Racial, Ethnic, and Language Disparities in Children's Exposure to Secondhand Smoke

Vibha Anand, MS, PhD,^{1,2} and Stephen M. Downs, MD, MS^{1,2}

Race and ethnicity affect children's risk of secondhand smoke exposure. However, little is known about how race and language preference impact parents' self-reported smoking and stopping smoking rates. We analyzed data for 16,523 children aged 0–11 years from a pediatric computer decision support system (Child Health Improvement through Computer Automation [CHICA]). CHICA asks families in the waiting room about household smokers. We examined associations between race, insurance, language preference, and household smoking and reported stopping smoking rates using logistic regression. Almost a quarter (23%) of the children's families reported a smoker at home. Hispanic children are least likely (odds ratio [OR]: 0.17, confidence interval [CI]: 0.12–0.24) to have secondhand smoke exposure when compared to African American and white children, as were those with private insurance (OR: 0.52, CI: 0.43–0.64) or no insurance (OR: 0.79, CI: 0.71–0.88) compared to publicly insured. Children from English speaking families were more likely (OR: 1.55, CI: 1.24–1.95) to have secondhand smoke exposure compared to Spanish speaking families. Among smoking families, 30% reported stopping smoking subsequently. Stopping rates were higher in Hispanic (OR: 3.25, CI: 2.06–5.13) and African American (OR: 1.39, CI: 1.01–1.91) families compared to white children's families. Uninsured families were less likely than publicly insured families to report stopping smoking (OR: 0.76, CI: 0.63–0.92). English speaking families were less likely (OR: 0.56, CI: 0.41–0.75) to report stopping smoking compared to Spanish speaking even in a subgroup analyses of Hispanic families (OR: 0.55, CI: 0.39–0.76). In our safety net practices serving children predominantly on public insurance, Spanish speaking families reported the lowest risk of secondhand smoke exposure in children and the highest rate of stopping smoking in the household. Hispanic families may have increasing secondhand exposure and decreasing rates of stopping smoking as they acculturate.

What Is New

Spanish speaking households reported the lowest risk of secondhand smoke exposure for their children and the highest rate of stopping smoking after controlling for race and insurance status. Hispanic families may have increased smoking and decreased stopping smoking rates as they acculturate.

Introduction

DESPITE TARGETED PUBLIC health interventions in the US, a high prevalence of exposure to secondhand smoke from cigarettes still exists among children in this country. In the US, it is estimated that 20% of children aged 3 to 11 years live with a smoker.^{1,2} Depending on the method of measurement used and the population studied, secondhand smoke exposure varies.³ Despite the adverse health effects of secondhand smoke on their children, a majority of smokers with children (70%) continue to smoke inside their homes.⁴

A 2007 study estimated that 19.1 million US children younger than 18 years lived in households that had a smoker.⁵ Infant and toddler exposure to smoking primarily occurs within the home, where they spend most of their time. The exposure for older children can come from a variety of sources. However, the home environment remains the top source of secondhand smoke exposure.⁶

Secondhand smoke exposure during childhood is a major health concern.⁷ It is associated with sudden infant death syndrome, otitis media, respiratory tract infections, decreased lung growth, and childhood asthma exacerbations.^{7,8} Furthermore, the severity of these problems increase with increased secondhand smoke exposure.⁹ Additionally, children with secondhand smoke exposure are at risk of more hospitalizations and may suffer from more severe bouts of influenza.^{10,11} Adolescent smoking has also been linked to the presence of a smoker in the home.^{12,13}

The health risks of secondhand smoke increase overall health care utilization and costs.^{14–16} Data from the National Survey of

¹Children's Health Services Research, Indiana University School of Medicine, Indianapolis, Indiana.

²The Regenstrief Institute, Inc., Indianapolis, Indiana.

Children's Health (NSCH) in 2007 found considerable disparities in children's exposure to secondhand smoke based on the geographic pattern (ie, state of residence in continental United States), race, ethnicity, and socioeconomic status.⁵ Children from lower socioeconomic status, non-Hispanic white and African American racial groups, and children from English speaking households have considerably higher odds of exposure to secondhand smoke.⁵ However, it is not known whether rates of stopping smoking differ based on sociodemographic variables such as race, ethnicity, or insurance status.

