Kinship Structure and Maternal and Child Mortality in Croatia 1750-1898

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Study Area

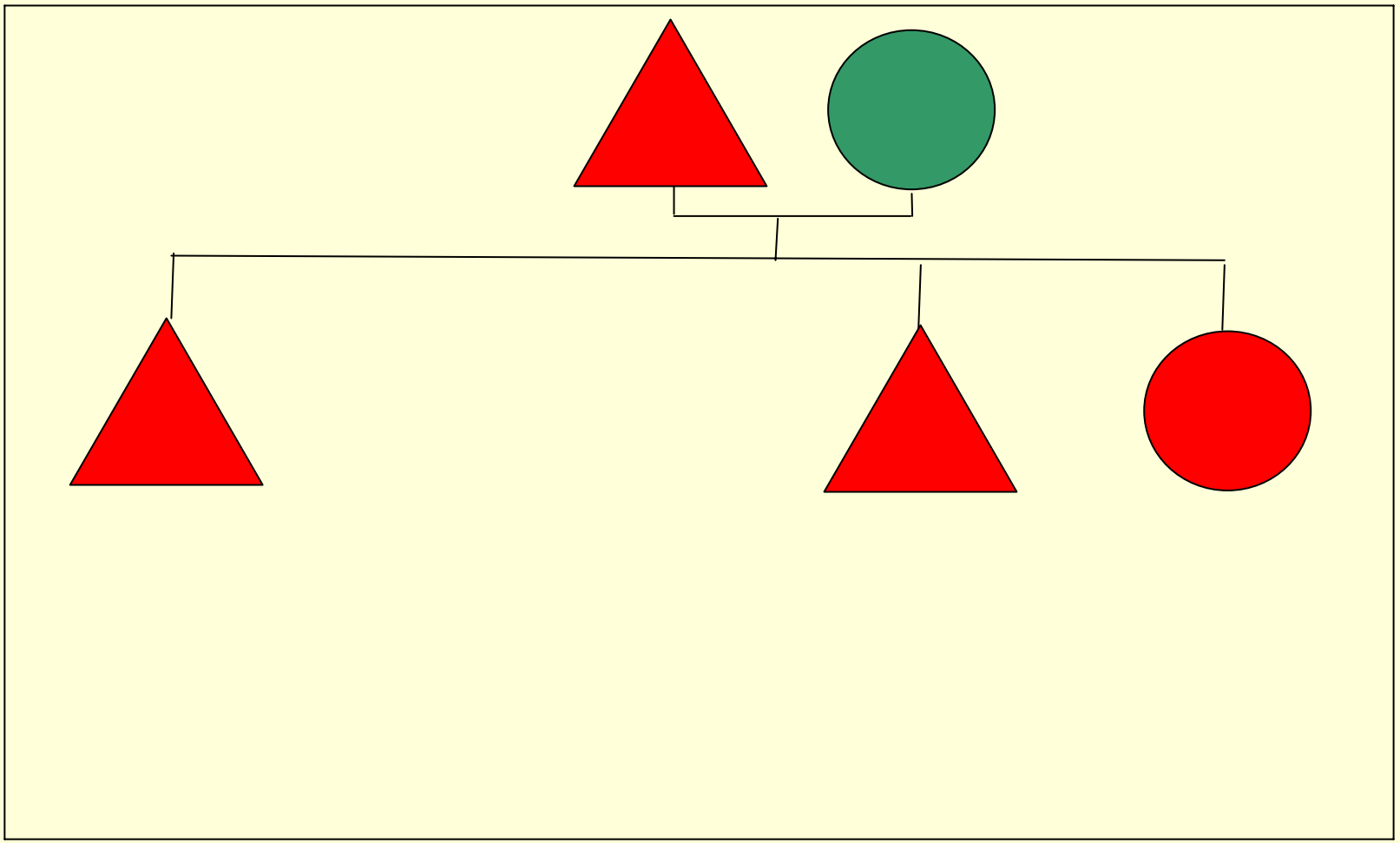
- Seven parishes in central Croatia (Slavonia)
- Retaken from the Ottomans in 1683, and repopulated by the Hapsburgs beginning in 1700
- Civil/Military peasantry - Croatians (and Serbians) were the prime cannon fodder of the Austro-Hungarian Empire
- Subsistence agriculture and slow capitalist development
- “New Feudalism”

