Disentangling Sex-Differentials in Death Registration & Mortality Estimates: Preliminary Findings from Morocco & Kuwait

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Expert Group Meeting on Methodology for and Lessons Learned from CRVS Assessments

Population Division, DESA, United Nations

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Outline

- Status of CRVS systems + mortality estimation in Western Asia
- Regional strategy for CRVS systems improvements
- Completeness assessment case studies: Kuwait & Morocco
- Methodological limitations & next steps

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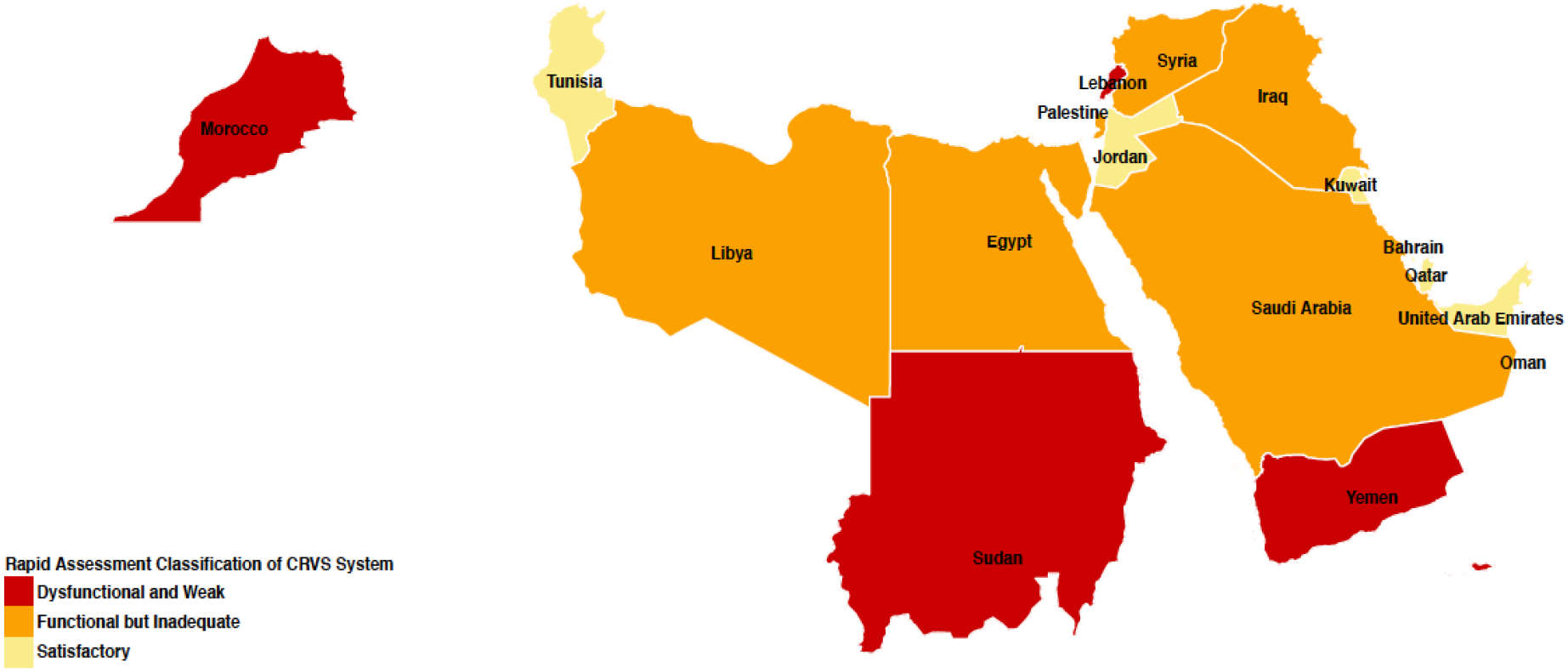
Current Status of CRVS Systems



Source: Eastern Mediterranean Regional Office, World Health Organization, 2013.

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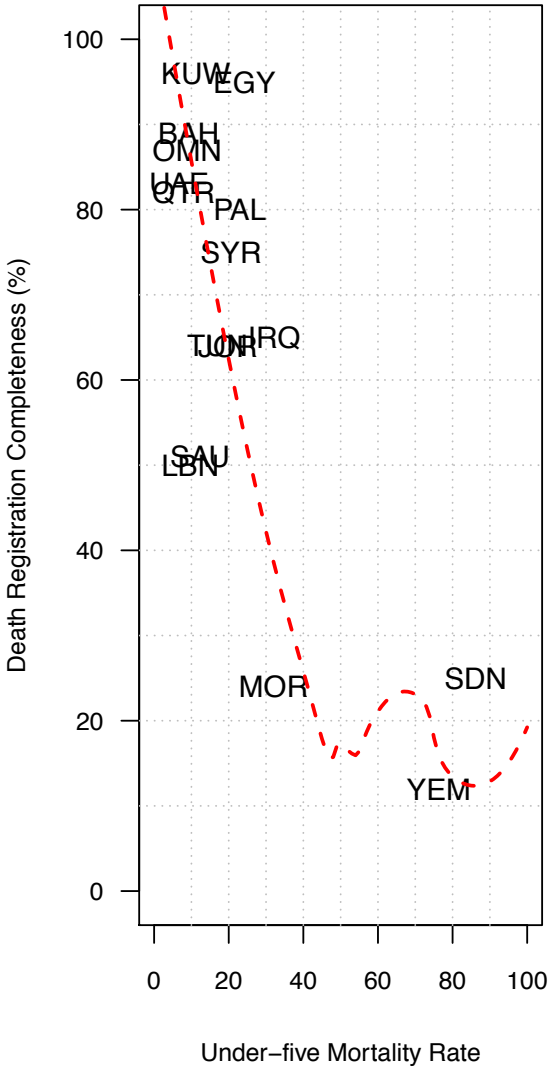
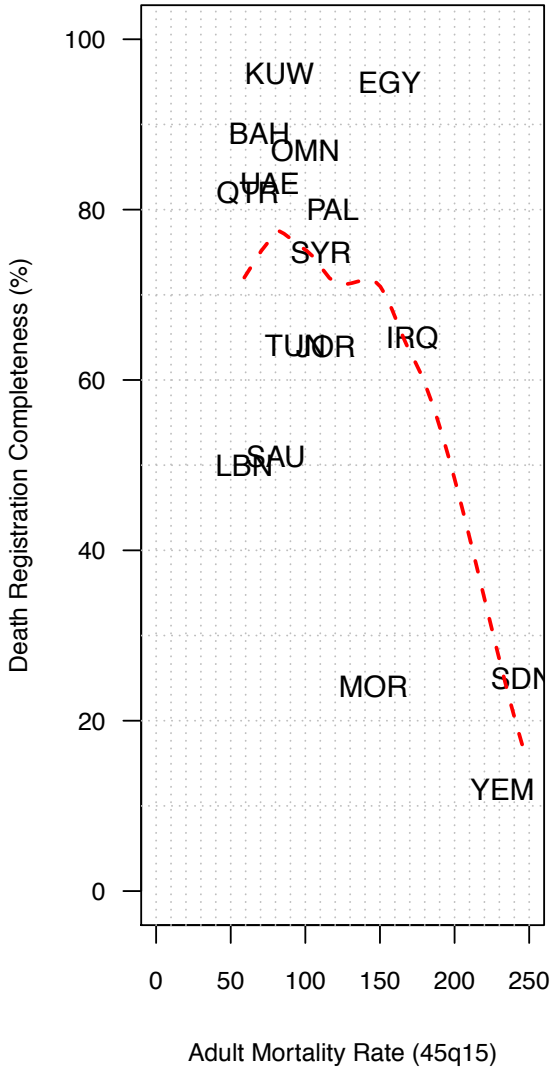
Mortality & Registration Paradox





