although no treatment-by-sex interaction occurred (McFarland, Gimbel, Donald and Folkenberg, 1964; Thompson and Wilson, 1966).

The American Lung Association (1982) engaged in a large-scale program evaluation of their Freedom From Smoking clinic. Follow-up data was collected on 547 program participants who had attended one of 19 clinics held throughout the United States. Similar to the Five-Day Plan, the ALA clinic was composed of a number of components, including lectures, a self-help manual, help with non-smoking maintenance, and films. Study participants attended clinics that consisted of either six, seven or nine sessions in length. Although the abstinence rate was 74% immediately following treatment, it had declined to 11% at a one-year follow-up. No control group was included in the research design.

Unfortunately, broad-scale programs, such as the Five-Day Plan and the Freedom From Smoking clinic, have not been rigorously evaluated using designs including random assignment, although they have probably involved the largest number of people in smoking cessation efforts. However, one historical influence of these programs has been to focus the attention of researchers on the evaluation of multiple component programs (Leventhal and Cleary, 1980; Bernstein, 1969; Hunt and Bespalec, 1974; Hunt and Matarazzo, 1973). The evaluation of several illustrative multiple component clinic programs will be described next.

Coelho (1983) implemented a randomized experiment comparing the American Lung Association's Freedom From Smoking clinic (n=35) and an innovative multi-component program (n=31) with a no-treatment group (n=47). The innovative program stressed contingency contracting and the substitution of healthy behaviors for smoking behaviors. The two treatments had an identical number of sessions of equivalent duration with an equal number of group leaders. Immediate post-treatment, one-month, and three-month follow-ups were conducted. Self-reported smoking behavior was validated using expired air carbon monoxide measurement. Although both the innovative program and the American Lung Association program resulted in greater abstinence and a smaller percentage of pre-treatment smoking when compared to the control group, the magnitude

of the differences decreased at subsequent follow-up measurements. Most importantly, however, the innovative program had significantly higher quit rates at all follow-up periods. For the three posttests, the quit rates for the innovative program were 85%, 46% and 32%, and for the American Lung Association Program 49%, 37%, and 24%, respectively. This study is exemplary because it represents an effort to evaluate, with a great deal of rigor, one of the most widely implemented intervention models offered by a major anti-smoking organization.

Elliot and Denney (1978) compared a multicomponent treatment package to three comparison groups: (1) a rapid smoking treatment, (2) a placebo treatment (to help examine the effects of "non-specific" treatment factors), and (3) a no treatment group. The package treatment involved a number of components delivered across nine program sessions. The specific components included rapid smoking, applied relaxation, covert sensitization, systematic desensitization, self-reinforcement, modeling, behavior rehearsal, and role-playing. The interventionists were blind to the design and the hypotheses of the study. The primary dependent variable, percentage of base line smoking, was collected by having subjects deposit their cigarette butts in a provided container which was returned to the experimenter. The six month follow-up results indicated that the multiple component treatment participants smoked 41% of their base line levels, and

achieved a 45% abstinence rate. This was significantly better than the level of change exhibited by any of the comparison groups. The differences between the rapid smoking, placebo, and no treatment groups were non-significant.

Lando (1977) examined a "broad spectrum" program that involved aversive conditioning, behavior contracts, booster sessions, and group therapy. Thirty-four subjects were randomly assigned to either the broad spectrum program or to a rapid smoking control group. Subjects were required to self-record the number of cigarettes they smoked before, during, and after treatment. While 76% of the multiple component program participants remained abstinent at a six month follow-up, only 35% of the control group subjects remained abstinent.

Hamilton and Bornstein (1979) compared three different multiple component programs against both a placebo and a waiting list control group. Eleven subjects were randomly assigned to each of the five experimental conditions. The experimental treatments were composed of some combination of the following techniques: self-control training, behavior modeling and rehearsal, problem solving training, rapid smoking, behavior contracting, self-monitoring, or social support. Post-treatment measurement of smoking was conducted at one, three, and six month follow-ups. Subject self-reports of smoking behavior were corroborated by reliability checks with members of the client's family.

The multiple component treatments had significantly better success in terms of both abstinence and percentage of base line when compared to the two control groups. There were no differences among the three experimental groups.

Delahunt and Curran (1976) randomly assigned fifty female volunteer smokers to one of five experimental conditions: (1) a multiple component program involving a combination of negative practice and self-control techniques, (2) negative practice alone, (3) self-control techniques alone, (4) a waiting list control, or (5) a placebo control. All three experimental treatments and the placebo group were equivalent in terms of the length and number of sessions that were attended. Waiting list group members were offered the combination treatment following the conclusion of the six month follow-up period. The reliability of subject self-reports was enhanced by collecting saliva sample data, although the resources were unavailable to actually analyze the samples for their thiocyarate level (i.e., the bogus pipeline).

In support of multiple component approaches, it was found that the combination treatment was more successful than the two single component treatments and both control groups in terms of both abstinence rates and percentage of base line at one month, three month, and six month follow-up periods. At six months, 55% of the combination treatment subjects had achieved total abstinence, whereas only 22% of the single component subjects had done so. For

the placebo and waiting list control groups, the six month abstinence rates were 11% and 0%, respectively. Combination treatment group subjects were at 28% of base line smoking at six months, while the single treatment and placebo group participants were in the 50 - 60% of base line range.

Bornstein, et.al. (1977), using a pre-post design, examined the effects of a multiple component program which included cigarette fading, a token economy, spouse support, and a self-help manual. One year follow-up data indicated that a statistically significant reduction occurred both in the number of cigarettes smoked and the percentage of base line smoking, although only one of the eight subjects achieved total abstinence. Prior to treatment, subjects reported smoking an average of 26.6 cigarettes per day. At the one year follow-up, they were smoking an average of 14.6 cigarettes per day (54% of base line).

The broad conclusion from this research is that combining different approaches and techniques in one package is better than providing unilateral treatments. Several factors may be at work in producing this effect. First, it is possible that the combination of different approaches may be interactive and multiplicative. In other words, "the sum of the parts is equivalent to more than the whole." This apparent synergism, however, does not imply that there isn't a need to conduct research with the goal of isolating "core" treatment techniques. Despite the fact

that multiple component programs appear to be superior, researchers should not abandon the effort to isolate outcome-producing components from less effective components.

Second, it might be the case that different techniques work better with different types of people, and that by offering multiple components, participants can pick and choose those that work best for them. Other research has suggested that subject characteristics can moderate smoking cessation program effects (Matarazzo and Saslow, 1960; Best, 1975; Straits and Sechrest, 1963; Eysenck, Tarrant, Woolf, and England, 1960 James, Woodruff and Warner, 1965; Jacobs, Spilken, Norman, Wohlberg, and Knapp, 1971; Keutzer, 1968; Steffy, Meichenbaum, and Best, 1970).

Finally, one might conclude, given similar levels of success across a diverse battery of treatment techniques, that it is simply better to do something than nothing. Alternatively, it does seem that true treatment groups fare better than attention placebo groups. Large-scale clinic approaches, such as those offered by the American Lung Association and the Seventh-Day Adventist Church, need to be subjected to more rigorous program evaluations. However, there is a large degree of overlap among the techniques employed by these programs and those employed in multiple component research projects typically conducted by members of the academic community.

Smoking cessation has received the particular attention of investigators with a social learning theory orientation. Considered next will be research using this treatment framework.

Applied Behavior Analysis. Treatment approaches in this area focus on changing the antecedents and consequences of smoking behavior. The consequences of target-behaviors are modified to facilitate positive changes. Negative consequences follow the performance of an undesired behavior (i.e., aversive conditioning of smoking); or positive consequences follow the performance of an alternative to an undesirable behavior (exercising, change in daily routine), or the lack of performance of an undesired behavior (i.e., negative reinforcement of smoking). Hence, behavioral approaches seek to restructure external environments to facilitate behavior change. Given that several of the multiple component studies reviewed above included behavioral techniques, this section will provide a brief and selective overview of research examining the application of singleton behavioral techniques.

Self-monitoring techniques for smoking reduction have been the focus of several studies (McFall, 1970; Foxx and Axelroth, 1983; Rozensky, 1974; Frederiksen, Epstein, and Kosevsky, 1975; Karoly and Doyle, 1975). Self-monitoring involves having subjects carefully record each instance of

smoking behavior with the goal of decreasing the frequency or eliminating the behavior.

Foxx and Axelroth (1983) used self-monitoring techniques to compare nicotine fading and cigarette fading. Nicotine fading involved a gradual reduction in the nicotine and tar content of the cigarettes smoked. Cigarette fading involved the gradual reduction of the number of cigarettes that were smoked per unit of time. Nicotine fading is a process that is designed to lessen nicotine withdrawal symptoms. Dependent upon which treatment they received, subjects kept daily graphs of either their tar/nicotine intake or their cigarette consumption. All subjects were provided with a specific reduction goal. Using a multiple base line across subjects research design, Foxx and Axelroth reported a 33% abstinence rate following treatment for cigarette fading participants, and an 85% reduction in tar and nicotine intake for the nicotine fading participants.

McFall (1970) demonstrated that when subjects self-monitored their cigarette consumption, the number of cigarettes that they smoked decreased. Employing a reversal design, and a detailed procedure for recording instances of smoking, McFall reported that participants smoked less during the "self-monitoring" period than they did during either the base line or return to base line periods.

Using data from a single subject case study, Rozensky (1974) argued that recording the target behavior prior to actually performing it results in a stronger self-monitoring effect than recording after performing the target behavior. He suggested that pre-monitoring is better than post-monitoring because the act of recording serves the function of disrupting behavioral chains for the client. The rate of reduction in smoking behavior was more rapid during the pre-monitoring period.

Frederiksen, Epstein, and Kosevsky (1975) demonstrated that continuous self-monitoring of smoking behavior resulted in greater smoking reduction than more intermittent recording procedures (i.e., daily or weekly). Subjects in the continuous monitoring group cut their cigarette consumption in half over a five week period, while the daily and weekly recorders maintained their pre-treatment smoking level throughout the experimental period. Additionally, the datasuggested that continuous self-monitoring produced a more reliable and valid measure of actual smoking behavior.

Rapid smoking, which involves making smoking aversive through stimulus satiation, has received considerable attention in the behavioral literature (Whitman, 1972; Franks, Fried, and Ashem, 1966; Danoher, 1977; Lichenstein and Glasgow, 1977; Lichenstein, et. al., 1973; Grimaldi and Lichenstein, 1969; Poole, Sanson-Fisher, and German, 1981). In the typical rapid smoking project, subjects are

instructed to smoke many cigarettes in rapid succession. The aversiveness of this intensive smoking supposedly acts to decrease the frequency of smoking outside the treatment setting.

Although the published studies have shown that rapid smoking does create reductions in smoking frequency, the procedure has not been without controversy. Many potential negative side effects may exist from such an intensive exposure to cigarette smoke, such as increases in heart rate, blood pressure, and carboxyhemoglobin (Danaher, Lichenstein and Sullivan, 1976; Dawley, Ellithorpe, and Tretola, 1976; Horan, Hackett, Nicholas, Linberg, Stone, and Lukaski, 1977). Some have suggested that the aversive nature of rapid smoking actually stems from nicotine poisoning, and that at times the dosage may reach hazardous levels (Horan, Linberg, and Hackett, 1977). Proponents of the technique have argued that care must be taken in selecting clients, in monitoring the amount of smoking, in placing limits on the duration of exposure, and in soliciting approval from the client's physician (Lichenstein and Glasgow, 1977; Dawley and Dillenkoffer, 1975; Hauser, 1974). Clearly, this is a technique which should never be used with pregnant women.

Several investigators have compared the effectiveness of different applied behavior analysis procedures within a more traditional methodological framework, employing data

collected from groups of participants receiving alternative treatments.

Whitman (1969) compared three interventions to each other, and to a no-treatment control group. Seventy-three subjects were matched on age, amount of smoking, and number of years smoked, and randomly assigned to: (1) an information-only group, (2) self-administered aversion therapy, (3) self-control training, or (4) the control group. Although each of the three treatments were better than the no-treatment control at the one month follow-up, these differences had disappeared by three months following the conclusion of treatment. There were no differences among the three treatments at either follow-up. Whitman's hypothesis, that informational approaches (i.e., providing the "facts") may change attitudes, but would not change smoking behavior, was not supported by his data.

Chapman, Smith, and Layden (1971), using a pre-post research design, examined the effectiveness of a treatment package which combined aversive conditioning and self-control techniques. The twelve subjects involved in the program recorded their cigarette consumption using a mechanical wrist counter before, during, and after treatment. At a twelve month follow-up, subjects were smoking at 64% of base line. Similar self-control training was used by Harris and Rothberg (1972). This type of training focused on identifying and substituting alternative behaviors in place of smoking, and self-

manipulation of the external physical and social environment such that smoking is punished, and non-smoking is positively reinforced.

Marston and McFall (1971) found no differences between a stimulus satiation treatment, a cigarette fading treatment, a drug treatment placebo group, and an information-only control group. All four treatments produced a substantial smoking reduction; however, those treatments that were intensive in nature and lengthy in duration were no more effective than the minimal treatments. By the six month follow-up, there was a considerable relapse across all four conditions. The authors suggested that it is "non-specific" factors or demand characteristics of smoking cessation programs that account for treatment effects, and that more sophisticated techniques within programs are largely unnecessary. Other behavioral investigators have also discovered no significant differences in the effectiveness of alternative treatments, although all treatments considered did better than no treatment at all (Koening and Masters, 1965; Kuetzer, 1968; Pyke, Agnew, and Kopperud, 1966).

In the clinical tradition of "behavioral bibliotherapy", Glasgow (1978) discovered that amount of contact with the therapist had no influence on the effectiveness of a multi-component self-help manual treatment. Furthermore, his data indicated that the self-help manual, essentially a "paper treatment", was just as

effective as a totally therapist-delivered treatment, that served as a control group. The self-help manual participants that received close to 200 minutes of therapist contact did not reduce their smoking to a greater extent than the self-help manual participants who received less than 100 minutes of therapist contact time. The smoking behavior dependent variable was well measured, including corroborative data gathered from an analysis of expired breath samples. Glasgow outlined several advantages of self-help approaches, including:(1) low cost, (2) ease of dissemination, (3) ease of treatment delivery, (4) greater attributions of success on the part of clients, and (5) greater likelihood of successful maintenance in the non-treatment environment.

Community-Wide Approaches. Public health advocacy and service agencies are frequently involved in large-scale media efforts to encourage people to stop smoking (see O'Keefe, 1971). The evaluation of such educational programs, typically with large units of analysis, presents particular challenges, and hence they have rarely been performed. Here, two exemplary studies of broad-based community education approaches will be described.

The Stanford Heart Disease Prevention Program (Maccoby and Alexander, 1979; Meyer, Nash, McAlister, Maccoby, and Farquhar, 1980) compared smoking reduction in two experimental communities and one control community. The first experimental community received a media campaign

concerned with several cardiac risk factors, with a major emphasis on smoking. The second experimental community received the media campaign as well as face-to-face health education for high risk community residents. The control community provided a no-treatment comparison. At a two-year follow-up, the media only community had a 5% smoking reduction, the media plus health education community had a 17% smoking reduction, and the control community exhibited a 12% smoking increase.

Warner (1977) estimated the effects of the anti-smoking media campaign on a national level. Using data concerning total U.S. cigarette sales and census data, Warner constructed econometric equations which predicted per capita cigarette consumption based on historical trends (1947 - 1975). The disparity between these predicted figures, and the figures reflecting actual cigarette consumption, following key anti-smoking events (e.g., the 1964 Surgeon General report), provided an estimate of the effects of the media campaign. Warner concluded that the cumulative effects of the nation-wide media campaign reduced smoking by 20% to 30% by 1975.

This review, thus far, has been concerned with smoking cessation efforts for a general population. Considered next are health education efforts specifically targeted for pregnant women.

Smoking Interventions With Pregnant Women

The previous part of this review stressed the different types of intervention models implemented, and the range of outcomes discovered for smoking cessation programs with general populations. When looking at the special case of pregnant women, pregnancy outcome variables, such as birthweight, become important dependent measures, as well as reductions in smoking level. Additionally, the special nature of most prenatal care settings (e.g., hospitals, clinics, physician offices) has some impact on the design and implementation of interventions.

Early intervention studies were developed largely in response to the research concerning the causal role of smoking in producing low birthweight and poor pregnancy outcome. The report of Butler, Goldstein and Ross (1972), that women who quit by the fourth month of gestation had pregnancy outcomes similar to non-smokers, was a major impetus to fielding studies evaluating alternative cessation interventions. Beginning in the early 1980's, the smoking and pregnancy issue, and intervention studies in particular, attracted growing research attention. The more recent studies have included several methodological refinements, including bio-chemical confirmation of smoking or non-smoking behavior, the study of women who quit smoking on their own following pregnancy, the development and evaluation of maintenance programs for the self-quitters, the application of cost-benefit analyses, and

longitudinal study of the long-term effects of interventions.

In an early and fairly comprehensive look at smoking behavior during pregnancy, Baric, MacArthur, and Sherwood (1976) conducted a survey of women receiving prenatal care at a hospital in England, and performed an evaluation of a health education intervention. One hundred and thirty four of 510 women attending the prenatal clinic (26.3%) were found to be smokers. Of the smokers, it was found that twenty-four women had stopped smoking on their own (17.9%) since learning they were pregnant. Those women who continued to smoke while pregnant were divided into an intervention group (n=63) and a control group (n=47). The intervention group received an anti-smoking counseling session from a physician who was a resident at the clinic. The women were interviewed during their first clinic visit, and at their homes eleven weeks later.

The data collection effort included variables concerning demographics, smoking behavior, knowledge about the risks of smoking, and expectations concerning change in maternal behavior during pregnancy. Only one-third of the women believed that smoking during pregnancy could definitely be harmful to the baby, with an additional 21% thinking that "maybe" it could be harmful. Those women who believed that smoking could result in health problems were more likely to be the ones who had stopped smoking on their own. Multiparous women were more likely to believe that

smoking was not harmful to the baby. A good experience with a previous pregnancy during which they had smoked led them to place less confidence in the fact that smoking is associated with poor pregnancy outcome. Primiparous women were more likely to believe that smoking presented a serious risk. Women who stopped smoking on their own since learning they were pregnant had a higher educational level, tended to smoke fewer cigarettes before pregnancy, had started to smoke at an older age, and had tried quitting more frequently in the past. Additionally, the authors suggested that the incidence of "morning sickness" during the first trimester of pregnancy was a key factor in these women's decision to quit. In some cases, these women returned to smoking during the second trimester, when the pregnancy sickness symptoms had faded, suggesting the need for "maintenance" programs.

The anti-smoking counseling was delivered by a physician within the hospital setting as a part of the routine clinic flow. The intervention involved a discussion of the disadvantages of smoking in pregnancy, including its association with increased perinatal mortality, decreased birthweight, and impairment of behavioral and intellectual functioning during childhood. Although primary emphasis was placed on providing information concerning the risks of smoking during pregnancy, some attention was given to methods of behavior change. At the conclusion of the intervention session, the

physician attempted to get the client to make a firm commitment to stop during pregnancy. Half of the intervention group women received a smoking behavior diary. Sixty percent of the women in the intervention group reported stopping or reducing their smoking habit as compared with only 15% of the control group.

Donovan (1977) and Donovan, Burgess, Hossack, and Yudkin (1975) reported on a randomized study of anti-smoking advice during pregnancy. Similar to the Baric, MacArthur, and Sherwood (1976) investigation, the health education intervention was delivered by a physician in a prenatal care clinic of a hospital. Pregnant smokers entering the clinic were randomly assigned to either an intervention group (n=263) or a control group (n=289). In addition, a non-smoker group (n=243), which was matched to the randomized control group on age and parity, was included in the study. Data was collected from medical archives maintained at the hospital, and from postpartum interviews conducted by obstetric nurses. Although intervention group women reported smoking significantly fewer cigarettes per day during pregnancy than control group women, there were no differences on any of the pregnancy outcome variables (i.e., birthweight, birthlength, newborn head circumference, prematurity, and perinatal deaths). During the third trimester, the intervention group reported a mean of 9.2 cigarettes per day versus 16.4 for the control group. Although there were

no birthweight differences between the two experimental groups, non-smokers' infants were 159 grams heavier than the infants of smokers, a difference that was statistically significant. Donovan (1977) concluded that the physician anti-smoking counseling was ineffective. The self-report data indicated that smoking levels were reduced by the intervention. However, because of reported problems with the reliability of the patient self-reports, he further concluded that smoking may not be a low birthweight risk factor.

The findings of the above two studies suggested that intervention models should go beyond just providing facts about smoking and pregnancy, and include instruction concerning behavioral skills as well. Danaher, Shisslak, Thompson, and Ford (1978) described a small-scale pilot study of a more intensive smoking cessation program. Eleven pregnant women participated in six two-hour sessions over a seven week period. The content of the program involved several different skills in three phases, including self-monitoring, relaxation training, and aversive smoking. Clients were provided with a self-help manual and printed information outlining the risks of smoking during pregnancy. Although none had completely stopped, 91% of the women reported reducing their cigarette consumption from pre-pregnancy levels by themselves. Following the intervention, 36% reported total abstinence, and all reported further reductions. As indicated by the

authors, the major weakness of this study is the lack of a control group, and the lack of clinical data.

Ershoff, Aaronsen, Danaher, and Wasserman (1983) reported on a quasi-experimental evaluation of a prenatal health education program at a health maintenance organization in southern California. The intervention model included both face-to-face nutrition education, and a home-correspondence smoking cessation program. Dependent variables included behavioral, health status, and cost-benefit outcomes.

Women in the experimental group (n=57), besides participating in a two-session nutrition education counseling, were involved in an eight week smoking cessation program. The smoking cessation program followed a self-help home-correspondence format. Each week, for eight weeks, the prenatal care patients were mailed a booklet which covered various behavior change skills, including self-monitoring, relaxation training, self-control techniques, and behavior contracting. Additionally, clients were encouraged to call into a telephone answering system which provided taped messages concerning that week's behavior change skill. The control group (n=32) was independently and randomly sampled from a group of women receiving prenatal care at a different health care facility. Data was collected from outpatient medical and financial records, and during a twenty minute telephone interview conducted two months postpartum.

There were no significant differences between the experimental and control groups on demographic variables (i.e., race, age, marital status, education, family income) or prior pregnancy history (i.e., parity and gravidity), bolstering the "fairness" of the comparison between the two non-randomly assigned groups. In terms of dependent variable findings, the experimental group significantly reduced smoking, and had a significantly higher mean birthweight, when compared to the control group. Forty-nine percent of the intervention group women had completely stopped smoking during pregnancy; only 37.5% of control group women had done so. An interaction involving smoking level prior to pregnancy and treatment effect was also uncovered. Those women who smoked less than a pack a day before pregnancy did significantly better if they were provided with the health education treatment (75% abstinence versus 40% for control group women when looking only at those clients who smoked less than a pack a day prior to pregnancy). Across all levels of prior smoking women in the intervention group delivered infants that weighed 216 grams heavier, on the average, than control group women. Furthermore, the low birthweight rate and the prematurity rate (less than thirty-seven weeks gestation) was lower among the experimental group women.

In terms of cost outcomes, the findings indicated that the mean delivery cost for experimental group women was $183 lower than the mean delivery cost for control group

women. Given the average cost of $93 per patient to provide the health education intervention, approximately a 2:1 cost-benefit ratio was observed. The authors concluded that health education represents an important preventive measure, and one that can contribute to overall cost containment strategies, particularly for organizations involved in capitation plans of health care.

Sexton and Hebel (1984) examined the effects of an anti-smoking intervention with pregnant women on birth outcome, self-reported smoking level, and a bio-chemical measure of smoking level. In order to be eligible for participation in the study, women had to report smoking at least ten cigarettes per day, and had to have been recruited prior to the eighteenth week of gestation. After eligible women completed an informed consent document, they were administered a brief questionnaire and a salivary thiocyanate test, and were then randomly assigned to a treatment group (n=463) or a control group (n=472). During the eighth month of pregnancy, an additional salivary thiocyanate test was administered to both groups. Additional pregnancy and infant data was abstracted from hospital records.

The smoking cessation intervention involved one face-to-face session with a health educator, supplemented by several telephone and mail contacts. The intervention protocol focused on information about the risks of smoking during pregnancy, as well as several behavioral strategies.

Various "homework" assignments were to be completed and returned to the interventionist through the mail (e.g., smoking behavior diary). No further contact was made with control group women following randomization.

For both measures of smoking at eight months gestation, self-report of cigarettes per day and mean salivary thiocyanate level, the intervention group demonstrated a statistically significant greater reduction than the control group. While 43% of treatment group women had totally abstained, only 20% of control group women had done so. These findings were corroborated by the biochemical measurements. The experimental group women smoked an average of 6.4 cigarettes per day at the eighth month, while control group women smoked 12.8 cigarettes per day. In terms of pregnancy outcome, infants born to mothers in the health education group had a mean of 3,278 grams, 92 grams heavier than the infants born to mothers in the control group, a statistically significant difference. There were no differences between the groups on head circumference, gestational age, or apgar scores, although birthlength was greater for intervention group infants. The authors concluded that smoking does negatively influence pregnancy outcome, and suggest that these results should help resolve the controversy concerning the "casuality" issue, for the most part generated by the work of Yerushalmy (1971, 1972). They state: "The major findings from our study are that anti-smoking intervention

is feasible to conduct, accepted by pregnant women, and effective" (p.915).

