

Tuberculosis Risk among Migrant Farm Workers on the Delmarva Peninsula

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Abstract: A survey was conducted to ascertain the risk of tuberculosis (TB) among migrant farm workers on the Delmarva peninsula. Relevant histories were obtained from 842 migrants; a total of 709 skin tests were completed, and 239 sputum specimens were examined for acid-fast bacilli (AFB) and culture. No cases of infectious tuberculosis were ascertained by history or AFB examination. One sputum culture was positive for *M. tuberculosis* and 13 were positive for various species of nontuberculous mycobacteria. Thirty-seven per cent of migrants tested had significant skin test reactions of 10 mm or more. Reaction rates for men were 41 per cent and for women 25 per cent. Age specific rates ranged from 14 per cent in children aged 5–14 to 54 per cent for ages 45–54. Rates for the

principal national/ethnic groups were Haitians 55 per cent, Mexicans 36 per cent, US Blacks 29 per cent and US-born Latinos 20 per cent. Based on these results and other information currently available, it is recommended that current Centers for Disease Control (CDC) recommendations for TB prophylaxis continue to be applied for migrant workers, but that mass screening by skin testing in camp populations not be emphasized. Other recommendations focus on: case finding of active disease, improving continuity and follow-up, increasing coordination among involved agencies, and actively supporting improved economic and living conditions for migrant farm workers. (*Am J Public Health* 1987; 77:29–32.)

Introduction

Each summer an estimated 7,000–10,000 Haitian, Latino, and United States farm workers follow the East Coast migrant stream northward from Florida to harvest crops on Delmarva, a peninsula shared by the states of Delaware, Maryland, and Virginia. Little is known about the health status of this migrant population. Their health care is provided primarily by Delmarva Rural Health Ministries (DRHM), a private voluntary organization operating in all three states, and by state and county health departments. Responding to a request by DRHM, the Johns Hopkins University School of Hygiene and Public Health initiated a Migrant Health Status Survey, designed to assess the major health care needs of Delmarva migrant workers. This paper reports on the tuberculosis screening component of the survey.

Tuberculosis might be expected to pose a significant problem for migrant farm workers, the majority of whom come from countries and ethnic/socioeconomic groups having much higher rates of tuberculosis than the general US population. While the United States in 1982 had a reported annual case rate of 11/100,000,¹ Haiti and Mexico have estimated case rates of 45/100,000 and 35/100,000, respectively.² Recent findings for Haitian entrants into the United States indicate a tuberculosis prevalence of 650 active cases per 100,000.³ In addition to their high risk of exposure to tuberculosis, many migrants continue to live in crowded, substandard, and poorly ventilated houses where conditions favor the spread of respiratory infection. The survey sought to estimate the prevalence of significant skin test reactions within this high-risk population, identify and refer to DRHM infectious cases of tuberculosis, and provide program recommendations concerning tuberculosis control in this migrant population.

Methods

Migrant workers living in 33 camps on the Delmarva Peninsula were screened for tuberculosis between July 25 and September 6, 1982. Camps were first grouped by the predominant ethnic and national origin of their residents; most camps could be identified as housing primarily Haitians, American Blacks, Mexican-born Latinos, or US-born Latinos (including Puerto Ricans). Specific camps of at least 20 or more residents were then identified to be included in the survey, producing a convenience sample which approximated the proportion of each subgroup of migrants living in Delmarva. All camp residents age 5 and above were asked to participate in the survey, and a majority of camp residents were screened in each camp. Children under age 5 were not included since they were usually screened in their day care centers. Exact participation rates could not be determined, since records of camp size were only approximate, but refusal rates appeared to be low, estimated at less than 5–10 per cent in most camps.

Each participant was checked for a BCG (bacille Calmette Guérin) scar, and interviewed for a history of recent cough or treatment for tuberculosis. Tuberculosis skin testing was performed by a survey physician or registered nurse, using 5 TU PPD-T (Connaught) by the Mantoux technique. Individuals were excluded from skin testing for: self-reports of severe reactions to PPD in the past; self-reported treatment for tuberculosis infection or disease; or documentation of a previous tuberculin reaction of 10 mm or greater. Skin tests were read at 48–72 hours after intradermal injection of the Connaught antigen.

