

Housing Conditions and Respiratory Illness in Migrant Ngöbe Children:

A Global Public Health Study.

Andrea Lund

Biology and Spanish

University of Minnesota, Morris

ABSTRACT

The indigenous Ngöbe population migrates annually from northern Panama to work on coffee plantations in southern Costa Rica. Chronic poverty and poor living conditions render the Ngöbe vulnerable to several health problems. In particular, smoke-producing activities in poorly ventilated houses may predispose the Ngöbe and their children to respiratory illness. A cross-sectional study was conducted to examine the relationship between respiratory health and housing conditions among Ngöbe children. Interview survey data were collected by staff from Finca Sana, a local health organization. Individual interviews of Ngöbe mothers were conducted in Ngöbere, the indigenous language, and responses were recorded in Spanish. Data from 123 surveys were analyzed using descriptive statistics, Chi-square analysis and logistic regression. Over 50% of mothers reported recent respiratory symptoms among their children. Analyses suggested that crowding in houses ($p = 0.0032$), trash burning ($p = 0.0207$) and wood burning ($p = 0.0256$) increased the likelihood of respiratory symptoms such as cough, runny nose and shortness of breath. The significance of these factors and the high prevalence of recent respiratory symptoms in Ngöbe children warrant further investigation. In order for local public health authorities to address the needs of migrant Ngöbe workers and their families, more thorough empirical examination of the factors that may contribute to their health status is necessary.

INTRODUCTION

Indigenous workers from the Ngöbe-Buglé population migrate from Panama every year to harvest coffee. This migratory population has been particularly vulnerable to poor health as a consequence of sub-standard living conditions on the coffee plantations and lack of accessible primary health care. However, a collaborative initiative began in 2007 between the International Organization for Migration (IOM), the Caja Costarricense de Seguro Social (CCSS), traditional healers and local health authorities in the coffee picking regions of Coto Brus and Los Santos, Costa Rica (IOM – Finca Sana). This initiative, called the Finca Sana project, seeks to improve health conditions of the migrant coffee harvesters by providing sustainable health services such as yearly check-ups and vaccinations through a mobile health team (IOM – Finca Sana).

Twelve coffee plantations in Costa Rica have been given the designation of *Finca Sana* (or “healthy farm”). To gain such designation from the organization, a farm owner permits members of the mobile health team to visit the farms regularly and provide basic health education and services (IOM - Finca Sana). To best serve its target population, the Finca Sana project also evaluates the epidemiological profile of indigenous coffee harvesters through surveys and interviews. In this way, Finca Sana will have a clearer epidemiological picture of the health of this vulnerable population and will be well equipped to start meeting needs based on this survey’s results. In addition, this work will contribute to a greater understanding of the relationship between health and living conditions of Ngöbe migrants. The Ngöbe are known to be poor and vulnerable among health authorities in Costa Rica, but very little information is available to document the health and living conditions and needs of this population. Findings from the Finca Sana survey will contribute valuable information on maternal and child health among the Ngöbe that could raise awareness among academics, humanitarians and governmental organizations.

Despite the dearth of information regarding issues of migrant Ngöbe health, the available literature also points to a need for further study. In 2008, a report released by the International Organization for Migration described current patterns and trends in indigenous migration. This report noted that the bulk of the research that has been conducted with respect to indigenous migration has focused on migrations from rural areas to urban centers. Consequently, there is a lack of research concerning trans-border migration, such as that in which the Ngöbe participate. This finding further demonstrates the importance of Finca Sana’s role in filling the gap in understanding and gaining a deeper and more complete knowledge of the yearly Ngöbe migration and its implications. Similarly, a 2008 study conducted by Bolaños et al. involved interviews with coffee harvesters in Los Santos, Costa Rica. A large portion of the study population was Ngöbe, but non-indigenous workers from Costa Rica and Nicaragua were also interviewed. Though a general lack of medical attention was noted across all three groups, the study found that the indigenous workers “lived in significantly unfavorable housing conditions” when compared with non-indigenous workers, an indication of the indigenous workers’ increased vulnerability to illness provoked by poor sanitation and housing conditions.

