EAPS Working Group on Health, Morbidity and Mortality
Rome, Sept. 17-19, 2007

Long term effects of reproductive history on female and male mortality in a rural area of Senegal

Géraldine Duthé & Gilles Pison

INED – France

Contact: geraldine.duthe@ined.fr

Introduction

- Lack of reliable data on adult mortality in Africa
- Knowledge in adult mortality :
  - ✓ Indirect methods
  - ✓ Specific focus on maternal mortality and AIDS
- New concerns with population aging
  - ✓ Other causes of death
  - ✓ Mortality differentials

    Relation between fertility and mortality after the reproductive life ?

Relation between fertility and female mortality in rural Africa

- Selection effect :
  - ✓ Women who give births are « healthier » (+)
- Direct effect : maternal mortality (-)
  - ✓ Factors : age, birth intervals, number of pregnancies, multiple pregnancies, circumstances of the delivery (maternity clinic)
- Indirect effects :
  - ✓ Maternal depletion syndrome (-)
  - ✓ Risks of fatal diseases
    - breast cancer (+)
    - cardiovascular diseases (-)
  - ✓ Socioeconomic factors :
    - Socioeconomic status & health risks in large households (-)
    - Daily assistance of children / frequent visits to health services (+)
    - Old age support from adult children (+)

Long term effects of the reproductive life

- Female :
  - ✓ Selection effects (+) (-)
  - ✓ Biological effects (+)(-)
  - ✓ Socioeconomic effects (+)
- Male
  - ✓ Socioeconomic effects (+)

No universal pattern (Hurt *et al.*, 2006)

- Biological *versus* socioeconomic ?
  - ✓ Causes of death
  - ✓ Biological and social factors
  - ✓ Female/male comparison

Demographic surveillance system (DSS)

- For a better understanding of population levels and trends in developing countries:
  - ✓ Locally delimited population
  - ✓ An initial census and a regular demographic follow up
  - ✓ Ability to relate various demographic events

Mlomp DSS

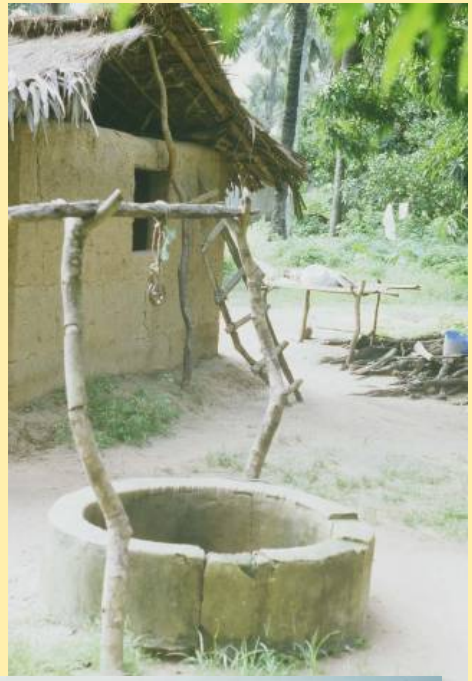
- South-West Senegal, West Africa
- A rural area

Mlomp DSS

- Initial census of the study population in 1985:
  - ✓ Nominative list of village dwellers
  - ✓ Women's union and reproductive histories
- Yearly demographic monitoring:
  - ✓ Births, deaths, migrations and unions
- Verbal autopsy for each registered death :
  - ✓ Questionnaire conducted with a close relative of the deceased
  - ✓ detailed information about symptoms and diseases prior to death
  - ✓ Establishment of the cause of the death by a physician

Household characteristics & economic resources

- 8,008 inhabitants in January 2005
- Population characteristics
  - ✓ Homogeneous
  - ✓ Jola
  - ✓ Animist/catholic
- Basic household characteristics
  - ✓ water from wells
  - ✓ Corrugated iron/straw roof
  - ✓ Latrines (60% in 2004)
- Economic resources
  - ✓ Rice-growing
  - ✓ Seasonal migrations



Fertility (1985-2004)

- Total Fertility Rate
  - ✓ 4.2 children per woman over the period
  - ✓ Compared to 6 in rural Senegal in 2000-2004
- Relatively old age at first birth and spaced births
  - ✓ Delayed first marriage : 26 years old
  - ✓ Average age at first birth : 23 years old
  - ✓ Low fertility rate before union
- Nuptiality: monogamy but, multiple unions over the lifetime
  - ✓ Consensual unions while single / marriage / possibility of remarriage after divorce or widowhood
  - ✓ In consequence : women have children from different partners

Mortality level (1985-2004)