In this study, we examined the relationship between race, ethnicity, preferred language, and self-reported smoking rates and rates of stopping smoking among parents of children seen in the inner city community health centers, using data from a computer-based decision support system. This study was approved by the Indiana University Institutional Review Board.

Methods

We implemented a smoking cessation module¹⁷ within our pediatric practices, using a computerized clinical decision support system (CDSS), the Child Health Improvement through Computer Automation system (CHICA).¹⁸ CHICA is a pediatric CDSS that was developed by our research group. It collects data through questionnaires for parents to answer in the waiting room and generates reminders and prompts for physicians. CHICA currently serves four primary care pediatric clinics in the Wishard/Eskenazi Health system in Indianapolis, IN, one of America's five largest safety net health systems. CHICA has records of nearly 35,000 patients to date. The clinics using CHICA serve a diverse population, mostly from the inner city and surrounding neighborhoods—males (51%), African American (50%), and Hispanic (31%); and with a vast majority (88%) of patients on public insurance (Medicaid).

CHICA screens parents in the waiting room using a bilingual questionnaire, that is, in English and Spanish, for many risk factors or concerns, including exposure to secondhand smoke.^{19,20} CHICA alerts the pediatrician to positive risks²¹ such as exposure to secondhand smoke, and provides support to the pediatrician for delivering smoking cessation counseling to the family. Lastly, as a comprehensive cessation counseling program, CHICA monitors whether the household smokers stopped smoking.^{17,22} Thus, using CHICA, we are able to record the household smoking status of a large cohort of racially and ethnically diverse children who visit our pediatric clinics for routine care.

The CHICA system

CHICA has been described in detail elsewhere.¹⁸ Briefly, CHICA uses adaptive turnaround document technology.²³ The adaptive turnaround documents are computer generated paper forms that are tailored to the patient for the visit and are completed by families, staff, or physicians. They are optically scanned to capture structured data. CHICA generates two types of documents: the Pre-Screener Form (PSF) and the Physician Work Sheet (PWS). Logic rules evaluate the electronic medical record to produce tailored documents for every patient visit.²²

When a patient registers in the clinic, CHICA generates the PSF (Fig. 1). The PSF includes 20 yes/no questions that

the parent or the caregiver answers in the waiting room before the physician encounter. Responses from these questions help guide preventive care or disease management content produced for the physician by CHICA.²² The 20 questions are printed in English on one side and in Spanish on the other. CHICA records the families' preferred language used to complete the questionnaire. When the PSF questions are completed, the nurse registering the patient scans the PSF and the information is stored in the patient's electronic medical record. Based on this and earlier information from the patient's electronic medical record, CHICA produces a PWS for use by the physician during the encounter. This worksheet, is scanned and optically read at the end of the clinic session (Fig. 2).²³

Details of CHICA's household smoking cessation module have been described elsewhere.¹⁷ Briefly, for all children between the ages of 0 and 11 years, CHICA asked patient families "Does anyone in <child>'s home smoke?" This question was asked on the PSF if the system contained no information or had not asked about the child's household smoking status in the past 18 months. The answer was recorded as an observation in CHICA's database for the household smoking or the secondhand smoke status variable. If the answer was yes, the physician was alerted and given smoking cessation guidance (Fig. 2). The CHICA decision support system encourages physicians to assess parent's readiness to stop smoking, and the assessment is recorded. Subsequently, CHICA provides suggestions on how to motivate smokers who are not ready to stop smoking or how to give cessation advice to those who are ready to stop smoking. For the latter group, CHICA also provides instructions on the use of over the counter nicotine replacement therapy. At subsequent visits for children exposed to secondhand smoke, CHICA monitored for smoking cessation by asking a question: "There was a smoker in <child>'s home, has that person quit?" Additionally, after a family reports that a household smoker has stopped smoking, CHICA asks at subsequent visits if the former smoker has relapsed. Parent and physician responses to these questions and reminders record new observations for the secondhand smoke status variable in the child's electronic medical record each time a form is scanned.

Extraction and analysis of smoking status data

De-identified data were extracted from CHICA's database for all children who had at least one visit between November 4, 2004 and June 12, 2012. The following variables were extracted and children who had missing values for socio-demographic and preferred language variables were excluded from the study.

