

# Health Status of the Pakistani Population: A Health Profile and Comparison With the United States

## ABSTRACT

**Objectives.** The health status of the Pakistani population was compared with that of the US population to provide a better understanding of the health problems in a developing nation and shed light on the dynamics of selected diseases.

**Methods.** Results from the National Health Survey of Pakistan (n=18315) and the US National Health and Nutrition Examination Survey (n=31311) were compared. Standardized and comparable methods were used in both surveys.

**Results.** Indicators of undernutrition among children were high throughout Pakistan. Among adults, there were urban-rural differences and economic gradients in indicators of undernutrition and risk factors for heart disease and cancer. In comparison with the US population, the Pakistani population has a higher rate of undernutrition, a lower rate of high cholesterol, and an approximately equal rate of high blood pressure.

**Conclusions.** There are major inequalities in health within Pakistan and between Pakistan and the United States. Standardized national health examination survey methodology can be used to monitor health status and plan health transition policy in developing countries. (*Am J Public Health.* 2001;91:93-98)

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The Islamic Republic of Pakistan celebrated its Golden Jubilee in 1997, 50 years after the partitioning of the British Raj. For Pakistan, this was also a time to evaluate the health status of its people, the government having recently completed a national health examination survey. In this article, we review the results of the National Health Survey of Pakistan and provide a sobering look at the health of the 141 million people in this economically struggling nation.<sup>1</sup> A picture emerges of a country bearing a "double burden"<sup>2</sup>: The nutritional deficiencies and infectious diseases that dominated mortality in the past have not yet been conquered, while the chronic diseases associated with development have increased to become leading causes of death.

This study of the health of the people of Pakistan examined inequalities in health within that country and between Pakistan and the United States. Equity in health has been a major concern for the World Health Organization (WHO) since its inception and has been reaffirmed as a core value in WHO's Health for All in the 21st Century, adopted as a framework at the 50th World Health Assembly in May 1998.<sup>3,4</sup> Health for All calls for a scientific examination of differences in health within and between nations. The National Health Survey of Pakistan—the first comprehensive national health examination survey in a less developed country to accurately document the magnitude and distribution of the country's health problems—provided a unique opportunity to respond to that call.<sup>5,6</sup> Data from the Third National Health and Nutrition Examination Survey (NHANES III) were used to provide US comparisons.<sup>7</sup>

In this article, we raise questions about equity within and between countries and recommend the development of internationally comparable health examination survey methodology to further policy development and program evaluation in less developed countries.

## Methods

Pakistan was the first Islamic republic, created in 1948 after the partitioning of British India. The country divided when Bangladesh (formerly East Pakistan) declared its independence in 1971, leaving the western provinces to continue as an independent nation. Pakistan has one of the most rapidly growing populations in the world (currently, the population increases annually at a rate of about 2.9%) and grew from about 31 million at its first census in 1951 to an estimated 141 million in mid-1998.<sup>8</sup> Pakistan currently has the seventh largest population in the world and is projected to have the third largest by the year 2050.<sup>9</sup>

Despite a good record of economic growth, Pakistan continues to be one of the world's poorest countries, with an annual per

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This article was accepted February 24, 1999.

**Note.** This article does not represent positions or policy of the US Department of Health and Human Services, the Office of the Assistant Secretary for Health, the Agency for Healthcare Research and Quality, the Centers for Disease Control and Prevention, the National Center for Health Statistics, Khyber Medical College, or the Pakistan Medical Research Council. The views expressed are those of the authors, and no official endorsement by the agencies employing them is intended or should be inferred.

capita gross national product (GNP) of less than \$500.<sup>10</sup> In the decade 1986 to 1996, the economy in Pakistan grew by more than 5% per year, on average, but rapid population growth reduced gains in GNP per capita to 1.2% per year.

In 1997, the government of Pakistan allocated 28% of all expenditures to defense and 33% to interest payments on debt. The country allocated less than 7% of government expenditures (less than 1% of GNP) to health.<sup>11</sup> In the United States, government expenditures on health represent about 18% of all government expenditures and about 6% of GNP.<sup>12</sup>

### Data Sources

*National Health Survey of Pakistan.* The National Health Survey of Pakistan was designed to provide a health profile of the country for national health planning, program evaluation, and policy development.<sup>1</sup> This nationally representative examination survey was patterned on NHANES.<sup>7</sup> The survey was conducted through a collaboration of the Pakistan Medical Research Council and the Pakistan Federal Bureau of Statistics. The US Department of Health and Human Services provided financial and technical support (via Public Law 480).