A study conducted by Barboz-Argüello and colleagues (2005) investigated pediatric hospitalizations due to pneumonia at Hospital Maximiliano Peralta, a regional referral hospital in Cartago, Costa Rica that serves the coffee region of Los Santos. The rates of pneumonia hospitalization fluctuated seasonally, peaking during the coffee harvest from November to March. Strikingly, 51% of all of these seasonal hospitalizations came from the Los Santos area, an area whose population is 97% indigenous during the coffee harvest. The prevalence of

pneumonia in indigenous children was notable given that the indigenous population makes up only 7.5% of the total population in the region that Hospital Maximiliano Peralta serves. The authors attribute this high prevalence to poor, overcrowded housing conditions on the coffee plantations that were at one time deemed “uninhabitable” by the Costa Rican Ministry of Health.

Moreover, Dr. Maria Fonseca (2005) comments on the effect that the migrant Ngöbe workers have on the health system in the Los Santos region. She specifically notes how drastically the area’s epidemiologic profile changes with the yearly arrival of the indigenous migrant population. Rates of malnutrition, respiratory illness, maternal and infant mortality, tuberculosis and malaria all increase in the region during the months of coffee harvest. She calls for an exhaustive evaluation of this impact, so that the public health system in Costa Rica may be able to account for this burden when allocating health care resources.

Based on this literature and personal observations made in the field by the author, it was hypothesized that houses with higher occupancy, wood-burning stoves and poor ventilation would be associated with higher rates of respiratory symptoms, specifically the presence of a cough, shortness of breath, runny nose or difficulty breathing. Data from Finca Sana surveys were used to analyze factors related to respiratory illness and housing conditions on the coffee farms.

METHODOLOGY

Initiation of data collection began in December 2008 and is ongoing. Presently, cultural advisors, bilingual members of the non-migrant Ngöbe community in Coto Brus, Costa Rica, are conducting structured interviews with Ngöbe mothers on the coffee plantations using a Finca Sana survey instrument. Interviews were conducted in Ngöbere, the indigenous language, and responses were recorded in Spanish. A total of 123 completed surveys were received from Finca Sana for analysis. Personal field observations of housing conditions on coffee farms informed the factors used in the analysis of Finca Sana’s data. According to these observations, the presence of crowding, wood-burning and improper ventilation seemed to be risk factors for chronic respiratory illness. The scope of the entire survey was beyond that of the specific interests of this study, and only survey items relevant to the factors of interest were selected for analysis. Selected survey items included number of children in the household, presence of cough, shortness of breath and runny nose, as well as difficulty breathing as a measure of cough severity. Items that measured housing conditions included whether or not drinking water was treated, presence of dirt floor, number of rooms in the house, whether or not wood burning was used for cooking, and whether or not families disposed of their trash by burning it.

Many of the survey questions addressing housing conditions were answered by choosing one of several response options. Measurements of flooring in the house, cooking methods and garbage disposal were all classified by type. Flooring responses ranged from dirt to wood to plastic to cement. Cooking methods ranged from electricity to gas to wood, and garbage disposal ranged from municipal collection to burial to disposal in the river. Although it may be useful to investigate the spectrum of housing conditions in which people are living, survey responses options were not ordered for ordinal statistical analysis. In order to be able to analyze these housing conditions in relation to respiratory symptoms, these items were converted to binary variables simply accounting for the presence or absence of dirt floor, wood burning and trash burning in the household.

Variables of primary interest were the presence of smoke-burning activity in cooking and trash disposal. Additional factors, including the treatment of water, presence of dirt floors, and number of rooms in house were considered proxies for house quality. Although data was collected on household water sources, this factor was not incorporated into the analysis because the responses were not scaled for an ordinal analysis. An approximation of household occupancy was measured by dividing number of children in the household by number of rooms per household, since the number of people per household was not available from survey data.

