The Fifth African Population Conference
Arusha , December10-14, 2007

Long term effects of reproductive history on female mortality in rural Senegal

Géraldine Duthé	INED, Paris
Emmanuelle Guyavarch	INED, Paris
Ekoué Kouévidjin	IRD, Dakar
Raphaël Laurent	INED, Paris
Adama Marra	IRD, Dakar
Gilles Pison	INED, Paris
Pascal Arduin	IRD, Dakar

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 health in rural Africa

- Selection effect:
  - ✓ Women who give birth 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 mortality:
  - ✓ Selection effects (+) (-)
  - ✓ Biological effects (+)(-)
  - ✓ Socioeconomic effects (-)

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

- Biological *versus* socioeconomic ?
  - ✓ Causes of death
  - ✓ Biological and social determinants

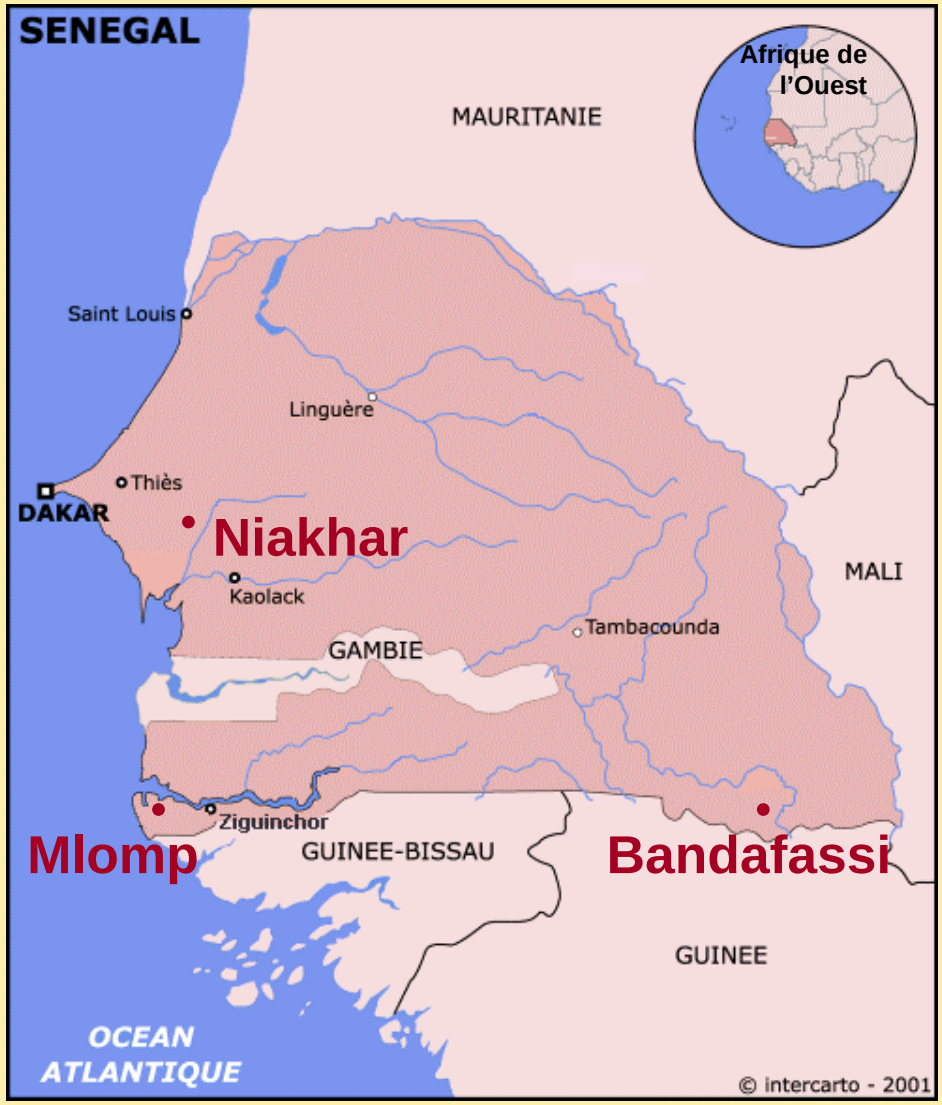
Demographic surveillance system (DSS)

- 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

- Case study
  - ✓ Three population in rural Senegal are simultaneously followed up since1985

3 DSS in rural Senegal

- Bandafassi (Centre-West)
  - ✓ since 1970/80
  - ✓ Annual follow up
- Mlomp (South-West)
  - ✓ Since 1985
  - ✓ Annual follow up
- Niakhar (South-East)
  - ✓ Since 1962/83
  - ✓ Quarterly follow up



