Improving the Immunization and Health Status of Children in the Women, Infants, and Children (WIC) Program

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Abstract: Maintaining enrollment in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and continued exposure of these children to immunization-promoting and nutritional benefits within the program is essential to improve the health status of this vulnerable population. Logistic regression was used to determine characteristics of 2 groups of children: those who dropped out of the program despite being eligible and those who remained in the program but were underimmunized. Of over 20,000 children 19–35 months old, 49% had participated in WIC but only 50% were still enrolled. Factors most strongly associated with dropping out of the program were older age of child; white, black, or American Indian race; living in an urban or suburban area; higher socioeconomic status but still eligible for the program; having only 1 child at home; and having mothers who were unmarried or less than 30 years old (p<0.05). Among current participants, factors most strongly associated with under-vaccination included younger age of the child; black or Asian race; moving from another state since birth; mother with less than a high-school education; and having 2 or more children under 18 years old living in the household (p<0.05). Routinely collected child/family information can be used to target outreach and immunization-promoting interventions toward children most likely to drop out of the program or to be underimmunized.

Key words: Immunization; vaccination; child; poverty; socioeconomic factors; Women, Infants, and Children Program

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Children participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), which includes almost 50% of the U.S. birth cohort, have been shown to be significantly less well immunized than the nation's more affluent children[1,2] and at risk for other adverse health outcomes.[3,4] Conducting immunization activities in WIC has been shown to dramatically improve vaccination coverage rates among enrollees.[5-9] In addition, studies have also shown improvements in other preventive health services for WIC-enrolled children, including higher anemia, lead, and TB screening, and more well-child visits at the child's medical home.[9] For these reasons, the Task Force for Community Preventive Services and the Advisory Committee on Immunization Practices (ACIP) recommend vaccination interventions in WIC as a strategy to improve immunization among low-income children.[10-11]

Despite these successes, the United States can do better at targeting immunization activities in WIC, especially since the WIC program was directed as recently as late 2000 to implement immunization activities at all WIC sites nationwide (White House Executive Memorandum, December 11, 2000). Previous studies have shown that approximately 50% of enrolled children drop out of WIC during the first two years of life, and that children who drop out are significantly less well immunized than children who remain enrolled in WIC.[1] In addition, even among those children who remain enrolled in WIC, certain children are less well immunized than others. Finally, not all income-eligible children enroll in WIC.

In this study, we used the National Immunization Survey (NIS), a large population-based survey that monitors vaccination coverage rates for preschool aged children at the national and state levels and collects information on WIC participation history and client information, to characterize children who 1) drop out of the program, 2) remain in WIC but are underimmunized, and 3) are eligible based on family income but never enrolled. The knowledge gained from this analysis could enable WIC and immunization programs to target efforts at keeping children enrolled in WIC more accurately and to provide more intensive intervention efforts to those children in WIC who are not well immunized.

Methods

Vaccination Coverage and Socioeconomic and Demographic Information. The NIS is an ongoing quarterly random-digit-dial (RDD) probability sample survey of households with children 19–35 months old living in the 50 states and the District of Columbia. Data collected by the NIS include information on sampled children's demographic and socioeconomic characteristics, provider-reported vaccination histories, and WIC participation. Descriptions of the NIS sampling methods and its complex weighting procedures have been published elsewhere.[12-14] We analyzed data from 4 consecutive NIS quarterly surveys conducted between April 1999 and March 2000.

We defined a child to be up to date (UTD) with all immunizations if he/she had received the correct number of doses of vaccine according to the Advisory Committee on Immunization Practices:[15] four or more doses of diphtheria and tetanus toxoids and pertussis vaccine, three or more doses of polio vaccine, one or more doses of measles-mumps-rubella vaccine, and three or more doses of

Haemophilus influenzae type b vaccine. An underimmunized child was missing one or more doses of these recommended vaccines.