Data was analyzed using SPSS (PASW Statistics 18) software. Variables for analysis were selected based on correlation analysis. A Chi-square analysis was performed in addition to basic descriptive statistics. Fisher's Exact Test, performed because of the relatively small size of the sample, determined if a significant relationship existed between values. A bivariate logistic regression was performed on the four respiratory symptom proxies with respect to several variables associated with housing conditions. The calculated average number of kids per room to assess the effects of crowding on the presence of respiratory symptoms. The presence of dirt floor, water treatment, and wood and trash burning were also examined.

RESULTS

There were 123 completed surveys. Ages of children ranged from 10 months to just over 12 years, and averaged just over 2 years. The number of children per household ranged from 1 to 9, with a mean of just over 3 per household. Mean number of children per room was 1.9 and ranged from less than 1 child per room to 9. Over half of the respondents reported living in dwellings with 2 or fewer rooms while approximately 40% lived in dwellings with 3 to 6 rooms (Table 1). Very few reported having dirt floors and cooking is done almost exclusively over a wood-burning stove. In addition, a surprising proportion of families (30%) burn their trash. Many do not treat their water, but this factor does not account for a wide spectrum of household water sources (Table 2).

Table 1 Number and frequency (%) of rooms per household

No. Rooms/House	N	%
1 - 2	65	55
3 - 6	46	40
7+	6	5
Total	117	

Table 2 Distribution of measures of housing quality

	Yes		No		Total
	N	%	N	%	N
Wood burning stove	104	86	17	14	121
Burn trash	36	30	84	70	120
Dirt floor	5	4	113	95	118
Treat water	38	34	73	65	111

More than half of the Ngöbe mothers reported the occurrence of coughing (59%) among their children (Table 3). In addition, 66% of those children who had a cough also experienced

difficulty breathing. These rates were relatively high given the two week time period in which mothers were asked to recall symptoms.

Table 3 Number and frequency of reported respiratory symptoms among migrant Ngöbe children within two weeks of the study

	Yes		No		Total
	N	%	N	%	N
Coughing	66	59	48	42	114
Shortness of Breath	39	41	55	59	94
Runny Nose	41	45	51	55	92
Difficulty Breathing	54	66	28	34	82 ¹

¹ The total number of responses for difficulty breathing exceeds the total number of mothers who reported coughing among their children due to lack of consistency in data recording.

Results of Chi-squared analysis and Fisher's Exact Test indicate a significant association between occurrence of coughing among children and burning trash ($p = .0166$) and water treatment ($p = .0004$) (Table 4). Difficulty breathing was significantly associated with both burning wood for cooking ($p = .0301$) and burning trash ($p = .0477$). Treatment of water was significantly associated with shortness of breath ($p = .0289$) and runny nose ($p = .001$).

Table 4 Results of contingency analysis relating respiratory symptoms with housing conditions

Response	Condition	Chi ²	DF	p value	R ²	Fisher's Exact p (Right-tail)
Coughing	Burn trash	5.353	1	< .0207	.0362	.0166
	Dirt floor	4.055	1	< .0440	.0393	.0529
	Treat water	5.205	1	< .0005	.0907	.0004
Difficulty breathing	Burn trash	3.596	1	< .0579	.0367	.0477
	Wood burning stove	4.980	1	< .0256	.0453	.0301
Shortness of Breath	Treat water	4.535	1	< .0332	.0381	.0289
Runny Nose	Treat water	15.943	1	< .0001	.1352	.001

Logistic regression analysis examined how contextual household factors affected the likelihood of respiratory symptoms. The likelihood of a child having a cough increased when families burned their trash ($\beta = 1.076$, $df = 1$, $p = 0.036$) and treated their water ($\beta = 1.440$, $df = 1$, $p = 0.006$). The likelihood of having a runny nose also increased when families treated their water ($\beta = 1.682$, $df = 1$, $p = 0.002$). The likelihood of mothers reporting recent difficulty breathing among their children also increased when families burned their trash ($\beta = 1.321$, $df = 1$, $p = 0.028$). Similarly, the likelihood of having difficulty breathing also increased slightly when families cooked over a wood-burning stove, although this relationship was only marginally significant ($\beta = 1.076$, $df = 1$, $p = 0.067$).