In a subsequently published article (Hebel, Nowicki, and Sexton, 1985), these investigators employed multiple regression analysis with both birthweight and salivary thiocyanate levels as dependent variables to examine interactions between treatment effects and several maternal characteristics. Although the intervention effect was somewhat greater for women who experienced medical problems early in pregnancy, overall few significant interaction effects were discovered. Because of the lack of interaction, it was suggested that there is lttle variation in the effect of intervention with different sub-groups, indicating that intervention should be helpful to all smoking pregnant women regardless of individual demographics, prior health behaviors or risk.

A longitudinal follow-up of mothers and infants involved in this experiment was also reported at a recent national conference (Sexton, Fox, and Hebel, 1986). At three years of age, growth and development measures were obtained on 728 infants (94% follow-up success) from both the intervention and control groups. Physical measurements were conducted during pediatric visits, and the McCarthy Scales of Children's Abilities were completed by parents. The children of women who quit smoking during pregnancy had higher average scores on the cognitive development tests, and differences in terms of both weight and height

persisted from birth. These differences continued to exist when statistically adjusted for a variety of household and maternal characteristics.

An exemplary study, still in progress, is being conducted at the University of Vermont Department of Obstetrics and Gynecology and funded by the National Heart, Lung, and Blood Institute (Secker-Walker, Flynn, Solomon, Collins, LePage, and Mead, 1986). Two randomized experiments are underway; one providing intervention to women who quit following pregnancy to prevent relapse (i.e., maintenance counseling), and the other providing intervention to promote cessation and reduction among women who continue to smoke at the first prenatal visit. Both treatments involve four counseling sessions during pregnancy, as well as postpartum and one-year follow-ups. Measures include maternal demographics, self-report smoking status with 100% urinary cotinine confirmation, patterns of prenatal care, and attitudinal tests of motivation, confidence and intention. For the cessation intervention study, preliminary data indicates that at 36 weeks of gestation, the quit rates were 14% in the counseled groups and 9% in the usual care groups, and at six weeks postpartum the quit rates were 12% and 8% respectively. For the maintenance intervention study, the relapse rates were 3% in the counseled group and 43% in the usual care group.

Additionally, some differences existed between the women still smoking at their first prenatal visit and those who had quit by that time. Specifically, the smokers were younger, were less educated, were smoking more heavily prior to pregnancy, were more likely to have other smokers in their household, were more likely to be multiparous, and were less likely to believe that smoking was harmful to their unborn infant. Data from another study of relapse prevention underway in California and funded by the National Center for Health Services Research suggested a similar pattern of differences between pregnant smokers and pregnant quitters (Ershoff, Mullen, and Quinn, 1986).

Windsor, Cutter, Morris, Reese, Manzella, Bartlett, Samuelson, and Spanos (1985) reported on a prospective evaluation study comparing three randomly assigned groups: (1) a "treatment-as-usual" control group, (2) ten minute counseling plus the American Lung Association Freedom From Smoking manual, and (3) ten minute counseling plus a self-help manual and plan specifically designed and constructed for pregnant women. Hence, the key comparison was between health education materials designed especially for pregnant women, and materials for the general population of smokers. The self-help guide for pregnant women used a seven-day quit plan, and involved ten behavioral skills, including rapid smoking, behavioral contracting, a "buddy" system, and relaxation training. The study was fielded in three

federally-funded prenatal care clinics for low-income women in central Alabama.

There were approximately 100 participants in each of the three groups. Self-report and salivary thiocyanate data was collected at the first prenatal visit, at mid-pregnancy, and at the ninth month of pregnancy. To be eligible for inclusion in the study, women had to begin prenatal care prior to 32 weeks of gestation, and had to report smoking at least one cigarette during the prior week. Of all women meeting these criteria, 80% agreed to participate. No differences in age, race, education, or the month prenatal care began existed between the participants and the eligible non-participants, supporting the external validity of the study.

The quit rates at nine months for the three groups were as follows: 2% for the control group, 6% for the Freedom From Smoking group, and 14% for the Pregnant Women's Self-Help Guide group. These differences were statistically significant, and confirmed by the salivery thiocyanate data. Although age, education, and race were not predictors of quitting, pregnant women who quit were more likely to begin prenatal care earlier, and were more likely to be light smokers prior to pregnancy.

It should be noted that Windsor, et. al. (1985), as well as Bailey, Loeb, and Waage (1983), experienced difficulty in implementing interventions designed for groups of pregnant women. Group interventions are

inherently cost effective because services can be delivered to many women by a single health educator at one time. Further, the opportunity exists to develop intervention models that capitalize on social supports and vacilitation among the group, an approach frequently utilized by broad-based smoking cessation programs.

However, both of these investigators were unable to elicit sufficient participation among pregnant smokers within their respective clinics. Windsor, et. al. (1985) were only able to recruit ten women into their peer-led group discussion intervention. Loeb, Bailey and Waage (1983) in an effort conducted in a Health Maintenance Organization in Oregon achieved only an 18% attendance rate for one and one-half hour multi-component group cessation sessions. These experiences suggested that interventions should be adapted to existing clinic flows and visit schedules within maternity care settings, and that individualized interventions are probably most feasible.

Windsor and Orleans (1986) recently published a review article which provides several methodological guidelines for smoking cessation intervention research with pregnant women. The guidelines, in part, are a primer for evaluation research, but also distinguish some important research challenges unique to this area of inquiry. The guidelines cover design, sampling and power considerations, measurement quality, and replicability of the treatment. The specific needs for improvement in research practice

cited by Windsor and Orleans (1986) are similar to issues discussed by Wilner (1984), in her paper commissioned for the National Academy of Sciences' Low Birthweight Prevention Task Force.

Objectives

The purpose of this study is to conduct an experimental evaluation of a prenatal health education program focusing on smoking cessation. Three groups will be compared. The first will receive education covering risk information and behavior change skills. The second will receive education concerning risk information. The third, the control group, will receive only printed information. Health outcomes, behaviors, knowledge, and attitudes will be measured within a pretest-posttest randomized design.

The hypotheses of the experiment are the following:

(1) The multiple component intervention and the risk information intervention will result in higher levels of abstinence and smoking reduction than the written risk information intervention.

(2) The multiple component intervention and the risk information intervention will result in greater increases in attitudes about the risks of smoking during pregnancy when compared to the written risk information intervention.

(3) The multiple component intervention and the risk information intervention will result in greater knowledge gain concerning the effects of smoking during pregnancy compared to the written risk information intervention.

(4) Participants in the multiple component and the risk information groups will have infants with higher birthweights than participants in the written risk information intervention.

CHAPTER 2

METHOD

The previous literature review has described research illustrating the negative impacts of smoking during pregnancy on the fetus, and on subsequent development for the child. Included in the adverse consequences of smoking during pregnancy are lower birthweight, a higher rate of prematurity, increased fetal and neonatal deaths, as well as increased costs for health care for both mother and infant.

Although only a small number of intervention-based studies have been directly concerned with smoking cessation for pregnant women, a number of treatment studies with a more general population have demonstrated moderate success. The imperative nature of quitting smoking for pregnant women is intensified because responsibility is "shared" for the health of both mother and unborn infant. Hence, pregnancy presents an optimal and extremely important time for smoking cessation intervention.

The purpose of the present study is to experimentally compare two smoking cessation interventions for pregnant woman with a "treatment-as-usual" control group. Specifically, a multiple component intervention and a

face-to-face risk information intervention (the "flip chart" group) were compared to a written information only control group. The interventions were implemented within the clinic flow of the Special Supplemental Food Program for Women, Infants, and Children (WIC) operated at a local health department. Pregnant women clients receiving nutritional services through the WIC program were randomly assigned to one of the three treatment conditions during the intake process. The measurement plan included demographic variables, smoking history and behavior, knowledge, attitudes, prenatal care history, and health outcomes. The remainder of this chapter will describe the research and implementation plan for the Smoking Cessation to Prevent Low Birth Weight Project, including the research setting, clients, experimental design, specification of treatment, and measurement.

RESEARCH SETTING

The WIC program, funded by the U.S. Department of Agriculture, served as the research setting. The research was conducted with the cooperation of the Health Education Division and the WIC Division of the Kent County Health Department in Grand Rapids, Michigan. The research and implementation plan described herein was the product of an administrative agreement between the author of this document and officials at the Kent County Health Department, and represents a consensus given the demands of

maintaining as efficient clinic flow within the WIC program, and the demands of implementing a rigorous program evaluation design.

The purpose of the WIC program is to provide food supplements, in the form of coupons redeemable for foods high in iron and calcium, and nutrition education to eligible women, infants, and children. The two primary criteria require that eligible families have incomes at or below 185% of the federal poverty level, and that expectant mothers and/or children exhibit certain medical or nutritional risks. These risk factors include overweight or underweight status, high hematocrit, poor previous pregnancy history, drug or alcohol abuse, and poor nutritional history. Typically, clients are referred by private physicians or local prenatal care clinics. At the national level, the program was initiated in the early 1970's in response to several influential surveys which suggested a surprisingly high level of nutritional deficiency among low-income families.

Program evaluations of WIC conducted throughout its history have suggested that the program is successful in increasing the birthweight of infants born to participating mothers (Kotelchuck, Schwartz, Anderka and Finison,1984; Edozien, Switzer, and Bryan, 1972; Kennedy, Gershoff, Reed and Austin, 1982; Metcoff, et.al., 1985).

For example, in Massachusetts, Kotelchuck, et.al. (1984) compared the pregnancy outcomes of 4,126 women who

participated in WIC to those of non-participating women matched on five demographic variables, including age, race, poverty, education, and marital status. Data was abstracted from both WIC program archives and the Massachusetts vital registration system. WIC participation was associated with improved birth outcome. The WIC group had a lower rate of births weighing less than 2500 grams, had a lower neonatal mortality rate, and a longer mean gestational age. Additionally, improvement in birthweight was greater for mothers who had participated in WIC for a longer duration of their pregnancy.

In another study, Metcoff, et.al. (1985) employed a prospective randomized design, including blocking on maternal risk, to evaluate the effects of WIC participation on birthweight. Both experimental and control group women received prenatal care from the same hospital clinic in Oklahoma, and hence, there was little difference between the groups with regard to all aspects of maternity care except participation in WIC. After adjusting the results for several maternal characteristics, including infant sex, gestational age, maternal weight, prenatal visits, smoking, and previous history of low birthweight, infants of mothers receiving WIC services had higher birthweights, but the magnitude of the difference was not statistically significant. When maternal weight was not included as a moderator, the birthweight difference was statistically significant. Importantly, there was an interaction between

smoking status and WIC treatment effect. The mean birthweight of infants of WIC smokers (>10 cigarettes per day) was 168 grams heavier than the birthweight of infants of smokers in the non-WIC group, a statistically significant difference. Overall, the authors concluded that WIC participation helps improve birthweight, particularly for smoking mothers.

The need for smoking cessation intervention within WIC is a topic that has received some recent attention by both State and Federal analysts. Analysts at the Centers for Disease Control in Atlanta, Georgia conducted a study of 127,512 pregnant women receiving WIC services (Nieburg, Fuller, and Wong, 1986). The smoking rate among whites (42.3%) was greater than that for blacks (23.1%), or for hispanics 15.3). Smokers had a higher low birthweight rate and a lower mean birthweight than non-smokers. Only 4.1% of the women quit smoking on their own over the course of WIC participation. The authors concluded that smoking during pregnancy makes a major contribution to adverse pregnancy outcome in the WIC population.

Garland and Stockbauer (1986) of the Missouri Center for Health Statistics linked WIC program archival records with birth/fetal death records for all pregnant women receiving Missouri WIC services in 1982. Successful record matching was achieved for 93% of the 1982 deliveries. Analysis of smoking patterns was possible because the Missouri birth certificate, unlike all others, includes an

item on maternal smoking. Overall, 44.9% of the women were smokers, and similar to the CDC analysis, the smoking rate was greater for whites (49.8%) than it was for blacks (35.8%). The overall WIC smoking rate was substantially greater than the smoking rate among all pregnant women in the State, largely due to the high risk demographic characteristics of WIC clients. Garland and Stockbauer concluded that the smoking rate among WIC women was unacceptably high, and that smoking cessation intervention within WIC clinics presents a great opportunity for improving the effectiveness of the program.

For the current project, only women who were pregnant and receiving WIC services were included. Although mothers of infants receiving WIC services could conceivably have been a part of the program, it was viewed as more crucial to direct the intervention effort at those women currently pregnant. For this group, pregnancy outcome and birthweight become important dependent variables. Thus the opportunity existed to consider the health status of the newborn infant within the research.

Due to the fact that the smoking project was implemented entirely with women receiving nutrition services with demonstrable impact, it will be impossible to disentangle these effects from the effects of the smoking intervention itself. However, it can be assumed that women in all three experimental conditions will receive equivalent nutrition services. Hence, because of random

assignment, the effects of the nutrition intervention should also be equivalent across treatment groups (i.e., selection-treatment interaction bias is minimized). Thus, the relative differences among clients assigned to different smoking treatment groups can be attributed to the smoking intervention. Essentially, the observed outcomes in the study will be a product of the specific smoking intervention plus a constant common to all three groups (i.e., the effects of WIC).

The WIC program is national in scope, and operated in every state. Hence, although external validity may be claimed only for smoking women receiving WIC services, this is a large group, and one for which the potential for replication of the study and the intervention model is substantial.

In terms of the Kent County WIC program, local data suggested that 51% of clients belong to the "working poor", and 49% are receiving support solely on public assistance (i.e., AFDC, Medicaid, General Assistance, etc.). Approximately 22% of the total WIC caseload were pregnant women. Given a large waiting list for the program, high risk pregnant women were given the highest priority for acceptance. In 1984 Kent County WIC served 700 pregnant women.

At the initial WIC clinic, new clients are screened for eligibility, shown a film concerning the mechanics of the program, receive individual and group nutrition

counseling, and are provided with two month's worth of redeemable food coupons. If necessary, additional health data is also collected, including hematocrit, anthropometric measurements, blood tests, and health history.

Because it was important to provide the smoking cessation treatments as early as possible during pregnancy, the experimental interventions were inserted into the clinic flow of the first WIC visit. Several studies have indicated that a "dose-response" relationship exists between smoking and pregnancy outcome (Dougherty and Jones, 1982; Butler, Goldstein and Ross, 1972; Wainwright, 1983; McMahon, Alpert, Salber,1965; Lowe, 1959; Williams and Meyer, 1973; Buncher, 1969; Frazier, Davis, Goldstein, Goldberg, 1961). Thus, the earlier during pregnancy that women quit smoking, the better the prognosis for their unborn infant's health.

During the second WIC visit (usually two months following the initial visit), clients attend a nutrition education session, and are provided with additional WIC coupons. At subsequent visits, WIC clients were provided more coupons, and if necessary, were re-certified for eligibility. At the first postpartum WIC visit, a dietary plan was developed for the newborn infant, and food coupons enabling the mother to comply with this plan were provided. During this visit, the first one immediate following

delivery of the child, the posttest for the smoking cessation project was administered.

Experimental design

The design for this study involved a randomized pretest-posttest control group design with the individual client serving as the unit of analysis. Smoking, attitudes, knowledge and pregnancy outcome were the dependent variables. For smoking behavior, attitudes, and knowledge, both pretest and posttest data was collected. The pregnancy outcome data (e.g., birthweight and weeks gestation at birth) was examined post only. The experimental design is illustrated in Figure 1. The design provides for a high degree of internal validity, and confidence that the observed effects are attributable to differences in the experimental treatments.

Three treatment/intervention groups were compared: (1) a multiple component intervention (2) a face-to-face risk information intervention (i.e., the flip chart group), and (3) a written information-only control group. The treatments for the first two experimental groups involved a face-to-face health education counseling session. The latter intervention group was provided only with written information. Considered below are several important procedural issues, including processing at intake, and the specification of treatment protocols.

Figure 1

Experimental Design

Group	time 1 (first WIC visit)	time 2	time 3 (postpartum)
Multiple component	pretest	face-to-face intervention	posttest
Flip Chart	pretest	face-to-face intervention	posttest
Written information-only control	pretest	provision of written educational materials	posttest

Intake and assignment

Several procedural changes were implemented within the WIC clinic in order to accurately identify pregnant smokers, recruit them into the project, and assign them to experimental conditions. These procedures were carried out by the project health educator, and other WIC staff members.

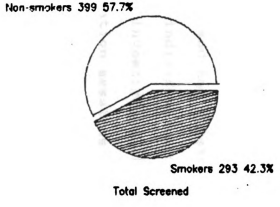
During the initial eligibility interviews, all incoming pregnant women were asked if they smoke (see Appendix A for the form that was employed). All identified current smokers (excluding quitters) were asked if they would like to participate in the smoking cessation project, and then asked to complete the pretest. A brief description of the project was given by WIC staff. If they agreed to participate, participants were asked to read and sign a "consent for participation" form (see Appendix B). The project had previously been approved by the University Committee on Research Involving Human Subjects at Michigan State University. Written clinic flow instructions and standard scripts were employed by WIC staff, and continual monitoring of the compliance of staff behavior key by the health educator was maintained (see Appendix C). The consent for participation form described the rights and responsibilities of participation, and ensured clients of the confidential nature of the data collected on them. The health educator and other WIC staff were available to

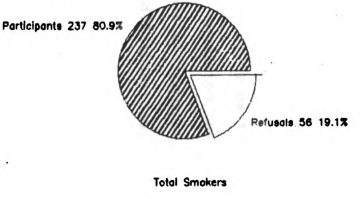
assist clients in completing these forms, and to answer questions.

If both the pretest and consent form were completed, the health educator attached color-coded tags to each smoking project participant file. The color codes signified the experimental condition for each individual client. The sequence of the tags was randomly determined prior to the implementation of the project using a random numbers table. The health educator knew which treatment protocol to employ dependent on the color of the tag attached to the file of any given participant. This procedure helped ensure the integrity of the random assignment process. The tags also served to identify project participants during the first postpartum WIC visit, so that posttest administration could be efficiently accomplished.

The intake, screening, and assignment procedures described above were implemented from August 15, 1985 through August 28, 1986. Because of the design of the screening process, the smoking status of every newly admitted pregnant woman was ascertained. Figure 2 outlines the results of the intake process. A total of 692 women went through the first visit screening interview. The smoking rate was 42.3% (n=293). Of the 293 identified current smokers, 237 agreed to participate in the smoking cessation project. This yielded a participation rate of 80.9%.

Figure 2
Intake Flow and Participation Rates





Following the intake and assignment procedures, the smoking project participant moved to the next station in the clinic flow, which involved the completion of a dietary history, determination of relevant WIC risk factors, and individual nutritional counseling. Following this clinic station, written information group participants received written materials and then completed the WIC clinic in the traditional manner; the multiple component and flip chart participants received an additional health education session before completing the remainder of WIC clinic activities. The content of these intervention sessions is described in the next section of this document.

Both experimental interventions were delivered to project clients by a female non-smoking health educator who was a member of the Kent County Health Education/Risk Reduction staff. All interventions were delivered by the same staff member. The health educator held a master's degree in health education, and had substantial prior experience delivering both individual and group health counseling. The principal investigator observed the clinic procedures and health education sessions on several occasions, but played no role in the actual delivery of the smoking cessation interventions. Both interventions, as well as clinic procedures, were pilot tested and refined prior to actual implementation.

Multiple Component Intervention

The multiple component intervention involved the provision of information concerning the risks of smoking during pregnancy, as well as several behavior change skills to assist the client in stopping smoking. This health education strategy was delivered in a face-to-face counseling session. The informational aspect of the treatment was presented as a part of the health counseling session with the use of a "flip chart" that included important facts about the effects of smoking during pregnancy on the unborn child (see American Lung Association, 1984). The client was also provided with a package of take-home informational materials (see Appendix D).

The most significant part of these materials was a "question-and-answer" book, that covered several important issues, including the exchange of oxygen and food between mother and baby, long term effects, and the relation of maternal smoking to birthweight, gestation, and child development. Hence, the information was specifically tailored to the needs of pregnant women. The information in the question-and-answer booklet duplicated what was covered by the health educator during the face-to-face "flip chart" part of the session.

The latter part of the multiple component intervention covered several behavior change skills. The behavior change skill aspect of the treatment involved individual

counseling and the provision of a self-help manual which outlined a seven-day approach to quitting (see Appendix E). The smoking cessation methods focused exclusively on the needs of pregnant women.

The two most prominent skill areas included self-monitoring and personal contracting techniques. Additionally, five other skills were presented to the client, including exploring reasons for quitting, discovering the reasons one smokes, relaxation training, learning about the physical reactions to quitting, and substituting more healthful behaviors for smoking. The materials were adapted from those used by Windsor, et.al. (1985), as well as the ALA Freedom From Smoking manual. Each of these behavior change components involved a self-help approach; the client was instructed in a number of home-based exercises that should facilitate her attempt to stop smoking (see Glasgow and Rosen, 1978). The client was provided with a behavior change skill manual which outlined the step-by-step procedures to becoming smoke free. The two primary behavior change skills, self-monitoring and contracting, are discussed in more detail below.

Self-monitoring. This procedure has successfully been used in smoking cessation programs as both an isolated treatment (McFall, 1970), and as a part of multiple component programs (Karoly and Doyle, 1975; Rozensky, 1974; Harris and Rothberg, 1972; Frederickson, Epstein and

Kosevsky, 1975; Foxx and Axelroth, 1983; Windsor, et.al., 1985). Although initially employed as a data collection technique by social learning oriented clinicians, it soon became apparent that the highly reactive nature of the self-recording of behavior gave the procedure a behavior change function. Soon thereafter, self-monitoring procedures were used in both weight control and smoking cessation applications, and became the subject of a growing number of published research studies (Kanfer, 1970; Nelson, 1977; Johnson and White, 1971).

These studies demonstrated that the effectiveness of self-monitoring as a behavior change tool could be maximized when certain other clinical strategies were employed concurrently. First, several investigators concluded that a general property of the self-recording of behavior was that it would increase the frequency of desirable behaviors, and decrease the frequency of undesirable behaviors (Sieck and McFall, 1976; Broden, Hall and Mitts, 1971; Kazdin, 1974; Nelson, 1977). Hence, if the undesirable nature of smoking during pregnancy was clearly communicated, the self-monitoring of smoking behavior should result in decreased frequency of smoking.

Second, several studies suggested that the timing of self-recording activity can influence the direction and rate of behavior change (Rozensky, 1974; Kanfer, 1970; Bellack, Rozensky, and Schwartz,1974). If clients were instructed to self record prior to performing the monitored

behavior, rather than after, then the recording activity itself served to disrupt the behavioral chain, and thus decrease the frequency of the target behavior. Therefore, if smokers were told to self-record before lighting a cigarette, this instruction should help maximize treatment effectiveness. Third, combining self-monitoring with a goal setting procedure was more successful in changing behavior than self-monitoring alone (Kazdin, 1974). This suggested that establishing a "quit date" within the self-monitoring treatment would be a reasonable complement within the treatment protocol.

Hence, the self-monitoring treatment protocol included:

(1) provision of self-monitoring charts, and instructions on how to complete them at home;

(2) instructions to self-record prior to lighting a cigarette;

(3) establishing an individualized "quit date" with the client; and

(4) development of a "plan of action" for breaking recorded behavioral chains leading to smoking, and substituting alternative behaviors for smoking behavior.

The other primary behavior change skill involved a personal contracting technique, focusing on anti-smoking social support.

Personal Contracting. Contracting provides a highly-specified behavior change plan for the client, and requires the client to commit to change within a socially

reinforcing context. This procedure has been successfully employed with both individuals, dyads, and larger groups, and in a variety of applications (Tharp and Wetzel, 1969; Patterson, 1973; Stuart, 1971). The contract specifies who is to do what, and when, and details the consequences for compliance or lack of compliance to the agreement reached in the contract.

In the current project, two kinds of contracts were developed. One contract was signed by the client and health educator during the intervention session; the second was a "buddy" contract, which included the involvement of a client- selected individual who co-signed the "buddy" contract along with the client. The specific procedures for the personal contracting treatment included:

(1) the development and signing of an individual contract by the client and health educator, including specification of a "quit" date; and

(2) provision of forms and instructions for completing the "buddy" contract; including selection of a significant other as co-signer of the contract.

In sum, the multiple component intervention included an informational presentation involving a flip chart and verbal counseling, a review of several behavior change skills primarily focusing on self-monitoring and behavioral contracting interventions, take-home educational materials concerning the effects of smoking during pregnancy, and a

self-help manual which describes step-by-step procedures for several home-based quitting techniques.

