日本における腎炎，ネフローゼ年齢訂正死亡率の年次推移

小林章夫*・中川武夫・山中克巳**

AGE-SPECIFIC TRENDS IN MORTALITY FROM NEPHRITIS AND NEPHROSIS IN JAPAN

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ABSTRACT

Analysis of mortality rates from renal disease (nephritis and nephrosis, acute nephritis, chronic nephritis) in Japan shows :

1) that death rates from chronic nephritis decreased sharply since 1970 in men aged 15-49 years and in women aged 15-39 years ;

2) that in men aged 20-34 years, the mortality rates from chronic nephritis increased from 1955 to 1969 with successive cohorts experiencing higher mortality rates ;

3) that the mortality rates from acute nephritis decreased simultaneously in all age groups and in both sexes during the first ten years from 1955.

The influence of the wide application of hemodialysis therapy are discussed.

1. INTROUDUCTION

In Japan, the number of the patients treated with hemodialysis has markedly increased during the past decade 1), as shown in Fig 1. Hemodialysis is a life-saving technique for end-stage renal disease. The wide application of hemodialysis therapy may have potentially altered mortality levels from renal disease. This paper describes secular changes in renal mortality in Japan, and attempts to interpret such changes.

2. MATERIALS AND METHODS

Date was obtained from Japanese Vital Statistics from 1955 to 1978 2). Deaths from nephritis and nephrosis (prior to 1968, codes 590-594 in the International Statistical Classification of Diseases (ICD), and after 1968, ICD codes 580-584) were tabulated by five-year age groups for Japanese men and women for each year since 1955.

The annual number of deaths in each age-sex group was divided by the correspond-

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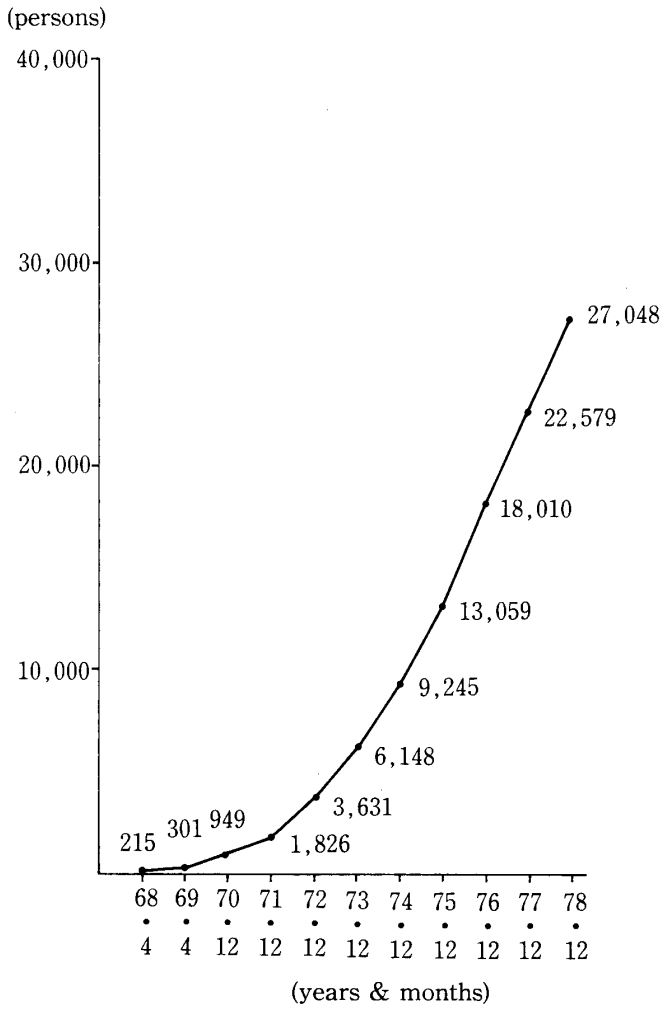


Fig. 1 Numbers of Patients Treated with Hemodialysis in Japan *From Odaka M. (1)

ing mid-year population, giving the annual-mortality rate per 100,000. Mortality rates for nephritis and nephrosis are shown in Table 1. The death index for each age-sex group was calculated by comparing the death rate for each year since 1956 with the rate in 1955 taken as 100. The secular changes of the death indexes are presented in Fig 2.

3. RESULTS

As shown in Table 1 and Fig 2, the secular trends in mortality rates and death indexes from 1955 to 1978 vary considerably by age, but can be divided into the following three patterns :

1. The first secular pattern involves a remarkable decrease in mortality rates and death indexes during the first 10 year period, beginning in 1955, which then shows to a gradual decrease, for men and women aged 0-9 years and 65-74 years.
2. Among men aged 15-44 years, and women aged 15-34 years, there is little change in mortality rate and death index with a slight decrease during the first ten year period, afterwhich there occurs a rapid decrease since 1970.
3. For men aged 10-14 and 45-64 years, and for women aged 10-14 and 35-64 years, a continuous decrease since 1955 was apparent.

When comparing the two sexes for secu-

Table. 1 Age-specific mortality rates (per 100,000) for nephritis and nephrosis for Japanese men and women aged 0-74 years, 1955-1978

Age (years)	Mortality rate : years (men)																							
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
0- 4	11.4	11.3	10.5	8.9	7.0	4.7	3.6	2.9	2.1	2.0	1.4	1.2	1.0	0.7	0.7	0.7	0.7	0.5	0.8	0.7	0.6	0.4	0.4	0.3
5- 9	8.9	9.4	7.9	6.2	4.9	4.3	3.7	3.2	2.9	2.6	2.7	1.9	1.4	1.7	1.5	1.4	1.0	0.9	1.1	0.6	0.4	0.6	0.4	0.4
10-14	4.2	4.9	4.6	3.7	3.6	3.2	3.0	3.0	2.5	2.6	2.8	2.0	2.1	2.2	1.9	1.6	1.0	1.3	1.3	0.6	0.5	0.4	0.3	0.3
15-19	5.0	5.4	5.5	5.3	5.4	5.0	5.6	4.7	4.0	4.0	4.0	4.3	3.7	3.6	3.9	3.6	3.1	2.2	2.2	1.5	1.4	0.9	0.7	0.3
20-24	6.3	6.7	7.6	7.3	7.9	7.6	6.6	6.8	6.9	7.1	7.8	7.1	6.9	6.6	6.6	4.9	4.8	3.9	3.6	3.0	2.1	1.9	0.8	1.1
25-29	6.5	6.6	7.8	7.1	8.1	7.5	7.1	7.8	8.0	8.3	8.1	8.3	8.1	7.6	9.0	7.0	6.5	5.2	4.2	3.0	2.3	1.9	1.5	1.5
30-34	7.0	7.3	8.0	7.2	6.9	7.3	7.6	7.8	7.7	6.9	7.6	6.8	7.0	8.1	8.5	6.2	5.8	5.5	4.6	3.6	3.3	2.3	1.9	2.0
35-39	9.0	9.3	9.6	8.2	8.5	7.8	7.4	8.5	7.7	7.6	7.3	7.4	7.4	7.5	8.0	6.7	5.8	5.1	4.8	4.6	3.5	2.8	2.7	2.5
40-44	11.3	11.1	13.9	11.5	11.4	9.1	10.3	10.4	9.8	8.9	8.3	9.2	8.2	8.3	9.8	7.1	6.7	6.6	5.5	4.9	4.4	4.0	3.5	3.2
45-49	16.7	16.7	17.4	15.7	14.5	14.5	14.1	13.2	12.9	11.7	12.4	11.2	10.2	10.2	10.5	9.1	8.1	7.0	5.9	5.5	5.6	5.7	4.8	3.7
50-54	25.8	26.6	25.4	22.8	19.4	20.6	17.3	17.2	17.2	14.7	14.2	12.5	13.6	14.7	13.3	12.8	10.9	9.9	8.4	9.5	7.2	6.5	5.3	6.6
55-59	39.8	39.5	41.7	36.5	31.7	31.0	25.7	25.2	22.7	20.6	21.2	17.9	16.7	18.3	17.7	17.0	15.6	12.9	12.4	13.4	12.0	10.1	10.1	9.1
60-64	69.8	69.7	68.0	55.6	50.8	45.3	39.8	38.9	31.3	30.3	30.1	27.4	25.2	22.9	26.0	22.5	21.2	18.7	19.1	18.5	16.8	15.4	14.1	13.5
65-69	121.8	118.9	113.7	94.0	83.4	78.4	75.9	68.1	58.0	44.8	43.7	39.5	36.3	37.7	35.7	33.5	33.6	27.3	30.8	27.8	27.6	23.5	21.7	25.3
70-74	195.1	195.6	189.8	161.7	148.3	139.8	124.6	120.3	97.0	80.1	81.5	65.1	58.0	56.7	54.1	49.5	42.6	39.9	38.7	40.3	41.4	43.7	36.3	41.0

Age (years)	Mortality rate : years (women)																							
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
0- 4	8.2	7.2	7.7	4.9	4.0	2.7	2.2	1.3	1.4	1.0	1.0	0.7	0.7	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.4	0.2	0.2
5- 9	6.7	6.5	5.3	4.8	3.6	3.2	2.1	1.6	1.3	1.2	1.2	1.0	1.2	0.6	0.9	0.7	0.6	0.5	0.6	0.4	0.4	0.5	0.3	0.2
10-14	4.4	4.6	4.4	4.3	3.1	2.8	2.2	2.4	2.1	1.7	2.0	2.1	1.4	1.4	1.3	1.1	1.1	0.8	1.0	0.7	0.4	0.6	0.2	0.2
15-19	5.3	5.0	5.1	4.4	4.7	3.7	4.1	3.6	3.3	3.1	2.9	2.7	2.8	2.7	2.8	3.1	2.5	1.8	1.5	1.3	0.6	0.5	0.4	0.5
20-24	6.0	6.6	6.2	5.5	5.3	4.8	5.2	4.9	4.9	4.4	4.4	5.3	3.9	4.0	3.8	3.3	2.6	2.7	2.0	1.6	1.3	1.2	0.8	0.5
25-29	7.7	6.9	8.0	6.5	6.5	6.6	5.0	5.6	5.2	4.7	5.3	5.3	4.6	5.2	5.2	4.0	3.6	3.2	2.6	2.1	1.6	1.1	1.3	1.1
30-34	8.7	8.6	10.3	7.4	7.5	6.7	6.4	6.2	5.7	5.3	5.9	5.1	5.2	5.4	5.2	4.7	4.1	4.0	3.0	2.8	2.2	2.1	1.6	1.1
35-39	12.4	12.4	11.4	9.9	9.3	8.5	8.2	8.5	7.1	7.7	6.9	6.4	5.9	5.6	6.5	5.9	5.2	4.1	4.0	3.4	3.0	2.6	1.9	1.8
40-44	14.9	13.4	14.9	12.0	11.8	10.5	9.8	9.2	9.2	7.5	8.4	7.5	7.2	7.3	6.8	6.5	6.7	5.3	4.9	4.9	4.4	3.2	2.4	2.4
45-49	19.7	18.4	17.7	16.5	14.5	15.0	12.9	11.5	11.1	11.1	11.3	9.0	9.1	8.7	9.4	8.4	8.5	7.0	7.1	5.3	4.8	4.7	3.7	3.6
50-54	26.0	25.5	26.4	22.0	18.6	17.5	16.4	15.1	12.8	13.6	12.2	11.3	9.6	10.6	10.9	9.2	7.8	8.0	8.4	7.4	7.0	5.3	4.6	4.7
55-59	38.4	37.8	35.8	31.7	27.4	23.4	23.5	20.9	20.5	17.2	16.6	14.0	13.2	15.2	13.3	13.8	11.7	10.5	10.7	10.0	9.2	9.2	7.2	8.2
60-64	60.8	62.8	55.1	51.4	46.4	40.6	34.0	31.2	27.6	24.2	25.6	20.7	21.6	21.4	19.9	18.2	16.9	14.8	14.9	14.0	13.3	12.7	11.2	10.8
65-69	109.5	101.2	94.0	80.7	75.0	68.3	59.4	53.1	47.1	43.2	40.2	34.5	31.9	32.2	29.5	25.9	26.4	23.0	24.3	21.5	22.2	20.2	17.5	17.9
70-74	166.7	169.7	166.9	142.8	130.1	117.9	103.5	90.4	79.2	66.3	69.7	54.3	47.5	48.4	48.4	43.2	38.8	32.7	34.0	34.5	34.1	30.8	27.8	32.9

