

An Occupational Health Services Initiative at a Women's Hospital in Kabul, Afghanistan

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SYNOPSIS

This article describes the process of developing targeted occupational health services for the health care workers in a women's hospital in Kabul, Afghanistan, as part of a larger project to establish an obstetrics and gynecology residency training program at the facility. The goal was to create a feasible and sustainable program to: (1) address basic health care needs impacting the ability of these Afghan health care workers to optimize learning opportunities; (2) decrease absenteeism due to illness; (3) decrease the likelihood of infectious disease transmission among staff, from staff to patients, and from patients to staff; (4) foster belief that a healthy and safe working environment is a basic right; (5) begin to collect preliminary health status indicators on health care workers in this employee population; and (6) serve as an adaptable program to expand to other Afghan health care workers.

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The people of Afghanistan have suffered decades of war and conflict, ravaging the country's entire infrastructure and leaving a deteriorated health care system. The Taliban had a particularly dramatic impact on the human rights and health of women and girls.¹ Restrictions in access to health care for women have contributed to extreme adverse health outcomes. Estimated maternal mortality ratios in Afghanistan range from 400/100,000 live births in the capital region of Kabul to 6,500/100,000 live births in a remote mountainous district, Badakshan, which is the highest ever recorded in the world.² Additionally, 2003 estimates of infant mortality and child mortality—the probability of dying under age five—are among the highest in the world at 165/1,000 live births and 257/1,000 live births, respectively.³ The number of trained health care workers in Afghanistan is insufficient. In 2001, the number of doctors in the country was 0.2/1,000 population compared to 1.2/1,000 reported for all developing countries.⁴ The World Health Organization (WHO) reported only 2.2 nurses and midwifery personnel per 10,000 population in Afghanistan for that same year.⁵

In the last several years, the Afghanistan Ministry of Public Health (MOPH) has worked with international partners to improve the country's public health infrastructure and the health of women and children. One of these partners, the United States Department of Health and Human Services (DHHS), pledged assistance by concentrating efforts on an obstetrics-gynecology residency training program in a women's hospital in Kabul. DHHS provided technical assistance from the Centers for Disease Control and Prevention (CDC) to implement a facility-based and perinatal health care hospital surveillance system, influencing decisions on resource allocation and teaching priorities. During the process of establishing this surveillance system, CDC staff had daily contact with hospital staff and observed that few of the hospital health care workers wore eyeglasses, some had difficulty hearing fetal heart tones, and others were frequently absent from work. Absence from work can be due to a variety of reasons, including lack of transportation or adequate child care and other family obligations. At this hospital, many absences were reported secondary to illness. Acknowledging that poor health is influenced by social, economic, and cultural factors, these observations raised concerns that the poor health status of the predominantly female health care workers in this hospital could pose a significant barrier to learning, hindering future educational opportunity and performance capability and ultimately impacting patient care.

Historically, health care workers are at high risk for

work-related illness and injury, facing a unique constellation of biological, chemical, physical, and ergonomic hazards, as well as psychological stress. Afghan health care workers are particularly disadvantaged due to decades of neglect of their personal health care and widespread inadequate infection control practices. The World Health Organization (WHO) states that focusing on occupational health not only improves worker health, but contributes to productivity, quality of work, motivation, and job satisfaction. By creating a healthy workforce, a country enhances its sustainable social and economic development.⁶ In light of the current struggle to improve the state of health care in Afghanistan, it seems prudent to direct attention to protecting the health of current and future health care workers in this country.

