Kinship patterns and co-residence in a rural area of Senegal: bridging the gap between longitudinal data and microsimulations

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5th World Congress of the International Microsimulation Association

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Introduction

Demographic changes have the potential to alter the familial environment in which people live $\leftrightarrow$ modifications in familial units can in turn affect demographic behaviors.

In Sub-Saharan Africa, because of a lack of detailed data, most of the research on familial environments has been conducted through the lens of living arrangements

- Changes in living arrangements can be difficult to interpret because they amalgamate two sources of variation.
  - ☞ the availability of kins, which is purely a function of mortality, marriage and fertility rates.
  - ☞ social norms defining the propensity of specific types of kin to co-reside with each other.

Research questions

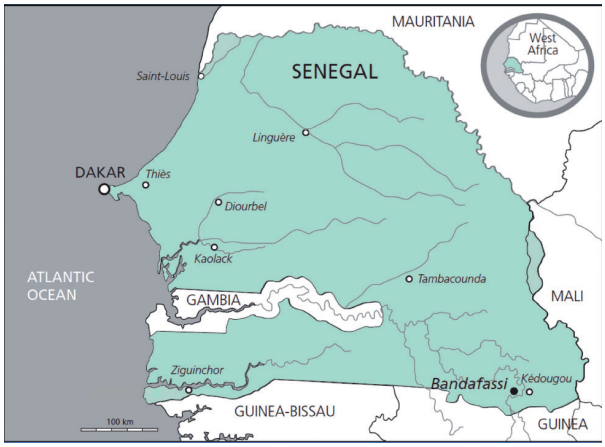
In this paper, we want to tease out the demographic constraints on changes in living arrangements in rural Africa.

To do so, we combine stochastic micro-simulations with data from a rural area in Senegal.

We address the following research questions:

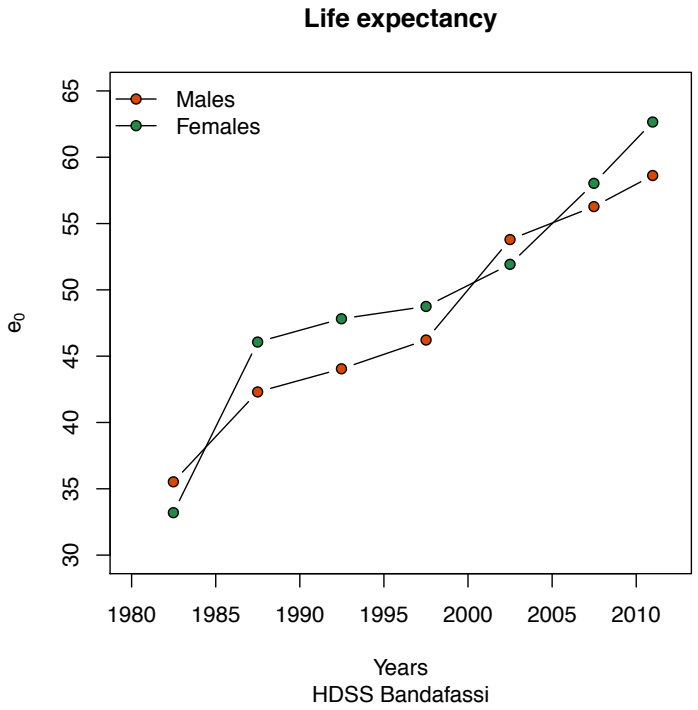
- How does the availability of kins evolve as people grow in age?
- Which proportions of kins are co-resident in this area?
- What are the effects of demographic changes on kinship networks and living arrangements?

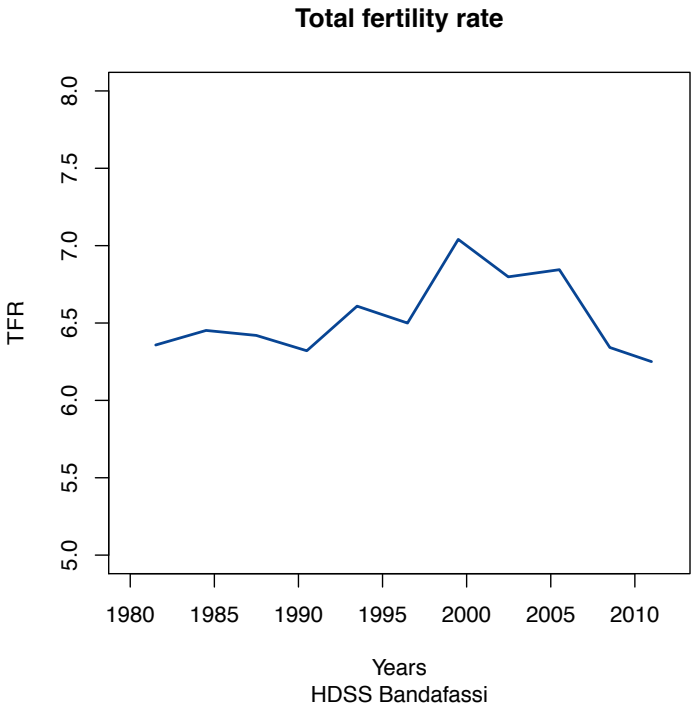
The Bandafassi Health and Demographic Surveillance Site