Face-to-face Risk Information Intervention (Flip Chart)

This intervention involved the informational "flip chart" counseling, but did not include counseling in behavior change skills or the self-help manual. The clients in this health education strategy received take-home materials concerning the risks of smoking during pregnancy (see Appendix C), but did not receive a behavior change self-help manual. The "flip chart" presentation and materials covered:

(1) exchange of oxygen and food between mother and baby

(2) relation between smoking and increased risk for pregnancy outcome

(3) the importance of stopping smoking early during pregnancy

(4) long term effects on child development

(5) social support and reactions to quitting

Thus, this treatment was identical to the earlier parts of the multiple component intervention.

In sum, the face-to-face risk information intervention involved an in-person presentation concerning the risks of smoking during pregnancy utilizing a "flip chart", and some printed educational materials covering the same content area.

Written Information Intervention

Participants assigned to this treatment condition received written information concerning the importance of quitting smoking during pregnancy (American Lung Association, 1984; see Appendix C). This material was provided to clients within the traditional WIC clinic flow. Face-to-face counseling with the health educator was not part of this treatment protocol. The information concerned the exchange of oxygen and food between mother and baby, and the relation between maternal smoking and birthweight, gestation, and child development. These same educational materials were provided to clients who were members of the multiple component and flip chart groups, as described previously.

This group served as a "treatment as usual" comparison group. Because of the randomized health education assignment procedure, this group of project participants should provided a good baseline against which to compare the two experimental groups' performance.

Summary of design issues

The proposed research design provides a powerful test of the comparative outcome of the three experimental conditions. Included is random assignment of participants to alternative treatments. Because the experimental intervention was housed within a clinic which has limited time with any given client, the actual health education

counseling session was short in duration (approximately 20 minutes for the multiple component intervention). However, both face-to-face treatments included a great deal of "homework". These features should serve to increase the "strength" of the treatment. Indeed, due to the tightly scheduled nature of many health care settings, and the failure of group interventions, several recently published investigations, have turned to augmenting their interventions with home-based, self-help activities (Ershoff, Aaronson, Danaher and Wasserman, 1983; Sexton and Hebel, 1984; Glasgow and Rosen, 1978; Windsor, et.al., 1985).

Although the findings of this study will be generalizable only to the population of women eligible for and receiving WIC nutrition services, this represents a large group. The WIC program is nation-wide in scope. Hence, local WIC clinics from across the country could be potential replication sites for the intervention model. Therefore, the population, of which the current study's subjects are a sample, reflect an important group, and one for which there exists ample opportunity for future intervention efforts.

Measurement and data collection

It was important to collect data on several types of process and dependent measures, and to document the quality of those measurements. This section will describe the

variables included in the study, the procedures for collecting the data, and measurement quality. The data collection strategies included the following measurements.

Pretest. This involved a paper and pencil questionnaire completed by study participants during the first WIC visit, with the assistance of staff if needed (see Appendix F).

The content of the pretest included a smoking history, number of cigarettes smoked per day both prior to pregnancy and currently, intentions and confidence about quitting, trimester prenatal care began, physician advice about quitting, trimester prenatal care began, physician advice about smoking during pregnancy, twelve attitude items, and ten knowledte items. Participants completed this questionnaire prior to receiving counseling or information.

Post-test. This measure was a paper and pencil questionnaire completed during the first postpartum WIC visit (see Appendix G). The content of the posttest included number of cigarettes smoked per day during the last month of pregnancy and postpartum, number of quitting attempts during pregnancy, perceived difficulty quitting, number of prenatal visits received, twelve attitude items and ten knowledge items. Also, this measurement included the collection of saliva samples for thiocyanate analysis for some participants. The procedures suggested by Hund, Pechacek, Luepker, and Neibling (1984) were employed in the collection of samples. The samples were frozen within two

hours of collection, and delivered to a local hospital laboratory for analysis. On the average, the written posttest questionnaire was administered 4.7 weeks following delivery of the infant. The range was from one week to 14 weeks, and the median was 4.3 weeks. If a study participant was a "no-show" for her postpartum visit, posttest dta was collected by phone and mail contact (see Appendix C). In some cases, repeated contact was made to collect this data. Recall problems were greater for these cases because the interval between delivery and questionnaire completion was longer. Additionally, it was not possible to collect saliva samples from women who returned completed posttests through the mail.

Archive retrieval. Coding of WIC program records for demographic, health history, and health outcome variables selected was performed by the health educator and principal investigator. (see Appendix H). Permission to collect this data was given by participants as part of the informed consent procedure. Access to program records was one element of the administrative agreement.

This measurement plan reflected implementation of the pretest/posttest control group design. The pretest and posttest instruments were pilot tested with 40 pregnant women prior to the actual implementation of the study. Revisions were made to the first drafts of the instruments given experiences during pilot testing, and given concerns

about collecting adequate information without overly burdening the clinic flow.

The major dependent variables were smoking status, pregnancy outcome (i.e., birthweight and length of gestation), knowledge, and attitudes. Process variables included demographics, smoking and health histories, and patterns of prenatal care. The measurement plan including reliability and validity for each of these sets of variables is illustrated in Table 1. Below, a more detailed discussion of each variable set is provided.

Demographics. Race, age, income, medicaid status, and family size were the demographic variables available in the WIC program archives. Each of these data elements were collected routinely on all WIC program clients. As with the other archival data elements in the study, program records for each study participant were located, and coded using the protocol included in Appendix H.

For a randomly selected sub-sample of 30 cases, two data gatherers, namely the health educator and the principal investigator, independently coded the same program records. This reflected an approximately 30% sub-sample of the overall project caseload. The exact inter-coder agreement reliability percentage across all archival data elements was 99.2%

Some proportion of pregnant women WIC clients also received prenatal care from hospital clinics funded and supervised by the health department. Independent medical

TABLE 1

Measurement Scheme

VARIABLE	MODE OF COLLECTION	WHEN COLLECTED	ITEM POOL	RELIABILITY AND VALIDITY
Demographics	coding of archival data	Pretest	Race; Date of birth; Income; Medicaid status; family size	inter-coder agreement; agreement between WIC program and medical records
Smoking history	paper and pencil	Pretest	length of time smoking; past quitting attempts; medical advice to quit; desire to quit; number of days smoked in prior week	
Smoking behavior	paper and pencil	Pretest and posttest	frequency of smoking;	correlation with salivary thiocyanate
Attitudes	paper and pencil	Pretest and posttest	perceived risk level of smoking; effects of smoking on pregnancy; ability of changing behavior to improve health;	internal consistency
Knowledge	paper and pencil	Pretest and posttest	effects of smoking during pregnancy on infant health	internal consistency

Table 1 (cont'd.)

VARIABLE	MODE OF COLLECTION	WHEN COLLECTED	ITEM POOL	RELIABILITY AND VALIDITY
Prenatal care	paper and pencil	Pretest and posttest	number of visits; month care began	agreement between medical and WIC program records
Health outcomes	coding of archival data	postpartum	WIC; Risk; pregravid weight; pregnancy outcome; WIC at entry; delivery and birth date; parity; gestation; birthweight; birth length; source of payment; place of care	inter-coder; reliability; agreement between WIC program and medical records

records were maintained at these clinics and the health department for the women receiving prenatal care. Officials from the prenatal care program agreed to allow Smoking Reduction Project staff access to these medical records. Individual project participants had agreed to release their medical records as an element in the informed consent statement. Following a process of case matching for clients who were enrolled in both WIC and the prenatal care program, a total of thirteen clients participating in both programs were located. Table 2 presents the exact agreement validity percentages for items that were common to both the WIC record and the medical record. For the demographic items, the validity coefficient was 90.4%

Smoking history. On the pretest study, participants were asked to indicate the age at which they began smoking, the number of prior quitting attempts, the number of days they smoked during the prior week, whether they received medical advice to quit during pregnancy, their level of difficulty in quitting, and their level of desire to quit. On the posttest, they were asked to indicate the number of quitting attempts during pregnancy, how difficult it was to try to quit, the number of days they smoked during the prior week, and a description of their smoking pattern before, during, and after pregnancy.

Smoking behavior. Because recognition of pregnancy can lead to smoking reduction or abstinence, and because following delivery women may relapse following reduction or

Table 2

Validity of Demographic and Health Archival Data

Data Element	n	Percent Exact agreement
Demographics		
Race	13	100 %
Maternal Date of Birth	13	100 %
Family Size	13	77 %
Parity	12	75 %
Infant Date of Birth	8	100 %
Health Data		
Pregnancy Outcome	10	100 %
Weeks gestation at birth	8	63 %
Month prenatal care began[1]	12	42 %
Number of prenatal visits[1]	8	42 %
Birthweight	8	88 %
TOTAL		79 %

[1] Reflects agreement between medical record and patient self-report of prenatal care; all others reflect agreement between medical record and WIC program record.

abstinence during pregnancy, study participants were asked to indicate the number of cigarettes smoked per day prior to pregnancy, after pregnancy but prior to the intervention, at the last month of pregnancy, and at the postpartum period. Estimates of smoking reduction attributable to health education intervention should reflect changes from the post-pregnancy but prior to intervention measurement to the eighth month of gestation measurement. Several investigators have over-reported quit rates by including in their computations women who quit on their own prior to intervention, but after pregnancy (e.g., Sexton and Hebel, 1984).

Several researchers have reported on the utility of salivary thiocyanate and expired other biochemical tests in validating self-report smoking data (Lando, 1975; Vogt, Selbin, Widdowson and Hulley, 1977; Densen, Davidow, Bass, and Jones, 1967; Sexton and Hebel, 1984, Windsor, et.al., 1985). The concensus seems to be that serum and unine samples provide higher quality data than salivary or expired air samples, and that cetinine-based tests provide higher quality data than thiodyanate-based tests. Because cotinine tests are much more expensive than tiocyanate tests, the use of thiocyanate tests has been more common. Because salivary and expired air samples are easier to collect, and are also less intrusive, salivary and expired air samples have been used more often than urine and serum samples.

The use of biochemical data, and salivary thiocyanate data in particular, to validate self-report smoking has not been without controversy. First, some researchers have demonstrated that biochemical incides are suspect to unwanted elevation from exposure to second-hand smoke (Bottoms, Kuhnert, Kuhnert, and Reese, 1982: Hughes, Epstein, Andrasik, Neff, and Thompson, 1982). Hence, if a pregnant woman lives with others who smoke, it is posible that biochemical indicants of nicotine exposure will be high, even though she has remained abstinent. Second, saliva thiocyanate levels are known to be influenced by certain dietary practices. Ingestion of broccoli, cauliflower, cazbbage, and almonds produces inflated values (Prue, Martin, and Hume, 1980). Third, it has been noted that thiocyanate data does not do well in correctly classifying light smokers (Vogt, Selvin, Widdowson, and Hulley, 1977; Borgers and Junge, 1979). The sensitivity and specificity of thiocyanate is much smaller for light smokers than it is for heavy smokers. Finally, biochemical measurements can improve the veracity of self-reports because participants may believe that the biochemical data will catch them in a lie, sometimes known as the "bogus pipeline" (Jones and Sigall, 1971).

In their review of studies using thiocyanate testing, Bliss and O'Connell (1984) report that the proportion of false positives ranges from 2% to 19%, and the proportion of false negatives ranges from 5% to 19%. However, they

also report that correlations between thiocyanate and self-report have been curiously low. The average correlation across nine independent studies was only .53 with a range from .23 to .91. All but one of these studies used serum thiocyanate; in the single study that reported a correlation between salivary thiocyanate and self-report data, the correlation was only .23.

In the present study, saliva thiocyanate data was available for 51 women collected during the postpartum measurement. Samples were collected from 62 women, but for 11 samples, the amount of the specimen was insufficient for chemical analysis. Because of resource constraints and staff scheduling issues at the clinic, it was not possible to collect saliva samples from all women, and furthermore, it was not possible to randomize the selection of women for whom samples could be obtained. The refusal rate for the collection of saliva samples was 25%. However, the collection of saliva samples was evely distributed across the three treatment groups. The thiocyanate values ranged from 97 to 454 MCG/ML, with a mean of 256.9. A value of 100 is commonly used as the cut-off value distinguishing smokers and non-smokers. The correlation between self-report smoking (cigarettes per day postpartum) and thiocyanate level (micrograms per milliliter) was .24 (n=51, p=.045). Only two of the women with available thiocyanate data were postpartum quitters. Both had thiocyanate levels above 100 MCG/ML.

Because both the self-report smoking data, as well as the thiocyanate data are known to be imperfect measures of smoking activity, the correction for attenuation formula was applied to the obtained validity coefficient in order to estimate the true validity coefficient (i.e., the correlation between two perfectly reliable measures). Self-report data is subject to error due to social desirability bias, and recall problems, both of which were present in the current effort. Thiocyanate data is subject to error due to behaviors and conditions outside of actual smoking behavior, such as diet, second-hand smoke, and differential sensitivity based on the intensity of smoking.

For self-report smoking, the correlation between pretest cigarettes per day and last month of pregnancy cigarettes per day, only for the control group, served as the reliability coefficient. Both measurements reflect smoking during pregnancy for a group of women receiving minimal intervention, and therefore, this correlation can be viewed as a test-retest coefficient. This correlation was .63. For the thiocyanate data, the correlation between eleven subjects' independent testings one to sixteen days apart served as the reliability coefficient. This data was not collected specifically for this study, but was obtained from data reported by Bliss and O'Connell (1984). Similar to the self-report coefficient, this coefficient reflected a test retest reliability. This coefficient was .597.

Using the correction for attenuation formula in Magnusson (1967), in which the observed validity coefficient is divided by the square root of the product of the two reliabilities, the true validity coefficient was estimated to be .389. Because 36% of the subjects with thiocyanate data smoked ten or less cigarettes per day, and 84% smoked a pack or less per day, the quality of this coefficient is probably negatively influenced by the thiocyanate tests' insensitivity to light smoking.

Attitudes. The attitude items were included on both the pretest and the posttest, and involved twelve 7-point Likert type items scaled from strongly disagree (scored as one) to strongly agree (scores as seven), The mid-point of the scale was "neither". The content of the items involved the perceived risks of smoking during pregnancy and the effect that changing one's behavior has on one's health.

Rational-empirical psychometric scaling techniques using the computer program PACKAGE (Hunter and Gerbing, 1979), were conducted with the attitude data. Negatively valenced items were re-coded so that a higher score reflected agreement with the belief that smoking presented risks to pregnant women and their children. Following a principal components factor analysis, a varimax rotation with communalities was performed. The final scale was a result of both rational considerations, as well as considerations involving the empirical solution of the

scale, and the level of internal consistency as measured by the alpha coefficient (Cronbach, 1970).

Table 3 presents the results of the rational-empirical scaling process. The alpha coefficient was .75, involving a scale of nine items based on a sample size of 237 (all women who completed pretests). A scale score for each participant was obtained by averaging across all non-missing items composing the scale. Hence, the scale score could possibly range from one to seven. A higher score on this scale reflected more agreement that smoking during pregnancy was an unhealthy, high-risk behavior, and could result in poor pregnancy outcome.

Knowledge. The knowledge items were included on both the pretest and the posttest, and involved ten multiple choice and true-false items. This test was designed to measure how much project participants knew about the effects of smoking on the unborn child, and the implications of smoking for pregnancy outcome and longer term child development.

Similar to the process employed with the attitude data, the knowledge data was subjected to a rational-empirical scaling process using PACKAGE. Individual items were re-coded as either right (scored as one), or wrong (scored as zero). Non-response was scored as wrong. The results of the scaling process are given in Table 4. Seven of the ten items were included in the final knowledge scale which had an alpha coefficient of .65, based on the 237

Table 3

Factor Structure of the Risks of Smoking During Pregnancy Attitude Scale

Item (#)[1]	Corrected Item-Total Correlation [2]
If I stop smoking while I am pregnant, it will help my unborn child's health. (9)	.68
Infants born to mothers who smoke have more health problems than other infants. (12)	.67
It is unhealthy for a pregnant woman to smoke. (8)	.56
When I smoke while pregnant, the baby receives some of the chemicals from the cigarette smoke. (2)	.53
Babies born to mothers who smoke heavily during pregnancy are more likely to die in the first few days or weeks of life. (6)	.49
Babies born to mothers who smoke tend to be born before their due date. (11)	.47
The main thing which affects my health is what I do myself. (5)	.41
By changing my actions, I can improve my health. (1)	.38
It is safe to smoke during pregnancy. (3)	.37

Coefficient Alpha = .75, N of items = 9, N of cases = 237

[1] Number in parentheses indicates questionnaire item number, see Appendix 6 and Appendix 7.

[2] Corrected for unreliability of both the item and the scale.

Table 4

Factor Structure of the Knowledge Test

Item (#)[1]	Corrected Item-total Correlation [2]
A pregnant woman who smokes... (7)	.62
Cutting down to only 2 or 3 cigarettes per day during pregnancy is just as good as stopping completely. (10)	.54
A mother who smokes during pregnancy is more likely to deliver a baby that is...(5)	.43
Babies whose parents smoke have...(1)	.41
Smoking increases the possibility of... (3)	.41
Cigarette smoking...(6)	.41
During pregnancy, nicotine from cigarettes...(2)	.40

Coefficient Alpha = .65, N of Items = 7, N of Cases = 237

[1] Number in parentheses indicates questionnaire item number, see Appendix 6 and Appendix 7.

[2] Corrected for unreliability of both the item and the scale.

women completing the pretest. Individual participant scale scores were computed by summing across all items in the scale. Hence, the knowledge scale score could possibly range from zero to seven; zero implying that all items in the scale were wrong, and seven implying that all items in the scale were right. The correlation between the knowledge scale and the attitude scale was .36.

Prenatal care. Two self-report items on prenatal care were included in the measurement plan. On the pretest, study participants were asked to indicate during what month of pregnancy they began receiving prenatal care. On the posttest, they were asked to indicate the total number of prenatal visits they received during the entire course of their pregnancy.

These two prenatal care items were also available from the health department prenatal care program medical records. Hence, it was possible to compute the level of exact agreement between the self-report data and medical record data. Table 2 indicates that the exact agreement is rather low (42% for both items.). It should be noted, however, that the magnitude of the differences between the two data sources was small. For example, for eleven of the twelve month prenatal care began validity cases, the difference between the self-report and medical record data was only one month. Other analysts have found similar modest levels of agreement between self-reports about prenatal care and data from birth certificates or medical

records (Fingerhut and Kleinmen, 1985). Hence, the data is no worse than that typically found on birth certificates.

Health outcomes. Health outcome data available from the WIC program records included pregravid weight, month of gestation at WIC first visit, parity, gestational age at birth, pregnancy outcome, birthweight and birthlength. These items were coded from WIC program records in a manner similar to that employed with the demographic data. As mentioned previously, the inter-coder exact agreement reliability coefficient was 99.2% across the entire data abstraction procedure (see Appendix H). Table 2 presents the exact agreement validity coefficients between the WIC program record and the prenatal care program medical record for the three health outcome items common to both data sources. Across these three items, the exact agreement percentage was 83.6%. Across all items which were common to the smoking cessation project data protocols and the medical records (including demographic and health outcome variables), the overall exact agreement validity coefficient was 79%.

The following section describes the results of the statistical analysis of the data.

CHAPTER 3

RESULTS

The purpose of the present study was to implement a randomized pre-post control group design to study the effects of two smoking cessation interventions for pregnant women. While the two experimental groups received face-to-face counseling from a health educator, the control group received only written information concerning the risks of smoking during pregnancy. The two experimental groups were distinguished by the fact that the multiple component intervention involved information about the risks of smoking during pregnancy plus counseling concerning behavioral changes while the flip chart group received counseling solely about risk. Hence, the multiple component intervention included a self-help manual that provided a seven day quit plan involving ten skills to achieve reduction and/or abstinence in smoking.

The previous two chapters outlined the relevant literature concerning birthweight and pregnancy outcome, and smoking cessation interventions for general populations and for pregnant women, and described the research setting, data collection, and quality of measurement. The current chapter presents the results of

the statistical analysis of the data that was collected. Specifically, each of the four hypotheses, posed at the conclusion of the first chapter, will be examined. Prior to treating the analyses pertinent to each of the hypotheses, an examination of the data in terms of the integrity of the implementation of the research design, and the comparability of the intervention groups will be presented.

Participation and smoking rates

As discussed in the previous chapter, the implementation of the proposed design required that all pregnant women attending the WIC clinic be screened as to their smoking status. Following the successful identification of currently smoking pregnant women, women needed to be recruited into the study, and needed to complete the informed consent statement that certified participation in the project. Hence, there were two decision points wherein women were either accepted into the project or not accepted into the project.

As indicated in Figure 2, a total of 692 pregnant women were screened as to their smoking status during their first visit to the WIC clinic. Of these 692 pregnant women, 293 were identified as current smokers. Three hundred ninety-nine were identified as non-smokers. This represented an overall smoking rate within the WIC clinic of 42.3%. Of the 293 women who were identified as current

smokers, 237 agreed to participate in the project,and completed the informed consent statement. Fifty-six of the pregnant women elected not to participate in the smoking cessation study. This represented a project participation rate of 80.9%. It should be noted that women who were smokers prior to pregnancy, but quit smoking following pregnancy, were not included in the present study, or sought for recruitment. Because the intention of the interventions was to promote reduction or abstinence among current smokers, women who already had quit smoking following pregnancy were not suitable candidates for inclusion in the study.

Several recent investigations have focused on interventions and evaluations of programs specifically designed for women who quit smoking following pregnancy. The objectives and goals of these interventions typically concern avoiding relapse for women who quit following pregnancy. Interventions of this type require components and content specific to the problems associated with the prevention of relapse. Hence, although approaches of this kind represent an important step forward in the area of anti-smoking intervention during pregnancy, this was beyond the scope of the present study. (Secker-Walker, et.al., 1986; Ershoff, Mullen, and Quinn, 1986).

A total of 237 pregnant women were recruited into the study. Because the work plan for the study required that at least 50 participants be included in each of the

experimental groups, posttesting and follow-up of women was terminated when these participation goals for each of the three groups had been met. Hence, posttesting and follow-up was completed on 219 of the 237 women originally recruited (92.4%). The women who were not included in the final study tabulations represented those who had not yet delivered their infants following the receipt of anti-smoking intervention. There is no reason to believe that these women were any different from other women who actually participated in the study; the research plan simply dropped those women who participated in the study towards the end of the pretesting and recruitment case flow. Postpartum posttest administration was not possible because these women were still pregnant.

The 219 women included in the study were distributed among the three groups as follows: 72 in the multiple component group, 70 in the flip chart group, and 77 in the written information only group. Table 5 presents the rates and reasons for posttest attrition. There were four reasons why women left the study prior to completion of their pregnancy or completion of the posttest. These reasons included moving from the community, termination from the WIC program, miscarriage, or an actual refusal to complete the posttest following pregnancy. Table 5 presents the relative frequencies and percents for each of these reasons for each of the three experimental groups. The latter part of Table 5 presents the attrition rates for

Table 5

Rates and Reasons for Attrition from the Experimental Groups

Reason for Attrition	Multiple Component	Flip Chart	Information
Moved from the community	5(29.4%)	1(12.5%)	2(25.0%)
Terminated from the WIC program	6(35.3%)	4(50.0%)	3(37.5%)
Miscarriage	1(5.9%)	1(12.5%)	1(12.5%)
Refused to complete posttest	5(29.4%)	2(25.0%)	2(25.0%)
Total Attrition	17(100.0%)	8(100.0%)	8(100.0%)
Number assigned to intervention group	72	70	77
Attrition rate	23.6%	11.4%	10.4%
Useable N	55	62	69

Overall attrition rate = 15.1%

each of the three groups as well as the resulting usable sample size for inclusion in the analyses that comprise the remainder of this chapter. The attrition rate for the multiple component group was 23.6%, for the flip chart group 11.4%, and for the information only group, 10.4%. The overall attrition rate was 15.1%.

Although the attrition rate was higher for the multiple component group than it was for the flip chart or information group, the proportions for each of the reasons for attrition were similar across the three groups. Indeed, the posttest refusal rates, perhaps the most potentially biasing reason, were very similar. The proportion of attritors that refused to complete the posttest was 29.4% for the multiple component group, 25.0% for the flip chart group, and 25.0% for the information group. The chi-square test examining differences on the complete attrition rates between the three groups was insignificant (chi-square=6.147, df=2, p=.056). Hence, the usable sample size for each of the three groups was as follows: 55 for the multiple component group, 62 for the flip chart group, and 69 for the information group, resulting in a total study size of 186 participants.

Participants versus refusals

An additional analysis was performed comparing women who agreed to participate in the study with women who did not agree to participate. In order to assert good external

validity, the characteristics of the participants should not be significantly different from the characteristics of the non-participants. Because archival data was still collected on those who refused to participate, it was possible to conduct this analysis. The variables that were available for this analysis included age, family size, parity, pregravid weight, birthweight. weeks gestation at WIC enrollment and at birth, race, source of payment for prenatal care, and trimester prenatal care began.

Chi-square analyses and t-tests were used to examine differences between participants and non-participants on these characteristics. Table 6 presents group means, group relative frequencies, and the results of the tests of significance. The differences between the participants and non-participants were small and not statistically significant. Thus, these analyses indicated that women successfully recruited into the study were not different from women who refused to participate, suggesting that self-selection bias was not a major threat to the external validity of the study.

