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Modelling the Decision to Participate in Poverty-Alleviating Programmes: An Example from Massachusetts

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1. Introduction

For a poverty-alleviating programme or project to have the desired effect on a targetted group of individuals, participation by some or all of those targetted is often necessary. However, the food and nutrition programme evaluation literature places little emphasis on the participation decision, the starting point of the debate taking programme enrollment as given (e.g. Sahn, et al, 1984). In the wider literature on agricultural project monitoring and evaluation, the participation decision is relegated to 'special topic' rather than 'fundamental' status (e.g. Casley and Kumar, 1987).

This neglect of the participation decision in a quantitative, and to a lesser extent, qualitative sense is all the more incongruous when one considers the development over the past decade of econometric techniques that aim to model behavioural responses that are qualitative in nature (Amemiya, 1981). Together with the increased availability of microcomputer-processed disaggregated data sets these qualitative response model techniques have been used extensively in the field of labour economics. Decisions such as whether or not to enter the labour force or join a trade union have been extensively analysed with these probit and logit-based models and have provided many insights as to the functioning of labour markets (Maddala, 1987).

Application of these methods in the field of poverty alleviation has been slow. Several notable exceptions spring to mind:- the vulnerability of an

individual to illness (Pitt and Rosenzweig, 1986), the adoption of new cultivation techniques, the decision to purchase a particular staple food, whether or not seek medical care (see Amemiya, 1981 for examples), and the U.S. food-stamp programme participation decision (Senauer and Young, 1986) - however these examples are usually found in economic journals which have a less than explicit focus on policy analysis. It would be very desirable from a policy point of view to have these by-now standard techniques incorporated into nutrition programme evaluation and applied to participation data, in much the same way as ordinary least squares is routinely applied to data by individuals who would not describe themselves as quantitative social scientists. In this way the efficacy of programme outreach could be evaluated and the magnitude of any potential barriers to entry could be assessed.

Accordingly, the rest of this paper is devoted to identifying the determinants of early (versus late) programme enrollment through the application of a qualitative response model to American supplementary feeding programme data. Specifically, Lee's (1978) binary choice model will be used to determine why some women join the U.S. Department of Agriculture's Special Supplemental Feeding Program for Women, Infants and Children (WIC) in the first (as opposed to the last two) trimester of pregnancy.

2. WIC: The Policy Issues

It has been well-documented that infants, children, and pregnant and lactating women are among the most nutritionally vulnerable groups (Abelson, 1975). In addition, several studies have demonstrated that nutritional supplementation of the mother during and immediately after pregnancy tends to increase foetal growth rates and reduce perinatal and postnatal mortality (Rush et al, 1980 and Smith, 1947), especially when the population is very malnourished (Beal, 1971 and McGarrison, 1937). The WIC programme, through nutritional supplementation and nutrition education aims to reduce adverse birth outcomes in participants deemed by a competent nutritionist to be nutritionally at risk.

Typically, pregnant women are given the highest priority for admission onto the programe - some being considered more at risk of an adverse birth outcome (those under 17, smokers, those with a history of birth difficulties etc.) than others. Supplementation trials have confirmed that women in the highest risk predicament tend to benefit the most (Rush et al, 1980) and WIC evaluations have reached similar conclusions (Kotelchuck et al, 1980 and Kennedy, 1979).

While participation of very high-risk groups is desirable, WIC's resources could be used more efficiently since early (first trimester of pregnancy) participation has been shown to substantially increase the programme's success (Edozian et al, 1979 and Kotelchuck et al, 1980). Thus if early

participation can be encouraged by the local WIC clinics, the health outcome return per dollar will be improved. The relevant policy questions pose themselves:- what are the barriers to early programme entry, how effective are current outreach activities, and how do potential early enrollers view the nature of the WIC transfer?

3. The Model

It is the structural form of Lee's (1978) binary choice model that makes it so useful in terms of policy formulation; specifically, the idea that an individual's expected gain from programme participation is an important determinant of whether or not the individual will join the programme.

