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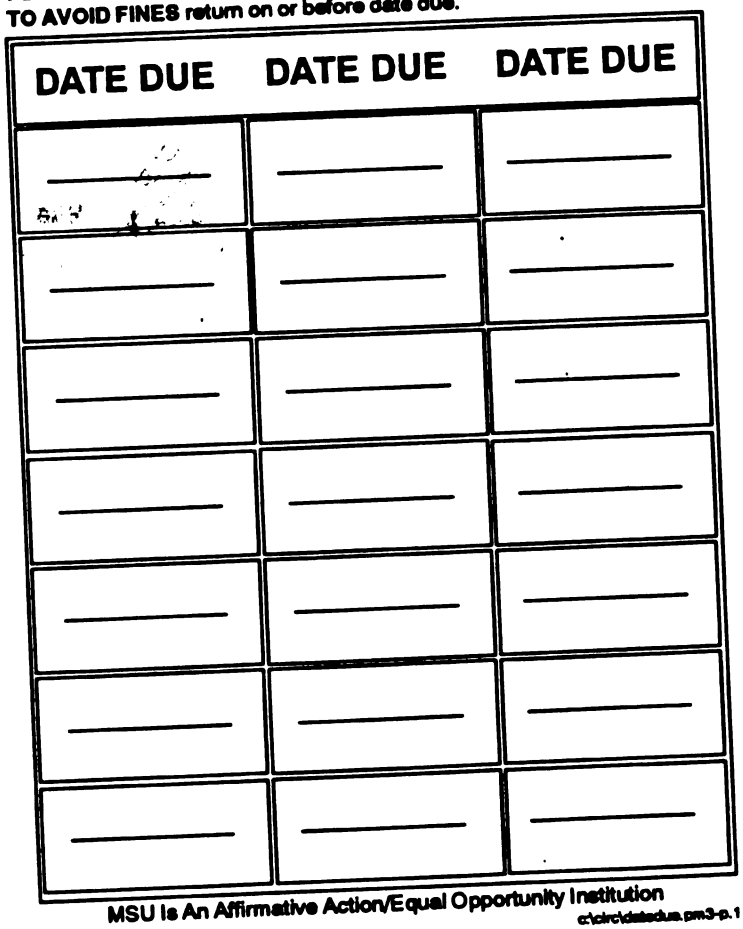

SMOKING, ADVICE TO QUIT, AND SOCIOECONOMIC STATUS -- THE CASE OF PREGNANT WOMEN IN U.S., 1990

By

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ABSTRACT

SMOKING, ADVICE TO QUIT, AND SOCIOECONOMIC STATUS -- THE CASE OF PREGNANT WOMEN 1N U.S., 1990

By

Chiungyu Cheng

This thesis discuss three questions. First, why do some women continue smoking after they learned that they are pregnant, but others stop? Second, would pregnant women comply with the advice to quit smoking from doctors? And third, why do some women continue smoking after they learned that they are pregnant, but others stop? Three hypotheses were built. The three factors -- doctor's advice to stop smoking, socioeconomic status, and amount smoked per day before pregnancy -- were assumed to be important predictors of pregnant women's smoking behavior.

The data is from "National Health Interview Survey, 1990: Health Promotion and Disease Prevention (HPDP) Pregnancy and Smoking Supplement". All hypotheses were tested by ordinary least squares regression.

The results indicate that socioeconomic status is not an important factor to predict whether a pregnant woman receive doctor's advice to stop smoking or not. The most important factor to predict whether a pregnant woman receive advice to quit is the amount she smoked per day before pregnancy. Moreover, socioeconomic status and doctor's advice to quit smoking do not impact pregnant women's smoking behavior strongly.

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TABLE OF CONTENTS

LIST OF TABLES (cont'd).

I. LITERATURE REVIEW AND PROBLEM STATEMENT

It has been well accepted that maternal smoking is hazardous to the fetus. Many reports have documented that the increased frequency of spontaneous abortion, placentae previa, abruptio placentae, premature and prolonged rupture of membranes and low birthweight which are caused by maternal smoking. (*Smoking and Health*, 1990; Kleinmann, Pierre, Madans, Land, & Schramm, 1988; Stein, Kline, Levin, Susser, & Warburton, 1980). In 1957, Simpson and Lomal have found that smoking may increase the risk of low-weight babies (<2500 g), and this hypothesis has been well supported by a lot of following studies (Lumley & Astbury, 1989). Recent studies show that smoking increases the risk of late fetal and early neonatal death (Haglund & Cnattingius, 1990; Cnattingius, Haglund, & Meirik, 1988). Moreover, some researches have found that smoking may increase the risk of retarded learning and childhood cancer (John, Savitz, & Sandler, 1991; Naeye &

some researches have found that smoking may increase the risk of retarded learning and childhood cancer (John, Savitz, & Sandler, 1991; Naeye & Peters, 1984). In sum, it is obvious that maternal smoking will seriously harm the health of fetus and newborns.

Although it has been proven that smoking will cause negative health consequences to the fetus, many pregnant women still smoke. For example, in Norway, 35percent of women smokers continue to smoke after their first trimester (Peen et al., 1991); in America, over 60 percent of women smokers continue to smoke during their pregnancy (*National Health Interview Survey*, 1990). The main purpose of this paper is to discuss the question: why do some women continue smoking after they learn that they are pregnant, but others stop?