With approval of MOPH, CDC staff proposed a public health program for occupational health services (OHS) for health care workers in the same women's hospital in Kabul where the residency program was being initiated. Services were delivered over a five-week period and included occupational safety and health (OSH) training and individual health assessments. This project was consistent with the recently developed Hospital Policy for Afghanistan's Health System that states, "Occupational health measures are adopted to ensure the safety of staff, especially those dealing with direct patient care."⁷ The objective was to create a feasible and sustainable program that could: (1) address basic health care needs impacting the ability of these Afghan health care workers to optimize learning opportunities; (2) decrease absenteeism due to illness; (3) decrease the likelihood of infectious disease transmission among staff, from staff to patients, and from patients to staff; (4) foster belief that a healthy and safe working environment is a basic right; (5) begin to collect preliminary health status indicators on health care workers in this population to assist MOPH in prioritizing its limited resources; and (6) serve as an adaptable program for MOPH and its international partners to expand to other Afghan health care workers.

THE HOSPITAL AND THE WORKFORCE

This hospital primarily delivers obstetrical-gynecological care and newborn care. In addition to obstetricians, gynecologists, and pediatricians, other specialists are employed including general surgeons; ear, nose, and throat surgeons; and dermatologists. Ancillary support staff include pharmacy, laboratory, administration, gate guards, and laundry personnel.

The DHHS-supported obstetrics-gynecology residency program in this hospital is currently being

developed. It will replace the existing program, where resident physicians are trained with no formalized method to evaluate competencies as they progress through the program. Pediatric Department staff perform newborn care and are closely integrated with the Obstetrics Department. We decided to focus initial attention on the health status of the staff in these two departments. They are almost entirely female, comprise almost half the entire hospital workforce, and include attending and resident physicians, nurses and midwives, and cleaning staff.

NEEDS ASSESSMENT

In March 2004, CDC staff received the approval of MOPH to conduct a voluntary health needs assessment of the staff at this women's hospital. This assessment collected demographic information, literacy levels, work history, information on social support, past medical history, current physical and psychological symptoms, vaccination history, workplace concerns, and information on health attitudes. Physicians, midwives, and cleaning staff were interviewed by an Afghan physician fluent in English and Dari, who had been trained to use the survey tool and trained in interviewing techniques. The physician documented all survey answers for the staff members. Due to time constraints, we were able to interview only 53 volunteers (37%) of the 142 staff in the Obstetrics-Gynecology and Pediatrics Departments, identifying the most immediate health needs of this hospital workforce. Thirty percent of these individuals reported visual difficulty, 28% a history of anemia, 10% were currently pregnant, and only 8% reported a history of previous hepatitis B immunization. Ninety-one percent of staff interviewed felt having a health clinic at the hospital to take care of work-related concerns would help improve their health, and 89% reported that such a clinic would help improve their ability to do their job.

CDC staff and Afghan health care professionals collaborated to prioritize health needs and developed an implementation plan to deliver occupational health services to this hospital workforce. Based on our experience with the needs assessment, we created a take-home occupational health medical record, printed in dual English and Farsi languages. This record included demographic information, past medical history, current physical and psychological symptoms, documentation of current medications, results of testing and physical exam, vaccines administered, diagnosis, and disposition/plan.

IMPLEMENTATION OF OCCUPATIONAL HEALTH SERVICES

Staff training

Collaborators prepared a basic occupational safety and health training program, introducing OSH concepts and providing preventive education on bloodborne pathogen exposure, needlesticks and other workplace injuries, tuberculosis transmission, and workplace dermatologic problems. During January and February 2005, the in-country project coordinator and other Afghan staff taught OSH concepts to hospital health care workers. Seventy-two physicians, nurses/midwives, and cleaning staff from the Obstetrics-Gynecology and Pediatric Departments attended OSH training.

Individual health assessments

We offered individual health assessments to all staff in the Obstetrics-Gynecology and Pediatric Departments. We conducted 113 individual health assessments during this timeframe, representing 80% of the eligible participants. These assessments included documenting self-reported health histories; measuring vital signs; performing vision, hearing, and hepatitis B screening tests; symptom screening for tuberculosis; administering vaccines; dispensing iron and folic acid supplements; and maintaining a computerized database to track staff immunizations. We performed no other laboratory tests. Individuals reporting symptoms suspicious for tuberculosis were further screened with a chest X-ray. If this X-ray was suspicious for active tuberculosis, the individual was referred to the Kabul Tuberculosis Clinic.