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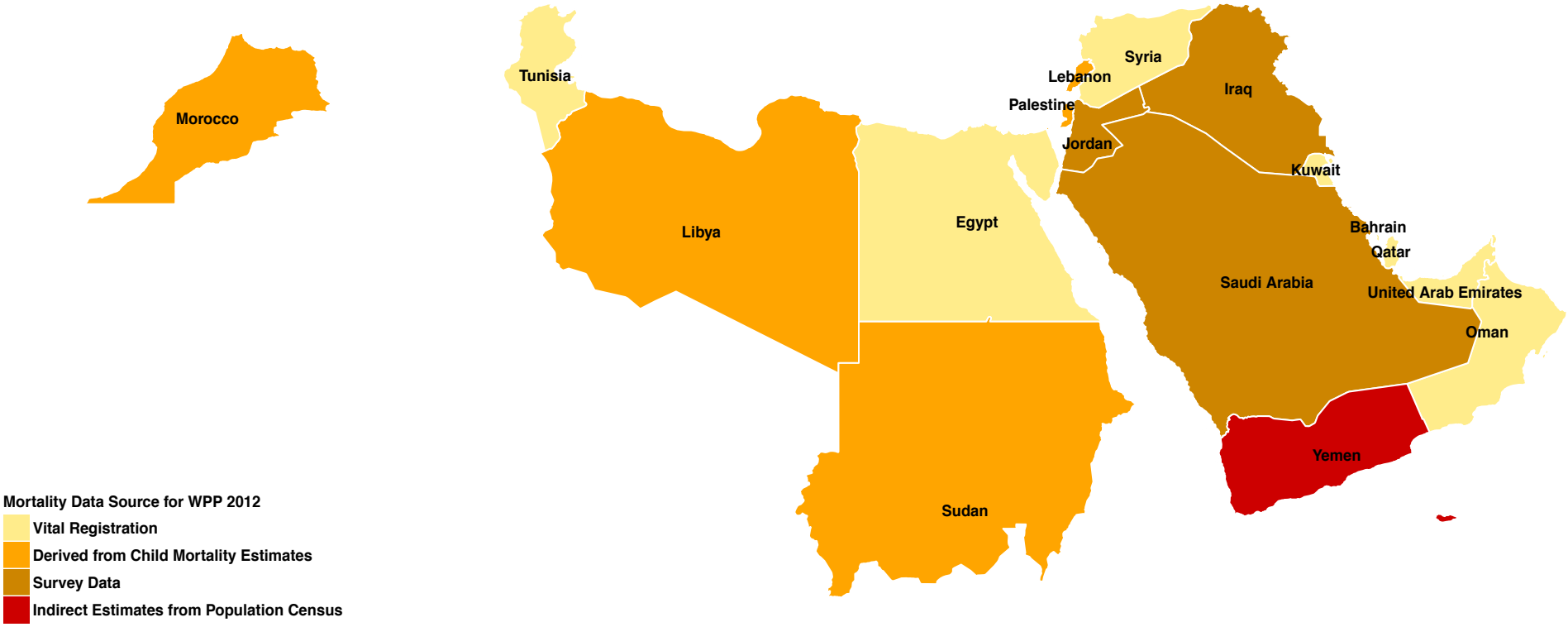
Heavy reliance on non-CRVS sources by UN when estimating summary mortality measures



Source: United Nations, Department of Economic and Social Affairs, Population Dicvision (2013), World Population Prospects: The 2012 Revision

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2014-2019 Regional Strategy: WHO-EMRO & UN-ESCWA Focus

- Strengthen the registration infrastructure and capacities
- Improve production, use and dissemination of vital statistics
- Improve inter-sectoral coordination and alignment among stakeholders
- Strengthen and harmonize regional and global partnerships in support of country strategies

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Study Objectives

- To assess completeness and quality of recent death registration data in Kuwait, and Morocco with a particular focus on sex differences.
  - Completeness: Proportion of all deaths (b/w ages 15-59) that were registered by CRVS system
  - Quality: whether the age, sex, geographic, temporal patterns in the registration data are internally consistent and externally consistent with alternative data sources
- Understand current deficiencies in death registration as a first step towards improvement of death registration systems and resulting DR-based mortality statistics

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Current Approaches to CRVS Completeness (& Quality) Assessment

1. **Self-reporting in HH surveys**
   - Reporting bias due to terminological differences
   - Reporting bias due to social desirability
2. **Comparison of registered deaths to E(deaths)**
   - Misalignment between reference populations
   - Large sampling errors
3. **Indirect demographic estimation: Death Distribution Methods**
   - **Strong assumptions:** [1] closed population, [2] completeness of recording of deaths is constant by age, [3] the completeness of recording of population is constant by age, & [4] error-free age reporting
   - Non-negligible uncertainty intervals (Murray et al., PLoSMed-2013)
4. **Record-Linkage**
   - Labor intensive & Technically challenging

Data & Methods

- Apply different variants of death distribution methods (DDMs) to data on national populations:
  - **Generalized Growth Balance (GGB)** method uses the observed population growth rates, the observed birth rate and the observed death rate to estimate the relative coverage of the population censuses along with the relative coverage of the death registration process.
  - **Synthetic Extinct Generations (SEG)** method compares the estimated future cohort deaths to the current cohort's population size as a means to assessing the completeness of the death registration process during the intercensal time period.
  - **Adjusted-SEG** method involves application of the GGB method to the available data to adjust the raw data followed by application of the SEG method to the GGB-adjusted data.

Country	Census 1	Census 2	Intercensal Deaths	Notes
Kuwait	20-21 April, 2005	21 April-20 May, 2011	2005-2011	Assessment for Nationals only.
Morocco	2 September, 1994	1-20 Sep, 2004	1994-2004	-

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Methodological Assumptions

- Coverage of each individual census is the same for all ages
- Completeness of reporting of deaths is the same for all ages from a minimum age (usually age 15)
- Population is closed to migration (or information on migration is available)
- No assumption of population stability (unlike earlier one-census methods)