A possible reason a woman continues to smoke during pregnancy is that she didn't get advice to stop smoking from any medical professional. Although the efficacy of physicians' advice to quit smoking has varied, most studies have shown that physicians' encouragement of smoking cessation can increase the patients' intention to stopping smoking (Glynn, 1990; Ockene, 1991; Commings et al., 1989; Pederson, 1982). For example, the 1979 Surgeon General's report on smoking and health found that 10 percent to 25

percent of smokers who were advised to quit smoking by doctors may quit or reduce the amount they smoke (*Smoking and Health,* 1979). However, many studies indicate that most smokers didn't get advice to quit smoking from their doctors. In 1975, a study found that only 35 percent of male smokers and 38 percent of female smokers have ever been cautioned to stopping smoking by their physicians (*Adult Use of Tobacco, 1975*). A 1980/1983 study found that only 42 percent male smokers and 46 percent female smokers had received advice to quit from physicians (Anda et al., 1987). Moreover, a recent 10 year study about smoking cessation carried out by the Stanford Center for Research in Disease Prevention found that among 2710 smokers, fewer than 50 percent said that their physicians ever advised them to stop (Hafferty & Salloway, 1994). According to 1990 National Health Interview Survey, among the 2776 female smokers who were currently pregnant or had a child in the past five years, only 49 percent people reported that doctors had ever advised them to stop smoking. (National Health Interview Survey, 1990).

Some studies also indicated that even though smokers have more doctor visits, most of them still didn't get advice to quit smoking from doctors. For example, Anda et al. (1987) found that only 46 percent of the smokers who reported having a routine checkup with a physician in the last

year reported having been told to quit, and only 53 percent of smokers who had ten or more physician contacts in the last year had been told to. Similarly, a 1993 report found that among the persons with four or more doctor visits in a year, only 45.5 percent of them got advised to quit smoking from doctors (Epidemiology Br., 1993). Moreover, in the 1990 National Health Interview Survey, only 64 percent of pregnant smokers who had ten or more doctor visits in past 12 months reported that they had ever been advised to quit smoking by doctors (National Health Interview Survey, 1990).

There are two interesting questions. First, for the women who have already received advice to stop smoking, did they comply with doctors? Second, why do some smokers get advised to quit smoking from doctors, but others don't?

Some perspectives from Health Belief Model have been used to explain patient compliance (Becker, 1974). Becker claimed that although a person recognizes personal susceptibility, he/she does not take any action unless he/she also believes that becoming ill would cause serious organic and social repercussions (Becker, 1974). One thing should be emphasized here is that, susceptibility refers to the person's subjective perceptions rather than to

medical estimate of how serious the illness may be. Many studies have proven that there is no association between medical views of the problems severity and patient compliance (Pragoff, 1962; MacDonald, Hagberg, Grossman, 1963; Johannsen, Hellmuth, Sorauf, 1966; Charney et al, 1967; Davis, 1968; Bonnar, Goldberg, Smith, 1969; Becker, 1974).

The pattern of communication between physicians and patients would also influence patient compliance. Davis noted that "patterns of communication which deviate from the normative doctor-patient relationship will be associated with patients' failure to comply with doctors' advice" (Davis, 1968). Such deviation includes that the physician is formal, rejecting, controlling, disagrees completely with the patients, or interviews the patient without feedback (Becker, 1974). Some studies reported that patients compliances are better when they are satisfied with intial contact, perceives the physician as friendly, and feels that the doctor understand the complaint (Francis, Korsch & Morris, 1969; Korsch, Gozzi, & Francis, 1968).

SOCIOECONOMIC STATUS AND HEALTH

Toward the second question, some studies have found that heavier smokers were more likely to get advice to quit smoking than lighter smokers (Anda et al., 1987; Frank, Winkleby, Altman, Rockhill, & Fortmann, 1991). It seems that physicians will refer to the patient's smoking history to decide whether to give the patient quitting advice or not. However, there are very few studies dealing with this question from the view of social structure.

Many studies have indicated that socioeconomic status has strong association with health status and health behavior (I will discuss this in next part). In this paper, I would like to see if socioeconomic status is an important predictor to explain the two questions I mentioned above.

Socioeconomic status (SES) describes the position of a person in society. Social stratification is the assignment of persons into different positions in the social structure, and is the unequal distribution of social resources. Desirable social resources are usually owned by people in higher SES. Generally, the unequal distribution of social resources makes people in different SES have different living circumstances ,life style, and behavior. As Green wrote,

> conceptually, an index of socioeconomic status is intended to reflect the balance or net effect of social, environmental, situational, educational,financial, and other forces in the individual's personal world. (Green, 1971, p.54)

Education, income, and occupation are three major indicators to measure SES (Liberatos Link, and Kelsey, 1988; Mueller, 1981; Hollingshead, 1971; Green, 1970; Duncan, 1961).

Many studies have found the association between SES and health. SES could reflect somewhat different individual and social forces associated with health and disease. For example,

> income reflects spending power, housing, diet, and medical care; occupation measures prestige, responsibility, physical activity, and work exposures; and education indicates skills requisite for acquiring positive social psychological, and economic resources. (Winkleby, 1992, p.186)

Generally, many health problems are related to some factors that differ by SES, such as persons' life-style (such as smoking, exercise, or diet), degree of compliance with advice of medical professionals, knowledge about health, and ability to access medical care.

