

Validity of the Spanish Surname Infant Mortality Rate As a Health Status Indicator for the Mexican American Population

MAIJA L. SELBY, RN, DRPH, EUN SUL LEE, PHD, DOROTHY M. TUTTLE, PHD,
AND HARDY D. LOE, JR., MD, MPH

Abstract: This study assessed the validity of the Spanish surname infant mortality rate as an index of urban Mexican American health status. Neonatal, postneonatal, and risk-factor-specific mortality rates were computed from linked birth and infant death records of the 1974-75 Harris County, Texas, cohort of 68,584 for Spanish surname White, non-Spanish surname White, and Black single live births. Infants of Mexican-born immigrants were distinguished from those of other Spanish surname parents by parental nativity information on birth records. Infants of Mexican immigrants

had paradoxically low mortality rates for high birth order, high maternal age, and delayed or absent prenatal care; only infants weighing <1500 gm showed expected high rates. Findings suggested loss of infant death data compatible with migration and under-registration of deaths. The Spanish surname infant mortality rate may be spuriously low and does not appear to be a valid indicator of Mexican American health status even in an urban, non-border area considered to have excellent birth and death registration. (*Am J Public Health* 1984; 74:998-1002.)

Introduction

Although the Texas Spanish surname population, largely Mexican American, has a disproportionate share of infant mortality risk factors (low socioeconomic and educational status, high fertility and large family size, absent or inadequate prenatal care,¹⁻⁴ and high incidence of diabetes mellitus and infectious diseases⁵), the actual infant mortality rate (IMR) reported for this population is relatively low.^{3,5-8} This phenomenon has been attributed to idiosyncracies in vital registration in rural areas near the Texas-Mexico border. Non-English speaking parents or lay midwives in these areas may fail to report home births which result in early neonatal death,^{3,8} and Mexican women may cross the border to give birth in Texas, then return to Mexico,³ where infant deaths are not reported to the United States. Such practices cause artificial deflation of the infant death numerator with inflation of the live birth denominator, and officials in rural border settings are aware that the resulting infant mortality rate is a spurious measure of health status for the Mexican American population.

However, Spanish surname infant mortality rates in urban areas, where over 95 per cent of Mexican Americans live,⁹ have not been scrutinized as carefully. In such settings, particularly those away from the border and with reportedly complete, modern vital registration systems, the Spanish surname infant mortality rate is used in evaluating the health care needs of the Mexican American population. This study assesses the validity of the Spanish surname infant mortality rate as an index of health status for the Mexican American population in an urban, non-border setting considered to have an excellent birth and death registration system.

Methods

Harris County, Texas, which includes the city of Houston, was selected as the study site for four major reasons: 1) it is a large urban county with a sizable Mexican American population of nearly 370,000 persons of Hispanic origin¹⁰; 2) it is located over 300 miles from the US-Mexico border, making it relatively inaccessible for border crossings solely for the purpose of childbirth; 3) it has an excellent vital registration system⁷; and 4) it showed considerable population growth through in-migration rather than decline through out-migration for the time period of the study, posing fewer methodological problems in computing infant mortality rates.

Texas Department of Health birth records January 1, 1974 to December 31, 1975* were matched with infant death records (1974-1976)* to create a linked-data file for infants born to mothers whose residence was Harris County. The study population consisted of all 68,584 single live births of Spanish surname White,** non-Spanish surname White,** or Black ethnicity. Of these births, 502 (0.7 per cent) occurred outside the hospital and 491 (0.7 per cent) had non-physician birth attendants. There were 931 infant deaths in the cohort; 121 infants (13 per cent of deaths) died outside the hospital and 51 (5 per cent) died outside Harris County. No cohort infant deaths were reported from out of state.

Neonatal and postneonatal mortality rates were examined according to variables available from the birth certificate:*** birthweight, birth order, maternal age, time of first prenatal care, ethnicity, and parental nativity (whether the infant's parents were born in the United States or abroad). In the American Southwest, the Spanish surname criterion generally is considered to identify Mexican Americans. However, the Spanish surname group also includes non-Hispanics, non-Mexican Hispanics, and persons whose Mexican heritage is so many generations removed that classification as Mexican American probably is questionable. Therefore, parental nativity was used to distinguish infants of the foreign-born Spanish surname population from

From the University of Texas Health Science Center at Houston, School of Public Health. Address reprint requests to Dr. E. S. Lee, U-TX Health Science Center at Houston, School of Public Health, P.O. Box 20186, Houston, TX, 77225. Formerly at Texas Woman's University, Dr. Selby is currently with the Nell Hodgson Woodruff School of Nursing, Emory University. This paper, submitted to the Journal May 27, 1983, was revised and accepted for publication February 13, 1984.