The survey involved a 2-stage stratified design.<sup>13</sup> The rural and urban areas of each of the 4 provinces of Pakistan were taken as strata. There were 80 primary sampling units, urban neighborhoods or rural villages. From each unit, 30 households were drawn into the sample, and all residents of the households were included in the study. Data collection began in February 1990 and was completed in August 1994.

Survey data were collected via both interview and examination. Interview data were collected in both homes and examination centers. Questions were asked of each individual, but responsible adults, usually mothers, answered for small children. Interviews were conducted in private cubicles and included questions on disease, symptoms, complaints, health care use, diet, exposure to pesticides, and smoking behavior. Careful attention was given to the problem of translation. The study instrument was developed in English and then translated into Urdu, Punjabi, Pashto, Sindhi, and Baluchi. A rigorous translation methodology was adopted to ensure linguistic and conceptual equivalence.<sup>14</sup>

At mobile examination centers, physicians performed standardized physical examinations that included a count of the number of teeth decayed, missing, or filled and 2 blood pressure readings. In addition, trained technicians carried out a number of other examination procedures such as anthropometry and vision testing. When it was appropriate to local

etiquette and custom, male and female staff were matched by sex to respondents for interviews and examinations.

Blood, urine, and feces samples were also collected as part of the examination. Blood chemistry was studied via Reflotron,<sup>15</sup> making it possible to process blood specimens in mobile examination centers and to avoid problems associated with shipping specimens to distant laboratories. In addition, venous blood samples were dried on cotton filter paper in the field. The dried samples from postpartum women were eluted in a laboratory, and antibodies for tetanus were measured through a modified enzyme-linked immunosorbent assay (ELISA).<sup>16</sup>

In total, 18315 persons were examined. Data quality was evaluated by consideration of response rates, end-digit preference of continuous measures, and comparisons with other national surveys conducted in Pakistan.<sup>17,18</sup> Quality control for the survey included visits to the field by expert consultants, duplicate examinations by field supervisors, calibration protocols, and retraining exercises. Survey response rates were uniformly excellent. The overall individual non-response rate was 7.2%, with only small differences among age, sex, and urban/rural groups. No bias was detected when these differences in individual response rates were evaluated.<sup>1</sup>

*National Health and Nutrition Examination Survey.* Selected data from NHANES III, a multistage probability sample of the US noninstitutionalized population, were used to represent the health of the US population. Details of the survey have been published elsewhere.<sup>7</sup> During 1988 to 1994, 31 311 persons were examined.

### Variable Definitions

Diarrhea episodes were based on maternal reports, for the previous 2 weeks, of 3 or more loose stools per 24 hours for a period of less than 7 days. Smoking status was based on self-report of having ever smoked more than 100 cigarettes and currently smoking cigarettes. Respondents with distance vision between 6/18 and 6/60 m (approximately 20/50 and 20/200 ft) were categorized as needing vision correction.

Hypertension was defined as either having elevated blood pressure (systolic at least 140 mm Hg or diastolic at least 90 mm Hg) or taking antihypertensive medication. The average of 2 blood pressure measurements was used. Respondents who had been told by a doctor or paramedic that they had high blood pressure were categorized as being aware of the presence of hypertension. Respondents with a diastolic pressure of less than 90 mm Hg and a systolic pressure of less than 140 mm Hg were categorized as being in control of their blood pressure.<sup>19,20</sup>

Respondents with a body mass index (weight in kilograms divided by height in me-

ters squared) below 18.5 were classified as underweight, and those with a body mass index of 25 or higher were classified as overweight.<sup>21</sup> Pregnant women were excluded from these calculations.

Childhood malnutrition was measured in terms of wasting. Measured weights for height were converted to *z* scores relative to a standard population from the National Center for Health Statistics. Wasting was defined as being more than 2 standard deviations below the mean weight for height of the standard population.<sup>21,22</sup>

Anemia was defined as hemoglobin values below 11 g/dL for children aged 0 to 5 years, below 12 g/dL for females aged 15 to 44 years, and below 13 g/dL for all other respondents.<sup>23</sup> High cholesterol was defined as a random blood cholesterol reading of at least 200 mg/mL.<sup>24</sup>

Economic status was measured via household ownership of durable goods. This measure has been used and validated in other studies conducted in Pakistan and Bangladesh.<sup>25,26</sup>

In each household, a responsible person was asked about the ownership of selected household durable goods, including an iron, fan, radio, tape recorder, television, refrigerator, VCR, air conditioner, motorcycle, and a car or tractor.