Lee's original application found that the expected wage gain from union participation had a significant impact on the determination of union status. Adapting the model for examining early WIC enrollment, the expected gain from early programme participation is now measured in terms of increased birthweight of the newborn. Structurally, the decision of an eligible individual to enroll early in WIC is hypothesised to depend on the individual's expected gain from WIC participation, the extent of outreach activities, and the various practical and stigmatic barriers to early enrollment.

However, unlike the union-wage model, the interpretation of the estimated coefficient on the differential outcome (birthweight) variable is relatively

straightforward only if we assume that this variable actually measures an individual's expected benefit from early enrollment. However, imperfect information may well impair an individual's ability to appreciate the health benefits of early WIC participation. One suspects the wage benefit of joining a union seems more tangible to the individual than the birthweight benefit due to early WIC participation. Factors influencing individual perceptions about the efficacy of WIC tend to come under the rubric of 'outreach activities'. The differential birthweight variable reflects essentially a technical relationship measuring the potential an individual possesses for improving birth outcome given WIC health inputs, but in the model it is being used as a proxy for expected improvement in birth outcome; the better the outreach information the closer will be the accord between these two measures. Therefore it is important to control for outreach activities with outreach variables in the structural early participation equation. Then, anything other than a significantly positive estimated coefficient could be interpreted as meaning that WIC is viewed by potential early joiners as an income rather than a health-improving intervention.

Mathematically, the structural model can be represented by the following three equations:

$$I^*_i = \delta_0 + \delta_1(\ln B_{Ei} - \ln B_{Li}) + Z'_i\delta_2 - e_i \qquad (1)$$

$$B_{Ei} = \theta_{1E} + X'_{Ei}\,\theta_{2E} + V_{Ei} \qquad (2)$$

$$B_{Li} = \theta_{1L} + X'_{Li}\theta_{2L} + V_{Li} \qquad (3)$$

with $e_i \sim N(0, \sigma_1^2)$

$V_E \sim N(0, \sigma_2^2)$

$V_L \sim N(0, \sigma_3^2)$

where B_{Ei} (B_{Li}) represents the expected birthweight of the child of the ith WIC early (late) joiner, X_{Ei} (X_{Li}) is a vector of the early (late) enrollers' characteristics and Z_i is a vector of characteristics of the programme site attended by the ith individual. θ and δ represent the corresponding coefficient vectors. The model formulation assumes that site characteristics play no part in the determination of birthweight once the participation decision has been taken. I^*_i is the value of the latent early enrollment variable for the i^{th} individual. If $I^* > 0$ then the individual belongs to the early enrollment group, the dependent variable in equation (1) has a value of 1 and birthweight is determined by equation (2). Otherwise the individual belongs to the late enrolment group, the dependent variable in equation (1) has a value of 0 and birthweight is determined by equation (3).

4. Model Estimation

Based on early (late) enrollment observations a set of estimated regression coefficients is generated for the early (late) birthweight equation. Note that no single individual contributes to the estimation of both sets of coefficients, being used in either one regression or another. Subsequently, for each individual, irrespective of enrollment status, two predicted birthweights are generated using the vectors of early and late birthweight coefficient estimates. For each mother a predicted differential birthweight can be calculated (represented by ($\ln B_{Ei} - \ln B_{Li}$) in natural log form) for use in the structural form.

In constructing the predicted differential birthweight variable it would be wrong to conclude that the expected improvement in birthweight is entirely due to early WIC enrollment. Because the early nutritional supplementation is voluntary, some of the expected improvement in pregnancy outcomes may be attributable to the motivational consciousness that prompted early joining in the first place. This self-selectivity bias is corrected with the Heckman Two-Stage technique (Amemiya, 1984).

Equation (1), representing the early enrollment decision, is estimated using binomial probit. The nature of the decision to join WIC in the first trimester of pregnancy is viewed by this technique as a dichotomous choice with a normally-distributed threshold 'breaking point'. When the circumstances conspire so as to elicit a change in behaviour, the stimulus threshold has

been achieved.

The estimation procedure can be summarised as follows:

1) Probit estimation of the reduced form of structural equation (1) to generate the selectivity corrections (Mills ratios).

