Operational Research on Working Migrants and TB in Armenia

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EXECUTIVE SUMMARY

Today, Armenia is facing a serious reemerging threat from tuberculosis (TB). This threat has increased significantly as drug resistant TB rates (DR-TB) have also increased. The situation is more complicated with the migration of Armenians to work in countries with higher TB prevalence. This operational research provided an assessment of TB related knowledge, attitude, and practices among migrant workers who have or have had TB in the last four years, their demographic characteristics, and their access and utilization of services in Armenia and in a host country of work.

The research team conducted a cross-sectional survey of migrant workers who worked outside Armenia for more than three months during the period from 2008 to 2011 and ever had a diagnosis of TB (including drug-resistant TB and TB-HIV/AIDS co-morbidity).

Some of the leading findings from the study included:

- Over 30% of migrant workers who had TB and participated in the study worked in the regions of Russian Federation with the highest rates of TB prevalence.
- The percent of TB-HIV/AIDS co-morbidity among the participants was 4.7 times higher than the percent of TB-HIV/AID co-morbidity among all TB patients in Armenia.
- The time period between first diagnosis and first treatment was about 5-times longer for those who were diagnosed in the host country of work than those who were diagnosed in Armenia. This difference represents the time of infectivity and the time for development of more advanced TB.
- Those participants who received treatment in the host country of work were 3.9 times more likely to have failed or defaulted treatment outcome than those who received the treatment in Armenia.
- Only 46% of the respondents reported taking drugs daily or six days a week and 54% reported taking drugs every other day or 2-3 times per week during the first ambulatory phase of treatment.
- Lack of DOT during the ambulatory phase of first treatment led to 3.6 times greater risk for re-treatment among the participants after adjusting for having DR-TB and crowing index in Armenia.
- Those who did not complete the first ambulatory treatment were at 3.1 times greater risk for being identified by their TB doctors as having DR-TB.

The overriding recommendation of the study is to establish close collaboration between TB and HIV/AIDS programs in the host countries of work and Armenia assuring immediate start of the treatment after TB diagnosis in the host country of work and strengthening existing TB service infrastructures such as DOT, focusing on TB patients among Armenian migrant workers. In addition, as part of the regular national TB surveillance system, collect information about experience of migrant work among newly identified TB cases as a separate risk factor for developing TB, including MDR-TB and TB-HIV/AIDS co-morbidity.

INTRODUCTION

Tuberculosis

Tuberculosis (TB) is an infectious bacterial disease caused by Mycobacterium Tuberculosis (BK, bacilli of Koch) that spreads through the air by coughing, sneezing, or simply talking.[1,2] Persons can be infected with the TB bacteria but not develop the disease. The disease may be expressed as pulmonary TB and extra pulmonary TB. The extra pulmonary is much less common than pulmonary.[1,2] More than 80% of active tuberculosis in the world falls on 22 low and middle income countries.[3]

Symptoms

The most commonly affected site is the lungs, but it can also affect other organs, especially in immune-suppressed persons. The symptoms include cough with thick, cloudy mucus or sputum, sometimes with blood for more than three weeks, fever, chills, night sweats, fatigue, muscle weakness, weight loss and in some cases shortness of breath and chest pain.[2,4]

Risk groups

Men and women have equal chances to become infected with TB but men are more likely to develop the TB disease.[4] The highest risk groups include migrant populations, the homeless, the Human Immunodeficiency Virus (HIV) positive population, prisoners, former prisoners, orphans, people in hospices or psychiatry hospitals, people with medical problems such as occupational pulmonary diseases, diabetes mellitus, gastric and duodenal ulcer, people who had treatment experience with corticosteroids, cytostatics, radiotherapy, people having contact with persons or animals suffering from pulmonary TB and people working at schools, municipal services, public transport, catering and grocery stores.[2,5] After infection the risk of developing TB disease is the highest among children younger than 4 years old; then it decreases. Starting from the age 15-19 the risk substantially increases with the second pick between the ages of 20-30 years.[6]

Transmission and disease development

The spread of TB bacteria depends on several factors such as duration and intensity of exposure (time of exposure and the number and concentration of infectious people) and the presence of people who are more susceptible to TB. About 30% of people who have close contact with a patient becomes infected. Furthermore, 10% of TB-infected people develop TB disease throughout their lifetime and the risk is the greatest in the first two years after

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infection.[1] Only about 5% of infected persons may develop the disease immediately after infection.[7] In most populations, approximately 95% of persons infected with TB enter a latent asymptomatic phase; these persons may develop the disease later when the bacteriaovercomes the immune system of the individual. Each person with active TB infects 10-15 people on average, if not treated.[7]

Drug-resistant TB

TB can be treated with five standard or first-line anti-TB drugs[i]. Misuse or mismanagement[ii] of these drugs may lead to drug resistant (DR) TB. DR-TB includes mono-resistant TB, poly-resistant TB, multi-drug resistant TB (MDR-TB) and extensively drug resistant TB (XDR-TB). A mono-resistant TB case is a TB patient with a Drug Susceptibility Test (DST) result showing resistance to one first-line anti-TB drug. A poly-drug resistant TB case is a TB patient with DST results indicating resistance to several anti-TB drugs but not to both rifampicin and isoniazid. MDR-TB case is a patient with DST resistance to at least two of the most powerful first-line anti-TB drugs: isoniazid and rifampicin. XDR-TB is resistance of the bacteria to any fluoroquinolone in addition to isoniazid and rifampicin and at least one of three injectable second-line drugs: capreomycin, kanamycin and/or amikacin. Patients with DR-TB can transmit DR-TB to others. Symptoms of any drug-resistant and non drug-resistant TB are the same.[2] The treatment with second-line drugs is more expensive, less effective and more toxic.[8]

According to the World Health Organization (WHO) 2011 progress report, each year an estimated 450,000 cases of MDR-TB develop worldwide and 150,000 will die.[9] According to WHO, in 2009 in all new TB cases 3.3% had MDR-TB.[9,10] The estimated number of multi drug-resistant TB is the highest in India (131,000), followed by China (112,000), Russia (43,000), South Africa (16,000) and Bangladesh (15,000).[11] By the end of 2010, in the world at least one case of XDR-TB was reported in 69 countries. The annual estimated number of XDR-TB in the world is 25,000 cases.[9]

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i First-line anti-TB drugs are isoniazid, rifampin, pyrazinamide, ethambutol and streptomycin.

ii Misuse or mismanagement – drugs taken in a wrong combination, or fewer drugs taken than prescribed, or drugs taken in insufficient doses, or drugs taken for insufficient time.

TUBERCULOSIS IN ARMENIA

Burden

According to the official country statistics, the number of active TB cases has doubled through 1988-2005: 3,205 cases in 1988 compared to 6,455 cases in 2005.[12] The official Armenian statistics reported a consistent decline in the overall number of active cases of TB, from the 6,455 cases in 2005 to 3,707 cases in 2010.[13,14] The disease mortality rate, which increased from 3.7/100,000 in 1995 to 5.2/100,000 in 2005, has also decreased by almost half to 2.9/100,000 in 2010.[12,14]

The number of newly diagnosed TB cases was reported at 41.3 per 100,000 population, and drug resistance surveillance estimated that approximately 9.4% of these new cases were MDR-TB (Table 1). Moreover, approximately 43% of previously treated TB cases became MDR-TB.[15] These figures show a substantial increase in MDR-TB rates which were reported to be 11% and 14% in 2003 and 2004, respectively.[16] According to WHO statistics for 2007, 10 cases of XDR-TB were reported in Armenia.[17] In April 2009, a Ministerial meeting of high MDR/XDR TB burdened countries was held in Beijing, China following the WHO XDR-TB task force recommendations meeting in April 2008. Armenia was one of the 27 countries with a high burden of MDR/XDR TB included in the Beijing declaration.[18]

HIV/AIDS-TB Co-infection: Exposure to mycobacterium tuberculosis puts HIV patients at increased risk for mortality and more sever morbidity, as their immune system is depressed and they have 20-30 times higher probability of developing active TB.[19] Currently, there are about 2,500 people (an estimated number) living with HIV/AIDS in Armenia. Although this number has been slowly increasing each year since early 1990s, it still comprised 0.1% or less of the population of Armenia in 2010. The population rate for HIV/AIDS-TB co-infectivity is only 0.001% but appears to be slowly and steadily increasing.[15,20]

From 2002 to 2007, 1,099 TB patients were tested for HIV; 1.8% of TB patients were reported to be co-infected with HIV in 2002, reaching 3.1% in 2007.[12] In 2010, the percent of co-infected persons with HIV dropped to 1.4%, based on the 1,242 TB patients tested for HIV.[16]

Table 1.[15] **TB indicators for Armenia for 2009 and 2010**

Indicators	Rates
Mortality (excluding HIV) in 2010	11 (7–15) per 100,000[*]
Prevalence rate (incl HIV) in 2010	114 (48–189) per 100,000[*]
Incidence rate (incl HIV) in 2010	73 (60–87) per 100,000[*]
Incidence rate (HIV-positive) in 2010	1 (0.55–1.6) per 100,000[*]
Case detection, all forms in 2010	62 (52–76) %[*]
New MDR-TB cases	9.4 (7.0–12) %[*]
Previously treated TB cases with MDR-TB	43 (38–49) % [*]
Treatment success rate among new smear-positive in 2009	73 %
Treatment success rate among new smear-negative/ extrapulmonary in 2009	82 %
Treatment success rate among retreated cases in 2009	63 %

[*]Uncertainty intervals

National TB Control Program

The National TB Control Program (NTP) monitors the TB situation in Armenia; the Government of Armenia established it on December 4th, 2003 by the decree N° 1680. The NTP adheres to the International STOP TB strategy and the Global Plan to STOP TB 2006-2015 to apply best practices for organizing prevention, detection and treatment efforts, based on the WHO recommended Directly Observed Treatment Short-course (DOTS) strategy.[21,22]

The current ongoing goal of the NTP is to reduce TB morbidity, mortality and DR-TB during the period of 2007-2015. All TB facilities undergo quality control by the NTP on a quarterly basis. Record keeping and distribution of drugs also falls under the NTP management. TB medications are distributed to health facilities based on reported need every month.[22,23] In September 2003, by order N° 913 of the Government of Armenia, one TB coordinator was assigned to each of the Health and Social Protection Departments in the 10 Marz Governors' offices (marzpetaran) and Yerevan Municipality. These TB coordinators carry out NTP responsibilities in their assigned marzes and Yerevan.[12]

Service delivery

In Armenia, TB services in the civilian sector are organized through health care facilities which are located in 10 marzes and Yerevan. These include two specialized TB dispensaries (the Republican TB Dispensary in Abovian and the City TB dispensary in Yerevan), 10 TB in-patient departments in general hospitals (with a total 518 TB hospital beds), and 72 TB cabinets/offices in polyclinics providing out-patient services.[16,22] The functions of the cabinets include 1) activities directed towards TB prevention among the healthy population,

2) early detection of TB, 3) record keeping of new and relapsed TB cases, 4) diagnostic procedures and treatments of new and relapsed TB cases based on the DOTS strategy, 5) appropriate referral of the patients to specialized TB facilities as needed, 6) dynamic dispensary surveillance of both new and relapsed TB patients, 7) organizing treatment for children and adults in sanatoriums, 8) medication distribution based on the DOTS strategy, 9) organizing laboratory/instrumental diagnostic procedures with referrals to TB departments in marz facilities or Republican TB Dispensary in (RTBD) as needed, 10) performing medical examinations for pre-military and military-age males in collaboration with the adolescent cabinets, and 11) maintaining TB control among former prisoners.[12]

The National Reference Laboratory (NRL), which is located in the RTBD building, is an independent legal entity and performs microscopy, Drug Sensitivity Testing (DST) and culture growth. The NRL through one level II (culture) laboratory (situated in Yerevan) comprises the network of TB laboratories. In addition, the National Reference Laboratory is also responsible for quality assurance monitoring of all laboratories in the country.[23]

Prevention

TB prevention practices in Armenia begin with BCG vaccination of newborns at the maternity wards during the first 24-48 hours of life. The BCG vaccination was introduced in 1998 and is currently officially scheduled by the National BCG Calendar. The Sofia, Bulgaria/ InterVac Ltd Toronto Canada BCG vaccine is used in Armenia, with approximately 94% coverage. Vaccines are only administered after an infant gains 1,700 grams or more. Those newborns who do not receive the BCG vaccine in maternity hospitals are vaccinated in the immunization cabinets of the local primary health care facilities. Those children who do not develop a scar after the initial vaccination are revaccinated with a second dose of BCG vaccine at six to seven years of age.[24]

People who have been in contact with TB patients are examined during 7 days after the diagnosis of the patient has been confirmed. TB infection identification among adults who have been in contact with a TB patient is done through fluorography or triple sputum test (when sputum is available).[16] Children under the age of 18 can additionally undergo Tuberculin Skin Test (TST). Those individuals with a positive skin reaction of more than 5 mm diameter are further subjected to chest X-rays. Izoniazide prophylactic treatments are prescribed for contact children from the patient's household, who are under the age of 15, for

a period of 3 months. After this period TST is conducted and if the results are positive, the treatment is continued for an additional 3 months.[16]

For HIV/AIDS patients, people with suppressed immune systems and children under the age of 4 who have been in contact with the TB patient, prophylactic treatments are prescribed regardless of their TST results. Three months-long Izoniazide prophylactic treatments are also performed in newborn babies of mothers having pulmonary TB, after which TST is conducted. If the TST results are positive, the treatment is continued for three month. In case of a negative result, the child is vaccinated with BCG, while those with positive results continue an additional 3 months of treatment.[16]

Diagnosis

The main method of TB detection is passive case finding by primary health care level specialists such as therapists, pediatricians, family doctors and nurses, who then refer all patients with suspected TB to the local polyclinic TB cabinets for diagnoses.[16] Two nurses assist the TB specialist; one of the nurses is responsible for the functioning of the cabinet and the other nurse is responsible for patient outreach to reach those patients who miss their regular appointments with the TB cabinet. All TB cabinet specialists who had direct contact with patients undergo certification training in WHO DOTS strategy.[16]

Although BCG vaccination can produce high numbers of false-positives in TST testing, this testing is used for screening purposes of males of the military age and for children up to 18 years of age who have been in contact with newly diagnosed patients. Those individuals with a positive skin reaction of more than 5 mm diameter are further subjected to chest X-rays.[16] Triple direct sputum smear microscopy serves as the main TB diagnostic method in Armenia. If there are negative results, chest X-rays are also conducted. For new cases of TB, Drug Susceptibility Testing (DST) for bacterial growths is conducted for identification of drug resistant strains.[25]

The diagnosis of MDR-TB patients is based on drug susceptibility tests.[16] As soon as an MDR-TB case is identified, they are registered on their personal MDR-TB medical records by the tuberculosis specialist at their local MDR-TB cabinet. In those situations when there

are no MDR-TB services in the closest TB cabinet, the patients are referred to an MDR-TB cabinet within the closest proximity.[16]

