Journal of Immigrant and Minority Health, Vol. 8, No. 2, April 2006 (© 2006)
DOI: 10.1007/s10903-006-8525-1

Housing Characteristics of Farmworker Families in North Carolina

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Adequate housing is a basic human right and an important determinant of environmental health. Little research has documented the housing quality of immigrant Latino farmworker families. This analysis uses data from four surveys of North Carolina farmworker communities conducted in 2001 and 2003 to document aspects of housing quality that could affect farmworker family health. Three housing domains are considered: dwelling characteristics, household characteristics, and household behaviors. Most farmworker families live in mobile homes, and few own their dwellings. Many are located near agricultural fields. Most houses are small, but household size is large, containing adults, in addition to the nuclear family. Crowding is common among farmworker families. Many farmworker households lack basic facilities, such as washing machines. Farmworkers attempt to reduce exposure by frequently cleaning their dwellings. These findings suggest that the health of farmworker families is at risk due to inadequate housing. Further research on housing-related health effects among farmworker families is needed.

KEY WORDS: migrant and seasonal farmworkers; housing; environmental health; occupational health; Latinos.

INTRODUCTION

The United Nations has recognized that adequate housing is a basic human right (1), and housing quality is an important environmental determinant of health (2). Crowding, as well as inadequate sanitary facilities, contribute to a higher incidence of infectious diseases. Injuries due to structural or electrical problems are frequent for those living in substandard housing. Toxic substances, such as lead, PCBs, and pesticides, are often present in substandard housing. Inadequate housing also affects psychological well-being (3, 4).

Children are particularly susceptible to health-related problems, as a result of poor housing conditions. Exposure to lead and other heavy metals in old peeling paint impairs motor function and neurological development. Long-term exposure to dust and mold, due to water leakage or broken windows, is related to respiratory and dermatological conditions (4, 5). Insect and rodent infestations may trigger allergies and increase the likelihood of pesticide exposure (6). Upper respiratory infections brought on by inadequate housing may be particularly harmful to children (7). Finally, the housing environment in which people live in their early life may have a long-term negative effect on their health (8).

While rates of inadequate housing in developed countries such as the US may be relatively low, subpopulations, such as immigrants, experience high rates of substandard housing. Overcrowding, lack of affordability, and structural deficiencies have been well-documented among immigrants in urban areas (9, 10). Immigrants to rural communities, such as

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migrant and seasonal farmworkers, are also at risk for inadequate housing. Over 80% of the migrant and seasonal farmworkers are immigrants; most of them live in poverty (11). Living primarily in rural areas, farmworkers face different housing challenges compared to their urban immigrant counterparts.

Farmworker families face unique risks related to housing. Individuals who work in fields, where pesticides have been applied, bring pesticide residues home with them on their clothes, boots, and skin. Therefore, housing characteristics that allow the farmworkers to take the proper safety measures to protect their families are important. Laundry facilities in the home allow the farmworker to wash the pesticide residues from their clothes immediately (12). The number of bathrooms available to farmworkers is another important consideration. Farmworkers who must wait to shower, increase the possibility of spreading pesticide residues into the home. Functional windows and the presence of air conditioning may help prevent pesticide drift from contaminating dwellings. Pesticide residues have been found in dust in the homes of farmworker families (13–16). Frequent cleaning is one way to decrease pesticide residue levels. Documenting the frequency of cleaning or the presence of a working vacuum cleaner in the home can inform educational programs designed to help the families in reducing pesticide exposure in the home. Finally, home ownership may be related to a sense of mastery, control or security (17, 18) and thus has implications for psychological health, as well as physical health.

While there is general agreement about the importance of farmworker housing to health, there is surprisingly little research on farmworker housing quality or the relationship of housing to the health of farmworker families (5). Only a handful of studies have attempted to document the quality of farmworker housing, and these universally decry the abysmal state of this housing (19–22). Farmworker housing is generally characterized as crowded, in disrepair, lacking basic facilities (e.g., indoor plumbing) and appliances (e.g., washing machines, fully functioning stovetops), located near fields in which pesticides are applied, and costly.

The purpose of this paper is to describe the housing conditions of farmworker families in North Carolina and identify housing features that place these families at risk for environmental exposures. This description focuses on dwelling characteristics, household characteristics, and household behaviors. Dwelling characteristics, such as building type, construction material, and tenure status, contribute to an overall picture of farmworker family housing. Some dwelling characteristics, e.g., living close to agricultural fields, indicate health risks for these families, such as pesticide exposure (5). Household characteristics, such as overcrowding, are problems that have been suggested to negatively affect mental health and to increase infectious diseases. Household behaviors, such as frequency of cleaning and laundering, can help families counter environmental exposures.