Secondhand smoke status. During the study period, for each child, the secondhand smoke status was defined at two time points: the first and the last observation recorded by CHICA. These observations were recorded when either a parent responded to the household smoking status question or when a physician responded to a smoking cessation prompt indicating secondhand smoke status. Secondhand smoke status was defined as positive if parental smoking was reported at the first visit. The stopping smoking rate was calculated as the proportion of children having a negative secondhand smoke status at the last recorded visit among those with positive secondhand smoke status at the first visit.

0695403153 CHICA Pre-Screening		MRN: #99-2	
Height: <input type="text"/> <input type="text"/> <input type="text"/> in. ☐ Uncooperative / Unable to Screen: ☐ Vision ☐ Hearing ☐ BP		Name: Patient, Ima Great	
Weight: <input type="text"/> <input type="text"/> <input type="text"/> kg. * Vision Left: 20/ <input type="text"/> <input type="text"/>		Age: 10 yo DOB: Mar 27 2002	
HC: <input type="text"/> <input type="text"/> <input type="text"/> cm. * Vision Right: 20/ <input type="text"/> <input type="text"/>		Date: Mar 28 2012	
BP: <input type="text"/> <input type="text"/> / <input type="text"/> <input type="text"/> * Left Ear @ 25db: P ☐ F ☐		Pulse Ox: <input type="text"/> <input type="text"/> <input type="text"/> %	
Temp: <input type="text"/> <input type="text"/> <input type="text"/> deg. F * Right Ear @ 25db: P ☐ F ☐		☐ Sick Visit ☐ Patient left without treatment	
Pulse: <input type="text"/> <input type="text"/> /min RR: <input type="text"/> <input type="text"/> ☐ Patient refused to complete form		☐ Two IDs checked	
Box For Nursing Use Only - Box For Nursing Use Only - Box For Nursing Use Only - Box For Nursing Use Only			
<p>Parents: Thank you for answering these questions about your child. The answers will help your doctor provide better quality of care. If your child is age 11 or older, he/she should answer the questions privately. Answers are confidential, but if you prefer not to answer that is allowed. You may want to talk about these questions with your doctor.</p> <p style="text-align: center;">Please fill in the circles completely with a pencil or pen.</p>			
Y N		Y N	
☐ ☐ Is Ima allergic to any medicines?		☐ ☐ Is Ima having pain today?	
☐ ☐ Does Ima take prescription or over-the-counter medicine, herbal medicine or vitamins, or use an inhaler or medicated creams or lotions?		☐ ☐ Does Ima have sickle cell disease?	
☐ ☐ Do you feel safe in your home?		☐ ☐ Has your partner kicked, hit, or slapped you?	
☐ ☐ Does Ima OFTEN make careless mistakes or not pay close attention to details, that is causing problems at home or school?		☐ ☐ Does Ima OFTEN have difficulty remaining seated when asked to do so, that is causing problems at home or school?	
☐ ☐ Does Ima OFTEN have a hard time paying attention to tasks or play, that is causing problems at home or school?		☐ ☐ Does Ima always wear a helmet when riding her bike or tricycle?	
☐ ☐ Does anyone in Ima's home smoke?		☐ ☐ Do you have a working smoke detector in your home or apartment?	
☐ ☐ Does Ima have a TV in her room?		☐ ☐ Does Ima usually watch TV or computer more than 2 hours a day?	
☐ ☐ Does Ima ever swim or play around any water (lake, stream, pool, or ocean) without adult supervision?		☐ ☐ Has your partner or another adult threatened or hurt your children?	
☐ ☐ Does Ima have asthma or wheezing, cough or breathing problems that won't go away or keep coming back?		☐ ☐ Has Ima seen a dentist this year?	
☐ ☐ Are any firearms or guns kept in Ima's home?		☐ ☐ Has Ima spent more than a week in Asia, Africa, Latin America or Eastern Europe?

Preguntas en español al otro lado.

FIG. 1. CHICA Pre-Screener Form depicting household smoking status question (all identifiers are fake identifiers). CHICA, Child Health Improvement through Computer Automation.

