



The estimation and interpretation of adult mortality using Census 2001 data

A presentation based on work done while registered as an M.Phil. student at
the University of Cape Town

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Outline

SIGNIFICANCE

RESULTS

BASIC

UNIVARIATE

MULTIVARIATE

CLOSING COMMENTS

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Why actuaries should care

- Mortality rates calculated for the adult population
- Widening scope of actuarial work
- Study allows us to explore new “South African” rating factors

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Census 2001 data set

- 2001 Census 10% sample data set
 - 948 592 households
 - 3 725 655 persons
 - 36 267 individual death records
- Exposure adjustments
 - Weighting factor to correct for undercount then multiplied by 10 (PES)



Methods

- Calculation of death rates complicated by
 - Under-reporting of deaths
 - Relative under-enumeration (exposure)
- Best estimate of deaths developed using:
 - Death notifications data
 - GGB and SEG methods
- GGB method used to correct under-enumeration
- Age- and sex-specific adjustment factors



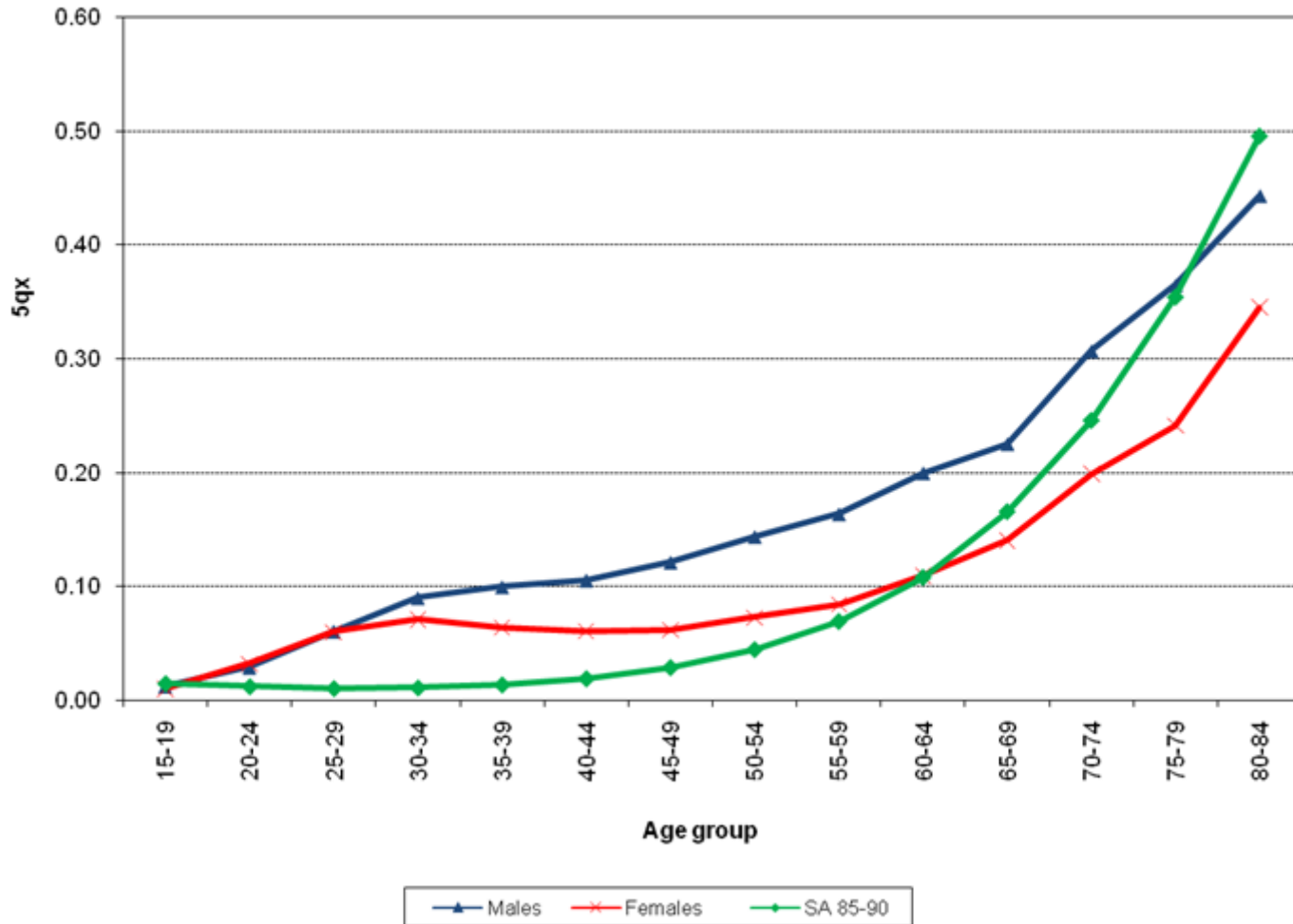
Significance of the adjustment factors

- Unadjusted census mortality approximately 15%-20% too light
- Largest adjustments were 33% (ages 40-44) and 47% (ages 80-84) for males and females respectively

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Comparison to standard rates



