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TUBERCULOSIS IN OLDER ADULTS: AN EPIDEMIOLOGICAL AND STATISTICAL REVIEW

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Abstract. Background. Tuberculosis (TB) caused an estimated 10.7 million cases and 1.23 million deaths in 2024. As populations age and transmission declines, an increasing share of TB occurs in older adults (≥65 years). This group has atypical presentation, frequent comorbidity and high case-fatality.

Methods. Narrative review of the WHO Global TB Report 2025, Global Burden of Disease 2021 analyses, national surveillance reports (Japan, Republic of Korea, Hong Kong SAR, United States, Australia, Uzbekistan) and peer-reviewed clinical studies.

Results. Older adults accounted for 62.5% of TB cases in Korea (2025) and about 60% (aged ≥70) in Japan (2024). Incidence rose steeply with age. It reached 101.5 per 100 000 among Koreans aged 65+ (6.4 times the rate in younger people) and 51.1 per 100 000 among Japanese aged 90+. Between 2015 and 2020, global TB deaths fell by only 3.3% in people aged 70+, against 35.3% in children under five. Classic symptoms were roughly half as frequent in older patients, and diagnostic delay was common. Mortality during treatment reached 38.1% at 80–89 years and 57.2% at 90+ years in Japan. Adverse drug reactions affected about one-third of older patients. Use of preventive treatment was lowest in the oldest groups.

Conclusion. TB control increasingly depends on older adults. Age-disaggregated surveillance, active case finding, geriatric-adapted treatment and wider preventive therapy are needed, including in Central Asian countries such as Uzbekistan.

Keywords: tuberculosis; elderly; older adults; epidemiology; incidence; mortality; immunosenescence; latent TB infection

1. Introduction. Tuberculosis (TB) remains the leading cause of death from a single infectious agent. According to the WHO Global Tuberculosis Report 2025, an estimated 10.7 million people fell ill with TB in 2024 and 1.23 million died, down from 1.27 million deaths in 2023 [1, 2]. Compared with 2015, global TB incidence has fallen by only 12% and TB deaths by 29%. These falls are far short of the End TB Strategy milestones of 50% and 75% reductions by 2025 [2].

The global response has historically focused on young and middle-aged adults, but the age structure of the TB epidemic is changing. Populations are ageing rapidly and life expectancy is rising. A large reservoir of people infected decades ago now carries latent infection into old age. In settings where transmission is declining, TB increasingly becomes a disease of older adults, driven mainly by reactivation of remote infection [3, 4].

Older adults, conventionally defined as persons aged 65 years and older, present a distinct clinical and public health challenge. Their disease is more often atypical and diagnosis is frequently delayed. Adverse drug reactions are more common, and case-fatality is substantially higher than in younger patients [5, 6, 29]. Despite this, older adults remain under-represented in TB research, screening programmes and preventive therapy policies.

This article reviews current statistical evidence on the burden of TB among older adults at global, regional and national levels. It summarises the biological and social factors behind their elevated risk. It then discusses implications for diagnosis, treatment and prevention, including in Central Asia and Uzbekistan.

2. Materials and methods. This is a narrative review with secondary analysis of published surveillance statistics. The data sources were:

- the WHO Global Tuberculosis Report 2025 and WHO regional publications;
- national surveillance reports from the Japan Ministry of Health, Labour and Welfare, the Korea Disease Control and Prevention Agency, the Hong Kong Department of Health and the US Centers for Disease Control and Prevention;
- peer-reviewed cohort studies, systematic reviews and meta-analyses indexed in PubMed/PMC, published mainly in 2015–2026.

Older adults were defined as persons aged 65 years or older unless a source used a different threshold (60 or 70 years); any such threshold is stated in the text. Incidence and notification rates are expressed per 100 000 population per year. Because sources differ in year, case definition and age bands, figures are compared descriptively rather than pooled.

3. Global burden of tuberculosis among older adults

3.1 Overall trends. Globally, TB incidence and mortality are declining again after the COVID-19 disruption. Between 2023 and 2024 the TB incidence rate fell by nearly 2% and TB deaths fell by 3% [1]. The global incidence rate was about 131 per 100 000 in 2024 [2]. However, the decline has not been equal across age groups.

3.2 Slower progress in older age groups. The GBD 2021 Tuberculosis Collaborators analysed age-specific trends in 204 countries [7]. Between 2015 and 2020, global TB deaths fell by:

- 35.3% in children younger than 5 years;
- 29.5% in children aged 5–14 years;
- 15.2% in adults aged 15–49 years;
- 7.97% in adults aged 50–69 years;
- only 3.29% in adults aged 70 years and older (95% UI –5.56 to 9.07), which is statistically indistinguishable from no change.