Comparability of samples

Although participants were randomly assigned to treatment groups, it was still important to examine the initial equivalency of the three groups on available demographic and health status variables. Table 7 presents evidence documenting the initial comparability of the three

Table 6

Comparison of Participants and Refusals

	Participants (n=237)	Refusals (n=53)	Test of Significance
Mean Age at Delivery in years	23.34	23.80	t=.62, df=250, p=.534
Mean Family Size	2.65	2.94	t=1.22, df=271, p=.225
Mean Number of Previous Pregnancies	1.63	1.98	t=1.32, df=271, p=.188
Pregravid weight in pounds	132.90	139.62	t=1.40, df=247, p=.163
Mean birthweight in grams	3212.50	3278.45	t=.74, df=247, p=.459
Weeks of gestation at WIC enrollment	21.83	22.40	t=.45, df=271, p=.656
Weeks of gestation at birth	39.18	38.65	t=.93, df=251, p=.351
Race			
White	75.5%	75.5%	X^2=.729,df=3, p=.867
Black	20.5%	18.9%	
Hispanic	3.6%	5.7%	
Indian	0.5%	0.0%	
Source of payment for prenatal care			
Health Insurance	14.2%	8.5%	X^2=3.05,df=4, p=.802
HMO	0.5%	0.0%	
Medicaid	77.0%	80.9%	
Self or family	6.6%	8.5%	
Other	1.5%	2.1%	
Trimester prenatal care began			
First trimester	23.6%	22.6%	X^2=.040,df=2, p=.983
Second trimester	49.1%	49.1%	

Table 7

Comparison of the
Three Experimental Groups Prior to
Randomization and Intervention

Variable	Intervention				
	Multiple Component (N=55)	Flip Chart (N=62)	Information (N=69)	Total (N=186)	Test of Significance
Race					
White	81.5	77.4	68.2	75.1%	X^2=10.31,df=61,
Black	16.7	22.6	21.7	20.5%	p=.112
Hispanic	1.8	0.0	8.7	3.8%	
Indian	0.0	0.0	1.4	0.5%	
Source of payment					
Health Insurance	10.9	10.2	18.5	13.4	X^2=10.04,df=10,
HMO	0.0	0.0	1.9	0.7	p=.612
Medicaid	80.4	77.6	72.2	76.5	
Self or family	6.5	8.2	7.4	7.4	
None	2.2	0.0	0.0	0.7	
Other	0.0	4.0	0.0	1.4	

Table 7 (cont'd.)

Parity					
Primiparous	35.2	27.4	21.7	27.6	X^2=2.744,df=2,
Multiparous	64.8	72.6	78.3	72.4	p=.254
Trimester prenatal care began					
First	88.9	81.0	82.1	83.8	X^2=1.95,df=4,
Second	11.1	17.2	16.4	15.1	p=.746
Third	0.0	1.7	1.5	1.1	
Trimester anti-smoking intervention delivered					
First	18.2	24.2	17.9	20.1	X^2=3.35,df=4,
Second	58.2	46.8	46.3	50.0	p=.501
Third	23.6	29.0	35.8	29.9	
Received advice to quit from regular physician					
Yes	67.9	67.7	68.2	68.0	X^2=.003,df=2,
No	32.1	32.3	31.8	32.0	p=.999

Table 7 (cont'd.)

Number of quitting attempts prior to pregnancy					
Never	27.3	32.3	27.9	29.2	X^2=3.329,df=10,
Once	23.6	24.2	22.1	23.2	p=.973
Twice	21.8	21.0	25.0	22.7	
Three times	10.9	12.8	13.2	12.4	
Four times	5.5	1.6	5.9	4.3	
Five or more times	10.9	8.1	5.9	8.1	
Number of years smoking					
≤ 3 years	21.8	32.3	20.3	24.7	X^2=6.21,df=6,
4-6 years	27.3	17.7	31.9	25.8	p=.400
7-10 years	27.3	19.4	23.2	23.1	
≥ 11 years	23.6	30.6	24.6	26.3	
Number of prenatal visits					
≤ 4 visits	11.1	14.8	13.4	13.2	X^2=3.488,df=8,
5-9 visits	14.8	23.0	22.4	20.3	p=.900
10-12 visits	29.6	27.9	26.9	28.0	
13-16 visits	44.4	32.8	35.8	37.4	
≥ 17 visits	0.0	1.6	1.5	1.1	

Table 7 (cont'd.)

Mean age at intervention	21.78 years	23.53 years	22.46 years	22.62 years	F=2.22, p=.112
Mean age when began smoking	14.84 years	15.83 years	15.12 years	15.27 years	F=2.96, p=.06
Mean number of prenatal visits	10.85 visits	10.11 visits	10.36 visits	10.42 visits	F=0.366, p=.694
Mean family size	2.46 members	2.74 members	2.75 members	2.67 members	F=.819, p=.443
Mean number of previous pregnancies	1.35	1.85	1.68	1.64	F=.361,
Mean number of years client has smoked	6.95 years	7.69 years	7.35 years	7.34 years	F=.361, p=.697
Mean weeks gestation when intervention occurred	21.63 weeks	22.23 weeks	23.67 weeks	22.59 weeks	F=.958, p=.386

intervention groups. It includes treatment group and total data for race, source of payment for prenatal care, parity, trimester prenatal care began, trimester that the intervention was delivered, whether or not advice to quit smoking was received from a physician, number of quitting attempts prior to pregnancy, number of years smoking, number of prenatal visits, mean age at intervention, mean age when smoking began, mean number of prenatal visits, mean family size, mean number of previous pregnancies, mean number of years smoked, and mean weeks gestation when intervention occurred. These variables were collected either through archival data coding, or through the pretest. Hence, these variables reflected the initial equivalence of the groups prior to intervention.

Both chi-square analyses and analyses of variance revealed that no significant differences existed on any of these demographic and health status variables as indicated in the far right column of Table 7. Hence, it can be claimed that the comparison between the three groups was a reasonable and fair comparison.

A description of the characteristics of the total study sample is also provided in Table 7. Approximately 75% of the women included in the study were white. Twenty percent of the women were black, and only a small proportion were of Hispanic or Indian origin. Large majorities of the women received prenatal care through Medicaid. Overall, 76.5% of the women received prenatal

care through Medicaid, and 13.4% received prenatal care through health insurance. Only small proportions received prenatal care through other sources of payment.

Approximately one-third of the women were primiparous (i.e., had no previous pregnancies). A large majority began receiving prenatal care early in pregnancy. Approximately 84% of the women began prenatal care during the first trimester, 15.1% began prenatal care during the second trimester, and only 1.5% began prenatal care during the third trimester. In contrast to this, the study participants received anti-smoking intervention or information much later during pregnancy. It takes approximately a month to two months for women to begin receiving WIC services following their initial prenatal visit. This lag occurs because women need to be referred to the WIC program by the physician from whom they are receiving prenatal care. This referral, appointment setting, and screening process takes approximately one month to two months to be completed. Hence, overall, 20.1% of the women received anti-smoking intervention during the first trimester, 50.0% received anti-smoking intervention during the second trimester, and 29.9% received anti-smoking intervention during the third trimester.

Approximately two-thirds of the women received advice from their prenatal care physician to quit smoking. Importantly, the proportions of women that received advice to quit smoking from their physician similar for each of

the three intervention groups. For the multiple component group women, 67.9% had received advice from their physician to quit smoking, for the flip chart group 67.7%, and for the information group, 68.2%. This is critical because it implies that advice to quit smoking outside the intervention itself was equivalent across the three groups.

In terms of smoking history, all three groups seemed to be similar. The differences between the groups were small with regard to the number of quitting attempts prior to pregnancy, number of years smoking, mean age when smoking began, and mean number of years client has smoked. Overall, approximately 29% of the sample had no previous quitting attempts. Twenty three percent had tried quitting once prior to pregnancy, 22.7% had tried quitting twice prior to pregnancy, and 24.8% had tried quitting three or more times prior to pregnancy. Approximately 25% of the women had been smoking for less than three years. Approximately 24% had been smoking for over eleven years or greater. The average age at which the women in the sample began smoking was 15.3 years, and their mean age at intervention was 22.6 years. Taken together, this reflects an average number of years smoking for the clients of 7.3 years.

The mean number of prenatal visits for the overall sample was 10.4 visits per client. In terms of the proportion of women that had received an inadequate amount of visits ($\leq$4 visits) there were no significant differences

between the groups. In terms of the number of previous pregnancies, the average for the overall sample was 1.6 previous pregnancies. On the average, the women in the sample received the smoking cessation treatment during the twenty-second week of pregnancy. The mean family size of women in the sample was 2.6 members.

In continuing with the outline for this chapter, the next sections will discuss the pertinent statistical analysis related to each of the hypotheses offered earlier in the first chapter. Comparative analyses of the dependent variables for each of the four hypotheses in the study were performed. The variables used in testing each of the hypotheses were analyzed using analysis of covariance with the appropriate pretest variable as the covariate, or chi-square analysis, depending on the nature of the data. Discriminant analysis was used to distinguish quitters and non-quitters. Analyses were performed using the SPSS computer package available at Michigan State University.

Analysis of changes in smoking status

The first hypothesis concerned changes in smoking status. Measurement of smoking status was obtained at four time periods. The first measurement period was the number of cigarettes per day prior to pregnancy, and was asked of study participants during pretest administration. Because the pretest occurred following pregnancy but prior to

intervention, the data for this variable depended upon the women's recall of their smoking patterns prior to pregnancy. The second measurement reflected women's smoking behavior following pregnancy, but prior to the delivery of counseling or information. In this case, women were asked to indicate the number of cigarettes they smoked per day at pretest administration. The third and fourth smoking status measurements were collected during the posttest. The third measurement, number of cigarettes per day during the ninth month of pregnancy, was dependent upon participants' recall of their smoking status during the final month of pregnancy. For the fourth measurement, postpartum smoking status, women were asked to indicate the number of cigarettes they smoked per day at the time of the posttest. As suggested previously, the average time span between delivery of the child and postpartum posttesting was 4.7 weeks.

It was critical to measure smoking patterns both prior to pregnancy and following pregnancy because pregnancy itself can have an influence upon the smoking status of women. Although estimates vary a great deal, the benchmark figure for the proportion of women who quit smoking following recognition of pregnancy is 20%. Following pregnancy, many women return to their former smoking levels. Hence, it was also important to measure smoking at the postpartum time period in order to test the effect of the interventions on preventing relapse following

pregnancy, as well as to examine the persistence of treatment effects.

Table 8 and Figure 3 presents data concerning the mean number of cigarettes smoked per day for the four measurement periods for the three intervention groups, as well as for the overall study sample. Table 9 includes a categorical treatment of this data. Prior to pregnancy, the average number of cigarettes smoked per day for all three groups was approximately one pack. A one-way analysis of variance indicates that the small group differences in cigarettes per day prior to pregnancy were non-significant (see Table 10). Smoking behavior data prior to the intervention and randomization indicated that women reduced smoking on their own following pregnancy. Multiple component group women reduced smoking on their own by 8.13 cigarettes per day, the flip chart group reduced smoking following pregnancy by 6.17 cigarettes per day, and the information group reduced smoking by 7.59 cigarettes per day. As suggested earlier, women who actually quit smoking following pregnancy were not included in the study because interventions focusing on cessation seemed inappropriate for women who had quit on their own. Relapse prevention health education was beyond the scope of the present study.

An analysis of variance comparing the three groups for the number of cigarettes per day at the pretest indicated that there were no significant differences between the

Table 8

Mean Number of Cigarettes Per Day
For the Three Experimental Groups
At Four Measurement Periods

Intervention Group	Prior to Pregnancy	At Pretest	At Ninth Month	Postpartum
Multiple Component (N=55)	19.53 (16.88-22.18)	11.40 (9.44-13.36)	10.24 (7.83-12.64)	14.76 (11.96-17.57)
Flip Chart (N=62)	19.94 (17.20-22.68)	13.77 (11.24-16.31)	13.13 (10.65-15.61)	15.29 (12.41-18.17)
Information (N=69)	20.16 (17.66-22.66)	12.57 (10.72-14.41)	13.36 (11.18-15.55)	15.46 (13.54-17.38)
Total (N=186)	19.90 (18.41-21.39)	12.62 (11.41-13.84)	12.36 (11.01-13.70)	15.20 (13.77-16.63)

95% confidence interval indicated in parentheses.

Figure 3

Average Daily Cigarette Consumption
For The Three Intervention Groups

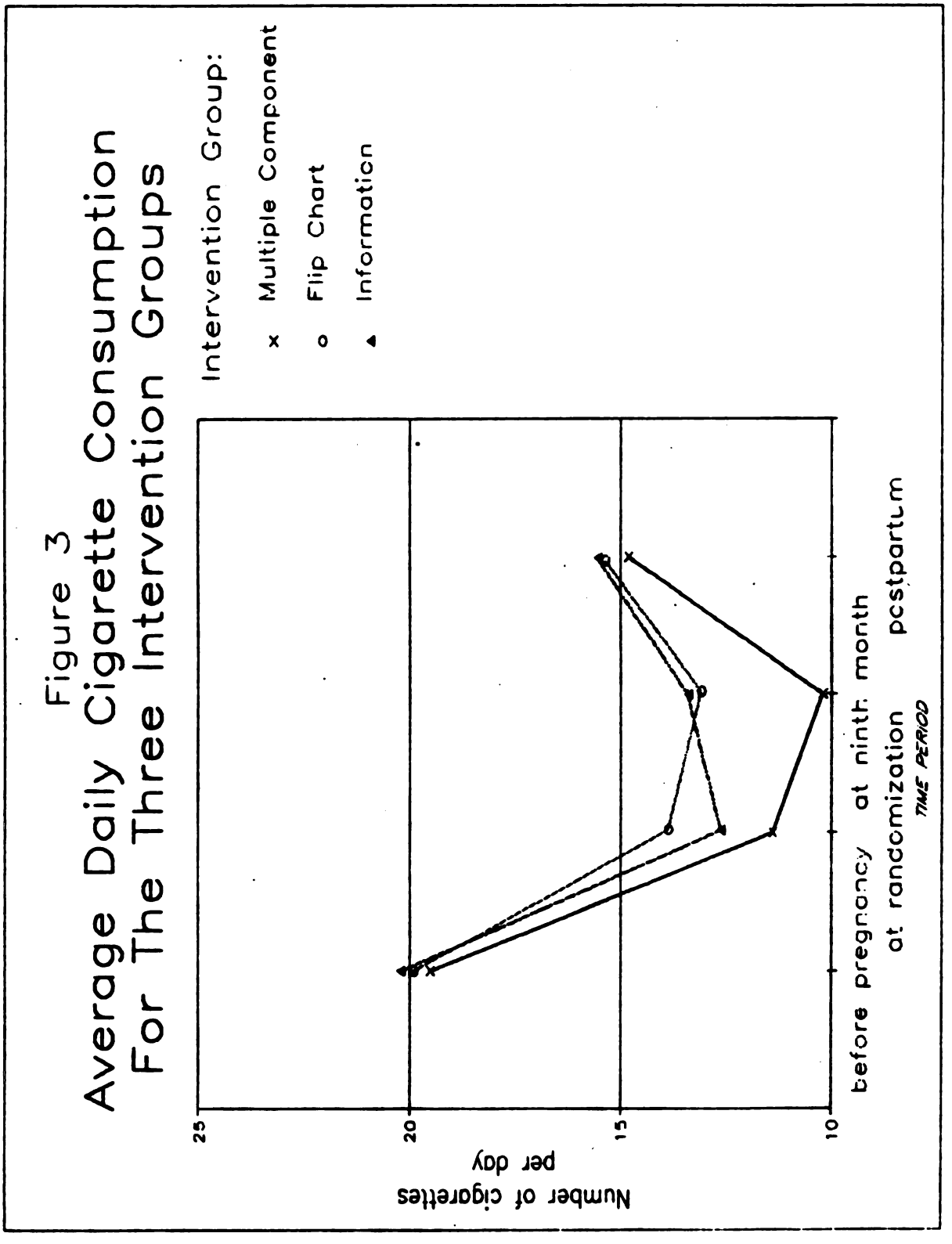


Table 9

Number of Cigarettes Per Day At Four Measurement Periods For the Three Experimental Groups

	Multiple Component	Flip Chart	Information
Prior to Pregnancy			
≤ 5	7.3%	9.7%	1.4%
6-10	14.5%	12.9%	24.6%
11-15	9.1%	16.1%	11.6%
16-20	41.8%	30.6%	31.9%
21-30	18.2%	17.7%	18.8%
31-40%	7.3%	11.3%	10.1%
≥40	1.8%	1.6%	1.4%
At Pretest			
≤ 5	16.4%	24.2%	21.7%
6-10	50.9%	29.0%	31.9%
11-15	14.5%	12.9%	18.8%
16-20	7.3%	17.7%	17.4%
21-30	9.1%	11.3%	10.1%
31-40	1.8%	3.2%	0.0%
≥40	0.0%	1.6%	0.0%
At Ninth Month			
0	14.5%	8.1%	2.9%
1- 5	20.0%	21.0%	21.7%
6-10	34.5%	24.2%	24.6%
11-15	10.9%	16.1%	13.0%
16-20	12.7%	11.3%	27.5%
21-30	3.6%	16.1%	7.2%
31-40	3.6%	3.2%	2.9%
≥40	0.0%	0.0%	0.0%
Postpartum			
0	9.1%	8.1%	0.0%
1- 5	9.1%	12.9%	14.5%
6-10	21.8%	21.0%	21.7%
11-15	20.0%	16.1%	15.9%
16-20	25.5%	22.6%	30.4%
21-30	9.1%	12.9%	15.9%
31-40	3.6%	4.8%	1.4%
≥40	1.8%	1.6%	0.0%

Table 10

Analysis of Variance of Number of Cigarettes Per Day Prior to Pregnancy

Source	df	Mean Square	F	Prob.
Treatment	2	6.181	.058	.944
Explained	2	6.181	.058	.944
Residual	183	107.490		
Total	185			

Table 11

Analysis of Variance of Number of Cigarettes Per Day at Pretest

Source	df	Mean Square	F	Prob.
Treatment	2	82.330	1.165	.314
Explained	2	82.330	1.165	.314
Residual	183	70.661		
Total	185			

three groups (see Table 11). This analysis suggested that although most women in the three groups reduced their smoking level quite substantially upon learning of their pregnancy, that this reduction in smoking was equivalent across the three groups, bolstering the fairness of the posttest comparison of smoking status.

At the ninth month of pregnancy, the data indicated that the multiple component group had reduced their smoking by 1.16 cigarettes per day, the flip chart group had reduced their smoking by .64 cigarettes per day, and the information control group had increased the number of cigarettes smoked per day by .79 cigarettes. Thus, following intervention, the two experimental groups further reduced the number of cigarettes they smoked, while the information control group actually increased the amount that they smoked.

An analysis of covariance with number of cigarettes per day at the ninth month as the dependent variable, and the number of cigarettes per day at the pretest as the covariate is presented in Table 12. Although the pretest smoking status variable was a significant covariate, the main effects for treatment were not statistically significant. An analysis of covariance with the number of cigarettes per day at the postpartum period as the dependent variable using pretest smoking as the covariate is presented in Table 13. This analysis indicated that although pretest smoking status was a significant

TABLE 12

Analysis of Covariance
of Number of Cigarettes Per Day
at Ninth Month of Pregnancy
with Pretest Smoking Level as the Covariate

Source	df	Mean Square	F	Prob.
Number of cigarettes at pretest (covariate)	1	6296.004	119.538	.001
Treatment	2	82.507	1.567	.212
Explained	3	2153.673	40.890	.001
Residual	182	52.669		
Total	185	86.740		

TABLE 13

Analysis of Covariance
of Number of Cigarettes Per Day
Postpartum with Pretest Smoking Level
as the Covariate

Source	df	Mean Square	F	Prob.
Number of cigarettes at pretest (covariate)	1	7603.967	133.318	.001
Treatment	2	29.535	.518	.597
Explained	3	2554.346	44.785	.001
Residual	182	57.036		
Total	185	97.533		

covariate, the differences between the three groups in terms of the number of cigarettes per day postpartum was not statistically significant.

An additional approach to examining the differences in smoking patterns was to examine rates of abstinence. Table 14, as well as Figure 4, presents both post-treatment abstinence rates for the three experimental groups. The quit rates at the ninth month of pregnancy were 14.5% for the multiple component group, 8.1% for the flip chart group, and 2.9% for the information group. The postpartum quit rates were 9.1% for the multiple component group, 8.1% for the flip chart group, and 0.0% for the information control group. Table 14 also presents the results of the chi-square analyses that were used to examine abstinence rate differences. Turning first to the multiple component versus the information control group comparisons, the analyses suggested that significant differences existed at both the ninth month of pregnancy, and at the postpartum measurement periods. When the flip chart group was compared to the information control group, the differences in quit rates were not significant at the ninth month of pregnancy, but were significant at the postpartum measurement period. The differences between the multiple component group and the flip chart group at both the ninth month and the postpartum measurements revealed no significant differences.

Table 14

Quit Rates for the Three Comparison Groups
At Ninth Month of Pregnancy and Postpartum

	At Ninth Month	Postpartum
Multiple Component (N=55)	14.5%	9.1%
Flip Chart (N=62)	8.1%	8.1%
Information (N=69)	2.9%	0.0%
Total (N=186)	8.1%	5.4%

Tests of Significance

At Ninth Month

MC vs. FC	X^2=1.24, df=1, p=.27
MC vs. I	X^2=5.59, df=1, p=.02
FC vs. I	X^2=1.72, df=1, p=.19

Postpartum

MC vs. FC	X^2= .04, df=1, p=.84
MC vs. I	X^2=6.54, df=1, p=.01
FC vs. I	X^2=5.79, df=1, p=.02

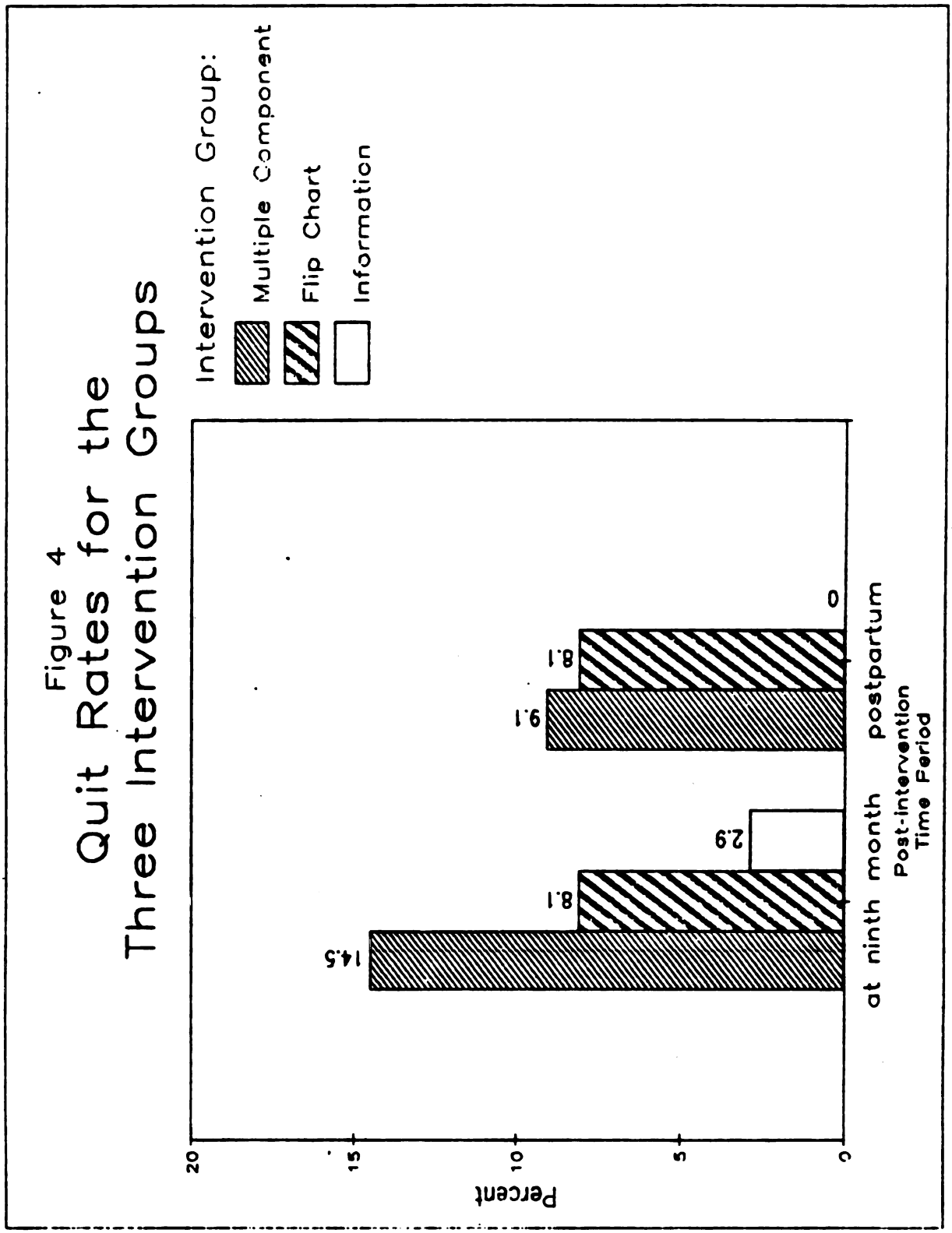


Figure 4
Quit Rates for the
Three Intervention Groups
Intervention Group:
Multiple Component
Flip Chart
Information
Percent
20
15
10
5
0
14.5
8.1
2.9
9.1
8.1
0
at ninth month postpartum
Post-intervention
Time Period

Several prior evaluation studies of smoking cessation interventions for pregnant women have used exclusionary criteria for participation based on the month of gestation when the woman was available for smoking cessation intervention. In one study (Windsor, et.al., 1985), only women who were available for anti-smoking cessation intervention prior to the thirty-second week of gestation were included in the study. In another study (Sexton and Hebel, 1984), only women who presented themselves for prenatal care prior to the 18th week of gestation were included. In the present study, all women were delivered cessation counseling regardless of the month of pregnancy during which they first entered the WIC clinic. Given the exclusionary criteria employed by other investigators, an additional analysis was conducted which examined solely women who entered the WIC clinic prior to the third trimester of pregnancy.

