



Tuberculosis: A global overview of the Situation

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Abstract

Tuberculosis (TB) continues to be a global health crisis, affecting over 1.7 billion people worldwide by 1990—approximately one-third of the population. This review traces patterns in prevalence, incidence, and mortality, drawing attention to the uneven progress across regions. South-East Asia and China accounted for more than half of global TB cases, while Africa reported the highest incidence rate, averaging 220 cases per 100,000 population. HIV has emerged as a critical driver, contributing to nearly 305,000 additional TB cases and significantly raising mortality, particularly in sub-Saharan Africa. Despite effective short-course chemotherapy and its cost-effectiveness, only about 46% of cases were being detected and treated globally at that time. Mortality remained high, with close to 3 million deaths estimated in 1990, concentrated in South-East Asia, China, and Africa. These findings reflect both medical and socio-economic challenges—ranging from poverty and under nutrition to gaps in health systems. The review emphasizes the urgent need for improved detection, sustained treatment adherence, investment in vaccines and shorter regimens, and strategies that address the social roots of vulnerability. Global elimination of TB will depend not only on medical innovation but also on political will and coordinated international action.

Keywords: Tuberculosis; Global burden; Mycobacterium tuberculosis; HIV co-infection; Drug-resistant TB; Incidence; Mortality; Public health; Epidemiology

1. Introduction

Tuberculosis (TB) has long been a major cause of illness and death around the world. Yet, for many years, it was largely ignored in both rich and poor countries. Recently, however, TB has started to gain renewed attention, and efforts are being made to strengthen control programs. This renewed focus is mainly due to three reasons[1,5]:

- HIV epidemic: TB cases have risen sharply in countries with high HIV infection rates.[1,3,10]
- Effective treatment: Short-course chemotherapy has proven to be highly effective in curing TB.[4]
- Cost-effectiveness: TB control is recognized as one of the most affordable and efficient public health measures in developing nations.[5]

This report provides an update on the global TB situation in 1990, and compares it with trends since 1974. To explain the scale and direction of TB, several key measures are used—such as the ‘prevalence of TB infection, case notification rates, predicted incidence of disease, and TB-related deaths’. The information comes from official reports of TB cases and deaths submitted to WHO, along with estimates based on simple epidemiological models.[14]

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2. Methods and Data Sources:

2.1. Annual risk of infection and prevalence of infection

One of the most important ways to measure TB in a population is by looking at the 'annual risk of infection-this means the chance that a healthy, uninfected person will get infected with 'Mycobacterium tuberculosis within one year. This measure is especially useful in countries where TB is common, because it helps estimate how many new TB cases may appear in the future.[6]

To calculate this, researchers used data from 'tuberculin skin test surveys' that have been collected since 1975. These surveys give information about TB infection at different ages. A model was then applied that considered three main factors:[6]

- The annual risk of infection,[6]
- How this risk has been changing over time, and [6]
- The age structure of the population By combining these factors, they were able to estimate TB infection rates in different regions and age groups.[6]

For people with 'both TB and HIV, estimates were made by applying the TB infection rates in the 15–49 year age group' (the age group most affected by HIV) to populations where HIV infection is common.[10]

3. Case Notifications

Since 1974, the Expanded Programme on Immunization (EPI) has been regularly collecting data on TB cases. These reports are sent by countries or WHO regional offices, and the information is updated and published twice a year. [14]

For this analysis, unusual numbers (outliers) were removed. Outliers were defined as cases where the number reported in one year was either three times higher or one-third lower than the numbers reported in the years just before and after. These sharp jumps or drops usually reflect changes in reporting systems or TB programs, not actual changes in the disease itself.[14,11,12]

Population figures used as denominators came from World Bank projections, with EPI supplying data for smaller countries.[9]

- For each country, researchers calculated:[14,11,12]
- The 10-year average number of TB cases (1980–1989), and[14,11,12]
- The highest annual number of TB cases reported during the same period.[14,11,12]
- To look at longer-term (secular) trends, they examined 5-year averages or the highest annual numbers within those intervals.[14,11,12]

For regional figures, the total number of cases reported by all countries in a region was added up. Then, the regional notification rate was calculated by dividing this number by the population of that region (excluding countries that did not report any data).[14,1]

3.1. Expected Incidence

To estimate how many new TB cases occur each year, calculations were done separately for each country and then combined at the regional level.[7,8]