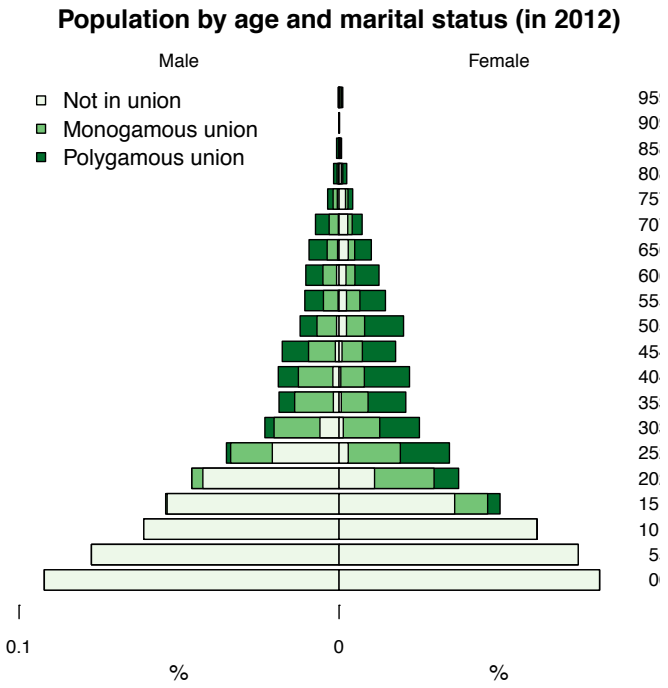
Sc: Pison et al. [2014]

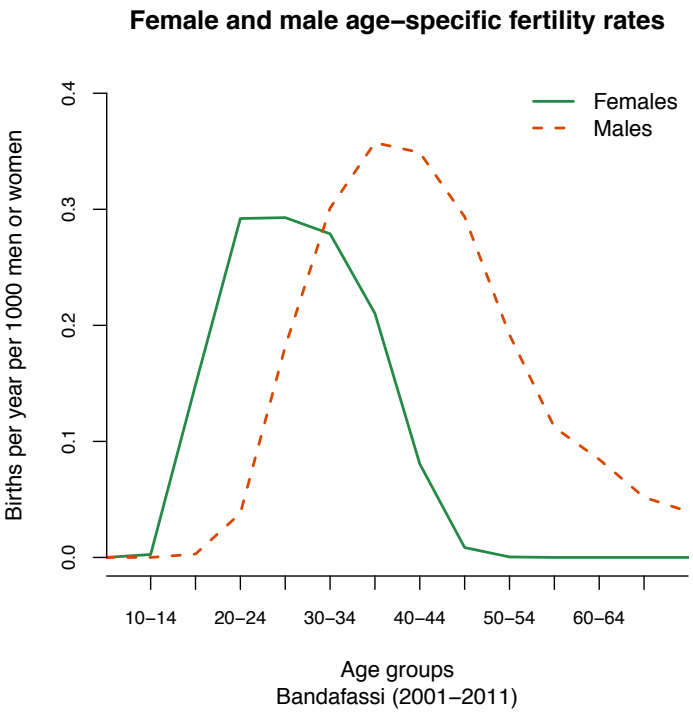
- Bandafassi is located in south-eastern Senegal, near the border with Guinea.
- The population is divided into three ethnic groups living in 42 villages: Bedik (25% of the population), Mandinka (16%) and Fula Bande (59%).
- The main economic activity is farming, with the cultivation of cereals, peanuts and cotton, as well as cattle-breeding.





Rapid mortality decline since 1980, but little change in fertility rates [Pison et al., 2014].





Polygyny is very frequent with about 60% of married men in polygamous unions.

Large differences in the age-specific fertility rates of males and females.

Data collection

- Accurate demographic data have been collected through annual rounds since the 1970's.
  - On each study round, interviewers review the composition of all the households, checking the lists of people who were present in the households at the last visit and collecting data about vital events, marriages and migrations since the last round.
- Genealogies were collected at the start of the surveillance, but they are not fully complete [Pison, 1987]. For example, the genealogies are less complete for migrants.

Microsimulations

We generate a population that advance through time in a way that mirrors demographic trends observed in Bandafassi.