Three levels of economic status were defined through a simple count of the number of items owned. Low economic status was defined as owning 0, 1, or 2 of these items (about half of these sample households owned a fan). Middle economic status was defined as owning 3 to 5 of these goods (almost all of these households owned a fan and half owned a television). Finally, high economic status was defined as owning more than 5 of the items (about half of these households owned a motorcycle, and about a quarter owned a car or tractor). The rural/urban classification defined in the 1981 census of Pakistan was used to stratify the sample.

### Statistical Analyses

Analyses were conducted with SAS and SUDAAN.<sup>27,28</sup> All estimates presented were weighted to represent national estimates for the United States and Pakistan.<sup>1,29</sup> Standard errors were calculated to account for the complex multistage sampling in both surveys. Statistical significance of sex differences, urban-rural differences, and economic status trends were tested with the SUDAAN Descript and Logistic procedures; significance of differences between proportions in the 2 samples was assessed with a normal deviate test.<sup>30</sup> *P* values of less than .05 in 2-tailed tests were considered statistically significant.

**TABLE 1—Selected Health Status Indicators: National Health Survey of Pakistan, 1990–1994**

	Age range, y	Rural: Economic Status, %			Urban: Economic Status, %			Rural: Economic Status, SE %			Urban: Economic Status, SE %		
		Low	Middle	High	Low	Middle	High	Low	Middle	High	Low	Middle	High
Infectious disease													
Annual episodes of diarrhea	0–5	11.0	11.3	12.7 <sup>a</sup>	12.4	10.5	7.9	0.8	0.8	1.5	1.0	1.1	0.8
Nutritional status													
Anemia	0–5	68.1	66.2	65.0	65.6	64.2	52.8	3.0	3.5	6.6	6.0	3.9	8.6
Wasting <sup>b</sup>	0–5	18.3	14.1	10.0	14.5	12.8	12.5	2.0	2.5	2.2	2.4	2.4	2.3
Anemia, males <sup>b,c</sup>	15–44	28.0 <sup>a</sup>	20.5	17.8	16.8	13.6	11.5	3.2	2.6	4.5	3.9	2.6	3.5
Anemia, females <sup>b</sup>	15–44	51.5	38.7	32.8	47.5	40.7	38.0	3.8	3.3	4.1	6.7	3.6	4.6
Underweight <sup>b,c</sup>	25–64	32.9 <sup>a</sup>	25.6 <sup>a</sup>	15.1	24.1	17.7	10.3	1.5	2.1	2.8	3.6	1.4	1.5
Overweight <sup>b,c</sup>	25–64	9.1 <sup>a</sup>	14.6 <sup>a</sup>	27.0 <sup>a</sup>	21.2	27.1	41.9	0.8	1.4	4.8	2.5	1.8	2.7
Chronic disease risk factors													
Hypertension <sup>b</sup>	45–64	22.0	32.2	52.1	29.7	40.7	46.0	1.8	3.5	4.7	4.2	3.3	3.8
High cholesterol <sup>b</sup>	45–64	13.7 <sup>a</sup>	16.9	26.7	22.1	22.6	27.8	1.8	2.5	5.7	3.7	2.9	4.0
Male smoking <sup>b,c</sup>	25–64	35.5 <sup>a</sup>	33.6 <sup>a</sup>	33.7	57.0	45.5	33.0	2.3	2.4	5.0	5.0	2.8	3.3
Female smoking	25–64	4.0 <sup>a</sup>	4.8	2.3	9.1	5.0	2.4	0.7	1.1	1.2	2.1	1.6	1.0

<sup>a</sup>Probability less than .05, after control for economic status, that rural not different from urban.

<sup>b</sup>Probability less than .05 of no trend after control for urban/rural residence.

<sup>c</sup>Probability less than .05 that rural and urban residents are at equal levels.