Sociodemographic variables. Race/ethnicity (African American, white, Hispanic or other), and insurance category (private, public, or no insurance) were extracted for each child.

Preferred language (English or Spanish). When families complete the PSF (Fig. 1), they complete one side or the other (English or Spanish). This was recorded for the visit as the preferred language. The last record of the preferred language

variable in the child's electronic medical record was used for our analysis.

Statistical analysis

Statistical analyses were performed with the SAS statistical package (SAS Institute, Inc.). Two mixed effects logistic regression models were created with insurance, race, and

6825065653		CHICA Physician Encounter Form		#99-2
Patient: Patient, Ima Great (F) DOB: 03/27/02 Age: 10 yo Doctor: Other		MRN: #99-2 Date: Mar 28 2012 Time: 12:16PM		A Vital Signs: Height: in. (%) Weight: kg.(%) BMI: (%) Head Circ: cm.(%) Temp: F Pulse: RR: BP: Pulse Ox: % Hear (L): Hear (R): Vision (L): Vision (R): Weight: lb. * = Abnormal, U = Uncooperative
Physical Exam: NI Abnl General: ☐ ☐ Head: ☐ ☐ Skin: ☐ ☐ Eyes: ☐ ☐ Ears: ☐ ☐ Nose / Throat: ☐ ☐ Teeth / Gums: ☐ ☐ Nodes: ☐ ☐ Chest / Lungs: ☐ ☐ Heart / Pulses: ☐ ☐ Abdomen: ☐ ☐ Ext. Genitalia: ☐ ☐ Back: ☐ ☐ Neuro: ☐ ☐ Extremities: ☐ ☐ Legend: * = Previously Abnl o = Needs Examination		History / Exam Comments: CC: _____ ☐ Additional notes on back... ☐ Two ID's Checked Informant: _____		
		medications: NONE Allergies: _____ Pain (0-10): _____		
INSTRUCTIONS: Check all applicable boxes. COMPLETELY fill space to right of each box to "uncheck" misfilled boxes.				
<p>The AAP has age-specific recommendations for the prevention of childhood burns and fires. Please review the following, and check those you review:</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> ☐ Working smoke detector ☐ Test batteries monthly ☐ Rec no smoking in house </div> <div style="width: 50%;"> ☐ Store matches/lighters safely ☐ Teach child plan if alarm rings ☐ Teach escape plan (>= 2 exits) </div> </div> <p>DENTAL: Children should see a dentist at least annually beginning at age 1 year. Ima may not have seen a dentist this year. Handout can be printed from CHICA.</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> ☐ Advise to see dentist ☐ Given handout ☐ Has seen dentist this year </div> <div style="width: 50%;"> ☐ Reminded child to brush BID ☐ Advise to see dentist ☐ Mouth/teeth healthy on exam </div> </div> <p>According to AAP guidelines, Ima should have vision screening today, but we have no record. Please screen vision now.</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> ☐ Screen done ----> ☐ Unable to screen </div> <div style="width: 50%;"> ☐ Passed ☐ Failed ☐ Not indicated </div> </div> <p>Firearms at home significantly increase the risk of injury to children. The AAP says removing guns from the home is the best way to prevent injury. If guns must be kept, they should be stored appropriately. Please review:</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> ☐ No guns in home ☐ Guns in home -> ☐ Asked about guns at friends' </div> <div style="width: 50%;"> ☐ Wishard quit smoking program ☐ Review risks to child ☐ Cost and risks to parent ☐ Advised no food before bed ☐ Gave dentist handout ☐ Abnl oral exam (see note) ☐ Store unloaded, locked ☐ Store away from ammo </div> </div>				
<p>Assessments and Plan: Medication Education Performed and/or Counseled on Vaccines: ☐ Y ☐ N ☐ N/A</p> ☐ The medical student acted as a scribe for this note.				
Staff: _____ Signature: _____				

FIG. 2. CHICA Physician Encounter Form depicting help for Smoking Cessation Counseling (all identifiers are fake identifiers).

language as fixed effects and with clinic as a random effect. The first model predicted household-level secondhand smoke status, and the second model predicted stopping smoking by families of children with positive secondhand smoke status. To control for clinic, the clinic location was used as a random effect in each model. Because language so strongly covaries

with Hispanic ethnicity, two additional logistic models were created to analyze the Hispanic group alone with insurance and language as predictors and clinic as a random effect. The first model predicted the secondhand smoke status and the second predicted stopping smoking among children with positive secondhand smoke status in the Hispanic group.