Fig. 11.1
Croatia, Slavonia, and the Military Border

Complex Family Structure

- For most of human history and in many parts of the world today, family systems have been far more complex than the nuclear family.
- In Croatia, an extended or joint-family household system existed with patrivirilocal residence of wives.
- (in english) Brothers, and sometimes cousins, lived together with their wives and unmarried sisters.

The life-cycle of a complex household



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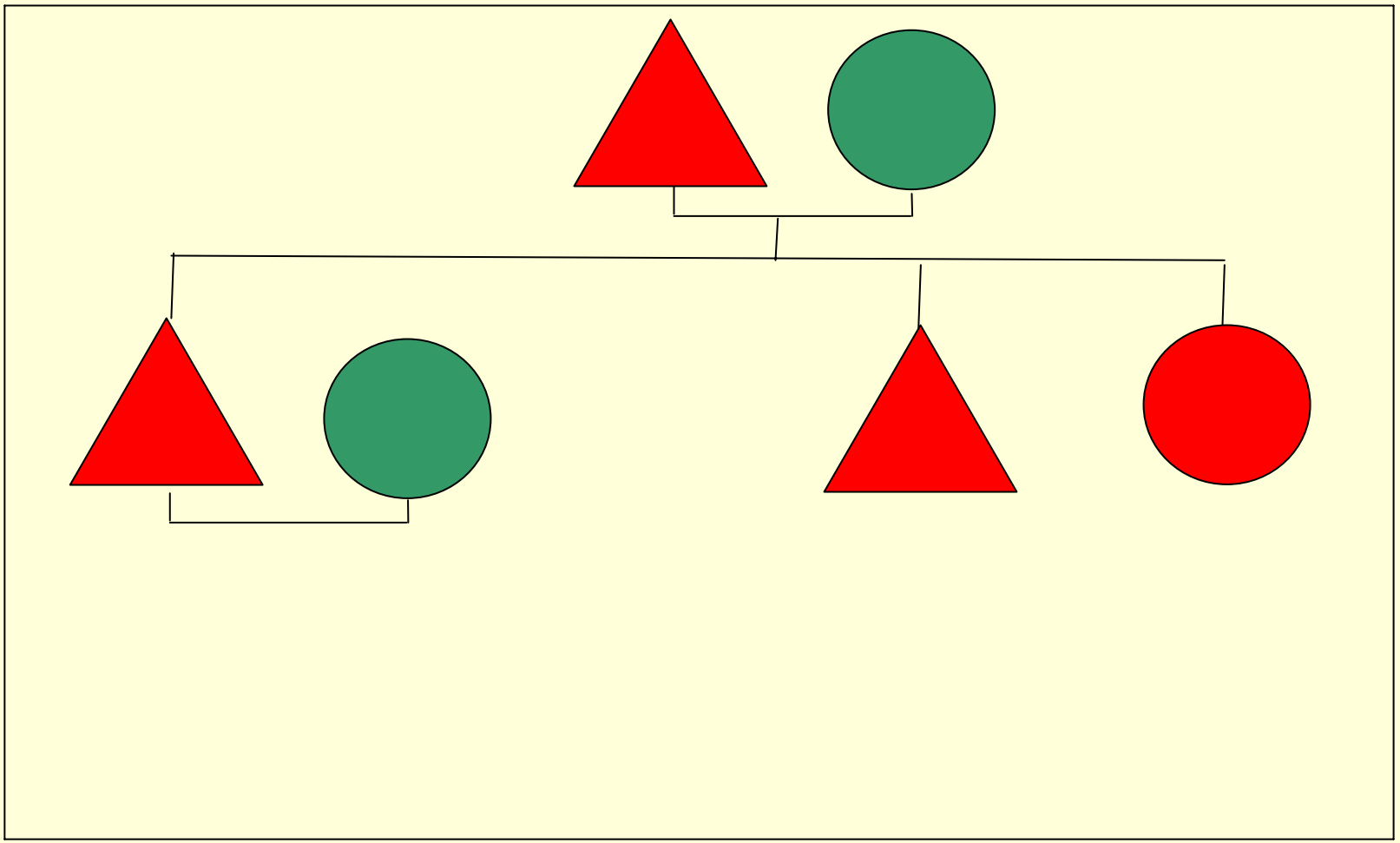

