

## 7. Calculation of Dose of Anti-TB Drugs

## Calculation of Dose of Anti-TB Drugs

### 1. Population and Number of Patient

At the time of request, the size of population for 9 provinces and 2 autonomous regions is 419,493,992. Since this Project starts from 2002 that uses the anti-TB drugs supplied by the Japan's Grant Aid Project, the size of population in 2002 is calculated at 434,800,803 by applying 0.9% of the annual increase rate for the Project sites. Among them, 152,254,058 people are covered by the Project, which is 35% of the Project site population.

Patients are classified according to their treatment history and diagnosis for the most appropriate dose of anti-TB drugs. This Project covers the following 3 cases.

1. New smear positive case

Cases diagnosed as positive in the sputum examination, with no treatment history for the duration of 1 month or more

2. Re-treatment smear positive case

Cases diagnosed as positive in the sputum examination, with treatment history for the duration of 1 month or more

3. New smear negative case (severely ill)

Cases, with no treatment history for the duration of 1 month or more, that fulfill the following criteria by radiography

Extensive pulmonary TB (interstitial or miliary)

The estimated number of patient are calculated as follows.

1. New smear positive case : 27.2 per 100,000

27.2 per 100,000 cases are identified by the sputum examination and registered. The estimation in MOH's 5-year plan is as follows.

**Table 1. Number of Case Registered and Ratio of New Cases to Re-treatment Cases, the first 5 year**

	Positive Cases Registered	Ratio of New Cases to Re-treatment Cases
Year 1	27.2/10	4.5 : 5.5
Year 2	30.8/10	5.5 : 4.5
Year 3	34.3/10	6.5 : 3.5
Year 4	37.7/10	7 : 3
Year 5	38.2/10	8 : 2

2. Ratio of new cases to re-treatment cases : 4.5 : 5.5

The ratio of new cases to re-treatment cases is 4.5 : 5.5. This ratio becomes necessary because the dose of drugs is different between new and re-treatment cases.

3. New smear negative case (severely ill) is 20% of the number of new smear positive case

20% of number of new smear positive case are presumed from the World Bank Project to be new smear negative case (severely ill).

**Table 2. Number of New smear negative case (severely ill) in the World Bank Project**

	New smear positive case	New smear negative case (severely ill)	Ratio
1992	9,721	1,645	17%
1993	35,065	8,243	24%
1994	59,261	12,988	22%
1995	90,175	17,765	20%

Calculated as such, the number of patient covered by the Project is as follows.

**Table 3. Estimated Number of Patient**

Province	Population (2002)			Registered Positive Cases 27.2/100,000	Patients			
	Total Population	Population Covered	Coverage		New Case Positive	Re-treatment Case Positive	New Severe Case Negative (Severely ill)	Estimated Case
Sichuan Shen	7,306,210	2,857,600	39.1%	777.3	355	432	74	861
Qinghai Shen	5,211,466	3,635,480	69.8%	988.9	458	555	100	1,113
Henan Shen	97,168,040	50,221,183	51.7%	13,660.2	6,190	7,549	1,270	15,009
Neimenggu Zizhiqu	24,001,510	10,388,096	43.3%	2,825.6	1,285	1,572	270	3,127
Jiangxi Shen	42,191,803	5,812,929	13.8%	1,581.1	717	874	149	1,740
Shanxi Shen (Shan)	36,402,343	7,375,901	20.3%	2,006.2	912	1,113	191	2,216
Anhui Shen	63,749,562	16,291,740	25.6%	4,431.4	2,007	2,450	411	4,868
Guizhou Shen	36,250,371	14,058,210	38.8%	3,823.8	1,737	2,119	358	4,214
Yunnan Shen	40,652,132	12,627,130	31.1%	3,434.6	1,561	1,904	322	3,787
Shanxi Shen (Jin)	33,958,839	12,276,134	36.2%	3,339.1	1,518	1,858	320	3,696
Guangxi Zhuangzu Zizhiqu	47,908,527	16,709,654	34.9%	4,545.0	2,055	2,510	419	4,984
Total	434,800,803	152,254,058	35.0%	41,413.1	18,795	22,936	3,884	45,615

## 2. Drugs and its Dose

A dose of anti-TB drugs, the same as adopted by the WB Project, shall be packed in a blister pack and monthly dose shall be packed in a box except streptomycin. This method, established as a method of distribution of anti-TB drugs, has the advantage of the error prevention of dose, quality maintenance of drugs, and drug management.

In accordance with the WHO's guideline, the regimen of drugs, shown in the Table 4., is also the same as those adopted by the ongoing Project.

**Table 4. Regimen of Drugs**

Type of Case	Initial Phase	Continuous Phase
New Sputum Smear Positive	2 H <sub>3</sub> R <sub>3</sub> Z <sub>3</sub> E <sub>3</sub> (B 1)	4 H <sub>3</sub> R <sub>3</sub> (B 2)
Re-treatment Sputum Smear Positive	2 H <sub>3</sub> R <sub>3</sub> Z <sub>3</sub> E <sub>3</sub> S <sub>3</sub> (B 3)	6 H <sub>3</sub> R <sub>3</sub> E <sub>3</sub> (B 4)
New Sputum Smear Negative	2 H <sub>3</sub> R <sub>3</sub> Z <sub>3</sub> E <sub>3</sub> (B 1)	4 H <sub>3</sub> R <sub>3</sub> (B 2)

An example of regimen is as follows.