Among the three SES indicators, education is the best predictor of health status (Winkleby et al., 1992; Funchs, 1979; Kitagawa and Hauser, 1973). Winkleby et al said that compared to income and occupation, education has more influence on health since it may protect against disease or risk-health behavior by influencing life-style behaviors (such as smoking,

exercise, and diet), problem-solving abilities, and values (Liberatos, Link, & Kelsey, 1988).

Some other studies concluded that education is a good predictor of health behavior because more educated persons are more aware of health risks and more likely to change their behavior to reduce health risks (Fuchs, 1979; Grossman, 1976; Rosenstock, 1975)[1]. Moreover, persons with higher education level are more attentive to health information and more trusting of the claims of science (Lefcowitz, 1973).

One explanation for the SES-health gradient is that persons in lower SES have fewer opportunities to access medical service (Wan and Gray, 1978). However, Adler et al. (1993) found that even if individuals have equal opportunities to access medical services, true access may still differ among persons in different SES. The reason is that "individuals with more education and income, who may be more skilled in dealing with bureaucracies and social systems, may be more efficient in determining who provides the best care and in obtaining care when needed". Moreover, many studies have

[1] Some studies found that for women, education has strong effect on their health status, but for men, income is the most important predictor (Fuchs, 1979; Kitagawa and Hauser, 1973). A 1988 study indicates that poor pregnant women are less likely to receive prenatal care than the nonpoor (Nersesian, 1988). Compared to education and income, occupation has relatively little effect on health status (Coburn and Pore, 1974).

indicated that persons in higher SES receive better medical care than persons in lower SES (Duff and Hollingshead, 1968; Brotheston, 1976).

The characteristics of the health care system (Rundall and Wheeler,1979) and people's attitude toward health and health care (Suchman,1965) are also causes of unequal use of medical care. Medical services are for middle-class in origin (McKinlay, 1975). Its culture is middle-class culture. As Adler et al. (1993) said "Health promotion programs and physician recommendations are frequently designed with upper-individuals (higher SES individuals) in mind". Persons in the lower-SES feel that their interaction with the medical system is a dehumanizing experience (Rundall and Wheeler, 1979). Therefore, elimination of financial barriers cannot really resolve disparities in health care (Williams, 1990) Patients' social background should also be considered to resolve the disparities. As Alder et al suggested, physicians should pay attention to patients' background when they give health advice. He said,

> physicians need to recognize not only the importance of discussing risk behavior increases with patients who are lower on the SES ladder, but also that recommendations need to be tailored to the patient's life circumstance. (Alder et al., 1993, p.3144)

SMOKING AND SES

Some smoking studies attempted to find the relationship between smoking behavior and SES. Some studies found that persons in lower SES are more likely to smoke (Alder et al., 1993). A study by Mattews et al. (1989) have found that the prevalence of smoking ranged from 45 percent of those with less than a high school education to 19 percent of those with an advanced degree. Winkleby et al. (1990) found that smoking has a negative strong association with years of education. Brownson et al. (1992) found knowledge about the health effects of smoking is lower among less-educated people. Besides these personal factors, there are rare studies dealing with the relationships between quitting behavior and SES. When the smokers meet the situation that something (such as their babies) may be hurt by their smoking behaviors, will they stop smoking? How does socioeconomic status impact on their behavior? In this paper, I will also discuss this question.

Besides SES, some studies also indicated that heavy smokers have more difficulties to quit smoking. For example, some studies found that high daily cigarettes consumption is related to difficulty to quit smoking (Coambs & Kozlowski, 1989; Cherry & Kiernen, 1976). Similarly, heavy smokers are

less likely to quit smoking even if they participate in smoking cessation programs (Coambs & Kozlowski, 1989; Kozlowski, 1979).

THE PURPOSE OF THIS PAPER

The purpose of this paper is to discuss the questions mentioned above. First, why do some persons get advice to quit smoking from doctors, but others don't ? Second, would pregnant women comply with the advice to quit smoking from doctors? And third, why do some women continue smoking after they learned that they are pregnant, but others stop? Based on the above discussions, three sets of hypotheses are developed to answer the two questions.

Because many studies have found that only education and income have significantly effect on health behaviors, in this paper, I would use education and income as two SES indicators. Occupation wouldn't be concerned here.

II. HYPOTHESES

Hypothesis One:

Assuming that other things being equal:

Because use of medical service is unequal among people in different socioeconomic status (based on the above discussions),

1-A) pregnant women with higher education level and with more family income are more likely to get advice to quit smoking from doctors, than women with lower education level and with less family income.

Because heavier smokers are more likely to get advice to quit smoking than lighter smokers (based on the above discussions),

1-B) pregnant women who smoke more cigarettes per day are more likely to get advice to quit smoking from doctors than women who smoke fewer cigarettes per day.

Hypothesis Two:

Assuming that other things being equal:

Because people in higher SES are more aware of health risks, and more likely to change their behavior to reduce health risks (based on the above discussion) ,

2-A) women with higher education level and with more family income are more likely to stop smoking during their pregnancy than women with lower education level and with less family income.