We used commercially available rapid chromatographic immunoassay test kits for qualitative detection of hepatitis B surface antigen (Accurate®) and hepatitis B surface antibody (Acon®). Rapid test kits for hepatitis B core antibody were not locally available at the time. The Central Blood Bank in Kabul agreed to perform confirmatory testing for all staff members identified as positive for hepatitis B surface antigen.

Post-assessment activities

We made arrangements with an eye clinic in Kabul to perform complete eye exams on hospital staff identified as having deficient near and/or distant visual acuity on screening tests. During March and April 2005, the in-country project coordinator ensured that follow-up eye exams were completed and eyeglasses procured, as needed, and continued health assessments for the remaining Obstetrics-Gynecology and Pediatric staff. She prepared weekly reports using a standardized format to update CDC staff on progress.

We kept de-identified copies of health histories to compile basic health statistics for this hospital employee population. We prepared a report of these findings and a proposed implementation plan for the MOPH to extend OSH services to other Afghan health care workers.

Findings of individual health assessments

Demographic information on staff who completed health assessments is presented in Table 1. Of these 113 employees, 70% were in the 31–40-year-old range, 70% were married and living with a spouse, and just over half were physicians, most of them in residency training.

Although not shown in the table, 60% of staff members reported a community water tap as their primary source of drinking water, while 21% reported an outside hand pump and 17% reported a household tap. Fifty-six percent of staff reported taking action to make their home drinking water safe. The most com-

mon water treatment used by 76% of these individuals was chlorine, currently distributed to the community through the MOPH. This was followed by 21% using boiling and 3% using filtration or sedimentation. Unfortunately, there is no safe drinking water available for patients or staff at the hospital.

Self-reported past medical history information obtained from health assessments is presented in Table 2. Eighty-two percent of staff members reported a history of needlestick injury. Although not shown in the table, 91% of all doctors, 72% of midwives/nurses, and 67% of cleaning staff reported needlesticks. Almost half of the staff reported a history of measles. Although most individuals were unaware of the timing or number of shots they had received, 81% reported prior measles vaccination. Half the physicians reported a history of anemia, while only 23% of nurses/midwives and 22% of cleaning staff reported a similar history. Four individuals, all physicians, reported a history of an injury at work other than a needlestick. These work-related injuries included one finger laceration from a surgical knife and three falls on slippery surfaces resulting in a leg fracture, arm fracture, and a head injury.

Reported medical symptoms experienced in the preceding four weeks of the health assessment are presented in Table 3. Looking at this information by subgroups, we found that feeling nervous or anxious much of the time was reported by 65% of doctors, 56% of midwives/nurses, and 89% of cleaning staff. Worrying about taking care of their family was reported by 68% of doctors, 51% of midwives/nurses, and 89% of cleaning staff. Widows were more likely to be worried about taking care of their families and 78% of cleaning

Table 1. Demographics—ob/gyn and pediatric staff, Women's Hospital, Kabul, 2005 (N=113; 100% female)

	n	Percent
Age (in years)		
Don't know	2	1.8
<20	1	0.9
20–30	9	8.0
31–40	79	70.0
41–50	20	17.7
>50	2	1.8
Marital status		
Never married	19	16.8
Widowed	12	10.6
Married, living with spouse	79	69.9
Married, not living with spouse	3	2.7
Occupation		
Attending physician	15	13.3
Resident physician	50	40.2
Midwife/nurse	39	34.5
Cleaning staff	9	8.0
Number people living in household		
<5	12	10.6
5–10	83	73.5
11–20	17	15.0
>20	1	0.9
Pregnancy history		
Currently pregnant	9	8.0
Gravida 0	22	19.5
Gravida 1–5	64	56.6
Gravida 6–10	26	23.0
Gravida >10	1	0.9
Temporarily lived in a refugee camp	8	7.1