© 1984 American Journal of Public Health 0090-0036/84 \$1.50

*These were the most recent years for which matched data were available.

**Throughout the text, "Spanish surname" and "non-Spanish surname" refer to these White ethnic groups.

***No measure of socioeconomic status was available from the Texas birth or death certificate.

those of the US-born Spanish surname population. Because over 90 per cent of the foreign-born Spanish surname population of Texas were born in Mexico,¹¹ this provided high specificity for identification of first generation Mexican immigrants, allowing comparison of mortality rates for infants of the Mexican immigrant population with those of the later generation, more heterogeneous US-born Spanish surname population.

First generation Mexican immigrants have lower incomes, less education,¹ and higher fertility² than later generation Mexican Americans, characteristics which suggest that infants of foreign-born Mexican immigrant parents would have higher mortality rates than infants of later generation US-born Spanish surname parents. However, the first generation Mexican immigrant group also could be expected to have closer ties to Mexico and be more likely to include some illegal aliens, suggesting the likelihood of out-migration in this group. Therefore it was hypothesized that if the calculated Spanish surname infant mortality rates were valid, the rates for the foreign-born Spanish surname parental nativity subgroup would be higher than the rates for the US-born parental nativity subgroup; if the rates were not higher, migration in the foreign-born group should be considered as a confounding factor.

Results

Even though the Spanish surname population had an excess of births to mothers who were age 35 or older, had three or more previous births, or reported late or no prenatal care (Table 1), Spanish surname neonatal and postneonatal mortality rates were only slightly higher than non-Spanish

surname rates and considerably lower than Black rates (Table 2). However, when rates were analyzed by the selected risk factors, several puzzling findings emerged. Among very low birthweight infants, the Spanish surname group had the highest neonatal mortality rate (NMR) but a postneonatal mortality rate (PNMR) less than that of the non-Spanish surname group. Spanish surname infants also had surprisingly low PNMRs for the usually high-risk categories of advanced maternal age, high birth order, and late or absent prenatal care.[†] The PNMR for Spanish surname infants whose mothers reported no prenatal care (1.4 deaths/1,000 live births) was even lower than for non-Spanish surname infants of mothers with first trimester care (2.0 deaths/1,000).

Analysis by parental nativity confirmed that the foreign-born Spanish surname group had the greatest excess of high order births and births to mothers of advanced age or with late or no prenatal care (Table 3). Nevertheless, NMRs for Spanish surname infants of foreign-born parents were even lower than for non-Spanish surname infants (Table 4). Closer examination of infants of foreign-born parents showed that very low birthweight infants had expectedly high NMRs, but moderately low birthweight infants had lower NMRs than other ethnic groups.

The overall PNMR for Spanish surname infants of foreign-born parents was slightly higher than for infants of US-born parents; this was accounted for by the one-parent foreign-born subgroup, which had a disproportionate num-

[†]These differentials also were true when PNMRs were recomputed by the alternate formula: PNMR = (postneonatal deaths/live births - neonatal deaths) × 1000

TABLE 1—Distribution of Selected Risk Factors by Ethnicity: 1974-75 Single Live Birth Cohort, Harris County, Texas