By excluding study participants who received smoking cessation intervention during the third trimester of pregnancy, the sample size was reduced by 55 to 131 subjects. Table 15 presents the quit rates for both the last month of pregnancy and postpartum periods for women who were delivered counseling during the first or second trimester of pregnancy. The quit rates for the last month of pregnancy were 19.0% for the multiple component group, 11.4% for the flip chart group, and 4.4% for the information group. At postpartum, the quit rates were 9.5%

for the multiple component group, 9.1% for the flip chart group, and 0.05 for the information group. Each of these rates were larger than the corresponding observed quit rates disregarding the trimester when the interventions were delivered, suggesting that anti-smoking counseling was more effective when provided earlier in pregnancy. Chi-square analyses of this data, presented in the latter part of Table 15, indicated that, at the last month of pregnancy, the multiple component group versus the information group difference was significant, and, at the postpartum period, that the multiple component group versus the information group difference and the flip chart group versus the information group differences were significant.

Besides promoting abstinence, it is also desirable to reduce smoking levels among participants of health education programs. This is particularly important in the case of pregnant women because a dose-response relationship seems to exist between smoking and birthweight. Hence, promoting quitting as well as reducing is an important goal of anti-smoking counseling for pregnant women. Table 16 indicates the proportion of women in each of the experimental groups who reduced smoking, exhibited no change in smoking, or increased smoking. This data reflects changes from the pretest to the last month of pregnancy. The proportion of women who reduced smoking was greatest in the multiple component group, and smallest in the information group. Conversely, the proportion of women

Table 15

Quit Rates for the Three Experimental Groups Excluding Study Participants Who Received Intervention During the Third Trimester of Pregnancy

	At Ninth Month	Postpartum
Multiple Component (N=42)	19.0%	9.5%
Flip Chart (N=44)	11.4%	9.1%
Information (N=45)	4.4%	0.0%
Total (N=131)	11.5%	6.1%

Tests of Significance

At Ninth Month

MC vs. FC	$X^2 = .988$, df=1, p=.32
MC vs. I	$X^2 = 4.55$, df=1, p=.03
FC vs. I	$X^2 = 1.47$, df=1, p=.23

Postpartum

MC vs. FC	$X^2 = .01$, df=1, p=.95
MC vs. I	$X^2 = 4.49$, df=1, p=.03
FC vs. I	$X^2 = 4.28$, df=1, p=.04

TABLE 16

Reduction Proportions For The Three Experimental Groups

	Reduced Smoking	No Change	Increased Smoking
Multiple Component (n=55)	41.8%	27.3%	30.9%
Flip Chart (n=62)	35.5%	32.3%	32.3%
Information (n=69)	29.0%	31.9%	39.1%
Total	34.9%	30.6%	34.4%

who increased their smoking levels was greatest in the information group, and smallest in the multiple component group. Chi-square analyses indicated that the reduction proportion differences between the groups were not statistically significant.

Changes in maternal attitudes

The second hypothesis concerned changes in attitudes about the risks of smoking during pregnancy. As discussed in the methods section, a set of one dozen questions concerning study participants' attitudes about the risks of smoking during pregnancy was administered at both the pretest and posttest. Rational-empirical scaling analyses with the one dozen attitude items yielded a uni-dimensional scale consisting of nine items with an alpha coefficient of .75. Because this data was collected at both pretest and posttest, it was possible to examine changes in attitudes. The attitude scale score was the average score of non-missing responses. Hence, the potential range of values for the risks of smoking during pregnancy attitude scale was from 1 (strongly disagree) to 7 (strongly agree). Higher values on this scale indicated a greater belief that smoking during pregnancy presented risks to maternal and infant health.

Table 17 presents the mean attitude scale scores for the three experimental groups, and the total sample. The 95% confidence intervals for these means are indicated in

Table 17

Mean Attitude Scale Scores For the Three Experimental Groups

	Pretest	Posttest
Multiple Component (N=55)	5.45 (5.22 - 5.68)	5.43 (5.20 - 5.65)
Flip Chart (N=62)	5.32 (5.08 - 5.57)	5.51 (5.28 - 5.75)
Information (N=69)	5.23 (5.00 - 5.46)	5.36 (5.14 - 5.58)
Total (N=186)	5.33 (5.20 - 5.46)	5.43 (5.30 - 5.56)

TABLE 18

Analysis of Covariance of Posttest Attitude Scale Score With Pretest Scale Score As the Covariate

Source	df	Mean Square	F	Prob.
Pretest (covariate)	1	36.691	61.762	.001
Treatment	2	.251	.423	.656
Explained	3	12.398	20.869	.001
Residual	181	.594		
Total	184	.787		

parentheses. Table 18 presents the results of an analysis of covariance with posttest attitude scale scores as the dependent variable, and pretest attitude scale scores as the covariate. This analysis suggested that the observed changes in attitudes were not statistically significant. In fact, the mean scores for the multiple component group actually decreased from the pretest to the posttest, while they increased for the flip chart and the information group. Overall, little change in women's attitudes concerning the risk of pregnancy were attributable to the interventions.

Changes in knowledge

The third hypothesis concerned changes in knowledge about the effects of smoking during pregnancy. Similar to the analysis of the attitude data, rational-empirical scaling with the ten knowledge items was conducted. This analysis derived a uni-dimensional knowledge scale score consisting of seven items with an alpha coefficient of .65. Each individual item was scored either 0 (the item was wrong), or 1 (the item was correct). Hence, the knowledge scale score could potentially range from zero to seven. A score of zero implied that the participant got all of the items wrong; a score of seven implied that the participant responded to all of the knowledge items correctly.

Table 19 presents the knowledge scale scores for the three groups and the total study sample at both the pretest

TABLE 19

Mean Knowledge Scale Scores For the Three Experimental Groups

	Pretest	Posttest
Multiple Component (n=55)	5.13 (4.68 - 5.78)	5.06 (4.60 - 5.51)
Flip Chart (n=62)	4.95 (4.51 - 5.39)	5.14 (4.70 - 5.57)
Information (n=69)	4.83 (4.38 - 5.27)	5.06 (4.60 - 5.52)
Total (n=186)	4.96 (4.70 - 5.21)	5.09 (4.83 - 5.34)

and the posttest. The 95% confidence intervals are indicated in parentheses. While the multiple component group knowledge score decreased from pretest to posttest, the knowledge scale score for the flip chart group and the information group increased from pretest to posttest. The analysis of covariance, presented in Table 20, indicated that changes in knowledge level were not statistically significant. Hence, no significant improvements in knowledge could be attributed to the three treatments.

Pregnancy outcome differences

The fourth hypothesis concerned differences in birthweight among the three experimental groups. This analysis is important because smoking during pregnancy appears to have a negative impact on birthweight, length of gestation, infant mortality, and child development. Birthweight and prematurity represent key independent variables because of their strong predictive relationship with mortality and other pregnancy outcome indicators.

Table 21 presents mean birthweight, mean weeks gestation, low birthweight and prematurity rates for the three experimental groups. Low birthweight was defined as births weighing 2500 grams or less, and prematurity was defined as births with gestations of 37 weeks or less. The mean birthweight of the multiple component and flip chart infants was 119 grams and 129 grams heavier than the mean birthweight of the information group infants, respectively.

Table 20

Analysis of Covariance
of Posttest Knowledge Score
With Pretest Knowledge Score
As the Covariate

Source	df	Mean Square	F	Prob.
Pretest (covariate)	1	123.459	54.418	.001
Treatment	2	.733	.323	.724
Explained	3	41.642	18.355	.001
Residual	171	2.269		
Total	174	2.948		

Table 21

Analysis of Pregnancy Outcome Differences For the Three Experimental Groups

	Multiple Component	Flip Chart	Information	Total	Test of Significance
Mean birthweight	3266 grams	3276 grams	3147 grams	3225 grams	F=1.318, p=.270
Low Birthweight Rate (≤2,500 grams)	11.3%	1.6%	8.8%	7.1%	X^2=4.47, df=2, p=.107
Mean weeks gestation at birth	39.55	39.60	39.40	39.51	F=.201, p=.818
Prematurity rate (≤37 weeks)	7.5%	8.3%	11.8%	9.4%	X^2=.741, df=2, p=.691

However, the analysis of variance with treatment as the independent variable and birthweight as the dependent variable indicated that these differences were not statistically significant. Contrary to the hypothesis, the multiple component group had the highest low birthweight rate. For the multiple component group, the low birthweight rate was 11.3%, for the flip chart group the low birthweight rate was 1.6%, and for the information group the low birthweight rate was 8.8%. The chi-square test indicated that these differences were not significant.

The trends for the data concerning gestational age at birth supported the hypothesis, but did not yield statistically significant results. The multiple component group had the lowest rate of prematurity, and the information group had the largest rate of prematurity. However, the chi-square analysis did not indicate significance. Additionally, the analysis of variance with mean weeks gestation as the dependent variable and treatment as the independent variable was insignificant. Analyses excluding women receiving counseling during the third trimester yielded similar findings. Overall, these results suggested that the interventions had no impact on pregnancy outcome.

Characteristics of quitters and smokers

The final set of analyses involved a comparison of women who quit during pregnancy versus those who did not quit during pregnancy. The strategy for this analysis involved both producing group frequency distributions on several demographic and health status variables for quitters and non-quitters, as well as a discriminant analysis attempting to distinguish quitters and smokers.

The comparison between quitters and smokers is presented in Table 22. Among the eighteen variables utilized in this comparison, significant differences emerged for four (using a $p<.05$ criteria). First, and not surprisingly, quitters experienced less difficulty in their efforts to abstain. Second, and also not surprisingly, none of the quitters reported not attempting to quit while pregnant, while over a quarter of the smokers did not attempt to quit at all during pregnancy. Almost half of the quitters stopped smoking at their first attempt, 13.3% needed two attempts, and 33.3% needed three attempts to successfully quit.

Third, the quitters received significantly more prenatal care visits than smokers. While none of the quitters received four visits or less, 14.4% of the smokers received four visits or less. The average number of visits for the quitters was 13.2 visits, and only 10.2 visits for those continuing to smoke. Finally, the quitters received anti-smoking counseling or information earlier during their

Table 22

Comparison of Quitters and Smokers

	Quitters (n=15)	Smokers (n=171)	Test of Significance
Smoking level prior to pregnancy			
≤ 5	6.7	5.8	X^2=5.79,df=6,
6-10	26.7	17.0	p=.447
11-15	26.7	11.1	
16-20	26.7	35.1	
21-30	13.3	18.7	
31-40	0.0	10.5	
> 40	0.0	1.8	
Smoking level at randomization			
≤ 5	40.0	19.3	X^2=6.82,df=6,
6-10	46.7	35.7	p=.338
11-15	6.7	16.4	
16-20	6.7	15.2	
21-30	0.0	11.1	
31-40	0.0	1.8	
>40	0.0	0.6	
Difficulty quitting during intervention			
Not hard	26.7	3.7	X^2=16.89,df=4,
A little hard	6.7	4.4	p=.002
Somewhat hard	40.0	25.2	
Very hard	6.7	31.1	
Extremely hard	20.0	35.6	

Table 22 (cont'd.)

	Quitters	Smokers	Test of Significance
Number of quitting attempts during pregnancy			
None	0.0	26.5	X^2=15.49,df=5,
One	46.7	17.6	p=.008
Two	13.3	24.7	
Three	33.3	13.5	
Four	0.0	8.8	
≥ 5	6.7	8.8	
Number of prenatal visits			
≤ 4 visits	0.0	14.4	X^2=9.65,df=4,
5-9 visits	13.3	21.0	p=.047
10-12 visits	13.3	29.3	
13-16 visits	73.3	34.1	
≥ 17 visits	0.0	1.2	
Trimester at intervention			
First trimester	26.7	19.5	X^2=7.01,df=2,
Second trimester	73.3	47.9	p=.031
Third trimester	0.0	32.5	
Number of years smoking			
≤ 3 years	26.7	24.6	X^2=2.22,df=3,
4-6 years	40.0	24.6	p=.527
7-10 years	13.3	24.0	
≥ 11 years	20.0	26.9	

Table 22 (cont'd.)

	Quitters	Smokers	Test of Significance
Race			
White	80.0	74.7	X^2=.91,df=3,
Black	13.3	21.2	p=.823
Hispanic	6.7	3.5	
Indian	0.0	0.6	
Source of payment for prenatal care			
Health Insurance	9.1	13.8	X^2=.576,df=5,
HMO	0.0	0.7	p=.997
Medicaid	81.8	76.1	
Self or family	9.1	7.2	
None	0.0	0.7	
Other	0.0	1.4	
Parity			
Primiparous	46.7	25.9	X^2=2.98,df=1,
Multiparous	53.3	74.1	p=.084
Received advice to quit from regular physician			
Yes	69.2	30.8	X^2=.011,df=1,
No	67.9	32.1	p=.919

Table 22 (cont'd.)

	Quitters	Smokers	Test of Significance
Mean age at intervention	21.80 years	22.69 years	F=.519, p=.472
Mean age when began smoking	16.00 years	15.21 years	F=1.56, p=.213
Mean number of prenatal visits	13.20 visits	10.17 visits	F=5.97, p=.015
Mean family size	2.53 members	2.68 members	F=.148, p=.701
Mean number of previous pregnancies	1.53	1.65	F=.075, p=.785
Mean number of years client has smoked	5.80 years	7.48 years	F=1.743, p=.188
Mean weeks gestation when intervention occurred	18.87 weeks	22.92 weeks	F=3.179, p=.076

pregnancy than the smokers. While 26.7% of the quitters received intervention during the first trimester, only 19.5% of the smokers did. While none of the quitters received anti-smoking counseling or information in the last trimester, almost a third of the smokers did.

Although not statistically significant, fairly strong trends existed for quitters to have smoked less prior to pregnancy or intervention, to have initiated smoking behaviors at a later age, and to have not experienced a prior pregnancy.

The results of the discriminant analysis are offered in Table 23. Several combinations of discriminating variables were entered based on rational concerns about likely predictors of success, as well as empirical concerns suggested by the comparative analysis of quitters versus smokers presented above. The variables included in the solution are number of quitting attempts, trimester of pregnancy that counseling or information was delivered, parity, number of prenatal visits, level of difficulty quitting, number of years smoking, age, reported desire to quit, and number of days smoking per week.

The standardized discriminant function coefficients are reported in Table 23. The direction and magnitude of these coefficients suggested that quitters attempted to quit less often, received intervention earlier in pregnancy, experienced fewer previous pregnancies, received more prenatal visits, found it less difficult to quit, had

Table 23

Discriminant Analysis of Quitters versus Smokers

		Predicted		
		Quitters	Smokers	
Actual	Quitters	8 57.1%	6 42.9%	14
	Smokers	20 16.0%	105 84.0%	125
				139

Percent of cases correctly classified = 81.29%

Variable	Standardized Discriminant Function Coefficient
Number of quitting attempts	+.7401
Trimester of pregnancy intervention delivered	+.5307
Number of previous pregnancies	+.4164
Number of prenatal visits	-.3563
Difficulty quitting	+.3390
Number of years smoking	+.2549
Age	+.2036
Desire to quit smoking	-.1942
Number of days smoking per week	+.1273

been smokers for fewer years, were younger, reported a stronger desire to quit, and smoked fewer days per week prior to pregnancy. The overall canonical correlation for the discriminant function was .4775, and the Wilks Lambda was .7719, which yielded a statistically significant chi-square (X^2=21.359, df=9, p=.011).

Table 23 also indicates that 81.3% of the actual quitters and actual continuing smokers were correctly classified by the discriminant function. Although greater success was achieved in correctly classifying continuing smokers, the small sample size for quitters (n=14) mitigated the statistical power for accurate classification of this group.

This chapter has presented the results of the empirical analysis related to the four hypotheses presented in the first chapter. The next and final chapter of this report discusses the results that were obtained within the context of existing literature, points to several limitations of the study, and offers several suggestions for future intervention and evaluation efforts.

CHAPTER 4

DISCUSSION

The previous chapter described the application of several statistical analysis techniques related to the four hypotheses of the present study. The purpose of this chapter is to describe the findings within the context of the existing literature, and to discuss the implications of the present research for future work. First, issues concerning the implementation of the proposed research design, including measurement quality, attrition, and selection bias, will be explored. Second, the results appropriate to each of the four hypotheses will be discussed. Third, the limitations of the present study will be described. Finally, several directions for future research efforts will be prescribed.

Smoking rates

The overall smoking rate among the 692 pregnant women screened during their first visit was 42.3%. Recent data from the National Health Interview Survey has indicated that the smoking rate among females in the United States population is 28%, although the rate was higher among

females of child bearing age. For example, the smoking rate among women aged 18-29 was 32%, and among women aged 30-44 the smoking rate was 35% (National Center for Health Statistics, 1986). Because WIC clients must have household incomes below 185% of the federal poverty level, this group is a low-income, high-risk group. The higher smoking rate among pregnant women receiving WIC services, when compared to national data, is attributable to their low-income status. Epidemiological research within Michigan and across the nation has suggested that smoking rates, as well as rates for other high risk behaviors, are more frequent among lower socioeconomic groups (Michigan Department of Public Health, 1983).

Other datasets specific to pregnant women receiving WIC services have indicated smoking rates of 42.1% (Nieburg, Fuller, and Wong, 1986) and 44.9% (Garland and Stockbauer, 1986). Hence, there appears to be consensus among the smoking rate observed in the present study with other prevalence analyses of smoking among WIC populations.

Overall, large proportion of women receiving WIC services were smokers, suggesting a need for broad scale dissemination and implementation of health education anti-smoking programs. Indeed, analysts at the Food and Nutrition Service of the U.S. Department of Agriculture have recently expressed interest in developing practical and useable intervention models for anti-smoking health education within WIC clinics (Ku, 1986).

Participation and external validity

Of the 293 women who were identified as current smokers during the screening process at the first WIC visit, 80.9% agreed to participate, and completed the informed consent statement. It was important that the participation rate be as high as possible to avoid recruiting a self-selected group of women into the study. The danger here lies in the fact that women who volunteer for anti-smoking cessation projects are more likely to be motivated to quit, and have greater intentions of quitting. Self-selection bias has plagued much of the existing smoking cessation evaluation research (Coelho, 1983; Leventhal and Cleary, 1980).

Windsor, et. al. (1985), in their evaluation of anti-smoking counseling in a prenatal clinic, also achieved an overall participation rate of approximately 80%. In their recent article describing guidelines and methodological standards for this research area, Windsor and Orleans (1986) suggested that an adequate recruitment level should range from 80% to 90% of all eligible women at the first visit. Hence, it was judged that the overall participation rate of 80.9% for this project represented a very successful recruitment effort.

Although the 80.9% participation rate represents a successful recruitment effort, it is still possible that self-selection bias existed. To further assist in documenting the external validity of the present study, an

analysis was performed which compared women who participated in the project with women who refused to participate. The participants and refusals were compared on a variety of demographic and health-related variables. Because pretest and posttest data was not collected on refusals (i.e., it was necessary that subjects complete the informed consent statement prior to administering any paper and pencil questionnaires), this comparative analysis was conducted with variables that were available from WIC program archives. The results indicated that there were no significant differences between the participants and the non-participants on any of the available measures. This suggested that those who agreed to participate in the study were no different than those who refused to participate. Participants were similar to non-participants in terms of their age, race, family size, pregnancy history and outcome, and prenatal care patterns. This is an important finding for establishing the external validity of the study, because these results suggested that there was little self-selection bias influencing the results.

Demographic, prenatal care, and health outcome data describing the overall study sample suggested that women involved in this study were typical of pregnant women receiving WIC services across the nation (Richman, Hidlebaugh, Ku, McMahon-Cox, Dayton, and Goodrich, 1986). Data describing subjects in the present study closely

matched descriptive data from a nationally representative sample of all women receiving WIC services.

Implementation of the research design

The evaluation design for the present study was a completely randomized pre-post control group design. This represents the most powerful evaluation design for attributing causation to experimental interventions, as opposed to other competing alternative explanations (Campbell and Stanley, 1966). Following successful identification of current smokers during the early part of the first WIC clinic visit, the health educator and other WIC staff employed a protocol developed by the principal investigator that utilized a random numbers table to assign women to one of three health education interventions. The health education staff were blind to the randomization scheme until just prior to the actual delivery of the counseling.

Following each WIC clinic, program records were examined to ensure that every pregnant woman entering the clinic had been screened as to her smoking status, and if a smoker, was invited to participate in the study. Discussion with the health educator and other WIC staff suggested that the procedural changes implemented in the clinic designed to accommodate the research design were implemented successfully. The additional step of cross-checking screening and recruitment records with program

records provided an additional assurance that the research procedures were adhered to correctly. The total number screened represented close to 100% of all pregnant women receiving WIC services for that year.

To examine the initial equivalency of the three intervention groups, they were compared on several demographic and health-related variables. The purpose of this analysis was to provide a check on the random assignment process, and to help ensure the fairness of the evaluative comparison. Using sixteen pretest and demographic variables, it was discovered that the three groups did not differ significantly on any of them. The women in the three groups had similar racial distributions, ages, smoking histories, family sizes, pregnancy histories, and prenatal care patterns. This suggested that the three groups were indeed equivalent prior to intervention.

Importantly, the proportions of women in each group who had received advice from their prenatal care physician to quit smoking were very similar. This is crucial because it suggested that study participants received similar levels of advice to quit smoking outside of the experimental treatments themselves.

Another issue bearing upon the integrity of the research design involved attrition from the experimental groups at the posttest. The overall attrition rate in the present study was 15.1%. This attrition rate is similar to the rate of 10%-15% discovered by Windsor, et.al. (1985).

Sexton and Hebel (1984) reported much less attrition than either Windsor, et. al. (1985), or the attrition rate of the present study. The attrition rate in the Sexton and Hebel (1984) study for self-report smoking was only 1.1% for the treatment group and 0.4% for the control group. A similarly high level of non-missing data existed for the thiocyanate measurements. The attrition rates for the thiocyanate data were 3% for the treatment group and only 2% for the control group. Overall, the attrition rate for the present study was within the 10% to 20% framework suggested by Windsor and Orleans (1986) in their methodological standards and guidelines paper.

The reasons for posttest attrition included moving from the community, termination from the WIC program, miscarriage, or actual refusal to complete the posttest. When considering the total number of attritors, 24.2% left the study because they had moved from the community, 39.4% were terminated from the WIC program, 9.1% experienced miscarriage, and 27.3% refused to complete the posttest.

With regard to group specific attrition rates, the rate for the multiple component group was higher than the rate for either the flip chart group or the information group. While the attrition rate for the multiple component group was 23.6%, it was only 11.4% and 10.4% for the flip chart and information groups, respectively. This higher attrition rate for the multiple component group was somewhat troubling. Because the multiple component

intervention involved a higher expectation that participants would quit smoking, it is possible that women in the multiple component group left more frequently because their behavior subsequent to intervention did not meet these expectations. However, only five of the 17 attritors in the multiple component group actually refused to complete the posttest. For the other eleven attritors, there was no possibility of ever completing the posttest because they had already moved from the community, were terminated from the program, or experienced miscarriage. Still, 6.9% of all women assigned to the multiple component group refused to complete the posttest, while the proportions of women refusing to complete the posttest in the flip chart group were 2.9% and 2.6%, respectively.

This situation seems to be the reverse of the situation usually found in evaluation research where the attrition rates are higher among control groups. Typically, attrition is higher among control groups because study participants in this group do not receive intervention, and therefore, feel less compelled to comply with research procedures. In the current situation, it seems that, high expectations about quitting communicated by the health educators during the multiple component intervention "scared" some women away from completion of the research procedures.

However, chi-square analyses, suggested that these differences in attrition rates were not statistically

significant. Therefore, attrition was not considered a serious problem for the implementation of the design.

