Development of a Population-specific Risk Assessment to Predict Elevated Blood Lead Levels in Santa Clara County, California

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ABSTRACT. *Objectives.* **To determine: (1) the prevalence of a blood lead level (PbB) of 10 µg/dL or greater and 20 µg/dL or greater among children aged 6 to 72 months attending the Santa Clara County (SCC), California, public clinics, (2) risk factors for elevated PbB in this population, and (3) whether an SCC public clinic population-specific risk-assessment tool and a five-question lead poisoning questionnaire developed by the Centers for Disease Control and Prevention are useful for prospectively identifying children at higher risk for elevated PbB.**

Methods. **We tested for PbB 3630 children aged 6 to 72 months attending SCC public outpatient clinics between August 8, 1991, and September 1, 1992. We then conducted two matched case-control studies. Five local risk-factor questions were combined with the CDC's five-question lead poisoning questionnaire, and from May 1, 1993, to June 30, 1993, we conducted risk assessments on 247 children tested for PbB.**

Results. **Two hundred twenty-two of 3630 children (6.1%) had a PbB of 10 µg/dL or greater. Thirty-nine (1.1%) had a PbB at least 20 µg/dL. Seventy-nine percent of the children screened and 91.0% of the children with PbB at least 10 µg/dL were Hispanic. Twenty percent of Mexican-born Hispanic children had a PbB of 10 µg/dL or greater, versus 7% of U.S.-born Hispanic children. Several factors were associated with elevated PbB among Hispanic children. For identifying children with a PbB of at least 10 µg/dL, the sensitivity and predictive value negative for the CDC's "high risk" definition were 30% and 93%, respectively, whereas for the SCC population-specific high-risk definition, the sensitivity was 90% and the predictive value negative was 98%.**

Conclusions. **Hispanic children attending SCC public clinics have risk factors for elevated PbB that were not included in the CDC's lead poisoning questionnaire. Methods for prioritizing the frequency of lead screening may be improved by combining the CDC's questions with a population-specific risk assessment. *Pediatrics* 1995;96:643–648; *Hispanic, lead, risk assessment, screening.***

ABBREVIATIONS. CDC, Centers for Disease Control and Prevention; PbB, blood lead level; SCC, Santa Clara County; PVN, predictive value negative; CI, confidence interval; OR, odds ratio; MOR, matched odds ratio.

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Blood lead screening of all U.S. children 6 to 72 months of age was recommended recently by the Centers for Disease Control and Prevention (CDC), except in areas that have a documented low prevalence of elevated blood lead levels (PbB).[1] In response to this recommendation, in the Fall of 1991 blood lead screening was initiated for all children aged 6 to 72 months who had blood drawn for a screening hemogram at a public clinic in Santa Clara County (SCC), California.

Along with universal screening for childhood lead poisoning, the CDC recommended that a five-question risk assessment be administered to parents of children to determine the frequency of lead screening. The CDC also recommended that the addition of population-specific questions to the five-question risk assessment would be useful for identifying children at high risk for an elevated PbB in areas with population-specific risk factors.[1] The population of children attending the SCC public clinics may have several geographic and ethnic-specific risk factors for an elevated PbB that differ from risk factors identified for all U.S. children.

To determine the prevalence of an elevated PbB among children attending the SCC public clinics and the risk factors associated with elevated PbB in this population, we conducted cross-sectional and case-control studies. We then used the identified risk factors to develop a population-specific risk assessment.

We report the prevalence of an elevated PbB among children attending the six public clinics in SCC, the results of studies that evaluate risk factors for an elevated PbB among Hispanic children attending these clinics, and the preliminary results of a study investigating the use of an SCC public clinic population-specific risk-assessment tool and the five-item questionnaire developed by the CDC in prospectively identifying children at higher risk for an elevated PbB.

METHODS

Population

In 1990, of SCC's 1.5 million inhabitants, 21% were Hispanic; 31% of the children less than 6 years old are Hispanic, but approximately 80% of the children attending the SCC public clinics are Hispanic.

Data Sources

Table 1 summarizes the studies conducted, including the subjects and the variables examined.