These calculations were based on two main observations:[7,8]

- In countries where TB is very common, for every 1% annual risk of infection, there are about 39–59 cases of smear-positive pulmonary TB per 100,000 people.[7]
- For each smear-positive case, there are about 1.22 additional cases of either smear-negative or extra-pulmonary TB.[7]

Using these relationships, the expected number of TB cases was calculated with different annual risks of infection for different regions:[7,8]

- Africa: 1.5% to 2.5%[7,8]
- Central & South America + Eastern Mediterranean: 0.5% to 1.5%[7,8]
- South-East Asia & Western Pacific: 1% to 2.25%[7,8]

On top of this, HIV-related TB was estimated. For people infected with both HIV and TB, it was assumed that about 10% would develop active TB disease each year.[7,8]

3.2. Coverage

Coverage (also called the case detection ratio) means the proportion of people with active TB who are actually diagnosed, treated, and officially reported. In practice, this is estimated by comparing the number of reported TB cases with the number of expected cases, and expressing it as a percentage.

For 1990, the analysis worked like this:[1,8]

The highest, average, and lowest expected numbers of TB cases for each country were calculated by applying the notification rates from 1980–1989 to the 1990 population.[14,1]

These figures were then compared with the predicted number of TB cases in 1990, which allowed researchers to estimate a range of coverage values (from low to high) for each country.[1,8]

3.3. Mortality

People usually die from tuberculosis when the disease is not diagnosed in time or when treatment does not work—either because patients do not complete their medicines properly or because the TB bacteria are drug-resistant. To measure TB deaths, death certificates are used to see both the total number of deaths and how many of them were caused by TB. For this analysis, mortality data from 62 countries were taken from the World Health Statistics Annual 1988 and 1990.[11,12]

The expected number of TB deaths in 1990 was calculated with the following assumptions:

- Untreated TB cases: About 50% were expected to die.[11,12]
- Treated TB cases: In most developing countries, cure rates are around 50–60%, so the average fatality among reported cases was assumed to be 15%.[11,12]
- Although deaths are usually higher among smear-positive patients than smear-negative ones, both groups were assumed to have the same fatality rate, since smear-positive cases are more likely to be identified and treated in developing countries.[11,12]
- To estimate mortality, researchers looked at the proportion of patients treated, using both the average and high coverage estimates. This gave a low estimate and a high estimate of TB deaths.[11,12]

For TB deaths linked to HIV infection, two different calculations were made:[11,12]

- Lower estimate: assumed HIV-positive and HIV-negative TB patients had the same fatality rate and treatment coverage.[11,12]
- Higher estimate: assumed that 50% of all HIV-positive TB patients would die, no matter if they were treated or not.[11,12]

Finally, countries were grouped by WHO regions (Europe, Eastern Mediterranean, Africa, and South-East Asia). But some adjustments were made:[11,12]

China was kept separate because no notification data was available.[11,12]

Japan, Australia, New Zealand, Canada, and the USA were also placed in a separate group because they are industrialized countries with very low TB levels.[11,12]

As a result, the “American Region” and “Western Pacific Region” in this analysis do not exactly match the official WHO definitions.[11,12]

4. Results – Prevalence of Tuberculosis Infection :

In 1990, about one-third of the global population—around 1.7 billion people—were infected with *Mycobacterium tuberculosis*.^[1]

The Western Pacific Region had the highest infection rate, with 44% of people infected.^[1]

The Eastern Mediterranean Region had the lowest, at 19%.^[1]

Most infected people lived in:^[1]

- South-East Asia (25%)^[1]
- China (22%)^[1]
- Europe and five major industrialized countries (22%)^[1]

4.1.1. Age distribution of infection:

Looking at age patterns shows important differences:^[1]

- In Western Europe, about 28% of people were infected, but 80% of them were older than 50 years.^[1]
- In sub-Saharan Africa, about 34% were infected, but 77% were younger than 50 years.^[1]
- In Africa, South-East Asia, and the Western Pacific, more than half of adults aged 15 years and above were infected (54%, 52%, and 62%, respectively).^[1]

4.2. Dual infection with TB and HIV:[1,10]

In 1990, more than 3 million people worldwide were infected with both TB and HIV.^[1]

Africa had the largest share, with about 2.4 million people (78% of the total), because HIV levels are very high there and about 48% of adults aged 15–49 already had TB infection.^[10]