The authors concluded that adults older than 50 years showed the slowest progress of any age group [7]. A separate GBD-based analysis of adults aged ≥60 years found that age-standardised incidence and mortality of drug-susceptible TB are falling. In contrast, the burden of multidrug-resistant (MDR) and extensively drug-resistant (XDR) TB in this group is rising and is projected to keep rising until 2035 [8].

3.3 Incidence rises with age. In most surveillance systems the age-specific notification rate is highest in the oldest groups. WHO data already showed in 2016 that notification rates among people aged 65 years and older exceeded those of every other 10-year age band [3]. In China, reported incidence among older adults is two to three times that of younger adults [3]. A prospective Chinese cohort combined active and passive case finding among people aged ≥65 years. It measured an incidence of active TB of 481.8 per 100 000 person-years (95% CI 417.4–546.2) and 138.9 per 100 000 person-years for bacteriologically confirmed TB [3]. Routine data probably undercount cases, because active screening found far more disease in older adults than passive notification did.

3.4 Why the share of older patients grows. Three mechanisms drive the ageing of the TB caseload:

1. Demographic ageing: the number of people aged 65+ is rising faster than any other group.

2. Cohort effect: today's older adults grew up when the annual risk of infection was high, so a large share carries latent infection. In Hong Kong, the estimated share of TB due to reactivation in the 65–74 age group approached 100% by 2000 [9].

3. Faster decline in the young: as transmission falls, cases in young people decrease quickly while reactivation in older people declines slowly, so the relative share of older patients rises.

4. Regional and national statistics. In high-income, low-incidence countries of East Asia, older adults now make up the majority of TB patients. They accounted for 62.5% of cases in the Republic of Korea (2025), and people aged 70+ accounted for about 60% of cases in Japan (2024).

4.1 Selected countries.

Table 1. TB in older adults, selected countries

Country	Year	All-age rate (per 100 000)	Share of cases in older adults	Rate in older adults (per 100 000)
Republic of Korea	2025	33.5	62.5% (≥65 y; 10 669 of 17 070)	101.5 (≥65 y), 6.4× the rate in younger people
Japan	2024	8.1	60.1% (≥70 y); 42.7% (≥80 y)	28.3 (80–89 y); 51.1 (≥90 y)
United States	2024	3.1	24.1% (≥65 y; 2 502 of 10 388)	4.1 (≥65 y), highest of all age groups
China	2013–2015 cohort	52 (WHO estimate, 2023)	not reported	481.8 per 100 000 person-years (≥65 y, active TB)

Republic of Korea. Cases fell for the 14th consecutive year in 2025, by 4.9% to 17 070. Yet cases among people aged 65+ rose by 1.3% to 10 669, a record high. Their share has climbed every year since 2021, when it was 51.0% [10].

Japan. Of 10 051 new patients in 2024, the 80–89 age band was the largest group (28.4%). Incidence per 100 000 was 10.9 at 70–79 years, 28.3 at 80–89 years and 51.1 at 90+ years, against 5.3 at 60–69 years [11].

Figure 1. TB incidence by age group, Japan 2024 (new cases per 100 000; all ages: 8.1)

Age	0–4	5–9	10–14	15–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90+
Rate	0.5	0.1	0.1	1.8	10.1*	4.5	2.9	4.0	5.3	10.9	28.3	51.1

*The 20–29 peak is driven mostly by foreign-born patients, who make up 90% of cases in this age group. Source: Japan MHLW, 2024 TB Registry Annual Report, Table 6-1.

United States. People aged 65+ had the highest incidence of any age group in 2024 (4.1 per 100 000) [12]. Among non-US-born persons, the rate in this group reached 22.8 per 100 000 [12]. In provisional 2025 data, older adults were the only age group in which the TB rate did not decrease [13].

Hong Kong SAR. The share of patients aged 65+ rose from 21% in 1990 to about 40% from 2004 onward. Over the same period, the 65+ share of the population rose from 8.5% to 15.3% [9]. In 2023, 84.4% of TB deaths occurred in people aged 65 or older, with a mean age at death of 76.9 years [14].

Australia. Between 2011 and 2020, 16.1% of notifications (2 231 cases) were in people aged ≥65 years. The median age of these cases was 75 years, and 65% were male [15].