2. Using the selectivity corrections, consistently estimate structural equations (2) and (3) with OLS.

3) Probit estimation of structural equation (1) with predicted differential birthweight as one of the explanatory variables.

5. Data Sources

The main body of data used is a subsest of that gathered in the comprehensive 1978 evaluation of the birth outcome impact of the Massachusetts WIC programme (Kotelchuck et al, 1980). Data set augmentation was necessary because many factors affecting early WIC participation are under the influence of local programme sites. Identification of the determinants of early WIC enrollment was not one of the goals of the Kotelchuck evaluation of WIC; consequently that data set does not contain information on local programme characteristics. With the assistance of the Massachusetts WIC Department, the additional site data were collected via a questionnaire sent to the 23 sites represented in the 1978

study. Of the questionnaires dispatched, 15 were returned, and 11 of these, accounting for 1270 mother-infant pairs, were sufficiently complete for the purpose of the analysis.

6. Explanatory Variables

(a) The early enrollment decision:

Given eligibility, an early WIC-enrolling individual must be aware of the programme's existence and be able to overcome any practical barriers to participation. It is of further interest to test whether an expected health outcome improvement is an important inducement for early entry onto the programme. The corresponding variables are listed in Table 1 and relate to local programme operating characteristics (Butler et al, 1980, Isley et al, 1980, and Bendick, 1978).

(b) The determinants of birthweight:

The standard set of socioeconomic and maternal/pregnancy risk variables as used to predict birthweight in the other two structural equations is also described in Table 1 (Ebbs et al, 1941, Haas, 1981, and Kennedy, 1979).

Table 1 : Definition of Variables in the Structural Form

Variable Name	Definition	Range of Values	Mean
Dependent			
Early participation (Eqn. 1)	Participation enrolled in WIC in the first trimester of pregnancy	1, if yes, 0 otherwise	.2055
Natural Log Birth Weight (Eqns.(2) and (3))	Natural log of birth weight of child born to WIC participant		*
Explanatory			
(a) Enrollment Variables			
Length of Operation Z_{1i}	Length of operation in months of the local WIC programme visited by the ith individual	6-60 months	29.32
Sponsoring Agency Z_{2i}	Type of sponsoring agency of the local WIC programme	1, if direct 0, if social services	.8921
Food Delivery Z_{3i}	Type of food delivery system of the local WIC programme	1, if store only 0, if combination/home only	.4874
Media Z_{4i}	Did outreach activities of local WIC programme include utilization of newspapers and/or radio PSA's?	1, if yes 0, otherwise	.6992
Hours Z_{5i}	Hours/week the local WIC programme is open for food pick-up or voucher redemption	30-52 hours	35.79
Child Care Z_{6i}	Child care facilities offered by local WIC programme	1, if yes 0, otherwise	.1882

Language Z_{7i}	Percentage of local WIC staff fluent in a language used by participants other than English	0-100	36.62
Birth weight differential Z_{8i}	Difference in logs of anticipated (predicted) early and late birth weights	-.1331 - .2793	.0312

* The range of birth weights for all participants is from 1106 g. to 6095 g. with a mean of 3239.4 g. Early participants values ranged from 2070 g. to 4675 g. with a mean of 3334.6 g while late participants birth weight values ranged from 1106 g. to 6095 g. with a mean of 3214.8 g.

(b) Maternal/Pregnancy Risk Variables

X_{1i}	Marital status of ith individual	1, if married 0, otherwise	.6236
X_{2i}	Age, in years, if ith individual	14-49 years	23.75
X_{3i}	Parity of ith individual	1-9	2.072
X_{4i}	Race/ethnicity of ith individual	1, if WIC group 1 0, otherwise	.7881
X_{5i}	Education of ith individual (years)	1, if formal education, $\leq$ 8 years 0, otherwise	.1393
X_{6i}	Education of ith individual	1, if 9 $\leq$ formal education $\leq$ 12 0, otherwise	.7204
X_{7i}	Number of previous birth complications encountered by ith individual	0-7	.1583

7. Results

Using the sample of 1270 WIC participants for the probit estimation of the structural enrollment equation resulted in two of the proposed fifteen explanatory variables being significant (in an asymptotic sense) at the five percent level, while nine had estimated standard errors smaller than their estimated coefficients. Table 2 presents these results and, in addition, partial derivatives (evaluated at the data mean) for the fifteen independent variables.