- The population is assumed to be demographically "stable" from 1850 to 1975.
- Female fertility rates vary by age, parity and marital status.
- Mortality rates and transitions into first marriage vary by age and sex
- Allowance is made for divorces, re-marriages, and polygyny.

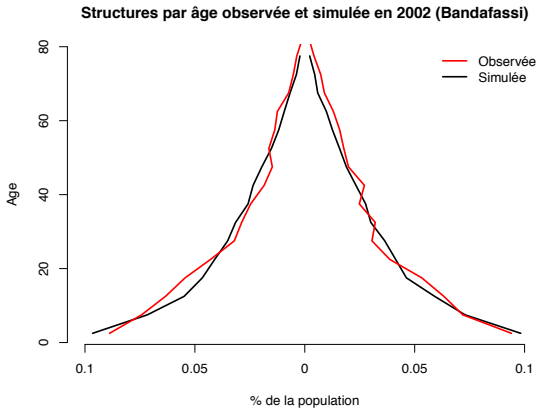
Final populations have about 400 000 surviving persons in 2012.

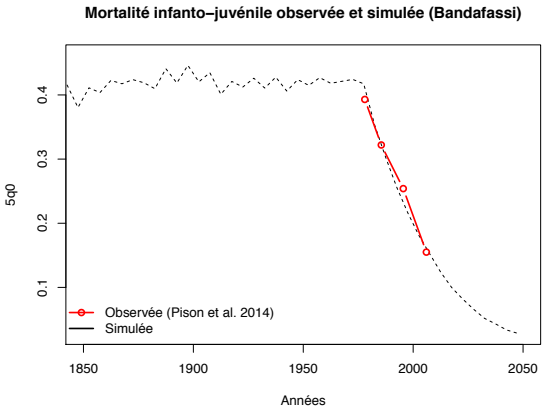
✏ We use SOCSIM, a program developed at the University of California [Wachter et al., 1997, Murphy, 2004].

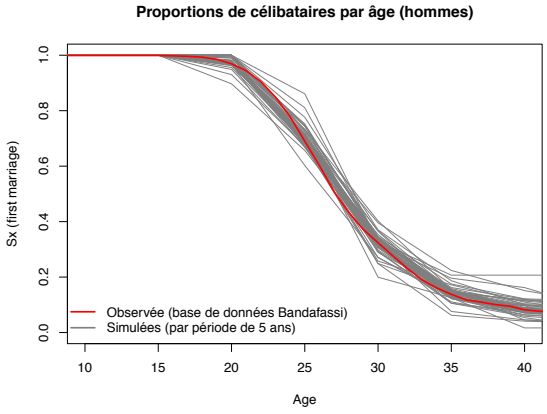
SOCSIM is a closed model (no individual joins the population during the population except through birth). This facilitates the tracking of kinship links.
Format of the output file:

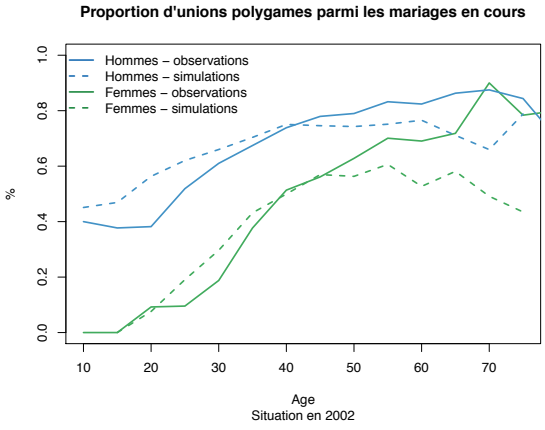
position	name	description
1	pid	Person id unique identifier
2	fem	sex
3	group	Group identifier (1-60)
4	nev	Next scheduled event
5	dob	Date of birth
6	mom	**Person id of mother**
7	pop	**Person id of father**
8	nesibm	Person id of next eldest sib (through mother)
9	nesibp	Person id of next eldest sib (through father)
10	lborn	Person id of last born child
11	marid	**Id of marriage**
12	mstat	Marital status
13	dod	Date of death
14	fmult	Fertility multiplier