4.2 Central Asia and Uzbekistan. Uzbekistan remains on the WHO list of high-burden countries for MDR-TB. In 2022, an estimated 16% of new cases and 31% of previously treated cases had MDR-TB [16]. The WHO-estimated incidence fell from 79 per 100 000 in 2015 to 51 in 2024 [17]. National programme data report a notified incidence of 33 per 100 000 and a TB mortality of 0.8 per 100 000 at the end of 2025. Treatment success reached 92.7% for new patients and 86.9% for drug-resistant TB [18]. In neighbouring Kazakhstan, the national incidence was 33.4 per 100 000 in 2024 [19].

Published age-disaggregated data for older adults in Uzbekistan are scarce. Given the East Asian experience, the share of older patients is likely to grow as the population ages and transmission falls. Routine reporting of incidence, treatment outcomes and mortality by 10-year age band (60–69, 70–79, 80+) would allow national monitoring of this trend.

5. Pathogenesis and risk factors in older adults. Most TB in older adults is reactivation of infection acquired decades earlier. More than 90% of cases in older individuals are estimated to arise from latent TB infection (LTBI) [20].

5.1 Immunosenescence and inflammaging. Cell-mediated immunity is the main defence against Mycobacterium tuberculosis [21]. With age, the immune system undergoes immunosenescence. T-cell and B-cell function declines, antigen-presenting cells are down-regulated and regulatory T cells increase [22]. At the same time, a chronic, sterile, low-grade inflammation called inflammaging develops; interleukin-6 is its commonly used biomarker [20, 22]. The ageing lung adds further changes: a more oxidised alveolar environment and altered alveolar lining fluid. This fluid can modify the mycobacterial cell envelope and the expression of its virulence genes [20, 21]. Together these changes weaken granuloma containment and allow latent bacilli to reactivate.

5.2 Comorbidities. Older TB patients carry more chronic disease than younger patients. In a Brazilian case–control study of patients over 60, pulmonary TB was associated with diabetes (OR 3.98; 95% CI 2.07–7.65), chronic lung disease (OR 7.24; 3.64–14.46) and heart disease (OR 5.86; 2.88–11.95) [23]. In Japan in 2024, 15.7% of all newly registered TB patients had diabetes [11]. Other frequent conditions are:

- chronic obstructive pulmonary disease and other structural lung disease;
- malignancy and its treatment;
- chronic kidney disease;
- immunosuppressive therapy, such as corticosteroids and biologic agents including TNF-α inhibitors;
- previous gastrectomy, malnutrition and low body-mass index [24].

5.3 Social and institutional factors. Living in long-term care facilities, social isolation, poverty and limited mobility increase the risk of late presentation. Older adults also have less access to diagnostic services and may attribute cough or weight loss to "normal ageing". In Australia, some older TB patients were living in aged-care facilities at diagnosis, which raises the risk of institutional outbreaks [15].

6. Clinical presentation and diagnostic challenges. TB in older adults is often atypical, so it is diagnosed later. A meta-analysis of 12 studies compared older and younger patients [25]. Older patients had less fever, sweating, haemoptysis and cavitary disease, and fewer positive tuberculin skin tests. They also had lower serum albumin and leukocyte counts.

6.1 Symptoms. A classic comparison of elderly and younger men shows the size of the difference. Every classic symptom was markedly less frequent in older patients, while altered mental status was three times more common [24].

Figure 2. Findings at presentation, elderly (n = 35) vs younger (n = 29) men with pulmonary TB, %

Finding	Younger	Elderly
Sputum production	76	48
Weight loss	76	34
Fever	62	31
Night sweats	48	6
Haemoptysis	40	17
Altered mental status	10	31

Source: Alvarez, Shell & Berk, Am J Med 1987.

The pattern is consistent in recent cohorts. In a large UK cohort, cough, haemoptysis, fever, night sweats and weight loss were all less common in patients aged ≥65, while dyspnoea was more common (p = 0.001) [26]. Among 92 patients aged ≥75 years (mean age 82.5), the most frequent symptoms were cough (51.1%), fever (43.5%) and dyspnoea (39.1%). Night sweats (16.3%) and haemoptysis (9.8%) were uncommon [27]. In a US review, only 28% of TB patients aged 65+ had cough, compared with 38% of younger adults (p = 0.035) [5]. Non-specific features often dominate the picture, including fatigue, anorexia, confusion, falls and functional decline.

6.2 Radiology. Chest radiographs in older patients show fewer cavities and more lower-lobe infiltrates. These are easily mistaken for bacterial pneumonia, aspiration, heart failure or lung cancer [5, 25]. Pre-existing scarring and comorbid lung disease make interpretation harder still.