Table 2. Past medical history—ob/gyn and pediatric staff, Women's Hospital, Kabul, 2005 (N=113, 100% female)

	n	Percent
Needlestick injury	93	82.3
Problems seeing	59	52.2
Measles	52	46.0
Anemia	44	38.9
Malaria	34	30.1
Problems hearing	22	19.5
Leishmaniasis	20	17.7
Hepatitis	14	12.4
Brucellosis	6	5.3
Accident at work (other than needlestick)	4	3.5
Tuberculosis	2	1.8
Baby with a neural tube defect	1	0.9

Table 3. Current medical history—ob/gyn and pediatric staff, Women's Hospital, Kabul, 2005 (N=113, 100% female)^{a,b}

	n	Percent
Physical		
Back pain	49	43.4
Headaches	43	38.1
Cough	34	30.1
Stomach pain	24	21.2
Dizziness	24	21.2
Rash from gloves	17	15.2
Weight loss	17	15.0
Wheezing	9	8.0
Fever	7	6.2
Night sweats	4	3.5
Diarrhea	2	1.8
Psychological		
Nervous or anxious much of the time	72	63.7
Worrying about taking care of family	72	63.7
Worrying about safety	35	31.0
Feeling hopeless	19	16.8
Difficulty sleeping	17	15.0
Little interest in daily activities	1	0.9

^aSymptoms reported in the last four weeks

^bIndividuals could answer yes to multiple symptom questions.

staff were widows. Additionally, 67% of cleaning staff reported feeling hopeless.

Overall, half the employees reported visual difficulties, including 42% of physicians, 56% of nurses/midwives, and 67% of cleaning staff, but lacked a current adequate eyeglass prescription. These individuals were referred for evaluation at the eye clinic and, to date, 67% have had eyeglasses made.

Only one staff member had positive symptom screening for possible active tuberculosis. On the chest X-ray, the individual had no evidence of disease and upon follow-up the suspicious symptoms had resolved. We diagnosed 10% of staff with suspected uncontrolled hypertension, defined as blood pressure of 140/90 or higher on two or more measurements. These individuals were referred to private local physicians for evaluation and treatment. Individuals with blood pressures from 120–139/80–89 (pre-hypertension), were asked to return over the next several weeks for additional measurements.

Ninety-eight of the 113 staff members underwent hepatitis B testing during January and February 2005. Twenty-three percent of those tested had evidence of previous exposure to hepatitis B. During this time, we vaccinated 65% of staff members with hepatitis B vaccine and 58% with tetanus toxoid.

Recommendations for program expansion

A report of health indicators on this hospital employee population and a proposed plan to expand this program to other health care settings was prepared for MOPH. This report stresses the importance and practicality of delivering occupational health services to health care workers, a population that is critically important in improving the conditions within the country. We recommend that MOPH engage international partners to assist in assessing the needs of health care workers in different settings throughout Afghanistan and develop implementation programs for training and services. The report recommends adopting a national policy on the delivery of occupational health services in Afghanistan and a program to emphasize needlestick prevention and universal standard precautions to prevent bloodborne pathogen exposure. We also propose extending the program to a second women's hospital in Kabul in 2006.

DISCUSSION

There is limited updated information on health indicators for the people of Afghanistan, although the MOPH and its international partners are beginning to compile these data. Occupational health programs exist in diverse settings all around the world, including many developing countries. To our knowledge, our efforts represent the first attempt to capture health information on health care workers in Afghanistan and provide them with occupational safety and health training and occupational health services.

The lack of safe drinking water for patients and staff in this hospital and other hospitals throughout Kabul is a significant problem. We are currently working with the hospital administration and MOPH to address the difficult logistics of hospital staff maintaining a large number of clean vessels and achieving proper chlorination of water sources.