Model calibration

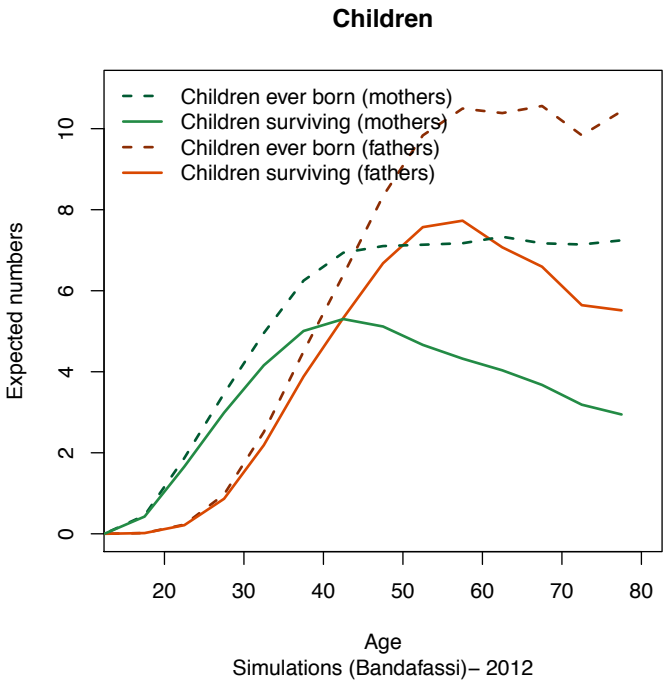




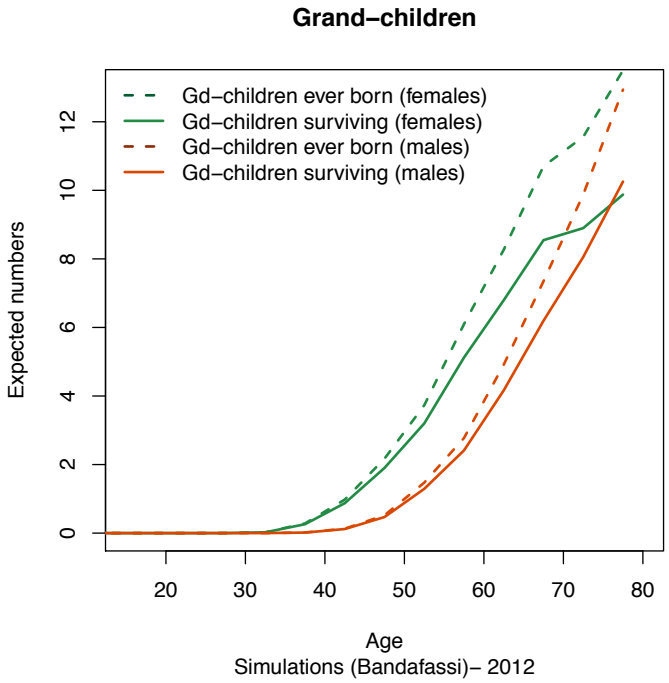




Children and grand-children (simulations)

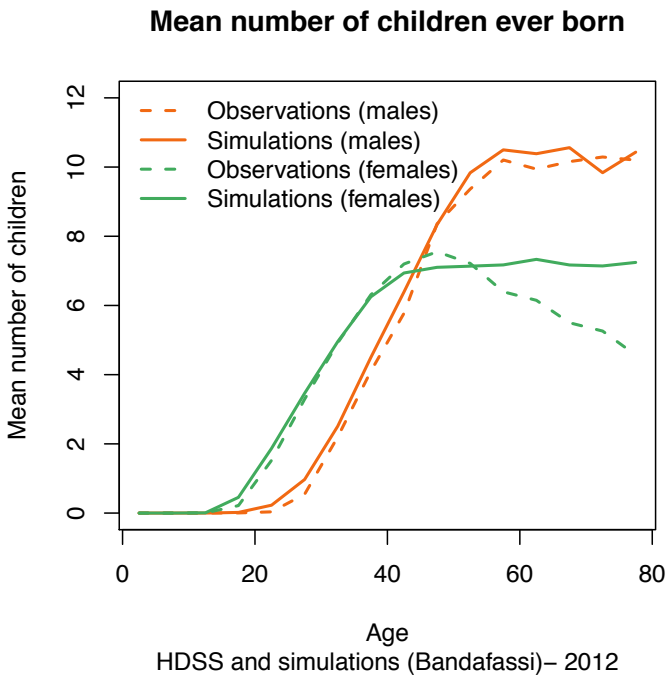


Differences in the rate and timing of male and female reproduction lead to a definite **asymmetry** between kinship networks of men and women. For example, men have less children than women until age 40, but then they start having more children on average (about three additional children ever born at age 60).