- Life expectancy at birth :
  - ✓ e0 = 61 years (57 for males / 65 for females)
- Local health system (1960s)
  - ✓ a dispensary (immunization, malaria treatment…)
  - ✓ a maternity clinic (prenatal consultations)
- Infant&child mortality :
  - ✓ ${}_5q_0 = 0.100$

  compared to 0.160 in rural Senegal in 1995-2004
- Maternal mortality

3 DSS in rural Senegal	Mlomp 1985-2004	Niakhar 1985-1998	Bandafassi 1985-1998
p. 1,000 live births	2.83	5.16	8.26

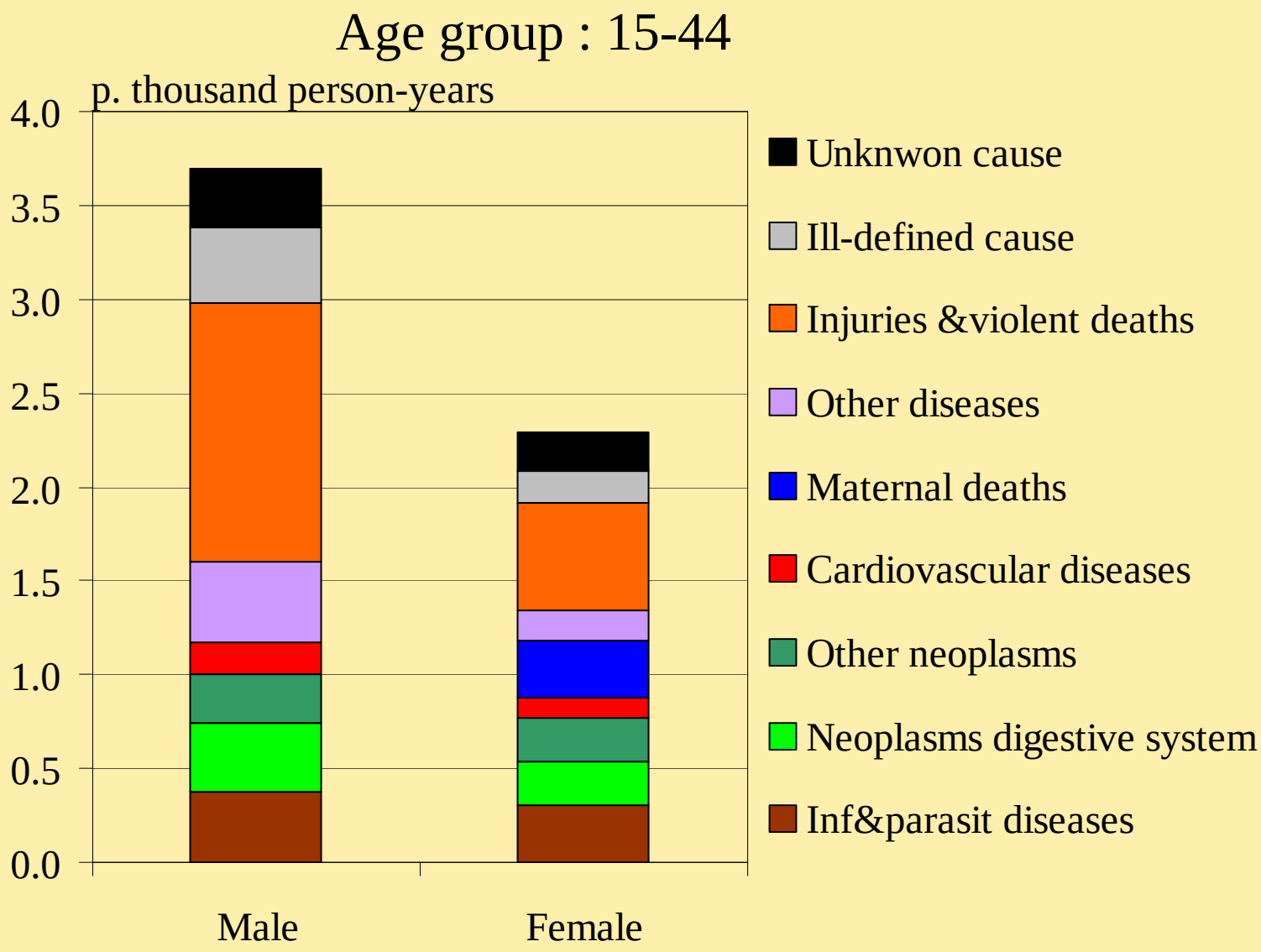
Adult mortality (1985-2004)