Socioeconomic and demographic information (age of child, gender, number of children 18 years or younger in the household, income, race/ethnicity, mother's education and age, marital status of mother, mobility (moved residence from different state since child born)) were reported by the parent or caregiver during the RDD interview. Poverty level was classified as family income at or below 100% of federal poverty level. Also, data from the NIS was used to characterize WIC participation type and to determine whether sampled children ever received WIC benefits and whether they were current recipients of WIC benefits at the time of the NIS RDD interview.

Metropolitan statistical area (MSA) type (in the central city of an MSA, non-central city of an MSA, non-MSA) in which the family lived was derived from NIS respondent's telephone number.[16] For the purposes of this article, a child is considered to live in (1) an urban area if the telephone number corresponds to the central city of an MSA; (2) a suburban area if the telephone number is outside the central city of an MSA, but inside the county containing the central city; and (3) a rural area if the telephone number is not in an MSA.

Definitions for WIC Participation Type. To characterize children's WIC participation type, we defined children who were currently WIC recipients as children who reported receiving WIC benefits previously and were also current recipients. Children who were previous WIC participants were defined as having received WIC benefits in the past, but were not current WIC recipients; we limited the analysis of risk factors for children dropping out of WIC to children who were eligible for WIC in order to eliminate income eligibility as a reason for dropping out of the program. Income eligibility was based on meeting WIC income eligibility criteria at the time of the interview. We used the same income criterion for eligibility as the WIC program:[17] family income less than or equal to 185% of the federal poverty level. In our analysis, for children who were eligible for WIC, we also looked separately at those of lower socioeconomic status, with family income less than 100% of the federal poverty level. Children with unknown WIC participation were excluded from the analysis.

Statistical Analysis. The software package SUDAAN Version 7.5.3[18] was used for statistical analyses of vaccination coverage rates and participation in WIC. Logistic regression was used to estimate risk ratios to evaluate the association between coverage rates and children's demographic and socioeconomic characteristics. Also, logistic regression was used to estimate risk ratios to evaluate the association between WIC participation type and children's demographic and socioeconomic characteristics. All analyses accounted for the complex sampling design and sample survey weights of the NIS.

Results

Characteristics of the Study Population. Between April 1999 and March 2000, provider-reported vaccination histories were obtained on 23,065 children sampled by the NIS. Among U.S. families participating in the survey whose WIC-enrolled children were 19–35 months of age during this time period, 50% had participated

Table 1.

PERCENT UP-TO-DATE (UTD) FOR IMMUNIZATIONS AT 19–35 MONTHS BY TYPE OF PARTICIPATION IN WIC, NATIONAL IMMUNIZATION SURVEY, APRIL 1999 TO MARCH 2000

Type of Participation in WIC	sample size(n)[a]	% UTD (± 95%CI) [a]	% population[a]
Currently on WIC	5,886	76.9 (±1.9)	26.4%
Previously on WIC	5,706	71.6 (±1.9)	26.2%
Never on WIC but eligible [b]	1,323	70.9 (±.3.7)	5.6%
Never on WIC and not eligible [b]	8,896	82.6 (±1.2)	35.2%
Unknown	1,253	78.5 (±3.6)	6.6%

CI, confidence interval
[a] The n is based on NIS sample size and is raw data. % UTD and % population are weighted and based on US population. % UTD is adjusted for age.
[b] Eligibility at time of interview and based on 185% federal poverty level.

in WIC at some time in their lives, and 26% of these were WIC participants at the time of the survey. Thus, of children who had originally enrolled in WIC, almost half of them had dropped out and were no longer enrolled at the time of the survey (by their 3rd birthday); although some of these children may have dropped out because they were no longer income-eligible for WIC, we found that 60% of the dropouts in our population were still income-eligible for WIC at the time of the survey. The dropout rate between ages 1 and 2 was 29% and between ages 2 and 3 was 19%; however, we were unable to determine the proportion of dropouts who were income-eligible at different ages because income-eligibility was determined only at the time of the survey. The children who dropped out were significantly less likely to be fully immunized than children who continued in WIC (72% vs. 77%, respectively; p<0.05) (Table 1, adjusted for age). Vaccination coverage was highest among those children who had never been on WIC and were not income-eligible, i.e., those children with higher socioeconomic status. Only 6% of the population was eligible for WIC but had never made use of the program.