Initial Phase 2 H<sub>3</sub>R<sub>3</sub>Z<sub>3</sub>E<sub>3</sub>(B 1) 4 H<sub>3</sub>R<sub>3</sub>(B 2)

Anti-TB drugs H, R, Z, and E given 3 times a week (every other day) for the first 2 months period of Initial Phase

Then Anti-TB drugs H and R given 3 times a week (every other day) for the next 4 months period of continuous Phase

Table 5 shows dose of TB drugs.

**Table 5. Dose of TB Drugs**

Drugs	This Project	WB Project
H (Isoniazid)	600mg	600mg
R (Rifampicin)	600mg	600mg
Z (Pyrazinamide)	2,000mg	2,000mg
E (Ethambutol)	1,250mg	1200mg
S (Streptomycin)	750mg	750mg

### 3. Calculation of Dose of Anti-TB Drugs

As shown in Table 4, 6 kinds of drugs are necessary depending upon the type of case and Phase of treatment. Dose of anti-TB drugs is as follows.

#### 1. New smear positive case

After completion of 2 months period of Initial Phase, sputum smear examination is conducted. 4 months period of Continuous Phase is followed for the cases that converted to negative. For the cases that remained positive, the Initial Phase is extended for another 1 month. From the results of the World Bank Project, 20% of new smear positive case remain positive after 2 months of Initial Phase.

2 H<sub>3</sub>R<sub>3</sub>Z<sub>3</sub>E<sub>3</sub> : H, R, Z, and E given 3 times a week (every other day) for the first 2 months period of Initial Phase

15 blister packs / month x 2 = 30 blister packs

4 H<sub>3</sub>R<sub>3</sub> : H and R given 3 times a week (every other day) for the next 4 months period of continuous Phase

15 blister packs / month x 4 = 60 blister packs

Considering 20% of new smear positive cases that remain positive after Initial Phase, the quantity of blister pack per patient is as follows.

Initial Phase :  $15 \times 2 + 15 \times 20\% = 33$

Continuous Phase :  $15 \times 4 = 60$

#### 2. Re-treatment smear positive case

After completion of 2 months period of Initial Phase, sputum smear examination is conducted. 6 months period of Continuous Phase is followed for the cases that converted to negative. For the cases that remained positive, the Initial Phase is extended for another 1 month. From the results of the World Bank Project, 30% of new smear positive case remain positive after 2 months of Initial Phase.

2 H<sub>3</sub>R<sub>3</sub>Z<sub>3</sub>E<sub>3</sub> : H, R, Z, E and S given 3 times a week (every other day) for the first 2 months period

of Initial Phase

15 blister packs / month x 2 = 30 blister packs

15 vials of streptomycin / month x 2 = 30 vials

15 bottles of distilled water / month x 2 = 30 bottles

15 syringes / month x 2 = 30 syringes

6 H3R3E3 : H, R, and E given 3 times a week (every other day) for the next 6 months period

15 blister packs / month x 6 = 90 blister packs

Considering 30% of re-treatment smear positive cases that remain positive after Initial Phase, the quantity of blister pack per patient is as follows.

Initial Phase :  $15 \times 2 + 15 \times 30\% = 34.5 = 35$

Streptomycin, distilled water, syringes = 35

Continuous Phase :  $15 \times 6 = 90$

3. New smear negative case (severely ill)

Same as new smear positive case.

#### 4. Quantity of Anti-TB Drugs and Other Products

Table 6 shows the final quantity of anti-TB drugs and other products necessary for each province. For a distribution plan by province, see Appendix 6.

**Table 6. Quantity of Anti-TB Drugs and Other Products**

Province	New Sputum Smear Positive		Re-treatment Sputum Smear Positive					New Sputum Smear Negative (Severely ill)	
	Initial Phase	Continuous Phase	Initial Phase	Continuous Phase	Strepto mycin	Distilled Water	Syringe	Initial Phase	Continuous Phase
Combination Symbol	B1	B2	B3	B4				B1	B2
Unit	Blister Pack	Blister Pack	Blister Pack	Blister Pack	Vial	Ampoule	Piece	Blister Pack	Blister Pack
Sichuan Shen	11,760	21,300	15,180	38,880	15,350	15,350	15,600	2,490	4,440
Qinghai Shen	15,240	27,480	19,560	49,950	19,850	19,850	20,700	3,465	6,000
Henan Shen	204,750	371,400	264,645	679,410	265,850	265,850	267,500	42,360	76,200
Neimenggu Zizhiqu	42,600	77,100	55,170	141,480	55,650	55,650	56,400	9,060	16,200
Jiangxi Shen	23,745	43,020	30,660	78,660	30,800	30,800	31,300	4,980	8,940
Shanxi Shen (Shan)	30,225	54,720	39,045	100,170	39,350	39,350	39,900	6,420	11,460
Anhui Shen	66,375	120,420	85,860	220,500	86,350	86,350	87,000	13,695	24,660
Guizhou Shen	57,480	104,220	74,265	190,710	74,800	74,800	75,600	12,015	21,480
Yunnan Shen	51,660	93,660	66,855	171,360	67,300	67,300	68,200	10,740	19,320
Shanxi Shen (Jin)	50,340	91,080	65,250	167,220	65,950	65,950	66,800	10,845	19,200
Guangxi Zhuangzu Zizhiqu	67,935	123,300	87,960	225,900	88,400	88,400	88,800	13,920	25,140
Total	622,110	1,127,700	804,450	2,064,240	809,650	809,650	817,800	129,990	233,040