

Gender difference in disease patterns and their impact on disability in the oldest old: results from the Newcastle 85+ Study

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Objectives

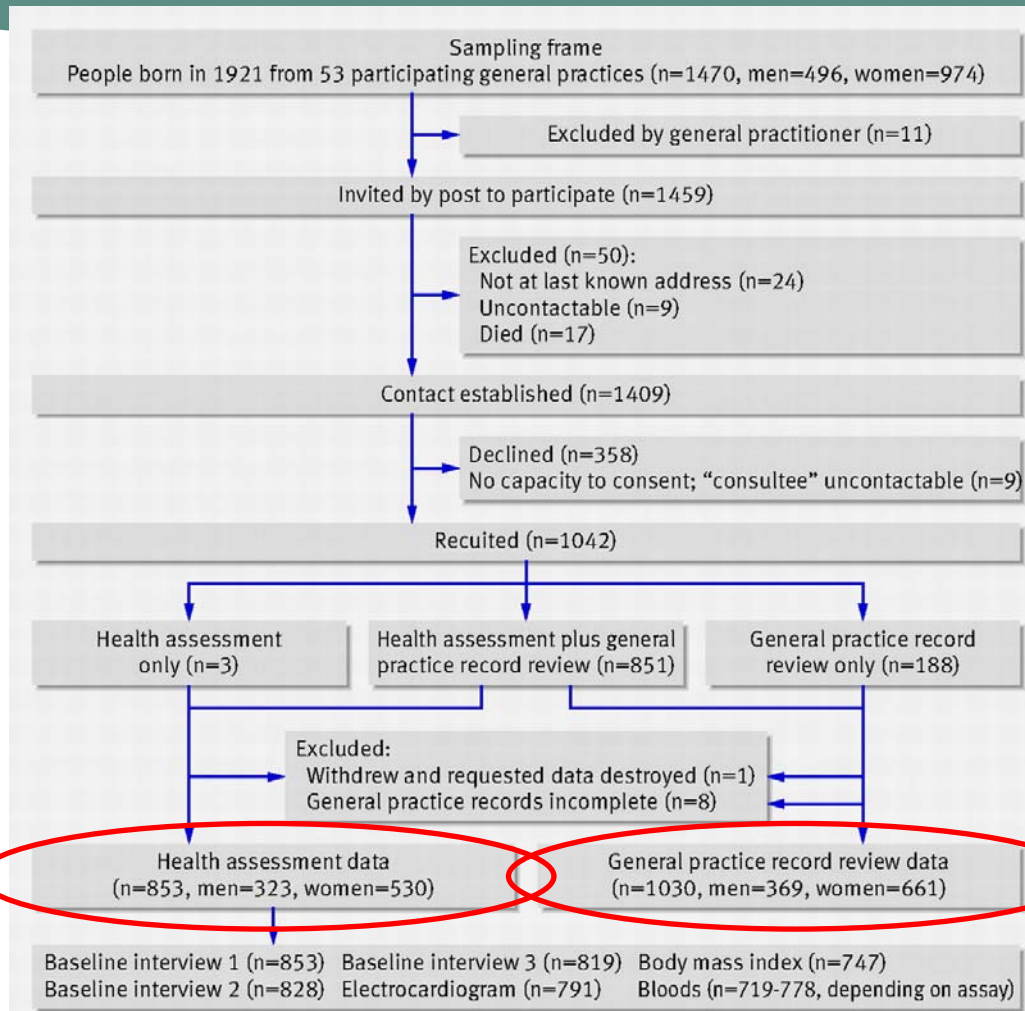
- **Do diseases cluster together and are patterns the same for men and women?**
- **What is the effect of disease patterns on disability and are these the same for men and women?**
- **Are patterns of disease are related to short term mortality (18 months) and similarly for men and women?**

Newcastle 85+ Study



A 5-year prospective study of 1042 individuals born in 1921 of the biological, clinical and psychosocial factors associated with healthy ageing

Recruitment profile for cohort



Disability

Diseases

Collerton, J. et al. *BMJ* 2009;339:b4904

BMJ

Diseases

Diseases include:

- Hypertension
- Ischaemic heart disease
- Heart failure
- Peripheral Vascular Disease
- Atrial fibrillation or flutter
- Cerebrovascular disease
- Arthritis
- Osteoporosis
- Diabetes
- Renal impairment MDRD
- Anaemia
- Thyroid disease
- Visual impairment
- Cognitive Impairment
- Respiratory disease

Chronic bronchitis, Emphysema, Asthma, Bronchiectasis, Pulmonary Fibrosis, Fibrosing Alveolitis, Asbestosis, Pneumoconiosis and COPD (in absence of other conditions)