Risk Factors for Children Dropping Out of WIC. We looked at all the children who had participated in WIC at some point in their lives (current and former WIC recipients) and were income-eligible at the time of the NIS interview. Higher socioeconomic status (income greater than 100% of the federal poverty level); being white, black, or American Indian; residing in a suburban or urban area; mother never having been married or widowed/divorced/separated; age of mother less than 30 years; higher education level of mother (at least a high school graduate); having only 1 child in the household; and index child at least 2 years of age were significantly associated with dropping out of the WIC program (p<0.05) (Table 2). Multivariate logistic regression confirmed these findings except that education of mother was no longer significant (Table 2). Children with all the characteristics found to be

Table 2.

BIVARIATE AND MULTIVARIATE ANALYSIS OF RISK FACTORS ASSOCIATED WITH CHILDREN DROPPING OUT OF THE WIC PROGRAM AND CHILD/FAMILY SOCIODEMOGRAPHIC CHARACTERISTICS [a] (N = 7,886)

Child/Family Characteristic	n	Percent of Children Dropping out of WIC (weighted percent)	R.R. (95% CI)[b]	ARR (95% CI)[b]
Poverty status				
>100% federal poverty	3,574	51	Ref	Ref
<100% federal poverty	4,307	39	0.76 (0.70, 0.83)	0.76 (0.70, 0.83)
Race/ethnicity				
Hispanic	2,332	38	0.80 (0.72, 0.88)	0.83 (0.75, 0.92)
White, non-Hispanic	3,089	48	Ref	Ref
Black, non-Hispanic	2,043	47	0.98 (0.89, 1.08)	0.95 (0.85, 1.05)
American Indian/ Alaska Native	178	48	1.01 (0.80, 1.27)	1.06 (0.84, 1.33)
Asian	235	37	0.77 (0.57, 1.05)	0.79 (0.61, 1.03)
Other	4	0.00	0.00	0.00
Gender				
Male	4,031	43	0.98 (0.90, 1.06)	NA
Female	3,850	44	Ref	NA
Age of Mother				
<=19 yrs	452	43	0.93 (0.79, 1.10)	0.94 (0.79, 1.11)
20–29 yrs	4,801	47	Ref	Ref
30+ yrs	2,628	39	0.83 (0.76, 0.91)	0.87 (0.79, 0.95)
Marital status of mother				
Widowed/divorced/ separated	1,092	45	0.93 (0.83, 1.05)	0.98 (0.87, 1.11)
Never married	2,838	48	Ref	Ref
Married	3,943	41	0.85 (0.78, 0.92)	0.85, 0.77, 0.94)
Deceased	8	20	0.42 (0.11, 1.63)	0.38 (0.09, 1.66)
Education of mother				
<12 yrs	1,965	38	0.81 (0.70, 0.93)	0.89 (0.77, 1.03)
12 yrs	3,352	46	0.96 (0.84, 1.09)	0.96 (0.85, 1.09)
>12 yrs, non-college graduate	1,693	47	0.98 (0.86, 1.13)	0.97 (0.85, 1.11)
College graduate	871	48	Ref	Ref

Table 2. Continued

Child/Family Characteristic	n	Percent of Children Dropping out of WIC (weighted percent)	R.R. (95% CI)[b]	ARR (95% CI)[b]
Number of Children 18 yrs. old or younger in household				
1 child	1,763	52	Ref	Ref
2–3 children	4,655	42	0.81 (0.74, 0.88)	0.83 (0.76, 0.91)
4+ children	1,463	39	0.74 (0.65, 0.84)	0.83 (0.73, 0.95)
Mobility				
Moved from different state	701	49	Ref	NA
Did not move from different state	7,180	43	0.89 (0.78, 1.01)	NA
Metropolitan Statistical Area				
MSA, central city (urban)	4,074	45	0.98 (0.89, 1.07)	0.98 (0.89, 1.07)
MSA, non central city (suburban)	1,905	46	Ref	Ref
non MSA (rural)	1,902	40	0.87 (0.78, 0.97)	0.82 (0.73, 0.91)
Age of child				
19–24 mo	2,945	39	0.83(0.75,0.91)	0.83 (0.76,0.91)
25–29 mo	2,286	45	0.98 (0.87, 1.05)	0.97 (0.89, 1.07)
30–35 mo	2,650	47	Ref	Ref

