

Supplementary Table 1. PECO

	Inclusion criteria	Exclusion criteria
Design	Cross-sectional Design	1) Case study or retrospective 2) Studies that do not directly discuss the relationship between TB, DM, and HIV and only show prevalence without discussing the relationship of the three diseases
Participants	Patients with comorbidities of HIV, TB, DM & patients with TB & HIV, TB & DM, DM & HIV co-infection	Patients who only suffer from one disease
Exposures	1) Patients with HIV who also have TB and/or DM	Patients who do not have HIV, TB, or DM coinfection

	2) Patients with DM who also have TB and/or HIV 3) HIV and TB co-infection 4) Immunodepression due to HIV and/or DM	
Comparisons	Patients with TB, DM, and HIV compared with patients without all three diseases	Patients without related conditions tested
Outcomes	Articles discussing the relationship between HIV, TB & DM	Articles that do not focus on this relationship
Article type	Original articles that have been reviewed and published (including further online publications)	• Conference abstract • Letter/ correspondence
Language	English	N/A

Supplementary Table 2. Sintesis Grid: Association Between Tuberculosis, HIV and Diabetes Mellitus: Should We Integrated Screening and Care?: A Systematic Review²⁵⁻³⁰

No	Researcher & City	Objective	Research Design	Sample Size	Result	Conclusion	Recommendation	Reference Number
1	(Jacob & George, 2020). India	To determine the prevalence of comorbidities such as Diabetes Mellitus & HIV/AIDS among newly diagnosed TB patients in Kerala in 2019 and also to determine the associated factors.	Cross-sectional study	Total data of 16,527 pulmonary and extra-pulmonary TB cases reported from 14 districts in Kerala from January to September 2019.	The results showed that diabetes mellitus was more dominant among pulmonary TB patients (27.6%) compared to extra-pulmonary TB cases (12.6%) with a statistically significant difference of $P < 0.001$. However, HIV as a comorbidity was found to be higher among extra-pulmonary TB patients (1.5%) compared to pulmonary TB patients (1%) with significance ($p < 0.001$). Pulmonary TB is more common than extra-pulmonary TB among diabetic patients due to a highly reactive immune response to.	Diabetes Mellitus and HIV/AIDS are comorbidities that significantly influence the diagnosis and management of Tuberculosis patients. Diabetes is significantly associated with pulmonary TB patients, while HIV/AIDS is significantly associated with extra-pulmonary TB.	Prevention, early diagnosis, and appropriate management strategies for comorbidities are greatly needed to ensure the success of TB treatment.	(28)

2	(Sama et al., 2023). Cameroon	To determine the prevalence and comorbidity rates of HIV and diabetes in tuberculosis (TB) patients.	Cross-sectional study	A total of 1221 suspected tuberculosis (TB) patients, but only 1115 confirmed pulmonary tuberculosis cases were included in this study, with no age restrictions. Each patient was given a sterile plastic cup (03) for sputum collection.	The results showed that the prevalence of TB/DM was 12.11%, while the prevalence of TB/HIV and TB/HIV/DM was 38.57% and 5.85%, respectively. The majority of TB/HIV/DM patients (77.42%) experienced chest pain for at least 2 weeks with highly statistically significant results ($p < 0.0001$; OR (95%CI): 114.3 (59.78–207.1)). In addition, it was found that 7.41% of patients had abnormal chest physical examination findings, 14.18% had positive sputum smear results, and 9.09% had positive sputum culture results ($p = 0.018$).	This study reported a high prevalence of DM comorbidity and HIV coinfection in the active tuberculosis patient population in the northwest region of Cameroon. Analysis showed a statistically significant difference between tuberculosis (TB) patients with HIV coinfection and/or diabetes mellitus (DM) comorbidity and TB patients without such coinfection. This difference was observed in clinical manifestations such as signs and symptoms, imaging findings, bacteriological examination results, and response to treatment provided.	Collaborative approaches should be implemented to improve screening and management of DM and HIV among TB patients in TB units.	(29)
3	Berkowitz et al., 2018) Afrika	To determine the prevalence of active TB among DM patients in primary care clinics and identify factors	Cross-sectional study	The number of participants was 492 DM patients, but only 440 participants completed the study, consisting of 13 TB-DM	The results showed that HIV prevalence was significantly higher in TB cases (61.5%; 95% CI 33.27–83.70) compared to non-TB cases (11.2%; 95% CI 8.57–14.62). Furthermore, the	DM patients with HIV–1 infection are 11 times more likely to have active TB and DM patients with TB are 10 times more likely to have HIV. This study further confirms that HIV-1 is a	Further research is needed to investigate who should be screened to improve screening feasibility. Should routine screening for TB be considered among all DM	(30)