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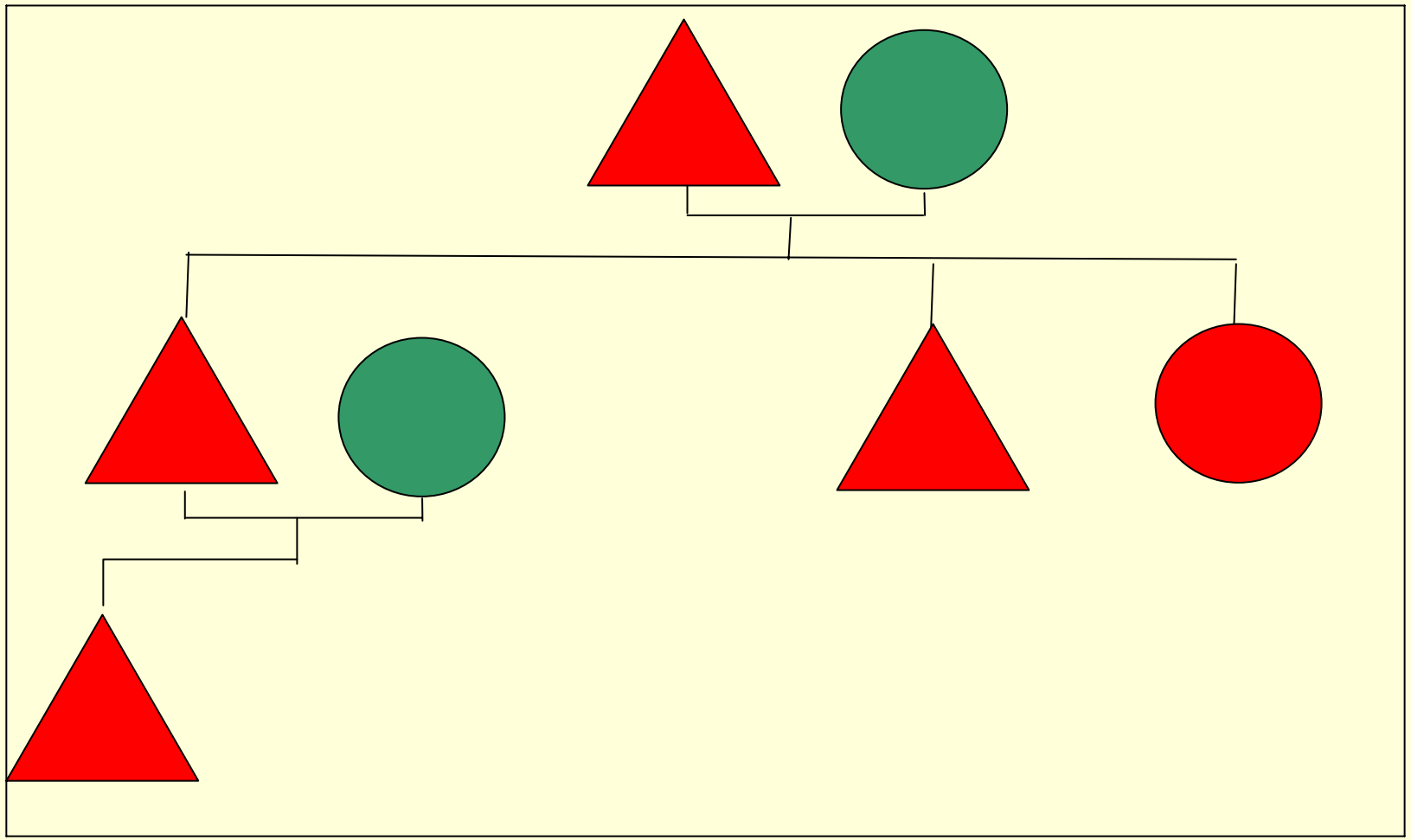