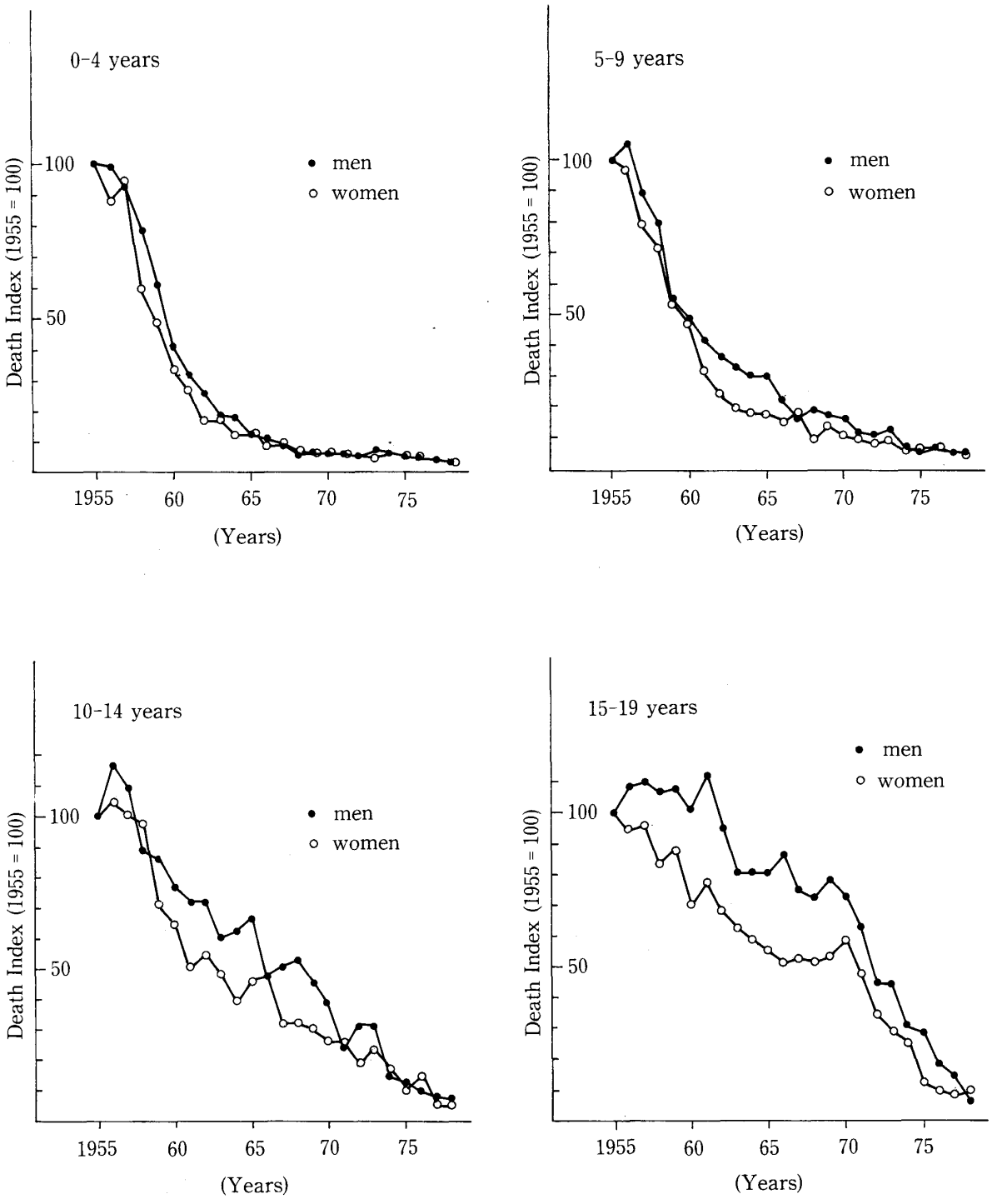
lar changes in death indexes, the difference which is most notable is in the age group between 20-39 years. In other age groups the differences are not as readily distinguishable.

According to the Eighth Revision of the International Statistical Classification of Diseases, nephritis and nephrosis (ICD 580 -584) consist of acute nephritis (ICD 580), nephrotic syndrome (ICD 581), chronic nephritis (ICD 582), nephritis unqualified (ICD 583) and renal sclerosis unqualified (ICD 584). In general, chronic nephritis accounted for 50-75% of the combined death rate (nephritis and nephrosis), and acute nephritis accounted for 10-20% of the combined death rate in the age groups above 20 years. The proportions of acute nephritis and nephrotic syndrome cases are high in the age groups under 20 years. The mortality rates from other renal diseases (ICD 583, 584) were low.

The secular changes of death rates from acute nephritis and from chronic nephritis were examined for each age-sex group (Table 2, Table 3). The death indexes are calculated as described above, and presented in Fig 3 and Fig 4.

The death rates and death indexes from acute nephritis showed a decline during the first ten years, from 1955, and then a gradual decrease until 1978 (Table 2, Fig 3). These trends occurred simultaneously in all age

Fig. 2 Secular changes of the death indexes for nephritis and nephrosis (1)



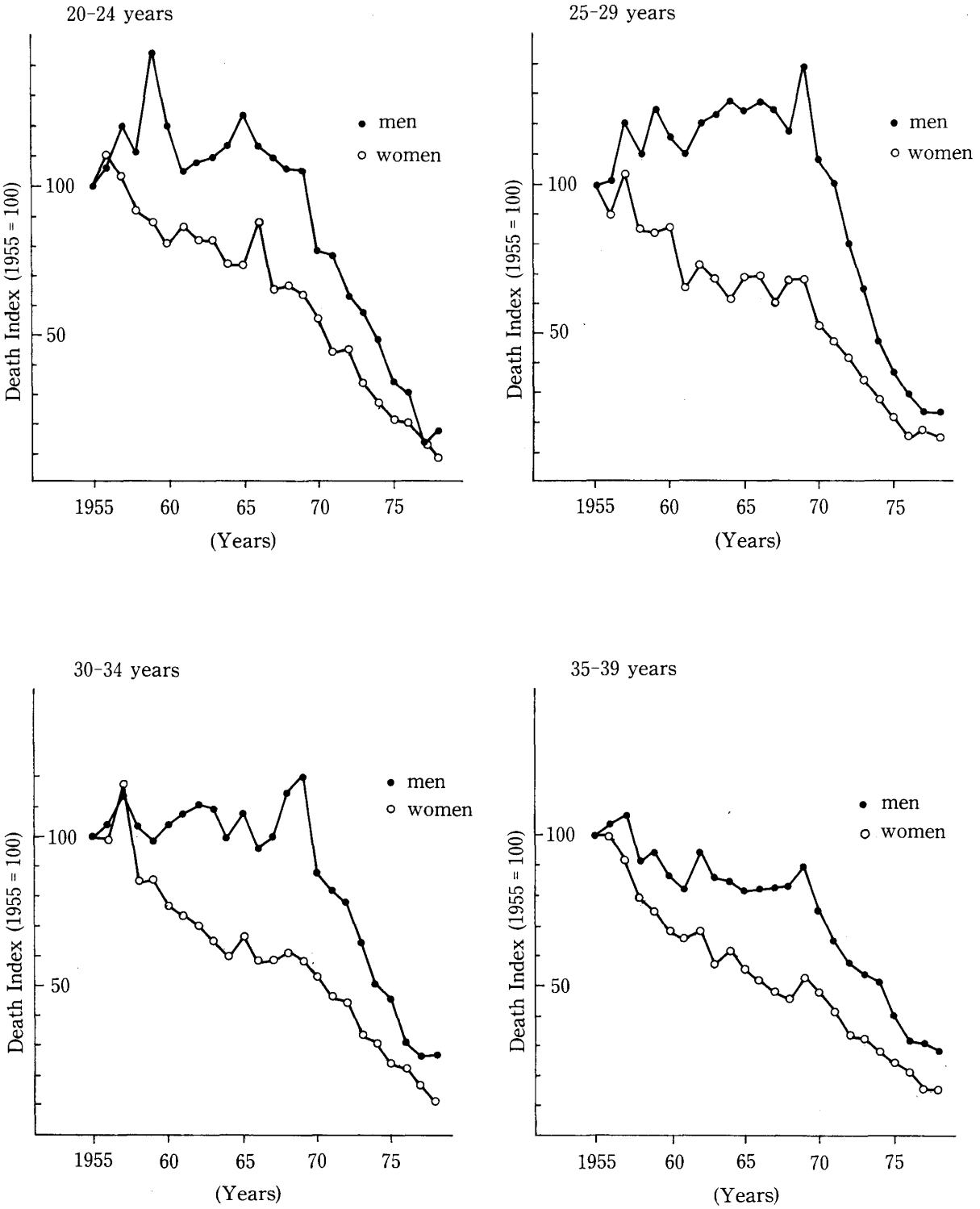
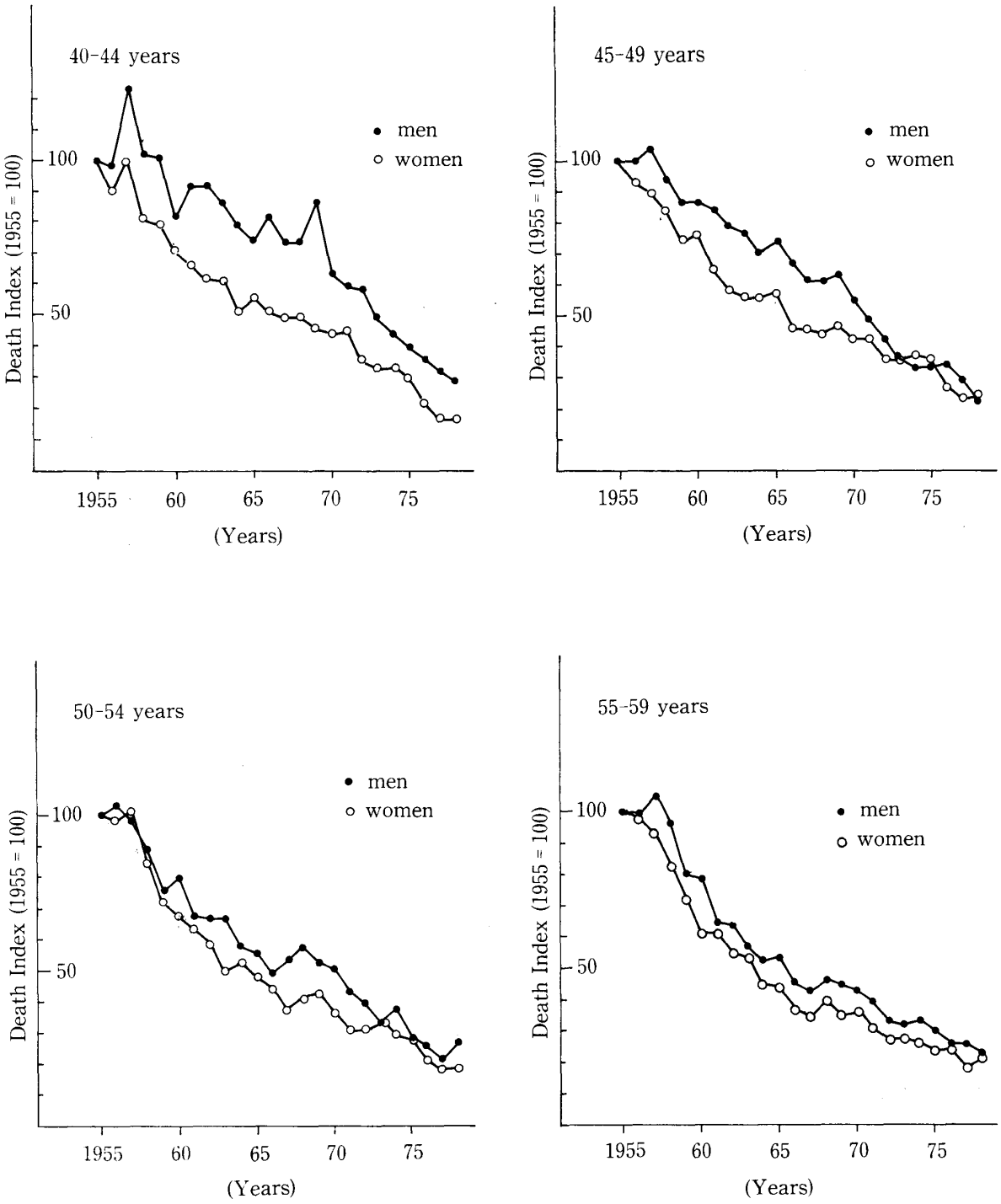
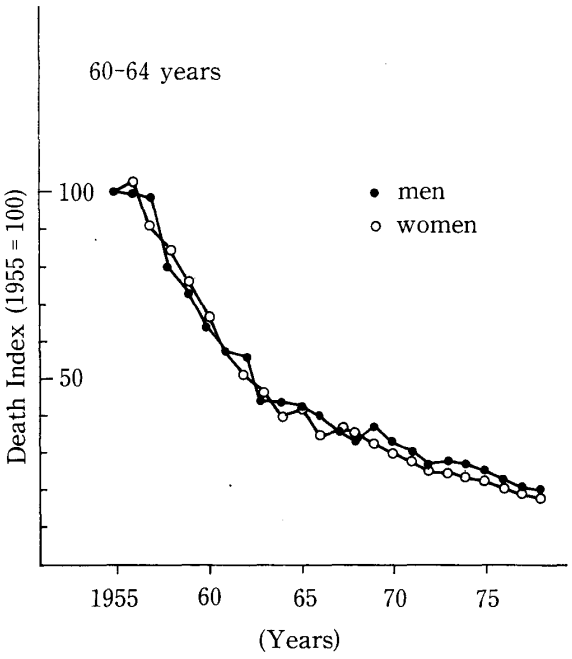
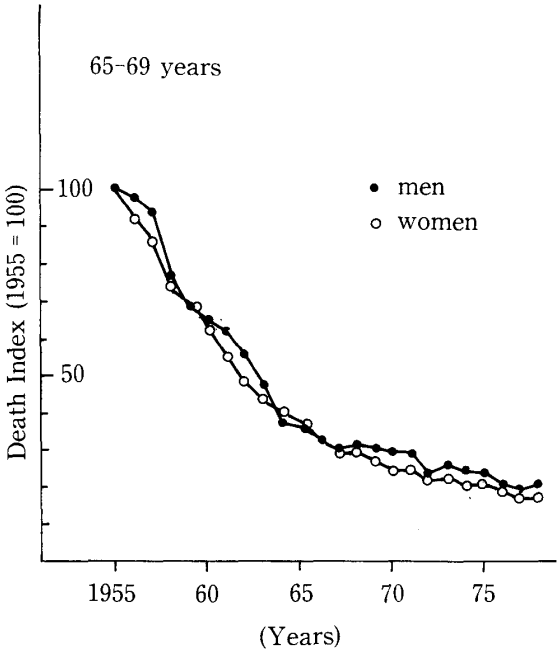