TABLE 1. Summary of Childhood Blood Lead (PbB) Studies Conducted at Santa Clara County (SCC) Public Clinics, 1991 to 1993

Study	Study No.	Subjects	Time Period	Variables Examined
Cross-sectional	1	All children aged 6 to 72 mo screened for PbB	9/1/91 to 8/31/92	Gender, age, race, season
	2	Hispanic children from study 1	9/21/91 to 12/21/91	Gender, age, country of birth, mother's primary language
Matched case-control	3	Hispanic cases (PbB 10 to 19.9 μg/dL); controls matched by age, race, and gender	4/1/92 to 8/31/92	Behavioral, environmental, and demographic factors
	4	Hispanic cases (PbB ≥ 20 μg/dL)	4/1/92 to 8/31/92	Same as study 3
Cross-sectional	5	All children aged 6 to 72 mo screened for PbB	5/1/93 to 6/30/93	Centers for Disease Control and Prevention questions; SCC risk factors

TABLE 2. Questions Used in Study 5 to Determine Child's Risk Classification for Elevated Blood Lead Level at Santa Clara County (SCC) Public Clinics, 1993

SCC definition: An answer of "yes" to at least one of questions 1 to 5 classifies the child as "high risk" by the SCC population-specific definition. No "yes" answer to all five of questions 1 to 5 classifies a child as "not high risk" by the SCC definition.

1. Does your child play in or put dirt in his/her mouth?
2. Has your child ever been in Mexico, Central America, or South America?
3. Have you ever given your child any of these home remedies? If yes, circle all that apply: Azarcon, Alarcon, Greta, Rueda, Pay-loo-Ah.
4. Do you use pottery or ceramic vessels or plates for cooking, eating, or drinking?
5. Do you live within one block of a freeway, for example, 101, 280, 880, 680, 17, or 85? (circle one)

Centers for Disease Control and Prevention (CDC) definition: An answer of "yes" to at least one of questions 6 to 10 classifies the child as "high risk" by the CDC definition. No "yes" answer to all five questions 6 to 10 classifies the child as "not high risk" by the CDC definition.

6. Does your child live in or regularly visit a house with peeling or chipping paint built before 1960?
7. Does your child live in or regularly visit a house built before 1960 with recent renovation or remodeling?
8. Has a sibling or playmate been followed or treated for lead poisoning?
9. Does your child live with an adult whose job or hobby involves exposure to lead?
10. Does your child live near an active lead smelter, battery recycling plant, or other industry likely to release lead?

Combined definition: An answer of "yes" to at least one of questions 1 to 10 classifies the child as "high risk" by the combined CDC/SCC definition. No "yes" answer to all 10 questions classifies a child as "not high risk" by the combined CDC/SCC definition.

Study 1

The objective of study 1 was to determine the prevalence of an elevated PbB (defined as PbB of 10 μg/dL or greater) among the children attending the SCC public clinics. Between September 1, 1991, and August 31, 1992, we tested venous blood for the lead level from all children presenting to one of the six public clinics in SCC who had blood drawn for a screening hemogram. These children included those (1) aged 6 to 12 months, (2) aged 13 to 53 months who had no previous hemogram in their records, and (3) aged 54 to 72 months. Demographic information was recorded for each child, including date of birth, sex, race, and ethnicity.

Because 79% of the children screened and 91% of the children identified with a PbB of 10 μg/dL or greater were Hispanic, we

TABLE 3. Results of Study 1: Childhood Elevated Blood Lead (PbB) Study Conducted at Santa Clara County Public Clinics, September 1, 1991, to August 31, 1992*