It should be noted that a large amount of effort was devoted to tracking women postpartum to obtain posttest data. In most cases, women were administered the posttest upon their return to the WIC clinic with their newborn infant to receive additional services. If a participant did not attend the postpartum WIC clinic, she was contacted through the mail and by phone in order to secure posttest data. In cases where women moved from the community, or left the WIC program, forwarding information concerning their new address and telephone number was not available, and therefore, it was not possible to even attempt to contact these women.

Changes in smoking status

The first hypothesis of the study suggested that women in the multiple component group and the flip chart group would reduce their smoking to a greater extent than women in the information only group. The current data indicated that women reduced smoking following pregnancy of their own volition. The magnitude of this reduction was from approximately 20 cigarettes per day to approximately 13 cigarettes per day.

This finding is in agreement with other studies that have reported that women reduced smoking substantially following pregnancy. Sexton and Hebel (1984) discovered

that the women in their study reduced smoking by half following pregnancy. Before pregnancy, the average woman was smoking a single pack of cigarettes per day, but following pregnancy consumption had been reduced to approximately one half pack per day. Hughes, Epstein, Andrasik and Neff (1982) reported a 42.7% reduction rate of 46% following pregnancy. Ershoff, Mullen, and Quinn (1986) reported a 42.7% reduction rate following pregnancy, but prior to intervention.

With regard to the proportion of women who quit following pregnancy, the current data set does not provide any information regarding this issue. However, other studies have suggested that somewhere between 15-20% of women quit smoking on their own following pregnancy. In the Sexton and Hebel study (1984), the proportion of women who quit smoking on their own following pregnancy was 17%. Ershoff, Mullen, and Quinn (1986) discovered that 39.5% of the smokers in their study quit following pregnancy.

The correlation between self-reported smoking and the salivary thiocyanate data did not yield a correlation of great magnitude ($r=.25$, $p<.05$). However, the correlation was statistically significant, and was higher following attenuation. Two primary problems existed with this validation check of self-report smoking. First, the sample for which salivary thiocyanate testing was possible reflected only a subset of the total study sample, and moreover, this subsample was not randomly selected.

Because the saliva data was only available on a subset of the overall sample, it was not possible to use this data as a primary dependent variable. The role of this data set, because of its limited size, was to act as a reliability check for self-report smoking, and not as a dependent variable in and of itself. Other evaluation studies of smoking interventions for pregnant women have collected biochemical data on all study participants (Windsor, et.al, 1985; Sexton and Hebel, 1984; Secker-Walker, et.al, 1986). Unfortunately, the available resources did not provide for collecting data on all study participants.

Even with this resource constraint determining the frequency of salivary thiocyanate data collection, the rate of refusal for this measure was also high (i.e., 25%). Concurrent with the posttesting process in the present study, much attention was devoted by the local and national press to drug testing for employment screening. It is possible that the rate of refusal for saliva data collection was inflated by this historical artifact. Women were told that the saliva samples were collected solely to monitor their smoking behavior, and that the data associated with the saliva samples would be anonymous. Nevertheless, this procedure does represent a rather intrusive procedure, and it is probably not surprising that the refusal rate was high.

The appropriate interval for measuring changes attributable to the health education interventions was the

interval from the period pregnancy but prior to the intervention, to the ninth month of pregnancy, or to the postpartum period. Both the average number of cigarettes per day, as well as quit rates, were used as dependent variables. Some researchers have over-reported quit rates by including within their computations women who quit smoking on their own prior to intervention. In these studies, quit rates were computed using changes from the before pregnancy smoking level to the post-intervention. Hence, when comparing the results of the present study to that of other smoking intervention studies, attention needs to be given to the mechanics of computing quit rates, and the interval employed. Windor and Orleans' (1986) performed recomputations for those studies that incorrectly calculated quit rates, and these quit rates will be used when comparing the results of the present study to other investigations.

When changes in the average number of cigarettes per day were examined, it was discovered that both the multiple component group and the flip chart group had reduced their smoking at the ninth month of pregnancy. Women in the information group actually increased their level of smoking across the same time period. However, the analysis of covariance indicated that these differences were not statistically significant. Nevertheless, the trend supported the efficacy of the multiple component and flip chart groups.

When considering smoking changes from the last month of pregnancy to the postpartum period, all groups increased their level of smoking. However, the average number of cigarettes smoked per day for the multiple component group was still below the level exhibited by both the flip chart and information groups. Once again, the analysis of covariance indicated that these mean differences were not statistically significant.

When considering quit rates, the data suggested that the multiple component and flip chart interventions resulted in greater abstinence. At the ninth month of pregnancy, the quit rates were 14.5% for the multiple component group, 8.1% for the flip chart group, and 2.9% for the information group. The overall quit rate across the total sample at the ninth month of pregnancy was 8.1%. Chi-square tests suggested that the difference between the multiple component and the information group (14.5% vs. 2.9%) was statistically significant.

At the postpartum measurement period, the quit rates were 9.1% for the multiple component group, 8.1% for the flip chart group, and 0.0% for the information group. This represented an overall postpartum quit rate of 5.4%. In this case, the chi-square analysis indicated that the quit rates for both the multiple component group and the flip chart group were significantly greater than the quit rate for the information group. Differences between the multiple component and flip chart groups were non-

significant, although the magnitude of the quit rates was greater for the multiple component group at both post-intervention measurement periods.

When women who received intervention during the final trimester of pregnancy were excluded from the analysis, this pattern of results persisted. At the ninth month of pregnancy, the quit rates were 19.0% for the multiple component group, 11.4% for the flip chart group, and 4.4% for the information group. This represented an overall quit rate of 11.5%. The chi-square analysis indicated that the multiple component group quit rate was significantly better than the information group quit rate.

At the postpartum period, the quit rates were 9.5% for the multiple component group, 9.1% for the flip chart group, and 0.0% for the information group. The overall quit rate at the postpartum period was 6.1%. Similar to the analysis that included all women in the analysis regardless of month of pregnancy when the intervention was received, both the multiple component group and the flip chart group had significantly better quit rates than the information group. Differences between the multiple component group and the flip chart group, although the trend favored the multiple component group, were not statistically significant. Each of these quit rates was better than the quit rates for the analysis that included all participants. This suggested that the earlier during

pregnancy intervention was delivered, the more likely it was that the intervention would be successful.

These results are consistent with the results of other investigations of smoking cessation interventions for pregnant women, particularly for those investigations that have involved a high risk clientele being served by public health programs. Windsor, et.al. (1985) reported quit rates of 14% for the multiple component intervention, 6% for the American Lung Association's Freedom From Smoking intervention, and 2% for the control group. In the Ershoff, et. al. (1983) study the recomputed quit rates, given the appropriate pre-post interval, were 28% for the treatment group and 14% for the control group. Sexton and Hebel (1984), once again with a re-computed rate, reported a 27% quit rate for the treatment group, and a 3% quit rate for the control group. Secker-Walker et. al. (1986), reported quit rates of 14% for the treatment group and 9% for the control group during the last month of pregnancy, and 12% for the treatment group and 8% for the control group at the postpartum period. Hence, the quit rates observed in the present study fell within the range of the previous studies.

It should be noted that both the Ershoff, et.al (1983) and Sexton and Hebel (1984) studies involved populations that were not low income or high risk. In the Ershoff, et. al. (1983) study, participants were drawn from a sample of middle class women receiving prenatal care at a health

maintenance organization. These women represented the full economic spectrum. In the Sexton and Hebel study (1984), women were sampled from the caseload of numerous private practices in the Baltimore area, as well as a private hospital clinic. Once again, these women were not of low income, high risk status, but reflected women from many socioeconomic levels. Therefore, the most appropriate benchmark for comparison involved comparing this study to both the Windsor, et.al. (1985) study and the Secker-Walker, et. al. (1986) study. When these quit rates are compared to those of the present study, the congruence between the quit rates across studies is very high.

One additional problem with the measurement plan of the present study was that the salivary thiocyanate data was collected only at the postpartum period. This createed a problem because the "bogus pipeline" effect (Jones and Sigall, 1971) was present only during posttesting, and not during the pretest. Because the effect of the bogus pipeline is to increase the veracity of self-reports, regardless of the use made of the biochemical data itself, the fact that thiocyanate data was collected only at the posttest period would suggest that women were more truthful at the posttest than they were during the pretest. Hence, it is possible that women were saying they smoked less than they actually did to a greater extent at the pretest. The overall effect would be to lessen the observed impact of the interventions on smoking behavior because women would

be more likely to be truthful (i.e., say they smoked more) at the posttest.

Changes in maternal attitudes

The second hypothesis of the study concerned changes in maternal attitudes about the risks of smoking during pregnancy. The employment of rational-empirical procedures yielded a uni-dimensional attitude scale. The content of the scale reflected women's attitudes concerning the risks of smoking during pregnancy. A higher score indicated that women believed there a was greater risk. Although the trend suggested that flip chart and information group women believed the risk of smoking during pregnancy was greater atthe posttest than at the pretest, there was very little change among multiple component group women. The analysis of covariance indicated that these changes were not statistically significant. It is possible, given that the flip chart and information intervention stressed the risks of smoking during pregnancy rather than behavior change skills, that these interventions had a greater cognitive effect, and a less significant behavioral effect.

Changes in knowledge

The group mean trends related to the third hypothesis of the study suggested that while the flip chart and information group women increased their knowledge, the level of knowledge for multiple component group women

decreased. The analysis of covariance indicated that these changes were not statistically significant. Because the multiple component group intervention focused on behavior change, rather than on changes in knowledge and attitudes, it is possible that the flip chart and information group provided a larger cognitive impact than the multiple component intervention.

Changes in pregnancy outcome

The analyses related to the fourth hypothesis of the study, concerning changes in pregnancy outcome, suggested there were little differences among the groups in terms of both birthweight and gestation. Analyses involving mean birthweight, low birthweight rate, mean weeks gestation at birth, and prematurity rate indicated there were no significant differences between the groups. The trends for low birthweight, indicating that the multiple component group had a higher low birthweight rate than the other groups, were contrary to the hypothesis. However, when low birthweight differences between quitters and non-quitters were examined, it was discovered that the continuing smokers had a higher low birthweight rate than women who quit smoking during their pregnancy. Hence, because only small proportions of women in any of the groups actually quit smoking, these birthweight differences could be attributable to factors outside the interventions.

When considering the prematurity rate, the trends in the data indicated the multiple component and flip chart groups had lower prematurity rates than the information group. Although this is consistent with the hypotheses of the study, all of these differences, including those involving birthweight, were statistically non-significant.

Overall, in contrast to the findings of Ershoff, et.al. (1983) and Sexton and Hebel (1984), the interventions involved in the present study had no significant impact on pregnancy outcome.

Comparison of quitters and continuing smokers

The analysis comparing quitters and continuing smokers suggested that quitters experienced less difficulty in their quitting efforts, received significantly more prenatal care visits, and received anti-smoking counseling or information earlier during their pregnancy. Although not statistically significant, trends existed for quitters to have smoked less prior to pregnancy or intervention, to have initiated smoking behaviors at a later age, and to have been primiparous.

The results of the discriminant analysis yielded similar findings. The direction and magnitude of the standardized discriminant function coefficients indicated that quitters attempted to quit less often, received intervention earlier in pregnancy, experienced fewer previous pregnancies, received more prenatal visits, found

it less difficult to quit, had been smokers for fewer years, were younger, reported a stronger desire to quit, and smoked fewer days per week and fewer cigarettes per day prior to pregnancy.

These findings are consistent with the findings of other research concerning smoking cessation intervention during pregnancy. Ershoff, AAronson, Danaher, and Wasserman (1983) reported that their "home-correspondence" intervention was more effective with women who smoked less than one pack per day. Baric, MacArthur and Sherwood (1976) reported that quitters smoked fewer cigarettes before pregnancy, had more previous quitting attempts, and experienced fewer previous pregnancies. Secker-Walker, et.al. (1986) found that quitters receiving their treatment smoked fewer cigarettes at the first prenatal visit, had stronger intentions to quit, and had more previous quitting attempts. Windsor, et. al., (1985) reported that successful quitters were lighter smokers prior to pregnancy, and entered prenatal care earlier. Hebel, Nowicki and Sexton (1985), using a multiple regression analysis, discovered that their treatment was more effective with women who were light smokers, and women who experienced medical problems early in pregnancy. Hence, there appears to be a great deal of congruence between the findings of the present study and previous studies regarding the characteristics of quitters and non-quitters.

Limitations of the study

The major limitations of the present study discussed here include the brevity of the interventions, the validity of self-report data, the non-use of exclusionary criteria, and attrition.

First, the multicomponent intervention was only 15 - 20 minutes in length. The flip chart intervention was approximately ten minutes in length, and the information control group intervention simply involved the distribution of printed materials to subjects. When considering the literature on smoking cessation programs for the general population, this represents a very limited and unintensive intervention. For example, the American Lung Association's Freedom From Smoking Program, the Seventh Day Adventist's Five-Day Plan, or the Integrated Package Program offered by Coelho (1983), involved interventions of greater duration and intensity than the interventions included in the present study.

Smoking is a habit that is a difficult one to change. The nature of the problem suggests that interventions be of greater intensity than the ones included in the present study. However, because of the unique demands presented by clinic flows in health care settings, this research, as well as most other anti-smoking counseling programs for pregnany women, have utilized short-term interventions which rely heavily upon self-help modes of intervention. This is largely due to the fact that interventions must be

delivered within the normal clinic flow of health care settings. In the past, when interventions were attempted that involved group meetings outside of the normal clinic flow, it was not possible to elicit large enough participation rates to allow the programs to be successfully implemented (Windsor, et.al., 1985; Hughes, Epstein, Andraski, and Thompson, 1982).

In the WIC program setting involved in the present study, these problems were somewhat amplified. For the WIC program, women typically enter the program in the second trimester of pregnancy, and then are not required to return to the program site for at least two months, and many times don't return for a second visit until even later. Because of the structure of the setting, the interventions had to be short in duration, and had to include self-help, "homework based" components.

Prenatal care clinics offer the opportunity to see women more frequently than the situation presented by WIC clinics. According to the American College of Obstetricians and Gynecologists guidelines, prenatal care visits should be scheduled every month for the first trimester of pregnancy, twice a month for the second trimester, and weekly for the third trimester. This frequent visit activity on the part of women receiving prenatal care offers a greater opportunity for more intensive intervention than that offered by WIC clinics. In fact, in other studies, most notably Sexton and Hebel

(1984), personal contact was made with study participants more than just once, and for a longer period of time.

The second limitation of the present study involved weaknesses due to the self-report nature of the smoking behavior data. It was not possible to collect salivary thiocyanate data on all women involved in the study because of resource constraints. Hence, saliva data was only collected for a subsample. Additionally, there was a high refusal rate among the women who were even approached to collect saliva samples. The relationship between the salivary thiocyanate data and the self-report smoking data was not strong. However, the low correlation (r=.25) falls within the range of most other studies.

Although women were asked about their smoking behavior at four different times, the data was collected only at two time periods. Hence, two of the smoking measurements (i.e., prior to pregnancy, and ninth month of pregnancy) relied on women's recall of their smoking behavior. The recollective nature of this data presented additional threats to the validity of the self-report information.

Also, because salivary thiocyanate data was collected only at the posttest, the " bogus pipeline" may have influenced the data during posttesting, but not during pretesting. The overall effect of this would be to bias results towards having less of an effect than actually might have occurred.

The third limitation of the study was that no exclusionary criteria were used in recruiting subjects. All women, regardless of when they entered prenatal care or offered themselves for the first WIC visit, were included in the study. Many previous studies have used exclusionary criteria, based either on the month of gestation when services could be offered or on prior smoking level (Windsor, et.al., 1985; Sexton and Hebel, 1984; Secker-Walker, et. al., 1986).

Although exclusionary criteria could be misused by biasing samples such that positive effects would be more likely, and external validity weakened, it may be true that offering smoking cessation intervention to women who are very far along in their pregnancy is fruitless. In the present study, when an analysis was conducted excluding women who received anti-smoking intervention during the third trimester of pregnancy, the quit rates were greater when compared to the analyses involving all women recruited into the study regardless of trimester.

The final limitation of the study involved a high attrition rate for the multiple component group. While the attrition rate for the multiple component group was 23.6%, it was only 11.4% and 10.4% for the flip chart and information groups, respectively. It is possible that multiple component group participants were less likely to complete the posttest because they were afraid that they had failed in their attempts to quit. However, most of the

attritors did not complete posttesting for reasons that were beyond their control, and not because they actually refused to complete the questionnaire.

The major strengths of the study were that it utilized a pre-post randomized control group design that employed a relatively good sample size (better than 15-20 subjects normally observed in smoking cessation research), a high recruitment rate (i.e., 80%), and post-intervention measurements including both the last month of pregnancy, as well as the postpartum period.

Future research directions

Given the experience of the present project, several directions for future research can be provided.

First, it seems that more powerful and better designed intervention models could be employed in future research efforts. Given that limitations on the duration and intensity of interventions are dictated by public health clinic management considerations, it should still be possible to extend one-on-one couseling to subsequent visits within the care setting. Additionally, efforts involving both extended mail and telephone communication with subjects in experimental treatments is possible. For example, Sexton and Hebel (1984) used a call-in health line as an additional component of their intervention.

If future projects are implemented within prenatal care clinics, the opportunity exists to provide more

intensive interventions. Unfortunately, prenatal visits are distributed more frequently towards the end of pregnancy rather than at the beginning. Some analysts have suggested that this pattern of visits should be reversed: more visits should occur early to provide health education that can positively influence the ultimate outcome of pregnancy.

Because smoking cessation interventions for pregnant women have relied largely upon self-help, "homework based" interventions, a need exists to collect better data concerning treatment implementation. A desirable aspect of future research should be to ask participants which components of the self-help aspect of the intervention they adhered to most closely. At this point in the evolution of the research, it is generally unknown what aspects of self-help programs are most accepted and adhered to by pregnant women clients.

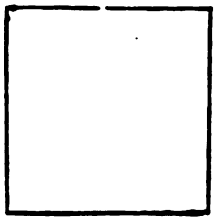
Secondly, more intensive and extended follow-up data should be included in future research designs. Most studies have only tracked women's smoking until the last month of their pregnancy, and not explored smoking behavior following pregnancy. An important direction for future research should be to track women longitudinally to examine the impact of interventions during pregnancy on smoking behavior following pregnancy.

Finally, future research should include biochemical confirmation at every measurement period. Although this

presents some logistical problems, in the sense that expired air, urine, saliva, or serum samples would need to be collected multiple times, it would in the long run improve the quality of measurement in this area of research.

APPENDIX A

Smoker Identification and Referral Form



Appointment Time

Client ID #_____

RECRUITMENT FORM

NAME_____ DATE_____

1. Smoking Status (Check one)

   ( ) Yes

   ( ) Yes, but stopped when became pregnant

   ( ) No, client is a non-smoker

2. Study Status (Check one)

   ( ) Participant

   ( ) Refusal

3. Current week of pregnancy _____

4. Consent Form

   ( ) Yes

5. Questionnaire

   ( ) Yes

APPENDIX B

Informed Consent Materials

KENT COUNTY HEALTH DEPARTMENT
MICHIGAN STATE UNIVERSITY
SMOKING AND PREGNANCY PROJECT

I volunteer to take part in a study about smoking and pregnancy. I understand that the study concerns the opinions and actions of pregnant women who smoke, and different ways to help them to stop smoking. As a part of my participation, I agree to answer some questions about smoking cigarettes during pregnancy, and to allow project staff access to my health records maintained at the Kent County Health Department. The study has been explained to me to my satisfaction, and I understand what my participation will involve.

The information that is collected will be kept in strict confidence. None of the information about individuals in the study will be reported. Only results for groups will be disclosed. I understand that, at my request, I can receive additional information following the conclusion of the study, and that my participation does not guarantee any beneficial results to me. I understand that I am free to end my participation in the project at any time. I realize that my participation in the study will not effect my receiving services from WIC, or any other programs of the Kent County Health Department.

Date:_____ Signed:_____

_____Witness

I certify that I explained to the client the items described in this consent form and that I answered the client's questions concerning the project.

_____ _____ AM PM

Signature Date Time

Original - Client Copy - KCHD

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
258 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824-1046

August 16, 1985

Mr. Jeffrey P. Mayer
Psychology
52 Baker Hall

Dear Mr. Mayer:

Subject: Proposal Entitled, "An Experiment in Health Education: Smoking and Pregnancy"

UCRIHS review of the above referenced project has now been completed. I am pleased to advise that since the reviewer's comments have been satisfactorily addressed, the conditional approval given by the Committee at its August 5, 1985 meeting has now been changed to full approval.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to August 5, 1986.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to our attention. If we can be of any future help, please do not hesitate to let us know.

Sincerely,

Henry E. Bredeck
Chairman, UCRIHS

HEB/jms

cc: Dr. Charles D. Johnson

APPENDIX C

Clinic Flow and Group Assignment

Clinic Flow Procedures

1. Clients sign in at door to clinic room, and go to waiting area.

2. Clients called by name by clerks from the waiting area.

3. As a part of the clerk/client intake session, the clerk will ask the client if she smokes (including if she smoked immediately before finding out she was pregnant). If the client says yes, then the clerk should invite the client to participate in the Smoking and Pregnancy Project and provide the client with a consent form and pretest. The clerk should use the 2-item Recruitment Form to identify smokers, and place the forms at a central location available to each clerk during each clinic hour (see Study Recruitment Procedures).

4. Collect the 2-item Recruitment Forms (completed by the clerks during intake). At this point, two brief, randomized procedures need to be performed. The first involves choosing randomly the number of smokers who can be accommodated in the research. The second involves the selection of a health education treatment for each particular client who is selected to be included in the project.

   A. Select all smokers who have agreed to participate in the study (they should be filling out the pretest in the "film" waiting room at this time).

   B. Examine the randomized "treatment selection" sequence table. Determine how many clients can be accommodated for the clinic - based on how many clients will need to be provided with one of the face-to-face treatments.

   C. Using the randomized "participant selection" sequence table, pick out the number of clients that can be accommodated in the research for this clinic in a random fashion.

   D. Pull off color-code stickers and attach to 2-item Recruitment Form based on the order found in the "treatment selection" sequence table. Mark off the number of clients provided treatment for that clinic on the "treatment selection" table.

5. Flip chart and multiple component clients are counseled prior to the beginning of the film. They can be called into the counseling session room by name. The color code tags on the Recruitment Form should be used to determine who gets what treatment. The information group clients are provided with the take-home American Lung Association materials only. After

one client is counseled, another can be called in. When not being counseled, the project clients will wait in the "film" room, or be involved in meeting with the CPA, just like other WIC clients who are not smokers or are not involved in the research project. In effect, the smoking intervention is provided, in a procedural sense, in the same way that clients are called in to visit with the CPA.

6. Consent and pretest forms are collected at the end of each counseling session. It is critical that the consent and pretest for a given client be kept together (perhaps stapled). There should be a consent/pretest package for each smoking project participant. This can be checked against the Recruitment Form (those checked YES and PARTICIPANT, and have a color code on them). All forms for a given clinic (including all Recruitment Forms, pretests, and Consent Forms) should be placed in an envelope with today's date on it. Client ID numbers should be printed on the pretest/consent package for each study participant.

Study Recruitment Procedures

Somewhere in the clerk/client intake session, one more step will need to be added (e.g., between completing the CDE and the conclusion of the intake session). This step will involve indentifying pregnant smokers, and recruiting them into the Smoking and Pregnancy Project. This document details the procedures for study recruitment. It will be important that we try to achieve a high level of successful recruitment in order to contribute to the evaluation's external validity, and to help along completion of the project in a timely manner.

1. Ask each pregnant WIC client the following questions:

   a) "Do you smoke now?"

   b) "If you don't smoke now, did you stop since finding out you were pregnant?"

2. If the client answers YES to the first or both of these questions, then you should encourage that client to participate in the study. Use the following example script to recruit pregnant smokers into the study:

   "THE HEALTH DEPARTMENT, WITH THE COOPERATION OF MICHIGAN STATE UNIVERSITY, IS DOING A NEW PROJECT CONCERNING SMOKING AND PREGNANCY. WE HOPE THAT THIS PROJECT WILL BECOME A REGULAR PART OF WIC SO THAT WE CAN SERVE OUR CLIENTS BETTER, AND THAT INCLUDES YOU! THE PROJECT'S PURPOSE IS TO LEARN ABOUT THE OPINIONS OF PREGNANT WOMEN ABOUT SMOKING, AND TO LEARN ABOUT DIFFERENT WAYS TO HELP WOMEN TO CUT DOWN OR STOP WHILE THEY ARE PREGNANT. WOULD YOU LIKE TO PARTICIPATE IN THIS NEW PROJECT? IT IS REALLY IMPORTANT THAT A LOT OF WOMEN BECOME INVOLVED SO THAT WE CAN PROVIDE BETTER SERVICES TO MORE PEOPLE, AND SO THAT WE CAN HELP IMPROVE THE HEALTH OF MOTHERS AND BABIES."