20-24 years
25-29 years
30-34 years
35-39 years
men
women
Death Index (1955 = 100)
100
50
1955
60
65
70
75
(Years)

Fig. 2 Secular changes of the death indexes for nephritis and nephrosis (2)




60-64 years
Death Index (1955 = 100)
100
50
• men
o women
1955
60
65
70
75
(Years)


65-69 years
Death Index (1955 = 100)
100
50
• men
o women
1955
60
65
70
75
(Years)

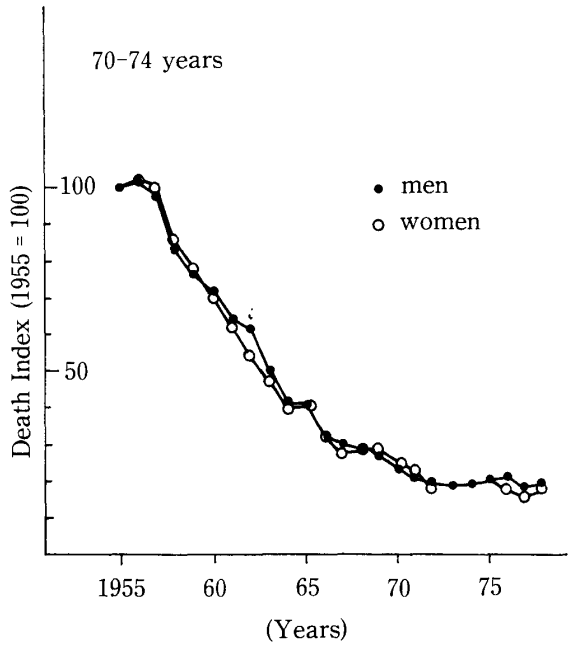
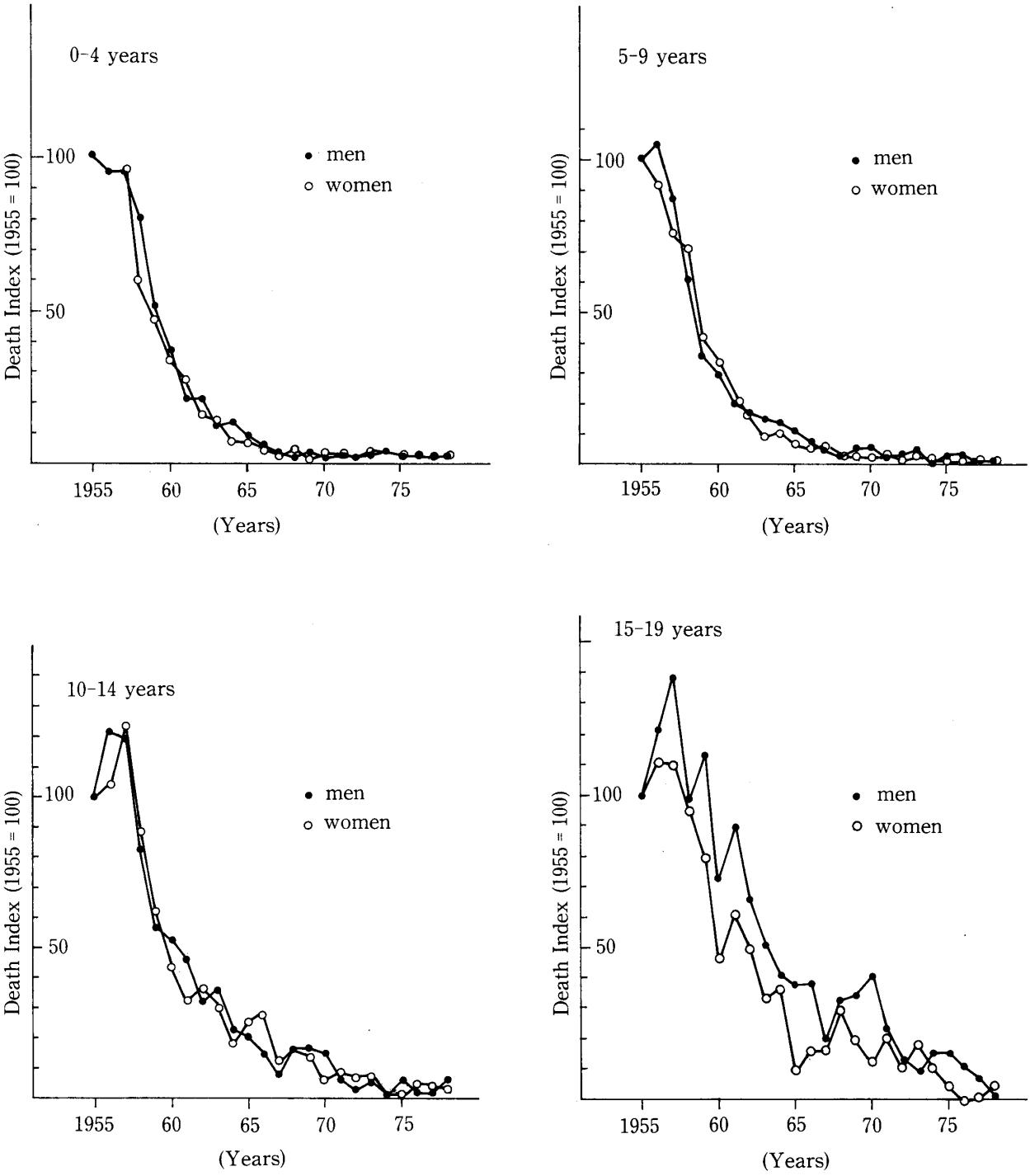
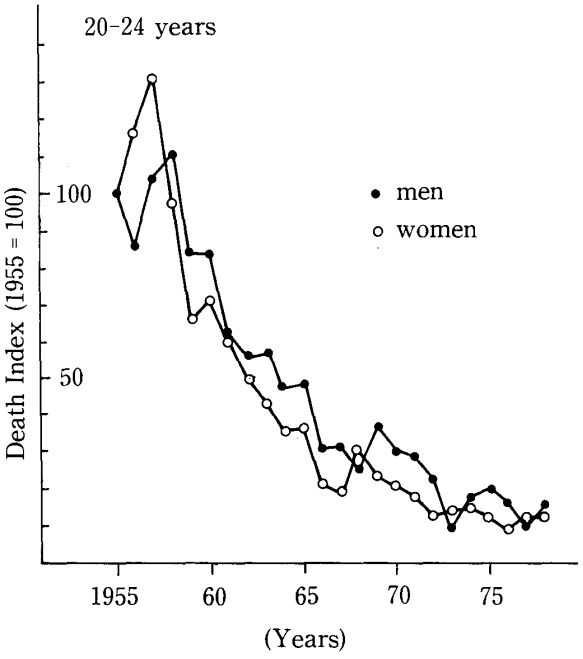
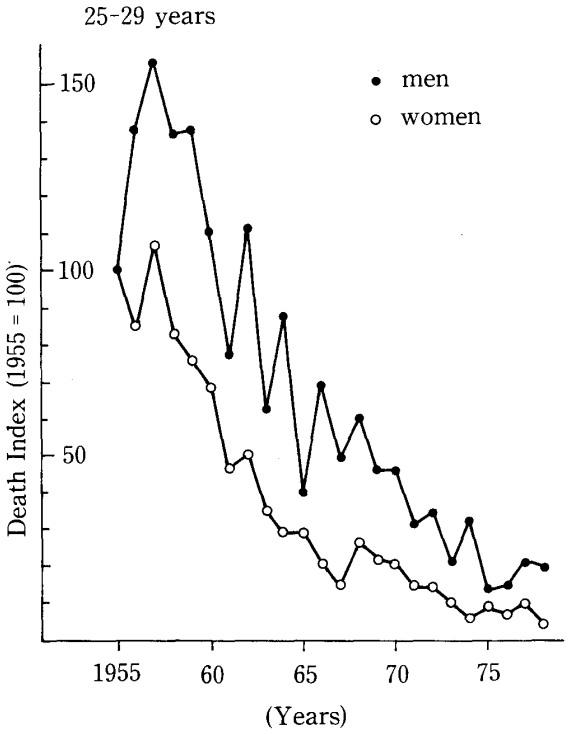
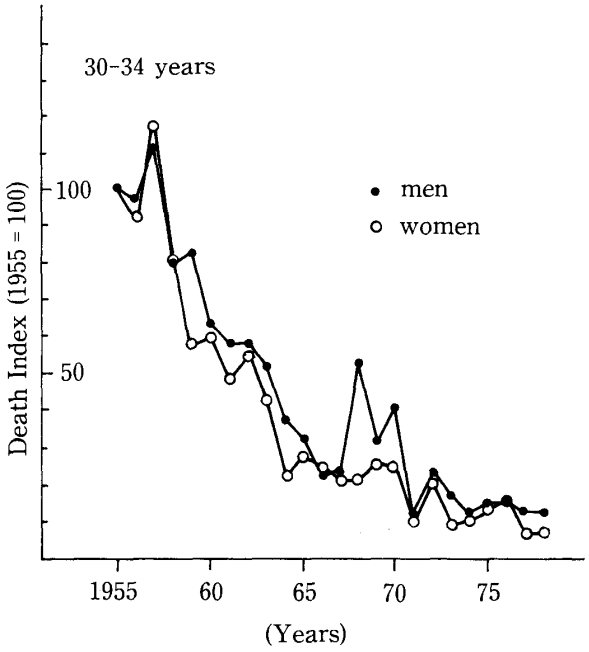

