A Section 508–conformant HTML version of this article is available at https://doi.org/10.1289/EHP2384.

WIC Participation and Blood Lead Levels among Children 1–5 Years: 2007–2014

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Background: The CDC recommends a targeted strategy for childhood blood lead screening based on participation in federal programs, such as Medicaid and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Yet, there is scarcity of data on blood lead levels (BLLs) among WIC participants.

Objective: Our objective was to investigate whether children participating in WIC and not enrolled in Medicaid, who have not been targeted in the historical Medicaid-focused screening strategy, have higher BLLs than children in neither of these programs.

Methods: The analysis included 3,180 children 1–5 y of age in the National Health and Nutrition Examination Surveys conducted in 2007–2014. Log-binomial regression, which allows direct estimation of prevalence ratios, was used to examine associations between WIC participation (in conjunction with Medicaid enrollment) and having BLLs ≥5 μg/dL with adjustment for age (1–2 vs. 3–5 y).

Results: The percentage of children participating in "WIC only," "Medicaid only," "both WIC and Medicaid," and "neither" were 18.9%, 10.8%, 25.4%, and 44.9%, respectively. "WIC only," "Medicaid only," and "both WIC and Medicaid" children were more likely to have BLLs ≥5 μg/dL than children who were not enrolled in either program, with adjusted prevalence ratios of 3.29 [95% confidence interval (CI): 1.19, 9.09], 4.56 (95% CI: 2.18, 9.55), and 2.58 (95% CI: 1.18, 5.63).

Conclusions: Children participating in WIC but not Medicaid were more likely to have BLLs ≥5 μg/dL than children who were not enrolled in either program. These findings may inform public health recommendations and clinical practice guidelines. https://doi.org/10.1289/EHP2384

Introduction

The main strategy for the prevention of childhood lead poisoning in the United States has been targeted early detection, followed by interventions to reduce exposure (CDC 1997; Wengrovitz and Brown 2009). Beginning in 1989, as a key element of this strategy, the Centers for Medicare and Medicaid Services (CMS) required that all Medicaid-enrolled children be screened for blood lead levels (BLLs) at 12 and 24 months of age (U.S. Congress, Social Security Act 1989). This requirement was based on an important determinant of high BLL: living in older, poorly maintained housing with surfaces coated with lead paint and other sources of lead such as lead piping and solder (U.S. EPA 2013). Economically disadvantaged families eligible for public assistance, such as Medicaid, are likely to live in such housing (Wengrovitz and Brown 2009).

There has been a gradual expansion in screening beyond the earlier strategy of universal blood lead screening of Medicaid-enrolled children (Wengrovitz and Brown 2009). CDC blood lead screening recommendations, updated in 1997, 2009, and 2012 encouraged state and local agencies to explore different ways to target subgroups of children with greater likelihood of having high BLLs (CDC 1997, 2012a; Wengrovitz and Brown 2009). Following the CDC recommendations issued in 2012 (CDC 2012a), the CMS began to allow states to switch from universal screening of Medicaid-enrolled children to using a customized approach based on the local distribution pattern of high BLLs across various subgroups of young children (CMS 2012). Children participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) have been identified as an additional target in the CDC recommendations (CDC 1997; Wengrovitz and Brown 2009). WIC, a federal program, provides supplemental foods, nutrition education, and health care referrals (including a referral for a blood lead test required in the absence of an existing test result) to low-income pregnant and postpartum women and infants and children up to 5 y of age through state-level grants (M. Kealey, written communication, January 2015) and (USDA 2015a). There has been a scarcity of reports regarding BLLs on WIC participants (General Accounting Office 1998; Zierold and Anderson 2004). This study aimed to investigate whether children participating in WIC and not enrolled in Medicaid have higher BLLs than children in neither of these programs.

Methods

Design and Population

This is a cross-sectional analysis of U.S. children, 1–5 y of age, using data from the National Health and Nutrition Examination Survey (NHANES), conducted by the National Center for Health Statistics (NCHS) (CDC 2017). NHANES is based on a representative sample of the U.S. noninstitutionalized civilian population selected through a multistage probability design. Since 1999, NHANES has been conducted annually and released in 2-y cycles. The survey includes household interviews and examinations, with whole blood collection through venipuncture, at mobile examination centers. Participants ≥1 y of age were eligible for venipuncture. A family member answered a questionnaire for children <5 y of age. For the four 2-y NHANES data releases from 2007 to 2014, examination response rates for children 1–5 y of age ranged from 74.6% to 86.8% (CDC 2015). The surveys were approved by the NCHS Ethics Review Board, and written parental consent was obtained for children <5 y of age.