Group	No. Tested	PbB ≥ 10 μg/dL	OR	95% CI
Total	3630	222 (6.1%)		
Gender				
Female	1763	119 (6.7%)	1.0	
Male	1867	103 (5.5%)	0.8	0.6, 1.1
Race/ethnicity				
White	402	11 (2.7%)	1.0	
African-American	141	7 (5.0%)	1.9	0.6, 5.3
Hispanic	2868	202 (7.0%)	2.7	1.4, 5.3
Asian/Pacific Islander	116	0	0.0	0.0, 1.4†
Other	61	1 (1.6%)	0.6	0.0, 4.2†
Unknown	41	1 (2.4%)	0.9	0.0, 6.3†
Age, mo				
0–12	777	17 (2.2%)	1.0	
13–53	2159	159 (7.4%)	3.6	2.1, 6.1
54–72	694	46 (6.6%)	3.2	1.8, 5.8
Season				
Spring	1116	53 (4.7%)	1.0	
Summer	866	64 (7.4%)	1.6	1.1, 2.4
Fall	803	63 (7.8%)	1.7	1.2, 2.5
Winter	845	42 (5.0%)	1.1	0.7, 1.6

* Abbreviations: OR, odds ratio; CI, Cornfield 95% confidence interval of the odds ratio.
† Exact 95% confidence limits of the OR: Mehta CR, Patel NR, Gray R. *J Am Stat Assoc.* 1985;78:969–973.

TABLE 4. Results of Study 2: Cross-Sectional Study of All Hispanic Children From Study 1 Tested During Fall 1991*

Group	No. Tested	PbB ≥ 10 µg/dL	OR	95% CI
Country of birth				
United States	515	36 (7.0%)	1.0	
Mexico	90	18 (20.0%)	3.3	1.7, 6.4
Gender				
Female	320	31 (9.7%)	1.0	
Male	331	25 (7.6%)	0.8	0.4 1.4
Age, mo (all)				
0–12	153	9 (5.9%)	1.0	
13–53	374	32 (8.6%)	1.5	0.7 3.5
54–72	78	13 (16.7%)	3.2	1.2, 8.6
Age, mo (Mexican born)				
0–12	2	1 (50.0%)	NC	
13–53	57	9 (15.8%)	1.0	
54–72	31	8 (25.8%)	1.9	0.6, 6.2
Age, mo (U.S. born)				
0–12	151	8 (5.3%)	1.0	
13–53	317	23 (7.3%)	1.4	0.6, 3.5
54–72	47	5 (10.6%)	2.1	0.5, 7.8†
Mother's primary language				
English	279	16 (5.7%)	1.0	
Spanish	369	40 (10.8%)	2.0	1.1, 3.8
Not stated	2	0	NC	

* Abbreviations: PbB, blood lead level; OR, odds ratio; CI, Cornfield 95% confidence interval of the odds ratio; NC, not calculated because of small cell size.
† Exact 95% confidence limits of the OR: Mehta CR, Patel NR, Gray R. *J Am Stat Assoc.* 1985;78:969–973.

conducted three studies (studies 2, 3, and 4) to evaluate risk factors for elevated lead levels among Hispanic children.

Study 2

The objective of study 2 was to measure the association between an elevated PbB and country of birth among Hispanic children. We conducted a cross-sectional study of all Hispanic children screened during the Fall (September 21 to December 21) of 1991. We used a computerized medical record search to identify each child's country of birth and mother's primary language.

Studies 3 and 4

The objective of study 3 was to determine specific behavioral and environmental associations with a PbB of 10 to 19.9 µg/dL. We defined a case patient as an Hispanic child with at least two PbBs of 10 to 19.9 µg/dL between April 1, 1992 and August 31, 1992. Santa Clara County conducts a joint Public Health Nurse/Environmental Health Specialist home visit of all children reported to the Department of Public Health with a PbB of 20 µg/dL or greater. To determine which risk factors were associated with a PbB at least 20 µg/dL (requiring home investigation), we conducted a second matched case-control study (study 4); case patients had at least one PbB of 20 µg/dL or greater and a second PbB of at least 10 µg/dL. For both studies (3 and 4), each case patient was matched by race, sex, and age within 3 months with one control (PbB < 10 µg/dL) randomly selected from a database of all children who were screened during the same time. Parents of case patients and controls were interviewed by telephone. When necessary, Spanish-English bilingual interpreters administered the survey.

The survey form contained 26 questions covering three categories: (1) the child's behaviors, (2) the child's environment, and (3) parental occupational and vocational risk factors.