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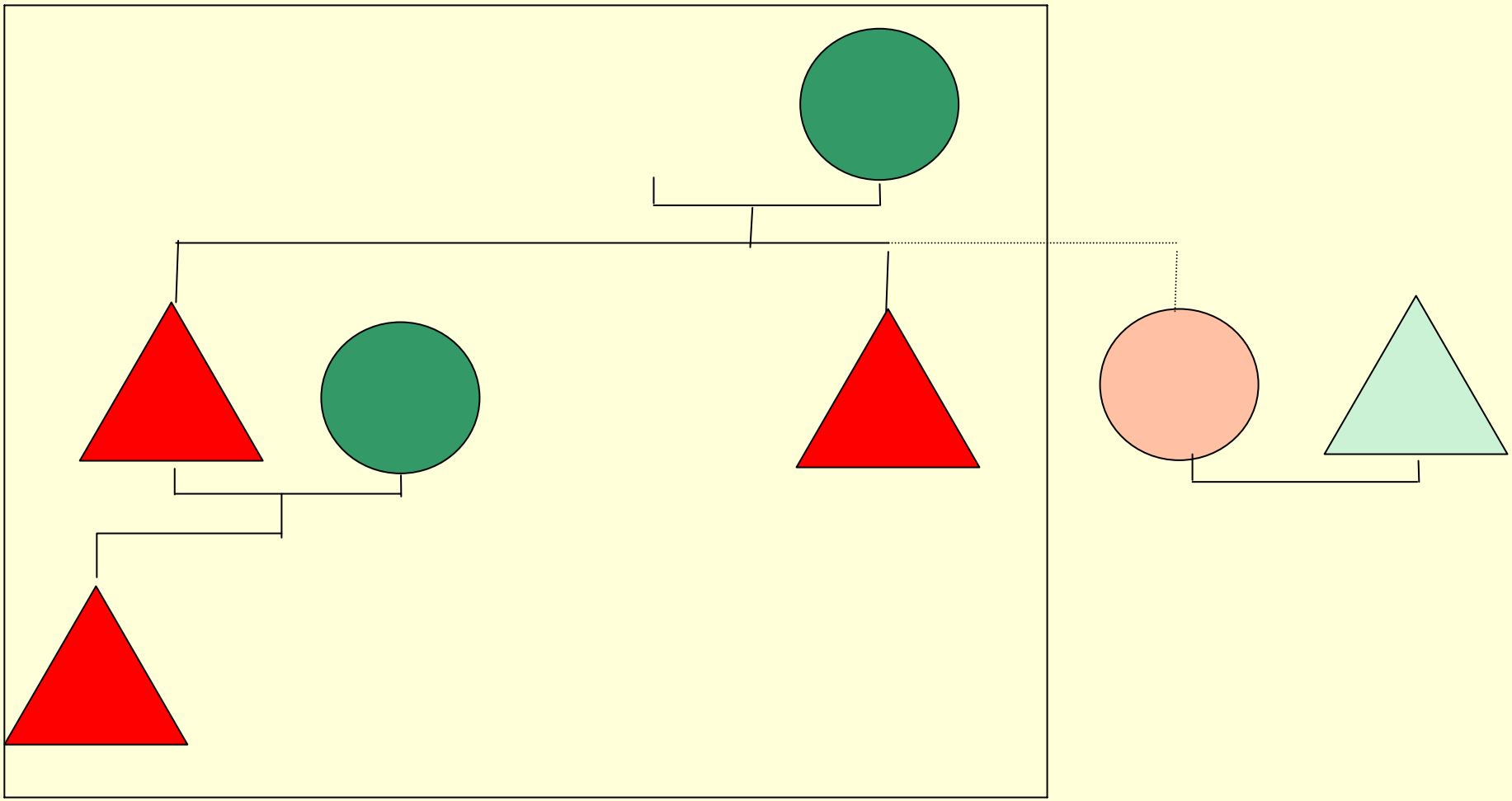