Blood Lead

Whole blood samples were collected by venipuncture and stored frozen at −20°C or lower until analyzed for whole blood lead at the National Center for Environmental Health, CDC, Atlanta, Georgia, using inductively coupled plasma mass spectrometry

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Supplemental Material is available online (https://doi.org/10.1289/EHP2384).

The authors declare they have no actual or potential competing financial interests.

Received 22 June 2017; Revised 30 May 2018; Accepted 3 June 2018; Published 29 June 2018.

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with a lower limit of detection of 0.07 μg/dL (Jones et al. 2017). BLLs were dichotomized, ≥ versus <5 μg/dL, based on the reference value defined by CDC in 2012 (CDC 2012a). For this study, a BLL ≥5 μg/dL was defined as a high BLL. The reference value of 5 μg/dL was the 97.5th percentile for children 1–5 y of age observed in NHANES 2009–2012 (CDC 2012b). Increment in BLLs below 5 μg/dL has been associated with lower intellectual function (Lanphear et al. 2005; Skerfving et al. 2015).

WIC Participation and Medicaid Enrollment

WIC participation was determined by a home interview question: "Did the survey participant receive benefits from WIC, that is, the Women, Infants, and Children program, in the past 12 months?" Medicaid enrollment status was determined based on a positive response to either of the two home interview questions: "Is the survey participant covered by Medicaid?" and "Is the survey participant covered by SCHIP (State Children's Health Insurance Program)?" Based on self-reported WIC and Medicaid statuses, a combined WIC/Medicaid status variable with four categories ("WIC and Medicaid," "WIC only," "Medicaid only," and "neither") was derived. We also examined high BLL among low-income children whose parents or guardians did not report participation in WIC or enrollment in Medicaid, using the WIC eligibility criteria of a family income-to-poverty ratio (FIPR) of ≤1.85. The FIPR was calculated using the family income reported in the NHANES interview and the Department of Health and Human Services' poverty guidelines. The analysis of children who were not in either WIC or Medicaid compared those children with an FIPR ≤1.85 (income eligible for WIC) to those with an FIPR >1.85 (income ineligible for WIC) or missing family income data.

Other Variables

Age, race/Hispanic origin, and urbanization have been associated with BLLs in previous studies (Akkus and Ozdenerol 2014; Wheeler and Brown 2013). Age in years was recorded at the time of the NHANES household interview and was used as a discrete variable and dichotomized as 1–2 versus 3–5 y of age because CMS has required universal screening by Medicaid of children at 1 and 2 y of age. Race/Hispanic origin groups were non-Hispanic white, non-Hispanic black, Mexican American, and other (other Hispanic and all other combined including multiracial). Urbanization, based on the county of residence and the 2006 NCHS Urban–Rural Classification Scheme for Counties (Ingram and Franco 2012), was defined as large metro (large central metropolitan and large fringe metropolitan), medium metro (medium metropolitan and small metropolitan), and rural (micropolitan and noncore). Urbanization was not included in the public use NHANES data files due to disclosure reasons but is accessible through the NCHS Research Data Center (https://www.cdc.gov/rdc/).

Analytic Sample

A total of 4,685 children 1–5 y of age were examined in NHANES 2007–2014. Of those, 1,501 had missing blood lead data (largely due to parental refusal for phlebotomy), 9 had missing reported WIC status, and 1 had missing county of residence (some were missing >1 of these variables). The remaining 3,180 children 1–5 y of age with complete data made up the analytic sample for this study. The age range of 1–5 y has been typically used in previous studies of blood lead in young children (Kaufmann et al. 2000; Wengrovitz and Brown 2009; Wheeler and Brown 2013) and coincides with WIC eligibility age criterion (i.e., up to the fifth birthday) (USDA 2015a), given the time window for which WIC participation was determined in this study (i.e., the past 12 months prior to the home interview).

Statistical Analysis

All results, excepted for the reweighted results, were weighted using publicly available examination weights to account for different probabilities of selection, nonresponse, and noncoverage (Johnson et al. 2013). The reweighted analyses were weighted using the publicly available examination weights modified to reflect the population composition by domains defined by survey cycle, age in years, race/Hispanic origin, and sex, which was intended by the design of NHANES. Variances of estimates were calculated using Taylor series linearization per NHANES analysis guidelines, incorporating the complex sample design. We used prevalence ratios primarily as measures of association. Wald tests for testing group differences were performed on log (prevalence ratio), as was construction of confidence intervals (CIs) with back-transformation. Stata (version 13.0; College Station, TX) was used for all analyses.