In Europe and the five industrialized countries, over 1.5 million people had HIV, but TB infection was relatively low among 15–49 year olds. As a result, dual TB/HIV infection was rare in these countries-making up less than 6% of the world's total dual infections.^[10]

Table 1 Worldwide prevalence of tuberculosis infection, 1990 ^[1]

Region	Prevalence (%)	Number Infected (Millions)	Percentage of total
Africa	33.8	171	9.9
America	25.9	117	6.8
Eastern Mediterranean	19.4	52	3.0
South-East Asia	34.3	426	24.7
Western Pacific	43.8	195	11.3
China	33.7	379	22.0
Europe and others	31.6	382	22.2
All Regions	32.8	1722	100

All of the nations in the WHO Region are included. ^[1]

Consists of all nations in the American WHO Region excluding the United States and Canada. ^[1]

All nations in the Western Pacific WHO Region are included with the exception of China Japan Australia and New Zealand. New Zealand. ^[1]

Refers to the USA, Canada, Japan, Australia, and New Zealand.[1]

4.3. Tuberculosis Notifications

Country reports[11,12,14,1]

Out of 194 countries and states listed in the WHO's EPI database, 8 countries (about 4%) have not reported any TB cases since 1974. These include:[14]

- Africa (3 countries, 6%): Comoros, Namibia, St. Helena[1,11,12,14]
- Americas (1 country, 2%): Netherlands Antilles[1,11,12,14]
- South-East Asia (1 country, 9%): Democratic People's Republic of Korea[1,11,12,14]
- Western Pacific (1 country, 3%): China[1,11,12,14]
- Europe (2 countries, 6%): Albania and San Marino[1,11,12,14]

Notifications: Looking at reports from 1980 to 1989, the average number of TB cases reported worldwide each year was about 2.5 million. Around 40% of these were from South-East Asia. The remaining cases were spread almost evenly across the other five regions (each contributing about 8–14%).[1,11,12,14]

4.4. Case notification rates:[14,1]

Lowest in industrialized countries about 50 per 100,000 people in Africa and Latin America. The highest annual rate was still modest-about 56 per 100,000 in Latin America. [1,11,12,14]

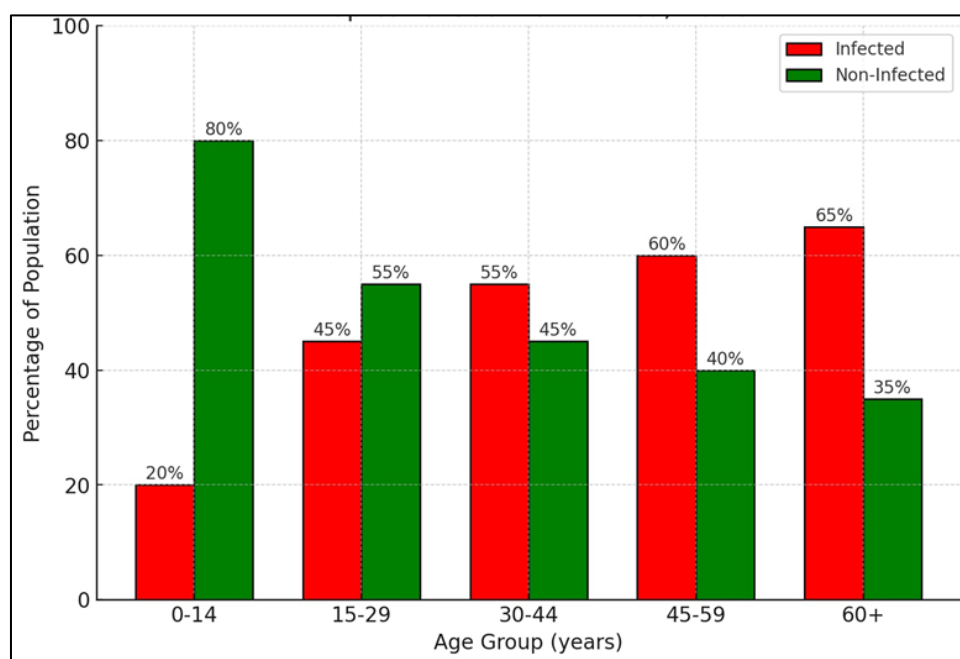


Figure 1 Prevalence of tuberculosis infection, by age, in tropical and southern Africa, 1990