Results

During the study period, we had complete data for 16,523 children, that is, for all sociodemographic variables, and secondhand smoke status for at least two visits—first and last as recorded by CHICA. Demographics are reported by race, language, and insurance in Table 1. The cohort was racially diverse—African Americans (52%), Hispanic (34%), white (10%), and others (5%). In this group, a majority (88%) of families had public insurance. Overall, 77% of families responded to the household smoking status screening question in English. However, among the sHispanic racial group, a majority of families (70%) responded in Spanish. Of the 16,523 children in this study, 3,827 (23%) children's families reported having a smoker in the home, and therefore, their children had presumptive exposure to secondhand smoke. Among families of 12,696 children that did not initially report smokers in the home, only 507 (4%) reported having a smoker at a subsequent visit.

Multivariate analysis of household smoking

In the logistic regression model to predict household smoking status (Table 2), all variables—insurance, race, and language—were significantly associated with a child's secondhand smoke status. Privately insured families were least likely (odds ratio [OR]: 0.52, confidence interval [CI]: 0.43–0.64) to have household smokers when compared to families of children on public insurance, the group that was most likely to have smokers. This was followed by families of children with no insurance (OR: 0.79, CI: 0.71–0.88). Households of white children were most likely to have smokers, followed by households of African American children (OR: 0.67, CI: 0.51–0.80) when compared to the white group. Hispanic households were least likely to have smokers (OR: 0.17, CI: 0.12–0.24) when compared to the white group. English speaking families were more likely to have household smokers than Spanish speaking families (OR: 1.55, CI: 1.24–1.95).

In an analysis of Hispanic children as a subgroup ($n=5,641$), we found significant differences in household smoking status based on the preferred language of the family. (Table 3) Hispanic children from English speaking families were at increased odds of secondhand smoke exposure when compared to Hispanic children from Spanish speaking families (OR: 1.34, CI: 1.09–1.66). Although not significant, privately insured Hispanic families had slightly

TABLE 1. DEMOGRAPHICS OF CHILDREN ($N=16,523$) WHOSE FAMILIES RESPONDED TO THE SECONDHAND SMOKE QUESTION AND HAD AT LEAST 2 VISITS RECORDED BY CHICA

Variable	Value	N (%)
Insurance	No insurance	1339 (8%)
	Private	680 (4%)
	Public	14504 (88%)
Language	English	12715 (77%)
	Spanish	3808 (23%)
Race/Ethnicity	Black	8537 (52%)
	Hispanic	5641 (34%)
	Other	759 (4%)
	White	1586 (10%)

CHICA, Child Health Improvement through Computer Automation.

TABLE 2. LOGISTIC REGRESSION MODEL TO PREDICT SMOKER AT HOME ($N=16,523$)

Variable	Comparison	Odds ratio	95% Confidence limits	
Insurance	No Insurance	0.79	0.71	0.88
	Private	0.52	0.43	0.64
	Public		Comparator	
Language	English	1.55	1.24	1.95
	Spanish		Comparator	
Race/ Ethnicity	Black	0.67	0.51	0.80
	Hispanic	0.17	0.12	0.24
	Other	0.42	0.25	0.72
	White		Comparator	

higher odds (OR: 1.62, CI: 0.99–2.65) of positive household smoking status when compared to publicly insured Hispanic families. (Table 3) However, children from uninsured Hispanic families had slightly higher odds (OR: 1.28, CI: 1.16–1.41) of secondhand smoke exposure when compared to Hispanic children on public insurance. (Table 3)

Multivariate analysis of household smoking cessation

Among families of children who had an initial positive secondhand smoke status ($n=3,827$), one third ($n=1,154$) reported stopping smoking, based on the last secondhand smoke status recorded in CHICA during the study period. We found that race, language, and insurance were significantly associated with reporting stopping smoking. (Table 4) Families of Hispanic children were three times more likely to report stopping smoking when compared to families of white children (OR: 3.25, CI: 2.06–5.13). In the study population, English speaking families were half as likely to report stopping smoking when compared to Spanish speaking families (OR: 0.56, CI: 0.42–0.75).