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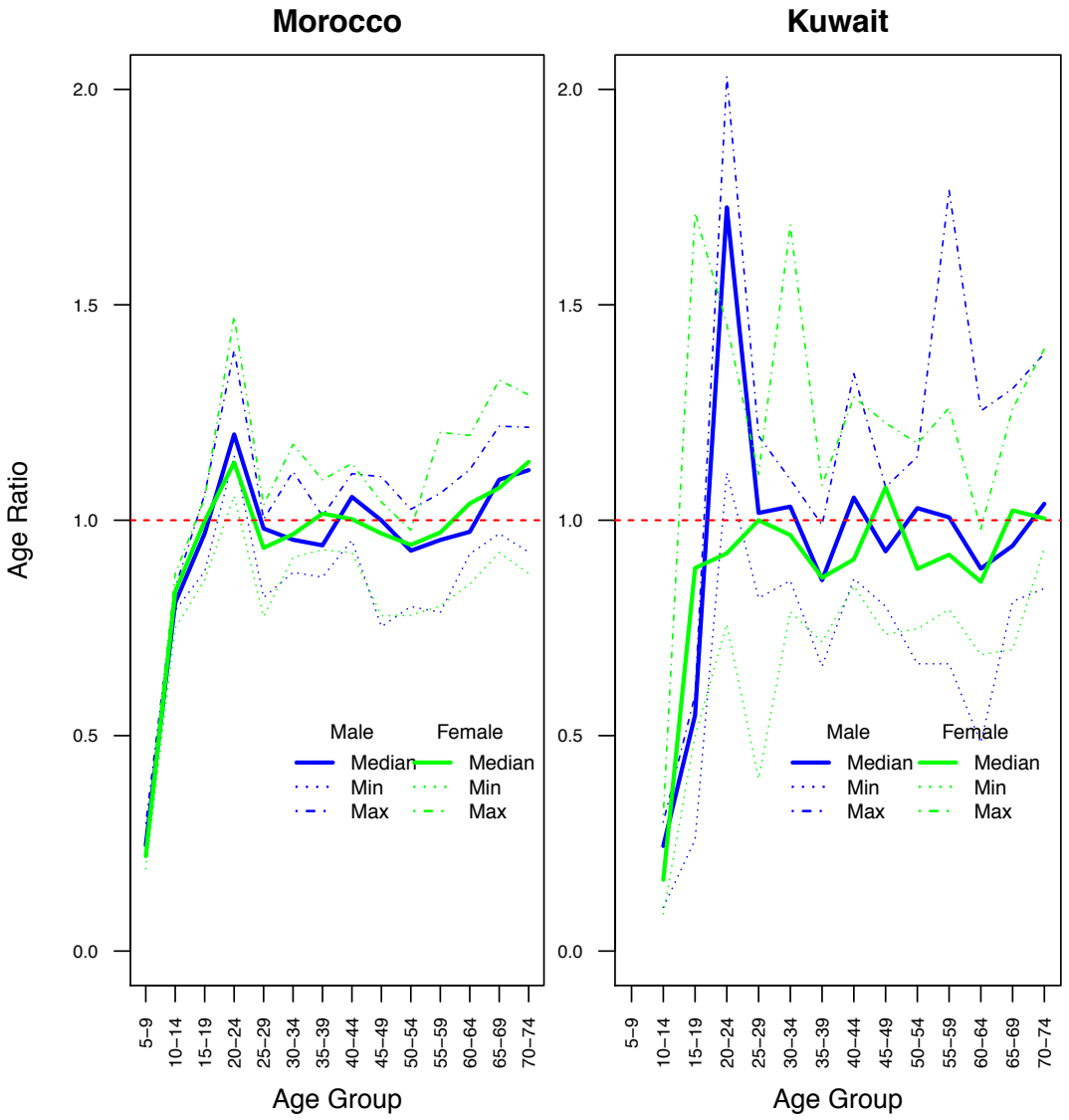
Death Register: Age Ratio

$$_5AR.D_x = \frac{2 \times {}_5D_x}{{}_5D_{x-n} + {}_5D_{x+n}}$$



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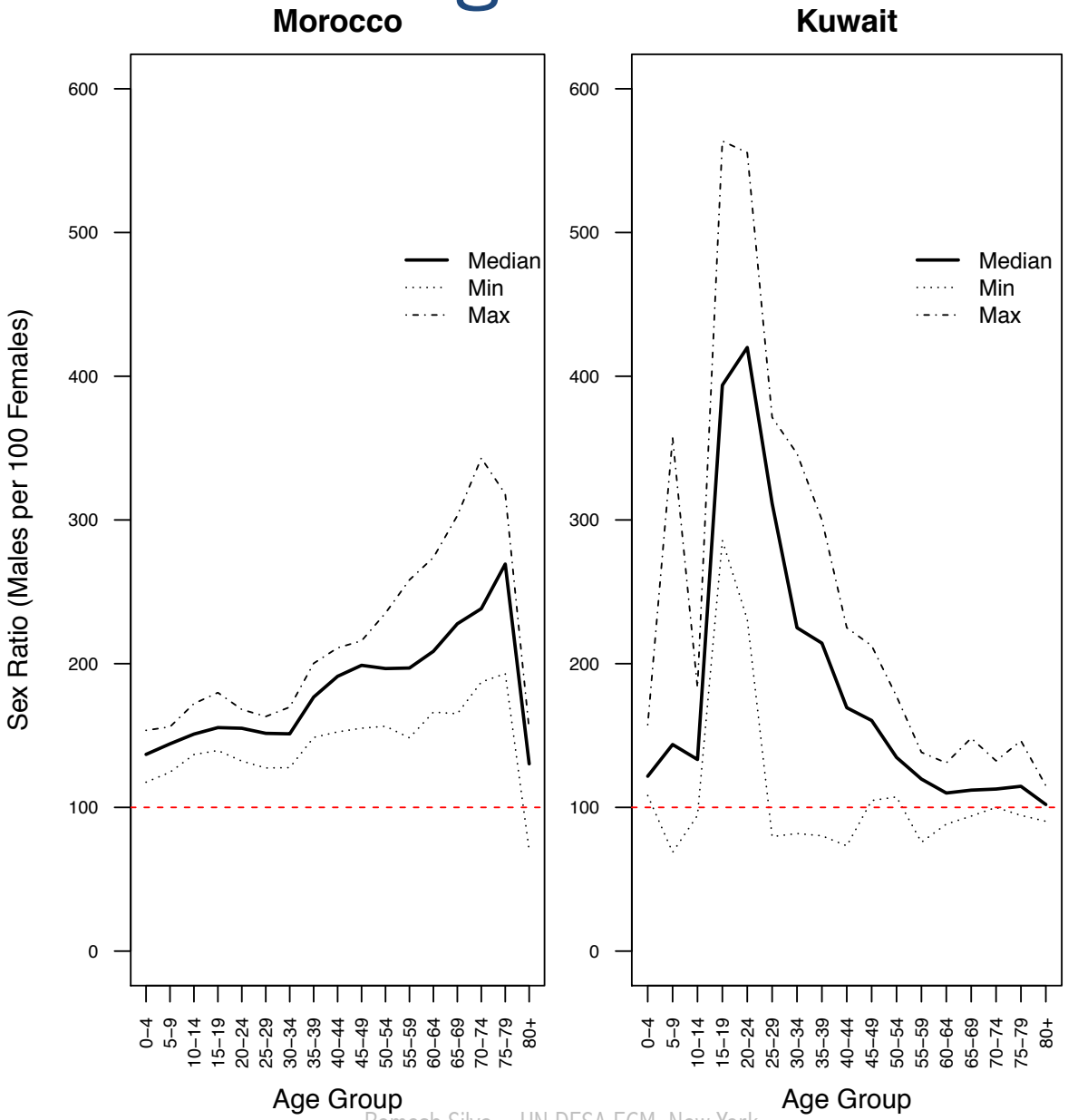
Death Register: Sex Ratio



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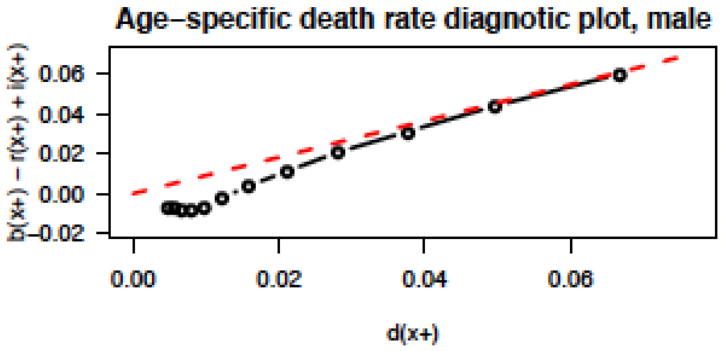
Death Registration Completeness Estimates