DISCUSSION

Analyses demonstrate a significant statistical relationship between respiratory symptoms and housing conditions. Logistic regression analysis indicates that smoke-producing activities

present in the household increased the likelihood of children exhibiting respiratory symptoms. Similarly, Chi-square analysis also showed that smoke-producing activities in the household, such as burning trash and cooking over a wood-burning stove, increased the probability of children exhibiting respiratory symptoms. These results support our hypothesis that poor housing conditions are associated with higher rates of respiratory symptoms.

However, results linking higher probability of respiratory symptoms, specifically cough and runny nose, with the treatment of water was unexpected. The water treatment variable was intended as a proxy to measure quality in plantation housing. The rationale behind this assumption was that in the houses where water treatment is available, people are living with one less risk for infection. However, source of water could not be accounted for because of the scaling of responses in the survey. We did not know if families had access to potable water sources or not, and thus, whether treatment was necessary.

Additionally, although statistical relationships were revealed through analysis of these data, it is likely that there are additional variables that contribute to the respiratory health of migrant Ngöbe children that were not addressed in this study. Although we have not uncovered all of the factors that contribute to respiratory illness in Ngöbe children, these findings suggest that respiratory illness is an issue that requires further attention. If more than half of all children surveyed have exhibited a cough in a period as short as two weeks, this is cause for concern, especially since a majority of the coughs were severe enough to generate difficulty breathing.

These results support the need for further epidemiological studies of the migrant Ngöbe population in Coto Brus, Costa Rica. Survey research that focuses specifically on respiratory illness and housing conditions could yield better data to inform public health policies. In addition, objective measures of housing conditions would provide more valid measures of people's physical living environments. In addition, response categories that more accurately reflect the range of conditions would be very useful. It may also be advised that interviewers gather data on all children in each family instead of just the most recently born. Other potential directions for future study would be to note which interviews were conducted at which farms, because of variable housing conditions observed across farms. Additionally, physiological measures of health would provide more accurate picture of health status. The introduction of a control group such as a non-migrant population for comparison may provide additional insight into this relationship. The seasonality of respiratory illness, as noted by Barboz-Argüello, also merits further investigation.

ACKNOWLEDGEMENTS

I would like to recognize my classmates Gabriel Lane, Lauren Perini and Mary Alice Sandberg who were collaborators on this project during our semester in Costa Rica with Duke University and the Organization for Tropical Studies.

REFERENCES

- Barboz-Argüello, María de la Paz. Morice-Trejos, Ana, Carranza-Maxera, María, Navas-Alvarado, Lissett. 2005. Estacionalidad de egresos por neumonía en el Servicio de Pediatría del Hospital “Maximiliano Peralta” y su asociación con la migración indígena Ngöbe Buglé. Acta Médica Costarricense 47(2): 78-83.
- Bolaños Rocío Loría, Partanen Timo, Berrocal Milena, Álvarez Benjamín and Córdoba, Leonel. 2008. Determinants of Health in Seasonal Migrants: Coffee Harvesters in Los Santos, Costa Rica. J. Occup. Environ. Health 14:129-137.
- Fonseca, Dra. María del Rosario Calvo. 2005. Efectos de la migración Ngöbe-Buglé en el Servicio de Pediatría del Hospital Dr. Maximiliano Peralta de Cartago. Acta Médica Costarricense 47(2): 67-68.
- IOM – Finca Sana: Improving Health among Highly Mobile Populations. <http://www.iom.int/jahia/Jahia/pid/2001>.
- Trujano, Carlos Yescas Angeles. 2008. Indigenous Routes: A Framework for Understanding Indigenous Migration. International Organization for Migration.