Supplementary tables

The Mediating Effect of Smoking on the Association Between Income and Dementia among

Japanese Older People

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	Dementia incidence	Death incidence	Loss to follow-up
- 1 year	434	751	147
1-2 year	671	1,012	152
2-3 year	735	1,082	164
3-4 year	827	1,071	155
4-5 year	918	1,115	139
5-6 year	805	1,068	94
6-7 year	864	1,047	110
7-8 year	1,252	1,048	146
8-9 year	803	965	88
9- year	296	270	28

Supplementary Table S1. The number of dementia incidences and censored cases each year

Supplementary Table S2. Association between income and dementia and mediating effect of smoking during 6-year follow-up*

	Overall Participants (N=44,083)	Men (n=20,634)	Women (n=23,449)	
	Excess relative risk (95% CI)	Excess relative risk (95%CI)	Excess relative risk (95% CI)	
Total Effect*	0.047 (-0.029; 0.124)	0.068 (-0.047; 0.182)	0.025 (-0.075; 0.125)	
Natural Indirect Effect*	0.008 (0.004; 0.013)	0.008 (0.002; 0.015)	0.006 (0.001; 0.011)	
Natural Direct Effect*	0.039 (-0.036; 0.115)	0.059 (-0.054; 0.172)	0.019 (-0.081; 0.118)	
Proportion Mediated (%)*	17.2	12.2	25.3	

Abbreviation: CI: Confidence Interval.

* Adjusted for age, educational attainment, self-rated health, geriatric depression scale (GDS), marital status, walking time, employment status, alcohol consumption habit, and region of residence.

Supplementary Table S3. Association between income (continuous*) and dementia and mediating effect of smoking during 9-year follow-up**

	Overall Participants (N=44,083)	Men (n=20,634)	Women (n=23,449)
	Excess relative risk (95%CI)	Excess relative risk (95%CI)	Excess relative risk (95%CI)
Total Effect*	0.058 (0.019; 0.098)	0.075 (0.014; 0.136)	0.044 (-0.008; 0.096)
Natural Indirect Effect*	0.004 (0.002; 0.006)	0.005 (0.002; 0.008)	0.002 (0.0005; 0.004)
Natural Direct Effect*	0.054 (0.015; 0.093)	0.070 (0.010; 0.131)	0.041 (-0.010; 0.093)
Proportion Mediated (%)*	7.4	6.6	5.4

Abbreviation: CI: Confidence Interval.

*The results compare the estimates for 1.25 million JPY and 3.18 million JPY. 1.25 million JPY was approximately the 25% percentile of income. 3.18 million JPY was approximately the 75% percentile of income.

**Adjusted for age, educational attainment, self-rated health, geriatric depression scale (GDS), marital status, walking time, employment status, alcohol consumption habit, and region of residence.

Supplementary Table S4. Association between income and dementia and mediating effect of past smoking during 9-year follow-up when excluding current smokers from the analysis*

	Overall participants (N=39,143 – 39,213)*	Men (n=16,587 - 16,623)*	Women (n=22,556 - 22,593)*
	Excess relative risk (95% CI)	Excess relative risk (95% CI)	Excess relative risk (95% CI)
Total Effect*	0.096 (0.029; 0.163)	0.117 (0.017; 0.216)	0.078 (-0.010; 0.165)
Natural Indirect Effect*	0.0004 (-0.001; 0.002)	-0.001 (-0.004; 0.002)	0.001 (-0.001; 0.003)
Natural Direct Effect*	0.096 (0.029; 0.163)	0.118 (0.019; 0.218)	0.076 (-0.011; 0.164)
Proportion Mediated (%)*	0.4	-1.2	1.4

*The current smokers were excluded from the analyses. Therefore, the number of analyzed populations differed between imputed datasets. The analysis was adjusted for age, educational attainment, self-rated health, geriatric depression scale (GDS), marital status, walking time, employment status, alcohol consumption habit, and region of residence.

Abbreviation: CI: confidence interval.

Variables	n	%
Age	0	0
Sex	0	0
Region of residence	0	0
Equivalent income	7513	17.0
Smoking status	4212	9.6
Educational attainment	1034	2.3
Self-rated health	474	1.1
GDS	1750	4.0
Marital status	712	1.6
Walking time	2645	6.0
Employment status	5268	12.0
Alcohol consumption habit	2553	5.8