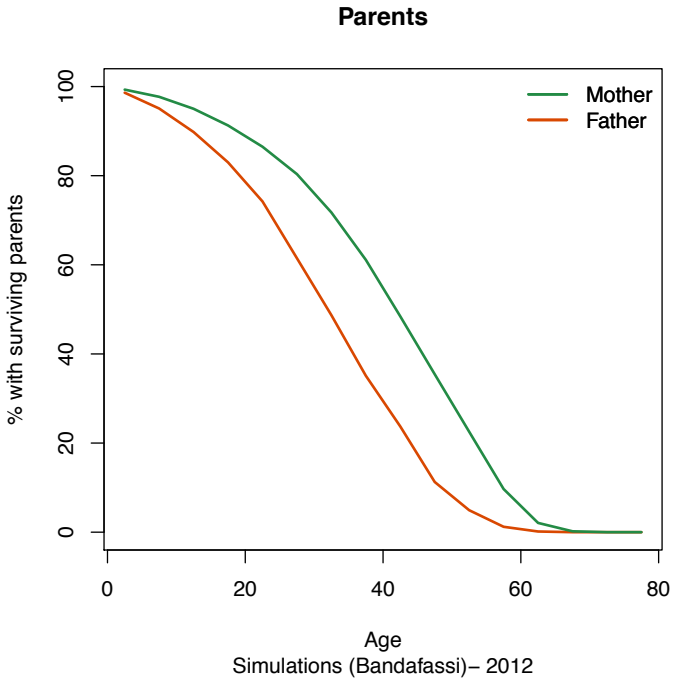
At almost all ages, women have more grand-children than men.

Comparisons between simulation outputs and HDSS data

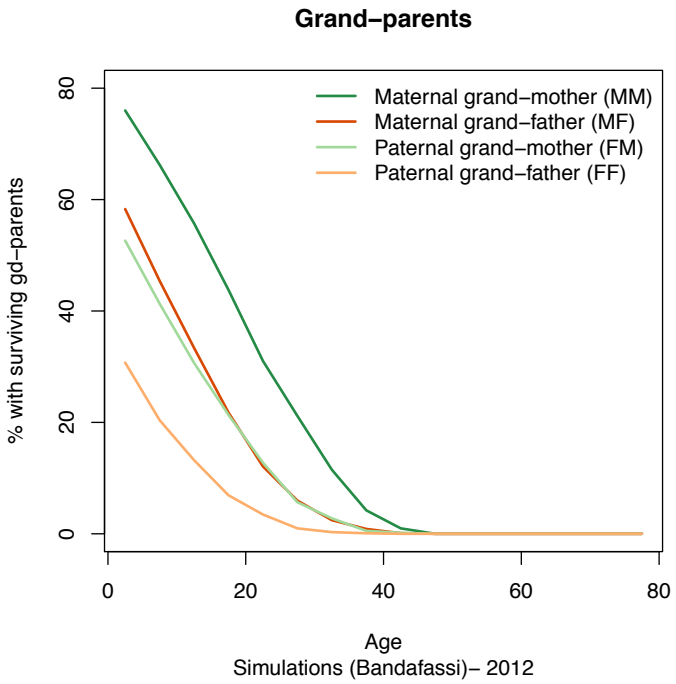


- Among older women, simulations generate more children ever born than in the data, because retrospective reports for the periods before the follow-up are incomplete.
- Such differences between simulated and reported number of kins are observed for the more distant past for all types of kinship links, to a varying degree.

Parents and grandparents (simulations)

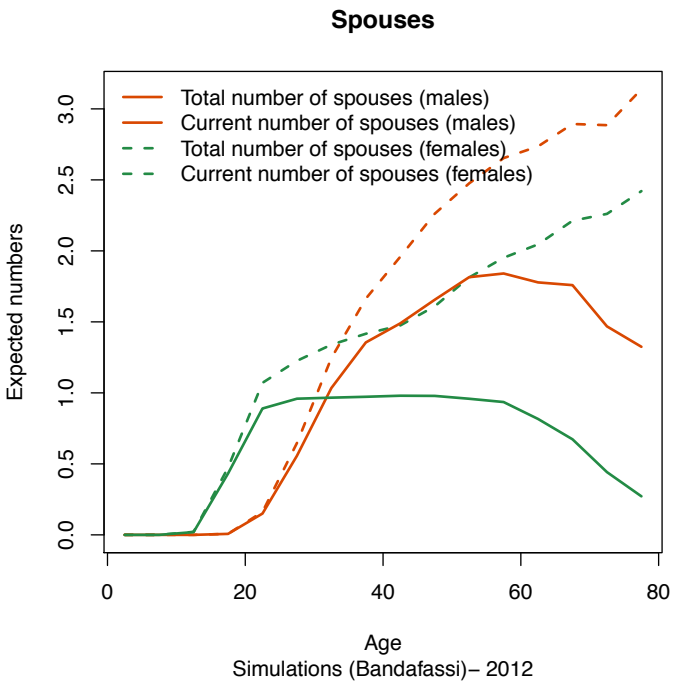


Because of higher mortality rates among males and later male fertility, the proportion of paternal orphans is always higher than maternal orphans. At age 40-44, 24% of adults have lost their mother, while 48% of adults have lost their father.