Because that physicians' encouragement of smoking cessation can increase the patients' intention to stop smoking (based on the above discussions),

2-B) women who are advised to quit smoking by doctors, are more likely to stop smoking during their pregnancy than women who are not advised to quit smoking by doctors.

Because heavy smokers have more difficulty quitting (based on the above discussions),

2-C) women who smoked fewer cigarettes per day before learning of their pregnancy are more likely to stop smoking during their pregnancy than women who smoked more cigarettes per day.

Hypothesis Three:

Hypothesis three is very similar to hypothesis two. Hypothesis two predicts that some factors could influence pregnant smokers to ***continue*** or ***stop*** smoking after they learned that they were pregnant. However, in hypothesis three, the concern focuses on this: although some smokers continue smoking after they learned that they are pregnant, the ***amount*** they smoked may still be influenced by the factors mentioned in hypothesis two. As with hypotheses one and two, this set of hypotheses also assume that other things are equal.

Because people in higher SES are more aware of health risks, and more likely to change their behavior to reduce health risks (based on the above discussions),

3-A) women with higher education level, and with more family income would smoke fewer cigarettes during pregnancy than women with lower education level and with less family income.

Because that physicians' encouragement of smoking cessation can increase the patients' intention to stopping smoking (based on the above discussions),

3-B) women who are advised to quit smoking by doctors would smoke fewer cigarettes during pregnancy than women who are not advised to quit smoking by doctors.

Because heavy smokers have more difficulty with quitting (based on the above discussions),

3-C) women who used to smoke more cigarettes per day before learning of pregnancy would smoke more cigarettes during their pregnancy than women who used to smoke fewer cigarettes per day.

III. METHOD

The data used for testing above hypotheses is from *"National Health Interview Survey, 1990: Health Promotion and Disease Prevention (HPDP) Pregnancy and Smoking Supplement"* (*National Health Interview Survey, 1990*). The original collector of the data is ICPSR, Inter-University Consortium for Political and Social Research.

The universe of the National Health Interview Survey (NHIS) is the civilian, noninstitutionalized population of the 50 states and the District of Columbia. The sampling method is a multistage probability sampling design. Four independent representative samples, which may be used in any combination, were drawn. Black persons were oversampled.

The sample of this survey is every woman who is 18-44 years old and was included in the NHIS (total=25,839). Smoking questions were asked of

women who had a live-born child in past five years or were currently pregnant (total=7477). The response rate for the pregnancy and smoking supplement of the NHIS was 89.6 percent (household response rate from NHIS, 95.5% multiplied by the Supplement response rate, 92.8%).

The final basic weight is included on the data file for accurate population estimate. However, instead of the final basic weight, all analyses in this paper are weighted by the modified weights to avoid incorrect significance results. The analyses weighted by the original final basic weight would appear to have much more cases than the sample size does. Due to the inflation of cases, the impact of an independent variable on a dependent variable may look very significant even though the standard partial regression coefficient is near to zero. In order to avoid this problem, modified weights are used in this paper. The formula of calculating the modified weights is : the modified weight=the final basic weight × (the sample size/the sum of the final basic weight). The sum of the modified weight is equal to the sample size. Therefore, the problem of the inflation of sample size would not occur. The results of the analyses without weights are listed in Appendix A.

The subsample for testing hypothesis one in this paper is women who were currently pregnant or had child in the past five years, and had ever

smoked 100 cigarettes in their entire lives. The size of the subsample is 2,755. For hypotheses two and three, only the women who had live-born child in the past five years and smoked during the 12 months prior to birth were considered. The number of cases discussed in hypothesis two is 1645 and for hypothesis three is 1500. The women who were currently pregnant are excluded when testing hypothesis two and three. The reason is because they are not appropriate for testing hypotheses two and three. Hypotheses two and three predicted smoking behavior of pregnant women during their pregnancy, but the answers of the women who were currently pregnant when they were interviewed cannot represent their smoking behavior during the whole period of pregnancy.

All hypotheses were tested by ordinary least squares (OLS) regression. Actually, for hypotheses one and two, the dependent variable is dichotomous. Therefore, OLS regression is not appropriate and other techniques such as logistic regression are more appropriate. I have, however, used OLS regression for two reasons. First, my statistics training has not included any of these other techniques. Second, when the two categories of the dependent variable are divided almost equally, the conclusions to be drawn from OLS are virtually the same as from logistic regression (Gillespie, 1977), and the

dependent variables of hypothesis one (advice) was divided into two almost exactly equal categories. For hypothesis two, 63% is in one category, and 37% in the other. The two categories are close enough to use OLS instead of other techniques (refer to table one).

The explanation of the variables used in this paper is listed in Table 1.