BACKGROUND

There are approximately 2.5 million farmworkers in the US. Most farmworkers are Latinos (83% of all farmworkers), with 75% of all farmworkers having been born in Mexico (11). Some farmworkers migrate from Mexico to the US each year, leaving their families in Mexico. However, the majority of farmworkers who are married and who have children, approximately 60% of the farmworker population, live with their spouses and children in the US while working (23). Most farmworkers are paid very low wages for their work (11).

North Carolina's farmworkers have been predominantly Latino since the early 1990s (23). Estimates of the number of seasonal and migrant farmworkers in the state range from 100,000 to 250,000 (24). North Carolina farmworkers may have greater language barriers, perhaps increasing their vulnerability, compared to farmworkers in other states that have more established Latino communities (e.g., California). While there are Latino farmworkers in most of North Carolina's 100 counties, there are regional variations in terms of numbers and density of workers as well as in the crops they tend. Those in the western, more mountainous counties work primarily with Christmas trees, and those in the eastern part of the state work with other crops such as cucumbers, sweet potatoes and tobacco. Common to both populations, however, is the need for affordable, decent housing.

METHODS

Data for this analysis were collected for two different projects, La Familia and Casa y Campo. Both projects were conducted primarily in North Carolina; however, some of the La Familia participants reside in Virginia. Both are community-based

participatory research projects conducted collaboratively by the North Carolina Farmworkers Project, a non-profit advocacy and service organization that assists farmworkers, Student Action for Farmworkers, a non-profit organization that places bilingual college students in agencies that assist farmworkers in North and South Carolina, and Wake Forest University School of Medicine. The projects each conducted two separate surveys that provided data for this analysis. All interviewers for each were fluent Spanish speakers. All interviewers participated in a formal training program that included instruction on participant inclusion criteria and recruitment, the protection of human subjects, interview techniques, and interview content. Each survey was approved by the Wake Forest University School of Medicine Institutional Review Board.

La Familia

La Familia is an intervention project aimed at reducing pesticide exposure among Latino farmworker families in the mountain counties of northwest North Carolina and southern Virginia. Mountain agriculture in this region is dominated by Christmas tree production. In addition to planting, cultivating, and harvesting Christmas trees, farmworker men and women make garlands and wreaths from Christmas tree branches. Data from the formative research used in the development of the La Familia intervention and from the baseline survey of intervention participants provide information about farmworker housing.

LA Familia Formative Research (LF Formative)

This component of the project was designed to document and evaluate farmworker women's knowledge and perceptions of pesticide exposure in their homes, as well as to assess the actual levels of pesticides and to identify the pathways for environmental exposure. Assessments included in-depth interviews, survey interviews, limited observation of housing quality**,** collection of environmental samples, and collection of urine samples. Data collection was completed in 2001.

Eligible households included at least two related persons, one of whom had to be employed as a seasonal, migrant, or year-round farmworker within the last 12 months, and the other had to be a child between 12 and 84 months of age. The primary contact was the adult female in the household. As no list of farmworkers was available, and due to the dispersed nature of farmworker residences, a standard random sample design could not be used. Potential candidates were found via a site-based sampling approach (26). Working with local service providers, we first identified locations ("sites") where members of farmworker families could be found. These included local women's groups, English as a second language (ESL) classes, and church groups. We discussed the project with women at these sites, and recruited those who fit the inclusion criteria of living in a household in which at least one adult who had done farm work in the previous 12 months, and at least one child 12–84 months of age. We expanded the list of potential families using a snowball approach in which recruited participants introduced us to additional potential participants. Details of the sampling procedures are described elsewhere (16, 25). Data were collected in the participants' homes. After describing the study, answering questions, and obtaining informed consent, interviews were conducted by bilingual female project staff. Forty-one families participated in the La Familia Formative Research.

La Familia Baseline Survey (LF Survey)

Before the implementation of the La Familia lay health advisor intervention, participating families were asked to complete a baseline survey that measured pesticide safety knowledge and behavior, as well as characteristics of the participating households and their dwellings. Women recruited to be lay health advisors had to have been employed in farmwork or have a spouse who had done farmwork, to be recognized as leaders in the Latino community and have wide social networks. Participants were families recruited by the nine trained lay health advisors, with the inclusion criteria being a family in which at least one person had done farm work in the previous year, and having a child. The primary respondent was the adult female of the household. The baseline survey included 117 farmworker families. Data collection was completed in 2003.