Individual Disease Prevalence

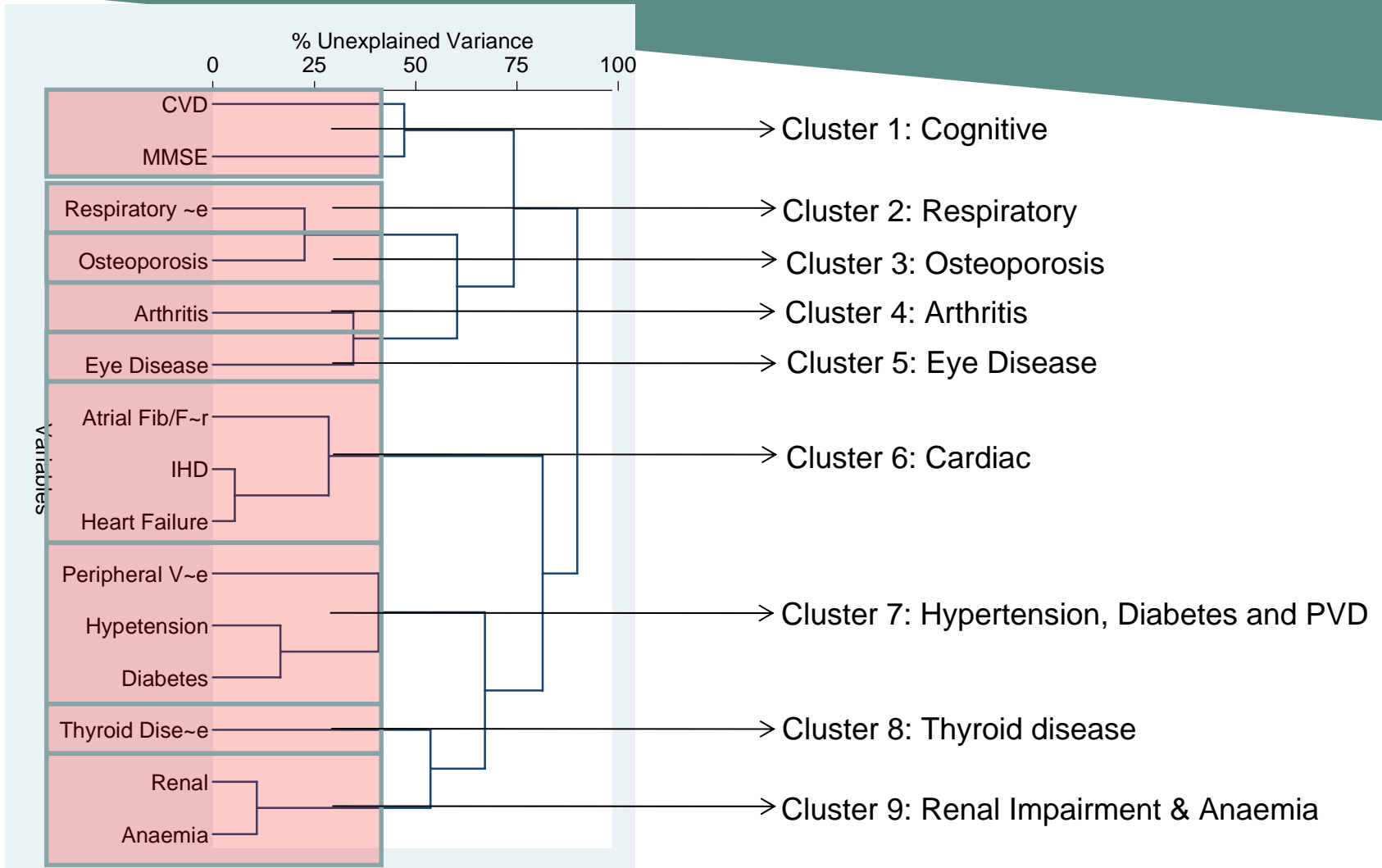
	Men	Women	All	OR (95% CI) **
<i>Hypertension</i>	52.7 (168)	60.1 (316)	57.3 (484)	1.4 (1.0 - 1.8)
<i>Ischaemic heart disease</i>	36.7 (117)	30.6 (161)	32.9 (278)	0.8 (0.6 - 1.0)
<i>Heart failure</i>	11.9 (38)	11.8 (62)	11.8 (100)	1.0 (0.6 - 1.6)
<i>Peripheral Vascular Disease</i>	9.4 (30)	5.5 (29)	7.0 (59)	0.6 (0.3 - 1.0)
<i>Atrial fibrillation or flutter</i>	17.2 (53)	12.5 (60)	14.3 (113)	0.7 (0.4 - 1.1)
<i>Cerebrovascular disease</i>	24.5 (78)	19.0 (100)	21.1 (178)	0.7 (0.5 - 1.0)
<i>Arthritis</i>	60.5 (193)	71.5 (376)	67.3 (569)	1.6 (1.2-2.2)*
<i>Respiratory disease</i>	22.3 (71)	22.8 (120)	22.6 (191)	1.0 (0.7 - 1.5)
<i>Diabetes</i>	14.4 (46)	12.6 (66)	13.3 (112)	0.9 (0.6 - 1.3)
<i>Osteoporosis</i>	4.1 (13)	18.8 (99)	13.3 (112)	5.5 (3.0 - 10.8)*
<i>Thyroid disease</i>	6.6 (21)	19.0 (100)	14.3 (121)	3.3 (2.0 - 5.7)*
<i>Renal impairment MDRD</i>	54.6 (166)	67.3 (318)	62.5 (484)	1.7 (1.3 - 2.5)*
<i>Anaemia</i>	33.1 (98)	27.6 (126)	30.0 (224)	0.8 (0.6 - 1.1)
<i>Visual impairment</i>	46.1 (147)	57.8 (304)	53.4 (451)	1.6 (1.2 - 2.1)*
<i>Cognitive Impairment</i>	6.3 (20)	7.3 (38)	6.9 (58)	1.2 (0.7 - 2.2)