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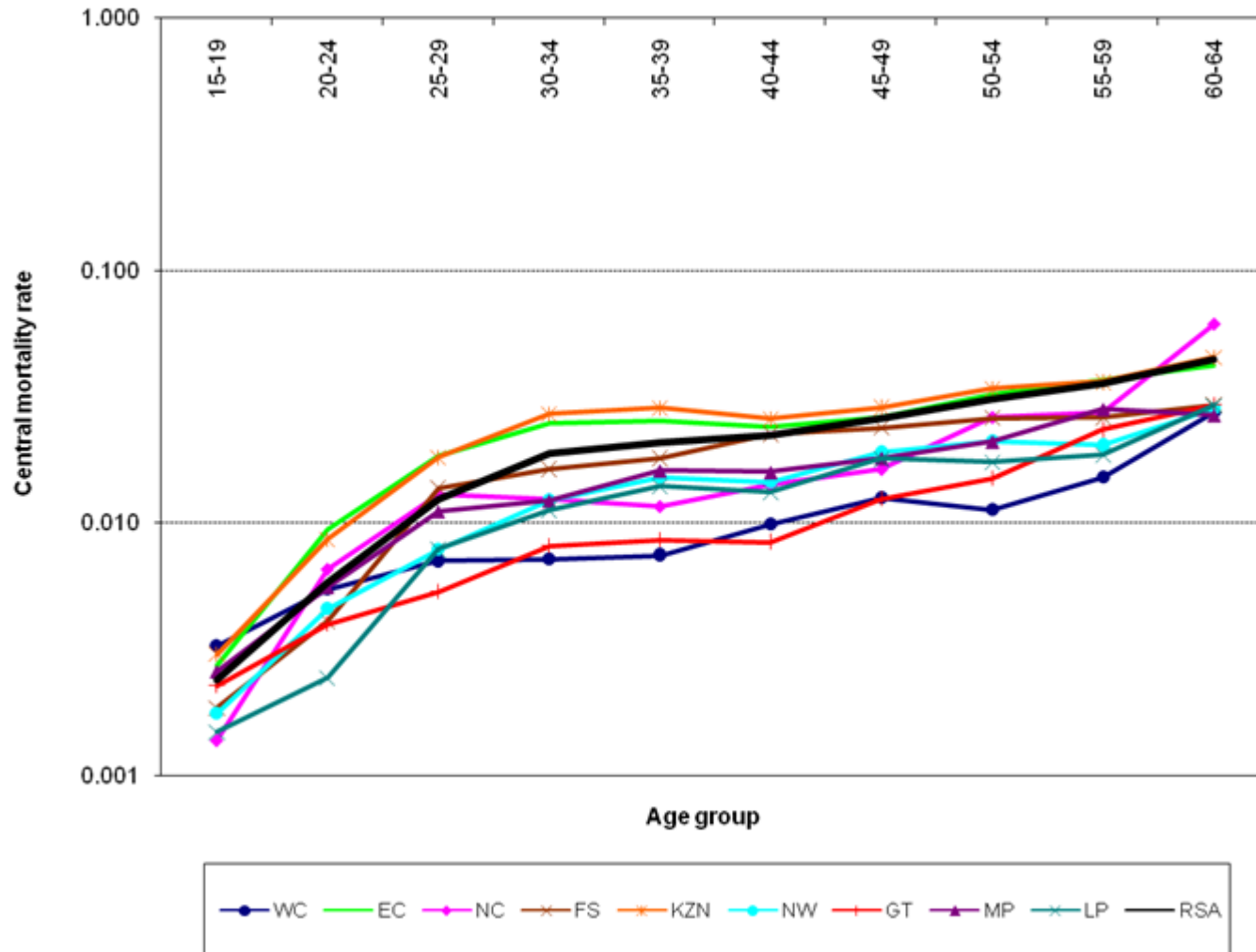
Mortality estimates for sub-groups

- Basic analysis yielded rates by age and sex
- Adjustments and assumptions required:
 - Use adjustment factors to correct for under-reporting of households deaths (assumption)
 - Household characteristics apply to the deceased
- Consider the following census variables:
 - Province
 - Enumeration area
 - Household head characteristics
 - Household variables