Risk Factor	Total† Births n	Ethnicity					
		Non-Spanish Surname White		Spanish Surname White		Black	
		n	%	n	%	n	%
Birthweight‡							
<3 lb 5 oz	803	290	0.8	119	0.9	394	2.3
3 lb 5 oz-5 lb 8 oz	4,226	1,881	4.9	644	4.9	1,701	10.0
>5 lb 8 oz	62,879	35,815	93.3	12,342	93.2	14,722	86.8
Unknown	676	403	1.1	133	1.0	140	0.8
Total¶	68,584	38,389	100%	13,238	100%	16,957	100%
Birth Order‡							
1st	29,242	17,540	45.7	4,737	35.8	6,965	41.1
2nd or 3rd	31,019	17,855	46.5	5,687	43.0	7,477	44.1
4th or higher	8,323	2,994	7.8	2,814	21.3	2,515	14.8
Total¶	68,584	38,389	100%	13,238	100%	16,957	100%
Maternal age							
<20 yr	14,418	6,002	15.6	2,888	21.8	5,528	32.6
20-34 yr	51,546	31,105	81.0	9,629	72.7	10,812	63.8
≥35 yr	2,616	1,279	3.3	721	5.4	616	3.6
Unknown	4	3	0.0	0	0.0	1	0.0
Total¶	68,584	38,389	100%	13,238	100%	16,957	100%
First Prenatal Care							
1st or 2nd trimester	62,223	36,318	94.6	10,853	82.0	15,052	88.8
3rd trimester/no care	6,274	2,018	5.3	2,359	17.8	1,897	11.2
Unknown	87	53	0.1	26	0.2	8	0.0
Total¶	68,584	38,389	100%	13,238	100%	16,957	100%

†429 births of "other" race/ethnicity excluded.

‡Birthweights recorded to nearest ounce. Approximate gram equivalents: 3 lb 5 oz = 1500 gm; 5 lb 8 oz = 2500 gm.

¶Percentage totals may not equal 100 due to rounding.

‡Birth order = sum of live births, fetal deaths >20 wk gestation, and this birth.

TABLE 2—Neonatal and Postneonatal Mortality Rates by Ethnicity and Selected Risk Factors: 1974–75 Single Live Birth Cohort, Harris County, Texas

Mortality Measures and Risk Factors	Ethnicity		
	Non-Spanish Surname White	Spanish Surname White	Black
NEONATAL MORTALITY RATE†	8.2	9.2	14.3
Birthweight‡			
<3 lb 5 oz	479.3	613.4	431.5
3 lb 5 oz–5 lb 8 oz	37.2	20.2	17.6
>5 lb 8 oz	2.8	2.8	2.8
Birth Order¶			
1st	8.3	9.1	13.3
2nd or 3rd	8.0	7.6	13.7
4th or higher	8.7	12.8	19.5
Maternal Age			
<20 yr	11.0	12.1	15.6
20–34 yr	7.6	8.1	13.8
≥35 yr	8.6	12.5	13.0
First Prenatal Care			
1st or 2nd trimester	8.0	8.8	13.2
3rd trimester/no care	11.4	11.4	23.7
POSTNEONATAL MORTALITY RATE‡	2.8	3.0	6.3
Birthweight‡			
<3 lb 5 oz	37.9	33.6*	30.5
3 lb 5 oz–5 lb 8 oz	9.6	1.6*	17.0
>5 lb 8 oz	2.1	2.8	4.4
Birth Order¶			
1st	2.1	3.8	3.5
2nd or 3rd	3.2	2.6	9.1
4th or higher	4.0	2.5*	5.6
Maternal Age			
<20 yr	5.5	4.8	7.2
20–34 yr	2.1	2.6	5.9
≥35 yr	6.3	1.4*	3.2*
First Prenatal Care			
1st or 2nd trimester	2.3	2.9	5.3
3rd trimester/no care	11.9*	3.8*	13.7

†Neonatal mortality rate = $\frac{\text{neonatal deaths}}{\text{live births}} \times 1000$.

‡Birthweights recorded to nearest ounce. Approximate gram equivalents: 3 lb 5 oz = 1500 gm; 5 lb 8 oz = 2500 gm.

¶Birth order = sum of live births, fetal deaths >20 wk gestation, and this birth.

‡Postneonatal mortality rate = $\frac{\text{postneonatal deaths}}{\text{live births}} \times 1000$.

*Rate based on fewer than 10 deaths.

ber of first births and births to teenage mothers. Infants whose both parents were foreign-born had exceptionally low PNMRs. Over 45 per cent of births in this immigrant group were of third or higher order; nearly 25 per cent were to mothers 30 years of age or older; and 22 per cent were to mothers who received late or no prenatal care; yet no postneonatal deaths were recorded in these categories.