On screening tests, we identified a 23% seroprevalence rate of hepatitis B in this population. Although this employee population had an apparently high rate of needlestick injury, we are uncertain if this was the mode of transmission that resulted in their hepatitis B infection. We were unable to find information on the current rate of hepatitis B infection in the general Afghan population. However, a study conducted in 18 clinics in Pakistan to assess practices of unsafe injections found 19% of patients had antibodies against hepatitis B.⁸ In serologic studies done in the United States during the 1970s, prior to the initiation of universal standard precautions, health care workers had a prevalence of hepatitis B infection approximately 10 times that of the

general population.⁹⁻¹² Although the rate of needlestick injury appears high in this Afghan hospital employee population, we have no direct comparison with data from the United States. There are no precise national data on the number of needlesticks in the United States, as many of these injuries are believed to go unreported.¹³ Although we were unable to test these health care workers for hepatitis C and HIV infections, we are concerned that these two infectious diseases may also be present as comorbid conditions since they share transmission patterns with hepatitis B. The World Health Organization modeled estimates of the number of occupational sharps-associated infections in health care workers world-wide as 66,000 for hepatitis B, 16,000 for hepatitis C, and 1,000 for HIV. For the country grouping in which Afghanistan is placed, these estimates are 6,800 for hepatitis B, 3,200 for hepatitis C, and 7 for HIV. These numbers were shown to be substantially lower in regions where efforts have been made to reduce exposures.¹⁴

Data presented here on hepatitis B are limited by the fact that the only routinely available types of tests were rapid screening tests, with a lower predictive value in clinically asymptomatic populations. Individuals may have been misclassified using these methods. The use of hepatitis B rapid testing kits is not optimal, but may be a practical alternative for screening purposes in developing countries. WHO is currently in the process of evaluating the operational characteristics of using hepatitis B surface antigen assays (rapid tests).^{15,16} The needlestick rate and the hepatitis B seroprevalence in this employee population, as well as general concerns about safety of the blood supply, emphasize the need for universal standard precautions, adequate testing of donated blood, and immunization of health care workers with hepatitis B vaccine. These concepts, in addition to aggressive management of sharps and biohazardous materials, will be heavily emphasized in further program expansion.

Addressing mental health issues is another major area in need of attention in Afghanistan. A previous survey conducted among women in Kabul found that 35% of respondents reported that symptoms of mental health problems interfered with daily activities and that 98% met diagnostic criteria for post-traumatic stress disorder, major depression, or severe anxiety.¹⁷ In 2002, CDC and its partners conducted a population-based mental health survey in Afghanistan. For nondisabled respondents, the prevalence of symptoms of depression was 67.7% and 72.2% for symptoms of anxiety. For disabled respondents, the prevalence of symptoms of depression was 71.7% and 84.6% for symptoms of anxiety. They found the prevalence of symptoms of

post-traumatic stress disorder was similar for both groups (42%) and that women had significantly poorer mental health status than men.¹⁸ One indication of the fragile state of mental health and degree of psychological stress in this hospital employee population is the high rate of staff reporting feeling nervous or anxious much of the time and worrying about taking care of their family. Of particular concern are the effects of widowhood and associated lower social status on the mental health of the cleaning staff, most of whom are widows. Along with other partners, we plan to further explore the issues of post-traumatic stress and mental illness as defined by Diagnostic and Statistical Manual of Mental Disorders (DSM)¹⁹ criteria in these non-western health care workers to learn more about the mental health needs of this population.

The information presented here is based on a single hospital with an all-female staff who live in a densely populated urban area. Health problems may be different for male health care workers and for health care workers in smaller or rural settings. Also, the medical histories and current symptoms were all self-reported and, in some cases, may represent under-reporting due to fear of impact on employment. Doctors were more likely to report a history of some diseases than other staff, possibly because they have had better access to health care. In a country with a suspected high rate of tubercular disease, we identified only one employee with symptoms initially suggestive of active tuberculosis. It is possible our screening tool was not sensitive enough to detect disease or that employees may have under-reported symptoms.