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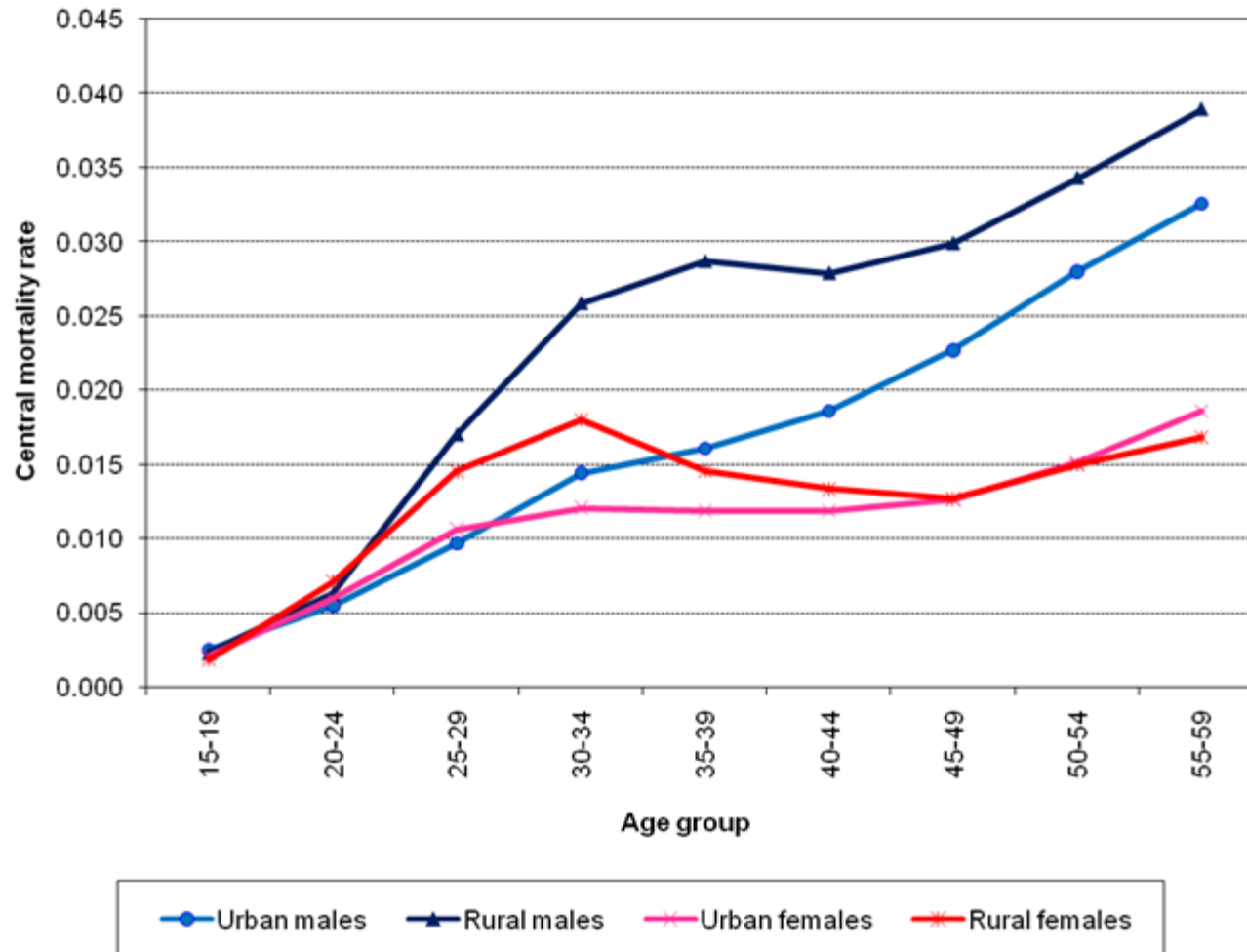


Provincial mortality rates



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Enumeration area (urban, rural)



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Household head variables

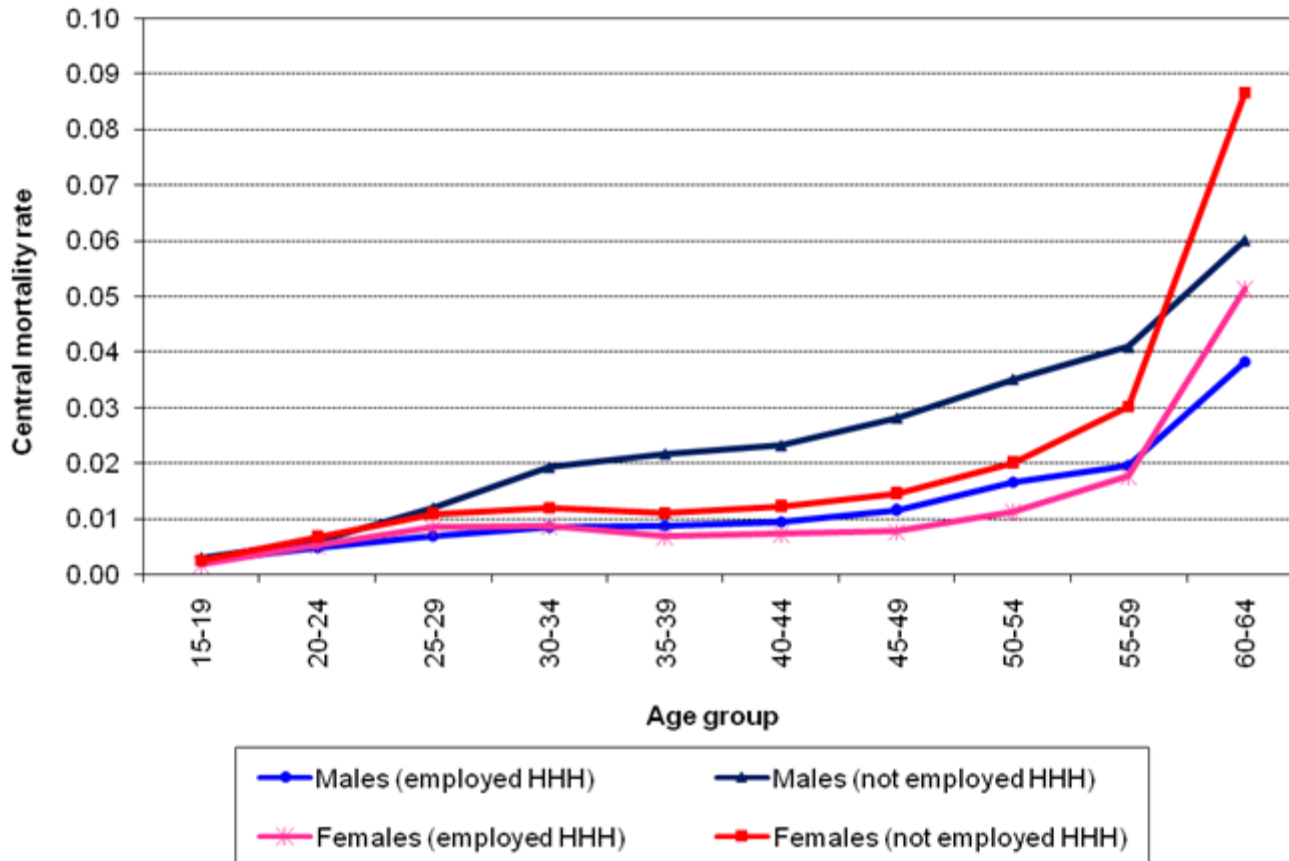
- Brave assumptions
- Definition: household head
- Variables considered
 - Employment status
 - Completed education level
 - Income level