All cases of TB and drug-resistant TB are reported to the State Hygiene and Anti-epidemic Inspectorate (SHAI) team.[16] The SHAI team visits patients at home and conducts environmental inspections and informs the households on TB infection. Reports are also sent to the *Disease Control and Prevention Centre LLC*. Moreover, the NTP regularly provides the SHAI with brief summaries of all quarterly reports and an annual report.[16]

Treatment

The DOTS program was implemented in Armenia in 1995 as a pilot program and achieved 100% national coverage by the end of 2002.[26] According to the National TB treatment protocol, treatment for new regular pulmonary and extra-pulmonary TB cases is six months. The first phase of treatment is two months of intensive treatment with HRZE[iii]; the exceptions are smear negative pulmonary cases and not severe extra pulmonary cases.[16] The second phase is four months of treatment with HR (Isoniazid(H), Rifampicin(R)). The treatment for relapsed regular TB cases is eight months – two months of intensive treatment with HRZES followed by HRZE (Streptomycin removed) for one month, followed by five months of treatment with HRE. If after this treatment the patient is still smear positive, the intensive phase treatment is extended for an additional month.[16] Usually patients receive their first phase of treatment at the in-patient TB care facility (the exceptions are some types of smear negative pulmonary and extra pulmonary cases that receive intensive treatment at their local TB cabinets).[16] The patients receive continuous phase of treatment at their local TB cabinets. For those patients who live far from the local TB cabinet, rural health facilities (Medical Ambulatories and FAPs) are responsible for providing TB care during the continuous phase of treatment.[16] Rural health care nurses are responsible for monitoring patients' compliance with TB treatment, as well as visiting any patient that has missed their regular appointment with the health facility. During both intensive and continuous phases of treatment directly observed treatment (DOT) is required.[16]

In 2009, the World Health Assembly resolution 62.15 urged the member states "to achieve universal access to diagnosis and treatment of multidrug-resistant and extensively drug-

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[iii] Isoniazid(H), Rifampicin(R), Pyrazinamide(Z), Ethambutol(E), Streptomycin(S)

resistant tuberculosis".[27] From the 27 high MDR-TB burden countries, 20 (including Armenia) began adapting their national TB control plans to adhere to the resolution to include MDR-TB treatment. In 2010, Armenia was one of the first countries to present their adapted national TB control plan to WHO.[27]

Médecins Sans Frontières France (MSF France) initiated MDR-TB DOTS+ treatment in two districts of Yerevan (Malatia/Sebastia and Shengavit) as a pilot program in 2005 in collaboration with the Armenian Government. In 2011 this program further expanded to cover the entire country with an ongoing handover of this treatment program to the National TB Program.[16] A multidisciplinary team, which included doctors, nurses, social workers and psychologists, was formed to assist and encourage patients and to decide on treatment approaches. MDR TB patients are directly treated by TB physicians who have undergone specialized training for DR-TB management. In Yerevan, the treatment of these DR patients is located at a few specific polyclinics. Patients from various polyclinics who have been diagnosed with MDR-TB are referred to those polyclinics with DR-TB treatment programs.[16]

The treatment for drug-resistant TB is complicated and varies widely depending on the response of the bacteria to the treatment and side effects.[16] Treatment for DR-TB requires a minimum of 21-24 months or 18 months after the smear and the culture are negative. Before starting the treatment for DR-TB biochemical and hematological tests are conducted for side-effects due to the medication and HIV testing is recommended since TB is an opportunistic disease for HIV. The intensive phase of treatment is provided in specialized TB dispensaries or in-patient departments. The continuous phase of treatment is provided in TB cabinets that have DR-TB services. All the marzes and Yerevan have TB cabinets that provide DR-TB services.[16]

Once the drug sensitivity test results are available, a special treatment plan is developed for each patient.[16] Based on their previous history of disease and treatment, 4-5 effective medications are chosen to begin the intensive treatment phase. Medications are administered twice a day, 6-7 days a week; initially, dosage is lower and is increased to full dosage within 3-14 days.[16]

The Armenian Red Cross Society NGO with financial support from the Global Fund trough the Government of Armenia provides social support and food and hygiene parcels to patients

undergoing intensive treatment and taking medication under supervision as a support to assure improved compliance to treatment regimens.[22]

Financing

The necessary funding for NTP is generated through various sources, including the Global Fund, the Republic of Armenia state health budget, funds from international organizations, and other sources.[22,28]

State Funding: The diagnosis and treatment of TB is included in the Basic Benefit Package (BBP) and is covered by the state budget in all levels of the health care system.[12] According to the Ministry of Finance of RA Decree No 127-A of 18 February 2008 and the Ministry of Health of RA Decree No 130-A of 04 February 2008, the mean duration of TB treatment in specialized TB facilities is 60 days for newly identified active regular and DR sputum smear positive TB cases, with the payment for the 60-day treatment per patient set at 450,000 AMD. The mean duration for "chronic" sputum smear positive TB case treatment is also 60 days, with the budgeting per patient set at 460,800 AMD.[12]

For newly identified active regular, DR and "chronic" sputum smear negative TB cases, the mean treatment duration in specialized TB facilities is 50 days.[12] The payment per patient is 375,000 AMD for regular and DR sputum smear negative TB cases in this group and 384,000 AMD per "chronic" sputum smear negative TB case. The treatment mean duration for TB patients with psychiatric disorders is 55 days with payment of 478,500 AMD per patient. The mean duration for TB surgical treatment is four days with payment of 48,000 AMD per patient. The mean duration for diagnostic testing is 10 days with payment of 60,000 AMD per patient. The mean duration for rehabilitation in TB sanatoriums is 50 days with payment of 300,000 AMD per patient.[12] TB control in the military system is financed and organized by the Ministry of Defence.[21]

International Financial and Technical Support: The Global Fund to Fight AIDS, Tuberculosis and Malaria has supported the Government of Armenia for TB control with the total amount of about 26,909,020USD. The support included strengthening the national TB control program to improve TB, MDR-TB and TB/HIV co-morbidity diagnosis, standardized treatment and quality DOTS, patient support, advocacy, communication and social mobilization, strengthening the health workforce, as well as renovating and equipping TB

facilities, procuring first and second line medication, lab equipment and other necessary resources.[29,30]

Collaborating with the Government of Armenia since 2005, the Médecins Sans Frontières France (MSF France) has provided financial and technical support to strengthen DR-TB control in Armenia.[22] The support included trainings for healthcare providers, building service infrastructure, renovation and construction, drug supplies and others.[22]

The WHO and the Stop TB Partnership through the Green Light Committee Initiative contribute to management of MDR-TB in Armenia providing second line medication.

The Government of Germany, together with its affiliated organizations Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and Kreditanstalt für Wiederaufbau (KfW), provided financial and technical resources to strengthen TB control in Armenia 2002-2009.[22] These resources have included laboratory and X-ray equipments, vehicles, renovation of the NTP Central Office, training of specialists in DOTS and technical assistance.[22]

In 2001, on behalf of the Ministry of Health the International Committee of the Red Cross (ICRC) built and equipped the National Reference Laboratory and trained the staff. From 1999 to 2008 ICRC, in close collaboration with the Ministry of Justice of the Republic of Armenia, developed a policy for TB control in the prisons and was responsible for financing and implementation of TB control in the penitentiary system.[12]

Human Resource Development
Pre-service training: the Yerevan State Medical University (YSMU) and the National Institute of Health (NIH) run residency programs for preparing TB doctors. The cost of the residency programs in TB is heavily subsidized by the state. Between 2005 and 2008 YSMU offered one and NIH offered six TB residency positions per year.[12]

In-service training: NTP has organized the training of 134 TB specialists, of which 27 have received training in project management; 53 TB doctors received training in DOTS strategy and 54 laboratory technicians. Twenty of them received trainings abroad, while the rest received the trainings in Armenia with assistance from the Government of Germany GTZ,

KFW/GOPA programs. MSF France has also provided training for TB specialists in the treatment of DR-TB.[12,23]

In 2003 and 2006 the Government of Armenia approved the Unified Family Medicine and Unified Nursing Curriculums developed by USAID funding. Both curriculums include a single-day training module on TB prevention, case detection and management.[31,32]

The aim was to re-train 1,650 physicians through a 12 month-long and 1,650 nurses through a 6 month-long curriculums over the period of 2005-2012. As of May 2011, the two curriculums have been utilized to train 1,327 family physicians, and 1,592 family nurses; al 107 physicians are currently undergoing Family Medicine trainings.[33]

MIGRATION AND TB

Migration has always had a major impact on the spread of infectious diseases, particularly tuberculosis.[34] Initially, in 19th century, western Europeans passed TB to Africa, Asia and the Americas, resulting in major epidemics in these regions. Later, after 1950s TB incidence decreased dramatically in Western Europe, remaining high in most low-income countries. At the end of the 20th century, migration of people increased drastically. Currently about 150 million people are residing in countries other than their country of origin. Moreover, the number of short-term migrants who return to their countries is 50 times greater than those who become permanent residents. These numbers continue to increase.[34]

Studies conducted in Europe and the US show that the incidence of TB is often higher among foreign-born (ranging from 20% to 70% of the total number of cases) than native populations. The risk of TB in migrant populations is excessively high due to conditions surrounding the migration process and the new life in the host community, including unequal access to health services, inadequate quality of health care, health risks related to reactivation of latent TB infection, and absence or delayed diagnosis. Moreover, because of treatment interruptions migrant TB patients are more likely to develop MDR-TB.[34,35]

MIGRATION IN ARMENIA

In 2005 and 2007, the "Advanced Social Technologies" NGO conducted two surveys to evaluate the migration rates, destinations and characteristics of migration by Armenians as well as the social-demographic characteristics of those Armenian migrants for the periods of

2002-2004 and 2005-2006. The study conducted in Armenia included all marzes and 1,500 households.[36,37] The Organization for Security and Co-operation in Europe (OSCE) supported both studies.

Burden

During 2005-2006 among the families interviewed, 14.5% had family members who were migrant workers. With the extrapolation of the data collected, the estimated number of households that have migrant workers was 778,667 with a 95% CI of 99,000-127,000 ().[37] This overall rate of 14.5% for 2005-2006 did not change from the 14.0% observed in 2002-2004 (95% Confidence Interval: 95,000-122,000 households).[36] Among those households that had migrant workers, for both time periods, 81% households had only one, 16% had two and 2% had three migrant workers.[37]

For the years 2005-2006, 3.6% of the Armenian population was estimated to be migratory, a total of 115,700 people – while in the years 2002-2004, it was estimated to be 4.1% (131,500 people).[36,37] Between the two study periods there was a shift in the pattern of migration between cities and villages, with an increase in the number of migrant workers among the village population and a decrease among the population in Yerevan and other cities (Table 2).[37]

Table 2.[36,37] Migration for 2002-2004 and 2005-2006 by residency

Residency	Households (%)				Migrants (%)			
	2002-2004		2005-2006		2002-2004		2005-2006	
Yerevan	10.5	15.2	7.3	12.3	4.2	5.4	2.4	3.6
Other cities	17.9		18.1		6.1		4.9	
Village	12.1	12.1	15.0	15.0	2.8	2.8	3.5	3.5

According to the studies, the most often visited country for migrant work was the Russian Federation – 93% in 2005-2006 and 88% in 2002-2004.[36,37] The highest migration level for 2002-2004 was registered in Shirak and Lori marzes and for 2005-2006 in Shirak, Lori, and Vayots Dzor marzes (Table 3).[36,37] In 2002-2004 every third household in Shirak marz and every fifth households in Lori marz had at least one person who was migrating.[36]

Table 3.[36,37] The migration rates and absolute number of migrants by marz for two periods

Place	Migration rate (%)		Absolute number of migrants	
	2002-2004	2005-2006	2002-2004	2005-2006
Yerevan	4.2	2.4	46,300	26,500
Aragatsotn	2.5	4.7	3,500	6,500
Ararat	2.9	3.3	7,900	9,000
Armavir	1.5	2.9	4,100	8,000
Gegharquniq	3.6	2.9	8,600	6,900
Lori	7.5	5.7	21,500	16,300
Kotayq	3.4	3.0	9,300	8,200
Shirak	9.2	8.8	26,100	25,000
Syuniq	2.7	1.2	4,100	1,800
Vayots Dzor	1.8	5.7	1,000	3,200
Tavush	2.1	2.1	2,800	7,700
Total	**4.1**	**3.6**	**131,500**	**115,700**

Demographic characteristics

The number of female migrant workers declined by half, from 14% in 2002-2004 to 7% in 2005-2006.[36,37] An extrapolation of these percentages to the total population produces 108,500 males and 7,500 female migrants in Armenia in 2005-2006.[37] For both periods the majority of migrants was 16-60 years old.[36,37] Only for the 21-25 years old group there was a substantial increase in migration in 2005-2006 compared to 2002-2004.[37] The large majority (76%) of migrants in 2005-2006 were married, 21% were single, 2% widowed, and 1% divorced. More than 75% of the migrants in 2005-2006 had completed secondary school or technical education and 20% had completed higher education.[37] For the same period, the migrant worker was the head-of-household in 42% of households with migrants, and in 45% of these households the son of the head-of-household was the migrant worker.[37]

Living conditions

In 2005-2006 during the time that migrants were working, 51% of migrants rented an apartment either alone or with relatives or friends.[37] The percentage of workers who shared an apartment with relatives or friends increased from 10% in 2002-2004 to 23% in 2005-2006, and the number of migrants who rented an apartment alone decreased from 29% to 20%, respectively (Table 4).[37]

Table 4.[36,37] **Places of living for migrant workers during the periods of 2002-2004 and 2005-2006**

Place	2002-2004 (%)	2005-2006 (%)
Rented and shared a room/apartment with friend/relative	9.6	22.9
Rented a room/apartment alone	29.0	19.6
Lived in a relative's/friend's house	20.5	17.3
Lived at the workplace	27.5	17.2
Lived in the employer's house	3.8	11.9
Lived in a dormitory	6.7	8.0
Owned an apartment in the host country	0.9	0.8
Other	2.0	2.3

According to the 2005-2006 survey, 99% of the migrants who lived at the workplace or barracks worked in the Russian Federation.[36] More than 90% of migrants reported that they were satisfied with their living accommodations, describing them as "very good" (26%) or "satisfactory" (65%).[37] Approximately three-quarters found their living accommodations in the host country equal or better to their homes in Armenia.[37]

Work dynamics

About three-quarters of the migrants began their migration in early spring, usually in March and return during the New Year/Christmas holidays for both periods.[36,37] The average duration of migrant work was eight months. About 26% of the migrants returned from the host country in less than six months, 67% stayed for 6-12 months, and 6% returned after a year.[37]

The average length of migrants' working day was 10 hours and 4.1% of migrants worked more than 12 hours for both periods.[36,37] In 2005-2006, only 43.9% had regular day offs, 22.5% non-regular day offs, and 25% worked without day offs. In 2005-2006, 77% of the migrants worked in construction, receiving an average reported salary of 643 USD per month in 2006 – an increase from the 410 USD per month reported in 2004.[36,37]

The Russian Federation requires migrants arriving for work to register on a migration roster. Before being employed, migrant workers are required to have a physical exam and test at a Russian government medical facility and present their medical report issued from that facility to the Russian Federal Migration Services. If the migrant worker does not provide this documentation, the employer is required to terminate their employment. The medical report

provides results from TB testing and for other diseases such as leprosy and syphilis, as well as other health conditions such as drug addiction.[38] However, only 12% of the migrant workers from Armenia were legally employed, thus the remaining 88% of these migrant workers did not have the physical exam and the official documentation on their health status (Table 5).[36,37]