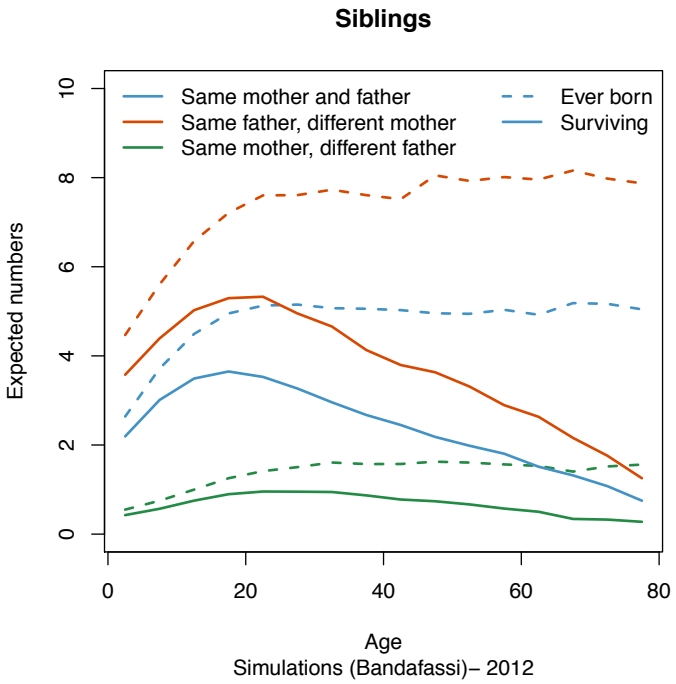


These differences are larger for the generation of their grand-parents. 76% of children aged less than 1 still have their maternal grand-mother, while only 31% of these children still have their paternal grand-father. Apart from the maternal grand-mother, less than 20% of the other grand-parents are alive when ego reaches 20.

Spouses and siblings (simulations)



High rates of divorce, widowhood and remarriage mean that adults will have more than two spouses on average in their lifetime.

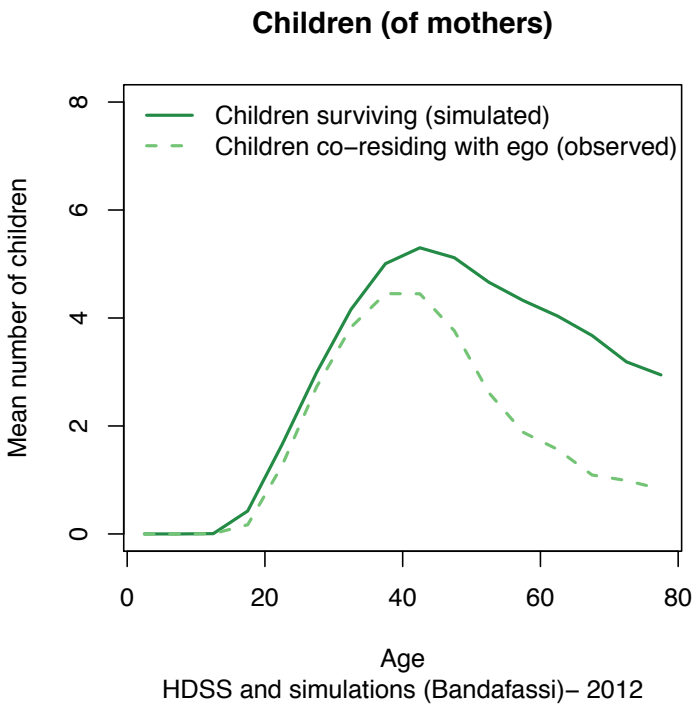


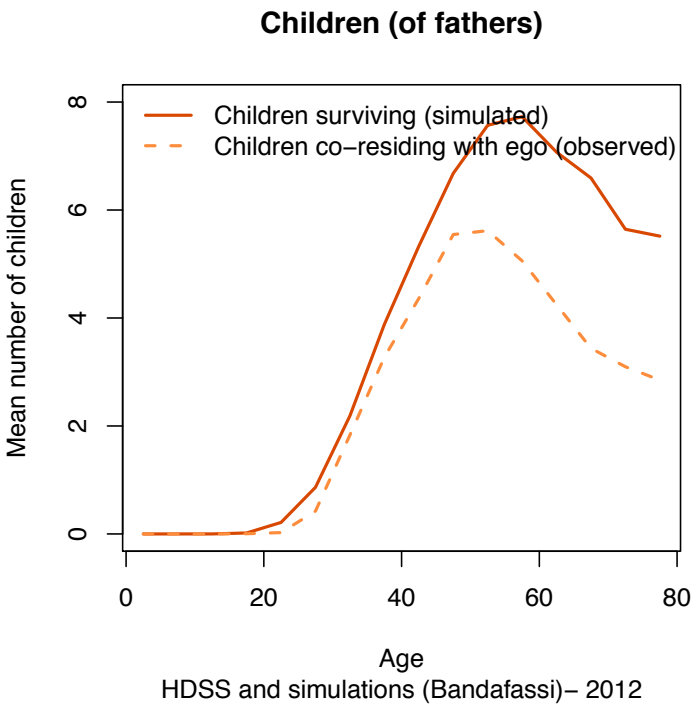
Among brothers and sisters, half-siblings born from the same father are the most numerous.