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Employment status - household head

Mortality at least 10% lighter



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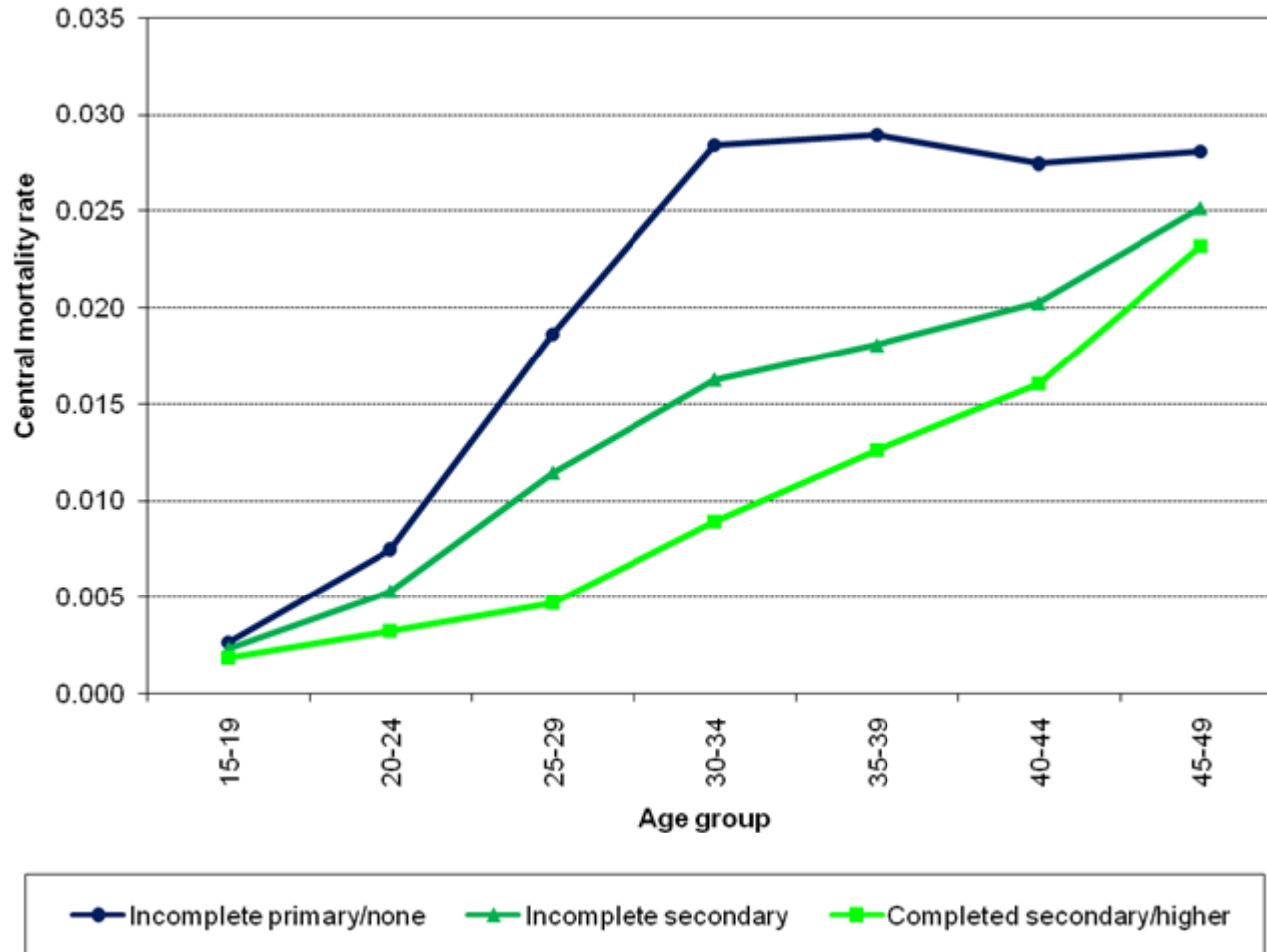