Study 5

The objective of study 5 was to determine whether a population-specific risk-assessment tool could identify children at high risk for elevated PbB. We developed a 10-question survey that included 5 questions recommended in *Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control.*[1] The other five questions were derived from risk factors from studies 2 to 4 or from lead sources in the homes of children with elevated PbB. Between May 1, 1993 and June 30, 1993, all children aged 6 to 72 months who had venous blood drawn for a routine hemogram were tested for blood lead level, and their parents were surveyed using the 10-question form. Table 2 shows the questions used and the CDC, SCC population-specific, and combined CDC/SCC definitions for classifying children as "high risk" or "not high risk" for elevated PbB. The sensitivity and specificity for our risk assessment were determined for a PbB of 10 µg/dL or greater and a PbB of 20 µg/dL or greater, as was the percentage of children classified as not high risk who had a PbB less than 10 µg/dL (predictive value negative [PVN]).

Statistical Analysis

In the univariate analysis of studies 1, 2, and 5, statistical significance was determined using Mantel-Haenszel χ^2 tests and 95% confidence intervals (CI) of the univariate odds ratio (OR). For studies 3 and 4, the matched case-control studies, univariate matched odds ratios (MOR) were calculated. Independent variables with ORs that had 95% CIs that did not include 1.0 were considered to be statistically significant. Univariate analyses were performed using Epi-Info, Version 5.01b.[2]

In studies 2 and 3, variables found to be significantly associated with elevated PbB in univariate analysis were included in the multivariate analysis. In study 2, independent associations with elevated PbB were determined by multiple logistic regression analysis. In study 3, independent associations with elevated PbB were determined by performing conditional logistic regression analysis. Logistic regression analyses in studies 2 and 3 were performed using SPSS.[3]

RESULTS

Study 1

Table 3 shows the results for study 1. As indicated in the table, of 3630 children screened, 222 (6.1%) had PbB levels of 10 µg/dL or greater. Thirty-two children (0.8%) had a PbB of 15.0 to 19.9 µg/dL, and 39 (1.1%) had a PbB at least 20 µg/dL.

Study 2

Table 4 shows the results for study 2. Among the

TABLE 5. Results of Study 3: Risk Factors Associated With a Blood Lead Level of 10 to 19.9 µg/dL in Children Attending Santa Clara County Public Clinics, 1992

Risk Factor	Univariate Matched Odds Ratio	Adjusted Matched Odds Ratio (AMOR)*	95% CI† for AMOR
Foreign birth	3.0	4.0	1.0, 16.0
Canned goods‡	6.5	7.4	1.1, 50.5
Dirt or paint§	9.5	8.1	1.6, 41.7
Live within one block of a freeway	3.0	5.4	1.2, 25.3

* Case-control sets were matched by age within 3 months, race/ethnicity, and sex.
† CI, confidence interval.
‡ Parental report that the child consumed food or beverages canned in other countries.
§ Parental report that the child had a history of putting either dirt, dust, or paint flakes or chips in his/her mouth. Two separate questions, one about ingestion of dirt or dust, and the other about ingestion of paint flakes or chips, were combined into one variable in the analysis.

651 Hispanic children screened during the Fall of 1991, 56 (8.6%) had a PbB of at least 10 μg/dL. Seventy-nine percent (n = 515) of the children screened were born in the U.S.; 13.8% (n = 90) were born in Mexico, 1.1% (n = 7) were born in other Latin American countries, and 6.0% (n = 39) had an unknown country of birth.

The multiple logistic regression analysis included the covariates of age (in years), mother's primary language (Spanish versus English), gender, and child's country of birth (Mexico or U.S.). Children with a PbB at least 10 μg/dL were significantly more likely to have been born in Mexico (adjusted OR: 2.5, 95% CI: 1.2, 5.2). Neither age, gender, nor primary language of the child's mother was independently associated with a PbB of 10 μg/dL or greater.