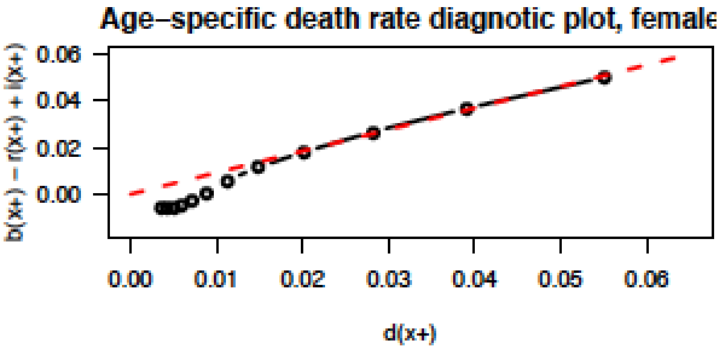
Member State	Male				Female			
	k1/k2	GGB	SEG	Adj. SEG	k1/k2	GGB	SEG	Adj. SEG
Kuwait	**0.914**	86	**110**	73	**0.946**	86	113	83
Morocco	0.842	50	68	62	**0.925**	28	33	38

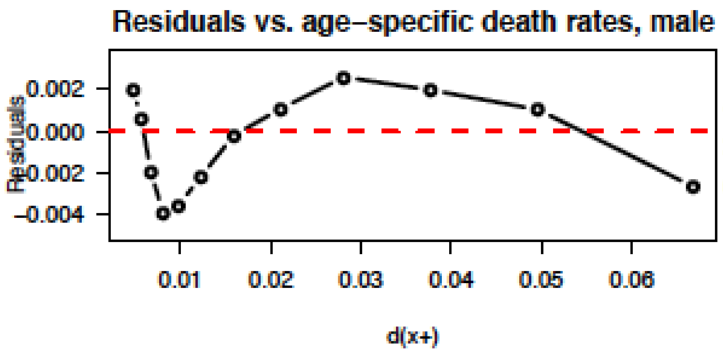
Note: GGB, SEG, and Adj. SEG completeness estimates that are b/w 90-110% are denoted in **bold**, all other completeness estimates are denoted in red.