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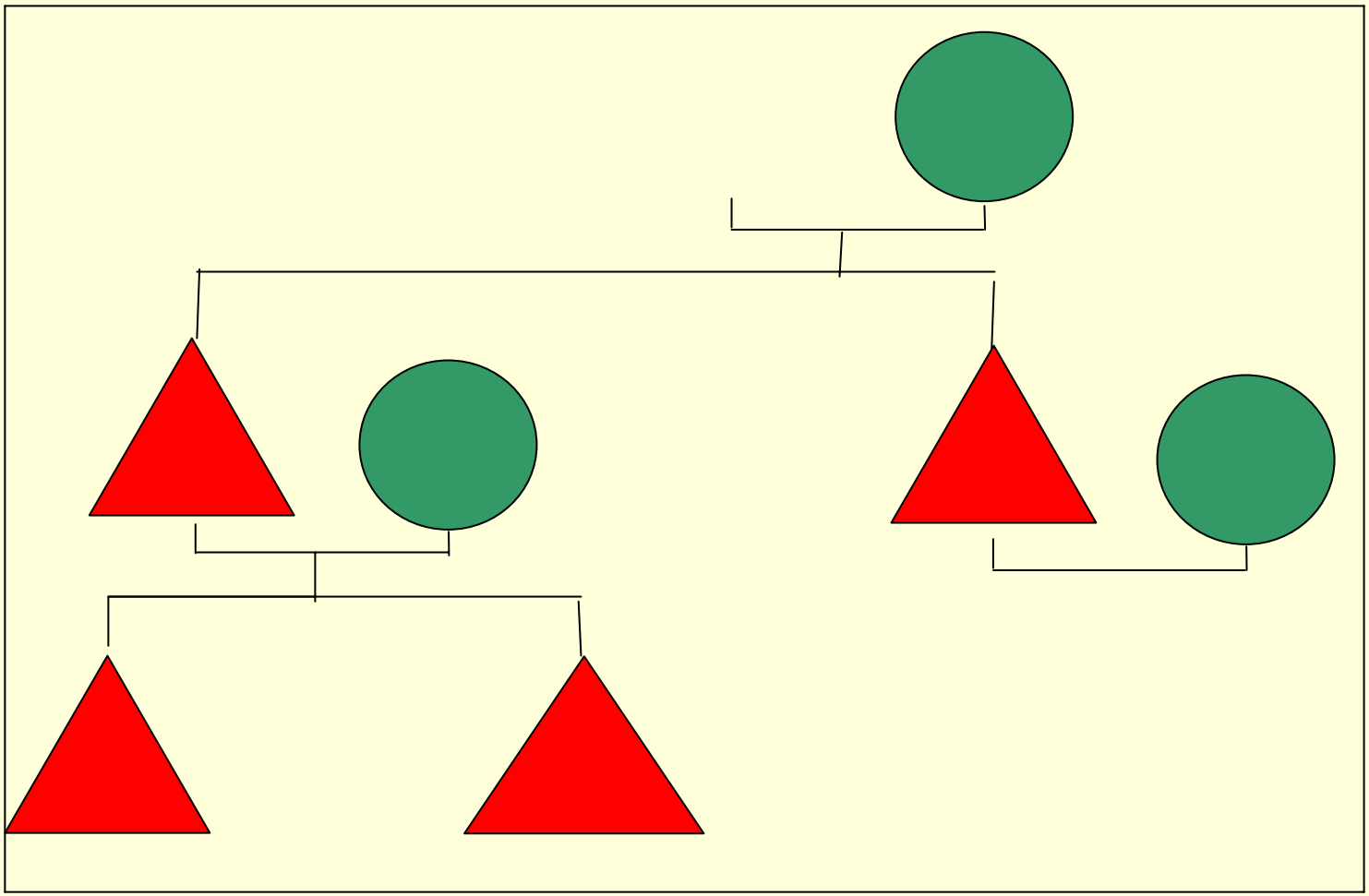