Log-binomial regression (Skov et al. 1998), unlike logistic regression, allows direct estimation of prevalence ratios and was used to model associations between WIC/Medicaid status and high BLL prevalence, with or without adjustment for age (1–2 vs. 3–5 y). We were primarily interested in the association among children 1–2 y of age, that is, the age range historically targeted in childhood blood lead screening (U.S. Congress, Social Security Act 1989; CDC 1997; Wengrovitz and Brown 2009). This historical target age range was based on the fact that the mouthing behavior leading to ingestion of lead dust and chips is most frequent for these ages with the highest BLLs observed at approximately 2 y of age (Tong et al. 1996), providing opportunities to prevent mouthing-related exposure through measures such as lead abatement/removal and residential relocation. Beyond 2 y of age, BLLs tend to decline with diminishing options for specific exposure-reducing intervention (CDC 2012b). A simple and obvious approach for obtaining results directly relevant to 1–2 y of age (i.e., to limit the age of the analytic sample to 1–2 y) was considered but eventually not chosen as the main approach because it would have resulted in a substantial reduction in sample size. Instead, we performed age-adjusted analyses using the wider age range (1–5 y), but examined: *a*) potential effect modification by age by fitting an expanded model with age (1–2 vs. 3–5 y) and WIC/Medicaid status interaction terms and comparing a model with and without the interaction terms, and *b*) differences between unadjusted and adjusted prevalence ratios. In the absence of effect modification by age, age-adjusted prevalence ratios would represent the association between WIC/Medicaid status and high BLL for all children in the study, including children in the 1- to 2-y age range. Race/Hispanic origin and urbanization of residence have also been associated with BLLs (Akkus and Ozdenerol 2014; Wheeler and Brown 2013). Therefore, we repeated models after adjusting for these factors in addition to age and compared the resulting estimates to those from the primary model. These models with adjustment for race/Hispanic origin and/or urbanization were considered secondary to the primary model without such adjustment because our primary aim was to compare actual population prevalence rather than to estimate the association between WIC/Medicaid status and high BLL while holding other population characteristics constant. We also examined the effect modification of WIC/Medicaid status–high BLL association by race/Hispanic origin and/or urbanization by fitting an expanded model with product terms representing the interaction between WIC/Medicaid status and candidate effect modifiers and testing all coefficients for the product terms being zero.

Sensitivity Analysis

To assess possible nonresponse bias due to missing blood lead measurements indirectly, we compared results based on two weighting schemes: (*a*) using publicly available examination weights, and (*b*) "reweighting" (also known as "poststratification adjustment") (Korn and Graubard 1999) using examination weights modified to restore the national-level population composition intended in NHANES' design.

Results

The sensitivity analysis revealed that reweighting resulted in relatively small changes (Tables 1–3; see also Tables S1–S3), specifically, within ±15% for the estimated prevalence ratios (Tables 2–3; see also Tables S2–S3). Therefore, we report results based on the unmodified publicly available examination weights.

The characteristics of the study population are shown in Table 1. Less than half (44.3%) of all the children 1–5 y of age participated in WIC (including those who were also enrolled in Medicaid). About one quarter (25.4%) of all the children were part of both federal assistance programs. Although WIC participation and Medicaid enrollment overlapped, 18.9% of the children were "WIC only" and 10.8% were "Medicaid only." Approximately one-tenth (10.1%) of the children were not in WIC or Medicaid yet were determined to be eligible for WIC participation according to their FIPR. WIC participation and Medicaid enrollment by age are shown in Figure S1. The proportion of WIC participants (represented by "WIC only" and "WIC and Medicaid") tended to decrease with age, whereas the proportion of Medicaid enrollees did not show this pattern.