Discussion

These consistently paradoxical findings lead us to conclude that the Spanish surname infant mortality rate is not a valid indicator of health status for the Mexican American population in Harris County, Texas. It is highly unlikely that the low rates calculated in this study represent a protective factor shared by Mexican Americans, given the IMR of 70 deaths per 1,000 live births for the country of Mexico.¹² Rather, our analysis suggests that considerable loss of death data occurs for infants of foreign-born Mexican immigrants

even in this urban, non-border setting. Migration and under-registration of deaths appear to be plausible reasons for the data losses.

The high mobility of the Mexican American population and the "revolving door" nature of Mexico-US migration have been documented.^{13–15} Therefore, migration to Mexico or to rural areas in the United States where vital registration is less complete could account for the unusual mortality rates. Even where registration is complete, infant deaths are not reported back to the state of birth unless the address given on the death certificate is from the state of birth; time lags and differences in state death certificate reporting may also result in incomplete referral of death records. In this study, indications of data loss were most evident for infants whose parents were both foreign-born. The adverse effects of this ethnic group's low socioeconomic status were expected to be most evident in the postneonatal period, yet the PNMRs for this group were exceptionally low, especially for the high-risk categories of high birth order, advanced maternal age, and absent or delayed prenatal care. These high-risk characteristics are not incompatible with those expected in a low socioeconomic status migrant population.

In this study, very low birthweight infants of foreign-born Spanish surname parents had very high neonatal mortality rates. This 1974–75 finding in an urban non-border setting contrasts with that of Powell-Griner and Streck, who found that 1979 NMRs for very low birthweight Spanish surname infants were comparatively low in Texas border counties.⁸ Like earlier researchers,³ they attributed the low rates of underreporting of early infant deaths by undocumented alien parents who fear deportation or by lay midwives who fear prosecution for delivering complicated births. McCarthy, *et al*, also identified underreporting of very low birthweight neonatal deaths as a problem in other settings.¹⁶ In our study, moderately low rather than very low birthweight infants of foreign-born Spanish surname parents showed these unusually low NMRs. It is possible that in Harris County, which has a 5,000 bed internationally-known medical center, very low birthweight infants who are born alive are more likely to be—and thus die—in a hospital, and therefore have death certificates recorded, while moderately low birthweight infants are discharged and/or cared for at home, with their death data being lost through migration or lack of registration. In this case, the singularly high death rate for very low birthweight infants may represent the true mortality risk for premature infants of foreign-born Spanish surname parents. This identifies low birthweight, despite the apparently favorable distribution of birthweights, as a serious health problem for Mexican Americans; that is, very low birthweight Mexican American infants appear more likely to die than very low birthweight infants of other ethnicity. If the very low birthweight neonatal mortality rates calculated in this study actually underestimate mortality risk, as data from Powell-Griner and Streck⁸ and McCarthy, *et al*,¹⁶ might indicate, this problem assumes even greater magnitude.

In any case, further research regarding prematurity (as well as other causes of infant death) in the foreign-born Spanish surname population is required, and examination of fetal deaths, not addressed in this cohort study of live births, is recommended. Spanish surname parental nativity analysis of births and deaths according to attendant and place of birth^{††} also may provide valuable insights into the possible

††Due to small subsample size, these variables were not analyzed.

TABLE 3—Distribution of Selected Risk Factors for Spanish Surname Infants by Parental Nativity: 1974–75 Single Live Birth Cohort, Harris County, Texas

Risk Factor	Foreign-born Parents						
	Total Spanish Surname Births	Both Parents US-born		One Parent Foreign-born		Both Parents Foreign-born	
	n	n	%	n	%	n	%
Birthweight*							
<3 lb 5 oz	119	76	1.0	21	0.7	22	0.8
3 lb 5 oz–5 lb 8 oz	644	393	5.3	143	4.9	108	3.7
>5 lb 8 oz	12,342	6,846	92.4	2,710	93.2	2,786	95.4
Unknown	133	96	1.3	33	1.1	4	0.1
Total+	13,238	7,411	100%	2,907	100%	2,920	100%
Birth Order§							
1st	4,737	2,770	37.4	1,080	37.2	887	30.4
2nd or 3rd	5,687	3,240	43.7	1,256	43.2	1,191	40.8
4th or higher	2,814	1,401	18.9	571	19.6	842	28.8
Total+	13,238	7,411	100%	2,907	100%	2,920	100%
Maternal Age							
<20 yr	2,888	1,948	26.3	562	19.3	378	12.9
20–34 yr	9,629	5,147	69.5	2,171	74.7	2,311	79.1
≥35 yr	721	316	4.3	174	6.0	231	7.9
Total+	13,238	7,411	100%	2,907	100%	2,920	100%
First Prenatal Care							
1st or 2nd trimester	10,853	6,266	84.5	2,322	79.9	2,265	77.6
3rd trimester/no care	2,359	1,132	15.3	581	20.0	646	22.1
Unknown	26	13	0.2	4	0.1	9	0.3
Total+	13,238	7,411	100%	2,907	100%	2,920	100%