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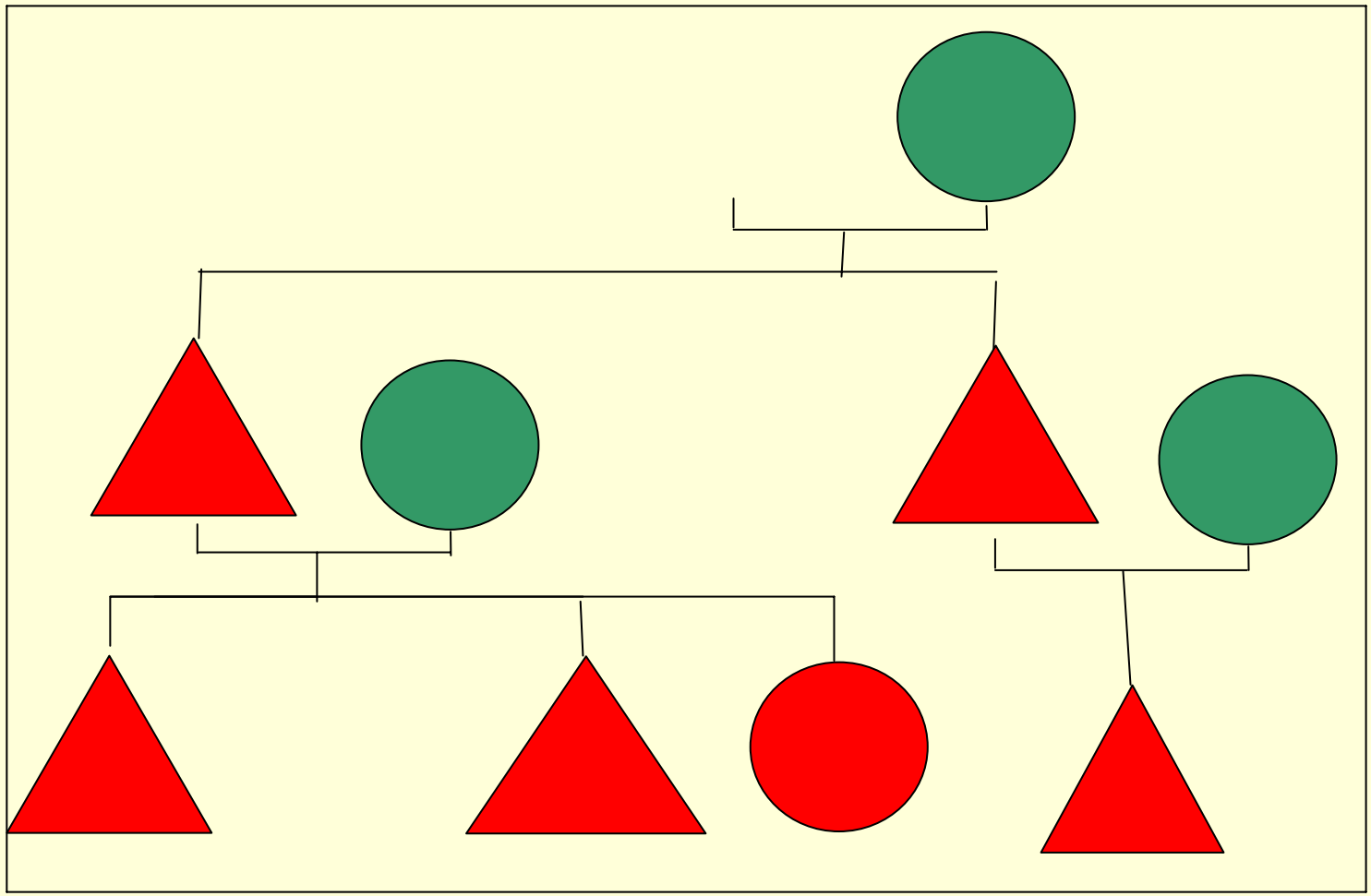