Completed education - household head

- Reasons for consideration:
 - Wealth effect
 - Access to health information (Cutler, Deaton and Lleras-Muney, 2006)
- Limitations include:
 - Other household members may have more education
 - Education, earnings and experience



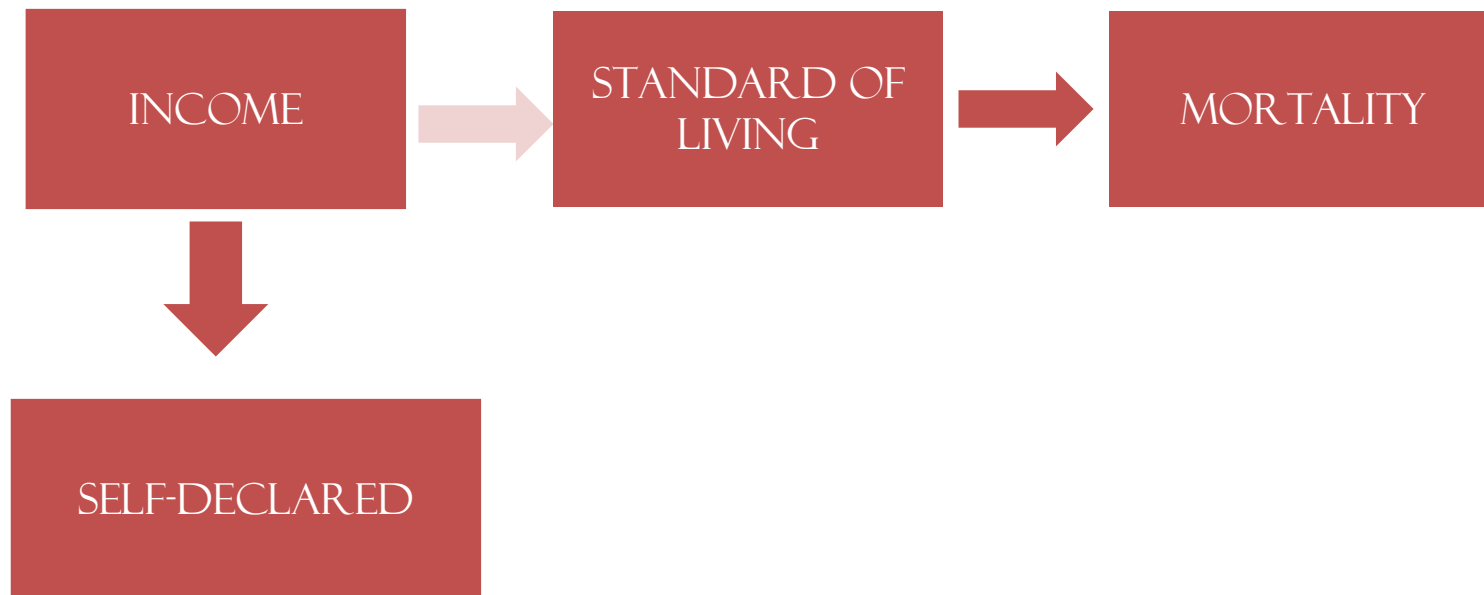
Results: completed education



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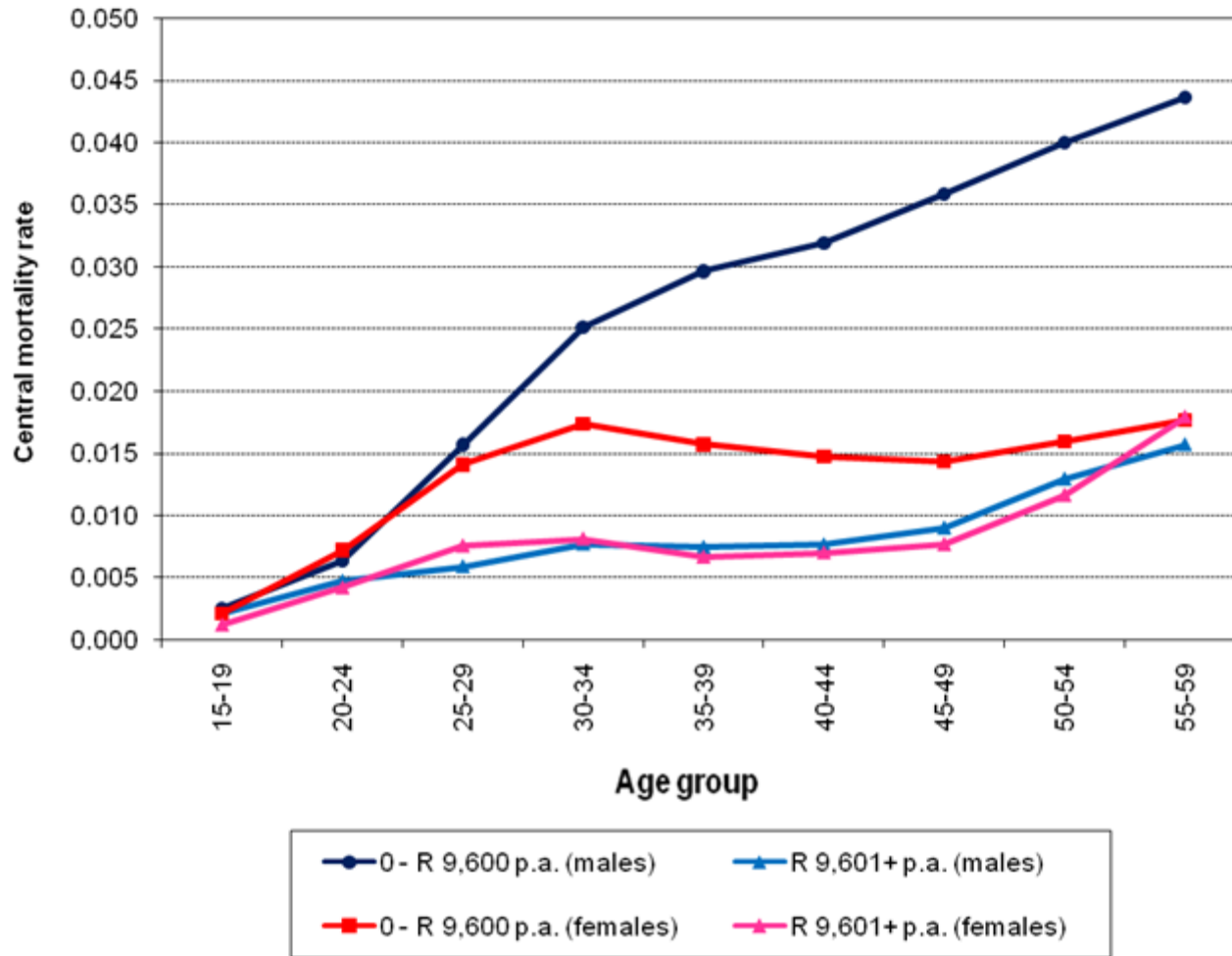
Income level - household head