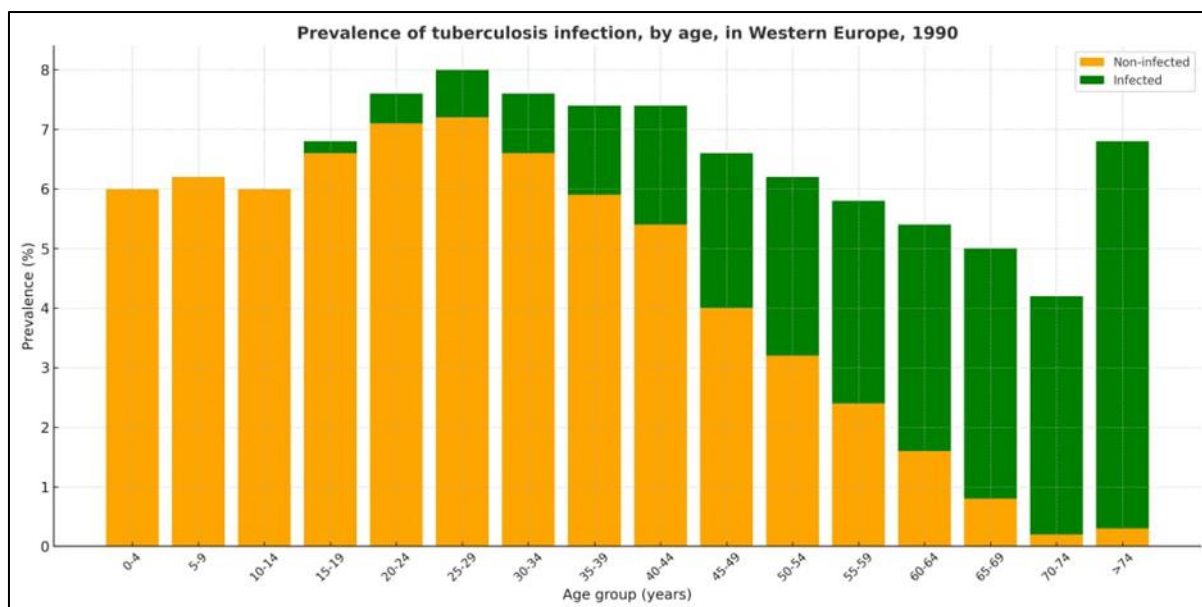


Figure 2 Prevalence of tuberculosis infection, by age, in Western Europe 1990.[1]

Table 2 Worldwide prevalence of tuberculosis and HIV infection in 15-49 years – olds , 1990.[10]

Region	HIV Infected(x1000)	Prevalence of TB infection	HIV/TB infected	
			No.(x1000)	%
Africa	1500	48	2375	77.8
America	1000	30	301	9.9
Eastern Mediterranean	30	23	7	0.2
South-East Asia, Western Pacific and China	500	40	200	6.6
Europe and others	1500	11	170	5.6
All Region	8030	34	3053	100.0

- This group covers every country in the WHO Region.[1,11,12,14]
- This group includes all countries in the Americas, but not the USA or Canada.[1,11,12,14]
- This group includes countries in the Western Pacific Region, but not China, Japan, Australia, or New Zealand.[1,11,12,14]
- This group only covers the USA, Canada, Japan, Australia, and New Zealand.[1,11,12,14]

4.5. Trends in tuberculosis notifications

Between 1974 and 1989, tuberculosis (TB) case reports showed different trends across the world.[14,1]

From 1974–79, about 2 million cases were reported (from 178 countries). In the next period, 1980–84, this number rose to 2.4 million (from 180 countries). However, in 1985–89, it fell slightly to 2.2 million (from 164 countries).[14,1]

The same general pattern was seen when looking at TB rates per 100,000 people.[14,1]

But the story was not the same everywhere:.[14,1]

In Europe and other industrialized countries, TB cases kept going down over the 15 years. The sudden rise in 1985–89 was mostly because the USSR started reporting its cases to the WHO in 1988.[14,1]

In the Eastern Mediterranean Region and Europe/industrialized countries, TB dropped in both number of cases and infection rates.[14,1]

In Africa and South-East Asia, TB increased in both total cases and infection rates.[14,1]

In Central/South America and the Western Pacific, infection rates went down, but the total number of cases still went up—likely because populations grew faster than the fall in infection rates.[14,1]

Looking at the bigger picture:[14,1]