R.R., Relative Risk; CI, Confidence Interval; NA, Not Applicable, means that variable was not significant on bivariate and was not included in multivariate model.
[a] Includes all children who had participated in WIC at some point in their lives and are income-eligible for the WIC program.
[b] Relative Risks in **Bold** are statistically significantly different from 1, indicating that the percent of children who drop out of the WIC program with these characteristics differs from the percent of children who drop out of the WIC program with the characteristics in the reference categories (Ref).

associated with dropping out of WIC (n=281) on multivariate analyses had similar UTD status compared with children without these characteristics (n=5425) (73.6% + 8.7 vs. 71.6% + 1.9, respectively).

Risk Factors for Not Being UTD Among Current WIC Participants. Black and Asian race, moving from another state since birth, younger age of the index child, mother with less than a high school education, and having 2 or more children under 18 years old living in the household were each significantly associated with the child being underimmunized (p<0.05) (Table 3). Lower-income children in WIC were not more likely to be underimmunized. Multivariate logistic regression confirmed these findings (Table 3). Children with all the characteristics found to

Table 3.

BIVARIATE AND MULTIVARIATE ANALYSIS OF UP-TO-DATE (UTD) STATUS AND CHILD/FAMILY SOCIODEMOGRAPHIC CHARACTERISTICS [a] (N=5,887)

Child/Family Characteristic	n	Percent of Children UTD (weighted percent)	R.R (95% CI)[b]	ARR (95% CI)[b]
Poverty status				
>185% federal poverty	29	78	1.02 (0.81, 1.29)	NA
<185% but >100% federal poverty	2,325	79	1.03 (0.98, 1.08)	NA
<100% federal poverty	2,661	77	Ref	NA
Unknown	872	73	0.95 (0.87, 1.04)	NA
Race/ethnicity				
Hispanic	1,928	77	0.97 (0.92, 1.02)	1.00 (0.94, 1.05)
White, non Hispanic	2,182	80	Ref	Ref
Black, non Hispanic	1,437	74	**0.92 (0.87, 0.98)**	**0.91 (0.86, 0.97)**
American Indian/ Alaska Native	135	77	0.97 (0.86, 1.10)	0.95 (0.85, 1.08)
Asian	200	60	**0.75 (0.57, 0.99)**	**0.78 (0.61, 0.98)**
Other	5	42	0.52 (0.11, 2.35)	0.51 (0.13, 2.03)
Gender				
Male	3,037	77	0.99 (0.94, 1.04)	NA
Female	2,850	77	Ref	NA
Age of mother				
<=19 years	362	73	0.92 (0.82, 1.04)	NA
20–29 years	3,414	76	0.96 (0.91, 1.01)	NA
30+ years	2,111	79	Ref	NA
Marital status of mother				
Widowed/divorced/ separated	762	78	Ref	NA
Never married	2,047	77	1.00 (0.92, 1.08)	NA
Married	3,070	76	0.98 (0.91, 1.06)	NA
Deceased	8	77	0.99 (0.67, 1.46)	NA
Education of mother				
<12 yrs	1,617	74	**0.90 (0.83, 0.98)**	**0.90 (0.82, 0.98)**
12 yrs	2,426	77	0.95 (0.88, 1.03)	0.94 (0.88, 1.02)
>12 yrs, non-college graduate	1,189	81	0.99 (0.92, 1.07)	0.99 (0.92, 0.07)
College graduate	655	81	Ref	Ref