Supplementary Table S5. Frequency of missing data of the variables

Abbreviation: GDS: Geriatric depression scale

Characteristic*	Baseline respondents n (%)	Complete case n (%)	Imputed data n (%)	
Equivalent income				
\geq 2.0 million JPY	18,531 (50.7)	14,920 (53.0)	22,103 (50.1)	
<2.0 million JPY	18,039 (49.3)	13,239 (47.0)	21,980 (49.9)	
Smoking status				
Non-current smoker	35,355 (88.7)	24,743 (87.9)	39,181 (88.9)	
Current smoker	4,516 (11.3)	3,416 (12.1)	4,902 (11.1)	
Age				
65-69	13,064 (29.6)	9,486 (33.7)	13,064 (29.6)	
70-74	13,178 (29.9)	8,852 (31.4)	13,178 (29.9)	
75-79	9,839 (22.3)	5,739 (20.4)	9,839 (22.3)	
80-84	5,519 (12.5)	2,890 (10.3)	5,519 (12.5)	
≥85	2,483 (5.6)	1,192 (4.2)	2,483 (5.6)	
Educational attainment				
≥ 13 years	8,070 (18.8)	5,964 (21.2)	8,225 (18.7)	
10-12 years	15,408 (35.8)	10,834 (38.5)	15,741 (35.7)	
6-9 years	18,695 (43.4)	10,964 (38.9)	19,211 (43.6)	
<6 years	876 (2.0)	397 (1.4)	906 (2.1)	
Self-rated health				
Very good	5,279 (12.1)	3,680 (13.1)	5,328 (12.1)	
Good	30,278 (69.4)	19,766 (70.2)	30,596 (69.4)	
Poor	7,010 (16.1)	4,107 (14.6)	7,102 (16.1)	
Very poor	1,042 (2.4)	606 (2.2)	1,056 (2.4)	
GDS				
Not depression	30,533 (72.1)	20,847 (74.0)	31,707 (71.9)	
Suggestive depression	8,970 (21.2)	5,639 (20.0)	9,403 (21.3)	
Depression	2,830 (6.7)	1,673 (5.9)	2,973 (6.8)	
Marital status				
Having partner	31,320 (72.2)	21,595 (76.7)	31,764 (72.1)	
Not having partner	12,051 (27.8)	6,564 (23.3)	12,319 (27.9)	
Walking time				
≥90 minutes	6,442 (15.6)	4,494 (16.0)	6,818 (15.5)	
60-89 minutes	6,577 (15.9)	4,583 (16.3)	6,980 (15.8)	
30-59 minutes	14,686 (35.4)	10,271 (36.5)	15,617 (35.4)	
<30 minutes	13,733 (33.1)	8,811 (31.3)	14,668 (33.3)	
Employment status				
Have job	9,043 (23.3)	6,777 (24.1)	9,815 (22.3)	
Retired job	24,890 (64.1)	18,323 (65.1)	28,336 (64.3)	
Never had job	4,882 (12.6)	3,059 (10.9)	5,932 (13.5)	
Alcohol consumption habit				
Not drink	25,001 (60.2)	15,533 (55.2)	26,577 (60.3)	
Used to drink	1,446 (3.5)	1,055 (3.8)	1,531 (3.5)	
Drink	15,083 (36.3)	11,571 (41.1)	15,975 (36.2)	

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* *Information about place of residence is omitted as some local governments may consider it to be sensitive information.