- Mortality between the ages 15 and 60
  - ✓ ${}_{45}q_{15}$ = 0.243

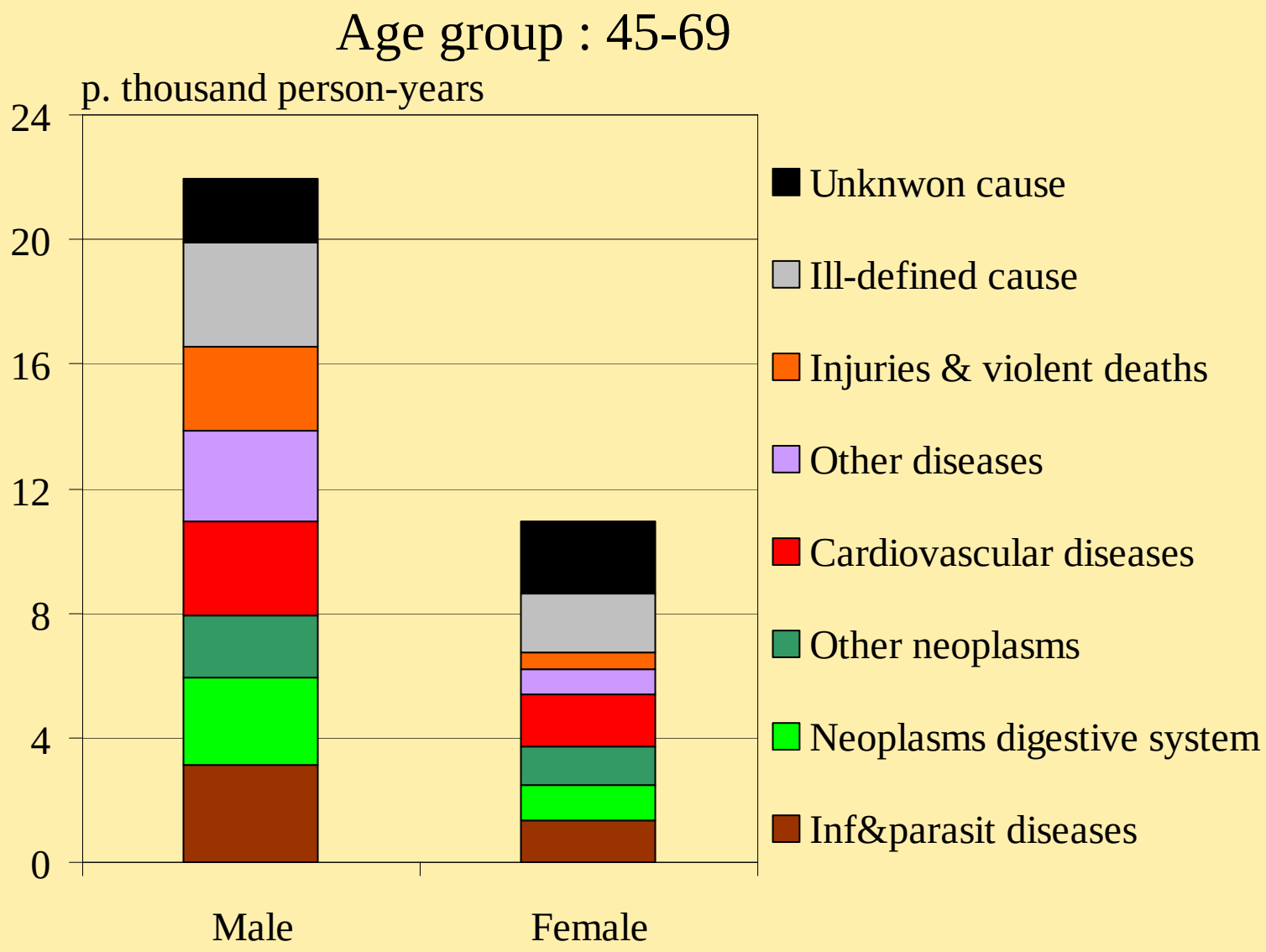
${}_{45}q_{15}$ in 3 DSS in rural Senegal	Mlomp 1985-2004	Niakhar 1985-2004	Bandafassi 1986-2000
Male	0.309	0.291	0.300
Female	0.165	0.236	0.285

  - ✓ Relatively high for males & low for females

Probable causes of death among adults



Probable causes of death among adults



Long term effects of the reproductive life in Mlomp

Methods

- Mortality observation period
  - ✓ For females :

    Between ages 45 (or 1 year after the last delivery if it occurred older) and 60
  - ✓ For males :

    Between ages 50 (or at the birth date of the last child if it occurred older) and 65
- Mortality differentials
  - ✓ Duration model
  - ✓ Cox proportional hazards models

Long term effects of the reproductive life in Mlomp

- Socio-demographic variables
  - ✓ Presence of latrines in the household in 2004

    43% (but 18% of unknown)
  - ✓ Nature of the house's roof in 2004

    53% in straw (but 18% of unknown)
  - ✓ Marital status during the follow up
    - at the end of the reproductive life :

	Men	Women
Married	76%	79%
Widowed	3%	7%
Unmarried	21%	14%

  - ✓ Number of partners

    1.4 per person (~for women and men)