Simple interventions can address basic health problems in these workers in an attempt to improve performance ability and economic productivity. In our occupational safety and health training, we incorporated information on ways to minimize the likelihood of back injury. The modest effort of providing eyeglasses to literate workers with deficient visual acuity can strengthen textbook learning, improve ability to read pharmaceutical labeling accurately and minimize medication errors, and enhance technical competency during surgery.

Although only one employee reported herself having had a baby with a neural tube defect, CDC staff witnessed many births with neural tube defects at the hospital. In addition, 39% of these employees reported a personal history of anemia, and few had completed the recommended full series of tetanus toxoid immunizations to prevent neonatal tetanus in their offspring. Although estimates of anemia prevalence vary widely, WHO estimates the worldwide number of anemic people to be two billion, with approximately 50% attributed

to iron deficiency. This is presumed to affect resource-poor countries disproportionately and can increase the risk of maternal and child mortality as well as have a negative effect on adult work productivity.^{20,21}

Although probably an underestimate, WHO reported 81 cases of neonatal tetanus in 2004.²² Interventions such as providing iron and folic acid supplements and tetanus vaccine to female health care workers during their reproductive years can be readily justified. We plan to demonstrate the intended positive impacts of this program by monitoring health status and absenteeism in these hospital workforces over the next three years and conducting a staff satisfaction survey.

The Ministry of Public Health in its National Malaria Strategic Plan, 2006–2010, is addressing malaria as a major public health problem and is focusing its efforts on (1) diagnosis and treatment; (2) application of integrated vector management and insecticide treated nets; (3) detection and control of malaria epidemics; and (4) strengthening the health system and malaria control program.²³

Afghanistan is currently receiving financial support from a number of different international donors. The uncertainty of future funding is always a concern for developing countries. MOPH created a National Health Policy 2005–2009 to outline their health priorities and a National Health Strategy 2005–2006 to implement these policies.²⁴ The Strategy was established for only two years in order to be flexible enough to adapt to changing funding sources. In order to maintain a focus on OSH for its health care workers, we are working with MOPH to develop a National Policy on Occupational Safety and Health, with an emphasis on sharps management and universal precautions. We are also laying the groundwork to incorporate OSH principles into medical and nursing school training.

Poor health detracts from quality of life and lowers economic productivity. Providing occupational safety and health training and occupational health services to health care workers in Afghanistan is one avenue to improve human security, which includes the ability to have a life of dignity and adequate livelihood.²⁵ This project in a women's hospital in Kabul demonstrates that implementing occupational health services for health care workers in Afghanistan is necessary, desirable, acceptable, and feasible.