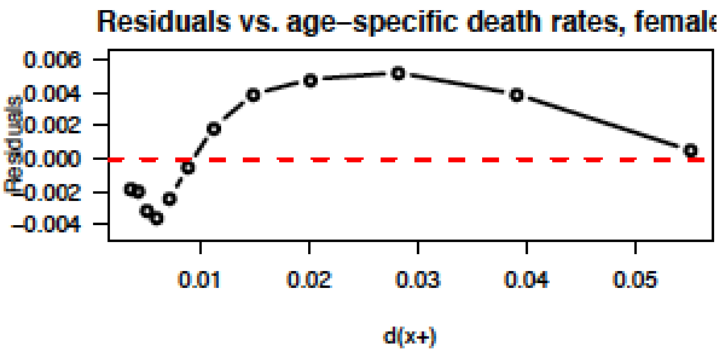
Kuwait, 2005-2011

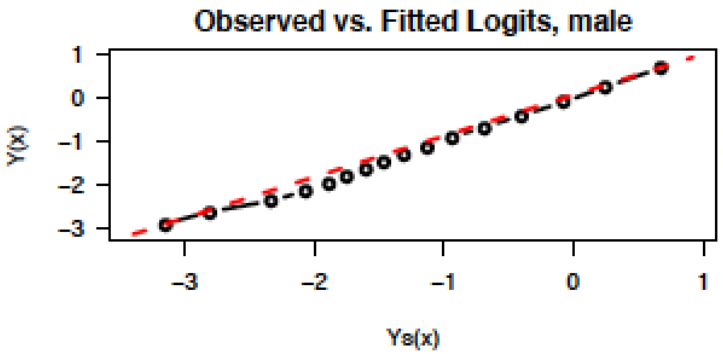
GGB Diagnostic Plots

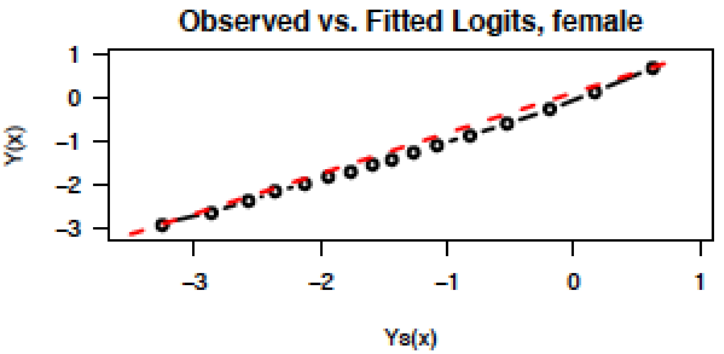


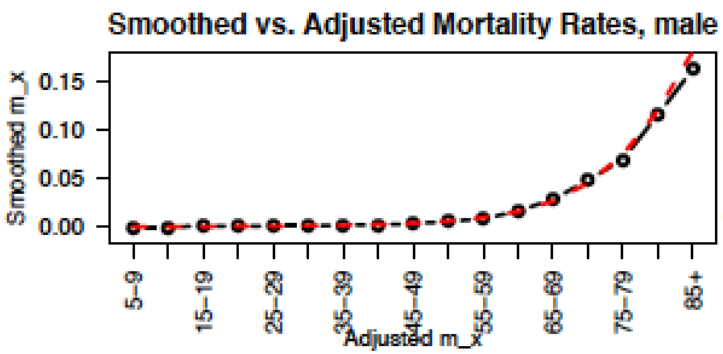


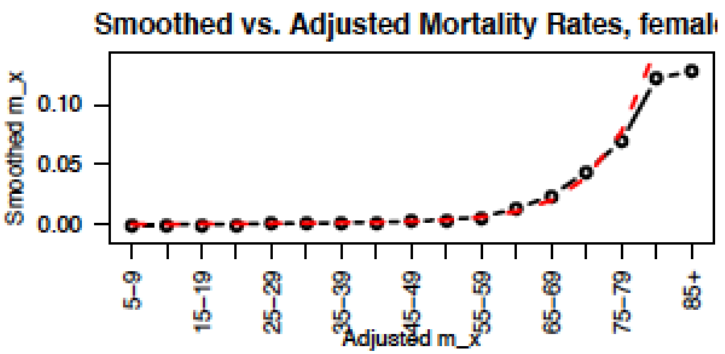






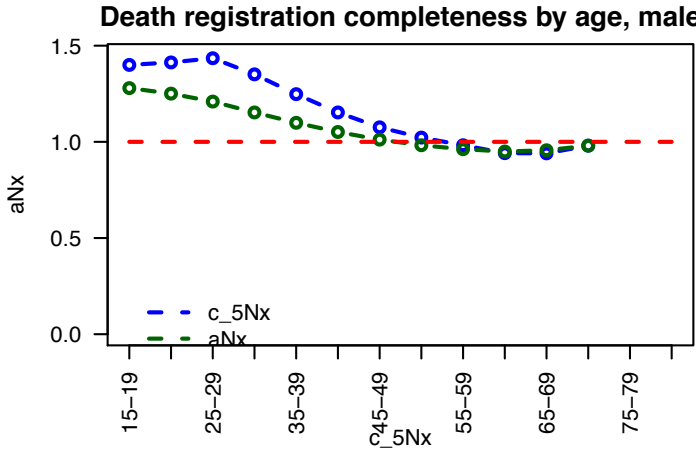


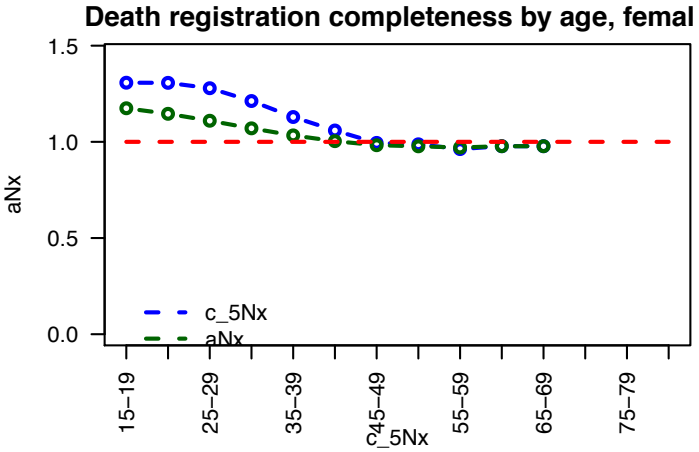


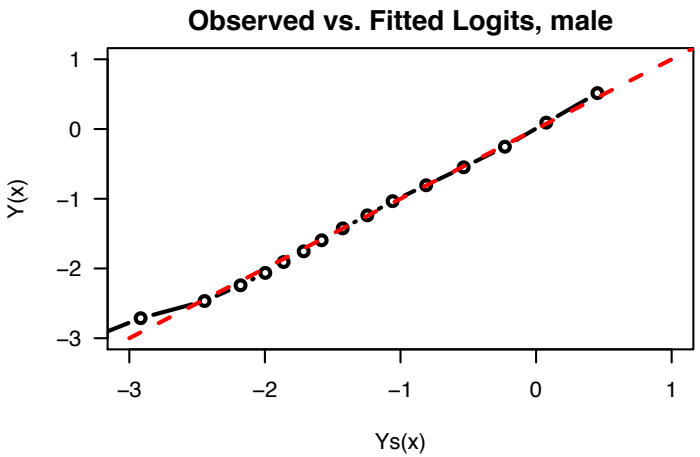


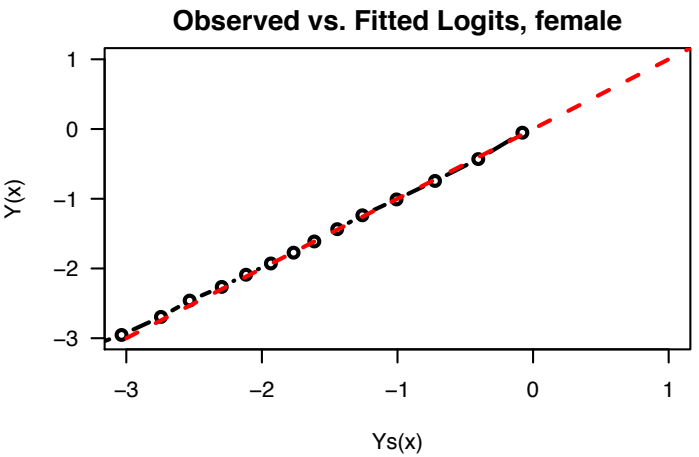
Kuwait , 2005-2011