## Results

According to the definition used here, two thirds of the population of Pakistan (66%) is rural. Forty-nine percent of residents live in households of low economic status, and 15% live in households of high economic status. Families of low economic status are disproportionately rural, and those of high economic status are disproportionately urban. Forty-two percent of the total population reside in households of low economic status in rural areas, whereas 9% reside in households of high economic status in urban areas. About 35% of the population is classified as residing in households of middle economic status; this group is divided about equally into rural and urban residents.

Pakistani children suffer from high levels of diarrhea and nutritional deficiency

(Table 1). Although there was an economic gradient in regard to wasting, there was no such gradient for diarrhea or anemia; also, overall, there were no rural–urban differences in wasting, anemia, or diarrhea. Only the high-status urban group had lower rates of diarrhea and anemia; even in this group, however, the difference in anemia rates was not statistically significant.

Pakistani young adults also suffer from nutritional problems, but an economic gradient is clearer in adults than in children. The prevalence of anemia ranged from 12% among urban young men of high economic status to 28% among rural young men of low economic status (Table 1). The prevalence of anemia in young women was 2 to 3 times higher than that in young men; there was an economic gradient but no urban–rural difference. Underweight

was common, especially in rural areas and among persons of low economic status. Overweight was more common among persons of high economic status and those residing in urban areas.

Both hypertension and high cholesterol, risk factors for heart disease, were more common in persons of high economic status than in persons of low economic status. Few Pakistani women smoked cigarettes, while more than a third of Pakistani men smoked. Urban men of low and middle economic status were more likely to smoke than men of high economic status or rural residents.

Levels of comparable nutrition indicators for men and women in Pakistan contrast sharply with levels in the US population (Table 2). Anemia was more than 10 times as prevalent in Pakistani men as in US men and

**TABLE 2—Selected Health Status Indicators Comparing the United States and Pakistan: National Health Survey of Pakistan, 1990–1994, and NHANES III, 1988–1994**

	Age Range, y	Male, %		Female, %		Male, SE %		Female, SE %	
		United States	Pakistan	United States	Pakistan	United States	Pakistan	United States	Pakistan
Nutritional status									
Anemia	15–44	1.5 <sup>a</sup>	20.6 <sup>b</sup>	10.4 <sup>b</sup>	44.4 <sup>a</sup>	0.3	1.8	0.7	2.4
Underweight	25–64	0.8 <sup>a</sup>	25.0 <sup>b</sup>	3.2 <sup>b</sup>	25.3	0.2	1.3	0.4	1.4
Overweight	25–64	61.8 <sup>a</sup>	13.2 <sup>b</sup>	51.9 <sup>b</sup>	22.6 <sup>a</sup>	1.0	1.0	1.3	1.3
Chronic disease risk factors									
High cholesterol	45–64	66.6 <sup>a</sup>	15.3 <sup>b</sup>	71.0 <sup>b</sup>	20.9 <sup>a</sup>	1.7	1.6	1.6	1.9
Hypertension	45–64	36.2	28.8 <sup>b</sup>	32.8	32.7	1.9	1.8	1.6	2.1
Smoking	25–44	36.7 <sup>a</sup>	40.6	30.0 <sup>b</sup>	3.9 <sup>a</sup>	1.3	1.7	1.3	0.5
Smoking	45–64	31.3 <sup>a</sup>	35.1	25.1 <sup>b</sup>	5.4 <sup>a</sup>	1.7	2.2	1.2	0.8

Note. NHANES III = Third National Health and Nutrition Examination Survey.

<sup>a</sup>Probability less than .05 that men and women within country are at equal levels.

<sup>b</sup>Probability less than .05 that US men and women are at equal levels with Pakistani men and women, respectively.

**TABLE 3—Indicators of Access to and Appropriateness of Health Care for Adults: National Health Survey of Pakistan, 1990–1994, and NHANES III, 1988–1994**