The explanatory ability of the variables used was not as strong as one would have liked. Deficiencies in the statistical estimation stem primarily from the lack of data in important areas. Although the data set augmented was the best available it was not developed for the specific problem we have addressed. Hence, we are missing rather important pieces of information.1/

1/ For example, information concerning important birth weight-predicting variables was missing. These variables include: income, pre-pregnancy weight of the mother, presence of existing medical complications, dietary faddism, smoking, alcoholism, drug addition, psychological problems, and the number of other children on WIC (Kennedy, 1979). The inclusion of these variables in the birthweight analyses would probably have resulted in more of the variability in birth weight being explained.
Information concerning stigmatic barriers to entry, identified as important factors in the WIC enrollment decision (Bendick et al 1976) was also unavailable. Variables that measure this include: whether the potential participant herself, or a friend, was receiving Food Stamps, whether they feared losing other welfare benefits as a result of WIC enrollment or were bothered by receiving "free" food. These barriers to (early) entry are anticipated to be of the greatest importance to the high-risk individuals WIC should be encouraging to join. Individual information concerning the more practical barriers to participation was also unavailable - for example, the distance lived from WIC site, the ownership or access to a car, and whether the individual was working.

Table 2: Probit results for the WIC enrollment decision (equation (1))

Variable	Coefficient	Coefficient / Standard Error	$\partial Y / \partial X_K$
Constant	-4.195	-3.005	-
Marital Status	.123	1.208	.025
Age	-.04	-.650	-.00815
Parity	.137	2.223*	.0279
Race 1	.336	1.233	.0685
Education 1	.210	-1.474	-.04282
Education 2	-.162	-1.216	-.03304
Prior Birth Complications	-.153	-.453	-.03120
Length of Local WIC programme Operation	.027	2.203*	.005506
Type of Local WIC Programme Sponsor	-.038	-.196	-.00775
Type of Food Service Delivery	.242	1.903	.04935
Use of Media Methods	.376	1.321	.07668
No. of Hours Per Week Local Programme is Open	.069	1.241	.01407
Child Care Facilities	.513	.968	.1046
Percentage of WIC Staff Familiar in a Participant Language Other than English	-.006	-.486	-.00122
Differential Birth Weight	9.290	.784	1.8947
Number of Observations		1270	
-2 Log Likelihood Ratio		75.52**	

Key: * Asymptotically significant at the 5% level.
** Significant at the .1% level.

Of the local programme variables, two out of the four are significant at the five percent level. The length of time a WIC programme has been operating is one of the significant variables. This variable has a relatively large partial derivative and one notes that the probability of an "average" individual (at the mean of the data) joining WIC early increases by approximately 0.55% for each extra month the WIC programme is in operation.[2/] The small value of this statistic is deceptive, as we shall see in Tables 3a and 3b. The sign on this variable is as expected and may reflect the effect of the mature WIC programme being more in touch with the local community and consequently better able to recruit participants.

The sign on the sponsoring agency variable is negative, implying that a WIC programme being direct health/hospital sponsored does not increase the probability of early WIC enrollment compared to a social services sponsored programme. This estimate is still incongruous with the fairly common-sense hypothesis (that Kennedy, 1979, has confirmed) that the time elapsed between the first prenatal care visit and visit to a health sponsored WIC clinic is less than if the same WIC programme were social services sponsored. The most likely explanation of this result must lie with the data. Only 10.8% of the 1270 individuals surveyed came from a social service-sponsored WIC programme, the lowest average value for any dichotomous explanatory variable used (in fact, they were

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2/ Strictly speaking the value of the partial derivative evaluated at the mean refers to a one unit increase in X_K, from the average value of X_K. Above the average value of X_K, the value of the partial derivative will increase up until the threshold and then decrease.

all from one programme (New Bedford) of the eleven surveyed). Indeed the New Bedford WIC programme had an above average percentage of early WIC entrants in 1978. Had more social services sponsored local WIC programmes responded to the questionnaire more completely, one would expect further probit analysis to reveal a positive sign on this variable's estimated coefficient.