70-74 years
Death Index (1955 = 100)
100
50
• men
o women
1955
60
65
70
75
(Years)

Fig. 3 Secular changes of the death indexes for acute nephritis (1)




20-24 years
Death Index (1955 = 100)
100
50
men
women
1955
60
65
70
75
(Years)


25-29 years
Death Index (1955 = 100)
150
100
50
men
women
1955
60
65
70
75
(Years)


30-34 years
Death Index (1955 = 100)
100
50
men
women
1955
60
65
70
75
(Years)

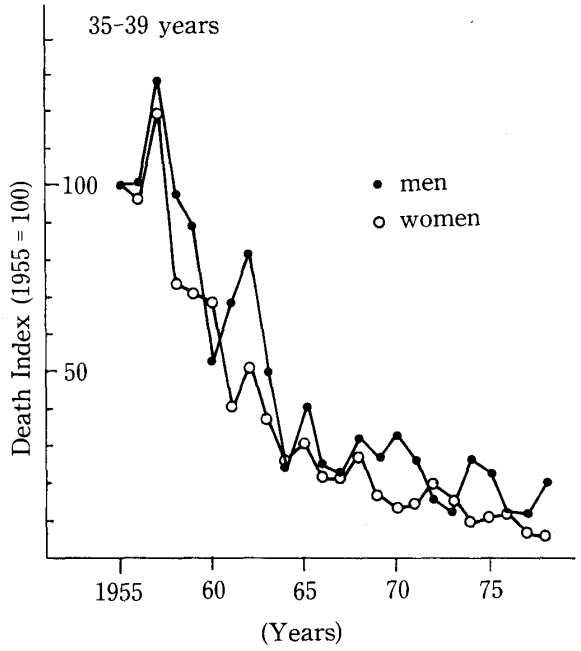
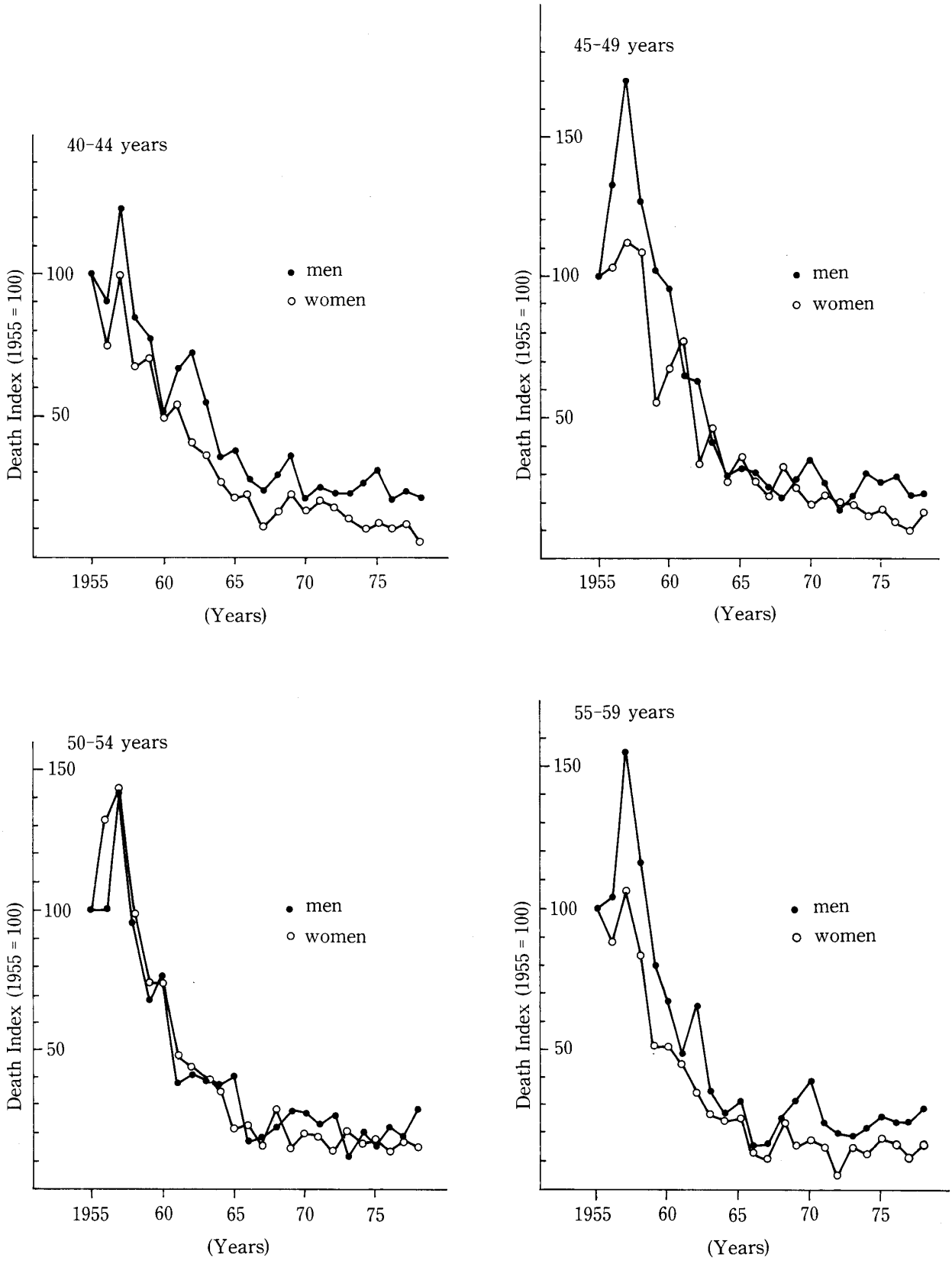
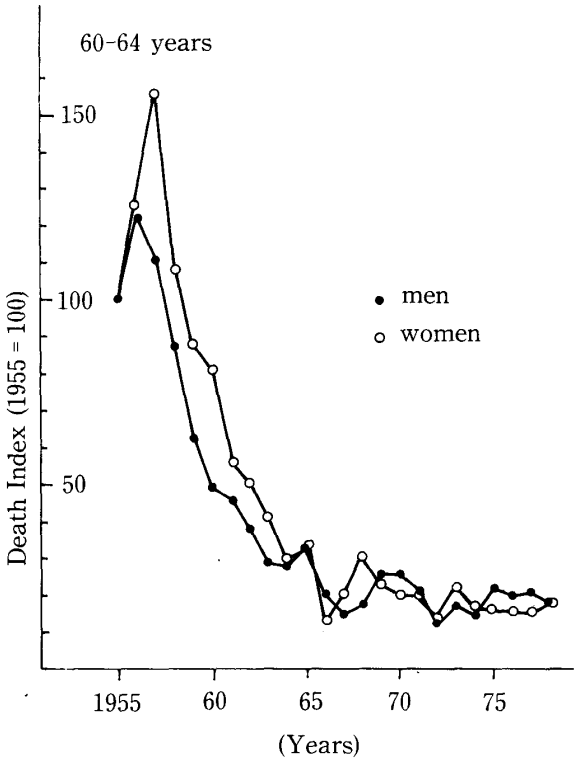
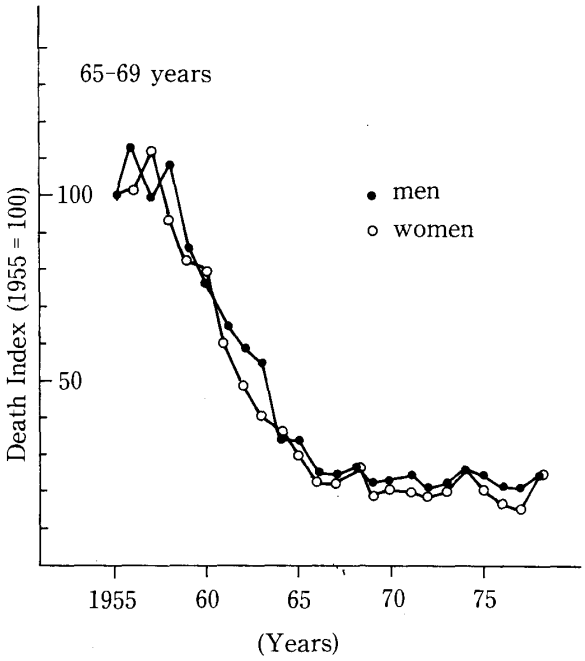

35-39 years
Death Index (1955 = 100)
100
50
men
women
1955
60
65
70
75
(Years)