	Male, %		Female, %		Male, SE %		Female, SE %	
	United States	Pakistan	United States	Pakistan	United States	Pakistan	United States	Pakistan
Hypertension								
Not aware	31.9 <sup>a</sup>	86.7 <sup>b</sup>	21.5 <sup>b</sup>	70.5 <sup>a</sup>	2.5	2.2	1.8	3.0
Aware, not treated	19.6	6.2 <sup>b</sup>	14.6	13.5 <sup>a</sup>	2.0	1.4	1.7	1.9
Treated, not controlled	25.4	4.7 <sup>b</sup>	28.8 <sup>b</sup>	11.3 <sup>a</sup>	1.8	1.3	2.1	1.9
Controlled	23.0 <sup>a</sup>	2.4 <sup>b</sup>	35.1 <sup>b</sup>	4.8	1.7	0.9	2.5	1.4
Dental health								
Decayed and missing teeth	9.9	10.4	10.1 <sup>b</sup>	15.2 <sup>a</sup>	0.4	0.5	0.4	0.7
Any filled teeth	78.0	2.3 <sup>b</sup>	77.4 <sup>b</sup>	2.0	1.4	0.6	1.4	0.6

Note. NHANES III = Third National Health and Nutrition Examination Survey.

<sup>a</sup>Probability less than .05 that men and women within country are at equal levels.

<sup>b</sup>Probability less than .05 that US men and women are at equal levels with Pakistani men and women, respectively.

about 4 times as prevalent in Pakistani women as in US women. Pakistani men were more than 20 times as likely as US men to be underweight, and Pakistani women were more than 7 times as likely as US women to be underweight. The risk ratios comparing Pakistanis and Americans in regard to being overweight or having high cholesterol were similar: less than 0.25 for men and about 0.33 for women.

In contrast, hypertension was found only slightly more often in US men than in Pakistani men and was found at the same rate in both Pakistani and US women. Smoking rates for Pakistani and US men were similar; smoking was rare among Pakistani women, but more than one quarter of US women smoked.

Indicators of access to health care for US and Pakistani men and women aged 45 to 64 years are shown in Table 3. Despite similar levels of hypertension in the 2 countries, the proportion of hypertensive individuals who were unaware of their disease was higher in Pakistan than in the United States, and the proportions of individuals with treated but not controlled hypertension and hypertension that was both treated and controlled were significantly lower. Forty-eight percent of US men and 64% of US women with hypertension were being treated; the comparable figures in Pakistan were 7% and 16%.

Tooth decay and missing teeth were common in both countries; the average number of decayed or missing teeth among men in both the United States and Pakistan was approximately 10. However, in Pakistan the number of persons with any filled teeth was very small; only about 2% of Pakistanis had fillings. Even among urban men aged 25 to 44 years with 10 or more years of education, fewer than 15% had any filled teeth. In the United States, about 78% of men and women aged 45 to 64 years had at least 1 filled tooth.

Other indicators of quality of health care not included in Table 3 are illustrative of the inequalities between the 2 countries. Among Pakistani women 6 months postpartum, approximately 60% were found to have been immunized according to ELISA testing of blood for the presence of tetanus toxoid antibody. In the United States, tetanus immunization rates among women of reproductive age ranged from 60% to 80%.<sup>31</sup>

Vision testing conducted in the National Health Survey of Pakistan revealed a striking unmet need for corrective lenses. Only 16% of those who could benefit from glasses had glasses. Comparable US figures were not available, although evidence suggests that access to vision correction is very good in the United States. For example, in 1971–1972, only 3% of US civilians aged 4 to 74 years (with their usual correction) had visual acuity between 20/50 and 20/200 ft, and 59% had ever worn glasses or contact lenses.<sup>32,33</sup>

## Discussion

Review of the data for the National Health Survey of Pakistan and NHANES III suggests conclusions in 3 broad areas. First, Pakistan is experiencing a “double burden,” one in which diseases associated with underdevelopment (infectious diseases and nutritional deficiencies) have not yet been controlled and risk factors for diseases associated with development (chronic and cardiovascular diseases and cancer risk factors) are also significant. Second, important inequalities exist within Pakistan both between urban and rural residents and between economic status groups. Third, the gap between Pakistan, a poor country, and the United States, a rich one, is dramatic and can be seen in patterns of diseases, risk factors, and quality of health care.

Developing countries such as Pakistan are increasingly exposed to conditions sometimes labeled “diseases of affluence” while struggling to control their continuing problems of malnutrition and infectious diseases associated with underdevelopment.<sup>34</sup> Children still suffer from infectious diseases and nutritional deficiencies, whereas adults may suffer the consequences of having had these diseases as well as adverse effects of unplanned and unregulated urbanization and industrialization. Although rising living standards may accompany urbanization and industrialization, so may increases in accidents, environmental pollution, and personal risk factors leading to disability, heart disease, and cancer.<sup>34,35</sup>

The World Health Organization has described the resulting challenge for health systems in developing countries as a “double burden” and has discussed the need for and benefits to be expected from policy development, planning, and investment in health systems.<sup>2,36</sup> Results from the National Health Survey of Pakistan, in providing indicators of nutritional status and risk factors for heart disease and cancer, help to define the needs within Pakistan and provide a factual basis for action there.