* - Statistically Significant
 ** - OR: Women: Men

Patterns of disease

- Make use of specified diseases
- Variable Cluster Analysis
Vigneau E. and Qannari E. M. Clustering of variables around latent components. Communications in Statistics - Simulation and Computation. 32(4): 1131-1150, 2003.
- Diseases are analysed allowing for gender differences
- Disease groupings will be used for further analyses

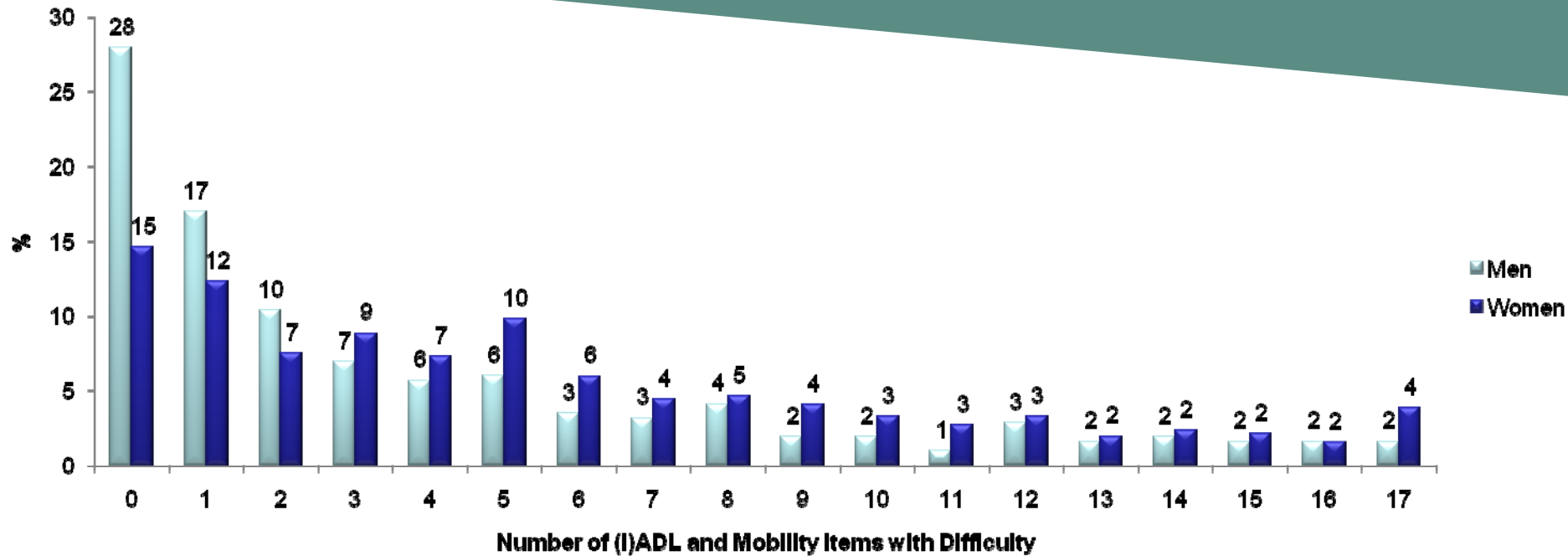
Patterns of disease



Disability

- Basic ADLs
 - feeding self , washing face and hands, getting in and out of bed, getting on and off toilet, dressing /undressing, **getting in and out of chair**, washing all over, cutting own toenails
- Instrumental ADLs
 - light housework, heavy housework, preparing and cooking hot meal, taking medication, managing money, **shopping**
- Mobility
 - **getting around house, going up and down stairs/steps, walking > 400 yards**
- Disability score (0-17)
 - Sum of difficulty with any of the (I)ADL and mobility measures