Immediate sputum samples were obtained from those having a significant reaction, defined as induration with a diameter of 10 mm or more. Nebulized sputum samples were obtained from those unable to produce specimens spontaneously. All specimens were sent either to the Maryland State Health Department Laboratory in Baltimore or to the Virginia State Laboratory in Richmond for fluorochrome stain and for culture. Evaluation of individuals having significant skin test reactions or positive laboratory findings was conducted by DRHM and/or the appropriate state health department, following local protocols.

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TABLE 1—Age and Sex Distribution of Migrant Survey Population

Age Group (years)	Male No. (%)	Female No. (%)	Total No. (%)
5-14	36 (6)	31 (14)	67 (8)
15-24	147 (24)	75 (33)	222 (26)
25-34	200 (33)	52 (23)	252 (30)
35-44	105 (17)	29 (13)	134 (16)
45-54	60 (10)	24 (11)	84 (10)
55-64	41 (7)	10 (4)	51 (6)
65+	21 (3)	6 (3)	27 (3)
Unknown	4 (0)	1 (0)	5 (0)
Total	614 (100)	228 (101)*	842 (99)*

*Totals differ from 100% due to rounding.

Results

Of the approximately 7,000 migrants registered with DRHM, 842 (12 per cent) participated in the screening program. Males accounted for 73 per cent of those screened and females 27 per cent, approximating the sex ratio in the camps as a whole. Table 1 presents the sex distribution of the survey population, which shows a somewhat younger age distribution of females compared to males. The major national/ethnic groups represented were: Haitians (34 per cent); US Blacks (31 per cent); US-born Latinos (18 per cent), Mexican-born Latinos (14 per cent); and others (4 per cent).

Based on the criteria described, 29 persons (3 per cent) were excluded from skin testing. A total of 813 skin tests were administered and 709 (87 per cent) results recorded. Approximately 60 of the 104 skin tests that were not read were missed because of the unexpected illness of the reader, and not the unavailability of the subjects. Most of the remainder were not read because the individuals had moved from the camp during the two to three days between administration and reading of the test. There was no evidence that the results of those tests that were administered but not read were biased as to the presence or size of reactions.

Of the 709 persons with skin test results recorded, 261 (37 per cent) had significant reactions of 10 mm or more. The rates for different age groups ranged from 14 per cent for those 5-14 years old to 54 per cent for those age 45-54 (Table 2). Forty-one per cent of the men had significant reactions compared to 25 per cent of the women, a difference that is not explained by differences in the age structure of the groups: age-adjusted rates (direct method) are 40 per cent and 27 per cent, respectively (95% confidence limits of difference 8.2%, 17.8 per cent). Significant tuberculin reaction rates within identified groups ranged from 20 per cent in the US Latinos

to 55 per cent among the Haitians (Table 3). Rates and size of reactions were not found to be associated with observed BCG scar status nor to the subject's history of persistent cough.

Sputum samples were collected from 239 of the 261 persons with significant skin test reactions. All were negative for acid-fast bacilli on smear and only one was positive for *M. tuberculosis* on culture. Several species of environmental (nontuberculous) mycobacteria were cultured from samples including 13 cases of *M. avium intracellulare* complex and five of other species (*M. vaccae*, *M. terrae*, *M. gordonae*).

Clinical evaluation by the survey staff of those with significant reactions did not identify any infectious cases of tuberculosis. The one individual with a positive *M. tuberculosis* culture was not picked up by the clinical evaluation; he had already sought treatment for respiratory illness diagnosed as tuberculosis, however, before culture results were available.

Discussion

This screening survey clearly confirms the expected high risk of tuberculosis infection in the migrant workers studied. Significant tuberculin reaction rates in the migrant worker groups surveyed averaged 37 per cent and ranged as high as 55 per cent in the Haitian subset, compared to 11.8 per cent that would be expected in a general US population having a similar age and sex distribution.⁴ Of special concern is the relatively high rate among the children screened, where 14 per cent of the 5-14 year age group had significant reactions. Migrant workers and their children are clearly at risk of developing tuberculosis infection, and thus pose a potential health risk to each other and a public health concern to the communities in which they live and work.