The prevalence of high BLL (≥5 μg/dL) in different population groups is also shown in Table 1. Overall, the prevalence of high BLL was 1.9% (95% CI: 1.3, 2.9) for the combined 8-y period. The estimated prevalence of high BLL was highest for non-Hispanic black children and lowest for Mexican American children, although neither of these estimates was statistically different from the estimate for non-Hispanic white children. The prevalence of high BLL was greater in WIC-participating children [2.6% (95% CI: 1.7, 3.8)] than in nonparticipating children [1.4% (95% CI: 0.7, 2.9)], although not significantly so ($p = 0.11$). Medicaid-enrolled children had a greater prevalence of high BLL than non-Medicaid–enrolled children [2.7% (95% CI: 1.9, 4.0) vs. 1.5% (95% CI: 0.9, 2.5)]. Based on the four WIC/Medicaid categories, the prevalence of high BLL was greater for "WIC only" [2.9% (95% CI: 1.5, 5.7)], "Medicaid only" [3.7% (95% CI: 1.6, 8.2)], and "both WIC and Medicaid" [2.3% (95% CI: 1.6, 3.5)] compared with "neither" [0.8% (95% CI: 0.4, 1.9)]. Children who were income-eligible for WIC in the "neither" category had a prevalence of high BLL greater than the rest of "neither" children [2.3% (95% CI: 1.0, 5.2) vs. 0.4% (95% CI: 0.1, 1.8), $p = 0.04$].

Prevalence ratios unadjusted and adjusted for age for the mutually exclusive four-categorization of WIC/Medicaid status

Table 1. Sample size, weighted percentage distribution, and prevalence of high BLLs by selected characteristics for U.S. children 1–5 y of age, NHANES 2007–2014.

Characteristics	Sample size and percentage distribution		Prevalence of BLLs ≥5 μg/dL	
	n	%	% (95% CI)	*p*-Value[a]
Total	3,180	100.0	1.9 (1.3, 2.9)	
Age at screening (y)				
1–2	1,453	37.5	2.5 (1.7, 4.6)	(Reference)
3–5	1,727	62.5	1.6 (1.4, 3.8)[b]	0.16
Sex				
Male	1,669	51.0	2.1 (1.3, 3.4)	(Reference)
Female	1,511	49.0	1.7 (1.1, 2.6)	0.35
Race/Hispanic origin[c]				
Non-Hispanic white	871	48.8	1.9 (0.9, 4.0)[b]	(Reference)
Non-Hispanic black	756	14.9	4.0 (2.8, 5.9)	0.07
Mexican American	841	19.0	1.1 (0.5, 2.3)[b,d]	0.36
WIC status				
Not participated	1,381	55.7	1.4 (0.7, 2.9)[b]	(Reference)
Participated	1,799	44.3	2.6 (1.7, 3.8)	0.11
Medicaid status				
Not enrolled	1,716	63.8	1.5 (0.9, 2.5)	(Reference)
Enrolled	1,464	36.2	2.7 (1.9, 4.0)	0.007
WIC/Medicaid status				
Neither	1,015	44.9	0.8 (0.4, 1.9)[b]	(Reference)
WIC only	701	18.9	2.9 (1.5, 5.7)[b]	0.02
Medicaid only	366	10.8	3.7 (1.6, 8.2)[b]	<0.001
Both WIC and Medicaid	1,098	25.4	2.3 (1.6, 3.5)	0.01
WIC eligibility[e] among neither in WIC/Medicaid				
Not eligible or unknown	725	34.7	0.4 (0.1, 1.8)	(Reference)
Eligible	290	10.1	2.3 (1.0, 5.1)	0.04
Urbanization				
Large metro	1,798	49.0	1.5 (1.0, 2.2)	(Reference)
Medium and small metro	852	29.7	2.6 (1.2, 5.8)[b]	0.21
Non-metro	530	21.3	2.0 (0.9, 4.3)[b]	0.50

Note: Large metro, MSAs with a population of 1 million or more; Medium and small metro, MSAs with a population of less than 1 million; MSA, metropolitan statistical areas; Non-metro, outside of MSAs; RSE, relative standard error.

[a]*p*-Value for testing difference from reference category.

[b]RSE >30%. NHANES-based estimates with RSE >30% historically have been considered unreliable (Johnson et al. 2013).

[c]Estimates were not shown separately for children of other race/Hispanic origin groups because the design of NHANES does not allow reliable estimation for them due to small sample size.

[d]Statistically significant difference from non-Hispanic black ($p = 0.002$).

[e]WIC eligibility was determined by a family income-to-poverty ratio (based on family income reported by child participant's family member) ≤1.85.

Table 2. Unadjusted and adjusted prevalence ratios (95% CIs) for high BLLs ≥5 μg/dL among children 1–5 y of age: United States, 2007–2014.