Disability score



Median (IQR) for (I)ADL and Mobility Difficulty

Men	Women
2 (2-6)	4 (1-8)
$p < 0.0001$	

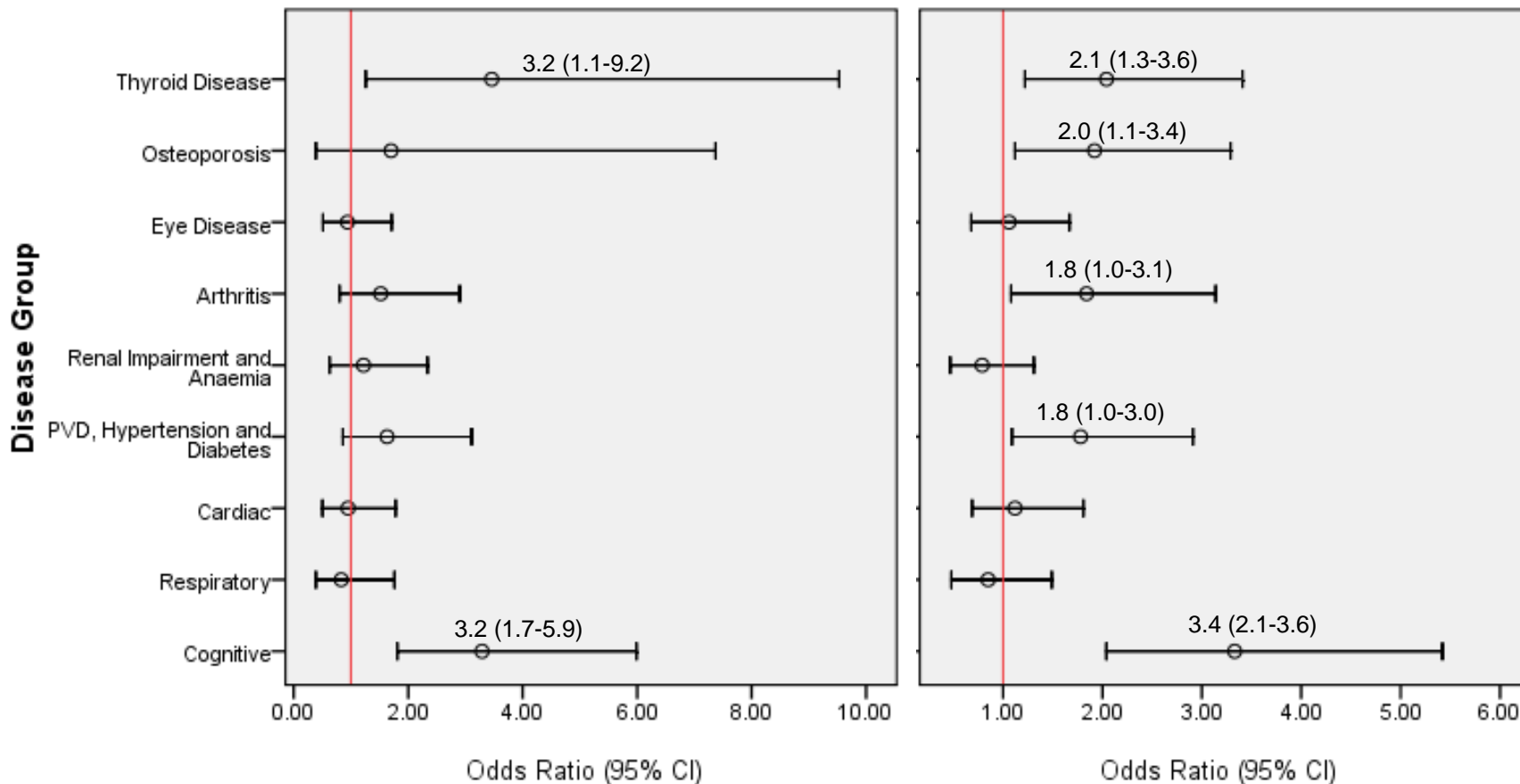
Which disease patterns have most effect on disability?

- For analysis disability score dichotomised in two ways:
 - None+mild (0-6) v mod-severe(7+)
 - None+mild+mod (0-12) v severe (13+)
- Use Logistic Regression then Population Attributable Fraction (PAF) to determine disease effects
 - *Definition:* PAF is the % reduction in population disability that would occur if exposure to the disease were removed
- Model constructed on all diseases then via backwards elimination
- Adjustment for education

Effect of Disease on Disability (0-6, 7+)