Fig. 3 Secular changes of the death indexes for acute nephritis




60-64 years
150
100
50
Death Index (1955 = 100)
men
women
1955
60
65
70
75
(Years)


65-69 years
100
50
Death Index (1955 = 100)
men
women
1955
60
65
70
75
(Years)

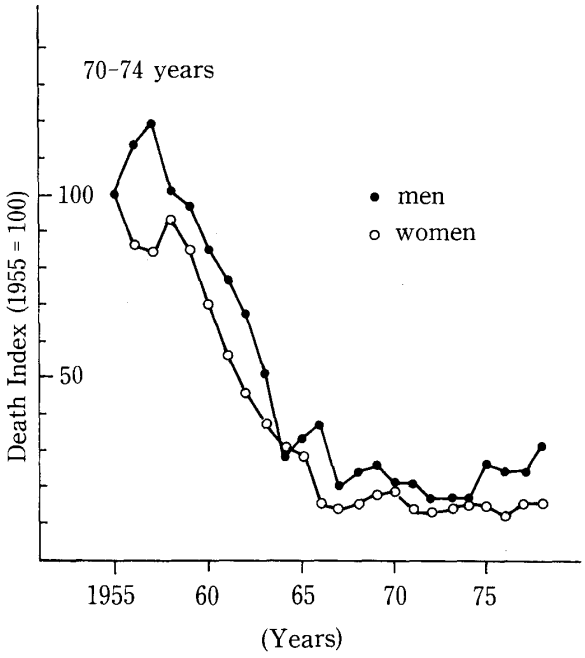
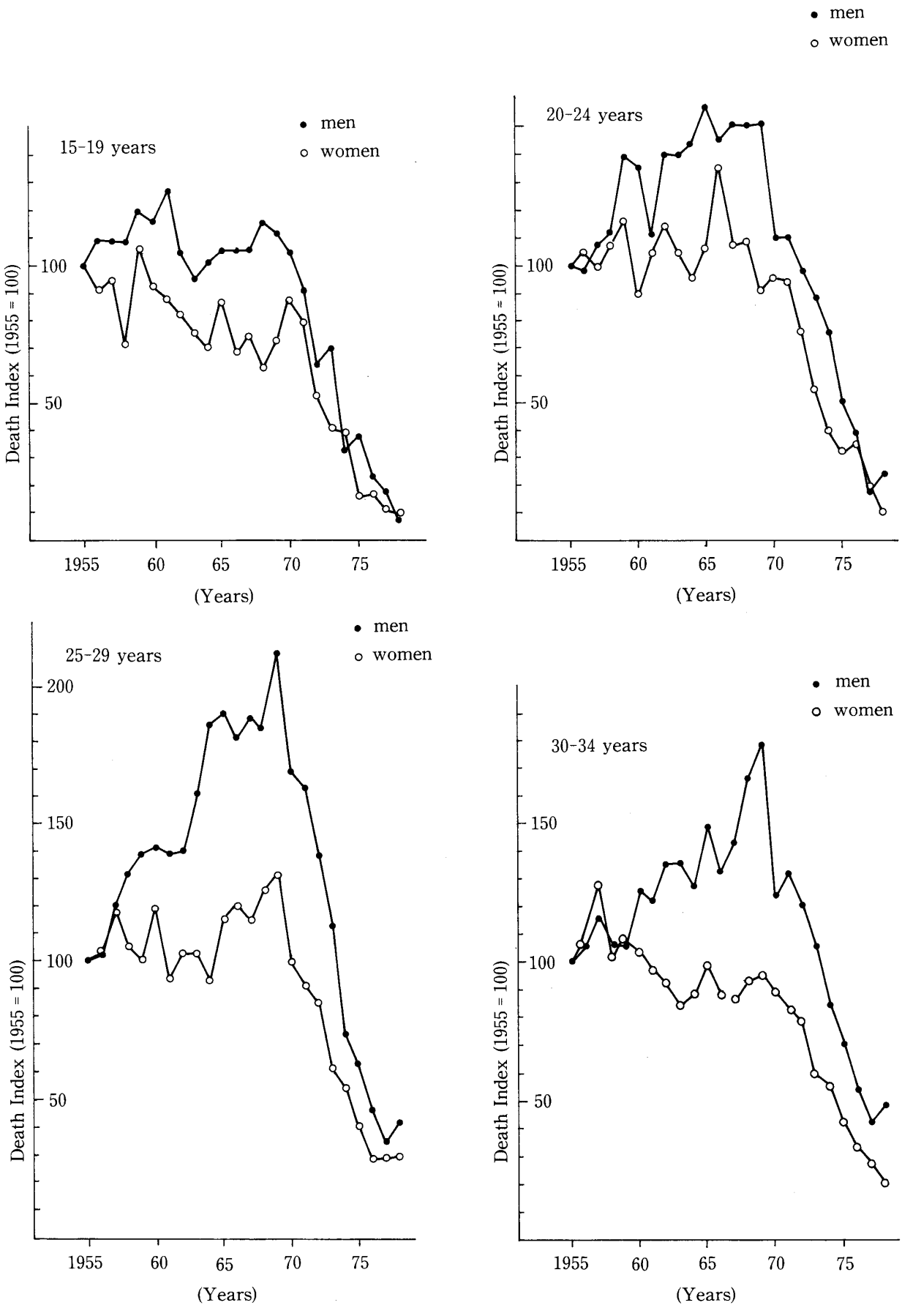
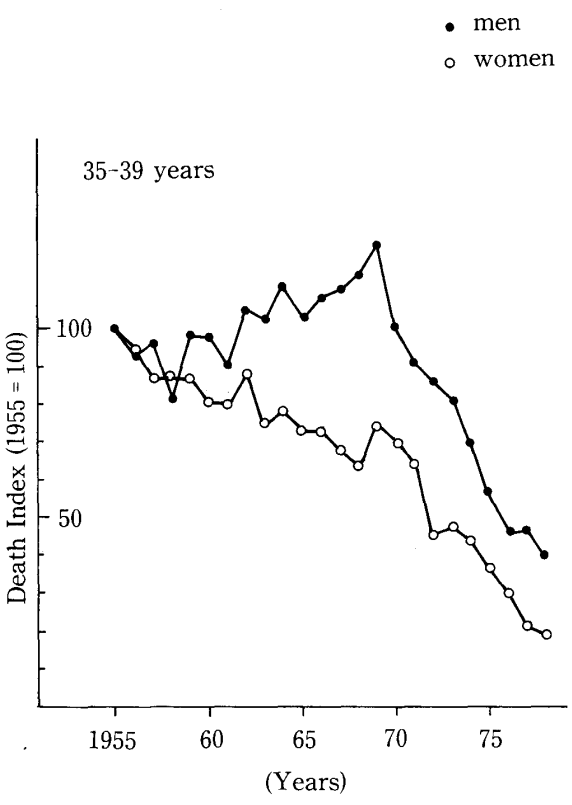
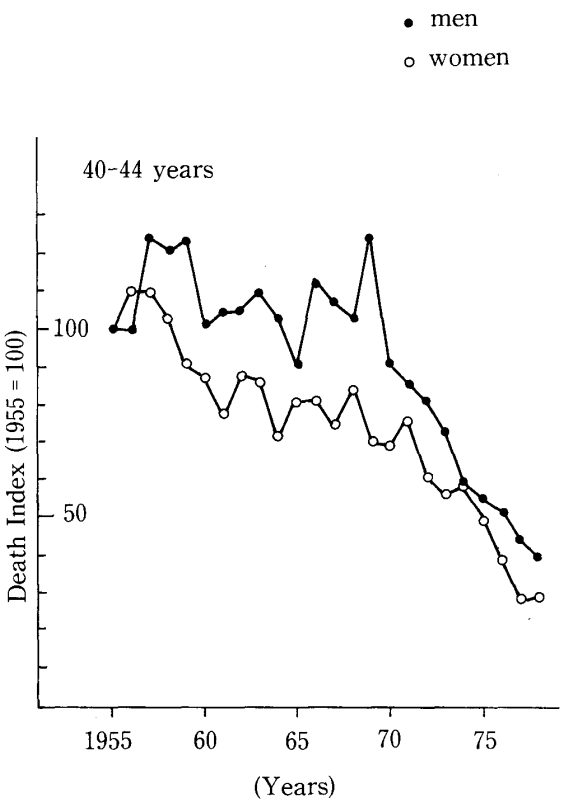
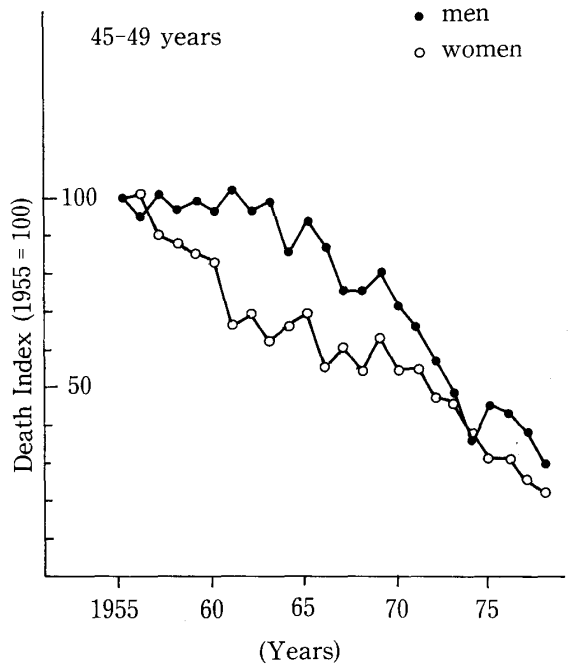

70-74 years
100
50
Death Index (1955 = 100)
men
women
1955
60
65
70
75
(Years)

Fig. 4 Secular changes of the death indexes for chronic nephritis (1)




• men
o women
35-39 years
Death Index (1955 = 100)
100
50
1955
60
65
70
75
(Years)


• men
o women
40-44 years
Death Index (1955 = 100)
100
50
1955
60
65
70
75
(Years)


• men
o women
45-49 years
Death Index (1955 = 100)
100
50
1955
60
65
70
75
(Years)

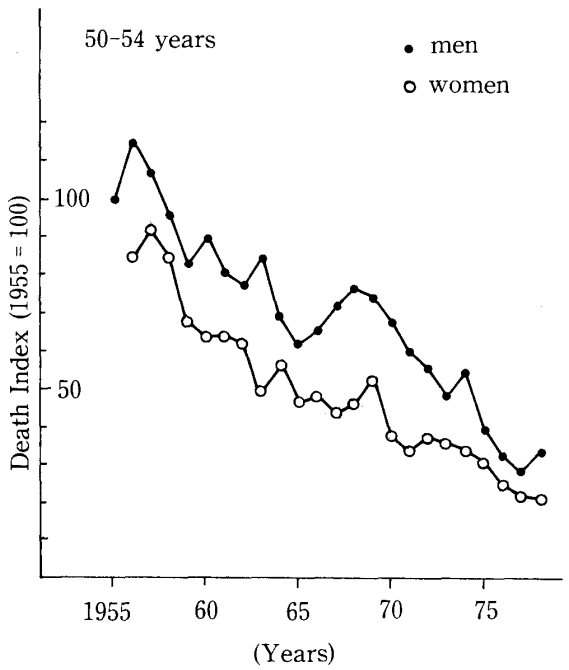

• men
o women
50-54 years
Death Index (1955 = 100)
100
50
1955
60
65
70
75
(Years)