Over 15 years, TB rates decreased in 101 countries but increased in 59 countries (about 1.7 decreases for every 1 increase).[14,1]

If Europe and the industrialized countries are left out, the ratio is closer to 1.2 decreases for every 1 increase, suggesting that the global TB situation had not significantly improved in those years.[14,1]

Table 3 Mean and highest number of tuberculosis cases reported annually in the world, 1980-89[14,1]

Region	Mean		Highest	
	Cases	Rate per 100 000	Cases	Rate per 100 000
Africa	234 863	51	317 841	69
Americas	200 607	49	225 815	55
Eastern Mediterranean	361 722	111	602 874	182
South-East Asia	974 861	84	1 223 172	105
Western Pacific	334 205	168	432 846	218
Europe	288 465	34	336 301	40
Others	900 84	21	105 876	25
All Regions	2 484 817	51	3 244 727	68

- Covers every country that belongs to the WHO Region.[14,1]
- Refers to all the countries in the Americas, but leaves out the USA and Canada.[14,1]
- Refers to the Western Pacific Region countries, but does not include China, Japan, Australia, or New Zealand.[14,1]
- Specifically includes only the USA, Canada, Japan, Australia, and New Zealand.[14,1]

Table 4 Trends in the average number of tuberculosis cases notified in the world ,1974-89[14,1]

Region	1974-1979			1990-1984			1985-1989		
	Cases	Rate per 100 000 population	Countries reporting (%)	Cases	Rate per 100 000 population	Countries reporting (%)	Cases	Rate per 100 000 population	Countries reporting (%)
Africa	187 084	65	42(91)	230 063	57	43(93)	210 695	57	32(70)
Americas	172 220	52	44(94)	203 345	54	44(94)	173 654	42	41(87)
Eastern Mediterranean	274 643	108	23(96)	427 832	143	23(96)	224 302	67	22(92)
South-East Asia	696 931	73	10(91)	943 140	87	10(91)	1 023 850	85	10(91)
Western Pacific	288 885	174	26(81)	337 907	183	27(84)	304 238	154	26(81)
Subtotal	1 617 763	78	145(92)	2 142 287	90	147(94)	1 936 739	72	131(83)
Europe	279 905	54	28(88)	179 941	34	28(88)	273 166	33	28(88)
Others	132 701	35	5(100)	96 617	25	5(100)	82 224	20	5(100)
All Regions	2 032 369	63	178(95)	2 418 845	68	180(93)	2 239 694	58	164(85)

4.6. Impact of HIV on notification rates

In Africa, 13 countries with a high number of HIV cases (such as Burundi, Congo, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia, Zimbabwe, Côte d'Ivoire, and Zaire) were compared with other countries in the region. Updated information came from a WHO survey in 1989 and data collected through TB programs supported by the International Union Against Tuberculosis and Lung Disease.[1,10]

- Over the last 15 years, a clear difference was seen:[1,10]
- In countries without a major HIV epidemic, the average number of TB cases per 100,000 people went down—from 60 (1974–79) to 59 (1980–84) to 47 (1985–89).[14]
- In countries hit hard by HIV, TB cases actually went up—from 51 (1974–79) to 56 (1980–84) to 64 (1985–89).[1,10]
- This shows that HIV had a major role in pushing TB rates higher in those countries.[1,10]

4.7. Incidence of tuberculosis

4.7.1. Tuberculosis cases in 1990 [1,8]

- It was estimated that about 8 million people developed tuberculosis worldwide in 1990. [1,8]
- The largest share was in South-East Asia with about 2.47 million cases (31%) [1,8].
- China had around 2.13 million cases (27%) [1,8]
- The African Region reported about 1.16 million cases (15%) [1,8]
- When looking at how common TB was compared to the size of the population: [1,8]

- The highest incidence was in Africa with about 220 cases per 100,000 people. [1,8]
- The lowest incidence was in the Americas with around 120 per 100,000 people. [1,8]
- In Europe and other industrialized countries, using the average rate from 1980–89 (31 per 100,000), about 392,000 cases were expected in 1990. [1,8]

4.7.2. Effect of HIV on TB cases

- HIV greatly influenced TB numbers because people infected with both HIV and TB are more likely to develop active disease. In 1990, the estimated extra TB cases caused by HIV were: [1,10]
- 238,000 in Africa[1,10]
- 30,000 in Central and South America[1,10]
- 20,000 in South-East Asia and the Western Pacific[1,10]
- 17,000 in Europe and industrialized countries[1,10]