6.3 Laboratory tests. Tuberculin skin test and IGRA: reduced cellular immunity lowers sensitivity, so a negative result does not exclude TB [25].

- Sputum: older adults often cannot produce good-quality sputum, so induced sputum, gastric aspirates or bronchoscopy may be needed. In Japan, the smear-positive pulmonary TB rate per 100 000 was 11.0 at 80–89 years and 19.5 at 90+ years, against ≤3.9 in all younger groups [11]. Many older patients are therefore infectious when diagnosed.
- Rapid molecular tests (Xpert MTB/RIF Ultra and similar) should be first-line, as they also detect rifampicin resistance.

6.4 Diagnostic delay. Delay is common at every step. In Yangzhou, China, 72.0% of pulmonary TB patients aged ≥65 delayed seeking care [28]. Among symptomatic patients in Japan in 2024 [11]:

- 20.7% presented two months or more after symptom onset;
- 22.4% waited a month or more from first visit to diagnosis;
- 21.8% were diagnosed three months or more after onset.

Time from symptom onset to treatment is longer in older than in younger patients [26]. Some cases are diagnosed only at autopsy.

7. Treatment outcomes, adverse drug reactions and mortality. Older adults respond to standard anti-TB regimens, but they die during treatment far more often and suffer more drug toxicity.

7.1 Mortality during treatment. Japanese cohort data show the age gradient most clearly. Of 10 086 patients registered in 2023, 67.3% were treated successfully and 25.1% had died by the end of 2024. Deaths rose from 11.5% at 60–69 years to 57.2% at 90+ years. Treatment success in patients under 60 ranged from 76.9% to 90.2% [11].

Figure 3. Patients who died during TB treatment by age, Japan, 2023 cohort, % (all ages: 25.1%)

Age	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90+
Died, %	3.8	0.0	0.8	0.2	2.3	5.7	11.5	23.3	38.1	57.2

Source: Japan MHLW, 2024 TB Registry Annual Report, Table 15-1.

Many of these deaths are from comorbid conditions rather than TB itself, but late diagnosis and drug toxicity contribute. A systematic review of 37 studies of older patients on anti-TB treatment reported a pooled mortality of 18%. In the Italian GERIA TB cohort, 18-month mortality was 23.4% [29]. In Brazil, older patients had a cure rate of 51% and a mortality of 24% [23]. In Hong Kong, 84.4% of all TB deaths in 2023 were in people aged 65+ [14].

Outcomes can be much better with early, definitive diagnosis. A Korean hospital series using early bronchoscopy reported favourable outcomes in 97% of older patients and a treatment mortality of only 0.5%. This compares with a national average of 12% among older Korean TB patients in 2010 [30].

7.2 Adverse drug reactions.

- In the systematic review cited above, 34% of older patients had at least one adverse event and 21% had a severe one [29].
- In the GERIA TB cohort, 35.8% had at least one adverse event: hepatotoxicity 29.6%, skin reactions 8.6% and gastrointestinal disturbance 6.2%, mostly within the first month [29].
- Older patients in Brazil had more adverse reactions overall (OR 1.62; 95% CI 1.04–2.54) and more gastrointestinal reactions (OR 1.64; 1.01–2.77) [23].

Pyrazinamide is the drug most often withheld. Until 2018, Japanese guidelines recommended omitting it for patients over 80. In 2009–2014, more than 75% of patients aged 80–84 and 90% of those over 90 received regimens without it [6]. Omitting pyrazinamide lengthens treatment to 9 months.

7.3 Practical treatment considerations

1. Calculate doses by actual body weight; many older patients are underweight.
2. Check creatinine clearance, and adjust ethambutol and pyrazinamide intervals in renal impairment.
3. Monitor liver function at baseline and every 2–4 weeks in the intensive phase.
4. Review all co-medications. Rifampicin induces cytochrome P450 and lowers the levels of anticoagulants, antidiabetic drugs, statins, calcium-channel blockers and corticosteroids.
5. Screen vision and colour vision before and during ethambutol therapy.
6. Support adherence with directly observed or video-observed therapy, pill organisers and family involvement.

8. Latent infection, prevention and long-term care settings. Older adults hold the largest reservoir of latent infection, yet they receive the least preventive treatment.