Casa y Campo

Casa y Campo is a community health education project aimed at reducing pesticide exposure

and addressing the health concerns of the farmworker community. It is being conducted in four counties in central and eastern North Carolina, the area with the highest concentration of migrant and seasonal farmworkers in the state. Agriculture in this region is dominated by the production of tobacco, sweet potatoes, cucumbers and other vegetables. Data from the formative research used in the development of the Casa y Campo community education program and from a survey of household lead exposure both provide information about farmworker housing.

Casa y Campo Formative Research (CC Formative)

In-depth and survey interviews were conducted with 25 farmworker families to document knowledge and beliefs about pesticide exposures and prevention at work and at home. Included in the interviews were fixed response interview items and observations about living conditions such as number of years of residence, type of structure, and house-cleaning.

A site-based sampling method was used to locate a representative sample (26). We worked with the North Carolina Farmworkers Project to identify locations where members of farmworker families could be found. These included local women's groups, ESL classes, and church groups. Project staff visited each site, approached individuals and asked if they wanted to participate. They explained the purpose of the study, study procedures, and risks and benefits involved. Once informed consent was obtained and respondents were interviewed by trained bilingual interviewers. Recruitment continued until the goal of 25 families was achieved. Interviews were conducted with 21 women and four men in 2002.

Lead Exposure Survey (CC Survey)

The design of the Casa y Campo project provided for data collection that addressed concerns of the farmworker community during each project year. In 2003, a survey was conducted to document lead exposure in farmworker dwellings. Eligible households had to have at least one adult who had done farm work within 12 months and at least one child under the age of six present. The staff of the North Carolina Farmworkers Project used a site-based sampling approach to locate potential participants.

Following an explanation of the purpose of the study, the study procedures, and an explanation of the risks and benefits of the study, informed consent was obtained, and survey interviews were completed by trained bilingual interviewers. Interviewers recorded their observations about housing quality in notes. Data were collected from 51 households.

Measures and Analysis

This paper uses a descriptive analysis to describe the housing conditions of farmworker families in North Carolina and identify housing features that place these families at risk for environmental exposures. This analysis presents information from the four survey interview data sets to provide a picture of these housing conditions. Each survey data set is limited in size. While each sample is representative of the population from which it was selected (farmworker families), none was randomly selected. Therefore, we did not conduct statistical analyses comparing information across data sets.

From the survey data we constructed measures of respondent characteristics, dwelling characteristics, household characteristics, and household behaviors. Respondent characteristics include gender, age, country of origin, and number of years in the US. Dwelling characteristics were reported by observation of the trained interviewers as well as from participant self-report (Table I). These included tenure, housing type, type of construction material, adjacency to agricultural fields, number of rooms, ease of cleaning, and presence of air conditioning. Household characteristics included length of residence, household composition, household size, and crowding (Table II). Behaviors included frequency of cleaning and laundry facilities (Table III). Equivalent data were not collected to construct all of the measures for each survey. However, there is a sufficient overlap of questions to assess the state of housing among North Carolina farmworker families.

Data from the in-depth interviews collected as part of the La Familia Formative Research and the Casa y Campo Formative Research were also reviewed for this analysis. Quotations from these

Table I. Dwelling Characteristics of Farmworker Households in North Carolina[a]

	Survey							
	La Familia				Casa y Campo			
	Formative research ($n = 41$)		Baseline survey ($n = 117$)		Formative research ($n = 25$)		Lead survey ($n = 51$)	
Dwelling characteristics	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Tenure								
Own	9	22.0	19	16.2	0	0.0	10	19.6
Rent	32	78.0	84	71.8	25	100.0	41	80.4
Housing provided by employer			14	12.0				
Dwelling type								
Mobile home or trailer	22	53.7	68	58.1	16	64.0	36	70.6
Single family detached	12	29.3	31	26.5	9	36.0	12	23.5
Apartments	7	17.0	18	15.4	0	0.0	3	5.9
Exterior material								
Aluminum siding	20	48.8			15	60.0	32	62.7
Wood siding	13	31.7			7	28.0	14	27.5
Aluminum and wood siding	4	9.8			0	0.0	4	7.8
Brick	3	7.3			2	8.0	1	2.0
Other	1	2.4			1	4.0	0	0.00
Condition of paint								
No peeling or no paint							31	60.8
Exterior paint peeling							6	11.8
Interior paint peeling							3	5.9
Window frames peeling							1	2.0
Two or more surfaces peeling							10	19.6
Number of rooms								
Two to four	19	46.3	17	14.5				
Five or six	19	46.3	73	62.4				
Seven or more	3	7.3	27	23.1				
Number of bedrooms								
One	3	7.3	5	4.3				
Two	17	41.5	72	61.5				
Three	16	39.0	32	27.4				
Four or more	5	12.2	8	6.9				
Number of bathrooms								
One	34	82.9	90	76.9				
Two	7	17.1	27	23.1				
Adjacent to agricultural fields	18	43.9	13	11.1	7	28.0		
Any window permanently shut	13	31.7			12	48.0	25	49.0
Difficult to clean	20	48.8	16	13.7			23	45.1
Air conditioning								
None	34	83.0			9	36.0	13	25.5
Window unit	1	2.4			9	36.0	25	49.0
Central	3	7.3			7	28.0	13	25.5
Do not know	3	7.3			0	0.0	0	0.0
Use of air conditioning (if present)	4	57.1			16	100.0	37	97.4