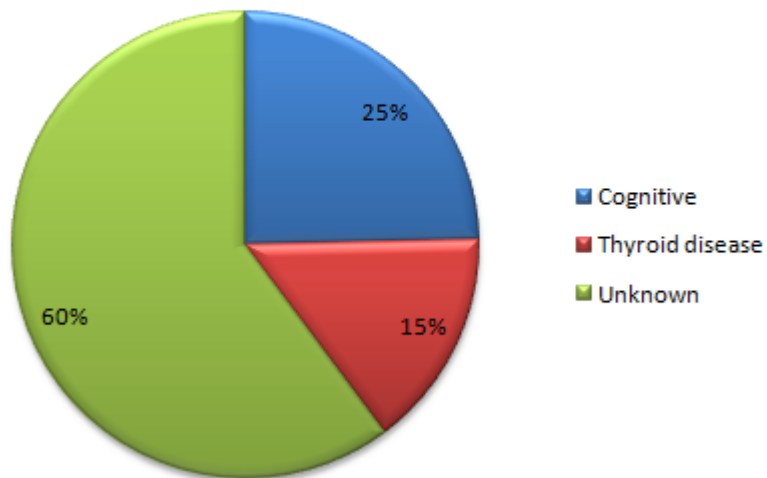
Men

Women



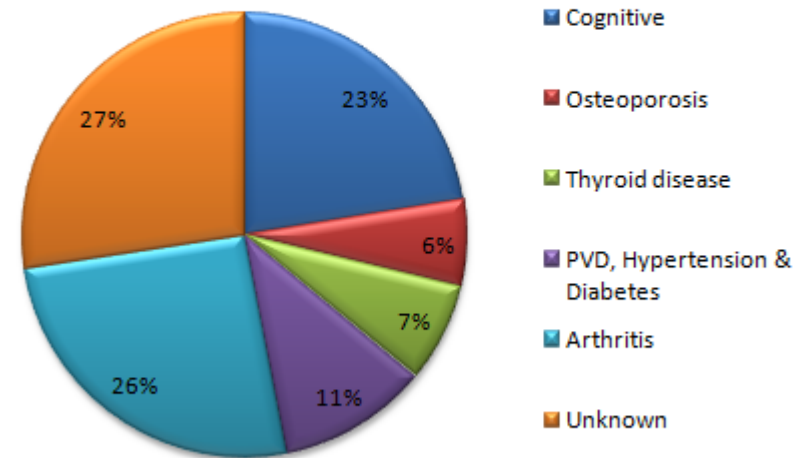
Effect of Disease on Disability (0-6, 7+)

Population Attributable Fraction - Men



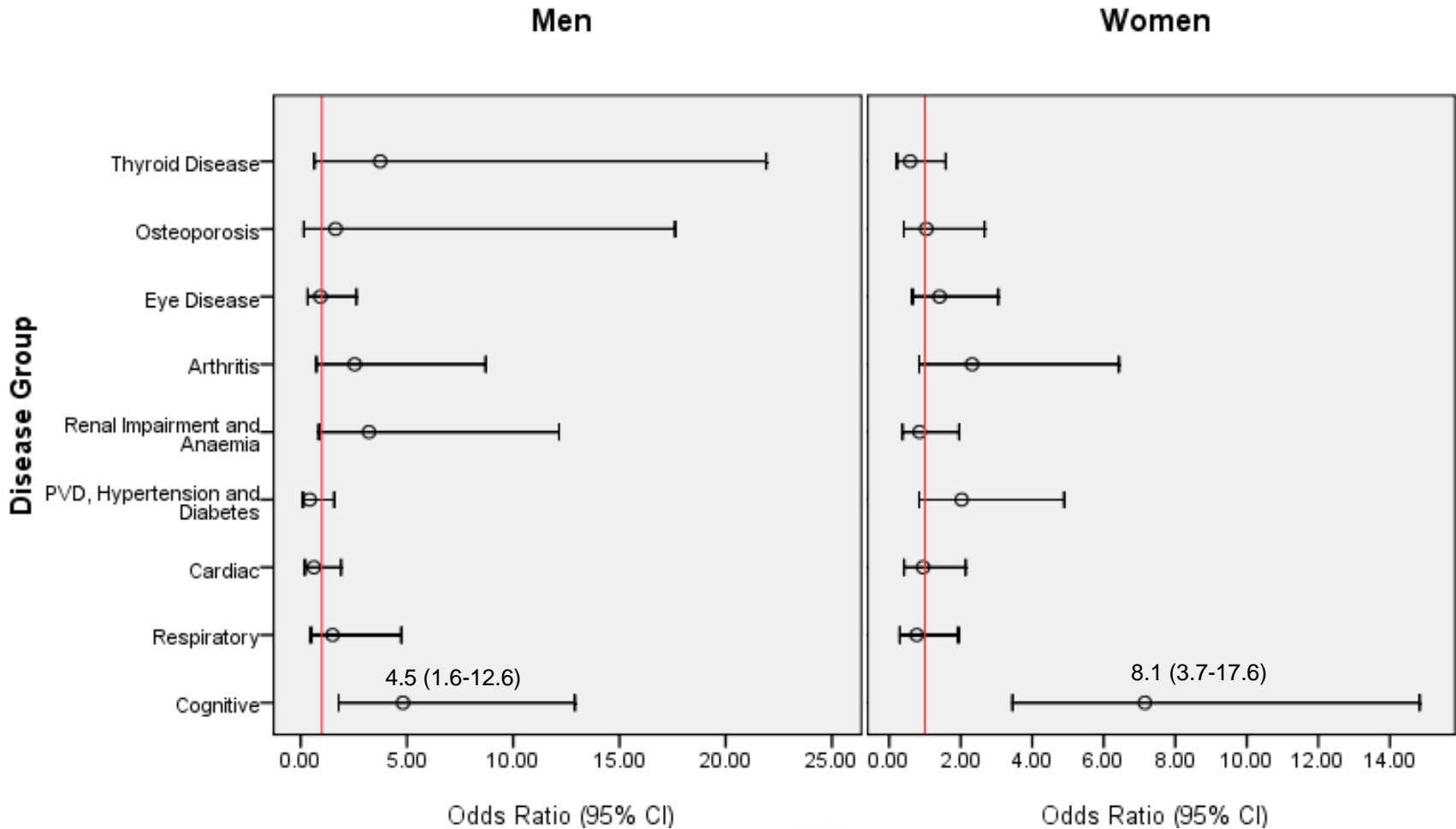
Total PAF: 34.4% (24.7%-51.2%)