Table 5.[36,37] **The legal work status of Armenian migrant workers in the Russian Federation for the periods of 2002-2004 and 2005-2006**

Survey	Legal contract	Prior verbal agreement	No prior agreement
2002-2004	11.5%	72.3%	11.9%
2005-2006	12.2%	74.1%	8.8%

Source: OSCE, AST 2007

TUBERCULOSIS IN THE RUSSIAN FEDERATION

Since 93% of migrant workers leave for Russia, this report presents a detailed profile of TB situation in Russia. The Russian Federation is among the 22 countries with the highest TB burden identified by the WHO. In the European Region the contribution of the Russian Federation to the spread of TB is 35%.[38]

Notification and prevalence rates of TB in the Russian Federation differ significantly from territory to territory based on 2008 data and showed an increasing trend from west (126–130 per 100,000 populations) to east (291.9 and 290.0 per 100,000 populations in the Siberian Federal Region and the Far-Eastern Federal Region, respectively) across the country. The territories of the Southern Federal Region also had high prevalence rates of TB – 221.7 per 100,000 populations (Krasnodar Krai, Astrakhan and Rostov oblasts, Republic of North-Ossetia – Alania).[39]

In the list of 27 high burden MDR-TB countries that contribute to 85% of the worldwide cases of MDR-TB, the Russian Federation is in the third place, after India and China (WHO estimate for 2006).[40]

Table 6.[15] **TB indicators for Russia, 2009 and 2010**

Indicators	Rates
Mortality (excluding HIV) in 2010	18 (11–29) per 100,000[*]
Prevalence rate (incl HIV) in 2010	136 (49–233) per 100,000[*]
Incidence rate (incl HIV) in 2010	106 (90–124) per 100,000[*]
Incidence rate (HIV-positive) in 2010	5.7 (4.8–6.6) per 100,000[*]
Case detection, all forms in 2010	78 (67–93) %[*]
New MDR-TB cases	18 (16–19) %[*]
Retreatment TB cases with MDR-TB	46 (41–52) %[*]
Treatment success rate among new smear-positive in 2009	55%
Treatment success rate among new smear-negative/ extrapulmonary in 2009	73%
Treatment success rate among retreated cases in 2009	34%

[*]Uncertainty intervals

Though the reported cases of new TB patients that are foreign nationals in the Russian Federation was only 2% in 2008, this percentage significantly increased from 2005 (Table 7). This trend may have been influenced by changes in the makeup of the proportions of TB disease and/or improvement in registration among migrants (implementation of Federal Law No. 115-ФЗ of 25.07.2002 «On the legal status of foreign nationals in the Russian Federation», governmental regulation No. 188 of 02.04.2003, and Federal Law No. 189-ФЗ of 05.11.2006 «On amending the Russian Federation Code of Administrative Violations of the Law»).[38]

Table 7.[38] **New TB cases registered in 2005–2008 in the Russian Federation**

New TB cases registered (%)	2005	2006	2007	2008
Among permanent residents (civil population)	86.8	87.4	86.5	85.9
Among foreign nationals	0.8	0.5	1.8	2.1

According to WHO, the TB situation in the Russian Federation is worse compared to Armenia in terms of all TB estimated indicators (Tables 1 and 6).

STUDY OBJECTIVES

The study conducted by the Center for Health Services Research and Development (CHSR) of the College of Health Sciences, American University of Armenia addressed the following objectives:

- To review and summarize existing studies, international literature, and other published information on Armenian migrant workers in general

- To measure the magnitude of the problem by determining the percentages of Armenian migrant workers among the following groups: new and retreated MDR TB cases, failed TB treatments, incomplete TB treatments, TB deaths, successful TB treatments and TB-HIV/AIDS co-morbidity

- To measure TB knowledge, attitudes and practices among migrant workers, including existing stigma in general population perceived by TB patients

- To follow-up on TB migrant workers (especially MDR-TB) under TB treatment in Armenia who default the treatment because of migrant work. Particularly, to understand whether they receive treatment in Russia or whether they wait for continuing treatment in Armenia, whether they return, to depict the health status (including their infectivity) in and outside of Armenia and the implications of health status on patients' work and choices.

- To determine if Armenian migrant workers have access to TB (especially MDR TB) treatment services in the country that they work and how the access influences the utilization of services.

METHODS

Document review

The main objective of the document review was to describe the burden of tuberculosis, as well as to map out and analyze the current TB control system in Armenia. It also aimed to depict the association of migration and TB in general, the current migration rates and migrant destinations, a description of the TB situation in the main destination country, characteristics of out-migration from Armenia as well as the social-demographic characteristics of Armenian migrant workers. This situational analysis was conducted through a review of existing official documents, studies, assessments, publications and websites, with a synthesis of relevant information associated with migration and/or TB in Armenia and the primary destination country, the Russian Federation.

Survey of TB cabinet physicians

The aim of the survey with TB cabinet doctors was to find out the number of TB patients that left Armenia in the last four years for migrant work, providing numerators for calculating percentages of the migrant workers among the following groups: new MDR-TB cases,

retreated MDR-TB cases, failed TB treatments, incomplete TB treatments, TB deaths, successful TB treatments and TB-HIV/AIDS co-morbidity.

The research team developed a consent form and table of questions to contact the doctors of the TB cabinets in English and Armenian (Appendix 1 and 2). The National TB Control Program Central Office informed all the TB cabinet specialists about the aims of the study and asked them to support the study by extracting TB data from the medical records. The accuracy of the provided information depended on the awareness of TB cabinet specialists about the migrant status of their patients as well as their willingness to support this study.

Survey of migrant workers who have had TB
Study design
A cross –sectional study design was selected to assess TB knowledge, attitudes and practice, including perceived stigma, among migrant workers with TB, to describe their socio-demographic characteristics and migrant work conditions as well as to assess access and utilization of TB services in and outside of Armenia. The study population included Armenians migrant workers who during the last four years (2008-2011) worked outside Armenia at least for three months and ever had a diagnosis of TB (including drug-resistant TB and TB-HIV/AIDS co-morbidity).

Survey instrument
The study instrument was developed based on the WHO sample KAP survey questionnaire.[42,43] The survey instrument includes questions about knowledge, attitudes, practices and stigma, as well as questions regarding previous and current experiences with TB care both in Armenia and in the host country of migration.

The CHSR research team sent the draft survey instrument to the members of the TB Working Group of the Country Coordinating Mechanism and other stakeholder groups active in TB control for their review and improved the questionnaire according to the received feedback. Appendix 3 includes the study instrument in English and Armenian.

The survey questionnaire had five main sections – working experiences in the host country of work, TB awareness and knowledge, TB attitude and stigma, TB infection and diagnosis in

Armenia and in the host country, and TB treatment experiences. The survey questionnaire included also the questions on social-demographic characteristics of the study participants. The study team pretested the survey instrument on a migrant worker who had TB and adapted based on his suggestions.

In addition to the survey instrument, the CHSR team developed a journal form in English and Armenian to calculate the response rate (Appendix 4).

Inclusion criteria

The inclusion criteria were: 1) experience as a migrant worker outside of Armenia that lasted at least three months during the last four years (2008-2011), 2) 18 years old and above, 3) Armenian citizenship, and 4) ability to understand and communicate in Armenian. A screening form was developed in English and Armenian based on the inclusion criteria of the study to identify the eligible study participants (Appendix 5).

Sampling strategy

No database exists in Armenia that includes information about migrant work experience of TB patients. TB doctors working in TB cabinets that are closely related to TB patients and would know if their patients had migrant working experience were targeted to create the sampling frame: the list of migrant workers with TB. The total number of migrant workers with TB reported by the TB cabinet specialists was 541. Taking into account the small number of the target population and the possibility of low response rate, the research team decided to include all the eligible study participants identified by TB cabinet specialists in the study (census).

Data collection

Given the sensitive topic and to protect the confidentiality of TB patients, the research team decided to involve the social workers of the Armenian Red Cross Society as interviewers for conducting the survey with the eligible patients, since they have experience of interacting with TB patients while providing them and their families with social support. Prior to the data collection, the CHSR research team conducted a 2-day training for the selected interviewers covering the consent form, data collection protocol, the instrument, infection control and other important details.

The interviews were conducted with the patients in their regional TB cabinets or a location of preference by the participants. Before the interviews, all the study participants were again introduced to the aim of the study and the ethical issues with regards to their participation. All those that provided oral consent were interviewed face-to-face. All participants were interviewed in private; the majority of the interviews took place in the TB cabinet where the patient was treated, with only a few being conducted at home, at the request of the patient. At the end of the interview participants were provided with mobile phone recharge cards, so that they could contact the study team in case if they had questions and as appreciation of their participation.

Ethical Consideration

The AUA Institutional Review Board approved the study for compliance with locally and internationally accepted ethical standards. The TB doctors made the first contact with the potential participants to get their consent for the research team to contact them. Before starting the interview an oral consent form with project description, confidentiality, anonymity, voluntary nature as well as benefits and risks of participation, was read to each respondent, providing the migrant workers who have had TB the choice not to participate if they did not choose to (Appendix 6).

Data analysis

The study used SPSS 16 statistical software package for double entry of the data, cleaning and analysis. The CHSR team used both descriptive and analytic statistics for data interpretation, including calculation of wealth score, crowding indexes for the study population living places in Armenia and in the host country, as well as cumulative knowledge, attitude, stigma scores.

To calculate the wealth score for questions characterizing the social status of the study participant (number of household members currently employed, family's general standard of living, and amount of household income spent monthly), scores were assigned to each of the response options, with higher score for the higher wealth status. Cumulative wealth scores were standardized by dividing the summed score (maximum of 10.5) by the number of items in the scale, resulting in cut point of 3.5. Surveyed population was considered poor when score fell between 0 -3.5, average when it fell between 3.6 -7.0, and wealthy between 7.1-10.5.

To measure crowding where study participants lived in Armenia and in the host country, the ratio of household members to the number of rooms in the household (crowding index) was calculated.[44,45] According to the similar studies conducted, crowding levels were considered low when the crowding index fell between 0.1-1.9, moderate when the crowding index fell between 2.0 to 3.9 and high when it was more than 4.0.[45]

To assess the levels of knowledge and attitudes of the study population toward TB disease, the cumulative knowledge and attitude scores were calculated out of the total correct positive knowledge and attitude items. For the 26 knowledge questions each correct positive knowledge item was scored 1.0, and all other answers zero. For the 5 attitude questions a Likert scale with three levels: disagree (1), neither agree nor disagree (2), and agree (3) was used. A score of zero was given to each indifferent response. The mean cumulative scores for knowledge and attitudes were analyzed between age groups and the level of education, the number of times treated for TB, and the study population treatment outcomes.

To measure stigma, two groups of questions were asked. One group of questions included a measure of the reluctance of the participants to inform family members, friends, and neighbors about their disease. Another group of questions measured how detrimentally TB affected TB patients' relationships with family members, relatives, colleagues, and siblings. Items were scored using a scale with four levels: nobody (0), some (1), majority (2), and all (3), with higher scores indicating higher stigma. Responses were summed for each scale to create cumulative stigma scores to be used in analysis. Stigma scores were standardized by dividing the summed score (maximum of 18) by the number of items in the scale, resulting in a cut point six. Surveyed population was considered as low stigmatized when score fell between 0-6.0, moderate when it fell between 6.1-12.0, and high between 12.1-18.0. [46]

RESULTS AND DISCUSSION

Sixty three out of 72 TB cabinets in the civilian sector of TB control in Armenia provided the requested information about migrant workers with TB. The total number of migrant workers during the last four years (2008-2011) who ever had TB reported by the specialist of TB cabinets was 541. The percent and number of migrant workers with TB-HIV/AIDS co-morbidity out of the entire sample of migrant workers was 4.7% (6/127), according to the information provided by the TB cabinet doctors. This percent is 4.7 times higher than the percent of TB-HIV/AID co-morbidity among all TB patients (1%). About one-forth of participants (26% - 25/95) had DR-TB, according to the information provided by the TB cabinet doctors.

Administrative/General

TB cabinet doctors made the first contact with individuals identified as migrant workers with TB, to inform them about the study and get their verbal consent for the study researchers to contact them. This first round of contact reduced the list to 339, as approximately 37% of those contacted were reportedly abroad, or could not be contacted due to lack of telephone numbers, or refused to participate or were not migrant workers (Table 8). The TB cabinet doctors gave the permission to the study investigators to contact the remaining 339 individuals who presumably gave consent for the study researchers to contact them by telephone. During the call the study researchers introduced the details of the study to the participants to get their oral consent for participation, with an interview date set for those who gave their consent. Out of these 339 individuals, 114 (34%) did not have correct contact numbers, 54 of them (15.9%) were not migrant workers in the last four years, 37 of them (10.9%) were not in Armenia at the time of interviews, 34 of them (10%) refused to participate – 28 of them were eligible (Table 9). The research team found that 163 from the lost were eligible but 37 were not in Armenia at the time of interviews, 28 refused to participate, and 3 did not come to the interview. Overall, 95 of 126 eligible contacted people completed the interviews (response rate – 75.4%).

The study team made 440 attempts to contact the eligible study participants, including the attempts for the arrangements with the selected participants through phone calls and the attempts for interviews by the social workers.

Table 8. The first round of contact of potential study participants by TB cabinet doctors

First contact with the study population	%	n (N=541)
Agreed to get a call from researchers	62.7%	339
Out of the country	25.0%	135
No contacts available	9.2%	50
Refused to participate	2.2%	12
Incarcerated	0.6%	3
Not a migrant worker	0.4%	2

Table 9. Study participants' response rate and the reasons for non-response

Response results	%	n (N=339)
Completed interview	28.0%	**95**
No contact	33.6%	114
The TB patient was not a migrant worker during the last 4 years	15.9%	54
The TB migrant is currently not in Armenia	10.9%	37
Refusal	10.0%	34
The TB migrant did not come to the place of interview	0.9%	3
TB patient died	0.6%	2

Data collection took place in January - March 2012. The mean duration of interviews was 33 minutes. The study participants were from Yerevan and nine marzes of Armenia including Shirak, Lori, Tavush, Gegharkunik, Kotayk, Ararat, Aragatsotn, Syunik, and Armavir (Table 10).

Table 10. Percent and number of study participants (migrant workers with TB) by residence

Residence	%	n (N=95)
Shirak	36.8	35
Yerevan	20.0	19
Lori	13.7	13
Tavush	10.5	10
Gegharkunik	9.5	9
Kotayk	2.1	2
Ararat	2.1	2
Aragatsotn	2.1	2
Syunik	2.1	2
Armavir	1.1	1

Socio-demographic characteristics

The mean age of the interviewed TB migrant workers was 45.9 years old and 75% of respondents were married. The mean number of household members was 4.4 and the mean number of children per household was 1.0. The great majority of participants had either high school or professional technical education (91%). Approximately a third of the participants' families were registered in social support programs, including PAROS. Moreover, the calculated wealth scores showed that social condition of families for 85% of the surveyed population was poor, 14% had average living conditions, and only 1 household of a migrant worker who have had TB could be considered wealthy (Table 11).