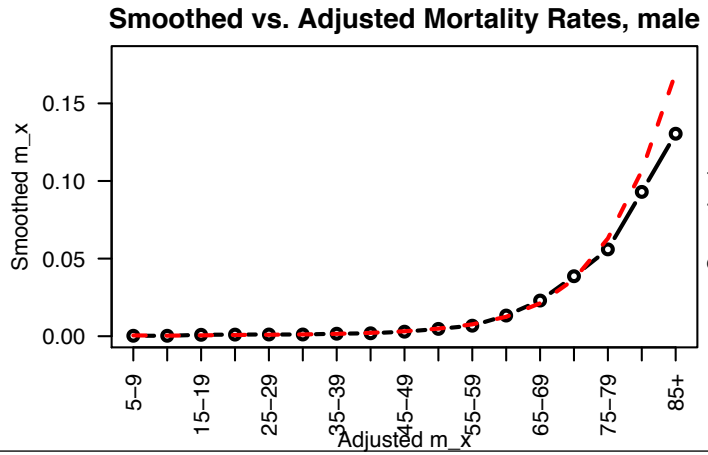
SEG Diagnostic Plots

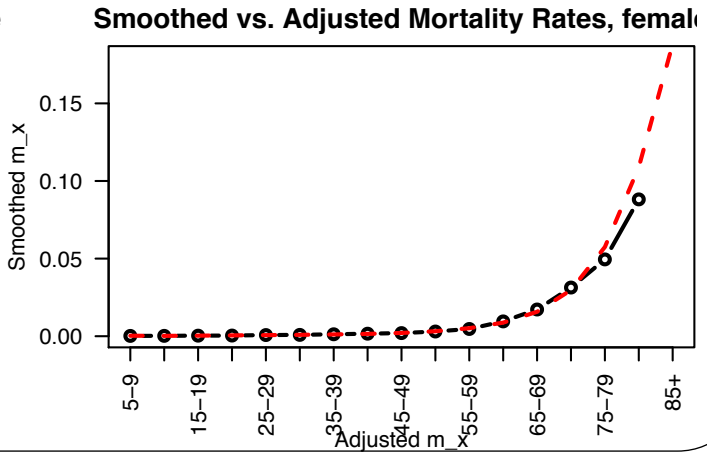






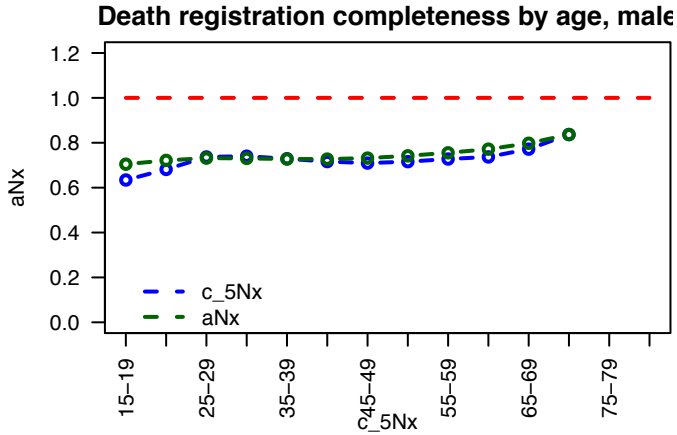


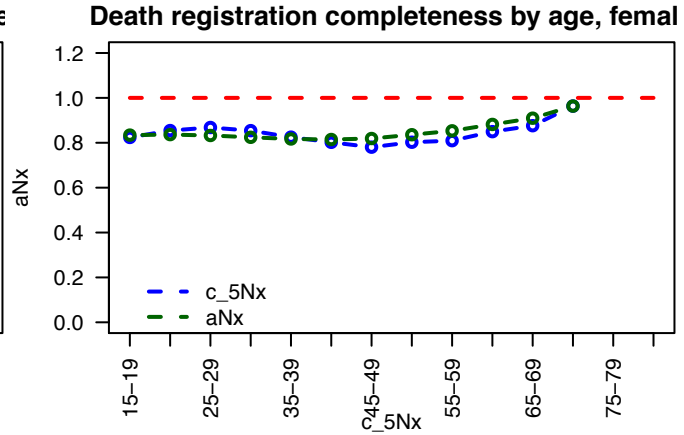


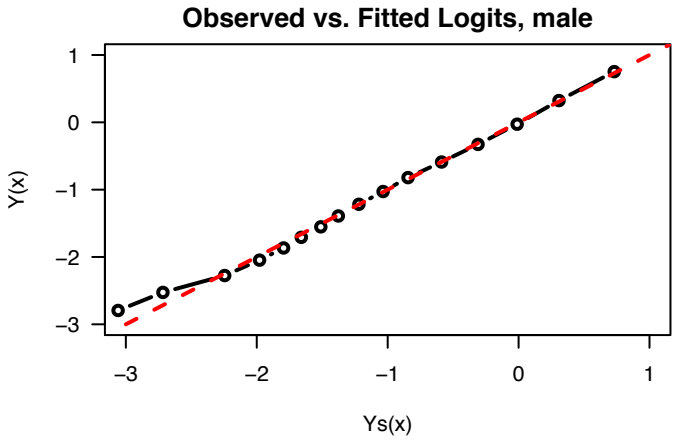


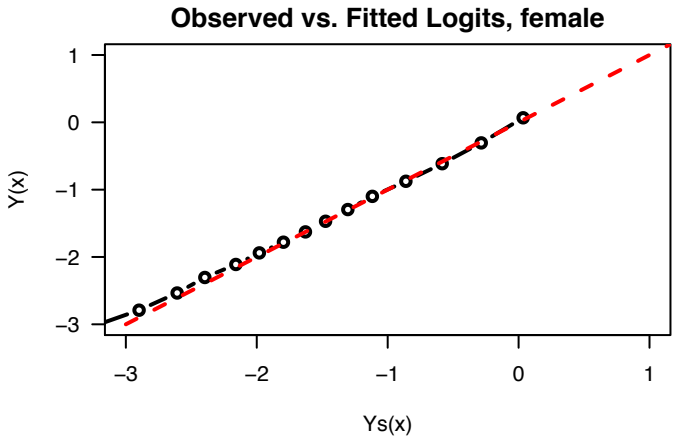
Kuwait, 2005-2011

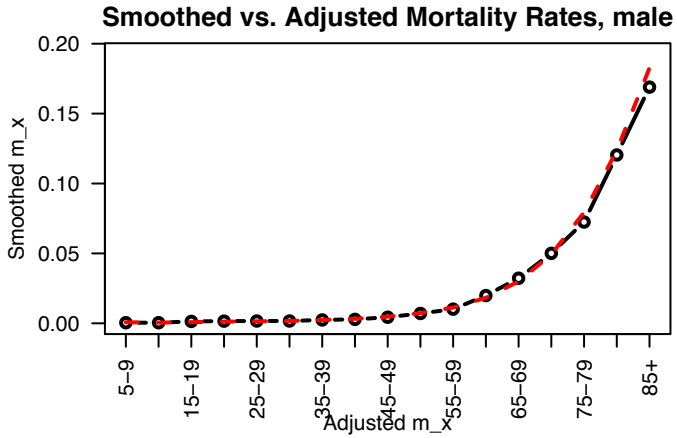
Adjusted-SEG Diagnostic Plots

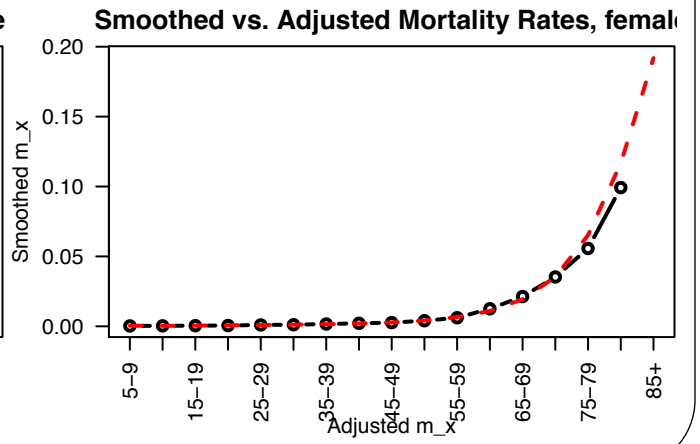






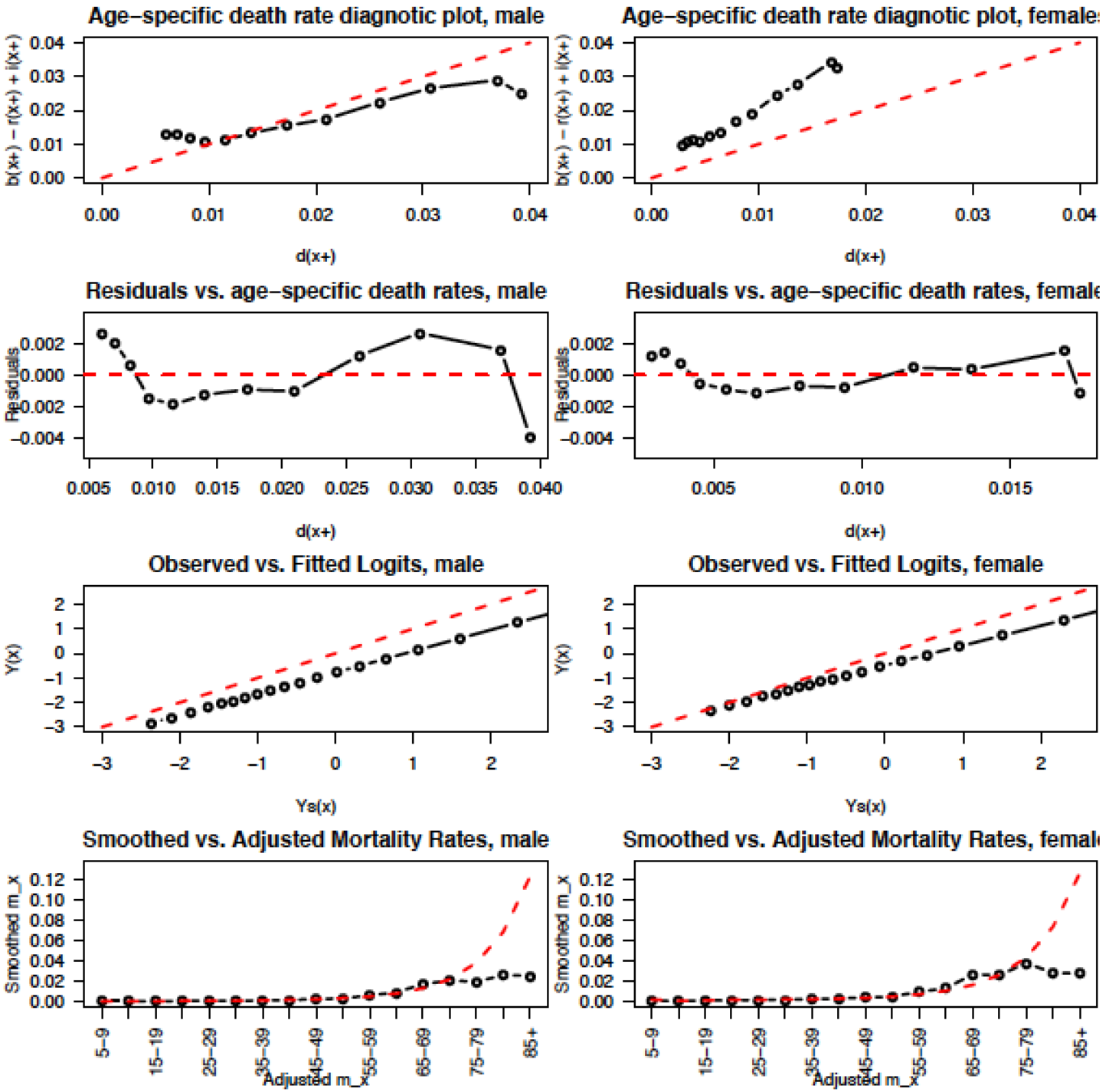