Fig. 4 Secular changes of the death indexes for chronic nephritis (2)

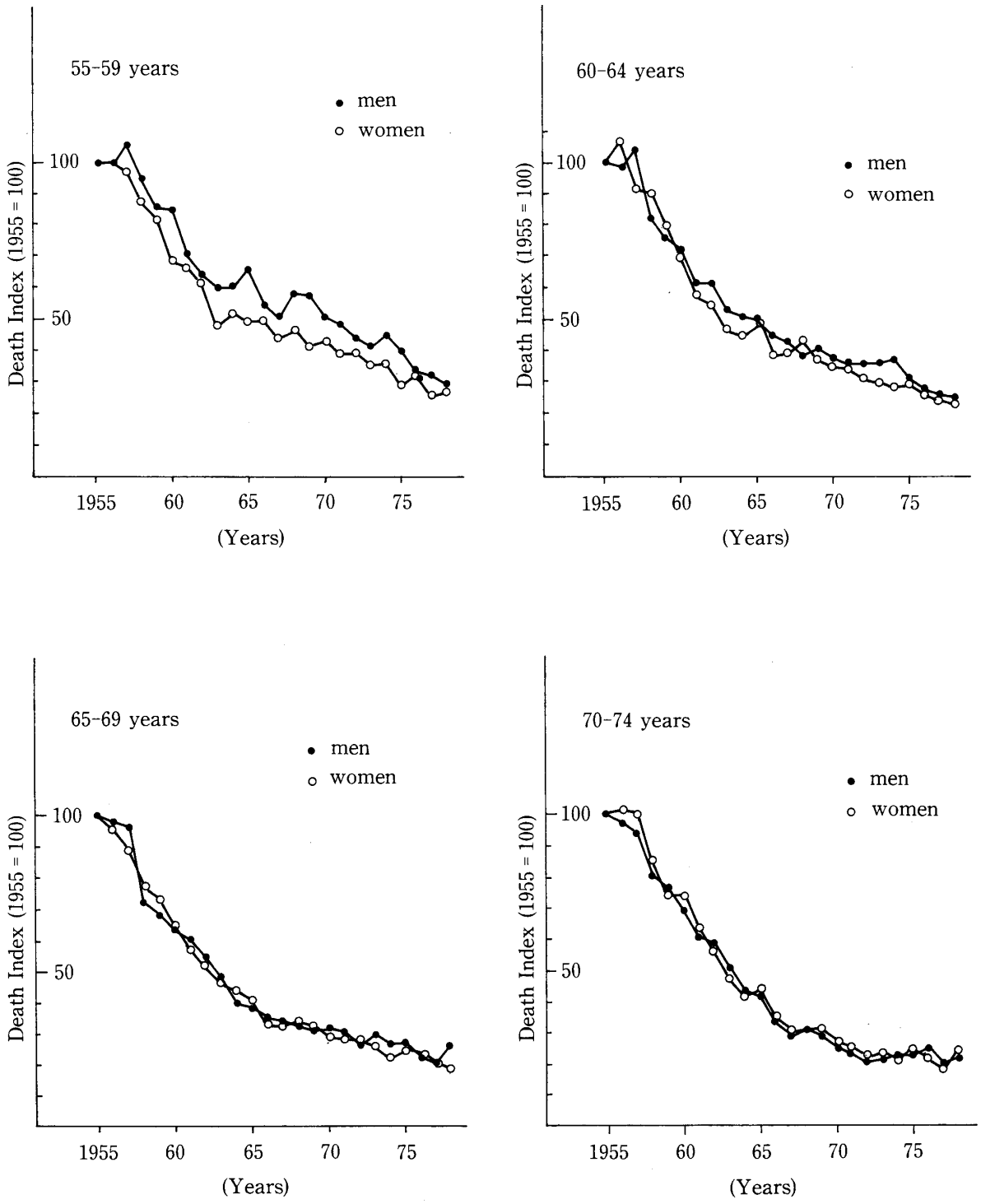


Table. 2 Age-specific mortality rates (per 100,000) for acute nephritis

Age (years)	Mortality rate : years (men)																							
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
0- 4	6.9	6.6	6.6	5.5	3.6	2.5	1.4	1.4	0.8	0.9	0.6	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
5- 9	4.7	4.9	4.1	2.8	1.7	1.4	0.9	0.8	0.7	0.6	0.5	0.3	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0	0.1	0.1	0	0
10-14	1.6	2.0	2.0	1.3	0.9	0.8	0.7	0.5	0.6	0.4	0.3	0.2	0.1	0.3	0.3	0.2	0.1	0	0.1	0	0.1	0	0	0.1
15-19	1.3	1.6	1.8	1.3	1.5	0.9	1.2	0.9	0.7	0.5	0.5	0.5	0.3	0.4	0.5	0.5	0.3	0.2	0.1	0.2	0.2	0.2	0.1	0
20-24	1.6	1.4	1.6	1.7	1.3	1.3	1.0	0.9	0.9	0.7	0.8	0.5	0.5	0.4	0.6	0.5	0.5	0.4	0.1	0.3	0.3	0.3	0.2	0.2
25-29	1.1	1.5	1.7	1.5	1.5	1.2	0.8	1.2	0.7	0.9	0.4	0.7	0.5	0.6	0.5	0.5	0.3	0.4	0.2	0.3	0.1	0.1	0.2	0.2
30-34	1.6	1.5	1.8	1.2	1.3	1.0	0.9	0.9	0.8	0.6	0.5	0.4	0.4	0.8	0.5	0.7	0.2	0.4	0.3	0.2	0.2	0.3	0.2	0.2
35-39	1.9	1.9	2.4	1.8	1.7	1.0	1.3	1.5	0.9	0.5	0.8	0.5	0.4	0.6	0.5	0.6	0.5	0.3	0.2	0.5	0.4	0.3	0.2	0.4
40-44	2.2	2.0	2.8	1.9	1.7	1.1	1.5	1.6	1.2	0.8	0.8	0.6	0.5	0.6	0.8	0.4	0.5	0.5	0.5	0.6	0.7	0.4	0.5	0.5
45-49	2.5	3.3	4.2	3.1	2.5	2.4	1.6	1.6	1.0	0.7	0.8	0.7	0.6	0.5	0.7	0.9	0.7	0.5	0.5	0.8	0.7	0.7	0.6	0.6
50-54	4.3	4.3	6.1	4.0	2.9	3.3	1.6	1.8	1.6	1.6	1.7	0.7	0.7	0.9	1.2	1.1	0.9	1.1	0.4	0.9	0.6	0.9	0.7	1.2
55-59	5.6	5.8	8.7	6.5	4.5	3.8	2.7	3.6	1.9	1.5	1.7	0.9	0.9	1.4	1.8	2.2	1.3	1.1	1.1	1.3	1.5	1.4	1.4	1.7
60-64	11.0	13.5	12.2	9.7	6.9	6.5	6.2	4.2	3.3	3.1	3.7	2.3	1.7	1.9	2.9	2.9	2.3	1.4	1.9	1.5	2.4	2.1	2.3	2.0
65-69	15.1	17.1	16.7	16.3	13.0	11.7	9.8	8.9	8.3	5.2	4.9	3.7	3.7	4.0	3.3	3.5	3.6	3.1	3.2	3.7	3.7	3.2	3.0	3.8
70-74	25.3	28.7	29.9	28.1	24.3	21.5	19.5	16.9	12.9	7.1	8.5	9.4	5.2	6.2	6.7	5.8	5.5	4.7	4.7	4.8	7.0	6.4	6.5	8.2

Age (years)	Mortality rate : years (women)																							
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
0- 4	5.4	5.2	5.2	3.3	2.5	1.8	1.5	0.8	0.7	0.3	0.4	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0	0.1	0.1	0.1
5- 9	4.5	4.1	3.4	3.2	1.9	1.5	0.9	0.7	0.4	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0
10-14	1.9	2.0	2.4	1.7	1.2	0.9	0.6	0.7	0.6	0.3	0.5	0.5	0.2	0.3	0.3	0.1	0.2	0.1	0.2	0	0	0.1	0.1	0.1
15-19	1.6	1.8	1.8	1.5	1.3	0.8	1.0	0.8	0.5	0.6	0.2	0.3	0.3	0.5	0.3	0.2	0.3	0.2	0.3	0.2	0.1	0	0	0.1
20-24	1.6	1.9	2.2	1.6	1.1	1.2	1.0	0.8	0.7	0.6	0.6	0.4	0.3	0.5	0.4	0.3	0.3	0.2	0.2	0.3	0.2	0.1	0.2	0.2
25-29	2.2	1.9	2.4	1.8	1.7	1.5	1.0	1.1	0.8	0.6	0.6	0.4	0.3	0.6	0.5	0.4	0.3	0.3	0.2	0.1	0.2	0.1	0.2	0.1
30-34	2.2	2.0	2.5	1.8	1.3	1.3	1.0	1.2	0.9	0.5	0.6	0.6	0.5	0.5	0.6	0.6	0.2	0.5	0.2	0.3	0.3	0.4	0.2	0.2
35-39	2.4	2.4	2.9	1.8	1.7	1.7	1.0	1.3	0.9	0.7	0.8	0.6	0.5	0.7	0.4	0.3	0.4	0.5	0.4	0.3	0.3	0.3	0.2	0.2
40-44	3.2	2.4	3.2	2.2	2.3	1.6	1.8	1.3	1.2	0.9	0.7	0.7	0.3	0.5	0.7	0.5	0.6	0.6	0.4	0.3	0.4	0.3	0.4	0.1
45-49	3.1	3.2	3.5	3.4	1.7	2.1	2.4	1.0	1.4	0.9	1.1	0.9	0.7	1.0	0.8	0.6	0.7	0.6	0.6	0.5	0.5	0.4	0.3	0.5
50-54	3.8	5.0	5.4	3.7	2.8	2.8	1.8	1.7	1.5	1.3	0.8	0.9	0.6	1.1	0.5	0.7	0.7	0.5	0.8	0.6	0.6	0.5	0.6	0.6
55-59	6.8	6.0	7.2	5.7	3.5	3.5	3.0	2.4	1.9	1.7	1.8	0.9	0.8	1.7	1.1	1.3	1.0	0.4	1.1	0.9	1.3	1.1	0.8	1.2
60-64	8.0	10.1	12.6	8.7	7.1	6.6	4.6	4.1	3.4	2.4	2.7	1.4	1.7	2.5	1.9	1.6	1.6	1.1	1.8	1.3	1.3	1.3	1.3	1.5
65-69	14.1	14.4	15.8	13.2	11.8	11.3	8.5	7.0	5.8	5.1	4.3	3.2	3.2	3.7	2.7	2.9	2.7	2.6	2.7	3.6	2.8	2.3	2.1	3.5
70-74	28.0	24.0	23.4	26.2	23.6	19.8	15.7	12.7	10.5	8.7	8.0	4.5	4.2	4.7	5.3	5.6	4.2	4.0	4.5	4.7	4.6	3.8	4.8	5.1