*Birthweights recorded to nearest ounce. Approximate gram equivalents: 3 lb 5 oz = 1500 gm; 5 lb 8 oz = 2500 gm.

+Percentage totals may not equal 100 due to rounding.

§Birth order = sum of live births, fetal deaths >20 wk gestation, and this birth.

TABLE 4—Neonatal and Postneonatal Mortality Rates by for Spanish Surname Infants by Parental Nativity and Selected Risk Factors: 1974–75 Single Live Birth Cohort, Harris County, Texas

Mortality Measures and Risk Factors	Both Parents US-born	Foreign-born Parents		
		Total	One Parent Foreign-born	Both Parents Foreign-born
NEONATAL MORTALITY RATE†	10.4	7.7	7.6	7.9
Birthweight§				
<3 lb 5 oz	605.3	627.9	571.4	681.8
3 lb 5 oz–5 lb 8 oz	25.4	12.0*	14.0*	9.3*
>5 lb 8 oz	2.9	2.5	3.0*	2.2*
Birth Order¶				
1st	10.8	6.6	5.6*	7.9*
2nd or 3rd	8.3	6.5	6.4*	6.7*
4th or higher	14.3	11.3	14.0*	9.5*
Maternal Age				
<20 yr	14.4	7.4*	5.3*	10.6*
20–34 yr	8.5	7.6	7.8	7.4
≥35 yr	15.8*	9.9*	11.5*	8.7*
First Prenatal Care				
1st or 2nd trimester	9.1	8.3	7.8	8.8
3rd trimester/no care	17.7	5.7*	6.9*	4.6*
POSTNEONATAL MORTALITY RATE‡	2.8	3.3	4.8	1.7*
Birthweight§				
<3 lb 5 oz	26.3*	46.5*	47.6*	45.5*
3 lb 5 oz–5 lb 8 oz	2.5*	—	—	—
>5 lb 8 oz	2.6	3.1	4.8	1.4*
Birth Order¶				
1st	2.5*	5.6	6.5*	4.5*
2nd or 3rd	2.5*	2.9*	4.8*	0.8*
4th or higher	4.3*	0.7*	1.8*	—
Maternal Age				
<20 yr	3.6*	7.4*	12.4*	—
20–34 yr	2.5	2.7	3.2*	2.2*
≥35 yr	3.2*	—	—	—
First Prenatal Care				
1st or 2nd trimester	2.9	2.8	3.4*	2.2*
3rd trimester/no care	2.7*	4.9*	10.3*	—

†Neonatal mortality rate = $\frac{\text{neonatal deaths}}{\text{live births}} \times 1000$.

*Rate based on fewer than 10 deaths.
—No deaths recorded.

§Birthweights recorded to nearest ounce. Approximate gram equivalents: 3 lb 5 oz = 1500 gm; 5 lb 8 oz = 2500 gm.

¶Birth order = sum of live births, fetal deaths >20 wk gestation, and this birth.

‡Postneonatal mortality rate = $\frac{\text{postneonatal deaths}}{\text{live births}} \times 1000$.

under-registration of births and deaths in the urban Mexican American community. Research in other similar geographic areas with larger data sets is recommended to confirm our findings and make meaningful comparisons. Until the issue of Mexican American infant mortality is resolved, health planners are cautioned not to base policy and programs for the Mexican American population on the Spanish surname infant mortality rate.