Studies 3 and 4

In the first case-control study (study 3), 52 matched pairs were enrolled. Univariate matched analysis revealed that the following risk factors were associated with having a PbB of 10 to 19.9 μg/dL: parental report that the child ingested dirt, dust, or paint flakes or chips (MOR: 9.5, 95% CI: 2.2, 40.8); parental report that the child consumed food or beverages canned in other countries (MOR: 6.5, 95% CI: 1.5, 28.8); birth outside of the U.S. (MOR: 3.0, 95% CI: 1.1, 8.3); and parental report that the child currently lived within one block of a freeway (MOR: 3.0, 95% CI: 1.1, 8.3). Conditional logistic regression analysis revealed that all of these risk factors were independently associated with having a PbB of 10 to 19.9 μg/dL. Table 5 shows the adjusted OR and 95% CI for these factors.

For study 4, which focused on Hispanic children with a PbB at least 20 μg/dL, 19 matched pairs were enrolled. We found that whereas 6 of 19 (32%) children with a PbB of 20 μg/dL or greater had a history of taking Azarcon, 0 of 19 matched controls had ever been treated with this home remedy (MOR: undefined, exact lower 95% CI: 1.4). No other associations were statistically significant.

Study 5

Of 247 children screened between May 1 and June 30, 1993, 14 (5.7%) had a PbB of 10 to 19.9 μg/dL and 5 (2.0%) had PbB of at least 20 μg/dL. As indicated in Table 6, ever having been treated with a lead-based home remedy (OR: 8.0, 95% CI: 1.1, 44.7); the use of pottery or ceramic vessels for cooking, eating, or drinking (OR: 4.6, 95% CI: 1.3, 14.9); and ever having been in Latin America (OR: 5.3, 95% CI: 1.7, 19.3) were significantly associated with a PbB of 10 μg/dL.

As shown in Tables 7 and 8, the sensitivity of the CDC's high-risk definition was 32% for a PbB of 10 μg/dL or greater and 60% for a PbB of 20 μg/dL or greater. The sensitivity of the SCC public clinic population-specific definition of high risk was 90% for a PbB at least 10 μg/dL and 100% for a PbB at least 20 μg/dL. The respective sensitivities of the combined high-risk definition were 90% and 100%.

Of the children classified as "not high risk" by the CDC's definition, 6.7% (13 of 195) had a PbB at least 10 μg/dL (PVN = 93%), and 1% (2 of 195) had a PbB at least 20 μg/dL (PVN = 99%). Of the children classified as not high risk by the SCC public clinic population-specific definition, 2.3% (2 of 87) had a PbB at least 10 μg/dL (PVN = 98%), and 0% (0 of 87) had a PbB at least 20 μg/dL (PVN = 100%). Of the

TABLE 6. Results of Elevated Blood Lead (PbB) Risk Assessment Study (Study 5) Conducted at Santa Clara County (SCC) Public Clinics, May 1 to June 30, 1993*

Risk Factor	No. Tested	PbB ≥ 10 μg/dL	OR†	95% CI‡
1. Plays in or puts dirt in mouth				
No	189	13 (6.9%)	1.0	
Yes	57	6 (10.5%)	1.6	0.5, 4.8
2. Been in Latin America				
No	152	5 (3.3%)	1.0	
Yes	92	14 (15.2%)	5.3	1.7, 19.3
Don't know	1	0		
3. Ever been given home remedies				
No	229	16 (7.0%)	1.0	
Yes	8	3 (37.5%)	8.0	1.1, 44.7
Don't know	7	0		
Don't understand	3	0		
4. Use pottery or ceramics for cooking, eating, or drinking				
No	206	12 (5.8%)	1.0	
Yes	27	6 (22.2%)	4.6	1.3, 14.9
Don't know	4	0		
Don't understand	3	0		
5. Live within one block of a freeway				
No	189	16 (8.5%)	1.0	
Yes	52	2 (3.8%)	0.4	0.1 2.0
Don't know	5	1 (20.0)		
Don't understand	1	0		
6. Lives in house with chipping paint built before 1960				
No	187	12 (6.4%)	1.0	
Yes	31	4 (12.9%)	2.2	0.5, 7.8
Don't know	28	3 (10.7%)	1.8	0.3, 7.1
Don't understand	1	0		
7. Lives in or visits a house built before 1960 with recent renovation				
No	188	13 (6.9%)	1.0	
Yes	28	3 (10.7%)	1.6	0.3, 6.5
Don't know	29	3 (10.3%)	1.6	0.3, 6.2
Don't understand	2	0		
8. Sibling or playmate followed for lead poisoning				
No	232	17 (7.3%)	1.0	
Yes	4	1 (25.0%)	4.2	0.1, 55.3
Don't know	9	1 (11.1%)		
Don't understand	2	0		
9. Child lives with adult whose job/hobbies involve lead				
No	227	19 (8.4%)	1.0	
Yes	5	0	0.0	0.0, 12.8
Don't know	15	0	0.0	0.0, 3.4
10. Child lives near lead smelter, battery recycling plant, or other industry likely to release lead				
No	227	19 (8.4%)	1.0	
Yes	10	0	0.0	0.0, 5.3
Don't know	9	0		
Don't understand	1	0		