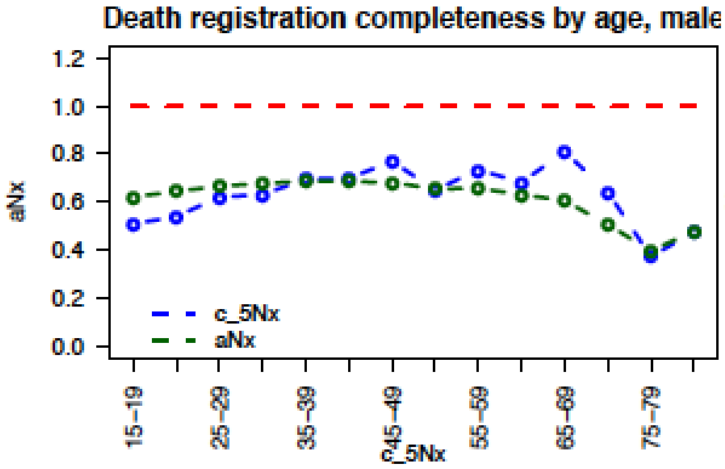
Morocco, 1994-2004

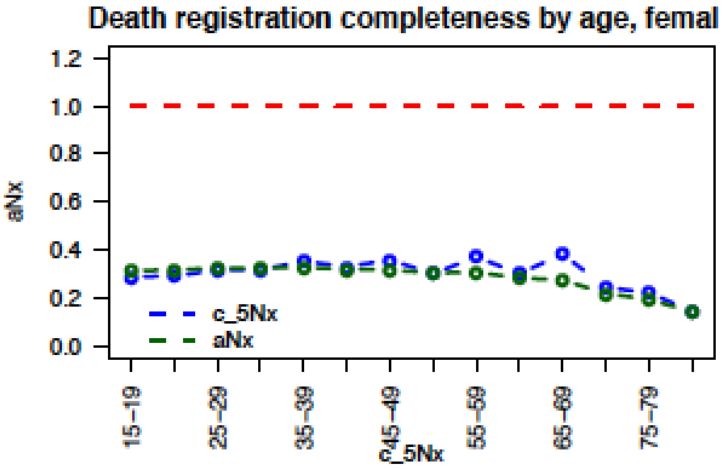
GGB Diagnostic Plots

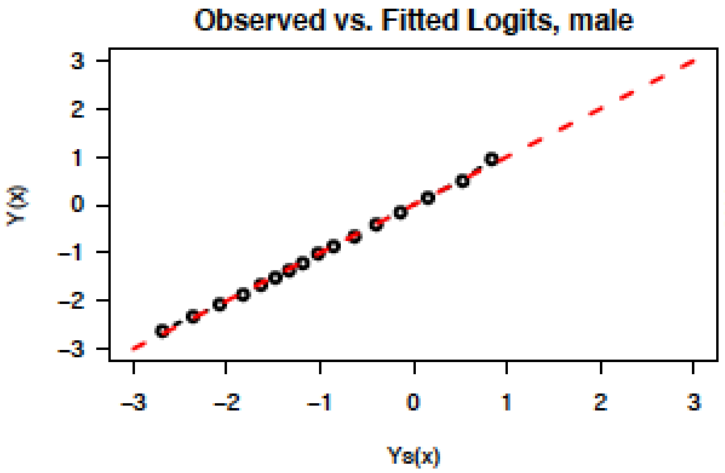


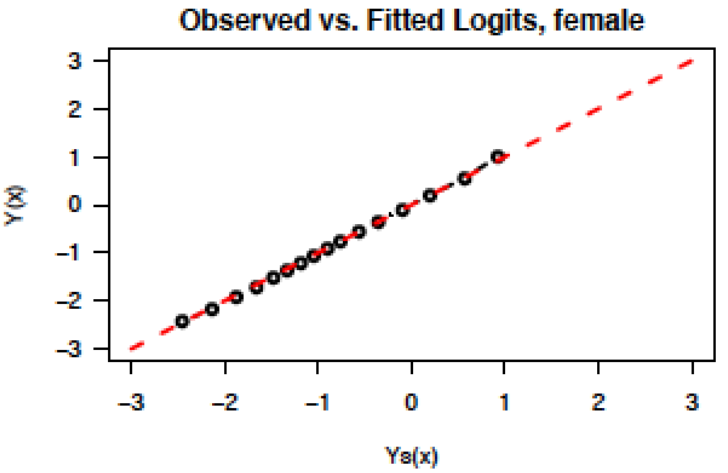
Morocco, 1994-2004

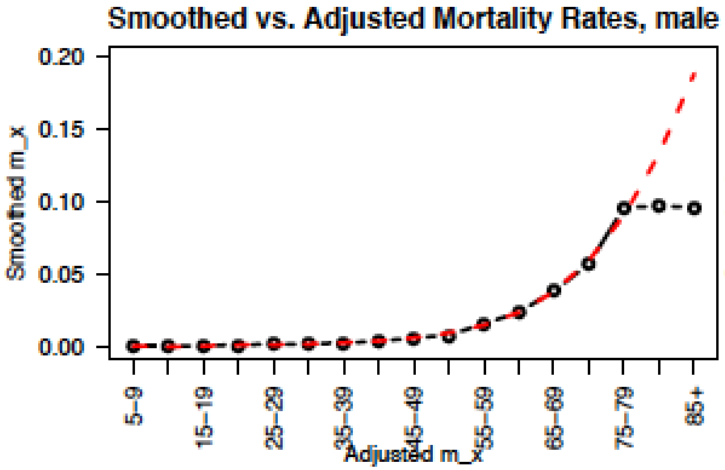
SEG Diagnostic Plots

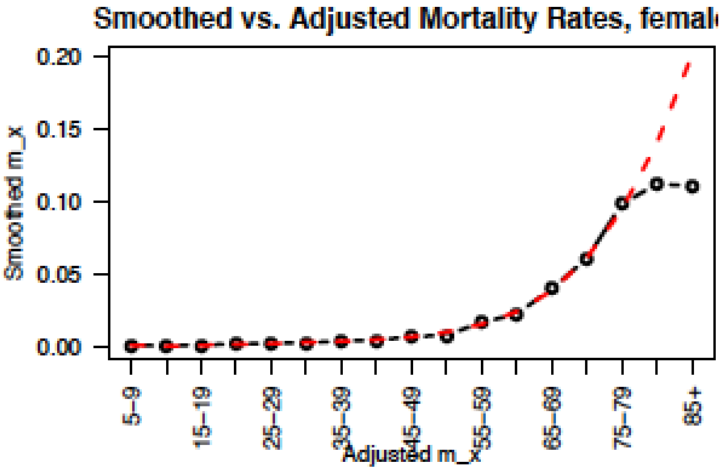












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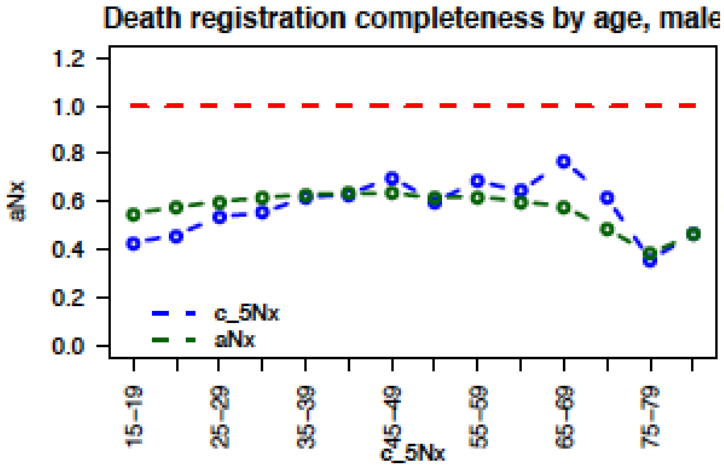