The type of food delivery system has a positive sign and is nearly significant at the five percent level. Even controlling for the availability of child care facilities, retail food delivery-only programmes increase the probability of the "average" individual enrolling early in WIC by approximately 4.9%. Certainly one can envisage the retail delivery of food (experienced by 48% of our sample) increasing a potential participants awareness of a local WIC programme as compared to home or combination delivery. In the latter situation it is less likely that the casual observer will come into contact with WIC food delivery systems and thus become aware of the programme's existence.

The placement of radio public service announcements (PSA's), newspaper articles, and press releases increases the probability of the average individual joining early by approximately 7.7%. Again, the sign on the coefficient is as expected and it seems reasonable that this type of outreach would increase an individual's awareness of the programme, facilitating early enrollment in WIC.

Tables 3a-3b: The Effect of Different Values for the Local Programme Variables On the Predicted Probability (%) of Early WIC Enrollment of an Otherwise Average Participant

a. For a WIC Programme Open 6 Months Prior to the End of 1978

	No Media Methods	Media Methods
Not Solely Retail Delivery	12.70	17.48
Retail Delivery Only	15.64	21.26

b. For a WIC Programme Open 30 Months Prior to the End of 1978

	No Media Methods	Media Methods
Not Solely Retail Delivery	21.75	28.82
Retail Delivery Only	26.15	34.03

Tables 3a and 3b illustrate the effects on the estimated probability of an otherwise average (at the means of data) individual of eight different combination settings of the three local programme characteristics, length of programme operation, use of the above media methods, and retail delivery only. An individual assigned to a two and a half year old WIC programme which places radio PSA's and press releases and delivers food solely by retail methods is almost three times as likely to join WIC in her first trimester than an individual assigned to a six month old clinic that delivers food to the home or uses some combination of home and retail delivery, and practices none of the above media methods (3% of individuals were assigned to programmes that did not). Also it should be noted that the increase in the predicted probability of early enrollment due to type of delivery system and use of media methods is larger, the more mature the local WIC operation.

Of the seven maternal risk variable estimated coefficients one was significantly different from zero at the five percent level and five were larger than their standard errors. These risk variables allow one to examine the consequences of possession of a high risk profile in terms of the early enrollment decision. According to the analysis the average individual is approximately 2.5% more likely to join WIC early if she were married rather than single. This is in accordance with a priori expectations, but the size of the partial derivative and the ratio of the coefficient and its standard error is less than anticipated.

The age of the potential WIC participant seems to have a negative effect on

the early participation decision. The results indicate that the average individual is about 8% more likely to join WIC if she were 19 rather than 29. This is encouraging because teenage pregnancies are considered high risk. However, any enthusiasm concerning this result must be tempered by noting that first, the result also implies that high-risk, older eligible individuals are less likely to join WIC early and second, that the small size of the coefficient/standard error ratio does not allow us to reject the null hypothesis that age has no effect on the early enrollment decision.

Parity plays an important role in the early enrollment decision. The variable's estimated coefficient is significantly different from zero at the five percent level and possesses the anticipated positive sign. The otherwise average individual who is experiencing her fourth pregnancy will have approximately an 8% higher predicted probability of joining WIC early than an individual experiencing her first pregnancy. This confirms that WIC benefits are reaching these higher risk participants, presumably by virtue of their familiarity with WIC procedures.

The positive estimated coefficient on the race variable is indicative of black women underutilizing WIC benefits by virtue of joining WIC later than their white/hispanic (group 1) counterparts who are nearly 7% more likely to join WIC in their first trimester of pregnancy. An even larger difference might be anticipated if the group denoted by "1" were less diffuse.

The education variable's estimated coefficients both have negative signs,

being compared to the highest education group. For example, an individual with an otherwise average data vector in the lowest education group is approximately 4% less likely to join WIC early than an otherwise average individual in the highest education group. Less maternal education, according to our model, has a negative effect on the early participation decision. This result is a useful accompaniment to Kotelchuck, et al's finding that 1978 Massachusetts WIC participants tended to have less formal education than other pregnant women in WIC catchment areas. Our result indicates that this is also be a trait of late versus early WIC joiners.