* An answer of "yes" to any of questions 1 to 5 indicates that the child is at high risk for elevated PbB by the SCC local definition. An answer of "yes" to any of questions 6 to 10 indicates that the child is considered at high risk for elevated PbB by the recommendations found in *Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control.*

† Odds ratios were calculated as the ratio of odds of a PbB at least 10 μg/dL in children whose parents answered "yes" or "don't know" to the odds of a PbB at least 10 μg/dL in children whose parents answered "no." Because of small cell size, odds ratios were calculated for children whose parents answered "don't know" only if the number responding was 10 or more.

‡ Exact 95% confidence limits of the OR: Mehta CR, Patel NR, Gray R. *J Am Stat Assoc.* 1985;78:969–973.

TABLE 7. Comparison of Three High-Risk Definitions for Blood Lead Levels (PbB) of 10 μg/dL or Greater for Children Aged 6 to 72 Months Attending Santa Clara County (SCC) Public Clinics, May 1 to June 30, 1993*

Risk Classification	N	PbB ≥ 10 μ/dL	Sensitivity	Specificity	Predictive Value Negative
High risk (CDC)	52	11.5	32%	80%	93%
Not high risk (CDC)	195	6.7			
High risk (SCC)	160	10.6	90%	37%	98%
Not high risk (SCC)	87	2.3			
High risk (combined)	173	9.8	90%	32%	97%
Not high risk (combined)	74	2.7			

* Abbreviation: CDC, Centers for Disease Control and Prevention.

TABLE 8. Comparison of Three High-Risk Definitions for Blood Lead Levels (PbB) of 20 μg/dL or Greater for Children Aged 6 to 72 Months Attending Santa Clara County (SCC) Public Clinics, May 1 to June 30, 1993*

Risk Classification	N	PbB ≥ 10 μg/dL	Sensitivity	Specificity	Predictive Value Negative
High risk (CDC)	52	5.8	60%	80%	99%
Not high risk (CDC)	196	1.0			
High risk (SCC)	160	3.1	100%	36%	100%
Not high risk (SCC)	87	0.0			
High risk (combined)	173	2.9	100%	31%	100%
Not high risk (combined)	74	0.0			

* Abbreviation: CDC, Centers for Disease Control and Prevention.

children classified as not high risk by the combined CDC/SCC definition, 2.7% (2 of 74) had a PbB at least 10 μg/dL (PVN = 97%), and 0% (0 of 74) had a PbB at least 20 μg/dL (PVN = 100%).

DISCUSSION

The prevalence of a PbB of 10 μg/dL or greater in U.S. children 1 to 5 years old declined from 88.2% in the late 1970s to 8.9% in 1991.[4] Among Mexican-American 4- and 5-year-olds, the prevalence decreased from 61.5% in 1982 to 4.9% in 1991.[4] Given this decline, the identification of population-specific risk factors for blood lead levels as low as 10 μg/dL is now possible.