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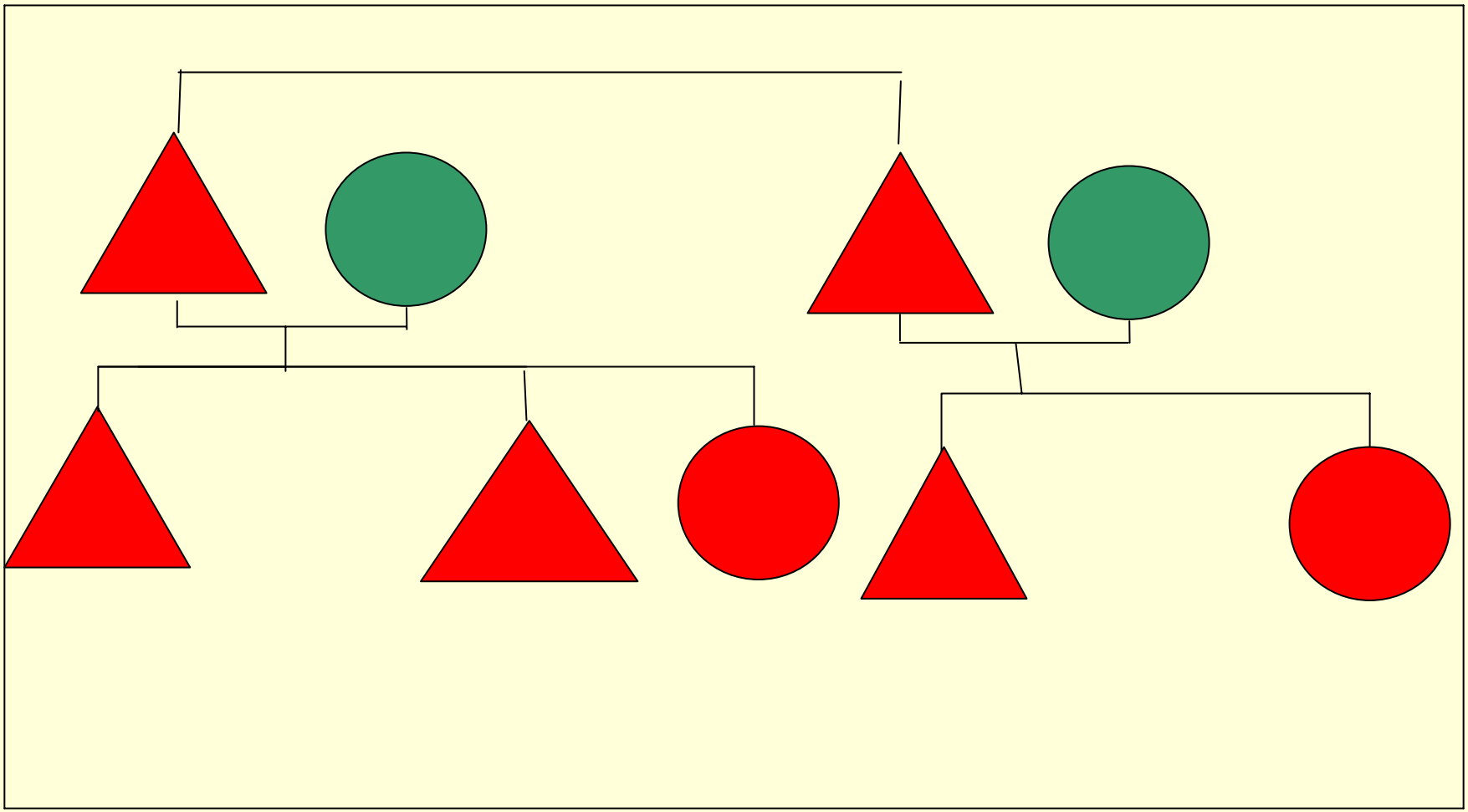