Concern arises from the lack of knowledge about the natural history of tuberculosis in such a population. The rate at which tuberculosis infections might be expected to eventually result in tuberculosis disease in these groups is not known. The majority of migrants appear to be of lean body build and live under unstable conditions, two likely risk factors for higher rates of progression from infection to disease.^{5,6} If these tuberculin reaction rates are representative of the Delmarva migrant population, and if they experienced rates of progression to disease similar to those reported in a study of Georgia and Alabama residents,⁷ one to four cases of infectious tuberculosis would be expected each year among the estimated 7,000 migrants in Delmarva. In fact, the infectious disease rate appears to be even higher. DRHM reported eight infectious cases of tuberculosis during the six-month harvest season in which the survey was conducted. The eight new cases represent a yearly frequency

TABLE 2—Significant Tuberculin Skin Test Reactions among Migrants by Sex and Age Groups

Age Group (years)	Males	Females	Total
	No./Total Read (%)	No./Total Read (%)	No./Total Read (%)
5-14	6/34 (18)	3/30 (10)	9/64 (14)
15-24	32/123 (26)	11/64 (17)	43/187 (23)
25-34	79/166 (48)	14/41 (34)	93/207 (45)
35-44	43/87 (49)	9/23 (39)	52/110 (47)
45-54	29/47 (62)	8/22 (36)	37/69 (54)
55-64	12/36 (33)	2/9 (22)	14/45 (26)
65+	10/17 (59)	2/6 (33)	12/23 (52)
Unknown	1/3 (33)	0/1 (0)	1/4 (25)
Total	212/513 (41)	49/196 (25)	261/709 (37)

TABLE 3—Frequency of Significant Tuberculin Reactions among Migrants by Sex and Ethnic Group

National/Ethnic Group	Significant Reactions		
	Males No./Total Read (%)	Females No./Total Read (%)	Total No./Total Read (%)
Mexican-born Latino	17/52 (33)	14/33 (42)	31/85 (36)
US-born Latino (incl Puerto Rico)	22/90 (24)	4/43 (9)	26/133 (20)
US Black	53/156 (34)	10/59 (17)	63/215 (29)
Haitian	117/200 (59)	21/53 (39)	138/253 (55)
Other/unknown	3/15 (20)	0/8 (0)	3/23 (13)
Total	212/513 (41)	49/196 (25)	261/709 (37)

of more than 200 cases per 100,000 migrants, roughly 18 times the reported US case rate of 11.0/100,000.

The documentation of such high tuberculosis infection and disease rates presents a major challenge to health agencies and practitioners serving this population. One of the policy questions that can be raised is the efficacy of recommending chemoprophylaxis for migrants with significant tuberculin reactions. Current recommendations from the Centers for Disease Control and the American Thoracic Society call for isoniazid (INH) prophylaxis daily for one year for: all positive tuberculin reactors under age 35; known household contacts of infectious cases; tuberculin reactors with chest x-ray evidence of inactive or nonprogressive tuberculosis; recent converters; and immunosuppressed persons and others constituting "special clinical situations" such as diabetes mellitus.⁸ Such recommendations—difficult to follow in the most stable populations—become even more formidable in the face of a migrant population, working in multiple states, speaking several different languages, and served by a group of loosely associated health services. Assuring full compliance for migrants who meet the above criteria would be difficult at best. However, prophylactic courses as short as six months' duration have been shown to reduce the progression from infection to disease by 70 to 90 per cent.^{9,10} Since it appears that even abbreviated courses of INH are of substantial benefit, INH prophylaxis clearly should be provided to all positive skin test reactors who meet the CDC criteria.

The problem, then, remains one of optimal use of the limited resources available for tuberculosis control in migrant health programs. Screening policies in particular should be formulated so as to identify those at greatest risk at such a time that appropriate and effective actions can be taken. This leads to the conclusion that tuberculin screening of migrant workers to identify candidates for prophylaxis is usually best conducted in the migrants' home base sites, as recommended in a recent Centers for Disease Control publication.¹¹ The relative stability of their home bases should optimize the possibility of appropriate follow-up and safe completion of an effective chemotherapeutic regimen.

In addition to suggestions related to screening policy, other recommendations for tuberculosis control among migrant farm workers include the following:

- In the camps, focus on case finding, treatment, and investigation of contacts of infectious tuberculosis cases, rather than mass screening. Sputum examinations on asymptomatic individuals were not found to be cost-effective in this study. In Delmarva, outreach nurses currently make regular visits to the camps to screen symptomatic workers for health problems which require clinic referral. It is critical that

staffing of migrant health services be maintained at levels sufficient to allow for such visits.