None of these maternal risk variables has, on its own, a particularly dramatic effect on the predicted probability of early enrollment, but taken together, their additive effects can be most revealing. Tables 4a-4d present some examples of these additive effects. Holding the programme characteristics/programme barriers to entry variables constant the early WIC joiner is characterized as a non-black, married woman in the highest education group, experiencing her third or fourth pregnancy. This profile does not correspond to that of a high risk pregnancy. This is not a desirable situation: it is precisely the unmarried, first pregnancy, black women in the lowest education group that WIC should capture early in pregnancy to assure WIC's limited resources are employed effectively. Tables 4a-4d illustrate the discrepancy between the predicted probabilities of the above two participant profiles. The former individual is over twice as likely, holding programme variables at a mean level, as the latter to join WIC in her first trimester of pregnancy. One is led to the conclusion that women at less

risk of an adverse birth outcome are more likely to join WIC early than women at high risk.3/

The number of hours a local programme clinic is open for food pickup and/or voucher redemption has the anticipated positive sign on its estimated coefficient and at the mean of the data, an increase in the number of hours open/week from 35 to 45 producing an increase in the predicted probability of early enrollment ($\hat{Y}$) of approximately 14%. The provision of child care, another means of reducing the barriers to early participation faced by the potential WIC participant, increases $\hat{Y}$ by approximately 10% at the mean of the data.

The language variable's estimated coefficient is not of the expected sign and its partial derivative is fairly large. One possible explanation of this result is that self-adjustment of these individuals and their sites has already occurred. All those WIC programmes that require bilingual staff may employ enough of them in order to maintain the smoothness of day-to-day operations, and mirror the linguistic balance exhibited by the programme

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3/ The age and previous birth complication proxy variables were not included in these tables because of earlier doubts concerning their accuracy. All reservations aside, however, their inclusion would narrow this discrepancy in terms of predicted probabilities of early WIC enrollment.

Tables 4a-4d: The Effect of Different Values for the Local Program Variables On the Predicted Probability (%) of Early WIC Enrollment of an Otherwise Average Participant

The Effect of Different Values for the Maternal Risk Variables on the Predicted Probability (%) of Early WIC Enrollment of an Otherwise Average Participant

a. Parity = 1, unmarried

	Education 1	Education 3
Black	18.69	22.12
Non-Black	24.35	28.42

b. Parity = 1, married

	Education 1	Education 3
Black	20.63	24.30
Non-Black	26.68	31.01

c. Parity = 4, unmarried

	Education 1	Education 3
Black	28.17	32.63
Non-Black	35.44	40.39

d. Parity = 4, married

	Education 1	Education 3
Black	30.72	35.39
Non-Black	38.30	43.38

clientele. Thus the hiring of additional bilingual staff resulting in an unbalanced staff/clientele language profile may alienate potential participants who do not require their specialized services, resulting in a reluctance to participate in WIC early on in their pregnancy.

Table 5 illustrates the impact the hours of operation and provision of child care facilities can have, increasing the predicted probability of early WIC participation by a factor of 2.7 indicating that each WIC site, when unencumbered by financial constraints, has the potential to encourage early enrollment.

Table 6 illustrates the effect the differential birth weight variable can have on $\hat{Y}$. The reader is reminded of the interpretation given to this explanatory variable. As noted earlier, it can be hypothesized that WIC-eligible individuals will be prompted to join WIC out of a desire to avert an adverse birth outcome. The differential birth weight variable can be interpreted as the potential participant's perception of the effectiveness of WIC in reducing adverse birth outcomes; specifically, raising birth weight. However, while the coefficient on this variable is positive, the null hypothesis that the coefficient on this variable is zero cannot be rejected. Thus, because the coefficient is estimated so imprecisely, we cannot reject the notion that WIC is viewed by potential early joiners as an income intervention. Nevertheless, one can take some encouragement from this result which suggests that the perception of a positive differential birth weight (resulting from early WIC enrollment), created by WIC outreach,

may encourage individuals to join WIC in their first trimester of pregnancy.