8.1 Low use of TB preventive treatment (TPT). In Japan in 2024, only 0.2 people aged 80+ were newly registered with LTBI for every newly registered TB patient of that age. The ratio in children aged 0–4 was 16.5 [11]. Completion of LTBI treatment also falls with age: 79.7% at 80–89 years and 67.9% at 90+ years, with 11.5% of the oldest group stopping treatment [11]. In Hong Kong, preventive treatment for household contacts was extended only to contacts under 65, because of concern about toxicity in older people [14]. TB rates among US adults aged 65+ did not fall in 2025, which suggests that LTBI screening and treatment are under-used in this group [13].

8.2 Choice of preventive regimen. Short rifamycin-based regimens are preferred to 6–9 months of isoniazid, because they are completed more often and cause less hepatotoxicity:

- 4R: rifampicin daily for 4 months;
- 3HP: rifapentine plus isoniazid weekly for 12 weeks;

- 3HR: rifampicin plus isoniazid daily for 3 months.

The decision should weigh the risk of progression against the risk of toxicity and drug interactions. Risk of progression is higher with recent contact, diabetes, immunosuppression and fibrotic lesions. Active TB must be excluded first.

8.3 Long-term care facilities and hospitals. Nursing homes concentrate frail people with high LTBI prevalence. One undiagnosed infectious resident can cause a large outbreak among residents and staff. Recommended measures are:

1. symptom and chest X-ray screening on admission;
2. a low threshold for sputum testing in residents whose pneumonia fails to respond to standard antibiotics;
3. airborne precautions and prompt isolation of suspected cases;
4. contact investigation of residents and staff after each case;
5. regular TB training for nurses and care workers, who are often the first to notice weight loss or functional decline.

8.4 Active case finding. Symptom-based detection performs poorly in older adults. Periodic screening with chest radiography (including computer-aided detection) and molecular testing is therefore a reasonable strategy in high-burden settings. A Chinese prospective cohort showed that active case finding uncovers far more disease among people aged ≥65 than routine notification [3]. GBD authors recommend active case finding for adults aged ≥60 [8].

9. Discussion and recommendations. The statistics reviewed here point in one direction: as TB declines, it concentrates in older adults. This group now determines whether End TB targets can be met. In Korea, cases fell for 14 years in a row while cases in people aged 65+ reached a record [10]. In Japan, incidence at 90+ years is more than six times the national rate [11]. In the United States, older adults were the only group whose rate did not fall in 2025 [13]. Globally, TB deaths in people aged 70+ barely changed between 2015 and 2020 [7].

The data also have limits:

- Most age-specific statistics come from high-income, low-incidence countries in East Asia, North America and Australia.
- Age-disaggregated outcome data are rarely published for high-burden countries, including those of Central Asia.
- Notification data underestimate true incidence in older adults, because atypical disease is missed and some cases are diagnosed only at death [3].
- Comparisons across countries are limited by different age bands, case definitions and years.

Recommendations

For national TB programmes (including Uzbekistan):

1. Report incidence, notification, treatment outcomes and mortality by 10-year age band, with 65+ and 80+ shown separately.
2. Include older adults in active case-finding strategies, especially residents of care homes and people with diabetes, COPD or immunosuppression.
3. Extend contact investigation and TPT policies to older contacts, using short rifamycin regimens with monitoring.
4. Include older patients in MDR-TB surveillance, as the drug-resistant burden in this group is rising [8].

For clinicians and nurses:

1. Suspect TB in any older patient with non-resolving pneumonia, unexplained weight loss, functional decline or new confusion.

2. Use rapid molecular tests early and obtain adequate specimens, including induced sputum or bronchoscopy when needed.

3. Assess frailty, renal and hepatic function and polypharmacy before treatment. Monitor closely in the first two months, when most adverse events occur [29].

4. Address geriatric needs alongside TB: nutrition, mobility, cognition and family support.

For research:

1. Include older adults in trials of new regimens, diagnostics and vaccines.

2. Study age-specific pharmacokinetics and safety of newer drugs (bedaquiline, pretomanid, linezolid).

3. Develop geriatric outcome measures, such as functional status and quality of life, for TB care.

10. Conclusion. Tuberculosis is increasingly a disease of older adults. In ageing, low-incidence societies they already account for 60% or more of cases. Their incidence and case-fatality rise steeply with each decade of life. Among Japanese patients aged 90+, incidence reaches 51.1 per 100 000 and treatment mortality reaches 57.2%. Atypical presentation, comorbidity, drug toxicity and low use of preventive treatment explain much of this burden. Ending TB will require programmes that count older adults separately and look for TB actively in them. Programmes must also adapt treatment to older patients' physiology and offer them preventive therapy. Countries such as Uzbekistan, where incidence is falling and the population is ageing, can prepare now by building age-disaggregated surveillance and geriatric-sensitive TB care.

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