Table 1: Variables List
(In parentheses is the condition that had to be met for the question to be asked)

Name of Variables	Items and Codes	frequencies
ADVICE	Doctor Ever Advised Quitting Smoking (Currently pregnant or had child in past 5 years and ever smoked)	
	0. No	1395(51%)
	1. Yes	1360(49%)
	Non-missing total	2755(100%)
SMOKE DURING PREG	Smoked During Most of Pregnancy (Had child in past five years and smoked during the 12 months prior to birth)	
	0. No*	1031(63%)
	1. Yes	614(37%)
	Non-missing total	1645(100%)
SMOKE AFTER LEARN	Amount Smoked After Learning of Pregnancy (Had child in past 5 years and smoked during the 12 months prior to birth)	
	00. less than one cigarette	377(25%)
	01-14. 1-14 cigarettes	701(47%)
	15-24. 15-24 cigarettes	330(22%)
	25-60. 25-60 cigarettes	92(06%)
	61+ more than 60 cigarettes	0(00%)
	Non-missing total	1500(100%)
	Mean=9.393	
	Standard Deviation=9.412	

* "No" was imputed for women who quit smoking after learning of the pregnancy.

Table 1 (cont'd)

EDUCATION	Education of Individual-completed years		
	00. Never attended; Kindergarten only		0(00%)
	01-11. Grades 1-11		597(22%)
	12. Grade 12		1306(47%)
	College:		
	13. 1 year		228(8%)
	14. 2 years		230(8%)
	15. 3 years		91(3%)
	16. 4 years		212(8%)
	17. 5 years		29(1%)
	18. 6 years or more		79(3%)
		Non-missing total	2772(100%)
		Mean=12.335	
		Standard Deviation=2.242	

INCOME	Family Income	
	0.5 Less than $1000	23(1%)
	1.5 $1000 - $1999	28(1%)
	2.5 2000 - 2999	34(1%)
	3.5 3000 - 3999	47(2%)
	4.5 4000 - 4999	64(3%)
	5.5 5000 - 5999	41(2%)
	6.5 6000 - 6999	49(2%)
	7.5 7000 - 7999	46(2%)
	8.5 8000 - 8999	42(2%)
	9.5 9000 - 9999	49(2%)
	10.5 10000 - 10999	62(2%)
	11.5 11000 - 11999	38(2%)
	12.5 12000 - 12999	77(3%)

Table 1 (cont'd)

13.5	13000 - 13999	44(2%)
14.5	14000 - 14999	39(2%)
15.5	15000 - 15999	50(2%)
16.5	16000 - 16999	58(2%)
17.5	17000 - 17999	50(2%)
18.5	18000 - 18999	61(2%)
19.5	19000 - 19999	71(3%)
22.5	20000 - 24999	229(9%)
27.5	25000 - 29999	232(9%)
32.5	30000 - 34999	214(9%)
37.5	35000 - 39999	167(7%)
42.5	40000 - 44999	152(6%)
47.5	45000 - 49999	116(5%)
60.0	50000 and over	410(16%)
	Non-missing Total	2493(101%)

Mean=28.862
Median=27.5
Standard Deviation=18.299

AMOUNT SMOKED PER DAY BEFORE PREGNANCY	Number of Cigarettes Smoked Per Day (Ever smoked 100 regularly)	
	00. Less than 1 cigarettes	54(2%)
	01-14. 1-14 cigarettes	1346(49%)
	15-24. 15-24 cigarettes	1028(38%)
	24-60. 24-60 cigarettes	293(11%)
	61-90. 61-90 cigarettes	2(0%)
	91+ more than 90 cigarettes	0(0%)
	Non-missing total	2723(100%)

Mean=14.593
Standard Deviation=7.336

Source:from codebook of "National Health Interview Survey, 1990: Health Promotion and Disease Prevention (HPDP) Pregnancy and Smoking Supplement"

IV. RESULTS

Table 2: Zero-order Correlations of Education, Income, Amount Smoked Per Day Before Pregnancy, Smoked During Pregnancy, Amount Smoked after Learning of Pregnancy, and Receiving Advice to Stop Smoking

	Education	Income	Amount Smoked Per Day Before Pregnancy	Smoked During Pregnancy	Amount Smoked after Learning Pregnancy	Receiving Advice to Stop Smoking
Education						
Income	.3901***					
Amount Smoked Per Day Before Pregnancy	-.0325	.0197				
Smoked During Pregnancy	-.1285***	-.1178***	.3290***			
Amount Smoked after Learning Pregnancy	-.1394***	-.0857***	.5905***	.5736***		
Receiving Advice to Stop Smoking	-.0105	.0198	.2198***	.2896***	.2107***	

Sample Size=2755 ** P<0.01 *** P<0.001

According to the above discussions, persons in lower SES are more likely to smoke. But the findings in Table 2 indicate that the relationships between SES (education and income) and smoking behavior (amount smoked per day before pregnancy, smoked during pregnancy, and amount smoked after learning of pregnancy) are all weak and negative (besides the relationship of income and amount smoked per day before pregnancy). And, as mentioned above, heavy smokers have more difficulty quitting. This idea is supported by the findings in Table 2. According to Table 2, the relationships between amount smoked per day before pregnancy and those variables, smoked during pregnancy, amount smoked after learning of pregnancy are all positive and quite strong. Moreover, the relationship between education and receiving advice to stop smoking is negative and very weak. The relationship between income and receiving advice to quit is positive and weak. Receiving advice to stop smoking has positive relationships smoking variables (amount smoked per day before pregnancy, smoked during pregnancy, and amount smoked after learning of pregnancy).