Table. 3 Age-specific mortality rates (per 100,000) for chronic nephritis

Age (years)	Mortality rate : years (men)																							
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
15-19	2.0	2.2	2.2	2.2	2.4	2.4	2.6	2.1	1.9	2.1	2.1	2.1	2.1	2.3	2.3	2.1	1.8	1.3	1.4	0.6	0.8	0.5	0.4	0.2
20-24	3.1	3.0	3.3	3.4	4.3	4.2	3.4	4.3	4.3	4.4	4.8	4.5	4.6	4.6	4.6	3.4	3.4	3.0	2.7	2.3	1.5	1.2	0.5	0.7
25-29	3.1	3.1	3.7	4.1	4.3	4.4	4.3	4.3	5.0	5.8	5.9	5.6	5.8	5.7	6.5	5.2	5.0	4.2	3.4	2.2	1.9	1.4	1.1	1.3
30-34	3.5	3.8	4.1	3.7	3.7	4.4	4.3	4.8	4.8	4.5	5.3	4.7	5.0	5.9	6.3	4.4	4.7	4.3	3.7	3.0	2.5	1.9	1.5	1.7
35-39	4.9	4.5	4.7	3.9	4.8	4.7	4.4	5.1	5.0	5.4	5.0	5.2	5.4	5.5	5.9	4.9	4.4	4.2	3.9	3.3	2.7	2.2	2.2	1.9
40-44	5.9	5.9	7.3	7.1	7.3	5.9	6.1	6.2	6.4	6.0	5.4	6.6	6.3	6.0	7.3	5.3	5.0	4.7	4.2	3.4	3.2	3.0	2.6	2.3
45-49	9.0	8.5	9.2	8.8	9.0	8.8	9.3	8.8	9.0	7.7	8.5	7.9	6.9	6.9	7.3	6.6	6.2	5.4	4.6	3.5	4.4	4.2	3.8	2.9
50-54	13.5	15.5	14.4	12.9	11.3	12.1	10.9	10.5	11.3	9.4	8.3	8.8	9.7	10.3	10.0	9.1	8.0	7.5	6.6	7.3	5.4	4.4	3.9	4.5
55-59	22.3	22.2	23.7	21.0	19.0	19.0	15.8	14.5	13.3	13.5	14.8	12.1	11.2	13.0	12.8	11.3	10.8	9.8	9.2	10.1	8.9	7.5	7.2	6.6
60-64	37.6	37.2	39.1	31.0	28.8	27.0	23.0	23.3	20.1	19.2	18.7	16.9	16.2	14.7	15.4	14.3	13.5	13.6	13.4	14.2	12.1	10.4	9.8	9.7
65-69	71.9	70.4	68.8	52.5	49.3	45.5	43.3	39.2	34.8	27.9	27.2	25.0	24.2	22.8	22.4	22.4	21.7	18.3	21.1	18.9	18.9	16.6	14.9	18.5
70-74	117.7	114.2	110.5	94.6	89.8	81.9	71.8	68.5	59.2	50.5	49.4	39.5	33.6	36.1	34.4	29.6	27.5	24.5	25.8	26.9	27.0	30.3	24.5	26.4

Age (years)	Mortality rate : years (women)																							
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
15-19	1.9	1.7	1.8	1.4	2.0	1.8	1.7	1.6	1.4	1.3	1.7	1.3	1.4	1.2	1.4	1.7	1.5	1.0	0.8	0.8	0.3	0.3	0.2	0.2
20-24	2.4	2.5	2.4	2.6	2.8	2.1	2.5	2.7	2.5	2.3	2.5	3.2	2.6	2.6	2.2	2.3	1.8	1.8	1.3	1.0	0.8	0.8	0.4	0.2
25-29	2.9	3.0	3.4	3.0	2.8	3.4	2.7	2.9	2.9	2.6	3.3	3.4	3.3	3.6	3.7	2.8	2.6	2.4	1.8	1.6	1.1	0.8	0.8	0.9
30-34	3.8	4.1	4.9	3.9	4.1	4.0	3.7	3.5	3.2	3.4	3.8	3.4	3.3	3.6	3.7	3.4	3.1	3.0	2.3	2.1	1.6	1.3	1.0	0.8
35-39	6.1	5.8	5.3	5.4	5.3	4.9	4.9	5.4	4.6	4.8	4.5	4.5	4.2	3.9	4.6	4.3	3.9	2.8	2.9	2.7	2.2	1.9	1.3	1.2
40-44	6.8	7.4	7.4	7.0	6.2	5.9	5.2	6.0	5.8	4.8	5.4	5.5	5.0	5.7	4.7	4.6	5.1	4.0	3.7	3.9	3.3	2.6	1.8	2.0
45-49	10.6	10.7	9.6	9.5	9.1	9.0	7.1	7.4	6.7	7.2	7.5	6.0	6.6	5.9	6.9	5.9	6.0	5.3	5.1	4.0	3.6	3.5	2.9	2.6
50-54	16.0	13.4	14.7	13.6	10.9	10.3	10.3	10.0	7.9	9.1	7.4	7.7	7.1	7.4	8.4	6.1	5.5	6.2	5.8	5.5	5.1	4.0	3.6	3.4
55-59	20.7	20.6	20.0	18.0	16.9	14.1	13.8	12.8	10.0	10.7	10.2	10.2	9.0	9.7	8.6	8.9	8.3	8.4	7.5	7.6	6.3	6.8	5.3	5.6
60-64	33.9	36.5	31.1	30.8	27.2	23.9	19.6	18.5	16.2	15.2	16.7	13.0	13.4	14.9	12.9	11.9	11.8	10.7	10.4	9.8	10.1	9.1	8.6	8.0
65-69	61.2	59.0	53.7	47.3	44.7	38.8	34.7	32.2	28.5	26.7	25.1	20.9	20.6	20.0	19.4	17.3	18.0	16.1	16.1	13.6	15.2	14.1	12.5	11.7
70-74	97.3	98.6	97.0	82.9	72.0	71.7	61.6	54.4	46.3	40.9	42.1	33.7	29.4	30.3	30.0	25.4	24.5	22.1	22.6	22.5	23.7	21.3	18.1	23.0

groups and in both sexes.

In contrast, age specific trends are apparent in chronic nephritis (Table 3, Fig 4). The secular trends in mortality rates and death indexes are divided into three patterns, as above for nephritis and nephrosis.

1. Death rates decreased primarily during the first ten years in men and women aged above 55 years.
2. A pronounced decrease was observed among men since 1970 in the 15-49 age groups, and among women in the 15-39 age groups.
3. A continuous decline since 1955 in men aged 50-54 years, and in women aged 40-54 years was apparent.

In addition, it is noteworthy that the death rates in men aged 20-34 years increased from 1955 to 1969. This increase is most obvious in the 25-29 year age group. The death index in this group exceeded 200 in 1969.

When comparing the secular changes of death indexes between the two sexes in the same age groups, the difference is quite remarkable in the 20-39 year age groups during the period from 1955 to 1969. In all other age groups, the patterns for both sexes are almost identical.

The death rates from chronic nephritis for various five-year birth cohorts are given in Fig 5, which shows the single-year rates at five-year intervals from 1953-1978. The most recent data in Fig 5 are for 1978, when the cohort members born in 1949-1953 were aged 25-29, those born in 1944-1948 were aged 30-34, and so forth.

The death rates of the cohorts born after 1924 increases with age until 1968, and then declines. In men aged 20-34, one can see that each successive cohort showed higher rates before 1968, but the pattern is reversed after 1973.

4. DISCUSSION

In 1968, the coding system for causes of death was changed (with the Eighth Revision ICD codes replacing those of the Seventh Revision). However, the secular changes of mortality rates from each renal disease showed no sharp discontinuity before and after 1968. It is suggested therefore that the change in death certificate coding has had little effect upon the secular trends in mortality rates reported here.

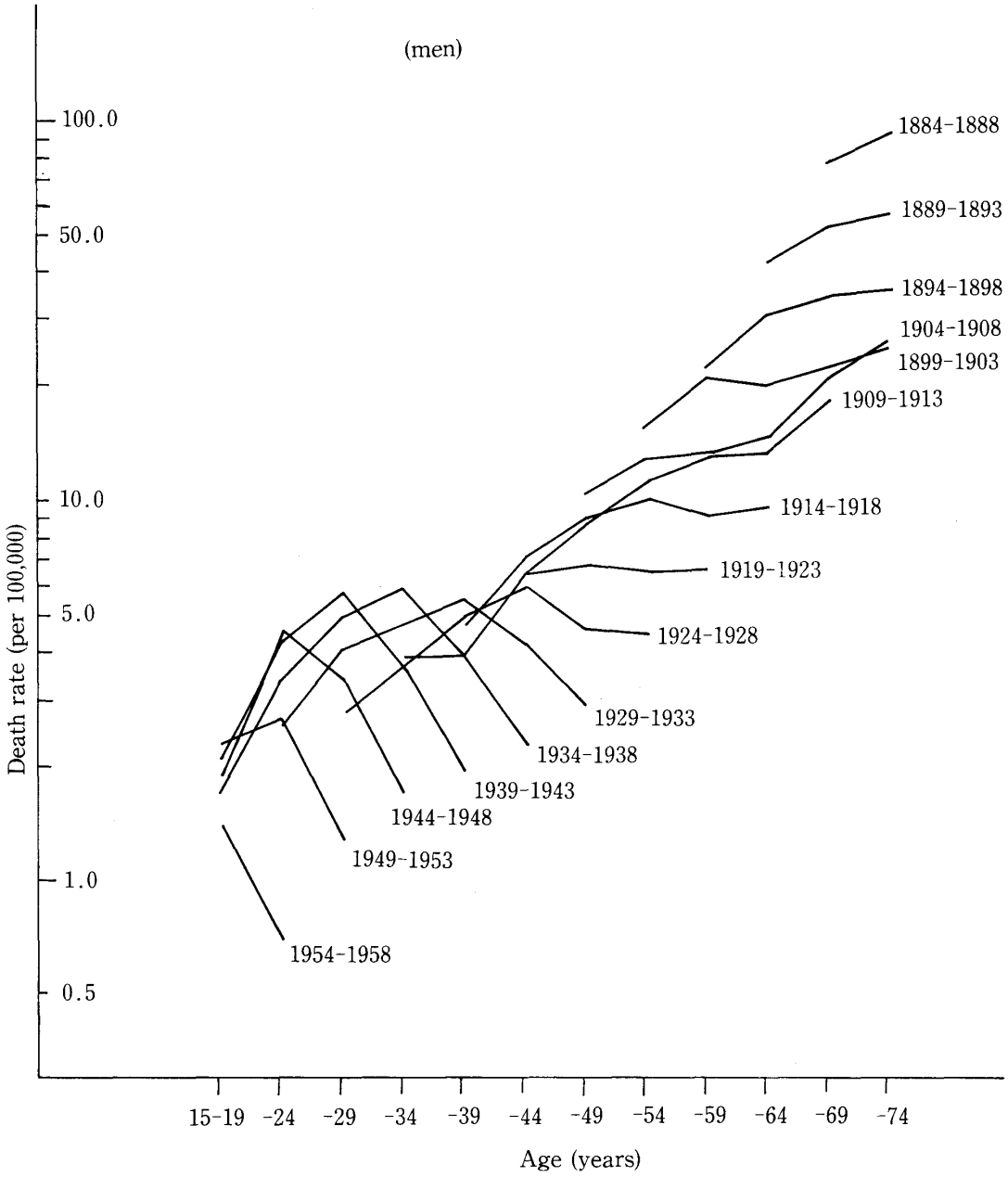
Since about 1970, the number of patients treated with hemodialysis has increased sharply, and in 1978, 27,048 patients were maintained on hemodialysis in Japan. This increase was promoted by the introduction of health insurance coverage for hemodialysis therapy in 1967, and the amendment of legistlation on the physically handicapped in 1972 (Law No. 112, 1972). This extension of benefits shifted the financial burden for care of patients with end-stage renal disease from the private to the public sector, and resulted in a dramatic increase in access to the therapy.