Table 6 demonstrates the effect WIC outreach can have in the direct sense (media utilization) and indirectly (creating positive birth weight concepts) on the early WIC participation decision. Women assigned to WIC programmes that do not utilize media methods and in addition are unaware of or indifferent to WIC benefits are less than one-quarter as likely to join early in their first trimester as those women whose local WIC programme uses media methods and who, in addition, perceive WIC participation will result in a 20% increase in their baby's birth weight.

Table 5: The Effect of Different Values for the Barriers to Entry Variables On the Predicted Probability (%) of Early WIC Enrollment of an Otherwise Average Participant

	Hours Local WIC Program Open/Week = 30	Hours Local WIC Program Open/Week = 45
No Child Care Facilities Offered	19.56	40.64
Child Care Facilities Offered	28.89	53.35

Table 6: The Effect of Different Values for two Outreach Variables On the Predicted Probability (%) of Early WIC Enrollment of an Otherwise Average Participant

	Differential Birth Weight ($)		
	0	+10	+20
No Media Utilized	18.73	36.85	59.64
Media Utilized	25.14	45.95	68.27

8. Conclusions

The results obtained here suggest that local WIC programmes' policies and practices both enhance and impede early enrollment. Furthermore, higher risk groups are more likely to enroll later in pregnancy than their less at-risk counterparts. High risk groups are also less susceptible to early participation-inducing policy changes.

The more mature a WIC programme, the more successful it appears to become in recruiting at risk individuals early in pregnancy. This is a highly encouraging result. It is indicative of the long-term benefits to accrue from WIC and provides some justification for continued federal support, but at increased levels. The utilization of radio and the press seems to be an important factor in encouraging the early enroller, while at the same time being fairly inexpensive in a local setting. Retail delivery of food as compared with combination/home delivery seems to promote an increased awareness of the program, possibly via casual observation and/or conversation at the checkout counter. The individual at the mean of the data perceives a differential birth weight of 8% as a result of early WIC participation. The magnitude of this positive value is likely indicative of effective WIC outreach. Furthermore, the positive sign on this variable's estimated coefficient implies that this perception leads to a change in behaviour; i.e., earlier enrollment in WIC. However, the coefficient is not estimated precisely enough to reject the hypothesis that WIC is viewed as an income intervention.

The results suggest that steps taken by local programmes to lower the barriers to early participation faced by the WIC participant would be the most effective in encouraging first trimester enrollment. The provision of child care facilities and an extention (or perhaps just a re-arrangement) of the clinic opening hours dramatically increase the probability of early enrollment according to results presented in Table 5. Insufficient data were available to investigate the role played by the type of sponsor in the early participation decision. The number of WIC staff fluent in a particpant language other than English (in 1978) seems to be optimally adjusted. The addition of more bilingual staff may in fact result in alienation of the participants not served by these additional staff, discouraging early participation.

Identical changes in programme policies do not affect all individuals equally however - those at the early participation threshold being most responsive to the manipulation of policy variables. Our model indicates threshold individuals to be lower risk, typically married, non-black, early twenties, not in the lowest education group, not experiencing her first pregnancy, having possibly had a previous birth complication. The individual least likely to respond to a change in local programme policies will be of the highest risk. She is typically unmarried, black, in the lowest education group, and experiencing her first pregnancy. WIC programmes appear to attract the high parity individual with previous birth complications but not the low education, black, unmarried first pregnancies.

The encouraging conclusion is that the means appear to be available to attract even these hard-to-find higher-risk groups by maintaining program operations, providing child care facilities, opening longer at more convenient hours, increasing media utilization, and switching to retail food delivery wherever convenient. WIC operations appear to become more effective in recruiting early participants as they mature and WIC outreach does create positive WIC perceptions which also lead to early enrollment of potential WIC participants.

Only by understanding the motivations for, and the constraints to programme participation faced by the eligible population can a poverty-alleviating programme be successfully targetted to those who stand to benefit from it the most.

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