Table 3. Continued

Child/Family Characteristic	n	Percent of Children UTD (weighted percent)	R.R. (95% CI)[b]	ARR (95% CI)[b]
Number of children ≤18 yrs in household				
1 child	1,341	83	Ref	Ref
2–3 children	3,441	75	**0.91 (0.86, 0.96)**	**0.90 (0.86, 0.95)**
4+ children	1,105	75	**0.91 (0.85, 0.97)**	**0.92 (0.86, 0.99)**
Mobility				
Moved from different state	493	62	**0.78 (0.68, 0.89)**	**0.77 (0.68, 0.88)**
Did not move from different state	5,394	79	Ref	Ref
Metropolitan Statistical Area				
MSA, Central city (urban)	3,045	76	0.95 (0.90, 1.01)	NA
MSA, non Central city (suburban)	1,396	76	0.96 (0.90, 1.02)	NA
non MSA (rural)	1,446	80	Ref	NA
Age of child				
19–24 mo	2,410	74	**0.93 (0.88, 0.99)**	**0.92 (0.87, 0.97)**
25–29 mo	1,662	78	0.98 (0.93, 1.04)	0.99 (0.93, 1.04)
30–35 mo	1,815	79	Ref	Ref

R.R., Relative Risk; CI, Confidence Interval; NA, Not Applicable, means that variable was not significant on bivariate and was not included in Multivariate model.
[a] Includes only current WIC participants.
[b] Relative Risks in **Bold** are statistically significantly different from 1, indicating that the percent of children who are UTD with these characteristics differs from the percent of children who are UTD in the reference-categories (Ref).

be associated with underimmunization (n=136) on multivariate analyses were significantly less well immunized than children without these characteristics (n=5,751) (60.8% + 11.9 vs. 77.4% + 1.9, respectively).

Characteristics of Eligible Children Who Never Enrolled in WIC. Of all income-eligible children, 14% had never made use of the WIC program. This number differs from the 6% referred to in Table 1 as being eligible but not making use of WIC because there were a number of current and previous WIC participants who were not income-eligible and were thus removed from this analysis. Higher socioeconomic status (income greater than 100% of the federal poverty level); race other than black, Hispanic or American Indian; age of mother 30 years or older; mother married or deceased; mother's education college graduate; 2–3 children under 18 years old residing in the household and suburban residence were significantly associated with never having used the WIC program (Table 4). Multivariate logistic regression

Table 4.

BIVARIATE AND MULTIVARIATE ANALYSIS OF CHILD/FAMILY SOCIODEMOGRAPHIC CHARACTERISTICS AND NEVER ENROLLING IN WIC[a] (N = 9,222)

Child/Family Characteristic	n	Percent of Eligible Children in WIC (weighted percent)	R.R. (95% CI)[b]	ARR (95% CI)[b]
Poverty status				
>100% federal poverty	4,557	21	Ref	Ref
<100% federal poverty	4,665	8	0.39 (0.33, 0.47)	0.59 (0.49, 0.71)
Race/ethnicity				
Hispanic	2,574	9	0.45 (0.36, 0.55)	0.60 (0.48, 0.74)
White, non Hispanic	3,969	20	Ref	Ref
Black, non Hispanic	2,169	7	0.33 (0.24, 0.44)	0.45 (0.33, 0.63)
American Indian/ Alaska Native	196	11	0.56 (0.32, 0.98)	0.65 (0.37, 1.16)
Asian	308	30	1.47 (1.08, 2.00)	1.23 (0.90, 1.67)
Other	6	14	0.69 (0.09, 5.42)	0.85 (0.08, 9.44)
Gender				
Male	4,720	14	0.99 (0.85, 1.15)	NA
Female	4,502	14	Ref	NA
Age of mother				
≤19 yrs	471	5	0.25 (0.12, 0.53)	0.60 (0.27, 1.29)
20–29 yrs	5,408	11	0.54 (0.46, 0.63)	0.70 (0.60, 0.82)
≥30 yrs	3,343	20	Ref	Ref
Marital status of mother				
Widowed/divorced/ separated	1,242	12	0.65 (0.51, 0.82)	0.81 (0.64, 1.02)
Never married	3,018	6	0.31 (0.25, 0.40)	0.58 (0.44, 0.76)
Married	4,951	19	Ref	Ref
Deceased	11	39	2.07 (0.87, 4.94)	2.44 (1.10, 5.41)
Education of mother				
<12 yrs	2,109	7	0.23 (0.18, 0.31)	0.39 (0.29, 0.51)
12 yrs	3,833	13	0.44 (0.36, 0.53)	0.57 (0.47, 0.69)
>12 yrs, non-college graduate	2,052	18	0.59 (0.48, 0.73)	0.68 (0.55, 0.83)
College graduate	1,228	30	Ref	Ref
Number of children ≤18 yrs in Household				
1 child	1,999	11	0.74 (0.60, 0.91)	0.92 (0.74, 1.14)
2–3 children	5,503	15	Ref	Ref
4+ children	1,720	14	0.90 (0.74, 1.10)	0.95 (0.78, 1.15)