Frequency of co-residence

- The residential unit in the HDSS is a compound with the members of the extended family (on average 15 individuals).
- The number of surviving kins (obtained from simulations) can be compared with the numbers of co-resident kins (as observed in the data).

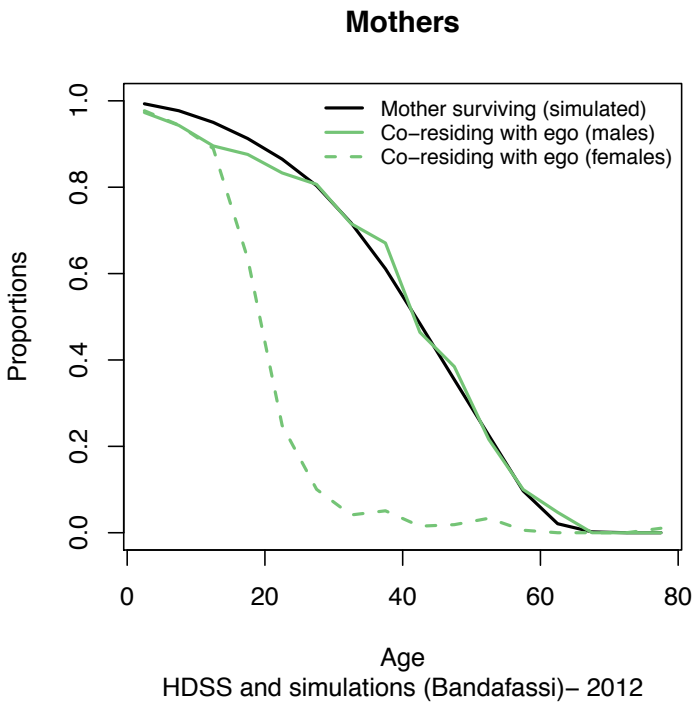
Co-residence with children

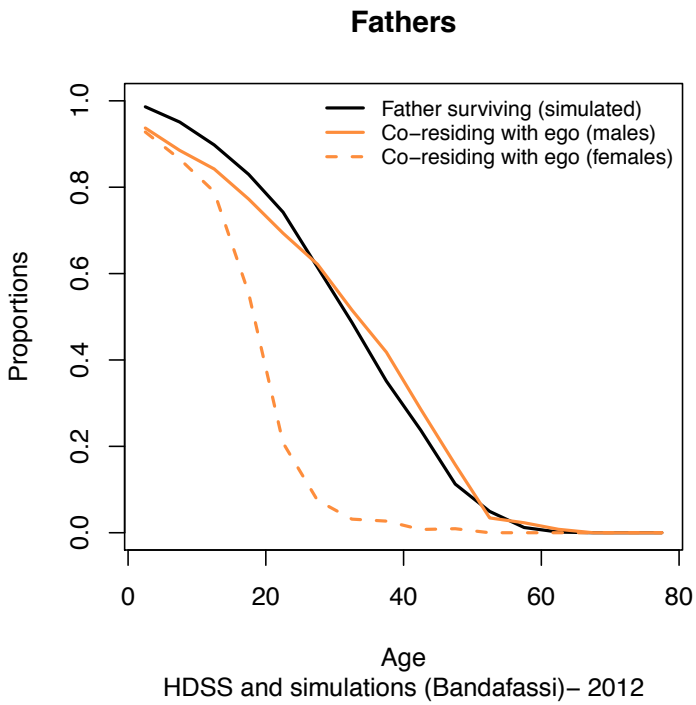




The co-residence of parents with their children is frequent, even at the adult ages. It tends to be reduced gradually between the ages 40 to 60 for mothers, but this is not so apparent for fathers. Older men reside less with their children as they grow in age simply because they have fewer children to live with.

