

# A Steady Increase in Nontuberculous Mycobacteriosis Mortality and Estimated Prevalence in Japan

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## Abstract

### Rationale:

Pulmonary disease caused by nontuberculous mycobacteria is generally reported to have a good prognosis. However, the actual mortality rate over time has not been reported in a large-scale survey.

### Objectives:

To determine the annual trend in mortality from nontuberculous mycobacteriosis, based on nearly four decades of patient data, and to estimate the prevalence of these cases in 2005.

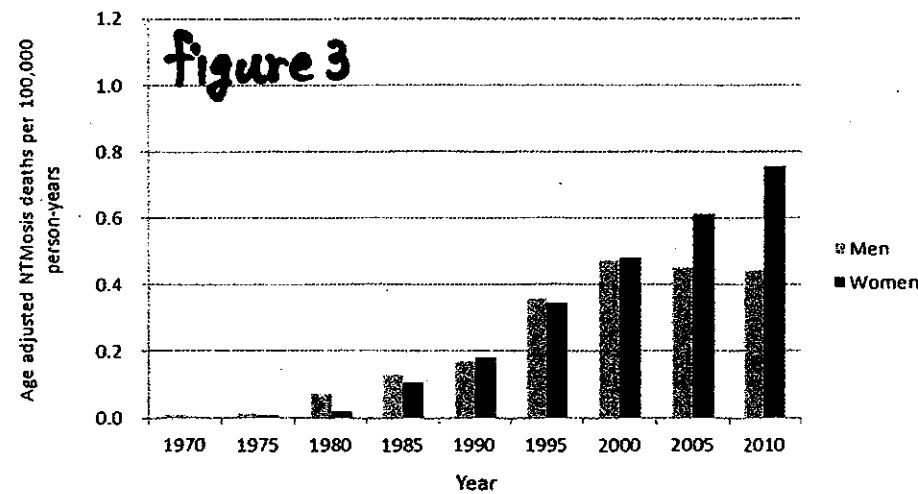
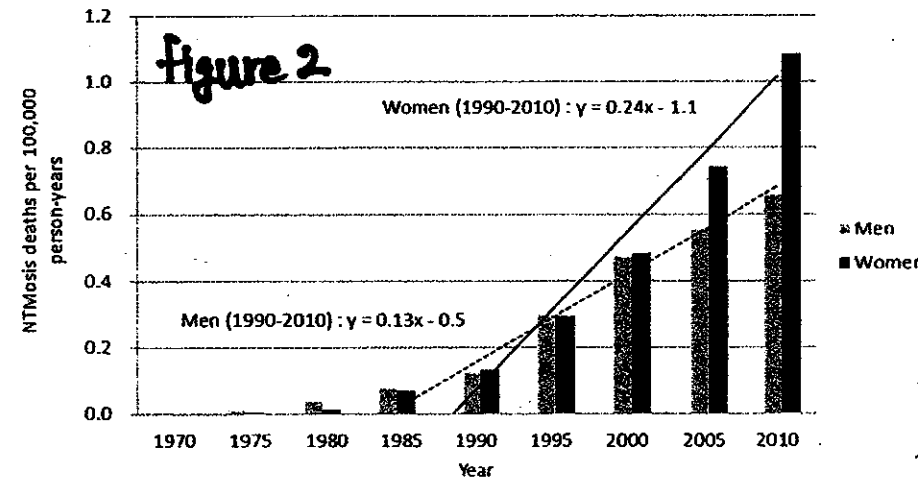
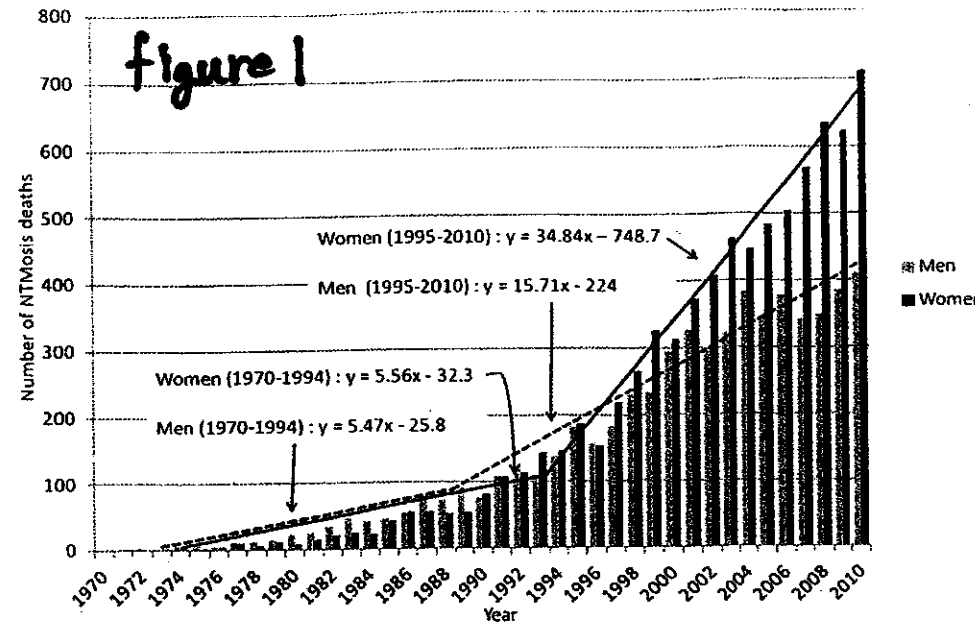
**Methods:** The annual mortality rate and regional distribution of nontuberculous mycobacteriosis-related deaths in Japan were obtained from Vital Statistics of Japan, which is published annually. The crude and age-adjusted mortality rates and associated regional differences were calculated from the Japanese census data. A 5-year follow-up study including 309 patients with pulmonary nontuberculous mycobacteriosis who visited and registered at our institute from 2004 to 2006 was conducted to determine the 5-year prognosis and the annual mortality rate.