The social distribution of risk factors for heart disease in Pakistan contrasts with the distribution in the United States. In the latter, as in other highly developed, urban societies, a disproportionate burden of cardiovascular disease falls upon disadvantaged groups.<sup>37–39</sup> In the US population, prevalence rates decrease from groups of low to high status for hypertension, obesity, high cholesterol, and smoking. In Pakistan, the gradients run in the other direction (except for smoking), with higher levels of cardiovascular risk factors found in economically better-off portions of the population. This contrast provides an understanding of the mutability of cardiovascular disease and suggests that programs and policies both

in the United States and abroad might be effective in reducing its incidence.

Review of nutritional status and infectious disease indicators for Pakistan demonstrates that children throughout the country, except possibly children in urban households of high economic status, suffer at high rates from undernutrition and disease. In adults, the burden of undernutrition falls most heavily on women, rural residents, and people of low economic status.

Reducing this burden on the people of Pakistan will require progress in many economic and policy sectors, not simply health care.<sup>2</sup> Although indicators of access to and appropriateness of health care reveal a need for health systems development, there is also much that could be done in the agriculture, education, transportation, and basic public health sectors and other areas in Pakistan to improve the nation's overall health.<sup>36</sup> International development plans should address both the inequities between rich and poor countries and the diverging health status within poor countries.<sup>4,40</sup>

The differences revealed in this study deepen our understanding of discrepancies in life expectancy between rich and poor countries. Life expectancies in Pakistan are currently about 61 years for men and 63 years for women.<sup>9</sup> US life expectancies stand at 73.1 years for men and 79.1 years for women.<sup>12</sup> Infant mortality is approximately 88 per 1000 births in Pakistan, more than 12 times higher than in the United States.<sup>10</sup> These results add detail to mortality statistics in regard to morbidity and the social distribution of disease. They also provide insight, beyond that available from mortality statistics, into risk factors, social distribution of morbidity, and health care systems. Survey results, however, must be interpreted in context. For instance, US and Pakistani immunization rates indicate less than full coverage in both countries, but access to tetanus immunization has greater benefits in less developed countries, where maternal deaths caused by tetanus are more common than in the United States.<sup>41</sup>

The prospects for better health information in developing nations have also been demonstrated by the work presented in this article. Relative to the statistics for the United States, the life expectancy figures for Pakistan just described are rough estimates; there are no life tables for Pakistan comparable to the US life tables.<sup>42</sup> However, the success of the National Health Survey of Pakistan demonstrates that a less developed country can produce high-quality health information that addresses a wide range of health policy and program needs. This survey involved a mixture of simple examination methods and advanced technology and made possible a country health profile based on detailed, objective information. Development

and improved health status in Pakistan will be facilitated by high-quality information. Monitoring of health status differences via comparable, reliable methods is essential for better policy development and program evaluation.<sup>34</sup> The need for essential national health science in developing countries is a call for equity at another level: within the institutions of science itself, in the subjects it studies, and in the distribution of its benefits.<sup>2,34,43</sup> □

## Contributors

G. Pappas and T. Akhtar proposed the study. T. Akhtar was a senior manager of, and G. Pappas, P.J. Gergen, and W.C. Hadden were consultants to, the survey planning, data collection, and data preparation. W.C. Hadden and A. Q. Khan prepared the statistics. G. Pappas wrote the first draft of the paper. W.C. Hadden coordinated the rewriting of the paper. All authors participated in the development of the study, the interpretation of the statistics, and the rewriting of the paper.

## Acknowledgments

We would like to thank the following people who assisted in the preparation of the paper: Clemencia Vargas, Robert Lubwama, Janice Tandler, Jason Wright, David B. Smith, and Amy Burns. Thanks also to the men and women who conducted the surveys, often, in Pakistan, under severe circumstances; the majority of the credit for the success of the surveys must go to them. Both of the surveys were reviewed and approved by institutional review boards.

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