[a]Blanks indicate that the variable was not collected in that survey.

in-depth interviews that illustrate the survey data were included with the results. Quotations are labeled with "LF" if they are from the La Familia Formative Research and "CC" if they are from the Casa y Campo Formative Research; numbers in the labels refer to specific respondents.

RESULTS

Respondent Characteristics

Data were available for 234 households across the four surveys (41 LF Formative; 117 LF Survey;

Table II. Household Characteristics of Farmworker Households in North Carolina[a]

	Survey							
	La Familia				Casa y Campo			
	Formative research ($n = 41$)		Baseline survey ($n = 117$)		Formative research ($n = 25$)		Lead survey ($n = 51$)	
Household characteristics	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Length of residence								
Less than 1 year	14	34.1	33	28.2	7	28.0	19	37.3
1 or 2 years	8	19.5	50	42.7	5	20.0	9	17.6
3 or 4 years	14	34.1	26	22.2	8	32.0	7	13.7
5 or more years	5	12.2	8	6.9	5	20.0	14	27.5
Household composition								
Nuclear family only	23	56.1	67	57.3	9	36.0	21	41.2
Nuclear family with relatives	12	29.3	28	23.9	12	48.0	25	49.0
Nuclear family with non-relatives	3	7.3	21	17.9	3	12.0	4	7.8
Nuclear family with relatives and non-relatives	3	7.3	1	.9	1	4.0	1	2.0
Household size								
Two to four persons	16	39.0	70	59.8	6	24.0	10	19.6
Five or six persons	18	43.9	33	28.2	13	52.0	21	41.2
Seven or more persons	7	17.1	14	12.0	6	24.0	20	39.2
Number of children								
None (pregnant participant)	0	0	5	4.3	1	4.0	0	0
One	13	31.7	59	50.4	7	28.0	12	23.5
Two	13	31.7	30	25.6	6	24.0	10	19.6
Three or more	15	36.6	23	19.7	11	44.0	29	56.9
Number of adults								
One or two	25	61.0	66	56.4	9	36.0	17	33.3
Three or four	10	24.4	42	35.9	10	40.0	22	43.1
Five or six	6	14.6	9	7.7	6	24.0	12	23.5
Number of farmworkers								
One	18	43.9	69	59.0	4	16.0	19	37.3
Two	14	34.1	30	25.6	7	28.0	14	27.5
Three or more	9	22.0	18	15.4	14	56.0	18	35.3
Crowding index (people/rooms)								
Less than or equal to one per room	22	53.7	74	63.8				
More than one person per room	19	46.3	42	36.2				
Farmworkers per bathroom								
Less than or equal to one	19	46.3	73	62.9				
More than one and less than four	16	39.0	37	31.9				
Four or more	6	14.7	6	5.2				

[a]Blanks indicate that the variable was not collected in that survey.

25 CC Formative; 51 CC Survey). Respondents were predominantly female by study design ($n = 220$), although a few males were included in CC Formative ($n = 4$) and CC Survey ($n = 10$). About half (52%) of those interviewed were in the 25–34 years age group, with 34% less than 25 years of age and 13% greater than 35 years of age. LF Survey respondents tended to be a little younger, with 40% less than 25 years of age.

Most respondents in all four groups had migrated from Mexico (over 90%). Most respondents in LF Survey (71.3%) and CC Survey (74.5%) had been in the US at least 3 years. Almost 40% of the CC Survey respondents had lived in the US for seven or more years, compared to 18% of the LF Survey respondents.