Hypothesis One

Table 3: Effects and Significance of Amount Smoked per Day Before Pregnancy, Education and Income on Receiving Advice to Stop Smoking

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Amount Smoked Per Day Before Pregnancy	.2185	.2202	.0000
Education	-.0905	-.0842	.0000
Income	-.0597	-.0558	.0059

Note: 1. Receiving Advice to Stop Smoking is coded 1, and not receiving it is coded 0.
2. Multiple Regression Analysis
3. Sample Size=2755

Hypothesis 1-A

Hypothesis 1-A is not supported by the results (please see Table 3). Opposite to the prediction that when the other variables are equal, pregnant women with higher education level and with more family income are more likely to get advice to quit smoking by doctors, the results indicate that pregnant women with lower education level and with lower family income are significantly more likely to be advised by their doctors to quit smoking.

However, the impacts of both education and income on receiving advice are quite weak.

Hypothesis 1-B

Hypothesis 1-B is supported by the findings (see Table 3). When the other variables are equal, pregnant women who used to smoke more cigarettes per day are significantly more likely to be advised to quit smoking by doctors.

Hypothesis Two

Table 4: Effects and Significance of Education, Income, Advice, and Amount Smoked Per Day Before Pregnancy on Continuing Smoking During Pregnancy

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.0856	-.0864	.0010
Income	-.1030	-.1039	.0001
Advice	.2414	.2522	.0000
Amount Smoked Per Day Before Pregnancy	.2691	.2788	.0000

Note: 1. Continuing Smoking During Most Pregnancy is coded 1. Stop Smoking During Most Pregnancy is coded 0.
2. Multiple Regression Analysis
3. Sample Size=1645

Hypothesis 2-A

Hypothesis 2-A is supported by the results (see Table 4). The results indicate that when the other variables are equal, education and income have negative relations with continuing to smoke during pregnancy. That is, women with high education level and with more family income are significantly less likely to continue smoking after they learn that they are pregnant when the other variables are equal. However, the impact of both education and income on continuing smoking after learning of pregnancy are very weak.

Hypothesis 2-B

Hypothesis 2-B is not supported by the results. According to Table 4, receiving quitting advice has positive relationship with continuing smoking during pregnancy. That is, when the other variables are equal, pregnant women who are advised to quit smoking by doctors are significantly more likely to continue smoking during their pregnancy than are those who aren't advised to stop.

Hypothesis 2-C

Hypothesis 2-C is supported by the results. According to Table 4, when the other variables are equal, the more cigarettes a pregnant woman

used to smoke per day before pregnancy, the higher the possibility that she continues to smoke during her pregnancy.

Hypothesis Three

Table 5: Effects and Significance of Education, Income, Receiving Advice to Stop Smoking and Amount Smoked Per Day Before Pregnancy on Amount Smoked after Learning of Pregnancy

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.0973	-.1125	.0000
Income	-.0601	-.0698	.0109
Advice	.0854	.1046	.0001
Amount Smoked Per Day Before Pregnancy	.5700	.5743	.0000

Note:1.Amount Smoked after Learning of Pregnancy is coded by the numbers of cigarettes
pregnant women smoked after learning of pregnancy (0 to 95)
2. Multiple Regression Analysis
3. Sample Size=1500

Hypothesis 3-A

Hypothesis 3-A is supported by the results. According to Table 5, when the other variables are equal, women with higher education level and with more family income would smoke significantly fewer cigarettes during

their pregnancy. However, the impact of both education and income on amount smoked per day after learning of pregnancy is very weak since the standardized partial regression coefficients of them are very close to zero.

Hypothesis 3-B

Hypothesis 3-B is not supported by the results. According to Table 5, when the other variables are equal, women who are advised to quit smoking by doctors would significantly smoke more cigarettes during pregnancy than women who are not advised to quit smoking by doctors. However, the same as above, the impact of receiving advice to stop smoking on amount smoked after learning of pregnancy is very weak.

Hypothesis 3-C

Hypothesis 3-C is supported by the result. According to Table 5, controlling education, income, and advice, the more cigarettes a pregnant woman used to smoke per day, the more cigarettes she will smoke during her pregnancy.

V. DISCUSSION AND CONCLUSION

DISCUSSION

Hypothesis 1-A is not supported by the findings. The findings indicate that when the other variables are equal, pregnant women who have lower education levels and lower family incomes have significantly more opportunities to be advised to quit smoking by their doctors. One possible reason is doctors may think that people with lower education level and with less family income usually smoked more cigarettes than women with higher education level and with more family income. Therefore, they have more opportunities to receive advice to quit smoking from doctors. Another reason may be that doctors think women with lower education level and with less family income might not recognize the danger of smoking and need doctors' advice to quit.

Hypothesis 1-B is supported by the findings since when the other variables are equal, pregnant women who used to smoke more cigarettes per day are significantly more likely to be advised to quit smoking from doctors. This findings are consistent with the results of some previous studies (Anda, et al in 1987, Frank, Winkleby, Altman, Rockhill, and Fortmann in 1991). One possible explanation of this findings is doctors may think that heavier smokers are less aware of the negative influence of smoking on the health of fstus, and the amount of heavy smokers smoke every day would harm infant very seriously. However, if doctors only pay attention on heavier smokers, due to lack of quitting advice, lighter smokers may continue or even increase smoking after pregnancy to release some possible pressure caused by pregnancy.