Globally, HIV added about 305,000 TB cases in 1990, which was around 4% of all cases. While this may look small worldwide, in Africa it had a huge effect—raising TB incidence from 220 to 265 cases per 100,000, which is about a 20% increase.[1]

Table 5 Cases of tuberculosis expected in the world in 1990[1,8]

Region	Cases	Rate per 100 000 Population	Percentage of all cases
Africa	1 160 000	220	15
Americas	534 000	120	7
Eastern Mediterranean	594 000	155	7
South-East Asia	2 470 000	194	31
Western Pacific	420 000	191	5
China	2 127 000	191	27
Europe and others	392 000	31	5
HIV-related	305 000	6	4
All Regions	8 002 000	152	100

The annual risk of TB infection was estimated at 1.5–2.5% in Africa, 0.5–1.5% in the Americas and Eastern Mediterranean, and 1–2.25% in South-East Asia and the Western Pacific.[1,10]

WHO Region notes:[1,10]

- Includes all countries in the WHO Region.[1,10]
- For the Americas, this includes all countries except the USA and Canada.[1,10]
- For the Western Pacific, this includes all countries except China, Japan, Australia, and New Zealand.[1,10]
- The “five industrialized countries” are the USA, Canada, Japan, Australia, and New Zealand.[1,10]

HIV-related TB cases by region:[1,10]

- Africa: 238,000 cases (78%)[1,10]
- Latin America: 30,000 cases (10%)[1,10]
- Europe + five industrialized countries: 17,000 cases (6%)[1,10]
- Eastern Mediterranean: 693 cases (0.2%)[1,10]
- South-East Asia + Western Pacific: 20,000 cases (6%)[1,10]

4.8. Coverage

In 1990, about 46% of tuberculosis cases worldwide were reported. When comparing the lowest and highest numbers of reported cases to the expected cases, the coverage ranged between 32% and 61%. Africa had the lowest reporting, with only about 24% of expected cases reported (ranging from 16% to 32%). On the other hand, reporting was highest in the Eastern Mediterranean Region at about 70% (between 37% and 100%) and in the Western Pacific Region at about 88% (between 61% and 100%). In Latin America, the coverage was around 42% (33%–47%), and in South-East Asia, it was about 44% (34%–56%). [1,8]

4.9. Mortality

Reported mortality: Between 1984 and 1989, a total of 77,809 deaths from tuberculosis were reported to WHO from 62 countries. Most reports came from Europe (27 out of 32 countries), while only a small number of countries reported from other regions: 3 out of 46 in Africa, 22 out of 45 in the Americas, 3 out of 24 in the Eastern Mediterranean, 1 out of 11 in South-East Asia, and 6 out of 35 in the Western Pacific. In Europe (not including the USSR), the average yearly death rate from TB was 2.16 per 100,000 people, while in the USSR it was much higher at 7.70 per 100,000. A similar large gap was seen between North America (0.76 deaths per 100,000) and Latin America (6.03 deaths per 100,000). [11,12]

Expected mortality: Between 26% and 29% of deaths worldwide were attributed to tuberculosis in 1990. million which is roughly 49 to 55 fatalities per 100000. The number of patients affected these estimates. received TB treatment in fact. Between 819000 and 928000 deaths or about 32% of all deaths occurred in South-East Asia. deaths) with 688000 to 780000 deaths in China accounting for 27%. But the greatest death rates were found in the African region. between 91 and 100 fatalities per 100000. There were also an additional 120000 to 150000 deaths according to estimates. TB patients with HIV with the majority (approximately 83 percent) occurring in Africa (100000–125000 deaths). [11,12].

- Each country has a different reporting year. [11,12].
- Mauritius São Tomé and Príncipe and Seychelles are included in [11,12].
- Alludes to Canada and the United States. [11,12].
- Covers Ecuador Guyana Mexico Cuba Barbados Brazil Chile Colombia Costa Rica Argentina and the Bahamas. Uruguay Venezuela Puerto Rico Trinidad & Tobago Jamaica Panama Paraguay and Peru. [11,12].
- Bahrain Egypt and Kuwait are included in this. [11,12].
- Sri Lanka is mentioned. [11,12].
- Includes Singapore Hong Kong Japan Australia and New Zealand. [11,12]
- No reports came in from Monaco San Marino Albania Turkey or Romania. [12,11]

5. Discussion

5.1. Prevalence of Infection [1,5,8]

Mycobacterium tuberculosis infects about one-third of the worlds population. There are two primary trends. observed: The majority of infected individuals in developing nations are under 50. This occurs due to the risk of something new. Infection rates are still high annually and nearly half of the population is under the age of 15 in many areas. given that HIV is. The overlap between HIV and TB is a significant concern when designing and it is also most prevalent in individuals aged 15 to 49. programs for TB control. [10].