Dwelling Characteristics

About 20% of the dwellings in three of the surveys were owner occupied (Table I). A large percentage of the dwellings in which farmworkers lived were mobile homes; hence the predominant exterior was aluminum siding. More of the La Familia than Casa y Campo participants lived in single family homes

Table III. Household Behaviors in Farmworker Households in North Carolina[a]

	Survey							
	La Familia				Casa y Campo			
	Formative research ($n = 41$)		Baseline survey ($n = 117$)		Formative research ($n = 25$)		Lead survey ($n = 51$)	
Household characteristics	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Frequency dust								
Daily	11	26.8			13	52.0	18	35.3
Several times per week	15	36.6			5	20.0	17	33.3
Once per week or less	15	36.6			7	28.0	16	31.4
Frequency sweep floors								
Daily	32	78.0			24	96.0	49	96.1
Several times per week	6	14.6			0	0.0	2	3.9
Once per week or less	3	7.3			1	4.0	0	0.0
Frequency mop floors								
Daily					15	60.0	37	72.5
Several times per week					8	32.0	12	23.5
Once per week or less					2	8.0	2	4.0
Frequency vacuum floors								
Daily	13	31.7			2	8.0	10	19.6
Several times per week	7	17.1			2	8.0	10	19.6
Once per week or less	8	19.5			2	8.0	3	5.9
Do not own a vacuum	13	31.7			19	76.0	28	54.9
Laundry facilities								
Working washing machine	25	61.0	67	57.3	16	64.0		
Working dryer	16	39.0	43	36.8	4	16.0		
Indoor clothesline	4	10.0	5	4.3	0	0.0		
Outdoor clothesline	24	58.5	31	26.5	18	72.0		
Hand launder	15	36.6			4	16.0		
Use public laundromat	20	48.8	56	47.9	8	32.0		

[a]Blanks indicate that the variable was not collected in that survey.

and apartments. Measures of household size are only available for the La Familia surveys, and reflect the types of dwellings. About half of the dwellings had five or six rooms (excluding kitchens). Most had two or three bedrooms, and most had a single bathroom.

Participants gave different evaluations of the sizes of their dwellings. Some were very positive; for example, "It's a big trailer. It has two bedrooms, a big kitchen—well, it's not real big, but it's not small either. We all fit into it. And the living room is big. It's a big trailer. I believe that we are very comfortable here because the living room is big. The bedrooms are big" (CC04). Others participants were less sanguine. For example, in describing the trailer in which two families lived, a participant stated, "I think the other trailers are bigger. This is the smallest one. It only has two bedrooms, but for us it's fine with just two bedrooms" (CC07). Another participant, whose household included four adults and a small child, reported that her dwelling, "Does not have bedrooms. It's just one big space. And it does not have a place for bathing. It's just this" (CC05).

Structural factors related to the potential for pesticide exposure were also available. Eleven percent of LF Survey families, 44% of LF Formative families, and 28% of CC Formative families lived in dwellings directly adjacent to agricultural fields. Reports of windows being permanently shut ranged from 32 to 49%. Over half of the households in Casa Formative (64%) and Casa Survey (74.5%) owned air conditioners. This compares to only 17% of the La Familia Formative respondents, who live in higher and presumably cooler altitudes.

The trained interviewers rated each house as to its difficulty to clean. Forty-five percent of CC Survey houses and 49% of LF Formative dwellings were rated as difficult to clean. Few (14%) LF Survey houses were rated as difficult to clean, and data were not available for CC Formative houses. Observational data on housing conditions were collected for the CC Survey. Peeling paint (interior,

exterior, or windows) was observed by interviewers in over 20% of the dwellings. Participants often noted the deteriorated conditions of their dwellings.

> The thing is that this house is the oldest and that's why it's like this. I told the boss to buy me some paint because the house needed to be painted on the outside because it's ugly already. And I told him I wouldn't charge him for that. (CC18)

> It's not very nice. It's a little bit dirty, but since there are no other trailers or houses here, here's where we come. It's a little dirty. We wanted a clean trailer, but there are not any. And we came here and it's dirty, a little bit dirty. (CC19)

> Because this house is very cold, and when we arrived, the house had lots of holes everywhere, like on the edges of boards, there in the kitchen, all along this hallway, and over there, behind the bedrooms. (LF11)

> It's very small and there are a lot of problems. I had to take out the carpet because the water pipes would bust open all the time. They do not work and it would flood, and I had to take off the other one that was on top of this one, and the owner does not come and fix it. (LF36)

Household Characteristics

While length of time in the US is a potential indicator for stability, from the standpoint of housing quality, another important variable is length of time in current residence (Table II). The longer a family lives in a particular dwelling, the greater the opportunity to make repairs. At least a quarter of the individuals in all four groups had lived in their current residence for less than 1 year. The CC Survey had the highest percentage of respondents living in their current house for less than 1 year (37%), and for five or more years (27.5%). These data illustrate significant variability between and within all four groups in terms of housing stability.