3. If the client agrees to participate in the project, provide the client with a consent/pretest package. Instruct the client to sign the consent form, and to answer the questions in the survey while they are waiting to be called in for a CPA session, or for blood work, etc. to be performed. Here's an example script:

   "PLEASE READ AND SIGN THE PARTICIPANT FORM, AND THEN COMPLETE THE QUESTIONS ON THE SURVEY, WHILE YOU ARE WAITING. THIS SHOULD TAKE APPROXIMATELY 5 TO 7 MINUTES TO FINISH. IF YOU HAVE

ANY QUESTIONS, FEEL FREE TO ASK A STAFF MEMBER. THANK YOU VERY MUCH. YOUR PARTICIPATION IS REALLY IMPORTANT TO OUR EFFORTS IN HELPING MOTHERS AND INFANTS."

4. A Recruitment Form should be completed for each pregnant women WIC client. On this form you need to do only three things:

   A. Write in the client's name on the provided blank space, and today's date.

   B. Check off the box which represents the client's smoking status.

   C. Check off the box which represents the client's participation status. If the identified pregnant smoker has agreed to become involved in the project, and is willing to complete the consent/ pretest package, check off "Participant." This will signal that this client should receive anti-smoking health education. If the client does not want to participate, and is unwilling to complete the forms, check off "refusal."

The Recruitment Form, once completely filled out, should be placed in the box behind the intake interview area that is available to all clerks.

KENT COUNTY HEALTH DEPARTMENT
SMOKING AND PREGNANCY PROJECT

POST-TEST ADMINISTRATION

1. The goal is to administer both the written post-test and the saliva thiocyanate test as soon as possible following delivery of the infant. In most cases, post-testing should occur during the 600-BABY appointment, the first infant WIC visit, occurring usually four to five weeks after delivery. At this appointment, both the written test and the saliva thiocyanate test should be administered within the WIC clinic flow.

2. It is important that administration of the written post-test occur following administration of the saliva thiocyanate test. This is important because sequencing of the tests in this way maximizes the validity of the self-report smoking data. If saliva thiocyanate testing, or awareness of it, only occurs after completion of the written post-test, then it is more likely that we will have a small reliability coefficient, and lower levels of specificity and sensitivity.

3. The saliva samples need to be clearly identified. The client ID number (the same number as that recorded on both written pre-tests and post-tests) should be attached to each sample that is collected. The hospital laboratory facility will report the thiocyanate levels by client ID number. This data can then be keypunched and merged with the written test data using client ID numbers to match different data for the same individual.

4. In the instance where a new mother misses her first 600-BABY appointment, but reschedules for another, do both written post-testing and thiocyanate testing during the re-scheduled 600-BABY appointment.

5. In the instance where a new mother misses her first 600-BABY appointment and does not reschedule, contact her by mail or telephone one week following the missed appointment. If the result of this communication is <u>not</u> a rescheduled 600-BABY appointment during which complete post-testing can occur, then complete the written post-test by telephone or mail as follows:

    a. for those without a phone, mail a copy of the post-test with a cover letter explaining purpose and seeking cooperation;

b. for those without a phone and don't return the first questionnaire mail-out, send a follow-up survey and a different cover letter two weeks following the initial survey mail-out. Do a third mailing if necessary;

c. for those without a phone and whose first mail-out is returned by the postal service as undeliverable, this is probably a lost case. (However, this woman may have moved or changed names and could show up at the WIC clinic with her infant);

d. for those with telephones, either administer the post-test survey verbally over the phone, or tell her a written survey will be sent to her with a self-addressed, stamped envelope. If, after talking to her and sending a survey, you have not received a completed survey in two weeks, conduct verbal follow-up over the phone, requesting a completed survey be returned.

e. We will not have saliva thiocyanate data for new mothers who never return for a 600-BABY appointment.

6. It is important that we collect as much follow-up data as possible. Any case without post-test information of any kind is essentially a lost case for the evaluation, even though health education activities have been delivered. Of course, there will be some level of participant attrition. If attrition occurs, it will be critical to know the reasons why it occurs (e.g., miscarriage, left the community, etc.). Part of the analysis will involve comparing attrition for the three evaluation groups. Differential attrition can threaten external validity. Hence, the more we know about it, the better we will be able to address this potential problem. Make sure everybody who completes a pre-test and received either the MC, FC or I interventions, is either successfully post-tested or accounted for.

7. Archival data, that is WIC and/or MIC CDE's, should be encoded following written and thiocyanate post-testing. Hence, these forms will need to be collected for every participant who receives health education, whether MC, FC or I interventions. The client ID number should be the same as used on both written tests, and with the saliva samples. Actual transferral of data from CDE's as well as keypunching can be accomplished at MSU.

KENT COUNTY HEALTH DEPARTMENT

700 FULLER, N.E.
GRAND RAPIDS, MICHIGAN 49503
774-3030

DOUGLAS A. MACK, M.D., M.P.H.
PUBLIC HEALTH DIRECTOR

July 1986

Dear

When you were added to the WIC Program at the Kent County Health Department, you participated in a research study about smoking and pregnancy. At that time you filled out a questionaire about your opinions and knowledge about smoking.

Now that you have delivered your baby, I need for you to answer the follow-up questionnaire which is enclosed.

Please take a few minutes to complete the survey and return it to the health department by using the self-addressed stamped envelope, by July 18, 1986.

Thank you for helping us in our efforts in improving the health of mothers and infants in Kent County. Best wishes to you and your new baby.

Sincerely,

Health Educator
Kent County Health Department

BH/kes

Encl.

APPENDIX D

Educational Materials Concerning the Risks of Smoking During Pregnancy

Because
You Love
Your Baby...
THERE'S NEVER BEEN
A BETTER TIME TO QUIT
AMERICAN LUNG ASSOCIATION
I Quit
Smoking
Because...
I LOVE
MY BABY
AMERICAN LUNG ASSOCIATION

RESULT: Smoking increases the possibility of...

- **MISCARRIAGE**
  170% more risk among heavy smokers
- **PREMATURE BIRTH**
  300% as likely for heavy smokers
- **STILLBIRTH**
  Heavy smokers increase risk by 55%
- **BIRTH DEFECTS**
  Such as hare lip and cleft palate
- **DEATH IN INFANCY**
  Particularly in first 28 days
- **DIFFICULT BREATHING IN INFANCY**
  Respiratory Distress Syndrome

THE SOONER YOU QUIT SMOKING THE BETTER

If you quit when you discover you are pregnant... you may reduce your baby's chance of having birth defects.

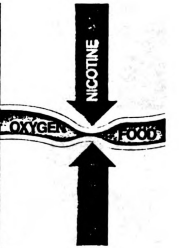
If you quit by the fourth month... your risk of having a low birth-weight baby is similar to that of a nonsmoker.

If you quit anytime during pregnancy... you increase your chances of having a healthy baby.

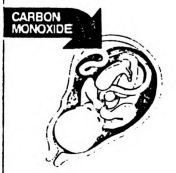
SMOKING IS DANGEROUS TO YOUR BABY

When you smoke, you breathe in nicotine and carbon monoxide.

NICOTINE tightens up your blood vessels. That reduces the amount of food and oxygen reaching your baby.



CARBON MONOXIDE is a poison gas. It gets in your blood and decreases the amount of oxygen your baby gets.



IF YOU CONTINUE TO SMOKE . . .

- Nicotine in your breast milk may be bad for your baby.
- Your child may have twice as many colds and respiratory problems as children of nonsmokers.
- As your children grow older, they may be shorter and smaller than children of nonsmokers. They may also score lower on math and verbal tests.
- Smoking sets a bad example for your children. Children of smoking parents are twice as likely to smoke as children of nonsmoking parents.

Q When will my craving for a cigarette stop?

A The first week is usually the worst. After that, the cravings lessen. Some ex-smokers still feel an occasional desire for a cigarette months or even years after quitting. It is not a true physical craving but rather a memory that can be handled.

Q When will I start to feel better because I have stopped smoking?

A Each day you will feel better and better. Your attitude is very important, be good to yourself. Reward yourself. You will be proud of your accomplishments – for both you and your baby.

Q How can my husband help me as I quit smoking?

A First of all, if he is a smoker, he can agree to try to quit with you. Remember both parents can damage the young child by exposing him or her to "second-hand smoke." At least, ask your husband to avoid smoking around you in the first few difficult weeks. If he does not smoke, ask him to be supportive of your efforts and help avoid situations that may "trigger" your urge to smoke.

Q I've tried to quit and never made it. I feel like a failure. What should I do?

A The first thing is to stop feeling like a failure – you are trying. Backsliding is a natural process – almost everyone goes through it. Sometimes it takes several attempts before you are successful. This time you are doing it for both of you. After going through the effort of quitting, there's no point in going back to cigarettes after your baby is born.

Because you love your baby, there's never been a better time to quit!

AMERICAN ‡ LUNG ASSOCIATION
Affiliate
The Christmas Seal People

Q&A

QUESTIONS AND ANSWERS ABOUT SMOKING AND PREGNANCY

AMERICAN ‡ LUNG ASSOCIATION

Q What are some specific effects of smoking during pregnancy?

A Women who smoke while pregnant have a higher percentage of stillborn babies, spontaneous abortions and premature deliveries than do women who don't smoke, and their babies are more likely to be born undersized or to die soon after birth.

Q Isn't it easier to deliver an undersized baby?

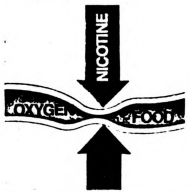
A It might be easier on you, but there are many disadvantages for low birth-weight babies. They generally have more difficulty getting a healthy start in life. For example, there is a greater risk of the undersized baby developing Respiratory Distress Syndrome (a reduced ability of the newborn to breathe). Babies born to women who smoke during pregnancy are, on the average, approximately half a pound lighter than babies born to comparable women who do not smoke. Also, you will not necessarily avoid caesarian birth if your baby is small.

Q I have delivered two other healthy babies. Why didn't my smoking hurt them?

A You were lucky! Statistics show, however, that the odds are against you and the baby you now expect if you continue to smoke. So why take a chance when you have so much to lose? There are also many other good reasons to quit. Smoking can affect your health and that of your other children at home.

Q How can the smoke from my cigarette reach my unborn baby?

A People used to think there was a placental barrier that protected the fetus from such poisons as cigarette smoke. Not true! When a pregnant woman smokes, harmful gases from the smoke do enter her blood and pass through the placenta directly into her baby's circulatory system. These gases narrow the baby's blood vessels and those in the placenta, and force oxygen out of the red blood cells of both mother and baby thus cutting down the amounts of badly-needed oxygen and food that are delivered to the developing child. For instance, a pregnant woman who smokes two packs of cigarettes a day blocks off the equivalent of 25 percent of the oxygen supply to the fetus.



Q Are there any long-term effects on my child if I smoke during pregnancy?

A Some studies have shown that children of mothers who smoked during pregnancy lag in physical growth. There may also be a negative effect on verbal and math scores. The more the woman smoked, the worse these deficiencies were.

Q Isn't pregnancy a difficult time to quit smoking?

A In fact, it may be easier for you now because you are making the decision for you and your unborn child. You owe your baby the best chance to get a healthy start in life.

It is estimated that about one-third of pregnant smokers do quit during pregnancy. You can do it too!

Q How about cutting down on cigarettes rather than quitting completely?

A Cutting down on smoking during pregnancy may be better than no change at all. However, many regular smokers tend to inhale more deeply when they cut down in order to get the same amount of nicotine as before.

Q Smoking relaxes me. How will I cope with tension during my pregnancy?

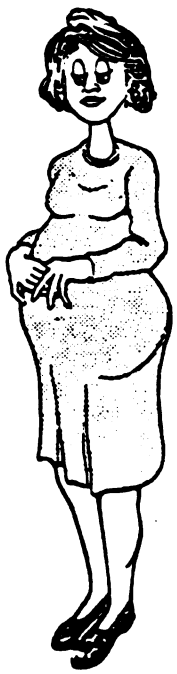
A Smoking does relax you in this sense: a cigarette restores the level of nicotine your body has come to need. But don't call that real relaxation; it's just temporary relief from the tension caused by your need for a "nicotine fix." In fact, smoking actually steps up your heartbeat and blood pressure. More to the point, you can learn to relax in ways that are just as effective and a lot better for you. Practice deep breathing. You can take up a new hobby. For instance, crochet an outfit for your baby. Once your baby is born, you'll have plenty to do with your hands so you won't miss cigarettes so much.

APPENDIX E

Self-help Manual For Quitting Smoking During Pregnancy

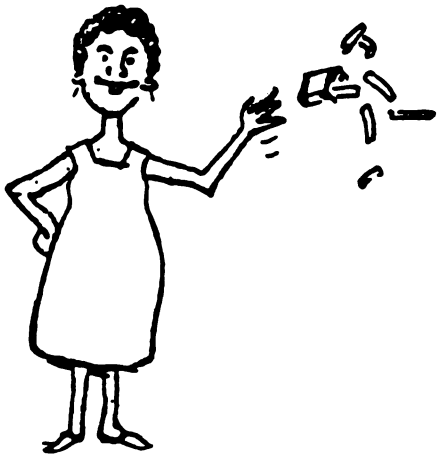
YOUR GUIDE TO A SMOKELESS PREGNANCY

A Self-Help Manual



Smoking and Pregnancy Project

Kent County Health Department



HI...

Welcome to the beginning of a "Smokeless Pregnancy". You are about to learn how to become a non-smoker. Yes, it is possible and this manual will give you the skills you need to stop smoking.

It is very important that you read and complete all of the assignments day by day. The skills must be practiced. On your buddy contract, check off each daily assignment you finish. This is a way of keeping track of your progress.

If you miss a day or two, start where you left off. If you miss a week, start over again. Remember, the sooner you begin to quit, the better for both you and your baby.

ASSIGNMENT SCHEDULE

DAY 1 - Diary - Start Recording Cigarettes - pg. 2.

DAY 2 - Record cigarettes/"BUDDY' CONTRACT pg. 3.

DAY 3 - Reasons to Quit/Why I Smoke pgs. 4, 5, 6, 7.

DAY 4 - Plan of Action/Call "BUDDY" pg. 8, 9.

DAY 5 - Relaxation/Practice PLAN pg. 10, 11.

DAY 6 - Reactions/Practice PLAN pg. 12, 13.

DAY 7 - QUIT DAY!

Send "Buddy" Contract & Diary to the Health Department in the envelope provided for you.

By using the simple skills in this manual, you will stop smoking with greater ease than you expect. When the days get rough, think about who you are quitting for. Your baby will love you for it. Best of all, ALL THE CREDIT FOR STOPPING WILL BE YOURS.

GOOD LUCK AND BEGIN READING ON PAGE 2

DAY 1

Today you will start recording the cigarettes you smoke per day. For each cigarette you smoke, write down the following things in your smoking diary:

1. Need - How important is that cigarette on a scale of 1-5, 1 = very weak urge; 2 = weak urge; 3 = somewhat strong urge; 4 = strong urge; 5 = very strong urge.

2. Place or Activity - Record where you were when you smoked (living room, at work, kitchen) and what you were doing (watching TV, talking on the phone).

3. Mood/reason - Why? Mood or event that made you want to smoke (bored, angry, desire).

4. Alternative Coping Strategies - Think of three things you could do, at that moment, instead of smoke.

Below are listed some choices for you to use. Can you think of others?

1. Take a walk.
2. Eat in a new place.
3. Avoid smoking places - go to the library, the movies, the store, etc.
4. Take a warm bath or shower.
5. Rinse with mouthwash.
6. Develop an exercise program.
7. Change the order of your daily routine.
8. Wash the dishes immediately after eating.
9. Drink tea, instead of coffee.
10. Chew sugarless gum.
11. Brush your teeth.
12. Eat carrot or celery sticks.
13. Spend more time with friends who don't smoke.
14. Start a garden.

RECORDING EXAMPLE

No. Cigs.	Need 1-5	TRIGGERS: ACTIVITY	TRIGGERS: MOOD/REASON	ALTERNATIVE COPING STRATEGIES: CHOICE #1	CHOICE #2	CHOICE #3
1	5	WAKING UP	TIRED	ROLL OVER	BRUSH TEETH	CHANGE ROUTINE
2	2	WAITING	BORED	DON'T BRING CIGARETTES	READ A BOOK	DEEP BREATHE

Assignment:
*record in diary before you light up.
*record every cigarette you smoke.

This diary is yours. If you are honest with yourself, you can get a good picture of how much you smoke, when the urges occur and what causes you to smoke. **Remember, to be successful in your effort to stop smoking, complete each assignment as directed.**

END OF DAY 1

DAY 2

Today you will continue to record the cigarettes you smoke in your diary. Looking back to your diary from yesterday, ask yourself the following questions:

Did you record all of the cigarettes smoked?
Are you surprised at how many you smoked?
How strong were the urges?
Were you able to fight some of the urges?

As you record in your diary today, keep in mind these questions?

What situations cause you to smoke?
When do you smoke automatically without thinking about it?
Do you smoke around certain people?
What things can you do instead of smoke?

BUDDY CONTRACT

One of the better ways to quit smoking is to get a Buddy to help. Today you are going to select a "Buddy". The person you choose should be someone who is helpful, someone you can talk to when you don't think you can resist the urge to smoke. If you can find a Buddy who stopped smoking before or during her pregnancy, she might be particularly helpful.

When you have selected your Buddy, have him/her sign the **Buddy Contract** in your folder. Put the contract in a place where you will see it a lot. Try to contact your Buddy every day for help when times get tough.

During the first week, you should call or visit your Buddy every day to talk about your problems and celebrate your successes. Talk to your Buddy four to five days during your second week of quitting, and on two to three days during your third week. For the rest of your pregnancy, you and your Buddy should get together at least one time per week. Of course, if you can call or visit with your Buddy more often, you should.

ASSIGNMENT:

Continue to record cigarettes in diary.
Select Buddy and sign contract.

DAY 3

By recording the cigarettes you smoke, as you have been doing for the past two days, you are learning about your smoking habit. Today you will learn more about why you smoke and determine why you want to quit.

ASSIGNMENT 1: "Why Do I Smoke"

This is a short test that will help you understand what kind of a smoker you are and what kind of satisfaction you think you get from smoking.

For each statement below, circle one number that tells how often you feel this way when smoking.

1 = NEVER; 2 = SELDOM; 3 = SOMETIMES; 4 = OFTEN; 5 = ALWAYS

A.	HOLDING a cigarette is a part of the enjoyment of smoking it.	1	2	3	4	5
B.	I find smoking a cigarette is RELAXING.	1	2	3	4	5
C.	I light up a cigarette when I feel ANGRY about something.	1	2	3	4	5
D.	When I'm out of cigarettes, I'm a NERVOUS WRECK until I can get one.	1	2	3	4	5
E.	I smoke cigarettes AUTOMATICALLY without being aware of it.	1	2	3	4	5
F.	I smoke cigarettes to STIMULATE me.	1	2	3	4	5
G.	Smoking cigarettes is PLEASURABLE.	1	2	3	4	5
H.	When I get BORED, I light up a cigarette.	1	2	3	4	5
I.	I often light up a cigarette while one is STILL BURNING in the ashtray.	1	2	3	4	5
J.	I get a REAL HUNGER for a cigarette when I haven't had one in a while.	1	2	3	4	5
K.	I smoke cigarettes to PERK me up.	1	2	3	4	5
L.	When I smoke, part of the enjoyment is FEELING the smoke being exhaled.	1	2	3	4	5

HOW TO SCORE: Turn to the next page.

Now that you've completed the test, use the Scoring Sheet below to find your results.

DIRECTIONS

1. Put the number you circled to Question A over line A; Question B over line B, etc.
2. Add the two numbers on each line to get your totals.
3. A total score of 7-10 tells you that this factor is an important source of satisfaction for you.

SCORING SHEET

HABIT

____ (E) + ____ (I) = ____ Total

You light up cigarettes without thinking about it. The cigarette smoked seems to be tied to a specific situation. Try to break the chain by asking yourself "Do I really want this cigarette?"

ADDICTION

____ (D) + ____ (J) = ____ Total

You feel a strong need to smoke. A lack of nicotine may cause you to have cravings. By stopping cold turkey, the cravings will in time decrease and stop.

STRESS REDUCER

____ (C) + ____ (H) = ____ Total

You will smoke when stressed or upset. You smoke to help you calm down and become more relaxed. Think of other ways to relax without smoking, such as deep breathing.

PLEASURE

____ (B) + ____ (G) = ____ Total

You actually enjoy smoking but do you smoke to feel <u>good</u> or to keep from feeling <u>bad</u>? Think about the harmful effects to your baby to motivate you to quit.

HANDLING

____ (A) + ____ (L) = ____ Total

You like to feel and see the cigarette. Something to keep your hands busy. Instead of smoking try doodling or playing with a coin or pen/pencil.

STIMULATION

____ (F) + ____ (K) = ____ Total

You feel the cigarette wakes you up and keeps you going. Instead of smoking, try taking a brisk walk.

In which areas did you score high (7-10 pts.)? Those particular areas which have a high score will need to be replaced in some other way when you stop smoking. Keep this test in mind when planning your alternatives to smoking (Day 4). Now turn to the next page for your second assignment of today.

ASSIGNMENT 2: Reasons to Stop Smoking

There are many reasons why you **SHOULD** stop smoking while you are pregnant. When trying to quit smoking it is important to know why you **WANT** to quit. You must have definite reasons for quitting.

The form below gives you a start by listing some of the reasons other pregnant women have stopped smoking. Put a check next to the sentence which applies to you. If you have other reasons for stopping, list yours on the blank lines.

After you've listed your reasons, pick your five most important reasons for quitting and write those 5 down on the form on page 7.

REASONS TO QUIT SMOKING

___ 1. To increase my chances of having a healthy baby.

___ 2. To improve my own health.

___ 3. To reduce the chance of my having a premature baby.

___ 4. To breathe more freely; won't have morning cough or phlegm.

___ 5. To reduce the chance of my having a low-birth-weight baby.

___ 6. To feel more liberated, more self-assured: in control of my life.

___ 7. To reduce the chances of my baby catching colds or flu.

___ 8. To improve my sense of taste and smell.

___ 9. To increase the amount of food and oxygen that reaches my baby.

___ 10. To show other people that I'm a responsible person.

___ 11. To save money.

ADD MORE REASONS YOU CAN THINK OF:

_____

_____

_____

_____

_____

_____

Turn page for the rest of Assignment 2.

Once you've written your list, cut on the dashed line below and post your reasons on your mirror at home. Read your reasons everyday. Say them outloud every morning of your pregnancy. Keep in mind your reasons when you get the urge to smoke.

There are 4 more days until Quit Day. At this point you should be:

1. Recording cigarettes in a Diary.
2. Cutting down on cigarettes each day.
3. Telling family and friends you are stopping.
4. Getting rid of all matches, lighters, and ashtrays, if possible.

REMEMBER TO CHECK BACK TOMORROW!

YOUR 5 MOST IMPORTANT REASONS FOR QUITTING

1. _____
2. _____
3. _____
4. _____
5. _____

Put these reasons on your mirror and say them out loud every morning of your pregnancy. It will help you to stay motivated to quit.

DAY 4

For the past 3 days you have been writing in your diary each cigarette that you smoked.

Today you are going to look at your diary, and figure out some of your smoking triggers. Then you will plan what you are going to do when the urge to smoke occurs.

TRIGGERS -----> URGES -----> SMOKING
cause cause

Triggers are certain times, activities, moods, and people that cause you to want to smoke. For example:

1. After a meal
2. With coffee
3. Bored/Waiting
4. Someone lights a cigarette

Some of these examples may be your triggers. Yours may be different. To find your triggers, look at your diary and find when your strong urges occured. These are the cigarettes you rated 4 & 5.

1. What were you doing?
2. How were you feeling? = TRIGGERS
3. Who were you with?

List your triggers on your **PLAN OF ACTION** form - found on the next page. After you've done that return for Assignment 2.

ASSIGNMENT 2

For each trigger you found from your smoking diary, you are going to think of 3 choices that you will use to replace smoking.

For example:

Triggers		#1	#2	#3
After a meal		Brush Teeth	Leave the Table	Do the Dishes
With Coffee		Skip Coffee	Eat Carrot Sticks	Drink Water
In the Car		Change Route	Chew Gum	Deep Breathe
Morning		Call Buddy	Take Shower	Change Routine

Now go back to each trigger that you wrote down on your PLAN OF ACTION and think of 3 choices that you could use to avoid smoking. The more choices you come up with, the better you'll be prepared for when an urge occurs.

PLAN OF ACTION

TRIGGERS	CHOICES
EXAMPLES:	
1. On the telephone	1. Doodle. 2. Wait 5 minutes for the urge to pass. 3.
2. Getting up in the morning.	1. Get up and go for a walk/do some light exercise. 2. Roll over. 3.
MY TRIGGER SITUATIONS:	
3.	1. 2. 3.
4.	1. 2. 3.
5.	1. 2. 3.
6.	1. 2. 3.

By completing this assignment, you have planned ahead on how you will handle the situations that trigger the urge to smoke. Tomorrow you will begin practicing your choices when a trigger occurs. You can break the chain of smoking by using your **PLAN OF ACTION.**

TRIGGER---->URGE---->CHOICES

You've finished DAY 4. Give your Buddy a call to share how things are going.