Population Attributable Fraction - Women



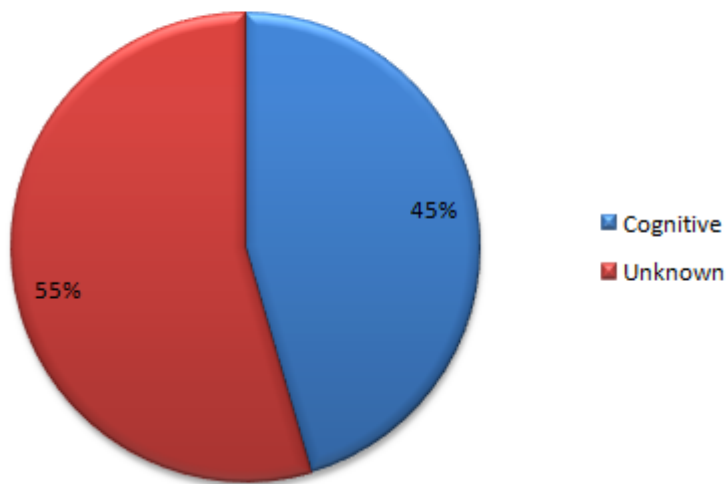
Total PAF: 61.7% (40.9% - 72.3%)

Effect of Disease on Disability (0-12, 13+)



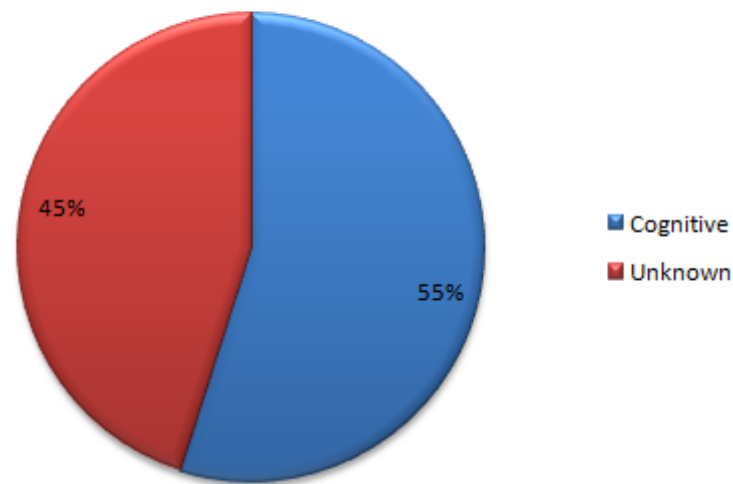
Effect of Disease on Disability (0-12, 13+)

**Population Attributable Fraction
- Men**



Total PAF: 45.5% (6.3% - 68.3%)