Table 11. Socio-demographic characteristics of the survey participants

Characteristics	mean	SD
Age	45.9	11.2
Number of family members	4.4	2.4
Number of children	1.0	1.2
Characteristics	**%**	**n (N=95)**
Married	74.5	70
Education		
School less than 10 years/ complete 10 years	68.4	65
Professional technical education	22.1	21
Institute/University	9.5	9
Family registered in PAROS or other social support program	30.5	29
Wealth status (score range)		
Poor (0-3.5)	85.3	81
Average (3.6-7.0)	13.7	13
Wealthy (7.1-10.5)	1.1	1

Host working locations and working conditions for migrant workers who have had TB

All study participants were asked about working locations outside of Armenia where they worked for more than three months during 2008-2011. Ninety-five participants reported a total of 161 work migrations to other countries during 2008-2011, including the Russian Federation, Ukraine, Kazakhstan, Belarus, Greece, the Netherlands, Turkey, and Cameroon (Africa). Out of these working destinations, the overwhelming majority (91%) worked in the Russian Federation (Table 12). Study participants reported working in all eight Federal Districts of the Russian Federation, with the most frequent work site reportedly was the Central District which includes Moscow (40%), followed by the Southern (20%), the Far Eastern (10%), the Volga (10%), and the Northwestern (8%) Federal Districts, and less

frequently – the Ural (5%), the Siberian (4%), and the North Caucasian (3%) Federal Districts (Figure 1 Appendix 7).

Table 12. Countries of destination for participants in years 2008-2011

Countries	% number (N=161) of visits to other countries for work in 2008-2011	
Russian Federation	91.3	(147)
Ukraine	6.8	(11)
Kazakhstan	1.2	(2)
Belarus	1.2	(2)
Greece	0.6	(1)
Netherlands	0.6	(1)
Turkey	0.6	(1)
Cameroon (Africa)	0.6	(1)

About 30% of the study participants reported working in the Far Eastern or the Southern Federal Districts, where the highest prevalence rates of TB have been reported in the Russian Federation. [40] This study showed that after Moscow (40%), the cities in the Russian Federation hosting the largest proportion of Armenian migrant workers who have had TB (16%) were Krasnodar and Rostov on Don; both cities have high rates of TB (Table 13, Figure 2 Appendix 7).

Table 13. Thirty-one cities of the Russian Federation where study participants worked in years 2008-2011 and the percent of participants and their visits to the host cities

Cities	% of Visits N=147	% of Participants N=95	Cities	% of Visits N=147	% of Participants N=95
Moscow	39.5	33.7	Cherkessk	0.7	1.1
Krasnodar	8.2	11.6	Chita	0.7	1.1
Rostov on Don	7.5	7.4	Kaluga	0.7	1.1
Yakutsk	6.1	6.3	Khabarovsk	0.7	1.1
Samara	4.1	5.3	Krasnoyarsk	0.7	1.1
St. Petersburg	3.4	4.2	Kursk	0.7	1.1
Ufa	4.1	3.2	Murmansk	0.7	1.1
Tula	5.4	2.1	Salekhard	0.7	1.1
Tyumen	2.0	2.1	Stavropol	0.7	1.1
Kaliningrad	1.4	2.1	Tver	0.7	1.1
Saratov	2.0	1.1	Vladikavkaz	0.7	1.1
Pskov	2.0	1.1	Vladivostok	0.7	1.1
Omsk	1.4	1.1	Volgograd	0.7	1.1
Kemerovo	1.4	1.1	Yekaterinburg	0.7	1.1
Bryansk	0.7	1.1	Yuzhno-Sakhalinsk	0.7	1.1
Chelyabinsk	0.7	1.1			

Even though Moscow hosted more of the study participants, those who went to work in Krasnodar city stayed longer in that city than those who stayed in Moscow.

About three-quarters of the study participants began migrant work in early spring, usually in March, and returned to Armenia during the New Year/Christmas holidays. This schedule of migration for work was similar to other migrant workers' schedule in Armenia.[37,38]

The reported periods of stay outside of Armenia for the study participants varied – from three months to maximum of 25.5 years (Figure 3 Appendix 7). However, the median length of stay for work was seven months and the mean was 25.6 months. Three quarters of the study participants stayed in the host country one year or less. Among those who stayed for one year or less in the host country, 18% took family members with them. For those who stayed longer than one year, half of the participants took family members with them and some took the entire family with them to the host country. However, 74% of the participants reportedly preferred to travel alone (Table 14).

Table 14. Frequency of travelling alone or with family members during out of 161 migrant work visits in 2008-2011

Travelers	%	n
The whole family	8.1	13
Some members of the family	18.0	29
Husband/wife	*34.6*	*9*
Son/daughter	*34.6*	*9*
Father/mother	*15.4*	*4*
Brother/sister	*15.4*	*4*
Alone	73.9	119

The study participants' occupation outside of Armenia included construction, driving/transportation, commerce, production, food industry, farming, and services. The majority (65%) worked in construction (Table 15). About two-thirds (63%) reported that they worked in closed areas, of which approximately half (46%) worked with one or two people in the same room, 32% worked with three to five people in the same room, 10% with six to nine people, and 13% worked with more than 10 people in the same enclosed space (Table 16).

Table 15. Occupations in the host country during 161 migrant work visits in 2008-2011

Type of work	%	n
Construction	64.6	104
Driving/Transportation	10.6	17
Commerce	7.5	12
Production	6.8	11
Food industry	4.4	7
Electrician	3.1	5
Farming	1.2	2
Security guard	1.2	2
Car wash	0.6	1

Table 16. Number of co-workers of study participants working in the same enclosed space in the host country during 111 working visits for those who worked in enclosed space

Number of coworkers	%	n
1-2	45.5	46
3-5	31.7	32
6-9	9.9	10
10-19	5.9	6
>20	6.9	7

About 91% of the study participants lived in low-crowded households and only 1% (one person) of the participants lived in highly crowded households in Armenia. During the 78% of the visitis to the host country of work the participants lived in low-crowded residencies and in 7% of the visits (11 visits out of 161) they lived in highly crowded conditions in the host country of work (Table 17). Even though mean crowding levels in both Armenia and the host country were low, there was a statistically significant difference between them ($p < 0.001$), showing that the participants statistically significantly more often lived in less crowded conditions in Armenia than in the host country of work.

Table 17. Crowding Index (number of residents /number of rooms) for residencies in Armenia and in a host country of work

Crowding level	In Armenia (N=95) %	In the host country of work (N=161) %
Low (from 0.1 to 1.9)	90.5	78.3
Moderate (from 2.0 to 3.9)	8.4	14.9
High (≥ 4.0)	1.1	6.8

Sources of TB Information and Knowledge

Most of the study participants (71%) reported that health care workers were the main source of information about TB (Table 18). Radio/TV, family/friends/neighbors and colleagues, and

printed materials were less frequently mentioned (16%-17% for each) by the respondents. Only 9.5% reported that they learned about TB from other TB patients; 2% reported that social workers were their main source of information, and another 2% identified the internet as an additional source of information.

More than half of the participants (almost 57%) wanted to learn more about TB, and among them 87% identified health workers as one of the three best sources of information about TB, followed by radio/TV (43%) and printed materials (34%) (Table 18, Figure 4 Appendix 7).

Table 18. Existing and suggested best sources of information about TB

Items	%	n (N= 95)
Sources of information for TB		
Health workers	70.5	67
Radio, TV	16.8	16
Family, friends, neighbors and colleagues	16.8	16
Printed materials (newspapers, magazines, brochures)	15.8	15
Other TB patients	9.5	9
Social worker	2.1	2
Internet	2.1	2
Wish to learn more about TB	56.8	54
The best sources of information for TB	**%**	**n (N=54)**
Health workers	86.8	46
Radio, TV	43.4	23
Printed materials (newspapers, magazines, brochures)	34.0	18
Internet	11.3	6
Family, friends, neighbors and colleagues	7.5	4
Other TB patients	7.5	4
Social worker	3.7	2

Table 19 presents the study participant's knowledge about modes of transmission of TB, common signs and types. Approximately 88% of study participants knew that TB is not a hereditary disease. Most (almost 73%) reported that a person might get infected with TB through the air when a person with TB coughs or sneezes, and almost half (48%) reported that direct contact with TB patients will spread disease. These reported modes are consistent with WHO classifications of transmission of this disease. Approximately 90% of the respondents knew that TB cannot be transmitted to people through handshakes and touching items in public places. Around 70% correctly understood that sharing personal items with a person with TB does not spread disease and 61% understood that sharing the same dishes and utensils is not a mode of transmission of disease. A few participants mentioned other modes

of getting TB such as living in cold and damp settings, poor nutrition and low socio-economic conditions, which are predisposing factors for TB.

The most frequent symptoms of TB reported by participants included cough and fever (69% and 68%, respectively), followed by on-going fatigue (63%), weight-loss (40%) and sweating (35%) - consistent with established symptoms of TB. More than 90% of respondents knew that rash, severe headache and nausea are not symptoms common to TB (Table 19).

Table 19. Knowledge about TB

Items	%	n (N=95)
TB is not a hereditary disease	88.4	84
A person can get TB through:		
The air when a person with TB coughs or sneezes	72.6	69
Direct contact with TB patients	48.4	46
A person cannot get TB through:		
Handshakes	89.5	85
Touching items in public places	88.4	84
Using the same personal items	69.5	66
Sharing dishes	61.1	58
A person can get TB through Cold/dampness (other category)	6.3	6
The signs of TB		
Cough	69.5	68
Fever	68.5	66
Ongoing fatigue	63.2	60.
Weight loss	40.0	38
Sweating	34.7	33
Shortness of breath	20.0	19
Cough that lasts longer than 3 weeks	12.6	12
Coughing up blood	10.5	10
Chest pain	7.5	8
Sputum discharge (other category)	7.4	7
Loss of appetite (other category)	5.3	5
Not signs of TB		
Rash	97.8	93
Severe headache	91.6	87
Nausea	90.5	86
Types of TB		
Pulmonary/Extra-pulmonary	28.4	27
Smear positive/negative	12.6	12
DR/Regular	8.4	8

Study participants listed the types of TB in an open-ended question, including bone, pulmonary, intestines, spinal cord, infectious/not infectious, closed/open or smear negative/positive, and drug resistant (DR)/regular. The study team grouped these types into

the three categories- pulmonary/extrapulmonary, smear positive/negative and DR/regular. Almost 28% of participants were aware of pulmonary/extrapulmonary types of TB, and 13% with smear positive/smear negative TB and 8% with DR/regular TB. Almost 46% of the participants (44 out of total 95 cases) did not report any types of TB (Table 19).

Table 20 illustrates the participants' knowledge about risk factors for development of TB, ways of preventing spread of disease and the best protective methods against TB. Poverty and undernourishment was identified by 75% of participants as a risk factor for TB, incarceration by 72% and contact with TB patients by 62%. Almost half of the participants reported tobacco smoking as a risk factor for TB. Having HIV/AIDS, alcohol abuse, and living in overcrowded conditions were reported as risk factors by about 40% of the study participants for each. A few participants added living in damp settings and catching cold as possible predisposing factors for developing TB.

Table 20. Knowledge of possible predisposing conditions for development of TB and possible ways of its prevention and treatment

Items	%	n (N=95)
Risk factors for TB		
Poverty and undernourishment	74.7	71
Incarceration	71.6	68
Contact with TB patient	62.1	59
Smoking	50.5	48
Having HIV/AIDS	44.2	42
Alcohol abuse	41.1	39
Living in overcrowded conditions	40.0	38
Being a migrant worker	40.0	38
Having diabetes	36.8	35
Catching cold/dampness (other category)	5.3	5
A person with TB can prevent the spread of disease through:		
Covering their mouth and nose when coughing or sneezing	45.3	43
Providing good ventilation in the room	30.5	28
By wearing masks	26.3	25
Receiving treatment (other category)	7.4	7
A person with TB cannot prevent the spread of disease through:		
Avoid shaking hands	82.1	78
Avoid sharing dishes	56.8	54
Avoid contact with people	51.6	49
Washing hands frequently	22.1	21
What best protects against TB?		
Taking prescribed drugs daily in the presence of doctor or nurse	91.6	87
Home remedies, such as herbs and good nutrition	4.2	4

Among the established means of preventing spread of disease, 45% of the participants correctly reported covering mouth and nose when coughing or sneezing, 31% reported providing good ventilation in the room as preventive and 26% by wearing masks. More than 82% of respondents knew that shaking hands with a person with TB does not spread the disease and 57% understood that sharing dishes with someone with TB does not put them at higher risk for disease. However, almost 80% of the respondents had the misconception that frequent washing of hands prevents the spread of TB. Almost 92% of the study participants correctly reported that taking prescribed TB drugs daily during treatment in the presence of a doctor or a nurse was the best protection against the disease.

The overall mean cumulative score was 11.6 out of the total 26 correct positive items (with the range of 2.0 to 20.0) and the mean percent cumulative score was 45%. No statistically significant differences were found in mean cumulative knowledge score between age groups, education levels or between groups with different number of times treated for TB.

The mean cumulative knowledge score of those respondents who were cured after their first treatment with TB statistically significantly was not different from those who had other treatment outcomes (currently on treatment, failed, or defaulters) during their first treatment.

Attitudes and Stigma

Table 21 illustrates the participants' attitudes toward TB infection, including their perceptions toward the seriousness of the disease, its curability, and effectiveness of drugs for TB treatment. Seventy-three percent of TB migrant workers believed that TB is a serious disease, 81% reported that TB is a serious health problem in Armenia and about half were certain that it is a serious health problem in the host country where they worked. The great majority of the study participants (95%) emphasized that TB can be cured and 92% believed that TB drugs can effectively treat the disease.

The mean cumulative attitude score was 12.9 out of possible 15 points (with the range of 6.0 to 15.0) and the mean percent cumulative score was 86% (Table 20). No statistically significant differences were found in the mean cumulative attitude score between age groups, education levels, survey participants who received different number of treatment, and who had different treatment outcomes (p>0.05).

Table 21. Number and percentage of attitude scores of participants

Items	%	n (N=95)
TB is a serious disease	72.6	69
TB is a serious problem in Armenia	81.1	77
TB is a serious problem in the country of your work	50.5	48
TB can be cured	94.7	90
TB drugs are effective for TB treatment	91.6	87

Table 22 explores the level of stigma towards TB in Armenian society through the evaluation of study participants' perceptions. Study participants reported that 36% of them wanted to hide their disease from their family members and 37% reported that TB infection negatively impacted their marriage. Sixty-three percent reported that TB patients wanted to hide their disease from their friends and 68% reported that the disease negatively affected their relationships with friends and relatives. Sixty-six percent stressed that TB patients wanted to hide their disease from their neighbors and 83% indicated that TB disease detrimentally impacted their work relationships. About 26% of the study participants believed that in the community a person with TB is generally treated well, however, more than a half (60%) emphasized that even though people treat TB patients well, they usually try to avoid them.