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Results: income level



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Household variables

HOUSEHOLD VARIABLES

Health and wealth

PIPED WATER

TOILET TYPE

ASSET INDEX

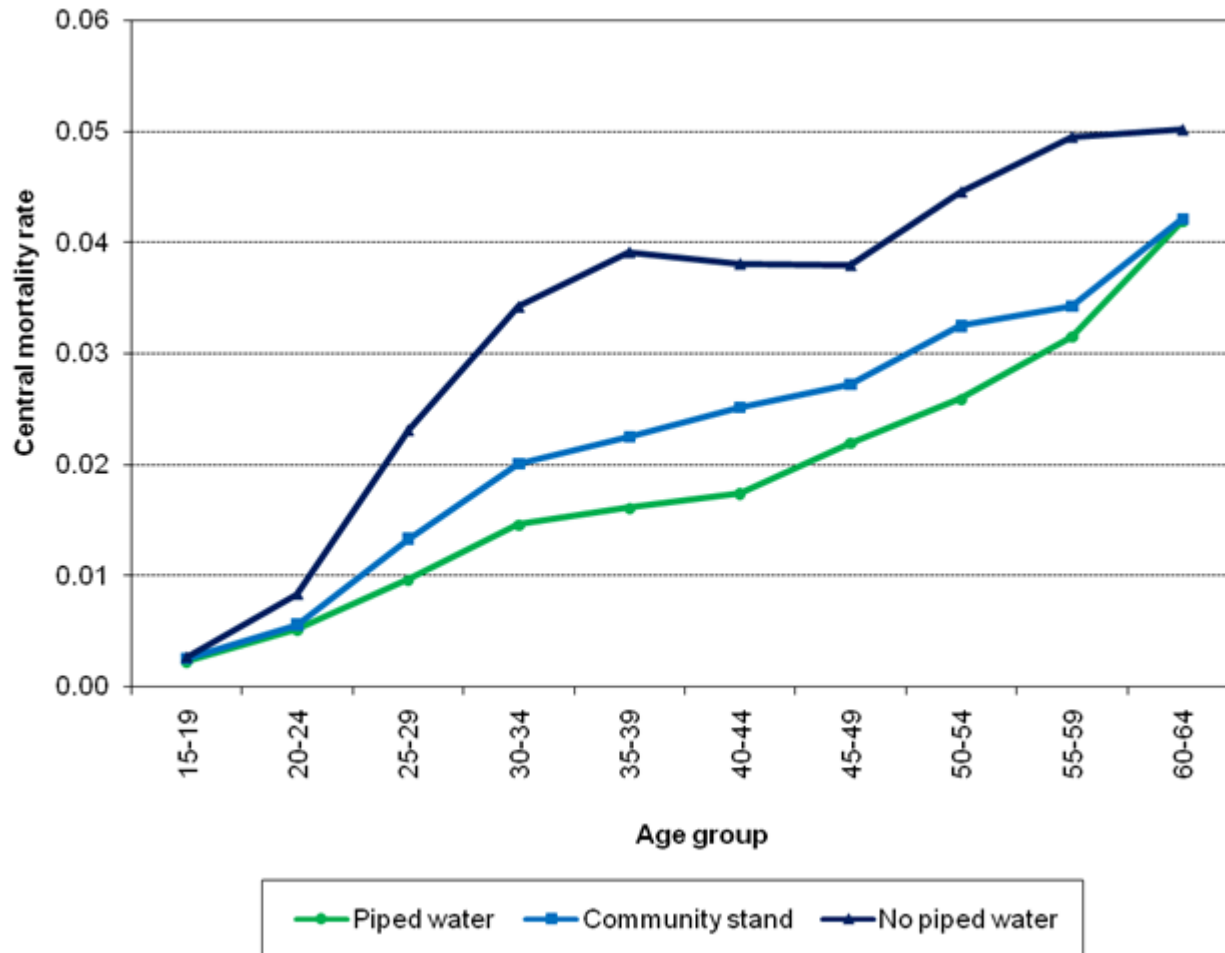


Household assets (e.g. radio, television, refrigerator, computer)
Households ranked and ordered

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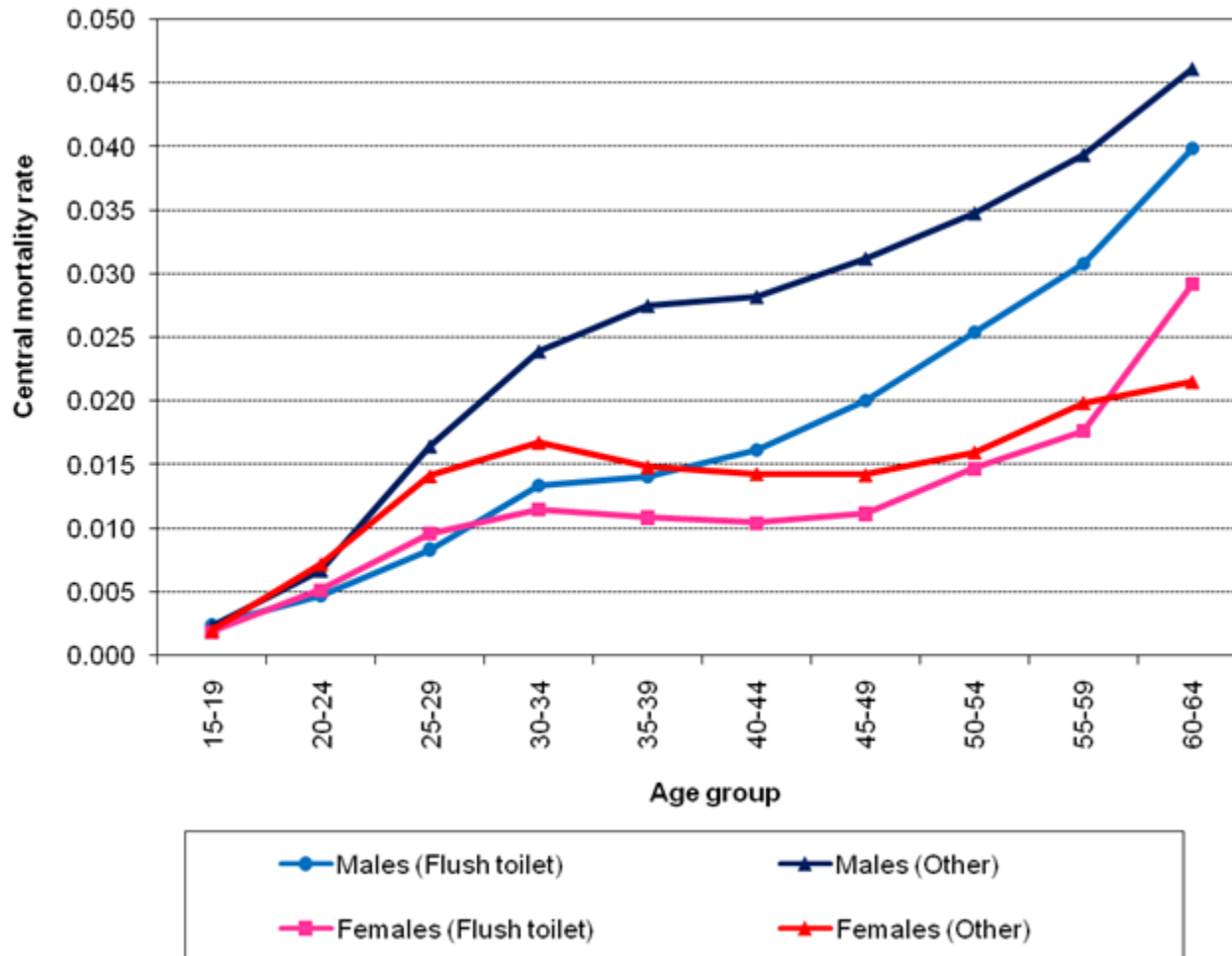
Results: access to piped water