**Population Attributable Fraction
- Women**

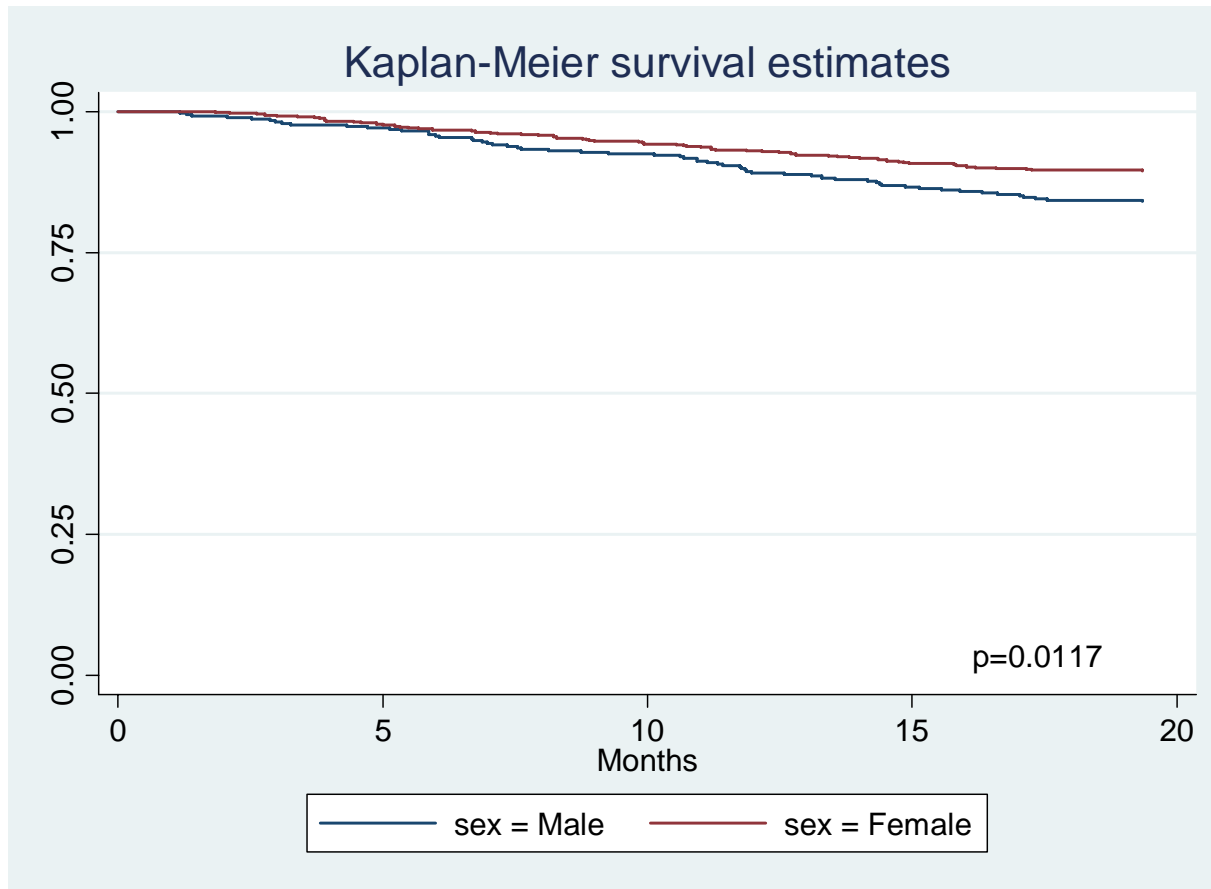


Total PAF: 54.9% (30.6%-70.6%)

Effects on Mortality

- 18 month mortality - 128 participants died during this interval.
- Kaplan Meier survival curves and Log rank test used to assess differential survival by gender and disease groups respectively
 - Bonferroni correction also implemented (multiple testing)
- Cox proportional hazards model for multiple disease groups
 - Models constructed by gender
 - Model assumptions checked