In developed nations the rate of infection is very low for people under 50 but high for those over 50. groupings. This is because infection risks were higher in the past. Therefore it is anticipated that the number of TB cases among the elderly will increase. these nations. [1,5,8]

The fact that these estimates only take age into account and are based on averages across multiple nations should not be overlooked. They really do. disregard variations in infection risk among specific subgroups where the actual infection rate is found. might be significantly higher. [1,5,8]

5.2. Notifications [1,5,8]

The TB situation the effectiveness of control programs and other pertinent information can be obtained by examining TB notification data. The way things evolve over time. Case reporting is available in nations where the majority of people

have access to health services. compulsory (like in many industrialized nations) notifications of new TB cases usually reflect the actual number of . situations fairly precisely. Official notifications however are less helpful in developing nations due to tuberculosis. Programs frequently lack sufficient funding.[1,5,8]

Table 6 Projected tuberculosis mortality in the world in 1990 [1,8,11,12]

Region	Low estimate		High estimate		Percentage of all TB death
	Deaths	Deaths per 100 000 population	Deaths	Deaths per 100 000 population	
Africa	481 000	91	531 000	100	18
America	197 000	44	205 000	46	7
Eastern Mediterranean	137 000	36	163 000	43	5
South east Asia	819 000	64	928 000	72	32
Western pacific	99 000	46	110 000	50	4
China	705 000	62	780 000	72	27
Europe	33 000	3.8	33 000	3.9	1
Others	6 000	1.5	6 000	1.4	0.2
HIV related	119 000	2.2	151 000	2.9	5
All region	2 596 000	49	2 907 000	55	100

According to global data between 1980 and 1989 185 million cases of tuberculosis were reported annually. nations where notification rates vary from 52 to 69 cases per 100000. In contrast with previous years the. The majority of regions saw an increase in reported cases with the exception of the Eastern Mediterranean and industrialized nations. The rapid population growth however which outpaced the rise helps to explain the slight decline in notification rates. in incidents that have been reported. For instance in 1967 WHO received reports of 1. 2 million cases from 145 countries (111 worldwide). 100000) 1 million cases from 130 nations in 1971 (96 cases per 100000) and 1 million cases from 157 nations in 1976. 1976–1977 (68 out of 100000). It may not always be the case that the 1980s saw an increase in both reporting nations and cases. greater prevalence of the disease but might instead indicate improved access to TB services. [14,1]

The criteria for identifying cases and the definitions of what constitutes a TB case are two problems with notification reports. were occasionally not expressed clearly. It was thought that these techniques would remain constant throughout a nation over time. Significant changes wouldn't occur simultaneously in numerous nations. [1,5,8]

There are differences in access to TB reporting units within and between nations and these differences can also occur over time. time. Higher notification rates occasionally indicate that more people are being notified because TB programs have grown. attained. The official figures are typically less than the actual numbers in nations with robust private healthcare systems. number of patients served. In this review because data on the population covered by national TB programs were missing the . Notification rates were calculated using the entire population of the country.[14,1]

Notifications of TB decreased somewhat in Africa in the late 1980s with the exception of nations severely affected by HIV. It was probably. associated with HIV but it might also be a result of improved TB surveillance and control in those regions. Most of the . Reports that are currently available span the years 1985–1989 before the full effects of HIV on TB were apparent. as more reports show. When the later 1980s arrive the disparity between nations with and without HIV will probably become more pronounced, more precise.[1,5,8]

Even though data from a single year in one country may not always be reliable, researchers assumed random variation rather than systematic error. To reduce the effect of short-term differences, averages over 5–10 years were used, and larger regions were compared instead of single countries. This approach improved the accuracy of trend comparisons and allowed meaningful regional analysis, even when some countries did not submit reports every year.[1,5,8]