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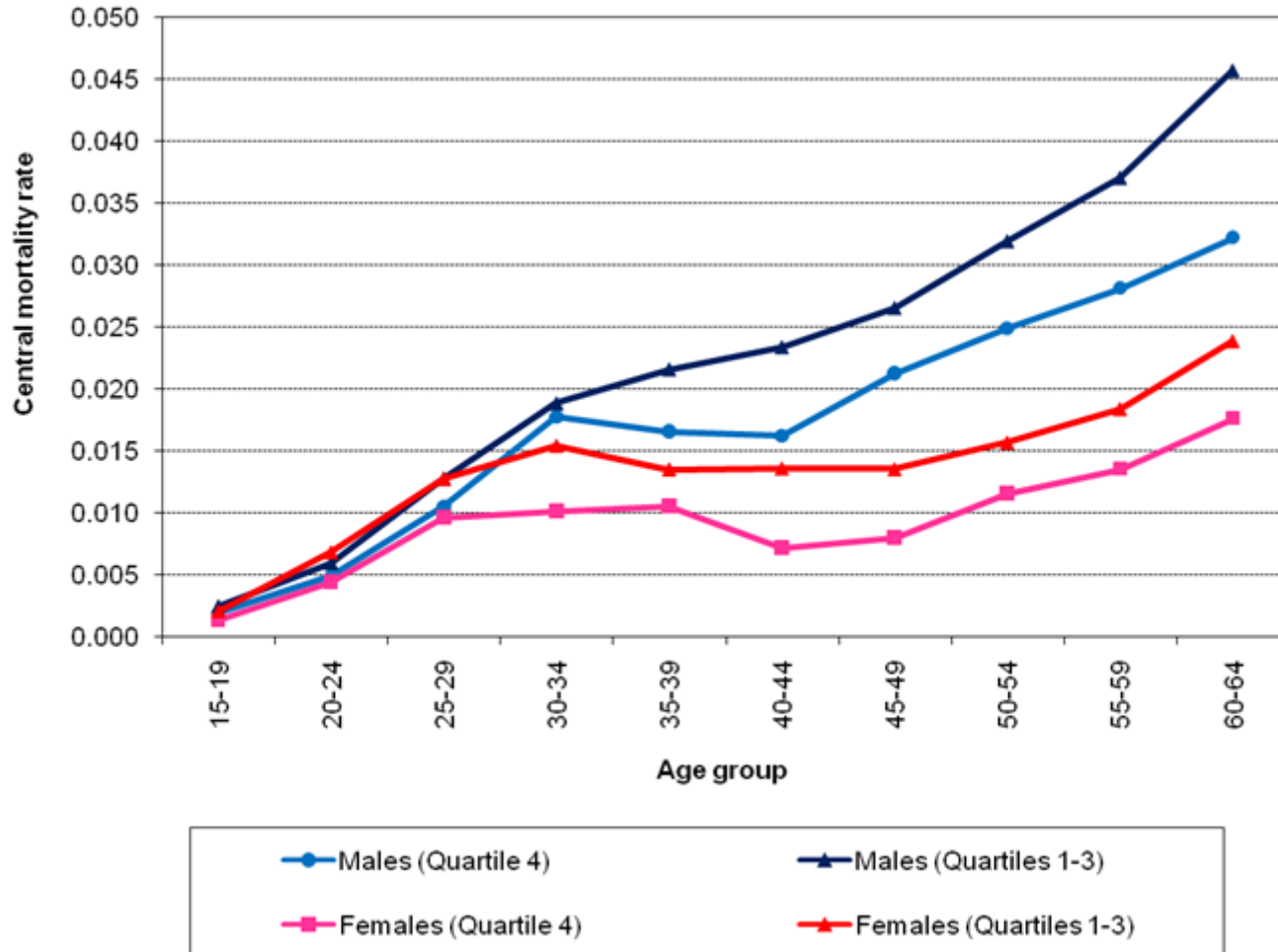
Results: toilet type



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Results: asset index



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Multivariate analyses

- Applied negative binomial regression techniques
- Regression outputs support the earlier univariate analyses
- Found various variables to be simultaneously significant

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Results: multivariate analyses

- Allowing for age and sex
 - After considering income level and employment status of the household head, the completed education level of the household head does not provide further information on adult mortality levels (at a 1% level)
 - After considering enumeration area, consideration of community stand does not provide further information on adult mortality levels (at a 1% level) BUT having piped water in the household is significant



Closing comments

- Robust adult mortality rates estimated from Census 2001 10% sample data set and other publicly available data
- Comparison with standard rates
- A number of rating factors identified
 - More than 4 seldom useful
- Can use reference person from household for rating
- Update using 2007 Community Survey



ANY QUESTIONS?

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