We found that Hispanic children born in Mexico were more likely to have an elevated PbB than Hispanic children born in the U.S. (study 2). The association of elevated PbB and birth in Mexico is intriguing. Mexican-born children could be more likely than children born in the U.S. to be exposed to lead in the U.S., or the lead exposure could be from a recent or remote Mexican source.

Potential sources of elevated blood lead levels in Mexico include leaded gasoline emissions, lead-glazed ceramics, lead-based paints, and lead in canned foods and beverages.[5] As recently as 1991, 89.8% of gasoline sold in Mexico contained lead.[6] Also, because lead crosses the placenta,[7] children can be exposed to lead before birth. A study in Mexico City in 1986 found a mean umbilical PbB of 12.2 μg/dL.[8] In contrast, a 1984 study in five hospitals throughout the state of California found a mean umbilical cord PbB of 4.9 μg/dL.[9]

In the study of risk factors for a PbB of 20 μg/dL or greater (study 4), we found an association with Azarcon treatment. Azarcon is an orange powder, composed of nearly 100% lead, that is used to treat a stomach ailment known as *empacho*.[10] On investigation, we could not identify a local source of Azarcon; all of the mothers of children who were treated with Azarcon reported that they either treated their children in Mexico or brought some of the powder with them from Mexico to the U.S.

In study 1, we estimated that 93% of children aged 13 to 53 months attending the SCC public clinics were screened. These children had not had a prior screening hemogram. Therefore, the prevalence rate of elevated PbB among all children aged 13 to 53 months may differ slightly from the prevalence we found among children of that age group.

Although the results of our risk assessment (study 5) using locally identified risk factors are preliminary and based on a relatively small sample size (N = 247), the sensitivity and PVN of this risk assessment are greater than those obtained when using the CDC's five recommended questions alone. The sensitivity of the CDC's risk assessment was lower in our study population than in several studies recently conducted in Chicago, Rochester, New York, San Francisco, and Wisconsin.[11–14]

The reasons for the low sensitivity (30%) of the CDC risk assessment in SCC may be due to the county's relatively low proportion of older housing (11%),[15] the CDC questionnaire's lack of Hispanic-specific risk-factor questions, and difficulty involved in answering some of the CDC's recommended questions.

For example, 12% of the parents responded "don't know" to the questions of whether the child lived in or visited a house built before 1960. In addition, we found that less than 10% of the parents from our case-control studies owned their residences, and that 60% had lived at their present residence for less than 1 year. In communities where many people rent and change residences frequently, questions about the age of housing may have limited predictive value. Second, in areas where a high proportion of housing is new, screening questions about the age and condition of housing may identify a smaller proportion of children

with elevated PbB than questions that address more prevalent risk factors.

The high sensitivity and PVN of the SCC population-specific risk assessment suggest that these questions may be useful in Santa Clara County for identifying children at high risk for an elevated blood lead level. Our population-specific risk-assessment tool had a sensitivity similar to that of the population-specific screening tool developed by Rooney et al[14] in Wisconsin, but in contrast to Rooney's study, we conducted the risk assessment prospectively in a population that was not used to determine the risk factors. Using the SCC public clinic population-specific high-risk definition, 90% of children with a PbB of 10 μg/dL or greater would be found, versus only 30% when using the CDC's high-risk definition. Our studies and home investigations confirmed that many children with elevated PbB in SCC have risk factors previously identified for U.S. children, such as exposure to lead-based paint, to lead-contaminated soil and dust, and to siblings with elevated PbB. Therefore, our population-specific risk assessment should be used only in conjunction with the CDC's questionnaire.

Although our risk assessment may be applicable to other Hispanic populations living in the southwestern U.S., we encourage other local health departments or clinics to determine population-specific risk factors for elevated PbB and thus facilitate the development of population-specific risk profiles for elevated PbB.

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A PEDIATRIC DISEASE

"A person who hasn't started smoking by age 19 is unlikely to ever become a smoker. Nicotine addiction begins when most tobacco users are teen-agers, so let's call this what it really is: a pediatric disease."

David A. Kessler, Commissioner of Foods and Drugs, Quoted in the *New York Times*, March 9, 1995.

Submitted by Student