WIC/Medicaid status	Unadjusted prevalence ratio (95% CI)	Adjusted prevalence ratio[a] (95% CI)
Neither	1.00 (reference)	1.00 (reference)
WIC only	3.49 (1.28, 9.57)[b]	3.29 (1.19, 9.09)[c]
Medicaid only	4.35 (2.04, 9.28)[b]	4.56 (2.18, 9.55)[c]
Both	2.78 (1.24, 6.25)[b]	2.58 (1.18, 5.63)[c]

[a]Adjusted for age (1–2 vs. 3–5 y of age).
[b]No statistically significant difference across three unadjusted prevalence ratios ($p = 0.66$).
[c]No statistically significant difference across three adjusted prevalence ratios ($p = 0.45$).

are shown in Table 2. "WIC only," "Medicaid only," and "Both WIC and Medicaid" children had greater prevalence of high BLL than children who did not participate in either program (reference) with adjusted prevalence ratios (aPRs) of 3.29 (95% CI: 1.19, 9.09), 4.56 (95% CI: 2.18, 9.55), and 2.58 (95% CI: 1.18, 5.63), respectively. The difference between these three aPRs was not statistically significant ($p = 0.45$, based on testing whether all of the three prevalence ratios are the same), possibly due to very wide confidence intervals.

There was little evidence that age was an effect modifier of the association between WIC/Medicaid status and high BLL (interaction $p = 0.24$) (Table 3). Comparisons of unadjusted versus adjusted prevalence ratios revealed a minor impact of the age adjustment, with relative changes expressed as (unadjusted − adjusted)/adjusted being within ±10% for the three unadjusted–adjusted pairs of prevalence ratios.

No statistically significant effect modification was observed in the association between WIC/Medicaid status and high BLL by race/Hispanic origin or urbanization (see Table S4). Adjustment for race/Hispanic origin, urbanization, or both resulted in relatively minor changes (within ±13%) in prevalence ratio estimates, with relative changes expressed as (unadjusted − adjusted)/adjusted (see Table S4). These results did not materially change with reweighting (see Table S5).

Discussion

Our comparison of children by the four-category WIC/Medicaid status revealed that children in either or both federal assistance programs ("WIC only," "Medicaid only," and "WIC and Medicaid") had about three to four times greater high BLL prevalence than children who did not participate in either of the federal assistance programs, with or without adjustment for age. "WIC only" children, who accounted for about 20% of the children, were not targeted by the earlier strategy of universal blood lead screening of Medicaid-enrolled children required by CMS (U.S. Congress, Social Security Act 1989). We confirmed that the association does not vary by age group (1–2 vs. 3–5 y), and adjustment for age group did not result in a substantial change in the prevalence ratios for the association. Thus, the association between WIC/Medicaid status and high BLL observed for the entire 1- to 5-y age group would be applicable to the 1- to 2-y age group as well. As mentioned in the "Introduction," children in economically disadvantaged families receiving public assistance such as WIC and Medicaid are thought to be more likely to have higher lead exposure from lead sources present in their housing, which tends to be old and poorly maintained.

Table 3. Age group-specific prevalence ratios (95% CIs) for high BLLs ≥5 μg/dL among children 1–2 and 3–5 y of age: United States, 2007–2014.

WIC/Medicaid status	Prevalence ratio for age 1–2 y (95% CI)	Prevalence ratio for age 3–5 y[a] (95% CI)
Neither	1.00 (reference)	1.00 (reference)
WIC only	3.18 (0.88, 11.4)[b]	3.53 (0.93, 13.4)[b]
Medicaid only	2.53 (0.49, 13.1)[c]	5.31 (2.42, 11.6)[c]
Both	3.51 (1.32, 9.33)[d]	1.45 (0.37, 5.70)[d]

[a]No statistically significant interaction between age group and WIC/Medicaid status ($p = 0.24$).
[b]No statistically significant difference between the two age groups ($p = 0.90$).
[c]No statistically significant difference between the two age groups ($p = 0.42$).
[d]No statistically significant difference between the two age groups ($p = 0.26$).

It is important to note that children participating in WIC or enrolled in Medicaid do not include all children in low-income families. According to the USDA Food and Nutrition Service, which administers WIC at the federal level, among the children 1 to 4 y of age who were eligible for WIC based on family income, about half (50.2%) were not taking part in WIC in a given month in 2013 (USDA 2015b). As such, screening WIC and/or Medicaid participants would still miss some children who are income-eligible for WIC but not enrolled in either WIC or Medicaid. We found this group of children had a greater prevalence of high BLL than the children who were not participating in WIC and were income-ineligible or had unknown WIC eligibility status.