Abbreviation: GDS: Geriatric depression scale

	Overall Participants (N=28,159) Men (n=14,944)		14,944)	Women (n=13,215)		
Characteristic*	≥2.0 million JPY	<2 million JPY	≥ 2.0 million JPY	<2 million JPY	\geq 2.0 million JPY	<2 million JPY
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Smoking status						
Non-current smoker	13,277 (89.0)	11,466 (86.6)	6,693 (82.0)	5,336 (78.7)	6,584 (97.4)	6,130 (95.0)
Current smoker	1,643 (11.0)	1,773 (13.4)	1,468 (18.0)	1,447 (21.3)	175 (2.6)	326 (5.0)
Age						
65-69	5,378 (36.0)	4,108 (31.0)	2,892 (35.4)	1,997 (29.4)	2,486 (36.8)	2,111 (32.7)
70-74	4,497 (30.1)	4,355 (32.9)	2,445 (30.0)	2,254 (33.2)	2,052 (30.4)	2,101 (32.5)
75-79	2,859 (19.2)	2,880 (21.8)	1,602 (19.6)	1,524 (22.5)	1,257 (18.6)	1,356 (21.0)
80-84	1,566 (10.5)	1,324 (10.0)	900 (11.0)	737 (10.9)	666 (9.9)	587 (9.1)
≥85	620 (4.2)	572 (4.3)	322 (3.9)	271 (4.0)	298 (4.4)	301 (4.7)
Educational attainment						
\geq 13 years	4,137 (27.7)	1,827 (13.8)	2,785 (34.1)	1,152 (17.0)	1,352 (20.0)	675 (10.5)
10-12 years	6,316 (42.3)	4,518 (34.1)	3,162 (38.7)	2,252 (33.2)	3,154 (46.7)	2,266 (35.1)
6-9 years	4,341 (29.1)	6,623 (50.0)	2,174 (26.6)	3,289 (48.5)	2,167 (32.1)	3,334 (51.6)
<6 years	126 (0.8)	271 (2.0)	40 (0.5)	90 (1.3)	86 (1.3)	181 (2.8)
Self-rated health						
Very good	2,146 (14.4)	1,534 (11.6)	1,208 (14.8)	798 (11.8)	938 (13.9)	736 (11.4)
Good	10,672 (71.5)	9,094 (68.7)	5,711 (70.0)	4,545 (67.0)	4,961 (73.4)	4,549 (70.5)
Poor	1,838 (12.3)	2,269 (17.1)	1,081 (13.2)	1,230 (18.1)	757 (11.2)	1,039 (16.1)
Very poor	264 (1.8)	342 (2.6)	161 (2.0)	210 (3.1)	103 (1.5)	132 (2.0)
GDS						
Not depression	11,933 (80.0)	8,914 (67.3)	6,495 (79.6)	4,483 (66.1)	5,438 (80.5)	4,431 (68.6)
Suggestive depression	2,486 (16.7)	3,153 (23.8)	1,373 (16.8)	1,668 (24.6)	1,113 (16.5)	1,485 (23.0)
Depression	501 (3.4)	1,172 (8.9)	293 (3.6)	632 (9.3)	208 (3.1)	540 (8.4)
Marital status						
Having partner	11,764 (78.8)	9,831 (74.3)	7,246 (88.8)	5,900 (87.0)	4,518 (66.8)	3,931 (60.9)
Not having partner	3,156 (21.2)	3,408 (25.7)	915 (11.2)	883 (13.0)	2,241 (33.2)	2,525 (39.1)
Walking time						
≥90 minutes	2,486 (16.7)	2,008 (15.2)	1,407 (17.2)	1,078 (15.9)	1,079 (16.0)	930 (14.4)
60-89 minutes	2,580 (17.3)	2,003 (15.1)	1,486 (18.2)	1,068 (15.7)	1,094 (16.2)	935 (14.5)
30-59 minutes	5,609 (37.6)	4,662 (35.2)	3,036 (37.2)	2,327 (34.3)	2,573 (38.1)	2,335 (36.2)
<30 minutes	4,245 (28.5)	4,566 (34.5)	2,232 (27.3)	2,310 (34.1)	2,013 (29.8)	2,256 (34.9)
Employment status						
Have job	4,071 (27.3)	2,706 (20.4)	2,723 (33.4)	1,594 (23.5)	1,348 (19.9)	1,112 (17.2)
Retired job	9,487 (63.6)	8,836 (66.7)	5,237 (64.2)	4,788 (70.6)	4,250 (62.9)	4,048 (62.7)
Never had job	1,362 (9.1)	1,697 (12.8)	201 (2.5)	401 (5.9)	1,161 (17.2)	1,296 (20.1)
Alcohol consumption habit						
Not drink	7,835 (52.5)	7,698 (58.1)	2,573 (31.5)	2,473 (36.5)	5,262 (77.9)	5,225 (80.9)
Used to drink	507 (3.4)	548 (4.1)	451 (5.5)	464 (6.8)	56 (0.8)	84 (1.3)
Drink	6,578 (44.1)	4,993 (37.7)	5,137 (62.9)	3,846 (56.7)	1,441 (21.3)	1,147 (17.8)

Supplementary Table S7. Characteristics of the participants in complete case analysis (N=28,159)

* Information about place of residence is omitted as some local governments may consider it to be sensitive information.

Abbreviation: GDS: Geriatric depression scale.

Supplementary Table S8. Association between income and dementia and mediating effect of smoking during 9-year follow-up in complete case analysis*

	Overall Participants (N=28,159)	Men (n=14,944)	Women (n=13,215)	
	Excess relative risk (95% CI)	Excess relative risk (95% CI)	Excess relative risk (95% CI)	
Total effect*	0.130 (0.056; 0.203)	0.137 (0.033; 0.242)	0.111 (0.008; 0.215)	
Natural indirect effect*	0.012 (0.006; 0.018)	0.011 (0.004; 0.019)	0.008 (0.001; 0.015)	
Natural direct effect*	0.118 (0.045; 0.190)	0.126 (0.023; 0.229)	0.103 (0.001; 0.206)	
Proportion mediated (%)*	9.3	8.4	7.2	

Abbreviation: CI: Confidence interval.

*Adjusted for age, educational attainment, self-rated health, geriatric depression scale (GDS), marital status, walking time, employment status, alcohol consumption habit, and region of residence.