A large percentage of the respondents in all four surveys had households composed of more than the traditional nuclear family (a married couple with children). About half of the two Casa samples had relatives beyond the nuclear family living with them, while about one-quarter of the two La Familia samples had co-resident non-nuclear family relatives. About 10% of the households from all of the samples had unrelated co-resident members, with the greatest percentage for LF Formative.

A large percent of households in each survey had seven or more residents, ranging from 12.0% of the LF Survey households to 39.2% of the CC Survey households. Most households had at least two children; 68.3% of LF formative, 76.0% of LF survey, 52.0% of CC formative, and 76.5% of CC survey households had two or more children. About half of the Casa households had three or more children. At least 40% of the households in every survey had more than two adults living in the household, and at least 40% of the households had at least two adults employed as farmworkers. Participants described problems caused by households with many adults.

> The house is fine. The thing is that living with a lot of people is difficult, very difficult. They do not keep things clean, the bathroom, the kitchen, and the living room. There are nine [people]. They do not fit in the beds, but there are nine. They leave everything thrown around and I would have to go around picking things up. And I also work everyday and I have to straighten everything up before I go to work. I have to leave everything clean before I go because, sometimes, the American comes and if he sees that it's dirty, he says things like, "There is a woman living in this trailer, and she does not even keep it clean." But it's not that, I clean it, but it's impossible for me to keep it clean because I'm not the only one living here. (CC14)

Estimates of crowding, defined as those households with a mean of more than one person per room (excluding bathrooms), were available for LF Formative and Survey. Crowding for both samples was about 40% (LF Formative 46.3%; LF Survey 36.2%). Issues surrounding crowding often came up in the in-depth interviews. "It's somewhat comfortable, but for me, it's not too comfortable because I just have this small room. The things that are here belong to my brother-in-law" (CC25). A woman whose household included three adults and two children stated, "It's not as big as I would like it to be, but the measurements—I do not understand inches. But it's a little house. A normal trailer for one family" (CC17). "This trailer, I do not know how old it is because, like I told you before, we have only been here for 3 years. I do not know how old it is. But it has two bedrooms. We turned that one into a bedroom since we are seven [people]. Here sleeps one, and the girl who will turn 15. And we are at the end, over there. So, we turned that one into a room, so you can say we have three bedrooms. But in reality, in reality it has two bedrooms. Two bedrooms only, and a bathroom" (LF25). "Well, sometimes we do not all

fit. It's like they want to go to sleep, well, yeah, there is enough room because that right there is a sofa-bed. My two sisters sleep there and over there, my sister sleeps over there, and my father and my mother sleep there, and we sleep in the room. It does not look good when everything is all mixed up. We really need a room, or a bed, because that way the living room would have sofas and a table, a real living room. We need more space right? So we can have some order over here. We do not fit anymore" (LF30A).

About a third of both LF Formative and Survey households (39.0% and 31.9%) had 2–3 farmworkers per bathroom, a potential indicator of limited access to personal hygiene facilities to bathe following farm work and potential exposure to pesticides.

> When we arrive [from work], we have to wait for awhile and then the other one takes a bath. But getting home everyone takes a bath and then we wait until the next one takes a bath. We stay here inside and there are some who go outside to walk and then when one person finishes bathing, that person comes in and takes a bath and so on. (CC06)

> You have to wait until the one who's taking a bath comes out and the one who won goes in and the next one continues to wait because there's just one bathroom. There's one outside but it's just for men and this one, too. It's just that when this one is occupied, that one is on hand if you need to use it. But the problem is that when you're using this one, there's hardly any water out there. (CC21)

Household Behaviors

Direct indicators of behaviors related to housing quality are reported in Table III. Household cleaning practices are consistent across the surveys. About two-thirds dust their homes daily or several times each week. Most sweep their floors daily. Over 60% mop their floors daily. Vacuuming is less frequent, but many do not own a vacuum cleaner.