Table 4. Continued

Child/Family Characteristic	n	Percent of Eligible Children in WIC (weighted percent)	R.R. (95% CI)[b]	ARR (95% CI)[b]
Mobility				
Moved from different state	838	14	0.97 (0.76, 1.24)	
Did not move from				
different state	8,384	14	Ref	
Metropolitan Statistical Area				
MSA, Central city (urban)	4,616	12	0.68 (0.57, 0.81)	0.87 (0.73, 1.04)
MSA, non Central city				
(suburban)	2,342	17	Ref	Ref
non MSA (rural)	2,264	13	0.75 (0.62, 0.92)	0.72 (0.60, 0.88)
Age of child				
19–24 mo	3,388	13	0.85 (0.71, 1.02)	NA
25–29 mo	2,705	15	0.98 (0.81, 1.19)	NA
30–35 mo	3,129	15	Ref	NA

R.R., Relative Risk; CI, Confidence Interval; NA, Not Applicable, means that variable was not significant on bivariate and was not included in Multivariate model.
[a] Includes all children who are income-eligible for WIC (<185% federal poverty)
[b] Relative Risks in **Bold** are statistically significantly different from 1, indicating that the percent of children who access the WIC program with these characteristics differs from the percent of children who access the WIC program with the characteristics in the reference categories (Ref).

showed similar findings although the number of children 18 years old and younger residing in household was no longer significant (Table 4). Children with all the characteristics found to be associated with not using WIC (n=58) on multivariate analyses did not differ significantly in UTD status compared with children lacking these characteristics (n=1,265) (80.4% + 12.1 vs. 70.5% + 3.9, respectively).

Discussion

This study confirms that many children (~50%) drop out of the WIC program during the first several years of life and that these are the children most at risk for being underimmunized. We also found that certain family and child characteristics can be used to identify and target the children most likely to drop out or not to make use of the WIC program, as well as children who remain in WIC but are most at risk for being underimmunized. Although they constituted the least well-immunized population, our study found very few children eligible for WIC who had never participated in the program (6%). The more affluent children, those who had never participated in WIC and were not income-eligible, were the best

immunized, confirming that WIC remains one of the best places to target at-risk low-income children in this country, capturing almost 50% of the U.S. birth cohort that was collected by the NIS.

Children most at risk for dropping out of WIC included those of higher socioeconomic status, from a single-parent family (widowed/divorced/separated/ or never married), or residing in a household with no other children. Since we excluded children who were not income-eligible for WIC, income was not a possible reason for dropping out of WIC. These findings suggest several reasons that might explain why these children drop out of WIC: the higher socioeconomic status might indicate that the parent was now working and either was not aware that the family was eligible for WIC and/or that time constraints for a single working parent did not allow the parent to visit the WIC site as easily.