- Initiate a system providing continuity of care for migrant workers receiving tuberculosis treatment or prophylaxis as they move between harvest areas. This would allow for monitoring compliance and decrease the proportion of patients lost to follow-up. In the present system, referrals are usually sent "upstream" to the health system responsible for migrant care in the area to which a migrant is believed to be traveling. Unless such individuals report to a clinic for health care, however, they may not be identified as needing special attention. Mandatory follow-up of such referrals for patients with serious conditions of medical or public health importance would be one approach to this problem.

- Emphasize further development and promotion of patient-carried health records containing information on health status, test results, and medical treatment.

- Continue refinement of mechanisms by which all agencies providing health services to migrants can be coordinated, emphasizing linkage with local health departments.

- Actively support improved economic and living conditions for migrant farm workers in this country in order to reduce social and environmental risks for tuberculosis.

This study has indicated a high risk of tuberculosis in a migrant farm worker population. Despite the survey limitations of a convenience sample, single sputum examinations, and short term follow-up, it clearly demonstrates the significance of this serious disease for this group. Besides identifying a specific, serious health need in a migrant population, a further question is raised as to how best to achieve tuberculosis control with the limited resources currently available for migrant health programs in the United States. Migrant workers constitute a high-risk group clearly in need of special attention by the health sector of this country.

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REFERENCES

1. Tuberculosis Statistics, States and Cities, 1984. HHS Pub. No. (CDC) 85-8249. Washington, DC: Govt Printing Office, 1985.
2. Hershfield ES: Tuberculosis in the world. *Chest* 1977; 76:805-815.
3. Pitchenik AE, *et al*: The prevalence of tuberculosis and drug resistance among Haitians. *N Engl J Med* 1982; 307:162-165.
4. Engel A: Tuberculin skin test reaction among adults 25-74 years: United States 1971-72. *Vital and Health Statistics, Series 11, No. 204*. DHEW Pub. No. (HRA) 77-1649. Hyattsville, MD: NCHS, 1977.
5. Edwards LB, *et al*: Height, weight, tuberculous infection and tuberculous disease. *Arch Environ Health* 1971; 22:106-112.

6. Comstock GW, Edwards LB, Livesay VT: Tuberculosis morbidity in the US Navy: Its distribution and decline. *Am Rev Respir Dis* 1974; 110:572-580.
7. Comstock GW: Frost revisited: The modern epidemiology of tuberculosis. *Am J Epidemiol* 1975; 101:363-382.
8. American Thoracic Society: Preventive therapy of tuberculosis infection. *Am Rev Respir Dis* 1974; 110:371-374.
9. Krebs A: IUAT trial on duration of preventive treatment in persons with fibrotic lesions—results of admission examination. *Bulletin IUAT* 1974; 49:289-293.
10. Iseman MD: Containment of tuberculosis. *Chest* 1979; 76:(suppl)801-805.
11. CDC, Division of Tuberculosis Control: Tuberculosis and Migrant Farm Workers. Atlanta: Centers for Disease Control, June 1985.

New Funding Available for Mental Health Services

The Robert Wood Johnson Foundation has announced the availability of up to \$10 million to fund as many as 20 new innovative programs to improve mental health services for the seriously mentally ill.

The Mental Health Services Development Program will support state and local initiatives to improve access to a broad range of health care and related services for the chronically mentally ill. Grants of up to a maximum of \$600,000 for up to four years will be made beginning in 1987.

States, counties, cities of any size, government agencies, universities, and not-for-profit organizations are eligible to apply. Highest priority will be given to proposals that: feature new, relatively untested approaches to improve access to care; are likely to have a city-wide, state, or regional impact; and are feasible to implement elsewhere.

Applicants must obtain at least one-third of their budgets in matching funds from public, corporate, or other philanthropic sources, or in-kind contributions. Examples of projects that may be funded under the program include: the reform or expansion of community-based services; innovative strategies to redeploy inpatient resources and staff to community care; the development of creative financing systems that encourage care in community settings; and the development of more effective links between the criminal justice and health sectors.

The program addresses the difficulty chronically mentally ill individuals have obtaining appropriate medical and mental health care, suitable housing, employment, recreation, and ongoing social contact, and is intended to help correct some of these disparities.

Applications will be reviewed in three cycles, with approximately one-third of the \$10 million allocated during each cycle. The application deadline for the first round of grants is February 1, 1987, with grants to be announced in August 1987. The deadline for the second round is June 1, 1987; the final deadline is December 1, 1987. Inquiries and requests for application forms should be addressed to:

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