To understand the level of stigma existing in the Armenian society toward TB infection, the mean cumulative stigma score was calculated. For the overall nine stigma questions mean cumulative stigma score was 7.2 (mean percent score 40%) out of possible 18 points with the range of cumulative stigma score of 0.0 to 17.0. The level of stigma existing in Armenian society toward TB infection was considered as moderate according to preset categories (Table 23). Moreover, only 5% of the surveyed population was highly stigmatized.

Table 22. Number and percentage of participants who reported existence of stigma toward TB patients

Items	%	n (N=95)
People with TB want to hide from their family members that they have TB	35.8	34
People with TB want to hide from their friends that they have TB	63.2	60
People with TB want to hide from their community/neighbors that they have TB	66.3	63
TB negatively affects relationships with friends and relatives	68.4	65
TB negatively affects work relationship	83.2	79
TB negatively affects marital relationship	36.8	35

Table 23. Level of stigma among the study participants

Categories of stigma	%	n (N=95)
Low (0-6.0)	43.2	41
Moderate (6.1-12.0)	51.6	49
High (12.1-18.0)	5.3	5

TB Infection, Diagnosis and Treatment in Armenia and in the Host Country of Work

Study participants answered questions about their experience related to TB infection, infection, diagnosis and treatment in Armenia and in the host country of work disease and diagnosis inside and outside of Armenia. About 83% of participants did not know from whom they got the TB infection. Among those who thought they knew who infected them, 14% identified an immediate family member, 36% identified a friend or other relative, and half identified a work colleague (Figure 5 Appendix 7).

Eighty one percent of study participants believed that they had been infected in the host country of work, and among those 95% worked in the Russian Federation. More than a half (57%) believed they knew when they were infected, 90% could recall when their first symptoms of TB appeared, and 99% knew the date of their first diagnosis. More than half (56%) of study participants were first diagnosed in Armenia. Less than half (44%) were first diagnosed in the host country of work, including 40 migrant workers in Russia, one in Turkey and one in Ukraine.

About 82% of participants were the only person in their family that had developed TB. Thirteen had reported one other family member who had TB, one participant reported two other family members having TB, and three participants had four other family members who had TB.

Infectivity

For all participants, the mean and the median duration between first signs of the disease and the first diagnosis was 2.2 and 1.0 months, respectively (ranging from less than one month to 33 months, n=76). The mean and median between the first diagnosis and the first treatment was 1.7 and less than one month, respectively (ranging from less than one month to 45 months, n=85). For the total time period from the first signs to first treatment the mean and the median were 3.3 and 1.0 months, respectively (ranging from less than one month to 49 months, n=76).

Table 24. Time intervals between first signs, diagnosis and first TB treatment compared by the place of the first diagnosis

Time intervals	Mean Duration (Months)		
	Armenia	Host country of work	P values
First signs - first diagnosis	2.8	1.4	0.234
First diagnosis - first treatment	0.6	2.9	0.055[*]
First signs - first treatment	3.4	3.1	0.538

[*]Marginally statistically significant

The time period between first diagnosis and first treatment was about 5-times shorter (marginally statistically significant difference) for those who were diagnosed in Armenia than those who were diagnosed in the host country of work. This difference in time period represents the time of infectivity and the time for development of more advanced TB (Table 24).

Those who received treatment in the host country of work were 3.9 times (p=0.001) more likely to have a failed or defaulted treatment outcome than those who received treatment in Armenia. The increased probability of failure and default in the host country could increase the likelihood of a longer period of infectivity for those who received their treatment in the host country of work. However, only 14% of participants received treatment outside Armenia.

All participants had been treated for TB at least once; 73% (69) had been treated only once, 15% (14) were treated twice, 11% (10) were treated three times, one person was treated for TB four times and another person was treated seven times. About 39% of participants were receiving TB treatment at the time of the interview. The overall percentages of new and retreated cases of TB among migrant workers were similar to the situation with all TB patients in Armenia (Table 25).

Table 25. The percentage of new and relapsed TB cases

Treatment Experiences	Migrant workers with TB % (N=95)	Total TB population 2010 % (N=1780)	P value
New cases	72.6	74.7	0.647
Retreated	27.4	25.3	

Access to TB treatment

All the participants who reported first receiving TB treatment in Armenia reported that treatment was free-of-charge. For those who received TB treatment in the host country of

work, 89% reported it was free-of-charge or cheap. Only one person said it was expensive.
There was no statistically significant difference between these two groups (p=0.102).

About 48% (44/91) of the respondents reported that it was easy to access the healthcare
facilities for getting TB drugs; for 23% (21/91) it was neither easy nor difficult and for 29%
(26/91) it was difficult. Though there was a higher percent (78% versus 47%) of those
treated in the host country of work reporting that it was easy to get to TB facilities to acquire
drugs than it was in Armenia, there was an approximately equal percentage (near 25%)
reporting that it was difficult to access TB facilities to acquire drugs in both Armenia and
host country of work. Overall, there was no statistically significant difference between
Armenia and the host country of work (p=0.14).

First TB treatment experience

Reasons for delay in health seeking

Fifty-six percent (53) of respondents reported first developing the symptoms in the host
country of work and 44% in Armenia. About two-third - 69% (64/93) of respondents
reported that as soon as they felt bad they visited a healthcare facility. About half of those
(59%) who delayed visiting a healthcare facility (17/29 people) explained that they didn't
think they had a serious problem; another 28% stated that they did not suspect it was TB;
others were not sure where to go (14%), were afraid to find out what was wrong (10%) and
were out of the country (10%) (Table 26).

Table 26. Reasons for delaying visiting a healthcare facility when feeling bad

Reasons	%	n (N=29)
Did not think they had a serious problem	58.6	17
Did not suspect it was TB	27.6	8
Was not sure where to go	13.8	4
Did not want to find out that something was really wrong	10.3	3
Were in Russia	10.3	3
Cost	3.4	1
Did not trust medical doctors	3.4	1
Could not leave work	3.4	1
Did not feel bad	3.4	1
Went for military service	3.4	1

The mean date for the first treatment was August 2009 and the median date was April 2010.

Out of 93[iv] respondents, 86% (80) received their first TB treatment (in-patient or out-patient or both) in Armenia, 9% (9) received their first treatment in the host country of work (seven in the Russian Federation, one in Ukraine and one in Turkey) and 4% (4) started their first treatment in the host country of work (the Russian Federation) and continued their treatment in Armenia.

In-patient care

About 91% (85/93 people) reported that they received in-patient hospital care, while 8% (7) did not receive in-patient care and 1% (one) was receiving in-patient care at the time of interview. The mean duration for the first in-patient TB treatment for participants who received TB treatment in Armenia was 78 days (ranging from 40 to 425 days). For those who received their first in-patient treatment in the host country of work, the mean duration was 164 days (ranging from 20 to 912 days).

Out of 72 respondents who received in-patient treatment in Armenia and 4 respondents who received part of their in-patient care in Armenia, 51% (39) received in-patient care in the Republican TB Dispensary in Abovyan city, 33% (25) in Gyumri Hospital and 9% (7) in Yerevan City TB Dispensary and 5% (4) in Vanadzor Hospital; one person did not specify the name of the hospital.

Among those who did not receive in-patient treatment (except one that did not provide an answer) two reported that they received out-patient treatment only, another two reported that they did not want to receive in-patient treatment, one wanted to be treated at home and one did not consider his condition very bad.

Defaults and interruptions: About 98% (83/86) of the participants who received or were receiving TB in-patient care reported that they were taking the TB drugs in the presence of a doctor or a nurse. Five people reported that they did not complete the full course of their first in-patient treatment because three participants returned to Armenia from the country where they started the treatment; one indicated that he/she felt worse and one did not provide an answer.

[iv] Two answers were missing.

About 9% (8/86) interrupted their TB drug intake in the hospital during their first treatment, with the mean duration of interruption equal to seven days (ranging from 1 to 30 days). When asked about the reasons for interrupting TB drug intake in the hospital, three-quarters (6/8) of the participants identified that it was due to side effects of the drugs and one-quarter identified that it was the doctor's decision (one of these participants also reported that it was due to side effects) and one person reported lack of time.

Out-patient care

About 95% of respondents (88/93) reported that they received or were receiving the ambulatory phase of treatment with the mean duration of 140 days (ranging from 1 to 380 days). At the time of the interview 17.0% of the respondents were still receiving the ambulatory treatment. Overall 94% (82/87[v]) of the participants received ambulatory treatment in TB cabinets and 6% (5) in village ambulatory or health posts.

About 92% (81/88) of the participants reported that they were always taking the drugs in the presence of a healthcare provider during the ambulatory phase of treatment, one reported often taking the drugs in the presence of a healthcare provider, one reported sometimes and five reported never taking drugs in the presence of providers. Overall, 34.5% (30/87) of the respondents reported taking drugs daily, 11.5% reported taking drugs six days a week, 44% reported taking drugs every other day, and 10% reported 2-3 times per week.

Excluding those who were going through their first treatment during the interviews (22) and one participant who did not answer the question about receiving complete ambulatory treatment, 91.0% (65/72) of those who received the first ambulatory treatment reported that they completed the full treatment and 10.0% (7/72) did not complete. Those that did not complete the treatment reported that it was due to migrant work (two people), feeling bad (two people) and the need to work (one person); two people did not provide a reason.

During the ambulatory phase of first treatment, 20% (19/93) of the respondents reported treatment interruptions with the mean duration of longest interruption of 7.8 days (ranging from 1 to 60 days). The reasons for interruption included side effects of the drugs (7/19, 37.0%), had to leave for migrant work (2/19, 11.0%), attended a social event (2/19, 11.0%),

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[v] One answer was missing.

forgot to take it (2/19, 11.0%), had to come back to Armenia from the country of migrant work (2/19, 11.0%), feeling well (1/19, 5.0%), by the decision of doctor (1/19, 5.0%), lack of time (1/19, 5.0%), the drug supply was stopped and the patient was told to get treatment in his/her own country (1/19, 5.0%), had to work (1/19, 5.0%), and feeling bad (1/19, 5.0%).

Treatment outcomes associations

For checking the associations between behavioral and medical factors and the number of treatments that the participants had, those who were having their first current treatment during the interview (22) were excluded due to the fact that they did not complete their first treatment and could not have information on treatment outcomes. Three participants with missing answers and two with "did not know" answers for their first treatment outcome were also excluded. About 81% (55/68) reported that they were cured as a result of the first treatment, 12% (8/68) reported not completing the treatment (defaulted) and 7% (5/68) failed the treatment.

Univariate logistic regression analyses did not show any statistically significant associations between the outcome variable of having one treatment vs. re-treatment and any of the following potential risk factors: 1) number of visits to the host country of work, 2) number of people working in the same enclosed area in the host country of work, 3) type of work performed in the host country (construction versus other), 4) crowding index of residence in the host country 5) knowledge/attitude and perceived stigma, 6) age, 7) family member/relatives/friends having TB, 8) number of employed people in the household, 9) monthly income, and 10) marital status.

Univariate logistic regression analyses revealed close to marginally significant ($p \le 0.15$) associations between the outcome variable of having one treatment vs. re-treatment and the following potential risk factors: 1) *crowding index for residence in Armenia* (p=0.02), 2) *frequency of drug intake during the ambulatory phase of first treatment* (six or seven days a week versus less often, p=0.15), 3) *having DR-TB* (as identified by the TB cabinet doctors, p=0.03), and 4) *DOT during the ambulatory phase of first treatment* (sometimes or never versus always or often, p=0.02). These factors were included in a multivariate logistic regression model to control for confounding between these factors.

In the final model the two factors *DOT during the ambulatory phase of first treatment* and *having DR-TB* had marginal statistical significance ($0.05 < p < 0.1$) and thus were retained in the model (Table 27). The *crowding index for residence in Armenia* was retained for adjusting for some small confounding with the other two independent variables. The Odds Ratios from the final model were converted to Relative Risk. [47] The final model showed that those respondents that reported having DOT sometimes or never during the ambulatory phase of their first treatment were 3.6 times more likely to have retreatment than those with DOT always or often. The study demonstrated that lack of DOT impacted both the final treatment outcome of the patient as well as increased the period of infectivity, increasing the likelihood of spreading the disease. The model also showed a 42% increased risk of having retreatment if they were identified by their TB cabinet doctors as having DR-TB (Table 27).

Table 27. Relative risk of migrant workers to have TB re-treatment associated with DOT compliance and having DR-TB

Factors	Odds Ratio (P value)	Relative Risks
Lack of DOT, ambulatory phase	8.33 (0.07)	3.57
Having DR-TB	3.14 (0.09)	1.42
Crowding index in Armenia	1.77 (0.16)	1.24

Those who did not complete the first ambulatory treatment were at 3.1 times greater risk for being identified by their TB doctors as having DR-TB ($p=0.039$).

Table 28. Association between not completing the first ambulatory treatment and having DR-TB

	Completed first ambulatory treatment	Did not completed first ambulatory treatment	P value (Fisher's Exact Test)
DR-TB	12	4	
Regular TB	53	3	0.039
Total	**65**	**7**	

Those who did not complete the first in-patient treatment were not different from those who completed in terms of being identified by their TB doctors as having DR-TB ($p=0.618$) (Table 29). However, the majority of those who did not complete in-patient treatment were outside of Armenia and transferred to continue their in-patient treatment in Armenia. Thus, they were not true defaulters.

Table 29. **Association between not completing the first in-patient treatment and having DR-TB**

	Completed first in-patient treatment	Did not completed first in-patient treatment	P value (Fisher's Exact Test)
DR-TB	22	2	
Regular TB	58	3	0.618
Total	**80**	**5**	

STUDY CHALLENGES AND LIMITATIONS

There was no official database for migrant workers or categorization of TB patients in terms of being a migrant worker. The research team had to implement a phone survey of all TB cabinet doctors to collect information about TB patients that to their knowledge could be migrant workers in the last four years.

This process required additional time, human and financial resources. The collected information for TB patients as being migrant workers was subjective - TB cabinet doctors' opinion, and for at least 56 cases it was not correct. It was possible that those doctors that were not willing to support the project did not identify any migrant worker among their TB patients. As a result, migrant workers with TB from certain TB cabinets were not included in the study. For some TB patients telephone numbers were not available or they were incorrect. Though the research team surveyed all the migrant workers with TB identified by TB cabinet doctors in Armenia (census), the final list of patients might be incomplete due to these limitations.

To respect the confidentiality of participants with TB, TB doctors were asked to make the first contact with the potential participants to get their consent for the research team to contact them. This also delayed the recruitment process. Moreover, some TB doctors informed the research team that all migrant workers with TB from registered in their TB cabinet refused to participate in the study. The research team could not check if this information was true or not.

Given that data collection started in late January and finished in March, due to the delayed identification of study participants and recruitment and because of snow storms and close roads in remote marzes, by the time of the interviews some migrant workers (at least 172) left Armenia for the host country of work and were not available to participate in the study

(migrant workers leave for migrant work in late winter/early spring and return at the end of December).

TB stigma created further challenges for data collection, as many patients hide their health status from other family members, including their spouses, the research team could not share with a family member the purpose of the phone call, which in some cases led to refusals by family member to pass the phone to the potential study participant.