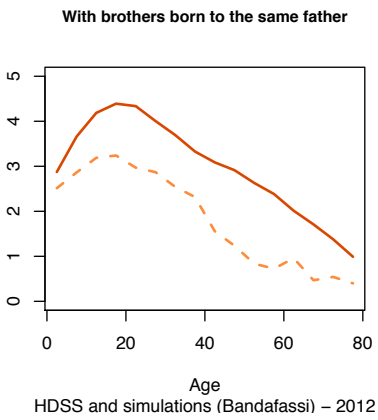
Co-residence with parents

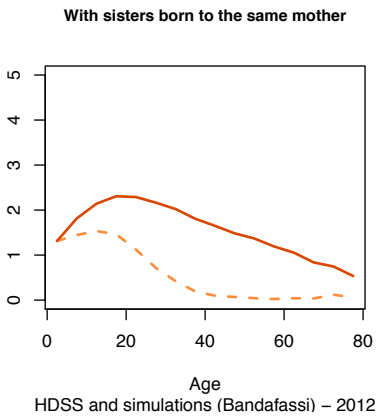


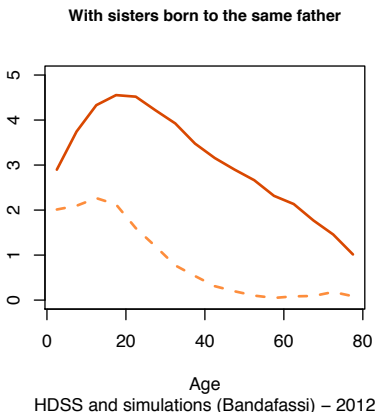


The co-residence of children with parents is almost systematic for sons, even when they advance in age. By contrast, it is rare for daughters after age 20, because they will move away after their marriage.
Quite surprisingly, once parental survival is taken into account, the co-residence of children with parents could be more frequent at the adult ages than in childhood.

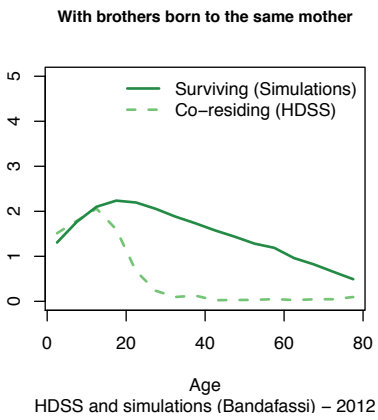
Co-residence of men with their brothers and sisters

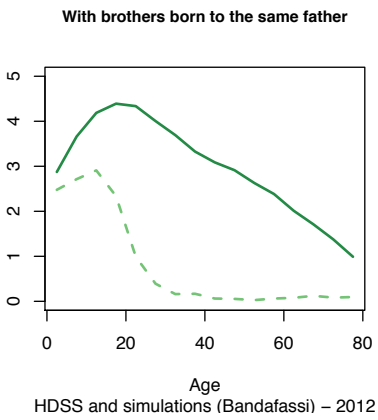


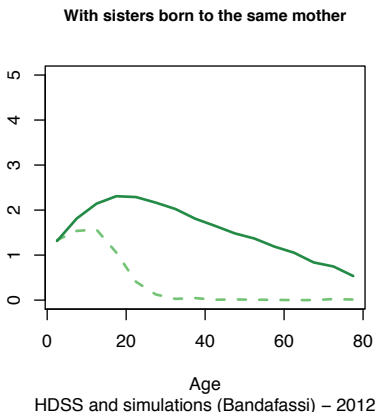


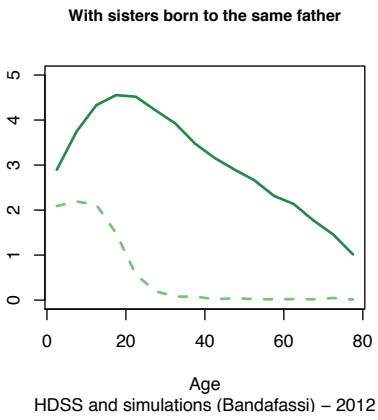


Co-residence of women with their brothers and sisters









Conclusions

- Our model assumes away some complexities (e.g. intergenerational correlation of fertility) but it reproduces faithfully the kinship networks in Bandafassi.
- Microsimulations are useful to represent the supply of kins and study the observed household structures.
- As observed by Howell [2008] with the !Kung population, "there are systematic differences between the genders in their place in the kinship system over their life spans, with women becoming socially central at an earlier stage of their lives than their brothers, but with men tending to hold the central positions in old age (p. xxi)."
- The asymmetry between males and females affects the entire kin group: patrilateral kins outnumber matrilateral kins [Pison, 1986].

Conclusions

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We are grateful to Valérie Delaunay (IRD) who provided access to the HDSS data and to Carl Mason (UC Berkeley) who provided access to SOCISM. This analysis was carried out thanks to a fellowship from the Belgian FNRS.