Check back tomorrow for Day 5!

DAY 5

Non-smoking is an undeveloped skill you will need to get good at through practice. By practicing not smoking, you will feel better ready to face Quit Day, just 2 days away.

Today you are going to begin to practice not smoking by using the choices you've thought of, on your Plan of Action, to replace smoking. When a trigger situation causes you to want to smoke, **STOP** and use the choices you've written on your Plan of Action instead of smoking.

Practicing can help you feel ready to say no to an urge. Not every choice you've thought of will work. You will need to keep thinking of and practicing other things to do besides smoke. When something works, USE IT!

ASSIGNMENT 1

In 3 smoking situations today, when the urge to smoke occurs, practice not smoking. Use your choices and see what works for you.

One method that may help you to control an urge to smoke is called **Deep Breathing.** It is a good way to deal with the tension and stress of quitting and staying off cigarettes. It is a relaxation method that copies the action of smoking. Deep Breathing replaces smoke with that of fresh air.

Deep Breathing can be done anywhere and at any time when an urge occurs. It can be used while sitting, standing, lying down or even moving.

When you first begin to learn the instructions, it may be helpful to have someone read the instructions to you, or you may want to put the instructions on a tape recorder.

Practice this Deep Breathing exercise when you have the urge to smoke. Notice how you feel before deep breathing and then after. Is there a difference? Are you more relaxed? Did the urge to smoke go away? This exercise is another choice you can use to replace smoking. <u>Practice it daily</u> so when the urge to smoke strikes, you'll be ready!

To learn Deep Breathing, turn the page.

YOUR STEPS TO RELAXING

1. Get comfortable. Loosen tight clothing, shoes. Take off jewelry, glasses, and other articles.
2. Take a deep breath. Breathe in through your nose, count 1 to yourself.
3. Exhale out through your mouth, count 2, 3, 4, to yourself. Feel the pleasure of feeling yourself breathe.
4. Take another deep breath. Breathe in through your nose (1) and out through your mouth (2, 3, 4). Take your time, allowing your stomach to rise and fall slowly as you breathe in and out.
5. Pause at the end of each breath out until you are ready to take the next deep breath.
6. As you breathe in, say quietly to yourself, "I AM". As you breathe out, say to yourself "RELAXED".
7. Continue this slow, deep breathing for ten full breaths. Try closing your eyes and let your mind focus on a restful scene.
8. Take one more deep breath and stretch comfortable. Notice how relaxed you are.
9. Lie or sit comfortably for five minutes.

DAY 6

In order to be prepared for your quit day, you have been learning about your smoking habit. You became aware of your triggers. You've learned why you smoke and what your reasons for quitting are. All of which will help you to stop smoking.

Today you are going to continue to practice not smoking in certain situations. By being prepared for the tough situations (in the car, after a meal, waiting for the bus), you will have control and not smoke.

Below are some suggestions to use when an urge occurs.

20 WAYS TO LEAVE YOUR HABIT

1. Take a walk.
2. Change the order of your daily routine.
3. Eat in a new place.
4. Develop new telephone habits -- stand instead of sit, use your other hand, another phone.
5. Avoid people who smoke.
6. Read your horoscope.
7. Take a new route to school/work.
8. Leave the table when finished eating.
9. Take a nap.
10. Rinse with mouthwash/Brush your teeth.
11. Fix something around the house/apartment.
12. Take a warm bath or shower.
13. Spend more time in no smoking areas.
14. Start or finish a hobby.
15. Read a book/magazine.
16. Cut down on sugar, coffee, and alcohol.
17. Go to a movie with money saved from not smoking.
18. Work a puzzle.
19. Chew/suck on a pen, ice cream stick (without ice cream), lollipop, plastic cigarette.
20. Make confetti out of your junk mail.

ASSIGNMENT 1

Continue to practice replacing smoking with other activities.

ASSIGNMENT 2

With quit day being only 1 day away, it is important for you to be prepared for some of the reactions to quitting. Most women take about 3 to 5 days to get all the nicotine out of their blood. During this time, you may have some side effects. These side effects are not harmful and will go away. Try to think about the benefits to you and your baby and that the symptoms are a positive sign that your body is returning to its natural state.

Go to the next page for a listing of common recovery symptoms and what you can do about them.

COMMON RECOVERY SYMPTOMS

By knowing what your recovery symptoms are, you will be able to cope with them. Listed below are some common recovery symptoms to quitting along with some solutions to try when symptoms occur. If you experience other symptoms not given, write those down along with a solution for them. The better prepared you are, the easier it will be for you to quit.

SYMPTOMS	SOLUTIONS
Nervousness	Limit intake of caffeine
Irritable	Breathing exercise
Coughing	Warm tea
Sleepy	Take a nap
Restlessness	Exercise - walk
Tense	Deep breathing
Thirst	Drink lots of liquids
Headache	A warm bath
Sore throat	Take a hard candy

ADDITIONAL REACTIONS:	SOLUTIONS

END OF DAY 6

QUIT DAY

This is your quit day. Today is the day you begin to take charge of your smoking habit. You will be free from a habit you will learn to live better without.

The techniques you have learned in this manual will help you to stop smoking if you use them. With practice of these skills, you will become a non-smoker. Having support from friends, relatives, co-workers and your Buddy will help you to be successful. Please use them for support.

Remember that the longer you remain a non-smoker, the easier it will be. Everyday is easier. Keep in mind if you do start to smoke again, GO BACK TO THE SKILLS YOU'VE LEARNED IN THIS MANUAL. GET CONTROL OF THE SITUATION. You can take charge of your life and your health during pregnancy and after.

GIVE YOURSELF THE "I QUIT" AWARD IN YOUR FOLDER. PUT IT UP SOMEWHERE THAT YOU CAN SEE IT. SHOW IT TO FRIENDS.

Send in your completed DIARY and copy of your BUDDY CONTRACT TODAY with the stamped envelope provided, and you will receive a FREE Maintenance Manual. The Maintenance Manual is an extension of what you've read and practiced in "Your Guide To A Smokeless Pregnancy." It is specially made to help you through the early stages of being a non-smoker.

CONGRATULATIONS ON BEING A SUCCESSFUL QUITTER.

KEEP UP THE GOOD WORK!!!

AMERICAN LUNG ASSOCIATION — FREEDOM FROM SMOKING®

RECORDING AND RATING SHEET #2

No. Cigs.	Mood 1-5	TRIGGERS ACTIVITY	TRIGGERS MOOD/REASON	ALTERNATIVE COPING STRATEGIES CHOICE #1	CHOICE #2	CHOICE #3
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

AMERICAN LUNG ASSOCIATION — FREEDOM FROM SMOKING®

RECORDING AND RATING SHEET #2

No. Cigs.	Mood 1-5	TRIGGERS ACTIVITY	TRIGGERS MOOD/REASON	ALTERNATIVE COPING STRATEGIES CHOICE #1	CHOICE #2	CHOICE #3
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

AMERICAN LUNG ASSOCIATION — FREEDOM FROM SMOKING®

RECORDING AND RATING SHEET #2

No. Cigs.	Mood 1-5	TRIGGERS ACTIVITY	TRIGGERS MOOD/REASON	ALTERNATIVE COPING STRATEGIES CHOICE #1	CHOICE #2	CHOICE #3
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

STOP SMOKING CONTRACT

I _____ HEREBY PROMISE TO

STOP SMOKING BY COMPLETING THE 'SMOKING AND PREGNANCY

PROJECT' MANUAL.

I PROMISE TO START THIS PROJECT ON_____

AND QUIT SMOKING ON _____.

DATE:_____ SIGNED:_____

WITNESS:_____

BUDDY CONTRACT

I _____ AGREE TO HELP _____
Print Buddy's Name Print Your Name

STOP SMOKING BY _____ AND DURING THE REMAINING
Date

MONTHS OF HER PREGNANCY. I WILL HELP HER BY BEING SUPPORTIVE AND HELPFUL, AND ENCOURAGING IN HER ATTEMPT TO STOP.

SIGNED _____.
Buddy Signs

Countdown To Quit Day

☐ DAY 1 ☐ DAY 4

☐ DAY 2 ☐ DAY 5 ☐ QUIT DAY!

☐ DAY 3 ☐ DAY 6

Keep Original - Send Copy to the Health Dept.

I Quit!

Congratulations to

_____

for successfully completing the Smoking Cessation Program for Pregnant Women.

_____

_____

Awarded this _____ *day of* _____ *19* ___

APPENDIX F

Smoking and Pregnancy Project
Pretest

KENT COUNTY HEALTH DEPARTMENT

MICHIGAN STATE UNIVERSITY

SMOKING AND PREGNANCY PROJECT

SURVEY

FOR OFFICE USE ONLY				
1	2	3	4	5
6	7	8	9	10
11	12	13	1/14	15
16	17	18	19	20

This survey asks some questions about your own smoking habit, and your opinions and knowledge about smoking. Your answers are very important for the success of the health education program. The information you provide on the survey will be kept confidential. Your answers will have no effect on the services you receive through the WIC program or any other program of the Kent County Health Department.

DIRECTIONS: These questions concern several different aspects of your smoking and health history. Either write in the best answer that describes your own smoking or health history, or check off the one best response.

1. How old are you now?

   _____ years

   21 22

2. How old were you when you began to smoke?

   _____ years

   23 24

3. How many cigarettes do you smoke per DAY?

   a. BEFORE YOU WERE PREGNANT?

      _____ cigarettes per day

      25 26

   b. NOW?

      _____ cigarettes per day

      27 28

4. How many days last week did you smoke one or more cigarettes? (Check one.)

   _____ 1 day (1) _____ 5 days (5)

   _____ 2 days (2) _____ 6 days (6)

   _____ 3 days (3) _____ 7 days (7)

   _____ 4 days (4)

   29

5. Before finding out you were pregnant, how many times did you try to quit smoking? (Check one.)

   _____ never (1) _____ three times (4)

   _____ once (2) _____ four times (5)

   _____ twice (3) _____ five or more times (6)

   30

6. Have you tried to quit smoking since finding out you were pregnant?

   _____ yes (1) _____ no (2)

   31

7. How hard do you think it would be to stop smoking while you are pregnant?

_____ extremely hard to quit (5)

_____ very hard to quit (4)

_____ somewhat hard to quit (3)

_____ a little hard to quit (2)

_____ not hard to quit (1)

32

8. Did the doctor providing prenatal care for you advise you to stop smoking?

_____ Yes (1) _____ No (2)

33

9. How much would you like to quit smoking?

_____ extreme desire to quit (5)

_____ strong desire to quit (4)

_____ some desire to quit (3)

_____ small desire to quit (2)

_____ no desire to quit (1)

34

10. During what month of your current pregnancy did you begin receiving prenatal care? (Check one)

_____ 1st month (1) _____ 6th month (6)

_____ 2nd month (2) _____ 7th month (7)

_____ 3rd month (3) _____ 8th month (8)

_____ 4th month (4) _____ 9th month (9)

_____ 5th month (5)

35

DIRECTIONS: The next set of questions ask about your opinions concerning smoking, pregnancy, and health care. Please check off the one response that best reflects your feeling about each of the statements below.

1. By changing my actions, I can improve my health.

_____ Strongly Agree (7) _____Slightly Disagree (3)

_____ Somewhat Agree (6) _____Somewhat Disagree (2)

_____ Slightly Agree (5) _____Strongly Disagree (1)

_____ Neither (4)

36

2. When I smoke while pregnant, the baby receives some of the chemicals from the cigarette smoke.

_____ Strongly Agree (7) _____ Slightly Disagree (3)

_____ Somewhat Agree (6) _____ Somewhat Disagree (2)

_____ Slightly Agree (5) _____ Strongly Disagree (1)

_____ Neither (4)

37

3. It is safe to smoke during pregnancy.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

38

4. Doctors don't really know about the results of mother's smoking on the unborn child.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

39

5. The main thing which affects my health is what I do myself.

_____ Strongly Agree (7) _____Slightly Disagree (3)
_____ Somewhat Agree (6) _____Somewhat Disagree (2)
_____ Slightly Agree (5) _____Strongly Disagree (1)
_____ Neither (4)

40

6. Babies born to mothers who smoke heavily during pregnancy are more likely to die in the first few days or weeks of life.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

41

7. If a doctor or nurse tells me I need to change some of my habits, I always follow their advice.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

42

8. It is unhealthy for a pregnant women to smoke.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

43

9. If I stop smoking while I am pregnant, it will help my unborn child's health.

_____ Strongly Agree (7) _____ Slightly Disagree (3)

_____ Somewhat Agree (6) _____ Somewhat Disagree (2)

_____ Slightly Agree (5) _____ Strongly Disagree (1)

_____ Neither (4)

44

10. My health is something that is outside my control.

_____ Strongly Agree (7) _____ Slightly Disagree (3)

_____ Somewhat Agree (6) _____ Somewhat Disagree (2)

_____ Slightly Agree (5) _____ Strongly Disagree (1)

_____ Neither (4)

45

11. Babies born to mothers who smoke tend to be born before their due date.

_____ Strongly Agree (7) _____ Slightly Disagree (3)

_____ Somewhat Agree (6) _____ Somewhat Disagree (2)

_____ Slightly Agree (5) _____ Strongly Disagree (1)

_____ Neither (4)

46

12. Infants born to mothers who smoke have more health problems than other infants.

_____ Strongly Agree (7) _____ Slightly Disagree (3)

_____ Somewhat Agree (6) _____ Somewhat Disagree (2)

_____ Slightly Agree (5) _____ Strongly Disagree (1)

_____ Neither (4)

47

DIRECTIONS: These questions concern how much you know about the effects of smoking during pregnancy. Both TRUE OR FALSE questions, and MULTIPLE CHOICE questions are included. Please check off the one response that you think is the right answer for each question below.

1. Babies whose parents smoke have:

_____ A. an immunity to lung diseases

_____ B. a higher rate of lung and breathing diseases

_____ C. better health than babies whose parents don't smoke.

48

2. During pregnancy, nicotine from cigarettes:

_____ A. increases the blood flow to baby

_____ B. doesn't affect the baby at all

_____ C. decreases amount of oxygen and food to baby

49

3. Smoking increases the possibility of:

_____ A. miscarriage _____ C. birth defects

_____ B. premature birth _____ D. all of the above

50

4. Maternal smoking during and after pregnancy may have a long term effect on:

_____ A. the child's height and weight

_____ B. how smart the child is

_____ C. how the child behaves

_____ D. all of the above

51

5. A mother who smokes during pregnancy is more likely to deliver a baby that is:

_____ A. 6 - 8 ounces lighter

_____ B. of an average weight

_____ C. 6 - 8 ounces heavier

52

6. Cigarette smoking:

_____ A. causes the heart to beat faster

_____ B. causes the blood pressure to increase

_____ C. creates problems with the flow of blood and air to the lungs

_____ D. all of the above

53

7. A pregnant women who smokes:

_____ A. sends the bad gases from the smoke into the baby's body

_____ B. shouldn't be worried about harming her baby

_____ C. has a baby of average weight

_____ D. All of the above

54

8. If a woman stops smoking by the fourth month of pregnancy her risk of delivering a low birthweight baby is similar to that of a non-smoker.

_____ A. TRUE _____ B. FALSE

55

9. Children of parents who smoke:

_____ A. are more likely to smoke

_____ B. are as likely to smoke as children of non-smokers

_____ C. are less likely to smoke

56

10. Cutting down to only 2 or 3 cigarettes per day during pregnancy is just as good as stopping completely.

_____ A. TRUE _____ B. FALSE

57

THANK YOU VERY MUCH.

APPENDIX G

Smoking and Pregnancy Project
Postest

KENT COUNTY HEALTH DEPARTMENT

MICHIGAN STATE UNIVERSITY

SMOKING AND PREGNANCY PROJECT

FOLLOW-UP SURVEY

FOR OFFICE USE ONLY				
1	2	3	4	5
6	7	8	9	10
11	12	13	2 14	15
16	17	18	19	20

This survey asks some questions about your opinions and knowledge about smoking. It is a follow-up survey from your first WIC visit. Some of the questions will be the same as the first survey. Your answers are very important to our efforts in improving the health of mothers and infants in Kent County. The information you provide will be confidential. Thank you very much for participating in this health promotion program.

DIRECTIONS: These questions ask about different aspects of your smoking during and after pregnancy.

1. How many cigarettes do you smoke per DAY?

   a. DURING THE LAST MONTH OF YOUR PREGNANCY?

   _____ cigarettes per day

   21 22

   b. NOW?

   _____ cigarettes per day

   23 24

2. How many days last week did you smoke one or more cigarettes?

   ___1 day (1)
   ___2 days (2)
   ___3 days (3)
   ___4 days (4)
   ___5 days (5)
   ___6 days (6)
   ___7 days (7)

   25

3. What statement below best describes your smoking pattern? (Check only one.)

   ____ I did not change my smoking habits during pregnancy. (1)

   26

   ____ I cut down on my smoking while I was pregnant, but now I smoke as much as I did before I was pregnant. (2)

   ____ I cut down on my smoking while I was pregnant; Now, I still smoke less than I did before I was pregnant. (3)

   ____ I quit smoking during my pregnancy, but returned to smoking following delivery of my baby. (4)

   ____ I quit smoking during my pregnancy, and have not smoked since then. (5)

4. How hard was it to try to quit smoking?

   ___extremely hard to quit (5)
   ___very hard to quit (4)
   ___somewhat hard to quit (3)
   ___a little hard to quit (2)
   ___not hard to quit (1)
   ___I did not try to quit (9)

   27

5. How many prenatal care visits did you have during your pregnancy?

____none (0)
____one visit (1)
____two visits (2)
____three visits (3)
____four visits (4)
____five visits (5)
____six visits (6)
____seven visits (7)
____eight visits (8)
____nine visits (9)
____ten visits (10)
____eleven visits (11)
____twelve visits (12)
____thirteen visits (13)
____fourteen visits (14)
____fifteen or more visits (15)
HOW MANY? _____

28 29

6. How many times did you try to quit smoking during your pregnancy?

____none (0)
____once (1)
____twice (2)
____three times (3)
____four times (4)
____five times (5)
____six or more times (6)
HOW MANY? _____

30 31

DIRECTIONS: The next set of questions ask about your opinions concerning smoking, pregnancy, and health care. Please check off the one response that best reflects your feeling about each of the statements below.

1. By changing my actions, I can improve my health.

_____ Strongly Agree (7)
_____ Somewhat Agree (6)
_____ Slightly Agree (5)
_____ Neither (4)
_____ Slightly Disagree (3)
_____ Somewhat Disagree (2)
_____ Strongly Disagree (1)

36

2. When I smoke while pregnant, the baby receives some of the chemicals from the cigarette smoke.

_____ Strongly Agree (7)
_____ Somewhat Agree (6)
_____ Slightly Agree (5)
_____ Neither (4)
_____ Slightly Disagree (3)
_____ Somewhat Disagree (2)
_____ Strongly Disagree (1)

37

3. It is safe to smoke during pregnancy.

_____ Strongly Agree (7)
_____ Somewhat Agree (6)
_____ Slightly Agree (5)
_____ Neither (4)
_____ Slightly Disagree (3)
_____ Somewhat Disagree (2)
_____ Strongly Disagree (1)

38

4. Doctors don't really know about the results of mother's smoking on the unborn child.

_____ Strongly Agree (7)
_____ Somewhat Agree (6)
_____ Slightly Agree (5)
_____ Neither (4)
_____ Slightly Disagree (3)
_____ Somewhat Disagree (2)
_____ Strongly Disagree (1)

39

5. The main thing which affects my health is what I do myself.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

40

6. Babies born to mothers who smoke heavily during pregnancy are more likely to die in the first few days or weeks of life.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

41

7. If a doctor or nurse tells me I need to change some of my habits, I always follow their advice.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

42

8. It is unhealthy for a pregnant women to smoke.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

43

9. If I stop smoking while I am pregnant, it will help my unborn child's health.

_____ Strongly Agree (7) _____ Slightly Disagree (3)
_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
_____ Slightly Agree (5) _____ Strongly Disagree (1)
_____ Neither (4)

44

10. My health is something that is outside my control.

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_____ Somewhat Agree (6) _____ Somewhat Disagree (2)
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45

11. Babies born to mothers who smoke tend to be born before their due date.

_____ Strongly Agree (7) _____ Slightly Disagree (3)

_____ Somewhat Agree (6) _____ Somewhat Disagree (2)

_____ Slightly Agree (5) _____ Strongly Disagree (1)

_____ Neither (4)

46

12. Infants born to mothers who smoke have more health problems than other infants.

_____ Strongly Agree (7) _____ Slightly Disagree (3)

_____ Somewhat Agree (6) _____ Somewhat Disagree (2)

_____ Slightly Agree (5) _____ Strongly Disagree (1)

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47

DIRECTIONS: These questions concern how much you know about the effects of smoking during pregnancy. Both TRUE OR FALSE questions, and MULTIPLE CHOICE questions are included. Please check off the one response that you think is the right answer for each question below.

1. Babies whose parents smoke have:

_____ A. an immunity to lung diseases

_____ B. a higher rate of lung and breathing diseases

_____ C. better health than babies whose parents don't smoke.

48

2. During pregnancy, nicotine from cigarettes:

_____ A. increases the blood flow to baby

_____ B. doesn't affect the baby at all

_____ C. decreases amount of oxygen and food to baby

49

3. Smoking increases the possibility of:

_____ A. miscarriage _____ C. birth defects

_____ B. premature birth _____ D. all of the above

50

4. Maternal smoking during and after pregnancy may have a long term effect on:

_____ A. the child's height and weight

_____ B. how smart the child is

_____ C. how the child behaves

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51

5. A mother who smokes during pregnancy is more likely to deliver a baby that is:

_____ A. 6 - 8 ounces lighter

_____ B. of an average weight

_____ C. 6 - 8 ounces heavier

52

6. Cigarette smoking:

_____ A. causes the heart to beat faster

_____ B. causes the blood pressure to increase

_____ C. creates problems with the flow of blood and air to the lungs

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53

7. A pregnant women who smokes:

_____ A. sends the bad gases from the smoke into the baby's body

_____ B. shouldn't be worried about harming her baby

_____ C. has a baby of average weight

_____ D. All of the above

54

8. If a woman stops smoking by the fourth month of pregnancy her risk of delivering a low birthweight baby is similar to that of a non-smoker.

_____ A. TRUE _____ B. FALSE

55

9. Children of parents who smoke:

_____ A. are more likely to smoke

_____ B. are as likely to smoke as children of non-smokers

_____ C. are less likely to smoke

56

10. Cutting down to only 2 or 3 cigarettes per day during pregnancy is just as good as stopping completely.

_____ A. TRUE _____ B. FALSE

57

DIRECTIONS: These two questions concern the smoking and pregnancy information you received during your first WIC visit.

1. What was the most helpful thing about the Smoking and Pregnancy Project?

_____

_____

58 59

2. What was the least helpful thing about the smoking and Pregnancy Project?

_____

_____

60 61

THANK YOU VERY MUCH.

APPENDIX H

Format for Coding Data From Program Records

KENT COUNTY HEALTH DEPARTMENT

MICHIGAN STATE UNIVERSITY

Smoking Cessation to Prevent
Low Birthweight Project

ARCHIVAL CODING FORMAT

---

1. Participant Identification Number:

___ ___ ___ ___ - ___ ___ ___ ___ ___
1 2 3 4 5 6 7 8 9

[Columns 10 - 13 = BLANK]

2. Card Number: 3
14

A. Demographics

3. Race: ___
15

4. Date of birth

___ ___ / ___ ___ / ___ ___
16 17 18 19 20 21

5. Income:

___ ___ ___ ___ ___
22 23 24 25 26

6. Size of economic unit:

___ ___
27 28

B. Health History and Status

7. WIC Risk Categories:

   1. ___ ___ ___ (29 30 31)
   2. ___ ___ ___ (32 33 34)
   3. ___ ___ ___ (35 36 37)
   4. ___ ___ ___ (38 39 40)
   5. ___ ___ ___ (41 42 43)

8. First Visit to Agency for Application

   ___ ___ / ___ ___ / ___ ___ (44 45 / 46 47 / 48 49)

9. Medicaid Status: ___ (50)

10. Delivery date (actual):

    ___ ___ / ___ ___ / ___ ___ (51 52 / 53 54 / 55 56)

11. Previous Pregnancies (don't include the current WIC pregnancy during which intervention occurred):

    ___ ___ (57 58)

12. Pregravid weight:

    ___ ___ ___ (59 60 61)

13. Weeks of gestation (enter weeks gestation when WIC enrollment occurred):

    ___ ___ (62 63)

14. Infant status: ____
64

15. Gestation age (enter weeks gestation at birth):

65 66

16. Birth length:

67 68 69 70

[Go to next record]

17. Repeat Participant Identification Number (should be identical to item number 1):

1 2 3 4 - 5 6 7 8 9

[Columns 10 - 13 = BLANK]

18. Card Number : 4
14

19. Birthweight

15 16 17 18

Pounds Ounces

20. Present Head Circumference

19 20 21 22

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