CONCLUSION AND RECOMMENDATIONS

This operational research provided an assessment of TB related knowledge, attitude (including stigma), and practices among migrant workers who have or have had TB in the last four years, their demographic characteristics, and their access and utilization of services in Armenia and in a host country of work.

Summarizing the main finding of this study, the research team came up with the following conclusions:

- The percent of TB-HIV/AIDS co-morbidity among the migrant workers with TB participating in the study was 4.7 times higher than the percent of TB-HIV/AID co-morbidity among all TB patients in Armenia.

- The Russian Federation is the host country of work for the great majority of migrant workers in Armenia.

- One third of the migrant workers with TB participating in the study worked in those regions of the Russian Federation that had the highest rates of TB prevalence.

- Four-fifth of migrant workers believed that they had been infected in the host country of work.

- The mean cumulative score for knowledge on TB transmission, prevention and treatment was 11.6 out of the maximum 26 possible.

- The great majority of the study participants understood the seriousness of TB infection; 95% believed that TB can be cured and 92% believed that TB drugs were effective.

- Thirty six percent of the study participants wanted to hide their disease from their family members and 37% reported that TB infection negatively impacted their marriage.

- The time period between first diagnosis and first treatment was about 5-times shorter for those who were diagnosed in Armenia than those who were diagnosed in the host country of work. This difference represents the time of infectivity and the time for development of more advanced TB.

- Those who received treatment in the host country of work were 3.9 times more likely to have failed or defaulted treatment outcomes than those who received treatment in Armenia.

- Overall, 73% of participants had been treated only once (new cases) and 27% had been re-treated; these percentages among migrant workers with TB were similar to the situation with all TB patients in Armenia.

- Access to drugs and services was relatively easy for most participants in both Armenia and in the host country of work.

- Almost half of the study participants were first diagnosed in the host country of work. Most of the participants who were diagnosed with TB in the host country chose to return to Armenia to start or continue the treatment.

- The leading reasons for delaying treatment when first symptoms appeared included 1) not thinking that they had a serious health problem, 2) not suspecting that they had TB, 3) not knowing where to go for care, 4) being afraid of the diagnosis, and 5) being in Russia.

- About 98% of the participants who received or were receiving in-patient TB care reported that they were taking the TB drugs in the presence of a healthcare provider (DOT).

- Only 9% reported interrupted drug intake during their first in-patient care and three quarters of them reported interrupting the drug intake due to their side effects.

- About 92% of the participants reported that they were always taking the drugs in the presence of a healthcare provider (DOT) during the ambulatory phase of treatment.

- Only 46.0% of the respondents reported taking drugs daily or six days a week; 54% reported taking drugs every other day or 2-3 times per week.

- About 9% of the respondents did not complete their full ambulatory treatment due to migrant work, feeling bad or because of work.

- About 20% of the respondents reported treatment interruptions during their first ambulatory treatment with the mean duration of longest interruption of approximately

8 days. The leading reasons for interruptions included drug side effects, migrant work, and forgetting to take drugs.

- Lack of DOT during the ambulatory phase of the first treatment led to 3.6 times greater risk for retreatment after adjusting for having DR-TB and crowding index in Armenia.
- Those participants who did not complete the first ambulatory phase of treatment were at 3.1 times greater risk for being identified by their doctors as having DR-TB.

The CHSR/AUA research team made the following recommendations based on the literature/document review and the main study findings:

- Establish coordination between Armenia and the Russian Federation TB control systems, including partnership between Armenian and Russian Federation TB specialists for TB patients follow-up.
- As part of the regular national TB surveillance system, collect information about experience of migrant work among newly identified TB cases as a separate risk factor for developing TB, including MDR-TB and TB-HIV/AIDS co-morbidity.
- Organize ongoing information, education and communication campaigns campaigns to increase the knowledge of general public, including migrant workers, about TB and its symptoms to improve their attitude and practices of TB prevention and treatment and reduce stigma and discrimination against people with TB among the general public.
- Provide incentives for migrant TB patients to complete the treatment despite milder drug side effects or the need to leave for migrant work.
- Improve the DOT during the ambulatory phase of treatment to assure daily drug intake for migrant workers with TB to reduce the rates of re-treatment and development of DR-TB, and to reduce the likelihood of spreading the disease.

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APPENDIX 1. Guidelines for Obtaining Information from TB Cabinet Physicians on Migrant Workers with TB

Hello, could I please speak to the _____ tuberculosis (TB) cabinet physician? Could I have five minutes of your time? If not, then when can I call back?

My name is_____, I am a researcher at the American University of Armenia College of Health Sciences and Research. Our centre is implementing a project with the support of the National Tuberculosis Program (NTP), the aim of which is to assess the knowledge, attitude and practices of migrant workers with tuberculosis regarding TB, as well as to understand whether or not these migrant workers receive medical attention abroad, and if yes, then when and how. Moreover, how they are later integrated into the TB control once they return to Armenia. Your marz (omit 'marz' in the case of Yerevan) TB-coordinators have also been informed about this study and have probably already notified you about our cooperation.

We have obtained your contact number from the NTP office and we would really appreciate it if you could assist us with the following issue. We need data on those patients who have ever been diagnosed with TB by your TB-cabinet who have left Armenia as migrant workers over the last 4 years. Let me clarify what we mean by saying migrant worker: those citizens of Armenia, who have left Armenia to work abroad (including in the Russian Federation) for periods of 3 months or longer once or more times during the last four years. We are aware that there is no official data on this issue so could you please provide us with as much information that you personally are aware of.

We specifically need to know the number of patients from the area that your TB cabinet serves who have been **diagnosed with TB and who have left Armenia for migrant work during the last 4 years**. How many of them died because of TB. In addition, please provide us with information concerning suspicious cases; by this we mean cases where you aren't sure, but suspect that the individuals have left for migrant work during the last 4 years.

Could you please provide us with a list, which will include the following details concerning migrant workers with TB (excluding those that have died from TB):

- Final diagnosis and the date of the diagnosis. The type of TB (pulmonary/extra-pulmonary), smear sputum positive or negative, results of drug resistance test – regular or drug resistant TB (new case or recurrence), according to the last available data.
- If treatment has been completed, the outcome of the treatment, such as: successful treatment; treatment completed; treatment failure and incomplete/incomplete treatment). If treatment has not yet been completed, then state that the patient is currently being treated.
- Whether the patient is co-infected with HIV/AIDS or not.
- The status of the migrant work (whether you are sure or suspect that the patient is a migrant worker)

Please state the most convenient day and time when we can call you again and receive the information. The data you provide will only be used for the current study and will be treated as strictly confidential. Finally, I would like to know from which year's list of TB patients this data was extracted.

Thank you very much for your support.

APPENDIX 2. Information Form for TB Cabinets about Migrant Workers with TB

TB cabinet (marz, city/village) _____

The total number of citizens from the entire population in the area served by your TB cabinet, who have ever been diagnosed with TB and who have left the country as migrant workers during the last 4 years _____; of which, the number of those that have died of TB_____.

(Those citizens of Armenia, who have left Armenia to work abroad (including in the Russian Federation) for periods of 3 months or longer once or more times during the last four years are considered migrant workers)

Please provide us with the following information on migrant workers with TB - excluding those that have died from TB.

#	Diagnosis (if the patient has/has had pulmonary TB, is bacillus extracting or drugresistant*, place a (+))	Date of TB diagnosis	Treatment outcome**	TB/HIV/AIDS co-infection ((+) if infected, or (–) if not)	Migrant Status: If certain that patient has left for migrant work (+), otherwise (?)
	PTB BK MDR o new o retreated		o On treatment o Success o Treatment completed o Unsuccessful o Incomplete		
	PTB SS MDR o new o retreated		o On treatment o Success o Treatment completed o Unsuccessful o Incomplete		
	PTB SS DR o new o retreated		o On treatment o Success o Treatment completed o Unsuccessful o Incomplete		
	PTB SS		o On treatment o Success		

MDR o new o retreated		o Treatment completed o Unsuccessful o Interrupted		
PTB SS MDR o new o retreated		o On treatment o Success o Treatment completed o Unsuccessful o Incomplete		
PTB SS MDR o new o retreated		o On treatment o Success o Treatment completed o Unsuccessful o Incomplete		

*Multidrug-resistant new case – Patient whose TB treatment (if it has been given) has not exceeded 1 month.
Multidrug-resistant acquired – Multidrug-resistance is usually acquired during treatment, due to incorrect prescription or incorrect maintenance of the treatment scheme.

** Successfully treated – Smear positive patient (new case or recurring), whose smear has become negative during the last 2 months of treatment (5th and 6th or 5th and 8th months).
Treatment completed – Smear positive patient (new case or recurring), whose sputum test has only one negative result at the end of treatment; Smear negative patient (new case or recurring), whose sputum has remained negative at the end of the intensive phase of treatment.
Unsuccessful treatment – New case or recurring patient, who remains or becomes smear positive at the 5th month of treatment or later.
Incomplete – Patient, whose treatment has been interrupted for 2 months or longer.
Please state from which year's list of patients this data was extracted_____

Thank you very much for the support.

APPENDIX 3. Survey Instrument for TB Migrant Workers with TB

1. Interviewer's first name, last name _____
2. Date (dd/mm/yy) ___/___/___
3. Interview start time ___:___
4. Respondent ID __ __ __
5. Marz (if the respondent is from Yerevan, mark it here only)_____
6. City/Village_____
7. During the last 4 years, from 2008-2011, how many times did you travel out of Armenia for migrant work for a period of three months or longer? _____

(Ask questions 8-15 for each case of migrant work during the last four years starting from the last case up to the first/initial case)

8. To which country did you go for work the last time during 2008-2011? *For Russia also the region or the oblast or the city.*	9. At that time, during which months were you absent from Armenia due to migrant work? *Remember that case should be considered not earlier than the 2008 year.*	10. At that time, did your family members travel with you?	11. What kind of work were you performing?	12. How many people were you usually working with during a day in the same room or in a closed area (*consider transport as a closed area*) *Put NA for those working outdoors*	13. How many people including you lived in your house in your country of work? (**Include yourself**)	14. How many were children under the age of 18?	15. How many rooms did the place where you lived have in your country of work? **Count all the rooms including kitchen**
	FROM MONTH, YEAR _____ TO MONTH, YEAR _____	**1**. YES **a**. The whole family **b**. Some members, specify _____	**1**.Construction **2**.Production **3**.Commerce **4**.Mining **5**.Driving/Transportation **6**.Other _____ _____	_____ **88**. Don't know	_____	_____	_____

Prior to the case we just discussed, during 2008-2011 to which country did you go for work? *For Russia also the region or the oblast or the city.*	At that time, during which months were you absent from Armenia due to migrant work? *Remember that case should be considered not earlier than the 2008 year.*	At that time, did your family members travel with you?	What kind of work were you performing?	How many people were you usually working with during a day in the same room or in a closed area (*consider transport as a closed area*) *Put NA for those working outdoors*	How many people including you lived in your house in your country of work? **(Include yourself)**	How many were children under the age of 18?	How many rooms did the place where you lived have in your country of work? **Count all the rooms including kitchen**
				2. NO			
	FROM MONTH, YEAR _____ TO MONTH, YEAR _____	**1**. YES **a**. The whole family **b.** Some members, specify _____ _____ **2**. NO	**1**.Construction **2**.Production **3**.Commerce **4**.Mining **5**.Driving/Transpo rtation **6**.Other _____ _____	_____ **88**. Don't know	_____	_____	_____

Prior to the case we just discussed, during 2008-2011 to which country did you go for work? *For Russia also the region or the oblast or the city.*	At that time, during which months were you absent from Armenia due to migrant work? *Remember that case should be considered not earlier than the 2008 year.*	At that time, did your family members travel with you?	What kind of work were you performing?	How many people were you usually working with during a day in the same room or in a closed area (*consider transport as a closed area*) *Put NA for those working outdoors*	How many people including you lived in your house in your country of work? **(Include yourself)**	How many were children under the age of 18?	How many rooms did the place where you lived have in your country of work? **Count all the rooms including kitchen**
	FROM MONTH, YEAR _____ TO MONTH, YEAR _____	1. YES **a**. The whole family **b.** Some members, specify _____ 2. NO	**1**.Construction **2**.Production **3**.Commerce **4**.Mining **5**.Driving/Transportation **6**.Other _____	_____ **88**. Don't know	_____	_____	_____
	FROM MONTH, YEAR _____ TO MONTH, YEAR _____	1. YES **a**. The whole family **b.** Some members, specify _____ 2. NO	**1**.Construction **2**.Production **3**.Commerce **4**.Mining **5**.Driving/Transportation **6**.Other _____	_____ **88**. Don't know	_____	_____	_____

TB awareness and knowledge

Instructions: Read for the respondent

The following questions will relate to TB disease in general.

16.	From which sources did you learn about tuberculosis? Select the best three sources. *Please, do not read. Mark all that are mentioned*	**1.** Printed materials (newspapers, magazines, brochures) **2.** Radio, TV **3.** Internet **4.** Posters, billboards **5.** Health workers **6.** Family members, friends, neighbors and colleagues **7.** Teachers **8.** Other TB patients **9.** Other _____
17.	Would you like to receive more information about TB?	1.Yes 2.No → *Go to Q19* 88. Difficult to answer
18.	In your opinion, which are the three best sources to receive information on TB? *Do not read. Mark the three most important sources*	**1.** Printed materials (newspapers, magazines, brochures) **2.** Radio, TV **3.** Internet **4.** Posters, billboards **5.** Health workers **6.** Family members, friends, neighbors and colleagues **7.** Teachers **8.** Other TB patients **9.** Other _____
19.	Do you think that TB is a hereditary disease?	**1.**Yes **2.**No **88**.Do not know/Difficult to answer
20.	How can a person get infected with TB? *Do not read. Mark all options given.*	**1.** By being in contact with TB patients **2.** By greeting a TB patient with a handshake **3.** Through the air when a person with TB coughs or sneezes **4.** By sharing the same platter **5.** By sharing the same sanitary utensils **6.** By touching various objects in public places (doorknobs, handles in transport, etc.) **7.** Other _____ **88**. Do not know/ Difficult to answer
21.	What are the signs of TB? *Do not read. Mark all options given.*	**1.** Rash **2.** Cough **3.** Cough that lasts longer than 3 weeks **4.** Coughing up blood **5.** Severe headache **6.** Nausea **7.** Weight loss **8.** Fever **9.** Chest pain

		10. Difficulty breathing/ shortness of breath **11.** Fatigue **12.** Sweating **13.** Other: _____ **88**. Do not know /Difficult to answer
22.	In which cases are the chances of developing TB higher? *Read. Mark all options given.*	1. Having diabetes 2. Smoking 3. Using too much alcohol 4. In overcrowded areas 5. In case of poverty and malnutrition 6. Having HIV/AIDS 7. Traveling abroad for migrant work 8. Being in contact with a TB patient 9. In prisons 10. Other _____ 11. All **88**. Do not know/ Difficult to answer
23.	How can a person with TB prevent the spread of disease? *Do not read. Mark all options given.*	**1.** Avoid shaking hands **2.** By covering mouth and nose when coughing or sneezing **3.** Separate platters and sanitary utensils **4.** By washing hands frequently **5.** By ventilating the room **6.** By wearing masks **7.** Avoid contact with people **8.** Other (please explain): _____ **88.** Do not know/ Difficult to answer
24.	What kinds of TB do you know of?	_____ **88.** Didn't ever hear about
25.	What is the best method of TB treatment? Please select one best method. *Read, mark one option.*	**1.** Home remedies, eg. Herbal medication, good nutrition **2.** Resting at home, without using any medication **3.** Treatment with medication purchased from pharmacies **4.** Taking drugs that are prescribed by the doctor every day, in the presence of the doctor or nurse **5.** Stop taking drugs as soon as the patient feels better **6.** Other _____

TB attitude in Armenia
Instructions: Read for the respondent:

Now I will read some statements. Please tell me to what extent you agree with them by answering agree, neither agree nor disagree, and disagree.