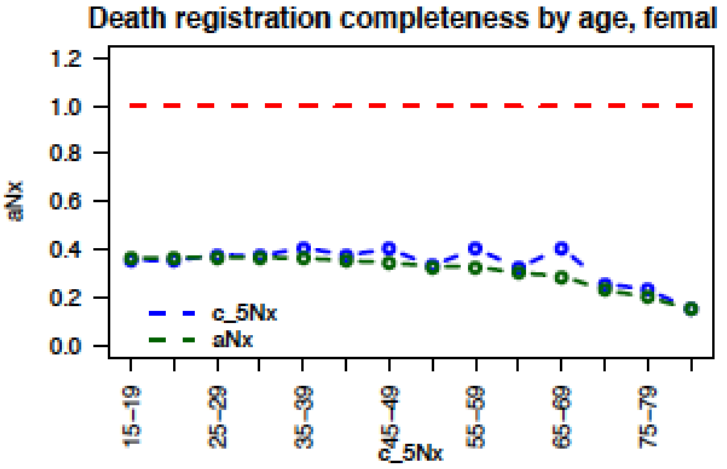

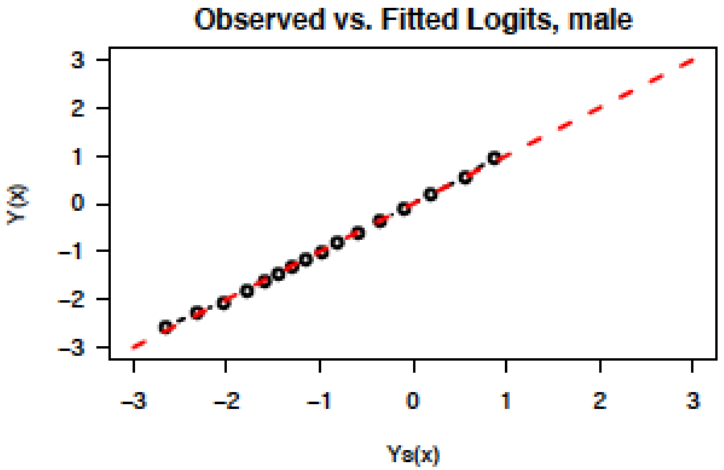

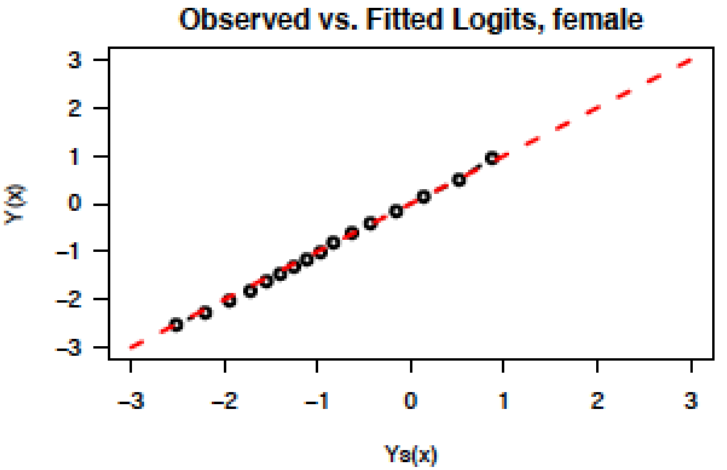

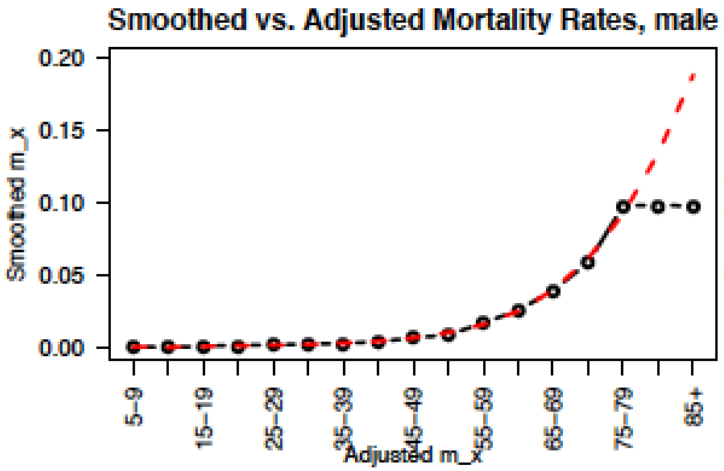

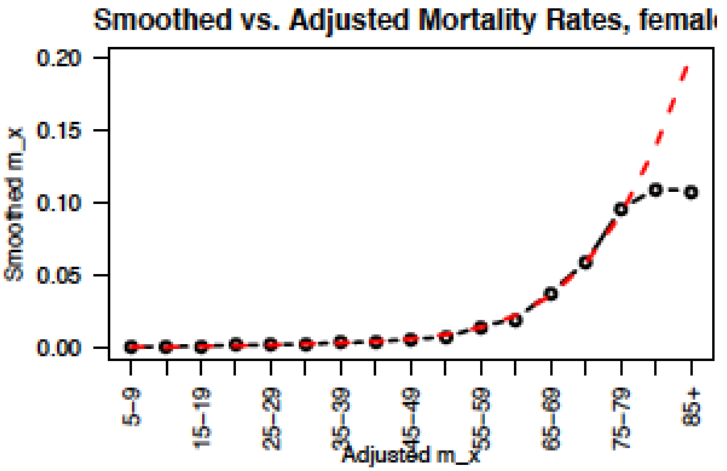

Death Registration Completeness Estimates: Comparison with UNPD Official Estimates

Member State	Male		Female		WPP,2012 Data/Method
	Adj.SEG	WPP, 2012	Adj.SEG	WPP, 2012	
Kuwait	116	98	87	64	Vital Registration
Morocco	227	188	213	141	Derived from Child Mortality Estimates

Comparison Table of Adult Mortality Estimates ($_{45}q_{15}$) by Sex derived using the Adjusted SEG Method and those published in WPP, 2012

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Tentative Conclusions

- Kuwait
  - Limited insight from application of DDMs
    - Published DR data only available for nationals (~1/3 of resident population)
    - DDMs sensitive to reporting errors/bias given small pop size
- Morocco
  - Notable sex differential in DR completeness
    - Likely a rural phenomenon, but need internal migration data
- Methodological
  - Subjective-choice of age-trim
  - Effects of assumption violations

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Next Steps

- **Kuwait**: investigate the nature of census enumeration & examine sex-specific CoD data
  - Quantitative Study:
    - Evaluate Cause-of-Death (CoD) data from death register
    - small-scale record linkage study focused on young adult ages – linkable data source?

- **Morocco**: investigate the nature of sex differentials in death registration in urban areas vs. rural areas
  - Quantitative Studies:
    - Replicate analysis using 2004 & 2014 Census data (and intercensal registration data)
      - Disaggregate by urban/rural (Census-2014 included migration questions)
    - Small-scale record linkage study – linking HH deaths in last 12-months (Census-2004) and registered deaths
  - Qualitative Study: Incentives for DR (by sex)
    - Ethnographic work to understand patrilineal inheritance tradition and impact of recent changes to Moroccan Family Code
    - Relationship b/w Burial permit process in urban/rural areas and DR completeness sex-differences

- **Regional**:
  - Expand completeness assessments beyond Morocco, Kuwait, Egypt, Bahrain
    - Application of DDMs in Jordan, Tunisia, Oman(?), Sudan
    - Develop small-scale record-linkage studies [Egypt, Jordan, Palestine]
  - Coordination with 2020 Pop Census Round & HH survey programs
    - Inclusion of "HH deaths in last 12 months" question or kin-survival modules;
    - Inclusion of migration questions → for study of subnational variation

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Thank you!

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