The main results from the four-category WIC/Medicaid status variable are not directly comparable to previously reported two-category comparisons regarding Medicaid enrollment or WIC participation (to our knowledge, no previous study investigated association between four-category WIC/Medicaid status and high BLL), yet the two-category comparisons of prevalence of high BLL shown in Table 1 may be compared with the previous results. We found Medicaid-enrolled children to be more likely to have higher BLLs than non-Medicaid–enrolled children, as seen in previous national-level research based on nationally representative NHANES data collected for 1988–1994 (Kaufmann et al. 2000), 1991–1994 (General Accounting Office 1998), and 1999–2010 (Wheeler and Brown 2013). Higher BLLs among WIC-participating children (vs. non-WIC–participating children) were reported in Wisconsin between 1996 and 2000 (Zierold and Anderson 2004).

At the national level, an existing mandate for WIC programs has been already playing an important role in the early detection of high BLL: Federal regulations require that the parent or caretaker of WIC-participating children be asked about blood lead screening tests and, in the absence of existing screening results, a referral to health care provider be made such that blood lead testing should occur (M. Kealey, written communication, January 2015) and (USDA 2015a). This policy may have contributed to the higher rate for lead screening among WIC-participating children than among non-WIC–participating children reported for Atlanta, Georgia (Vaidyanathan et al. 2009).

This study has some limitations. A screening strategy involving WIC-participating children as a target, if implemented, would target WIC-participating children when they first take part in WIC. Yet, the children we identified as WIC participants had taken part in WIC for some length of time. This would have rendered our estimates of WIC versus non-WIC differences biased as differences relevant to targeting WIC participants at the time they start participation. Specifically, the relevant WIC versus non-WIC differences would have been underestimated in our prevalence ratios because children's BLLs may have been lowered as a result of continued WIC participation, for example, through consumption of food rich in iron and calcium provided by WIC (USDA 2011). Sufficient intake of these metals may suppress lead absorption through the gastrointestinal tract and thereby reduce BLLs as indicated by animal (Jiao et al. 2011)

and human (Schell et al. 2004) studies. Other components of WIC, for example, education and health referrals (USDA 2015a), may also have resulted in reductions in exposure to lead over time.

A misclassification issue arises from our definitions of WIC participation and Medicaid enrollment. Conceptually, the children who have never been in WIC or Medicaid would have been an ideal reference group. Yet our actual reference group of "neither in WIC/Medicaid" included some past WIC participants and Medicaid enrollees because the WIC/Medicaid status was determined only by the questions about WIC participation in the past 12 months and Medicaid enrollment status at the time of home interview. This misclassification may have introduced bias toward the null in our estimates of differences between referent and nonreferent WIC/Medicaid groups. Even with such a bias, though, our WIC/Medicaid prevalence ratios showed statistically significant elevations of a nontrivial size from the null value, implying that the misclassification had a relatively minor impact.

Another potential source of bias is the phlebotomy response rates for the children 1–5 y of age, which may have compromised the degree to which the analytic sample was representative of the underlying population. However, reweighting based on response rates by domains defined by race/Hispanic origin, sex, and age did not materially change the estimates, indicating nonresponse bias due to differential phlebotomy response across such domains would have been relatively small.

Finally, another limitation of the study is the relatively small sample sizes for some subgroups, resulting in wide confidence intervals for the estimated prevalence of high BLL. For instance, children who were enrolled only in Medicaid accounted for $<10\%$ of the NHANES population studied, and prevalence estimates for this and other groups of relatively small sample size potentially are subject to more random error than prevalence estimates for other groups.

A strength of the present study is the use of a nationally representative sample to determine whether young children (1–2 y of age) who are enrolled in WIC but are not targeted for screening via Medicaid would benefit from an expanded screening program. We estimated age-adjusted prevalences of high BLL relevant to actual population, rather than statistically adjusting for additional covariates to estimate what the association between WIC/Medicaid status and high BLL would be if all other factors were held constant.

Conclusions

Our estimates suggest that children participating in WIC, Medicaid, or both federal assistance programs were all more likely to have high BLLs than children who were not participating in WIC nor enrolled in Medicaid. We confirmed that this finding would be applicable to children 1–2 y of age, the age range targeted by the current childhood blood lead screening required by CMS. Our results indicate that the CDC's 2012 recommendation of targeting WIC participants for screening would identify additional children with high BLL.

Acknowledgments

We thank D. Hines, M. Kealey, and G. Lovellette of the USDA Food and Nutrition Service; the USDA for their feedback on interim results and review of the manuscript; and J. Madans, B. Kit, L. Akinbami, and J. Parker for their helpful comments on the manuscript. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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