		Agree	Neither agree nor disagree	Disagree	Don't know
26.	TB is a serious disease	3	2	1	88
27.	TB is a serious problem in Armenia	3	2	1	88

28.	TB is a serious problem in your country of work	3	2	1	88
29.	TB is a curable disease	3	2	1	88
30.	TB drugs are effective for the treatment of this disease	3	2	1	88

31.	What portion of people with TB wants to hide from their family members that they have TB?	**1.** All **2.** Majority **3.** Some **4.** Nobody **88**. Don't know /Difficult to answer
32.	What portion of people with TB wants to hide from their friends that they have TB?	**1.** All **2.** Majority **3.** Some **4.** Nobody **88**. Don't know/ Difficult to answer
33.	What portion of people with TB wants to hide from their community/neighbors that they have TB?	**1.** All **2.** Majority **3.** Some **4.** Nobody **88**. Don't know/ Difficult to answer
34.	In what portion of people with TB does this disease affect their relationship with friends and relatives?	**1.** All **2.** Majority **3.** Some **4.** Nobody **88**. Don't know/ Difficult to answer
35.	In what portion of people with tuberculosis, does this disease affect their working relations?	**1.** All **2.** Majority **3.** Some **4.** Nobody **88**. Don't know/ Difficult to answer
36.	In what portion of people with TB does this disease affect their marital relations?	**1.** All **2.** Majority **3.** Some **4.** Nobody **88**. Don't know/ Difficult to answer
37.	In your opinion, how do those in your circle of acquaintances usually treat TB patients? *Read, mark one option.*	1. Generally bad 2. Generally good, but try to stay away 3. Generally good 88. Don't know/ Difficult to answer

TB infection and diagnosis in Armenia and obroad

38.	Do you know **who** you were infected from?	**1.** Yes → Specify
		   a. Family member
		   b. Friend/relative
		   c. Colleague

		d. Neighbor/circle of acquaintances e. Other (specify) _____ 2. No
39.	Do you know **where** you were infected?	1. Yes → Where? a. In Armenia b. In the country of work →country_____ c. Other: _____ 2. No
40.	Do you know **when** you were infected?	1. Yes → When? _____(month/year) 2. No
41.	When did you first notice disease symptoms? (Such as: cough, fever, fatigue).	1. _____ (month/year) 2. Do not know
42.	Do you know **when** were you first diagnosed with TB?	1. Yes → Specify _____(month/year) 2. No
43.	Do you know **where** were you first diagnosed with TB?	1. Yes → Where? a. In Armenia b. In the country of work → country_____ c. Other: _____ 2. No
44.	To your knowledge, how many family members, relatives and close friends of yours have/had TB?	_____*(write 0 if nobody)*
45.	How many times did you receive TB treatment?	_____*(If more than 0, → Go to Q47)*
46.	What was the reason for not receiving TB treatment? *Do not read. Mark all options given.* **Go to Q135**	1. I was not sure where to go 2. Financial expenses 3. Difficulties with transportation/the hospital was too far 4. I did not trust medical workers 5. I did not like the attitude of the medical workers 6. I could not leave work 7. I had no time 8. I was waiting to come to Armenia and then start treatment 9. I was waiting to go and receive treatment in the country where I was working 10. Wanted to hide that I have TB 11. Long duration of the treatment 12. Side effects of the drugs 13. There was no treatment available for my case of TB 14. Other _____
47.	Are you currently receiving treatment?	1. Yes 2. No

First treatment experience

Instructions: please, read for the respondent. Now I will ask you some questions which will be related to your first treatment experience.

48.	Did you visit a healthcare facility immediately when you started feeling bad the first time?	1. Yes → *Go to Q 50* 2. No 3. I didn't suspect I had TB (I visited the physician for another reason and was diagnosed with TB)→*Go to Q50* 4. Other _____
49.	What was the reason for not visiting a physician when you started feeling bad the first time? *Do not read. Mark all options given.*	1. I was not sure where to go 2. Financial expenses 3. Difficulties with transportation/the hospital was too far 4. I did not trust medical workers 5. I did not like the attitude of the medical workers 6. I could not leave work 7. I had no time 8. I did not want to know if there was a serious problem 9. I did not think is was a serious problem 10. Other _____
50.	**When** did you receive your first treatment?	_____ (month/year)
51.	**Where** did you receive your first treatment? *Read, mark one answer*	1. In Armenia 2. In the country of work→ Specify_____ 3. Other _____
52.	Did you receive in-patient care?	1. Yes → How long _____(*identify months or days*) 2. I am still in hospital 3. No →Why _____→ *Go to Q59*
53.	In what hospital did you receive your in-patient care?	_____
54.	Did you take your drugs in the hospital **in the presence** of a doctor or nurse?	1. Yes 2. No
55.	Did you finish your entire hospital TB treatment course?	1. Yes 2. No → Why? _____
56.	How long did the hospital TB treatment course last?	_____(*identify months or days*)
57.	Were there days during your in-patient treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → For how many days? _____ 2. No→ *Go to Q59*
58.	What was the reason for not taking your drugs?	1. I felt well 2. I had forgotten 3. It was the doctor's decision

		4. I did not trust the treatment
	Do not read. Mark all options given.	5. I did not like the attitude of the medical workers
		6. I was going to for migrant work
		7. I was going to return to Armenia
		8. I had no time
		9. Long duration of the treatment
		10. Side effects of the drugs
		11. Treatment-related expenses
		12. Other _____
59.	Did you receive ambulatory TB treatment? Did you receive drugs from your TB cabinet or local health post?	1. Yes → How long? _____(*identify months or days*) 2. No → ***Go to Q65***
60.	Where did you receive your ambulatory care/your drugs? *Read, mark one option*	1. At the TB cabinet 2. At the village ambulatory/health post 3. At a Private doctor 4. Other _____
61.	Did you take your drugs in the presence of a doctor or nurse? *Read, mark one option*	1. Always 2. Often 3. Sometimes 4. Never
62.	How often did you take your drugs? *Read, mark one option*	1. Daily 2. Every other day 3. 2-3 times per week 4. Other _____
63.	Did you receive your entire TB ambulatory treatment course?	1. Yes 2. No → Why?_____
64.	Were there days during your ambulatory care treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → How long _____days 2. No → ***Go to Q66***
65.	What was the reason for not taking your drugs? *Do not read. Mark all options given.*	1. I felt well 2. I had forgotten 3. It was the doctor's decision 4. I did not trust the treatment 5. I did not like the attitude of the medical workers 6. I was going to for migrant work 7. I was going to return to Armenia 8. I had no time 9. Long duration of the treatment 10. Side effects of the drugs 11. Treatment-related expenses 12. Other _____
66.	What was your treatment outcome? *Read, mark one option.*	1. I was cured (*success*) 2. I wasn't cured (*failed treatment*) 3. I interrupted my treatment (*interrupted treatment*) 4. I am still receiving treatment 88. Don't know/ Difficult to answer

67.	How easy was it usually for you to access the hospital/ polyclinic/ health post to receive TB drugs? *Read, mark one option.*	1. Easy 2. Neither easy nor difficult 3. Difficult 88. Don't know/ Difficult to answer
68.	How expensive was TB diagnosis and treatment? *Read, mark one option.*	1. It was free of charge 2. It was reasonably priced/cheap 3. It was expensive

Instructions: *Look at the response of* **Q 45**. *If the interviewee has received more than one treatment, continue questioning. If he/she has received one treatment only →* **go to Q 135**.

Second treatment experience

Instructions: please, read for the respondent. Now I will ask you some questions which will be related to your second treatment experience.

69.	Did you visit a healthcare facility immediately when you started feeling bad the second time?	1. Yes → *Go to Q 71* 2. No 3. I didn't suspect I had TB (I visited the physician for another reason and was diagnosed with TB)→*Go to Q71* 4. Other _____
70.	What was the reason for not visiting a physician when you started feeling bad the second time? *Do not read. Mark all options given.*	1. I was not sure where to go 2. Financial expenses 3. Difficulties with transportation/the hospital was too far 4. I did not trust medical workers 5. I did not like the attitude of the medical workers 6. I could not leave work 7. I had no time 8. I did not want to know if there was a serious problem 9. I did not think is was a serious problem 10. Other _____
71.	**When** did you receive your second treatment?	_____ (month/year)
72.	**Where** did you receive your second treatment? *Read, mark one answer*	1. In Armenia 2. In the country of work→ Specify_____ 3. Other _____
73.	Did you receive in-patient care?	1. Yes → How long _____(*identify months or days*) 2. I am still in hospital 3. No →Why _____→ *Go to Q80*
74.	In what hospital did you receive your in-patient care?	_____
75.	Did you take your drugs in the hospital **in the presence** of a doctor or nurse?	1. Yes 2. No
76.	Did you finish your entire hospital TB treatment course?	1. Yes 2. No → Why? _____

77.	How long did the hospital TB treatment course last?	_____(*identify months or days*)
78.	Were there days during your in-patient treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → for how many days? _____ 2. No→ ***Go to Q80***
79.	What was the reason for not taking your drugs? *Do not read. Mark all options given.*	1. I felt well 2. I had forgotten 3. It was the doctor's decision 4. I did not trust the treatment 5. I did not like the attitude of the medical workers 6. I was going to for migrant work 7. I was going to return to Armenia 8. I had no time 9. Long duration of the treatment 10. Side effects of the drugs 11. Treatment-related expenses 12. Other _____
80.	Did you receive ambulatory TB treatment? Did you receive drugs from your TB cabinet or local health post?	1. Yes → How long? _____(*identify months or days*) 2. No → ***Go to Q86***
81.	Where did you receive your ambulatory care/your drugs? *Read, mark one option*	1. At the TB cabinet 2. At the village ambulatory/health post 3. At a Private doctor 4. Other _____
82.	Did you take your drugs in the presence of a doctor or nurse? *Read, mark one option*	1. Always 2. Often 3. Sometimes 4. Never
83.	How often did you take your drugs? *Read, mark one option*	1. Daily 2. Every other day 3. 2-3 times per week 4. Other _____
84.	Did you receive your entire TB ambulatory treatment course?	1. Yes 2. No → Why?_____
85.	Were there days during your ambulatory care treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → How long _____days 2. No → ***Go to Q87***
86.	What was the reason for not taking your drugs? *Do not read. Mark all options given.*	1. I felt well 2. I had forgotten 3. It was the doctor's decision 4. I did not trust the treatment 5. I did not like the attitude of the medical workers 6. I was going to for migrant work 7. I was going to return to Armenia 8. I had no time 9. Long duration of the treatment

		10. Side effects of the drugs 11. Treatment-related expenses 12. Other _____
87.	What was your treatment outcome? *Read, mark one option.*	1. I was cured (*success*) 2. I wasn't cured (*failed treatment*) 3. I interrupted my treatment (*interrupted treatment*) 4. I am still receiving treatment 88. Don't know/ Difficult to answer
88.	How easy was it usually for you to access the hospital/ polyclinic/ health post to receive TB drugs? *Read, mark one option.*	1. Easy 2. Neither easy nor difficult 3. Difficult 88. Don't know/ Difficult to answer
89.	How expensive was TB diagnosis and treatment? *Read, mark one option.*	1. It was free of charge 2. It was reasonably priced/cheap 3. It was expensive
90.	Is your TB specialist aware that you have received TB treatment in the past?	1. Yes 2. No 88. Do not know / Difficult to answer

Instructions*: Look at the response of **Q 45**. If the interviewee has received more than two treatments, continue questioning. If he/she has received two treatments only → **go to Q 135**.*

Third treatment experience
Instructions: please, read for the respondent. Now I will ask you some questions which will be related to your third treatment experience.

91.	Did you visit a healthcare facility immediately when you started feeling bad the third time?	1. Yes → ***Go to Q 93*** 2. No 3. I didn't suspect I had TB (I visited the physician for another reason and was diagnosed with TB)→***Go to Q93*** 4. Other _____
92.	What was the reason for not visiting a physician when you started feeling bad the third time? *Do not read. Mark all options given.*	1. I was not sure where to go 2. Financial expenses 3. Difficulties with transportation/the hospital was too far 4. I did not trust medical workers 5. I did not like the attitude of the medical workers 6. I could not leave work 7. I had no time 8. I did not want to know if there was a serious problem 9. I did not think is was a serious problem 10. Other _____
93.	**When** did you receive your third treatment?	_____ (month/year)

94.	**Where** did you receive your third treatment? *Read, mark one answer*	1. In Armenia 2. In the country of work→ Specify_____ 3. Other _____
95.	Did you receive in-patient care?	1. Yes → How long _____(*identify months or days*) 2. I am still in hospital 3. No →Why _____→ ***Go to Q102***
96.	In what hospital did you receive your in-patient care?	_____
97.	Did you take your drugs in the hospital **in the presence** of a doctor or nurse?	1. Yes 2. No
98.	Did you finish your entire hospital TB treatment course?	1. Yes 2. No → Why? _____
99.	How long did the hospital TB treatment course last?	_____(*identify months or days*)
100.	Were there days during your in-patient treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → for how many days? _____ 2. No→ ***Go to Q102***
101.	What was the reason for not taking your drugs? *Do not read. Mark all options given.*	1. I felt well 2. I had forgotten 3. It was the doctor's decision 4. I did not trust the treatment 5. I did not like the attitude of the medical workers 6. I was going to for migrant work 7. I was going to return to Armenia 8. I had no time 9. Long duration of the treatment 10. Side effects of the drugs 11. Treatment-related expenses 12. Other _____
102.	Did you receive ambulatory TB treatment? Did you receive drugs from your TB cabinet or local health post?	1. Yes → How long? _____(*identify months or days*) 2. No → ***Go to Q108***
103.	Where did you receive your ambulatory care/your drugs? *Read, mark one option*	1. At the TB cabinet 2. At the village ambulatory/health post 3. At a Private doctor 4. Other _____

104.	Did you take your drugs in the presence of a doctor or nurse? *Read, mark one option*	1. Always 2. Often 3. Sometimes 4. Never
105.	How often did you take your drugs? *Read, mark one option*	1. Daily 2. Every other day 3. 2-3 times per week 4. Other _____
106.	Did you receive your entire TB ambulatory treatment course?	1. Yes 2. No → Why?_____
107.	Were there days during your ambulatory care treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → How long _____days 2. No → *Go to Q109*
108.	What was the reason for not taking your drugs? *Do not read. Mark all options given.*	1. I felt well 2. I had forgotten 3. It was the doctor's decision 4. I did not trust the treatment 5. I did not like the attitude of the medical workers 6. I was going to for migrant work 7. I was going to return to Armenia 8. I had no time 9. Long duration of the treatment 10. Side effects of the drugs 11. Treatment-related expenses 12. Other _____
109.	What was your treatment outcome? *Read, mark one option.*	1. I was cured (*success*) 2. I wasn't cured (*failed treatment*) 3. I interrupted my treatment (*interrupted treatment*) 4. I am still receiving treatment 88. Don't know/ Difficult to answer
110.	How easy was it usually for you to access the hospital/ polyclinic/ health post to receive TB drugs? *Read, mark one option.*	1. Easy 2. Neither easy nor difficult 3. Difficult 88. Don't know/ Difficult to answer
111.	How expensive was TB diagnosis and treatment? *Read, mark one option.*	1. It was free of charge 2. It was reasonably priced/cheap 3. It was expensive
112.	Is your TB specialist aware that you have already received TB treatment in the past?	1. Yes 2. No 88. Do not know / Difficult to answer

Instructions: Look at the response of Q 45. If the interviewee has received more than three treatments, continue questioning. If he/she has received three treatments only → go to Q 135

Fourth treatment experience

Instructions: please, read for the respondent. Now I will ask you some questions which will be related to your fourth treatment experience.