Long term effects of the reproductive life in Mlomp

- Female reproductive histories
  - ✓ Number of pregnancies (M =7.5) & live births (6.7)
  - ✓ Number of multiple pregnancies (0.2)
  - ✓ Number of stillborns (0.2)
  - ✓ Number of abortions (0.7)
  - ✓ Number of live born boys (3.4) and girls (3.3)
  - ✓ Number of deaths before age 5 (1.5)
  - ✓ Age at first (22.5) and last (38.9) deliveries & mean birth interval (2.6)
- Male reproductive histories (through their female's partners)
  - ✓ Number of live births (6.3)
  - ✓ Number of live born boys (3.2) and girls (3.1)
  - ✓ Number of deaths before age 5 (1.2)
  - ✓ Age at first (28.3) and last (43.9) birth of their children

Mortality differentials (1)

Women	881
Age group	45-59
Deaths	41
Prob>chi2	0.000

	Hazards Ratio	P>|z|	Test of prop. haz. ass. Prob>chi2
Unmarried/ref.married	**2.45**	0.05	0.27
Widowed/ref.married	1.67	0.19	0.38
Number of partners (cont.)	**1.48**	0.01	0.94
Number of livebirths (cont.)	**0.82**	0.00	0.68
Age at first birth (cont.)	**0.92**	0.00	0.94
			0.77

Mortality differentials (2)

Women	881
Age group	45-59
Deaths	41
Prob>chi2	0.0000

	Hazards Ratio	P>|z|	Test of prop. haz. ass. Prob>chi2
Unmarried/ref.married	**2.70**	0.04	0.24
Widowed/ref.married	1.64	0.22	0.59
Number of partners	**1.50**	0.01	0.86
Number of surviving boys at 5	**0.74**	0.00	0.12
Number of surviving girls at 5	0.97	0.79	0.24
Number of dead children < 5	**0.74**	0.01	0.54
Age at first birth	**0.91**	0.00	0.93
			0.48

Mortality differentials (3)

Women	854
Age group	45-59
Deaths	40
Prob>chi2	0.0000

	Hazards Ratio	P>|z|	Test of prop. haz. ass. Prob>chi2
Unmarried/ref.married	**2.46**	0.06	0.34
Widowed/ref.married	1.76	0.16	0.49
Number of partners (cont.)	**1.47**	0.01	0.71
Number of livebirths (cont.)	0.95	0.46	0.50
Age at first birth (cont.)	-	-	
Age at last birth (cont.)	**0.93**	0.00	0.71
Mean interval (cont.)	**1.17**	0.03	0.34
			0.89

Mortality differentials (4)

Men	862
Age group	50-64
Deaths	120
Prob>chi2	0.0617

	Hazards Ratio	P>|z|	Test of prop. haz. ass. Prob>chi2
Unmarried/ref.married	**1.82**	0.02	0.00
Widowed/ref.married	1.43	0.35	0.19
Number of partners (cont.)	**0.65**	0.02	0.87
Number of livebirths (cont.)	1.04	0.36	0.84
Age at first birth (cont.)	1.02	0.41	0.16
			0.02

Mortality differentials (5)

Men	869
Age group	50-64
Deaths	121
Prob>chi2	0.0000

	Hazards Ratio	P>|z|	Test of prop. haz. ass. Prob>chi2
Number of partners (cont.)	**0.67**	0.05	0.88
no latrines / ref. latrines	**1.82**	0.01	0.26
Unknown / ref. latrines	**4.48**	0.00	0.84
			0.68

Conclusions (1)

- Factors contributing to a lower female mortality after the reproductive life
  - ✓ Being married
  - ✓ Having few partners
  - ✓ Having many children
    - Selection effect during the reproductive life
    - Having children late in reproductive life
      - "Healthy pregnant effect"
      - Frequent visits to dispensary and maternity
    - Protective effect of having boys
      - Social support in old age by sons in a patriarchal system

Conclusions (2)

- Factors contributing to a lower male mortality after the reproductive life
  - ✓ Socioeconomic status
  - ✓ No impact of reproductive life of their partners
- Limitations
  - ✓ Socioeconomic characteristics
  - ✓ Data reliability of retrospective information for reproductive events
  - ✓ “Longer term” effects : certain diseases occur late in life (>60)
  - ✓ Analysis of the causes of death (reliability & frequencies)
- Prospect
  - ✓ Comparative analysis in the 3 DSS in rural Senegal

EAPS Working Group on Health, Morbidity and Mortality
Rome, Sept. 17-19, 2007

Long term effects of reproductive history on female and male mortality in a rural area of Senegal

Géraldine Duthé & Gilles Pison

INED – France

Contact: geraldine.duthe@ined.fr