In a subanalysis of Hispanic children in homes with smokers ($n=467$), in a separate model, the odds of reporting stopping smoking among English speaking Hispanic families were much lower than among Spanish speaking Hispanic families (OR: 0.55, CI: 0.39–0.76). Those with private insurance (OR: 0.49, CI: 0.29–0.85) or no insurance (OR: 0.75, CI: 0.57–1.00) were less likely to stop smoking than those with public insurance. (Table 5)

Discussion

We analyzed self-reported household smoking status in a large group of children aged 0–11 years, using data from our pediatric clinics. In this group, 23% of families reported

TABLE 3. LOGISTIC REGRESSION MODEL TO PREDICT SMOKER AT HOME AMONG HISPANIC FAMILIES ($N=5,641$)

Variable	Comparison	Odds ratio	95% Confidence limits	
Insurance	No Insurance	1.28	1.16	1.41
	Private	1.62	0.99	2.65
	Public		Comparator	
Language	English	1.34	1.09	1.66
	Spanish		Comparator	

TABLE 4. LOGISTIC REGRESSION MODEL OF REPORTED STOPPING SMOKING RATES AMONG SMOKERS AT HOME (N=3,827)

Variable	Comparison	Odds ratio	95% Confidence limits	
Insurance	No Insurance	0.76	0.63	0.92
	Private	0.85	0.68	1.06
	Public		Comparator	
Language	English	0.56	0.42	0.75
	Spanish		Comparator	
Race/ Ethnicity	Black	1.39	1.01	1.91
	Hispanic	3.25	2.06	5.13
	Other	1.32	0.85	2.06
	White		Comparator	

household smoking and, presumably, secondhand smoke exposure for their children. This rate is higher than the national average adult smoking rate.²⁴ However, the difference may reflect the higher rates of smoking in the poor and near poor population served by our health system and the higher than average baseline smoking rates in Indiana.^{25,26}

We specifically examined language preference as a predictor of secondhand smoke exposure in children. In multivariate analyses, parents of children who completed the questions in Spanish were at lower risk of secondhand smoke exposure even when controlling for race and insurance status. These families also had the highest rate of reporting stopping smoking. Although the Spanish language is strongly correlated with Hispanic ethnicity, we found that even in stratified analyses of Hispanics, the Spanish language predicted a higher rate to report stopping smoking. Because there were essentially no Spanish speakers among the non-Hispanic population, we restricted our analyses to the Hispanic subgroup within this population.

Consistent with previous research that has used language as a marker for acculturation,²⁷⁻³⁰ we hypothesized that families that speak Spanish are less acculturated to the US. While it is known that disparities in tobacco use exist between the white and African American race groups,^{5,31,32} and the odds of smoking and secondhand smoke exposure among the white and African American families is greater than Hispanic families,²⁹ it is worrisome that Hispanic families may have increasing smoking rates and decreased rates of stopping smoking as they acculturate.

It is conceivable that as Hispanic families acculturate, the adoption of poorer health practices corresponds to the adoption of English as a preferred language. In many epi-

demiological studies, paradoxically, Hispanic Americans have health outcomes comparable or better than their white US counterparts despite lower average socioeconomic status.^{33,34} This health advantage has been largely hypothesized to the sociocultural characteristics of the Latino community. One finding in our study that is not consistent with the above hypothesis is that Hispanic children with no insurance, (presumably, mostly children of undocumented recent immigrants who are not publicly insured) have higher odds of secondhand smoke exposure than publicly insured Hispanic children. However, their rates of stopping smoking were comparable to those of publicly insured Hispanic families.

As with all such research, there are some limitations of this study. First, this is a retrospective study of data from the CHICA system, which is primarily used for routine clinical care. Since we analyzed only patient families for whom we had complete household smoking data, we may have underestimated parental rates of stopping smoking because our analyses assume that families with no follow-up still smoke.