113.	Did you visit a healthcare facility immediately when you started feeling bad the fourth time?	1. Yes → *Go to Q 115* 2. No 3. I didn't suspect I had TB (I visited the physician for another reason and was diagnosed with TB)→*Go to Q115* 4. Other _____
114.	What was the reason for not visiting a physician when you started feeling bad the fourth time? *Do not read. Mark all options given.*	1. I was not sure where to go 2. Financial expenses 3. Difficulties with transportation/the hospital was too far 4. I did not trust medical workers 5. I did not like the attitude of the medical workers 6. I could not leave work 7. I had no time 8. I did not want to know if there was a serious problem 9. I did not think is was a serious problem 10. Other _____
115.	**When** did you receive your fourth treatment?	_____ (month/year)
116.	**Where** did you receive your fourth treatment? *Read, mark one answer*	1. In Armenia 2. In the country of work→ Specify_____ 3. Other _____
117.	Did you receive in-patient care?	1. Yes → How long _____(*identify months or days*) 2. I am still in hospital 3. No →Why _____→ *Go to Q124*
118.	In what hospital did you receive your in-patient care?	_____
119.	Did you take your drugs in the hospital **in the presence** of a doctor or nurse?	1. Yes 2. No
120.	Did you finish your entire hospital TB treatment course?	1. Yes 2. No → Why? _____
121.	How long did the hospital TB treatment course last?	_____(*identify months or days*)
122.	Were there days during your in-patient treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → for how many days? _____ 2. No→ *Go to Q124*

123.	What was the reason for not taking your drugs? *Do not read. Mark all options given.*	1. I felt well 2. I had forgotten 3. It was the doctor's decision 4. I did not trust the treatment 5. I did not like the attitude of the medical workers 6. I was going to for migrant work 7. I was going to return to Armenia 8. I had no time 9. Long duration of the treatment 10. Side effects of the drugs 11. Treatment-related expenses 12. Other _____
124.	Did you receive ambulatory TB treatment? Did you receive drugs from your TB cabinet or local health post?	1. Yes → How long? _____(*identify months or days*) 2. No → **Go to Q130**
125.	Where did you receive your ambulatory care/your drugs? *Read, mark one option*	1. At the TB cabinet 2. At the village ambulatory/health post 3. At a Private doctor 4. Other _____
126.	Did you take your drugs in the presence of a doctor or nurse? *Read, mark one option*	1. Always 2. Often 3. Sometimes 4. Never
127.	How often did you take your drugs? *Read, mark one option*	1. Daily 2. Every other day 3. 2-3 times per week 4. Other _____
128.	Did you receive your entire TB ambulatory treatment course?	1. Yes 2. No → Why?_____
129.	Were there days during your ambulatory care treatment, when you did not take your medication? Please, specify the longest break.	1. Yes → How long _____days 2. No → **Go to Q131**
130.	What was the reason for not taking your drugs? *Do not read. Mark all options given.*	1. I felt well 2. I had forgotten 3. It was the doctor's decision 4. I did not trust the treatment 5. I did not like the attitude of the medical workers 6. I was going to for migrant work 7. I was going to return to Armenia 8. I had no time 9. Long duration of the treatment 10. Side effects of the drugs 11. Treatment-related expenses 12. Other _____
131.	What was your treatment outcome?	1. I was cured (*success*)

		2. I wasn't cured (*failed treatment*)
		3. I interrupted my treatment (*interrupted treatment*)
		4. I am still receiving treatment
		88. Don't know/ Difficult to answer
132.	How easy was it usually for you to access the hospital/ polyclinic/ health post to receive TB drugs? *Read, mark one option.*	1. Easy 2. Neither easy nor difficult 3. Difficult 88. Don't know/ Difficult to answer
133.	How expensive was TB diagnosis and treatment? *Read, mark one option.*	1. It was free of charge 2. It was reasonably priced/cheap 3. It was expensive
134.	Is your TB specialist aware that you have received TB treatment in the past?	1. Yes 2. No 88. Do not know / Difficult to answer

Demographic data

135.	Gender of the respondent *Do not read*	1. Male 2. Female
136.	Birth year	_____
137.	What is your marital status? *Read, mark one*	1. Married 2. Separated/Divorced 3. Widowed 4. Single
138.	How many people live in your household in Armenia (including you)?	_____
139.	How many children under the age of 18 live in your household?	_____
140.	How many rooms do you have in your house/apartment (including the kitchen)?	_____
141.	Indicate your level of education. *Read, mark one*	1. School (less than 10 years) 2. School (10 years) 3. Professional technical education (10-13 years) 4. Institute/University
142.	Is your family registered in a family poverty benefit PAROS, or other social support program?	1. Yes 2. No
143.	How many members of your household including yourself are currently employed, include self-employment, also those who are in farming, and seasonal/migrant	_____

	work?	
144.	How would you rate your family's general standard of living? *Read, mark one*	1. Substantially below average 2. Little below average 3. Average 4. Little above average 5. Substantially above average
145.	In average, how much money does your family spend monthly? *Read, mark one*	1. Less than 50,000 AMD 2. From 50,000 to 100,000 AMD 3. From 100,100 to 200,000 AMD 4. From 200,100 to 300,000 AMD 5. Above 300,100 AMD 88. Don't know/ I refuse to respond

Thank you!   Interview end time ___:_____:___

*Instructions: read and give the telephone numbers to the interviewee in case they have some questions.**Thank the participant and give them a mobile phone charge card (equivalent to 2,000 AMD) as an incentive.***

APPENDIX 4. Journal Form

Name, surname of interviewer _____

Respondent's ID _____

Date _____

*At the end of each attempt/completed interview choose the **result code** from the list below and fill in the table.*

	Result code
Attempt 1	**1**. Completed interview **2**. No such case (wrong name, wrong telephone) **3**. The TB patient has not been a migrant worker during the last 4 years **4**. The TB migrant has worked abroad for a period of less than 3 months **5**. The TB migrant is younger than 18 **6**. The TB migrant did not come to the place of interview * **7**. Refusal **8**. The TB migrant is currently not in Armenia **9**. Postponed interview* **10**. Incomplete interview* **11**. TB patient has died **12**. Other *(specify)*_____
Attempt 2	**1**. Completed interview **2**. No such case (wrong name, wrong telephone) **3**. The TB patient has not been a migrant worker during the last 4 years **4**. The TB migrant has worked abroad for a period of less than 3 months **5**. The TB migrant is younger than 18 **6**. The TB migrant did not come to the place of interview **7**. Refusal **8**. The TB migrant is currently not in Armenia **9**. Postponed interview **10**. Incomplete interview **11**. TB patient has died **12**. Other *(specify)*_____

* *These result codes could require second attempt.*

APPENDIX 5. Screening Form for Selection of Migrant Worker with TB

Name, surname of interviewer _____

Respondent's ID _____

Date _____

1. Have you worked abroad during the last 4 years (2008-2011)?
   a. Yes
   b. No   →   *(Discontinue interview)*

2. What is the longest period of time in months that you have been absent from Armenia due to working abroad?
   _____ *(Discontinue interview if the respondent has been absent for less than 3 months)*

3. How old are you?
   _____ *(Discontinue interview if respondent is younger than 15)*

APPENDIX 6. Participant Recruitment Informed Consent Form

Hello. Am I speaking to Aram? My name is ……. *If yes, continue reading. If no,* can I speak to Aram? *In case of questions respond that you are from Yerevan, this is a social survey, and you need to speak to Aram personally, since he has been selected as a participant. Find out when and how you can contact Aram.*

I am a researcher at the Health Center of the American University of Armenia. We have obtained your name/surname and telephone number from the Ministry of Health (MOH). Our centre, together with the MOH, is implementing a survey, the aim of which is to assess the knowledge, attitude and practices of migrant workers that have ever been diagnosed with Tuberculosis (TB), regarding TB as well as to understand whether or not these migrant workers receive medical attention abroad, and how their treatments continue once they return to Armenia; your TB cabinet doctor has also been notified about this survey.

We would like to know what you think about TB and what treatment experience you have had. We would like to meet you personally at a convenient time and place for further questions. Your participation in this study is voluntary. The decision to participate or refusal to do so will have no consequences on you. During the interview you may refuse to answer any question or stop the interview at any time.

The interview will last approximately 30-40 minutes. Your name and address will not be recorded in the questionnaire. All information provided by you and the other participants will remain confidential. Only the summary of the data from all interviews will be presented in the final report.

If you agree to participate, as an incentive, you will be provided with a mobile phone top-up card of 2000 AMD at the end of the interview.

Do you agree to participate? If yes, then when and where can we meet (TB cabinet, village health post or some other convenient place.

Ok, we shall meet at the appointed date and time.

APPENDIX 7. Figures

Figure 1. Proportions of working visits of the study participants in 2008-2011to the eight Federal Districts of the Russian Federation
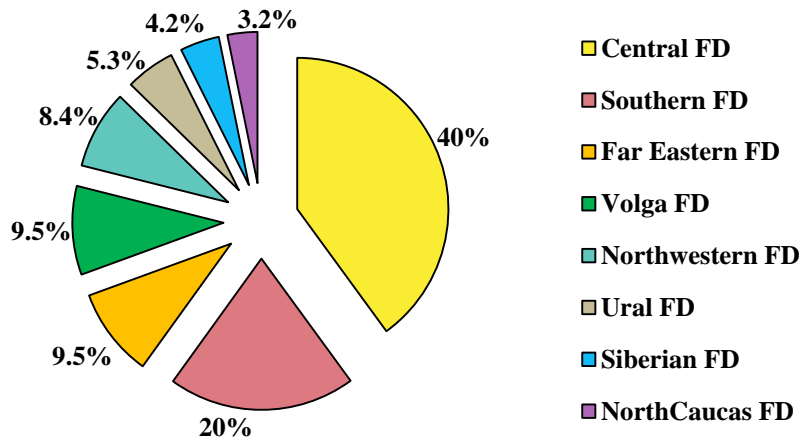

Legend:
- Central FD
- Southern FD
- Far Eastern FD
- Volga FD
- Northwestern FD
- Ural FD
- Siberian FD
- NorthCaucas FD

Figure 2. Destinations of Migrant Workers who have had TB from Armenia to the Russian Federation

Figure 3. Length of stay outside of Armenia for migrant workers who have had TB in months in regular and Log10 scales
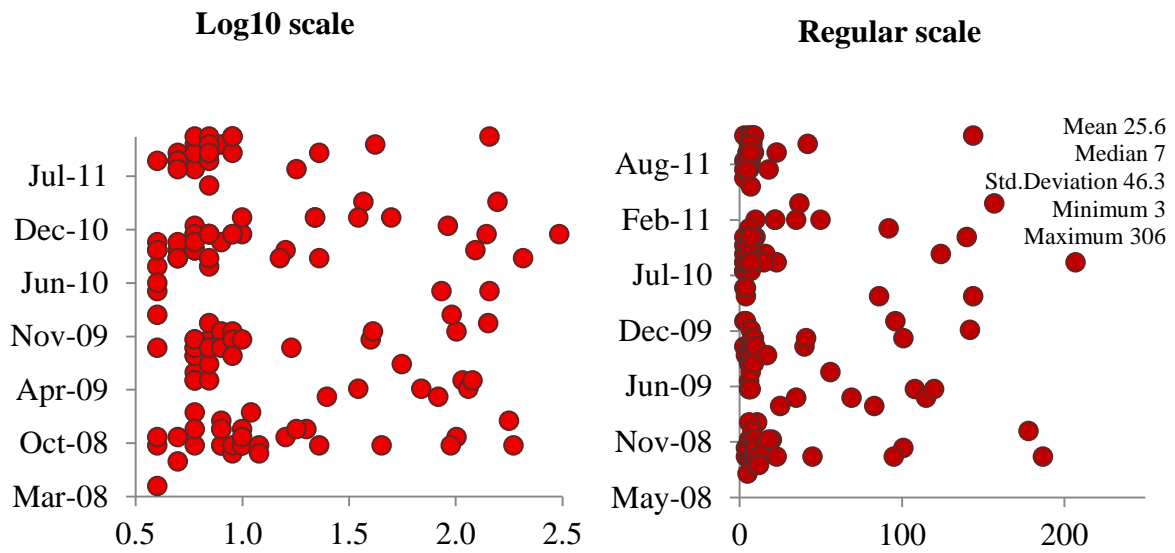

Log10 scale

Regular scale

Mean 25.6
Median 7
Std.Deviation 46.3
Minimum 3
Maximum 306

Figure 4. Sources of TB information for the study participants

- Printed materials
- Radio_TV
- Internet
- Health workers
- Family, friends, neighbors
- Other TB patients
- Red Cross social worker

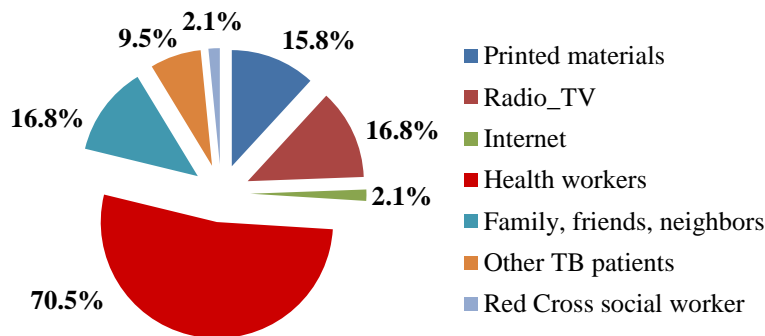15.8% 16.8% 2.1% 70.5% 16.8% 9.5% 2.1%

Figure 5. Knowledge of migrant workers who have had TB, about the source of their infection

Immediate family — 14%
Friend or other relative — 36%
Work colleague — 50%

17%
83%

- Did not know from whom they were infected
- Knew from whom they were infected