5.3. Anticipated occurrence

Around 8 million people were thought to have contracted tuberculosis globally in 1990. More than 4 points out of 5. Africa had the highest incidence rate with Asia accounting for millions of cases. These findings were similar to those of Murray and associates projected 7.1 million cases of tuberculosis in developing nations that year. Previously in 1977 Styblo had projected between 3 and 7 million new cases of pulmonary tuberculosis that tested positive for smears. If there are smear-positive cases for each one. The global total would have been approximately 8.3 million cases per year if there had been about 1.22 additional TB cases. [7,8]

HIV was predicted to be responsible for an additional 20% of TB cases in Africa. The majority of these extra cases were gathered in one area. a few nations with serious HIV epidemics especially in cities. [7,8]

Data from the Netherlands was initially used to develop the model that estimates the number of expected TB cases. Later on it happened. found to be reasonably dependable in areas with high TB rates after being tested in developing nations. Nevertheless the model excluded the additional cases of TB brought on by HIV infection. This suggests that it might understate the actual TB burden. nations where HIV is prevalent. In order to account for this the number of individuals infected with both was included in the calculations. HIV and TB representing the additional TB cases linked to HIV using a breakdown rate of 10%. [7,8]

A breakdown rate of 10% might seem high but it doesn't take into consideration the additional infections and spread that this causes. HIV-related TB cases can spread among individuals with HIV and within communities. Moreover this is easy. calculation assumes HIV and TB occur independently which may not always be correct-especially in countries where . There is less TB. [7,8]

5.4. Coverage

The global average coverage in 1990 was estimated to be roughly 46% when the number of reported TB cases was compared to the number of expected cases. In order to account for cases treated in the private sector Murray added 20% to the highest number of cases reported over the previous ten years making his estimate for developing nations slightly higher at 55%. [1,8].

The simplest way to gauge the detection efficiency of TB cases is to compare reported and expected cases. Coverage however is merely an approximation and does not accurately represent the number of cases that are being found and appropriately handled. [1,8]

Over diagnosis over-reporting or setting the expected number of TB cases too low (for instance if many chronic cases were excluded from the calculations) could result in overestimated coverage. However TB could be underdiagnosed underreported or the expected number of cases set too high resulting in an underestimation of coverage.

5.5. Mortality

Between 1984 and 1989 62 countries that routinely provided TB mortality data reported approximately 78000 TB-related deaths annually (2.96 per 100000 people). Previous numbers were higher: 168229 deaths (19.6 per 100000) were reported from 69 countries in 1967 149983 deaths (16.1 per 100000) were reported from 99 countries in 1971 and 105735 deaths (9.2 per 100000) were reported from 103 countries in 1976-1977. [11,12]

The thoroughness with which death certificates are completed and the frequency of post-mortem examinations determine how accurate mortality data are. In certain cases TB deaths may be over-reported for instance TB deaths may be recorded for patients who had TB but passed away from another illness. This is more likely to occur in nations with high rates of both TB and HIV. TB deaths on the other hand are frequently underreported because many TB deaths go unreported by national statistics or TB programs. [11,12]

An estimated 2 to 9 million people (49 to 55 per 100000) were predicted to die from tuberculosis globally in 1990. A growing number of these deaths particularly in Africa have been connected to HIV infection with the majority occurring in China and South-East Asia. These numbers are in line with projections made by Murray and associates who estimated that 25 million deaths (between 1 and 3 million) would occur in developing nations alone in 1990. [11,12]

6. Conclusion

Tuberculosis continues to be one of the world's most pressing public health problems, with millions of new cases and deaths every year. Although advancements in diagnostic tools, effective medicines, and preventive strategies have improved outcomes, progress remains uneven across regions. Low- and middle-income countries continue to carry the heaviest burden, where poverty, under nutrition, and limited healthcare access fuel the cycle of infection. The HIV epidemic and the rise of multidrug-resistant TB further complicate control efforts and highlight the urgent need for stronger, integrated responses. Industrialized nations have experienced declining trends, but the global fight cannot succeed unless high-burden countries are supported with resources, training, and sustainable health programs. To achieve meaningful progress, it is essential to strengthen case detection, ensure treatment adherence, and invest in research for shorter, more effective regimens and vaccines. Equally important is addressing the social and economic determinants that make people vulnerable to TB in the first place. The path toward TB elimination will require sustained political commitment, global collaboration, and continuous innovation. With collective effort, what is now a leading infectious killer can become a preventable disease of the past.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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