Among the three independent variables, income, education, and amount smoked per day before pregnancy, amount smoked per day before pregnancy has the strongest impact on receiving advice to quit smoking. The impact of education and income on receiving advice to quit smoking is significant but very weak.

Hypothesis 2-A, when the other variables are equal, education and income have negative impacts on continuing to smoke during pregnancy, and

hypothesis 3-A, when the other variables are equal, women with higher education level and with more family income would smoke fewer cigarettes during pregnancy than women with lower education level and with less family income, are both supported. One possible reason is pregnant women with higher education level and with more family income are more aware of the danger while smoking during pregnancy and are more likely to take action to avoid the danger. However, as with the findings of hypothesis 1-A, when the other variables are equal, the influences of education and income on both continuing to smoke during pregnancy and on amount smoked after learning of pregnancy are very low. It seems that education and income are not really important factors to predict a pregnant woman's smoking behavior after learning of pregnancy.

For hypothesis two and three, when subsample was replaced with the women who were currently pregnant, the results changed a little bit. When the subsample for testing hypothesis 2-A was replaced with the women who were currently pregnant[2], the influence of education become stronger (please

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[2] In order to realize how the results would change when currently pregnant women are selected as sample, the analysis using currently pregnant women as sample to test hypotheses two and three were also been performed. The results are in the Table A (for hypothesis Two) and Table B (for hypothesis Three).

compare Table A and Table 4). The difference may be caused by the error of recall. The pregnant women with higher education level may tend to recall

Table A: Effects and Significance of Education, Income, Advice, and Amount Smoked Per Day Before Pregnancy on Continuing Smoking During Pregnancy

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.2641	-.2607	.0000
Income	-.1369	-.1404	.0149
Advice	.3129	.3272	.0000
Amount Smoked Per Day Before Pregnancy	.0033	.0037	.9489

Note: 1.Continuing Smoking During Pregnancy is coded 1. Stop Smoking During Pregnancy is coded 0.
2.Total cases=358(100%). The number of cases coded as 0 = 148(41%). The number of cases coded as 1=210(59%)
3.Multiple Regression Analysis

Table B:Effects and Significance of Education, Income, Receiving Advice to Stop Smoking and Amount Smoked Per Day Before Pregnancy on Amount Smoked after Learning of Pregnancy

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.0506	-.0649	.3903
Income	-.0275	-.0356	.6378
Advice	.1679	.2231	.0028
Amount Smoked Per Day Before Pregnancy	.6321	.6502	.0000

Note: 1. Amount Smoked after Learning of Pregnancy is coded by the numbers of cigarettes pregnant women smoked after learning of pregnancy (0 to 95)
2. Total cases=209(100%). 1-14 cigarettes=72(34%); 15-24 cigarettes=86 (41%); and 25-60 cigarettes= 51(24%) ; more than 60 cigarettes=0(0%)
3. Multiple Regression Analysis

These results are somewhat different from the results measured by the sample of the women who had live-born child in past five years and smoked during the 12 months prior to birth (please refer to Table 4 and Table 5).

that they did not smoke cigarettes during their past pregnancy even though they actually did. Another possible reason for that change is that some pregnant women with higher education level may try to stop smoking after they realize that they are in pregnant. But because smoking is an addictive behavior, the quitting action may fail latter.

Hypothesis 3-A (Women with higher education level and with more family income would smoke fewer cigarettes during their pregnancy.) is significantly supported by the findings listed in table five. However, when the subsample was replaced with the women who were currently pregnant, the two predictors, education and income, become not significant. One possible reason of the difference is the error of recall. For the women continuing to smoke after learning of their pregnancy, education and income may have no impact on how many cigarettes they smoked. But the women who were with higher education level and with more family income may tend to recall that they smoked fewer cigarettes during their past pregnancy.

Hypothesis 2-B predicts that when the other variables are equal, pregnant women who are advised to quit smoking by doctors are more likely to stop smoking than those who are not. Hypothesis 3-B predicts that when the other variables are equal, pregnant women who are advised to quit

smoking by doctors would smoke fewer cigarettes during pregnancy than those who are not advised to quit smoking by doctors. Both of the two hypotheses are not supported by the results. According to the results, when the other variables are equal, pregnant women who are advised to quit smoking by doctors are significantly more likely to continue smoking and would smoke more cigarettes than those who are not. It seems that many pregnant women do not comply with the quitting advice from doctor.

The finding reveals that doctors' quitting advice could not make pregnant women take action to quit. There are some possible reasons for that. For example, the communication patterns between doctors and patients are bad; doctors' advice did not give pregnant women enough motivation to quit; or besides the advice from doctors, pregnant women need other supports, such as quitting training programs, supports from family and friends...etc., to help them quit, or doctors are likely to advise heavy smokers who are less likely to quit.

Hypothesis 2-C states that when the other variables are equal, the more cigarettes a pregnant woman used to smoke per day before pregnancy, the higher possibility she will continue to smoke during her pregnancy. Hypothesis 3-C states that when the other variables are equal, pregnant

women who used to smoke more cigarettes per day before learning of pregnancy would smoke more cigarettes than women who used to smoke fewer cigarettes per day. Both hypotheses are supported by findings. However, interestingly, if the subsamaple for testing hypothesis 2-C is replaced with the women who were currently pregnant, the impact of amount smoked per day before pregnancy would become not significant (please refer to Table A in Footnote 2). One possible reason is that amount smoked per day before pregnancy hasn't effect on continuing to smoke in the early period of pregnancy but it does in late period.