> The vacuum cleaner, I hardly ever use. I use the broom because the vacuum does not work well. [How do you wash the carpet?] With a bucket of water. You put some soap and a little bit of bleach in it and with that you scrub it. And then with clean water, you rinse it. (CC15)

> When my husband has a day that he does not work, he always helps me take out the carpet and we put it outside. And with the brooms I scrub it and then I clean it with water. And then, I put it out to dry. Then I return it to the house. (CC07)

About 60% of the participants have a working washing machine, with almost 40% of the La Familia respondents also having a working dryer. However, about half of the La Familia households still use public laundromats, as do about one-third of the CC Formative participants. "For example, we are three in my family. We do laundry on a weekly basis. I take two baskets per person. Because sometimes, I do more loads, because I use at least like eight washers every time, I do laundry. Because her [child's] clothes—I wash her color clothes separately. And I wash her white clothes separately. Same with his [husband's] clothes" (LF17). "I do my husband's laundry. That is why he can change, but the others [farmworkers] go to the laundromat every week, so they have to keep their clothes in the same room. So, I think that could be a source of pesticide contamination" (LF02).

DISCUSSION AND CONCLUSIONS

This analysis provides descriptive information about housing characteristics of farmworker families in North Carolina. The health of these families may be at risk due to inadequate housing. Most farmworker families live in mobile homes, and few own their dwellings. Repairs needed in these dwellings should be addressed by the landlords. Many dwellings are located near agricultural fields. Most houses are small, with six or lesser rooms. However, the size of farmworker households is large, many containing related and unrelated adults in addition to the nuclear family of the householders. Crowding is widespread. Many farmworker households lack basic facilities such as clothes washers and dryers, and vacuum cleaners. Farmworkers attempt to keep their dwellings clean with frequent sweeping, dusting, and mopping.

There are noticeable differences between our results and housing surveys completed among other rural populations. Farmworkers have extremely low rates of home ownership compared to the general US rural population (Table IV). Krivo (9) found that Hispanics who have lived in the US longer and spoke English were more likely to own their homes. She also found that income, education, and age had a positive effect on homeownership for Hispanics. As the farmworker population in North Carolina has little education, low income, and limited ability to speak English, it is not surprising that its rate of home ownership is low. While it is important to address barriers

Table IV. Comparison of North Carolina Farmworker Family Housing Characteristics with Regional and National Farmworker Data, and National US Data

Housing characteristics	La Familia y Casa y Campo projects (range)	Farmworkers eastern stream (28)	Farmworkers national (21)	United States rural (27)	United States total (27)
Tenure	Rent: 71–100% Own: 0–22%	Rent: 99.7% Own: .03%	Rent: 97% Own: 3%	Rent: 25% Own: 75%	Rent: 34% Own: 66%
Dwelling type	Single family: 23–29% Mobile home: 54–71%	Single family: 32% Mobile home: 22%	Single family: 42% Mobile home: 15%	Single family: 72% Mobile home: 15%	Single family: 62% Mobile home: 7%
Peeling paint	20%	Not reported	41%	3%	3%
Adjacency to fields	11–44%	29%	26%	Not reported	Not reported
Household composition	Living with non-nuclear family members: 43–64%	Not reported Not reported	Living with unrelated family members: 52%	Not reported Not reported	Not reported Not reported
Household size	Means: 5.62–6.39	Not reported	Mean: 5	Not reported	10% had 5 or more in household
Crowding	36–46%	72%	52%	4%	3%
Laundry machines	Lacked washer: 36–42% Lacked dryer: 61–84%	Not reported	laundry machines: 52% Lacked one or more	Lacked washer: 16% Lacked dryer: 21%	Lacked washer: 24% Lacked dryer: 28%

for farmworker families to buy their own home, it is also important to examine whether home ownership is a goal for farmworker families, many of whom migrate from state to state or see their time in the US as temporary.

Across the four surveys, 54–71% of the participants lived in mobile homes, compared to 7% of the general US population, and 15% of the rural US population (Table IV). New mobile homes could provide some benefit to farmworker families, as they would not contain lead paint and might have laundry facilities, as well as central heating and air conditioning. However, the observations of the interviewers and the statements of the participants indicated that the mobile homes in which these farmworkers live were old and in deteriorating condition. Further, while home ownership may bring a sense of mastery and control, many families who own mobile homes do not actually own the land they occupy.

Variables considered in this analysis, such as access to laundry facilities and adjacency to fields, are particularly relevant to farmworker populations. Laundry facilities at home are especially important in rural households, where distance to the public laundromat is often great. From 63 to 84% of farmworker families in our surveys lacked either a washer or dryer at home, compared to 16% for the rural US population. Apart from being convenient and cost-efficient, easy access to laundry facilities is important for farmworker families, because it helps in protecting them from pesticide exposure (12).

Proximity to agricultural fields was considered by the Housing Assistance Council as an important housing variable (21), as it increases the risk of pesticide exposure (13–16). They found that 26% of farmworker households in the US lived near agricultural fields, and 29% of those in the Eastern Migrant Stream. Children lived in 60% of these households. In our surveys, 11–44% of dwellings were adjacent to agricultural fields, and all of the households contained children.