3 DSS in rural Senegal

	Bandafassi	Mlomp	Niakhar
Population 1/1/2005	11,500	8,000	34,500
Villages	42	11	30
Ethnic groups	Mandinka Fula Bande Bedik	Jola	Serer
Health condition	Lesser	Better	Average

Mortality levels

1985-2004	Bandafassi	Mlomp	Niakhar
Total number of deaths	3,453	1,560	9,227
Life expectancy (years)			
Male	47	57	52
Female	48	65	56
Male&Female	**48**	**61**	**54**
Mortality before age 5 ($_5q_0$)			
Male	0.249	0.112	0.215
Female	0.228	0.090	0.190
Male&Female	**0.239**	**0.101**	**0.202**

Mortality levels

	Bandafassi	Mlomp	Niakhar
Maternal mortality rate (‰ live births)	8	3	5
HIV prevalence (%) (end of the 90s)	0.0	0.8	0.3
Adult mortality 15-59 ($_{45}q_{15}$)			
Male	0.300	0.309	0.291
Female	0.285	0.165	0.285

Long term effects of the reproductive life

Method

- Measure of female mortality
  - ✓ Duration model beginning at age 45 or one year after the last delivery if it occured after age 44
  - ✓ Until age 60
- Differential mortality
  - ✓ Cox proportional hazards models
- Analysis on 2 DSS

	Bandafassi	Mlomp
Number of women	1,339	947
Number of deaths	116	47
Time at risk	10,000	7,064
Mortality 45-59 ($_{15}q_{45}$ en ‰)	0.163	0.093

Long term effects of the reproductive life

- Union covariates

	Bandafassi	Mlomp
Marital status at the end of the reproductive life		
Married	89 %	80 %
Widowed	5 %	8 %
Divorced, single, unknown	6 %	12 %
Marital status at age 60 or at death		
Married	80 %	70 %
Widowed	13 %	18 %
Divorced, single, unknown	7 %	12 %
Average number of partners during the reproductive life		
	1.2	1.4

Long term effects of the reproductive life

- Fertility covariates

Average	Bandafassi	Mlomp
Number of pregnancies	5.8	7.7
Number of live born children	5.5	6.9
Sex * vital status of children at age 5		
Number of surviving boys at age 5	2.1	2.7
Number of surviving girls at age 5	2.0	2.7
Number of deceased children before age 5	1.4	1.5
Age at first delivery (in years)	21.1	22.6
Age at last delivery (in years)	35.6	39.4
Interval between 2 deliveries (in years)	2.4	2.6

Differential mortality

Cox model (1)

	Bandafassi		Mlomp	
Bedik / Fula Bande	0.7			
Mandinka / Fula Bande	1.8	**		
Unmarried / Married	13.0	***	1.9	**
Number of partners	0.9		1.5	***
Number of live born children	0.9		0.8	***
Age at first delivery	1.0		0.9	***

*** p<0.01 ** p<0.05 * p<0.10

Differential mortality

Cox model (2)

	Bandafassi		Mlomp	
Bedik / Fula Bande	0.6			
Mandinka / Fula Bande	1.7	*		
Unmarried / Married	13.5	***	2.1	**
Number of partners	0.9		1.5	***
No surviving boys at age 5 (ref. 1-3)	1.3		1.9	
At least 4 surviving boys at age 5 (ref. 1-3)	0.7		0.4	**
No surviving girls at age 5 (ref. 1-3)	1.1		1.6	
At least 4 surviving girls at age 5 (ref. 1-3)	0.4	**	1.0	
Age at first delivery	1.0		0.9	**

*** p<0.01 ** p<0.05 * p<0.10

Summary

Determinants linked to lower female mortality risks after the reproductive life

- ✓ Being married in either DSS
  - With a very strong effect in Bandafassi
- ✓ Having had fewer partners in Mlomp
  - No effect in Bandafassi
- ✓ Having had many children in Mlomp
  - Is it a selection effect occurring during the reproductive live ?
  - It ‘s not the case in Bandafassi despite a very high maternal mortality
  - Protective effect of having boys in Mlomp
    - Social support in old age by sons in a patriarchal system
  - Protective effect of having many girls in Bandafassi among fula bande
    - need further analysis to explain

Conclusion

- Limitations
  - ✓ Homogeneous population but socioeconomic differentials ?
  - ✓ 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)
- Conclusion
  - ✓ No rural model: there are many differences between the DSS
  - ✓ Long term effects of reproductive history on female mortality in rural Senegal appear to be more social than biological

Thank you for your attention !