CONCLUSION

Generally, according to the findings, socioeconomic status is not an important factor to predict whether a pregnant woman receive doctor's advice to stop smoking or not. The most important factor to predict whether a pregnant woman receive advice to quit is the amount she smokes per day before pregnancy. Moreover, socioeconomic status and doctor's advice to quit smoking haven't strong impact on pregnant women's smoking behavior. The most important factor to predict pregnant women's smoking behavior

after learning they are pregnant is how many cigarettes they smoke per day before learning they are pregnant.

APPENDIX

APPENDIX

THE RESULTS REMOVED WEIGHTS

The following tables present the results of the analyses removed weights. The conclusion of these tables would be the same as those weighted by the modified weights.

Table A-1: Zero-order Correlations of Education, Income, Amount Smoked Per Day Before Pregnancy, Smoked During Pregnancy, Amount Smoked after Learning of Pregnancy, and Receiving Advice to Stop Smoking

	Education	Income	Amount Smoked Per Day Before Pregnancy	Smoked During Pregnancy	Amount Smoked after Learning Pregnancy	Receiving Advice to Stop Smoking
Education						
Income	.3852***					
Amount Smoked Per Day Before Pregnancy	-.0274	.0168				
Smoked During Pregnancy	-.1272***	-.1129***	.3278***			
Amount Smoked after Learning Pregnancy	-.1355***	-.0874***	.6011***	.5724***		
Receiving Advice to Stop Smoking	-.0107	.0207	.2151***	.2865***	.2033***	

** P<0.01 *** P<0.001

Note: 1. Sample Size=2755

2. Compare with Table 2

Table A-2: Effects and Significance of Amount Smoked per Day Before Pregnancy, Education and Income on Receiving Advice to Stop Smoking

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Amount Smoked Per Day Before Pregnancy	.2093	.2107	.0000
Education	-.0702	-.0654	.0013
Income	-.0717	-.0668	.0010

Note:1. Receiving Advice to Stop Smoking is coded 1, and not receiving it is coded 0.
2. Multiple Regression Analysis
3. Sample Size=2755
4. Compare with Table 3

Table A-3: Effects and Significance of Education, Income, Advice, and Amount Smoked Per Day Before Pregnancy on Continuing Smoking During Pregnancy

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.0845	-.0853	.0012
Income	-.0980	-.0988	.0002
Advice	.2352	.2454	.0000
Amount Smoked Per Day Before Pregnancy	.2668	.2758	.0000

Note: 1. Continuing Smoking During Most Pregnancy is coded 1. Stop Smoking During Most Pregnancy is coded 0.
2. Multiple regression analysis
3. Sample size=1645
4. Compare with Table 4

Table A-4 : Effects and Significance of Education, Income, Receiving Advice to Stop Smoking and Amount Smoked Per Day Before Pregnancy on Amount Smoked after Learning of Pregnancy

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.0961	-.1124	.0000
Income	-.0610	-.0716	.0000
Advice	.0778	.0963	.0004
Amount Smoked Per Day Before Pregnancy	.5832	.5872	.0000

Note: 1. Amount Smoked after Learning of Pregnancy is coded by the numbers of cigarettes pregnant women smoked after learning of pregnancy (0 to 95)
2. Multiple Regression Analysis
3. Sample Size=1500
4. Compare with Table 5

Table A-5: Effects and Significance of Education, Income, Advice, and Amount Smoked Per Day Before Pregnancy on Continuing Smoking During Pregnancy

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.2752	-.2795	.0000
Income	-.1739	-.1833	.0014
Advice	.3171	.3377	.0000
Amount Smoked Per Day Before Pregnancy	-.0215	-.0244	.6733

Note: 1. Continuing Smoking During Pregnancy is coded as 1. Stop Smoking During Pregnancy is coded as 0.
2. Total cases=358(100%). The number of cases coded as 0 = 148(41%). The number of cases coded as 1=210(59%)
3. Multiple Regression Analysis
4. Compare with Table A

Table A-6 :Effects and Significance of Education, Income, Receiving Advice to Stop Smoking and Amount Smoked Per Day Before Pregnancy on Amount Smoked after Learning of Pregnancy (compare with Table B)

Variables	Std. Partial Regression Coefficients	Partial Correlation Coefficients	Sig T
Education	-.0430	-.0570	.4502
Income	-.0486	-.0656	.3847
Advice	.1379	.1884	.0118
Amount Smoked Per Day Before Pregnancy	.6568	.6676	.0000

Note:1.Amount Smoked after Learning of Pregnancy is coded by the numbers of cigarettes pregnant women smoked after learning of pregnancy (0 to 95)
2.Total cases=209(100%). 1-14 cigarettes=72(34%); 15-24 cigarettes=86 (41%); and 25-60 cigarettes= 51(24%) ; more than 60 cigarettes=0(0%)
3.Multiple Regression Analysis
4.Compare with Table B

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