Children most at risk for underimmunization among current WIC participants were found to be black or Asian, reside in a household with at least 1 other child, have mothers with relatively less education, and belong to a family that had moved from a different state since the child's birth. Interestingly, children of lower socioeconomic status within WIC (i.e., family income below 100% of federal poverty level) were not more likely to be underimmunized, even though poverty is a known risk factor for underimmunization. Child's age is known to be associated with immunization status (i.e., typically, a 35-month-old is better immunized than a 19-month-old because they have had more time to receive the same vaccines);[14] our study also found younger age of the index child to be a risk factor for underimmunization within the WIC population. Staff of WIC programs should be aware that mothers with multiple children might need added support and encouragement regarding immunizations.

Children most at risk for never enrolling in or using WIC (despite being income-eligible) were found to be of higher socioeconomic status and of a race other than black or Hispanic, and to have mothers who were married, better educated, and lived in the suburbs. These findings suggest that parents who do not make use of WIC may fail to do so as a result of the parent not knowing that she is eligible for the program or of the parent avoiding participation in the program because of possible stigma associated with participating in a federal assistance program.

Since many of the child and family characteristics considered here are routinely collected by WIC staff and stored in the automated or paper system maintained by WIC for each client, knowledge of these characteristics can be used to identify and target the most at-risk children in WIC. For example, if resources are limited, immunization-promoting activities can be targeted to those children in WIC who are less likely to be fully immunized, such as minority children or children who have other siblings residing in the household. Outreach activities in WIC can be targeted to those children more likely to drop out of WIC (e.g., by means of phone reminders to bring these children back in for appointments and to emphasize eligibility requirements). Similarly, outreach activities to bring non-participating eligible mothers and children into WIC through posters or media campaigns could also be tailored to better capture the population at risk.

A recently published study found a similar relationship between whether or not the child participated in WIC and immunization status,[1] but in that study there was some variability among states, with 12 states having higher immunization rates among WIC—compared with non-WIC—enrolled children. This finding of higher immunization rates among WIC enrollees has also been demonstrated in some locally conducted studies[19] and most likely depends on other ongoing efforts in WIC to promote immunization or community efforts that may be targeting children of lower socioeconomic status who are also enrolled in WIC.

We know of no other published studies that have specifically looked at the association between child/family characteristics of children in WIC and dropping out from or not making use of the WIC program. Two locally conducted studies, however, have looked at risk factors for lack of immunization in WIC.[6,20] In New York City, these 2 studies used a logistic regression model and found only young age of child (23 months and younger compared with 24–59 months) to be a risk factor for underimmunization in WIC. In contrast to our study, race/ethnicity was not found to be a risk factor.

Several of the risk factors we found to be markers for undervaccination among children currently participating in WIC have also been found in other studies to be markers for undervaccination among preschool children in the general population, including being a member of a minority group, having more than one immunization provider (which could result from a child moving from a different state), larger family size, and lower parental education.[2,21-24] Overall, national data shows that poverty remains one of the most reliable markers for lower coverage rates among children in the general population[25,26] and is consistent with our finding of lower coverage among impoverished children participating in WIC.

The study was limited by the child and family characteristics captured through the NIS. It is likely that local WIC programs could have different risk factors associated with their client population. This could be a result of ongoing efforts in the community-or state-level immunization and WIC-promoting activities. Thus, our conclusions may not be applicable in other locations and with different populations.

The determination of which strategies to use in WIC and which at-risk children to target will depend on local expertise and feasibility. Findings from our study should serve as a knowledge base so programs can develop locally relevant, targeted outreach and interventions.

In response to the White House Executive Memorandum (December 11, 2000), WIC sites continue to implement immunization activities at all WIC sites nationwide. Although these immunization activities can be powerful in improving the health and immunization status of our most vulnerable population, they can also be resource intensive. We recommend that state or local WIC and immunization programs compare our findings with state and locally collected data, when available, in order to further refine outreach efforts and utilize resources more efficiently to target the most at-risk children in WIC and to keep these children in WIC so they can continue to get necessary nutritional and immunization benefits.

Notes

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