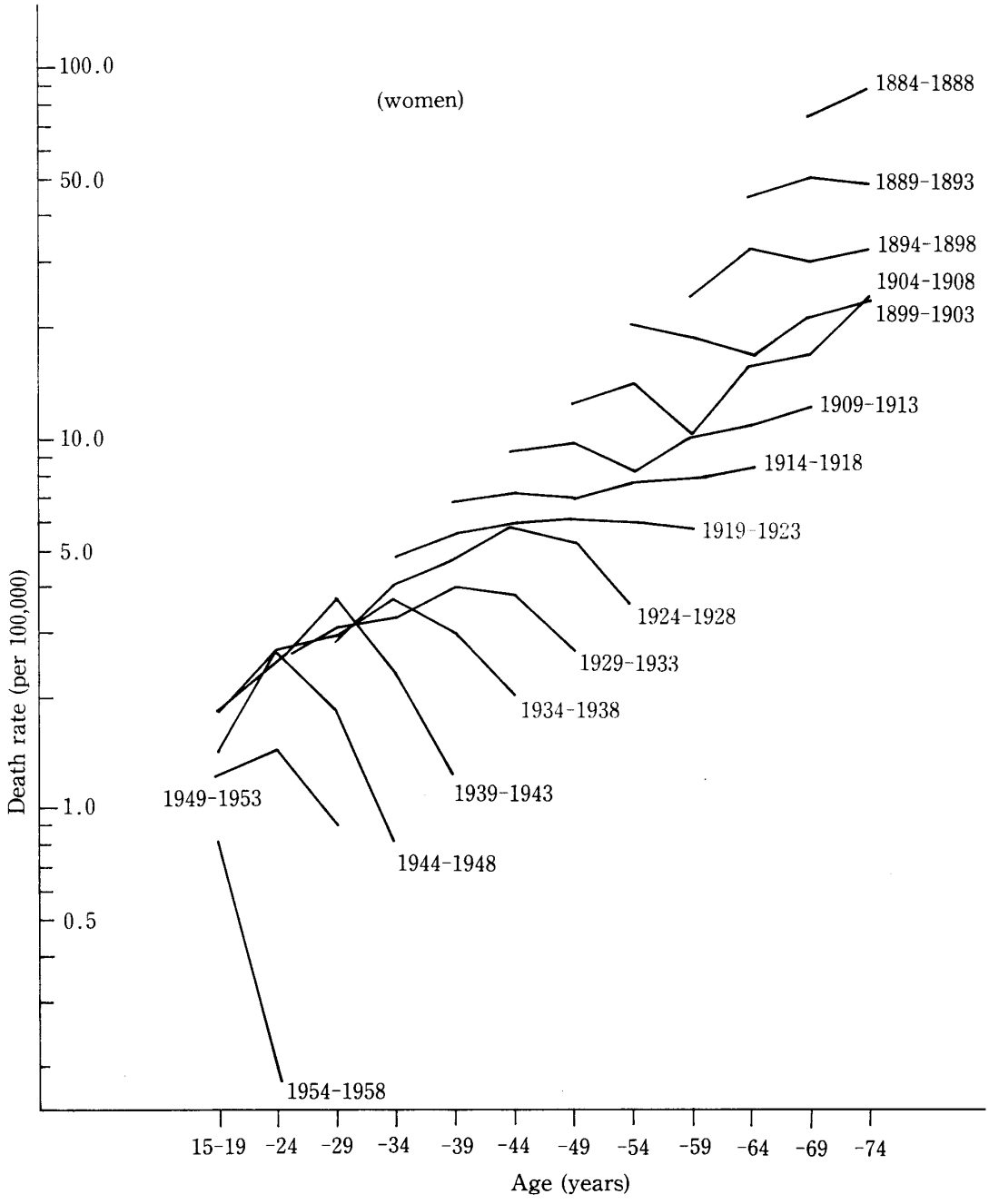
Fig 6 shows the age distribution of hemodialysis patients at the start of treatment (cumulative data for 1976 in Aichi Prefecture, Japan 3)). Complete data for Japan is not currently available, but the trends are expected to be similar to those reported here.

Table 4 shows diagnosis of primary renal disease in patients treated with hemodialysis in 1979, in Japan 3). The proportion of patients with a diagnosis of chronic glomeluronephritis accounted for nearly 80%.

From these data on hemodialysis utilyzation, it can be said that in Japan, young adults with chronic glomeluronephritis have gained considerable benefits from hemodialysis ther-

Fig. 5 Age-specific mortality rate (per 100,000) from chronic nephritis for several five-year cohorts born 1884-1958




(women)
100.0
50.0
10.0
5.0
1.0
0.5
Death rate (per 100,000)
1884-1888
1889-1893
1894-1898
1904-1908
1899-1903
1909-1913
1914-1918
1919-1923
1924-1928
1929-1933
1934-1938
1939-1943
1944-1948
1949-1953
1954-1958
15-19
-24
-29
-34
-39
-44
-49
-54
-59
-64
-69
-74
Age (years)

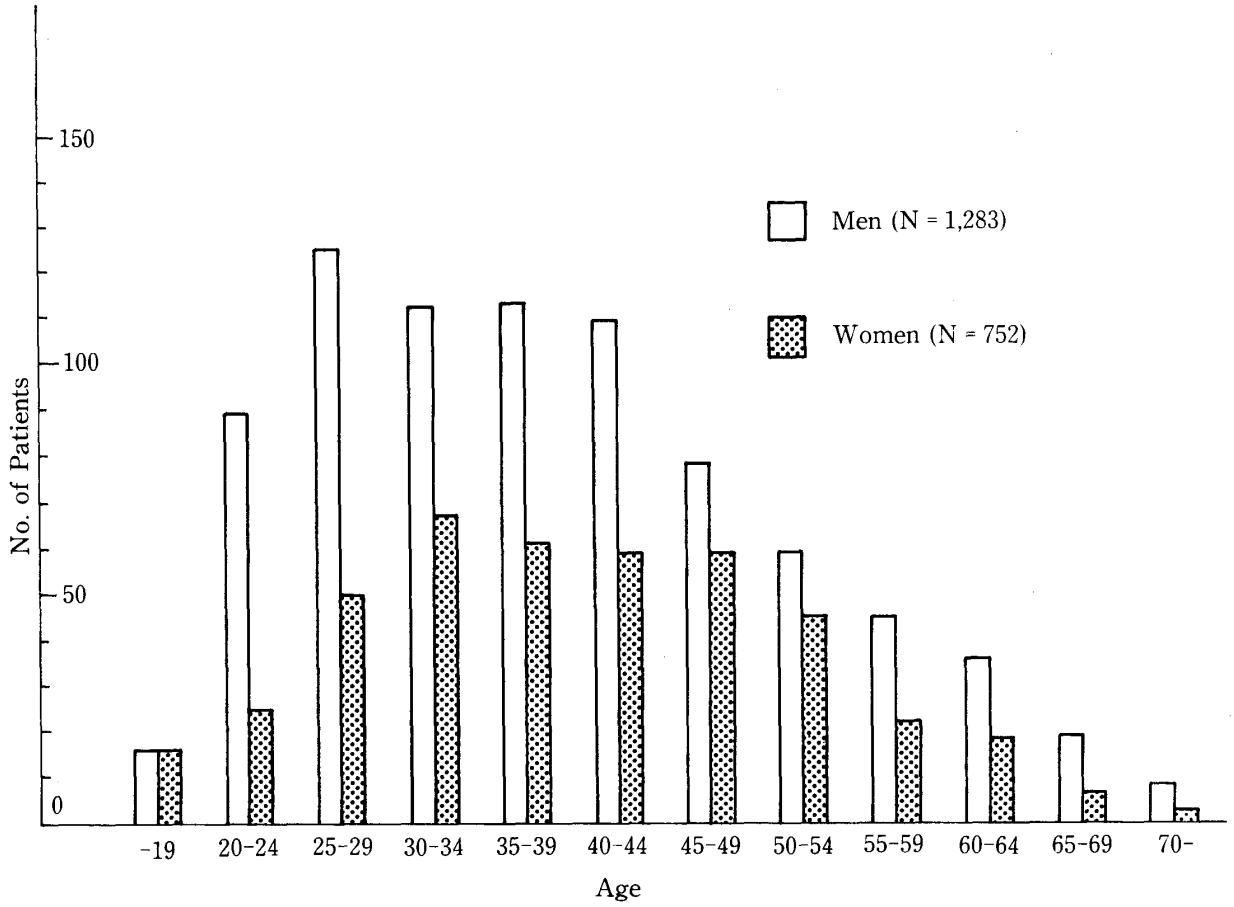


Fig. 6 Age at start of hemodialysis therapy, 1976 in Aichi prefecture (3)

Table. 4 Primary renal diseases of hemodialysis patients in 1979*

Primary Diseases	Patients	(%)
Chronic glomerulonephritis	12,596	79.1
Diabetes	588	3.7
Chronic pyelonephritis	584	3.7
Nephrotic syndrome	425	2.7
Cystic kidney disease	378	2.4
Tuberculosis	253	1.6
Renal sclerosis	247	1.5
Malignant hypertension	230	1.4
Collagen diseases	141	0.9
Gout	80	0.5
Obstructive uropathy	43	0.3
Malformations	19	0.1
Myeloma	18	0.1
Amyloidosis	10	—
Others	316	2.0
Total	15,928	100.0

*From Odaka M. (1)

apy since about 1970.

It is suggested therefore that the characteristic decline in mortality rates from chronic nephritis since 1970 in younger age groups is mainly attributable to the effect of increased application of hemodialysis treatment.

In men aged 20-34 years, the death rates from chronic nephritis increased from 1955 to 1969, while for women of the same age, the rates remained stable or decreased slowly. These phenomena cannot be explained by the changes in diagnostic criteria which have influenced the choice of diagnosis in men and women equally. The results of birth cohort analysis suggest that successive generations have had increased exposure to certain, presently unknown risk factors.

Mabec 4) detected an increase in mortality from chronic interstitial nephritis among women from 1950 to 1960 in Denmark, and correlated this increase to the consumption of phenacetin.

Henderson 5) 6) described a large excess of death from chronic nephritis in young adults between 1890 and 1950 in New South Wales, and indicated that a toxin led to death, from ingested lead present in house paint.

In Japan, however, the possible risk factors which have caused the increase in mortality from chronic nephritis among young males from 1955 to 1969 has not yet been elucidated.

In acute nephritis, a decline in mortality rate was observed simultaneously for all age groups and both sexes during the first ten year period, from 1955. The possible factors affecting this decline may be considered as follows :

Firstly, medical or nonmedical interventions have decreased the effects of certain risk factors throughout the entire community.

Secondly, improved therapeutic management of patients may have contributed significantly to a decline. However, interpretation of these trends without the use of multivariate analysis is defficult, and potentially limits the validity of conclusions so drawn.

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