REFERENCES

- Jaffe AJ, Cullen RM, Boswell TD: *The Changing Demography of Spanish Americans*. New York: Academic Press, 1980.
- Lee ES, Roberts RE: Ethnic fertility differentials in the Southwest: the case of Mexican-Americans reexamined. *Sociol Soc Res* 1981; 65:194-210.
- Teller C, Clyburn S: Texas population in 1970: trends in infant mortality. *Texas Bus Rev* 1974; 40:240-246.
- US Department of Health, Education, and Welfare: *Health of the Disadvantaged, Chart Book*. DHEW Pub. No. HRA 77-628. Hyattsville, MD: HRA, 1977.
- University of Texas at Austin, Lyndon B. Johnson School of Public Affairs: *The Health of Mexican Americans in South Texas*. Austin: University of Texas, 1979.
- Burris JM: Neonatal and postneonatal mortality in a birth cohort: Houston, Texas 1958-1960. Houston: University of Texas School of Public Health, 1974 (master's thesis).
- Gee SC, Lee ES, Forthofer RN: Ethnic differentials in neonatal and postneonatal mortality: a birth cohort analysis by a binary variable multiple regression method. *Soc Biol* 1976; 23:317-325.
- Powell-Griner E, Streck D: A closer examination of neonatal mortality rates among the Texas Spanish surname population. *Am J Public Health* 1982; 72:993-999.
- Clark BM: Mexican migration to the United States. In: Weaver T, Downing TE (eds): *Mexican Migration*. Tucson: University of Arizona, 1976.
- US Bureau of the Census: *Census of Population and Housing 1980. Census Tracts, Houston, Texas, Standard Metropolitan Statistical Area. PHC 80-2-184*. Washington, DC: Govt Printing Office, July 1983, Table P-7, p 177.
- US Bureau of the Census: *Census of the Population 1970. Subject Reports. Persons of Spanish Surname. PC (2) 1D*. Washington, DC: Govt Printing Office, 1973, Table 2, p 3.
- US Bureau of the Census: *World Population 1979: Recent Demographic Estimates for the Countries and Regions of the World*. Washington, DC: Govt Printing Office, 1980, p 334.
- North DS, Houston MF: The characteristics and role of illegal aliens in the US labor market: an exploratory study. Report for US Department of Labor. Washington, DC: Linton and Company, 1976.
- Roberts K, Conroy ME, King AG, Rizo-Patron J: *The Mexican migration numbers game: an analysis of the Lesko estimate of undocumented migration from Mexico to the United States*. Bureau of Business Research Report. Austin: University of Texas, April 1978.
- Weaver T, Downing TE (eds): *Mexican Migration*. Tucson: University of Arizona, 1976.
- McCarthy BJ, Terry J, Rochat RW, Quave S, Tyler CW Jr: The underregistration of neonatal deaths: Georgia 1974-77. *Am J Public Health* 1980; 70:977-982.

ACKNOWLEDGMENTS

The authors wish to express their gratitude to the Texas Department of Health for providing basic data and to the Health Services Data Library of the University of Texas School of Public Health for extracting data and creating a working tape. The data processing activity was supported in part by the Public Health Special Project Grant Number 5D04AH01635. This paper is based on information presented at the American Public Health Association's 111th annual meeting, November 1983, Dallas, Texas.

Child Care at APHA Annual Meeting

APHA will be providing a child care program at its 1984 Annual Meeting in Anaheim. This service will be located within walking distance of the Anaheim Convention Center. The program will be coordinated and staffed by Sitters Unlimited, a licensed and bonded agency experienced in providing high quality child care services for convention attendees. Children of all ages can be accommodated. The program will be tailored to the needs of the specific age groups enrolled and will include organized activities such as arts and crafts, music and dance, games, toys, etc. Nutritious snacks will be provided in the morning and afternoon. Lunch and dinner will be the responsibility of the parent.

The hours of operation will be:

Sunday, November 11	10:00 am-10:00 pm
Monday, November 12	8:00 am-10:00 pm
Tuesday, November 13	8:00 am-10:00 pm
Wednesday, November 14	8:00 am-10:00 pm
Thursday, November 15	8:00 am-10:00 pm

Although the Association will be subsidizing the major expenses involved in providing this service, it will be necessary to charge the following fees to assist in defraying a portion of the expense:

Rates per Child

Hourly	\$3.00
Half Day or 6 Hours	16.00
Full Day	25.00
Entire Week (5½ Days)	75.00

Pre-registration of children will be required. Space cannot be assured if the children are not registered by October 11.

For additional information APHA, Convention Dept., 1015 15th St., N.W., Washington, D.C. 20005.