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REFERENCES

- Amowitz LL, Reis C, Iacopino V. Maternal mortality in Herat Province, Afghanistan, in 2002: an indicator of women's human rights. *JAMA* 2002;288:1284-91.
- Bartlett L, Mawji S, Whitehead S, Crouse C, Bowens S, Ionete D, Salama P. Maternal mortality in Afghanistan: magnitude, causes, risk factors and preventability. (Preliminary findings). New York: UNICEF, CDC, USAID; 2002.
- UNICEF/CSO. Multiple Indicator Cluster Survey (MICS) 2003 [cited 2006 Jul 25]. Available from: URL: http://www.unicef.org/infobycountry/afghanistan_afghanistan_statistics.html
- WB Group. Developing countries-health, nutrition. 2001 [cited 2005 Jun]. Available from: URL: <http://genderstats.worldbank.org/external/dgcomp.asp?rmdk=110&smdk=473886&w=0>
- World Health Organization Regional Office for the Eastern Mediterranean. Country profiles: Afghanistan. August 2004 [cited 2006 Jul]. Available from: URL: <http://www.emro.who.int/emrinfo/index.asp?Ctry=afg>
- World Health Organization. Global strategy on occupational health for all: the way to health at work. Geneva, 1995 [cited 2005 Jun]. Available from: URL: http://www.who.int/occupational_health/en/oehstrategy.pdf
- Islamic Transitional Government of Afghanistan Ministry of Health, Policy Statement. Hospital Policy for Afghanistan's Health System. February 2004 [cited 2006 Jul]. Available from: URL: <http://www.moph.gov.af/Data/Policies/Hospital%20Policy/hospital%20policy.pdf>
- Khan AJ, Luby SP, Fikree F, Karim A, Obaid S, Dellawala S, et al. Unsafe injections and the transmission of hepatitis B and C in a periurban community in Pakistan. *Bull World Health Organ* 2000; 78:956-63.
- Segal HE, Llewellyn CH, Irwin G, Bancroft WH, Boe GP, Balaban DJ. Hepatitis B antigen and antibody in the U.S. Army: prevalence in health care personnel. *Am J Pub Health* 1976;66:667-71.
- Denes AE, Smith JL, Maynard JE, Doto IL, Berquist KR, Finkel AJ. Hepatitis B infection in physicians: results of a nationwide seroepidemiologic survey. *JAMA* 1978;239:210-2.
- Dienstag JL, Ryan DM. Occupational exposure to hepatitis B virus in hospital personnel: infection or immunization? *Am J Epidemiol* 1982;115:26-39.
- West DJ. The risk of hepatitis B infection among health professionals in the United States: a review. *Am J Med Sci* 1984;287:26-33.
- DHHS (NIOSH). NIOSH alert: preventing needlestick injuries in health care settings [cited 2006 Jul 24]. November 1999. Available from: URL: <http://www.cdc.gov/niosh/2000-108.html> Publication No. 200-108.
- World Health Organization. Environmental burden of disease series, No. 3. Sharps injuries: global burden of disease from sharps injuries to health-care workers. Geneva: WHO; 2003.
- World Health Organization. Hepatitis B surface antigen assays: operational characteristics. Report 1. Geneva: WHO; 2001.
- World Health Organization. Hepatitis B surface antigen assays: operational characteristics. Report 2. Geneva: WHO; 2004.
- International Medical Corps. International Medical Corps in Afghanistan. 2003 [cited 2006 Jul 24]. Available from: URL: <http://www.imc-la.com/programs/afghanistan.html>
- Cardoza BL, Bilukha OO, Crawford CA, Shaikh I, Wolfe MI, Gerber ML, Anderson M. Mental health, social functioning, and disability in postwar Afghanistan. *JAMA* 2004;292:575-84.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders, 4th ed., text revision. Washington: American Psychiatric Association; 2000.
- WHO/UNICEF/UNU. Iron deficiency anaemia: assessment, prevention and control. Geneva, 2001.
- Stoltzfus, RJ. Iron-deficiency anaemia: reexamining the nature and magnitude of the problem. Summary: implications for research and programs. *J Nutr* 2001;131(2S-2):697S-700S.
- World Health Organization Regional Office for the Eastern Mediter-

- ranean. Country profiles: Afghanistan. 2004 [cited 2005 Dec]. Available from: URL: http://www.who.int/immunization_monitoring/en/globalsummary/countryprofileresult.cfm?C=afg
23. Ministry of Public Health, Islamic Republic of Afghanistan. National Malaria Strategic Plan 2006–2010.
 24. Ministry of Public Health, Islamic Republic of Afghanistan. National Health Policy 2005–2009 and National Health Strategy 2005–2006. September 2005 [cited 2006 Jul 25]. Available from: <http://www.moph.gov.af/Data/PolicyandStrategy/Policy/Contents.htm>
24. United Nations Program Development 2004. Afghanistan National Human Development Report 2004. Security with a human face: challenges and responsibilities [cited 2006 Jul 24]. Available from: URL: http://www.undp.org.af/nhdr_04/NHDR04.htm