Second, most children in this study come from a poor, publicly insured, inner city population. Therefore, the findings may not be generalizable to other settings. Although both private and no insurance are a small proportion of the group, the sample size is sufficiently large to evaluate public (Medicaid) insurance increased risk of secondhand smoke exposure in children when compared to private or no insurance.

Third, our data show a higher rate of reporting stopping smoking (30%) compared to rates in the general population,²⁴ which is estimated at 18% to 23% by a recent meta-analysis.³⁵ However, this meta-analysis considered studies that included biochemical validation and included interventions that offered medications with high follow-up rates. By contrast, our study depended on self-reported secondhand smoke exposure at irregular intervals, that is, when the family was asked or when a physician responded to a cessation prompt.¹⁷ Parental smoking status was not confirmed biologically. Whereas a biochemical verification of reported smoking cessation is an ideal measure, past studies relating self-report to biochemical verification have shown low error rates. For example, the lung health study³⁶ compared smoking status at baseline and at five annual follow-up visits by self-report, salivary cotinine, and expired air carbon monoxide. This study reported that self-report errors may be small for both tobacco use and stopping smoking behaviors. Another study reported high sensitivity and specificity for self-reported tobacco use among smokers in a veteran population.³⁷

Last, CHICA data are convenient for assessing such a large population, but the data are not as detailed as we might want. For example, CHICA asks if anyone smokes in the child's home. However, this is not the same as asking if the child is exposed to secondhand smoke at home or at other public places. Children can be exposed to secondhand smoke outside the home. Our study did not evaluate secondhand smoke as a result of other environmental exposures such as from living in public housing or multiapartment buildings. We also had no information regarding the relationship between the smoker at home and the child. Moreover, a family may report that a smoker at home stopped smoking, whereas others in the home may continue to smoke. When CHICA determines that a smoker in the home has stopped smoking, it does not distinguish attempts, abstaining for an interval, or long-term cessation.

TABLE 5. LOGISTIC REGRESSION MODEL OF REPORTED STOPPING SMOKING RATES AMONG SMOKERS AT HOME IN HISPANIC FAMILIES (N=467)

Variable	Comparison	Odds ratio	95% Confidence limits	
Insurance	No Insurance	0.75	0.57	1.00
	Private	0.49	0.29	0.85
	Public		Comparator	
Language	English	0.55	0.39	0.76
	Spanish		Comparator	

It might also be nice to determine whether secondhand smoke exposure was associated with negative health consequences in this population. Whereas it would be possible to link data from CHICA to our electronic medical record, the Regenstrief Medical Record System,³⁸ to evaluate how secondhand smoke exposure is related to child health outcomes such as asthma exacerbations, influenza, or even hospitalizations in children, these associations are already well known. In this study, we focused on the racial, ethnic, and language differences in smoking and stopping smoking rates.

For all of these reasons, the measurements we have made are approximations of the ideal. However, most of these approximations tend to produce a bias toward the null, which might mean that our results would be stronger if confirmed biochemically. None the less, we believe this work contributes to our understanding of the role of race, ethnicity, and language to secondhand smoke exposure among lower socioeconomic status children.

Conclusion

The racial and socioeconomic status differences observed in smoking rates are also reflected in rates of stopping smoking. Our finding that the Spanish language is an independent predictor of lower secondhand smoke exposure and higher rates of reporting stopping smoking speaks to the negative effect of acculturation on smoking in Hispanic families.

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Authors Contributions

Vibha Anand, PhD is the first author and responsible for the conception and design, analysis and interpretation of the data. Dr. Anand drafted the article and revised it critically with the input of Dr. Downs who agreed to read early versions of the manuscript. Dr. Anand gives final approval of the version of the article as it is submitted.

Stephen M. Downs, MD, MS is the senior author and has provided weekly mentoring and support to Dr. Anand throughout the course of the study. He provided input into the study design/protocol, statistical analysis and interpretation of results. He also provided the funding to conduct the study. He helped with the revision of the manuscript before submission.

Author Disclosure Statement

No competing financial interests exist.

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Address correspondence to:

Vibha Anand, MS, PhD
Children's Health Services Research
Indiana University School of Medicine
410 West 10th St., HS 1020
Indianapolis, IN 46202

E-mail: vanand@iupui.edu

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