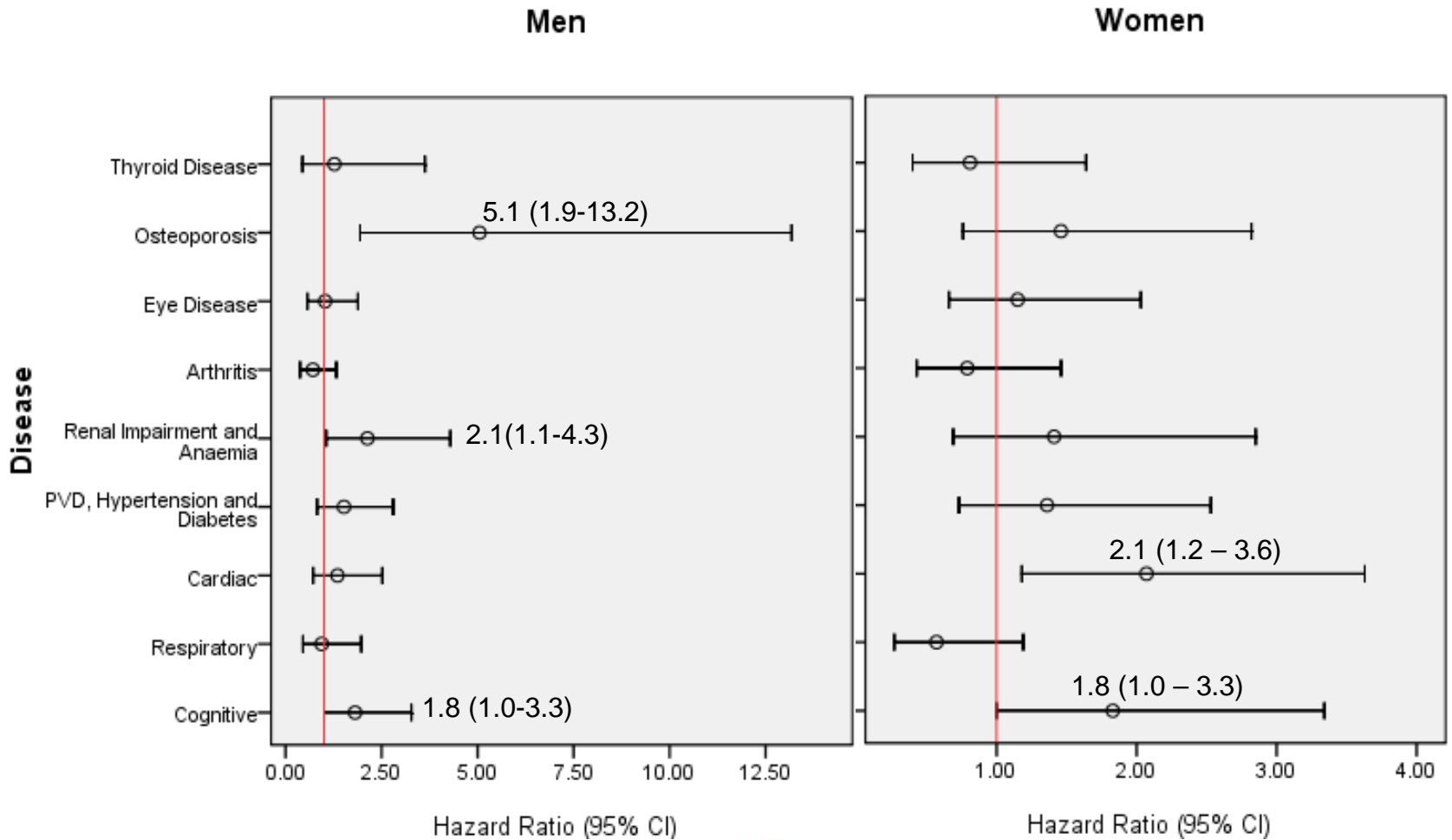
Effects on Mortality



Effects on Mortality

Disease	Men	Women
Cognitive	p=0.0033	p=0.0101
Respiratory	p=0.9119	p=0.7991
Cardiac	p=0.3661	p=0.0159
PVD, Hypertension, Diabetes	p=0.3385	p=0.0105
Renal Impairment & Anaemia	p=0.0901	p=0.1779
Arthritis	p=0.8819	p=0.5953
Eye Disease	p=0.7224	p=0.9325
Osteoporosis	p=0.0041	p=0.3054
Thyroid disease	p=0.9013	p=0.3888
Education	p=0.9013	p=0.0237

Effects on Mortality



Conclusion

- Not much difference in terms of gender
- To reduce the burden of disability on the oldest then interventions should be targeted towards:
 - Cognitive impairment
 - Thyroid disease
 - Arthritis (particularly women)
- Increased mortality for:

Men:

- Osteoporosis 5x
- Renal Impairment & Anaemia 2x
- Cognitive Impairment 1.8x

Women:

- Cardiac Impairment 2x
- Cognitive Impairment 1.8x

Strengths and Weaknesses

STRENGTHS:

- Large sample size
- Data are from oldest old (not previously described)
- Data collected are detailed and very few missing values

WEAKNESSES:

- Cross sectional analysis (not mortality)
- Small numbers of men who suffer from Osteoporosis
- PAF analysis treats diseases as mutually exclusive during calculation and can only give overall PAF
- Only 18 months mortality

Future Analyses

FUTURE ANALYSES:

- Mortality to 36 months and beyond
- Use of Sequential Population Attributable Fractions to account for mutual exclusivity in disease attribution
- Longitudinal analyses to determine disability trajectories and the effect of diseases (i.e. Look at change in disability and onset of disease)

Acknowledgements

- Co-authors: Joanna Collerton, Karen Davies, Martin Eccles, Louise Robinson, Carmen Martin-Ruiz, Thomas von Zglinicki, Oliver James, Tom Kirkwood.
- The research nurse team.
- Pauline Potts – data manager.
- The Newcastle 85+ Study academic stakeholders.
- National Health Service organizations.
- Medical Research Council, Biotechnology and Biological Sciences Research Council, Dunhill Medical Trust, British Heart Foundation, Unilever.
- And of course the study participants.



Disease	Composite make-up
<i>Hypertension</i>	
<i>Ischaemic heart disease</i>	Angina, MI, Coronary Angioplasty, CABG
<i>Heart failure</i>	
<i>Peripheral Vascular Disease</i>	
<i>Atrial fibrillation or flutter</i>	Diagnosed from ECG as disease transient
<i>Cerebrovascular disease</i>	Stroke, TIA, Carotid Endarterectomy
<i>Arthritis</i>	Osteoarthritis, rheumatoid arthritis, lumbar spondylosis / back OA / Spine OA, Cervical spondylosis / Neck OA & other arthritides not specified in GP records
<i>Respiratory disease</i>	Chronic bronchitis, Emphysema, Asthma, Bronchiectasis, Pulmonary Fibrosis, Fibrosing Alveolitis, Asbestosis, Pnuemoconiosis and COPD (in absense of other conditions)
<i>Osteoporosis</i>	
<i>Thyroid disease</i>	Hyperthyroid, Hypothyroid plus those undiagnosed from blood test
<i>Diabetes</i>	Type I, II and type unspecified
<i>Renal impairment MDRD</i>	MDRD formula (coded as normal and mild; moderate, severe and very severe)
<i>Anaemia</i>	Using WHO crierion from blood test results
<i>Visual impairment</i>	Cataracts, Age related macular degenration, Glaucoma, Registered paritally or totally blind.
<i>Cognitive Impairment</i>	MMSE with impairment at <=17 point score