		associated with TB in this population.		positive and 427 TB-DM negative.	likelihood of having active TB was 11.3 times higher for HIV-1 infected DM patients (95% CI 3.26–39.42) and the odds of having HIV among DM patients with TB were almost 10 times higher (OR 9.7; 95% CI 3.05–31.00) compared to DM patients without TB. People with HIV are more susceptible to TB because HIV-1 infection is the strongest recognized risk factor for TB. HIV infection weakens the immune system, making individuals more vulnerable to infections, including TB. Additionally, diabetes mellitus (DM) also contributes to the burden of TB, and DM patients infected with HIV-1 are at a greater risk of developing TB. DM itself can worsen health conditions and increase the risk of infections, including TB, so individuals with	significant risk factor for tuberculosis (TB) in diabetes mellitus (DM) patients, while also showing an increasing trend of multimorbidity.	patients in high TB prevalence settings, or should screening be focused on DM–HIV patients only?	
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4	Giri et al., 2024). India	To evaluate the burden of HIV and DM in TB cases from Odisha during 2019, and their impact on TB treatment outcomes.	Cohort Study	This study used data from 47,831 TB cases in the state of Odisha, India. The data was extracted from the Nikshay application in 2019. Nikshay is an online portal that serves as a health management information system specifically for TB disease in India.	The results showed that 7.6% (3659/47,831) suffered from diabetes mellitus (DM) along with TB and 1.2% (571/47,831) suffered from HIV along with TB, while only 0.08% (37/47,831) suffered from DM/HIV/TB. People with TB who did not have DM had significantly higher good outcomes (OR 1.6, 95% CI 1.5–1.8) compared to those with TB and DM. Similarly, TB cases without HIV infection had significantly higher good outcomes (OR 2.4, 95% CI 1.9–3.0) compared to those with TB and HIV.	This study shows that the presence of DM and/or HIV in TB patients impacts TB treatment outcomes.	It is crucial to prevent the occurrence of comorbidities such as DM and HIV and prioritize early diagnosis and management of these conditions.	(31)
5	(Tulu et al., 2021). Ethiopia	To determine the prevalence of DM and HIV infection and their	Cross-sectional study	280 TB patients met the inclusion criteria, but only 269 were included	The research findings indicate that among the total patients studied, 11.5% (95% confidence interval,	This study reported a high prevalence of DM and HIV coinfection among active TB	This study highlights the importance of collaborative efforts to improve screening	(32)

		associated risk factors among active tuberculosis patients in Northwest Ethiopia.		in the final analysis; 6 patients refused to participate in screening and 5 patients were excluded due to lack of confirmatory test results.	CI 7.8–15.2) had DM/TB comorbidity, and 21.9% (95% CI 16.7–26.8) had HIV/TB coinfection. The risk of DM was higher in TB patients from rural areas (adjusted odds ratio, aOR 3.13, 95% CI 1.02–9.62, $p = 0.046$). Similarly, DM was higher in TB patients with a family history of DM (aOR 4.54, 95% CI 1.31–15.68, $p = 0.017$). Furthermore, HIV/TB coinfecting patients were identified as predictors of DM comorbidity in active TB patients (aOR 5.11, 95% CI 2.01–12.98, $p=0.001$). The high prevalence of DM cases among TB/HIV cases is associated with changes in quality of life and side effects of antiretroviral drugs (ART) among HIV-positive patients. Additionally, immune suppression in HIV/AIDS patients	patients in Northwest Ethiopia. Additionally, rural residence status, family history of DM, and HIV/TB coinfection were found to be associated with DM–TB comorbidity.	and adopt better clinical management strategies for DM–TB comorbid patients.	
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6	(Munseri et al., 2019) Afrika	To identify factors associated with dual TB-DM disease among patients attending TB clinics in Dar es Salaam.	Cross-sectional study	The number of participants recruited was 660 out of 678 people undergoing TB treatment because 18 participants did not provide consent.	TB patients with HIV sero-positive were less likely to have DM compared to those who were HIV sero-negative {OR 0.35, 95% CI [0.17–0.73]}. TB patients have Impaired Fasting Glucose (IFG) which may be caused by stress. The stress experienced by TB patients can affect blood sugar levels, triggering the release of cortisol hormone and increasing blood sugar levels, thus becoming an indicator of future DM development	Diabetes mellitus is a common comorbidity in TB patients. HIV-seronegative TB patients are more likely to develop diabetes than those who are HIV-seropositive. However, the exact cause is unknown.	Diabetes mellitus is a common comorbidity in TB patients. HIV-seronegative TB patients are more likely to develop diabetes than those who are HIV-seropositive. However, the exact cause is unknown.	(33)