### Measurements and Main Results:

The crude mortality rates for both sexes have increased since 1970, and the mortality rate from pulmonary disease was greater in women after 2005. The age-adjusted rates of disease also showed a gradual increase until 2010 in women. Geographically, higher standardized mortality ratios were observed in middle and western Japan, particularly in the southern coastal regions along the Pacific Ocean. In a clinical follow-up study, the mortality rate was approximately 1–2% annually. The prevalence of pulmonary nontuberculous mycobacteriosis was estimated to be 6- to 10-fold higher than the annual incidence.

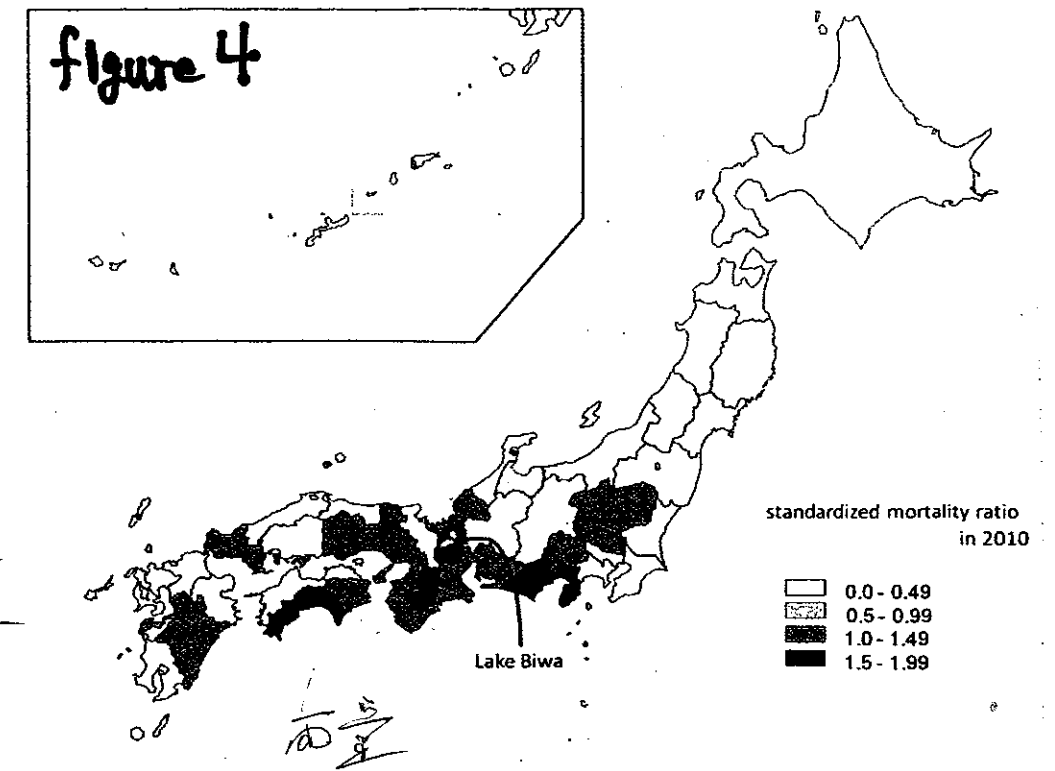
### Conclusions:

There was a constant and steady increase of nontuberculous mycobacteriosis-related mortality in Japan, and this mortality rate showed significant geographical variation. The prevalence of environmental mycobacterial disease in Japan is higher than reported in most other countries.



**table 2**

	Years of Follow-Up					Total (%)
	1	2	3	4	5	
Terminated follow-up	1	0	3	1	1	6 (2)
Continued follow-up	228	199	179	161	149	149 (48)
Culture-positive	228	109	98	64	53	—
All-mortality causes	13	8	3	5	2	31 (10)
MAC-specific mortality	4	3	3	2	1	13 (4.2)
Other institutes	37	6	7	2	0	52 (17)
Unknown	30	15	7	10	9	71 (23)



**table 1**

	Patients (n = 309)	%
Women	200	64.7
Age, yr	67 ± 13.7	
Smoker	93	30
Body height, cm	156.2 ± 9.2	
Body weight, kg	46.4 ± 9.5	
BMI, kg/m <sup>2</sup>	19.1 ± 3.1	
Symptoms		
Symptom free	105	34
Hemoptysis	43	14
Productive cough	171	55.3
Dyspnea	13	4.2
Cough	28	9.1
Fever	24	7.8
Chest pain	4	1.3
Underlying lung disease	123	39.8
Previous tuberculosis	59	19.1
COPD	10	3.2
Bronchiectasis	13	4.2
Bronchial asthma	10	3.2
Pulmonary fibrosis	4	1.3
Lung cancer	4	1.3
Other	23	7.4

**table 3**

Surveyed Area/Population, Country	Study Period	Incidence	Prevalence	Author [Ref. No.]
North America				
Ontario, Canada	2008		6.81	Al-Houqani <i>et al.</i> [15]
Four IHDS, USA	1994-2006		1.4-6.7	Prevots <i>et al.</i> [30]
Oregon, USA	2005-2006		5.6	Cassidy <i>et al.</i> [3]
Medicare beneficiaries, USA	1997-2007		20-47	Adjemian <i>et al.</i> [27]
New York, USA	2000-2003	2		Bodle <i>et al.</i> [31]
British Columbia, Canada	1990-2006	1.6		Hernández-Garduño <i>et al.</i> [32]
Europe				
Denmark	1997-2008	1.08		Andréjak <i>et al.</i> [5]
Sentinel site surveillance, France	2001-2003	0.73		Dailoux <i>et al.</i> [33]
Central Greece, Greece	2004-2006	0.7		Gerogianni <i>et al.</i> [34]
Oceania				
Queensland, Australia	2005	3.2		Thomson [35]
New Zealand	2004	1.17		Freeman <i>et al.</i> [36]
Asia				
Japan	2007	5.7		Satoh [13]
	2005		33-65	Present study