When compared to rural households in the US, the percentage of crowded farmworker households is striking. Two percent of rural households and 3% of very low income rural households were crowded in 1997 (27), compared to 36% and 46% among farmworkers in these studies. Rates of crowding were higher in other surveys with farmworker households; HAC found that 52% of farmworker households in the US and 72% in the Eastern Stream are crowded (28). Crowding has long been regarded as an important housing problem. It is much more prevalent among immigrant populations, particularly farmworkers, than it is in the general US population. Crowding increases exposure to environmental toxicants and communicable disease (2, 25, 29, 30). It has been suggested that the differences between immigrants and the general population may reflect cultural differences in their living arrangements (31). This argument poses important questions for researchers and policy makers about how cultural background might play a role in the way that living arrangements affect psychological

well-being. Our in-depth interview data indicates that many Latino farmworker families feel that their housing is crowded, and that this crowding is detrimental to their quality of life.

To understand the problem of crowding among farmworker families and how to address it, more research is needed on how farmworkers make decisions about their living arrangements. For some families there may be issues of affordability, or they might prioritize sending money to relatives in their communities of origin over having more space. Another important issue to explore is the living arrangements for these families before they came to the US, and their expectations for how they would be here in the US. Overcrowding, as it is defined, may be more of a stressor in households that include unrelated adults than in households with several small children. Women living with their husbands' relatives may also experience additional stress.

The surveys described in this paper are important in that they focus on farmworker "family" housing. The housing reports that have been published are rare and have looked at farmworker housing as a whole. While unaccompanied male farmworkers face some of the same challenges with regard to housing and environmental health, farmworker families have different needs, resources, and lifestyles. The sub-group of farmworker families could be divided into two more sub-groups: migrant families and settled families. It has been suggested that while both of these sub-groups experience problems with housing quality, migrant families are less likely to have their housing needs met (20).

Advocating for farmworker families is challenging. Agencies who work toward protecting the rights of farmworkers do not have much leverage when it comes to seasonal farmworker families. Employers who hire workers legally under the H2A visa program, a guest–worker program used widely in North Carolina, must comply with the migrant housing code or face penalties. Undocumented migrant farmworkers who live in camps, often without their families, are covered under the migrant housing code (32). However, there are no specific housing regulations for seasonal farmworkers, and they are more likely than migrant farmworkers to live with their families. Children in seasonal farmworker families are the most vulnerable to the health implications of poor housing quality.

This analysis has several limitations. The design of the four studies required that the respondents were women in most cases. While women are generally knowledgeable about the domestic sphere, their responses could be systematically different from those of men. There are very few men in the samples to conduct an analysis of gender differences. Future farmworker housing research should include interviews with men as well as women, or collect information from both householders. Some housing quality indicators, such as structural problems, presence and functioning of cooking appliances and fixtures, and exterior and interior quality of the home were not collected as part of the survey data. However, field notes indicate that many farmworker families experienced problems in these areas. Cost burden was not addressed. While rent paid may be relatively easy data to collect, reliable data on family income among this population is very difficult to obtain, due to factors such as job dependence on the changing agricultural cycle or living with unrelated individuals. The differences between farmworkers in these studies compared to other states are still unclear.

The LF Formative and LF Baseline surveys included participants from Virginia as well as North Carolina. A comparison of participants by state showed no statistically significant differences in any of the measures included in this analysis. The four studies included in this analysis were completed over the 3 years from 2001 to 2003. During this short period there were no significant changes in housing regulations, the provision of services or in the farmworker population in North Carolina or Virginia. It is therefore, unlikely that the results were affected by any historical factors.

Every adult and child has the right to live in housing that does not compromise their health or well-being (1). Most families in the US enjoy this right, but many families live in moderately or severely inadequate housing. Farmworker families are a particularly marginalized population in the US whose housing needs are not being met; yet few studies specifically address the housing needs of farmworker families. A range of housing-related issues for farmworker families need to be researched further. This study is one of the first steps in addressing this need. More research is needed on housing availability, quality, and affordability. Ethnographic research that would inform us better on farmworker perceptions of their housing quality, how they make decisions about their living arrangements, and how their housing situations may affect their sense of well-being would be extremely helpful.

ACKNOWLEDGMENTS

This research was supported by grant R01-ES08739 from the National Institute of Environmental Health Sciences, and by grant R25-OH07611 from the National Institute for Occupational Safety and Health.

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