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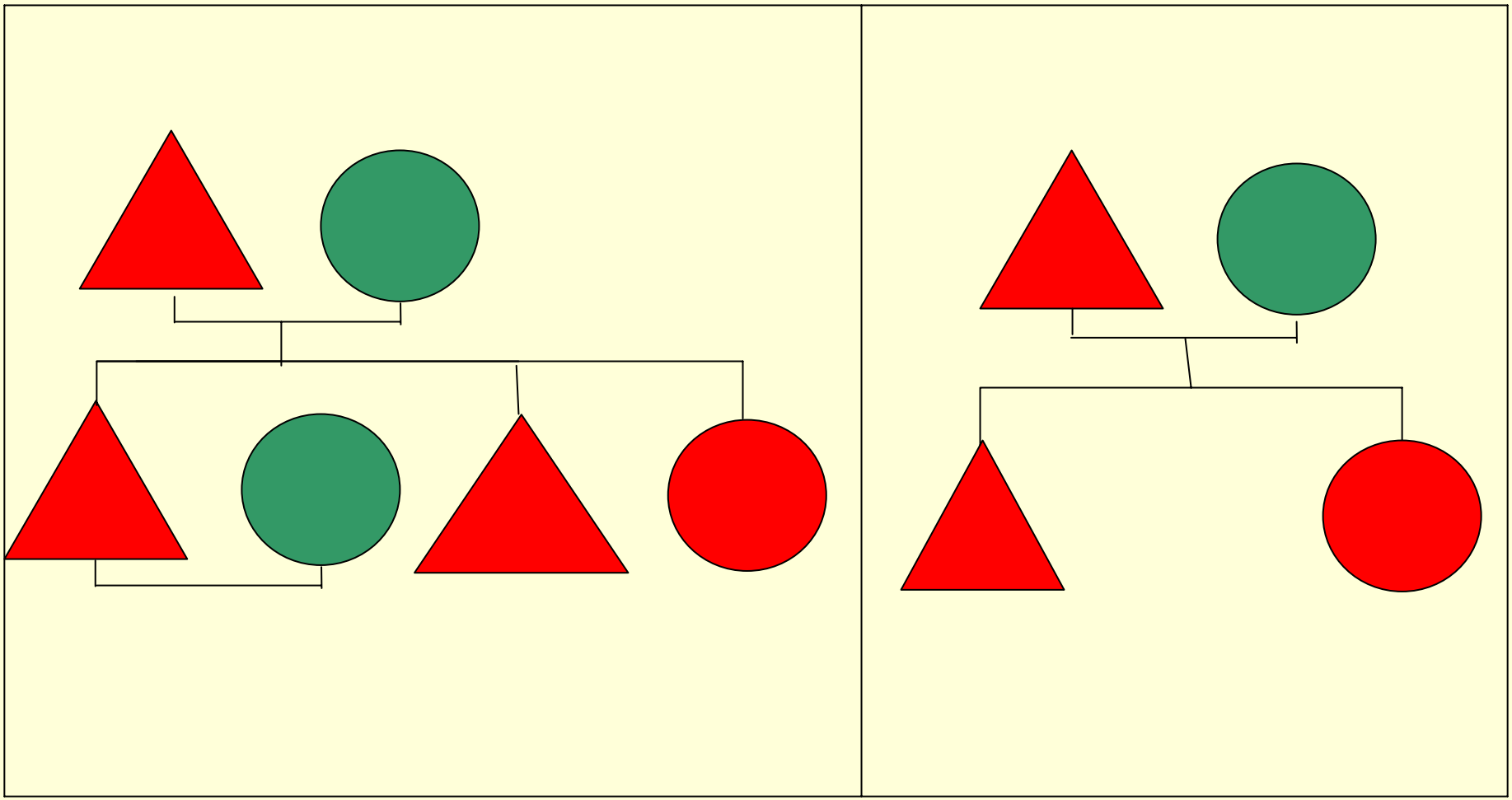

Understanding Complex Family Systems

- The life cycle of any complex household includes significant periods of nucleation.
- In pre-industrial societies, high mortality and variation in fertility will often interfere with the realization of complex family units.
- Complex, multi-generational families are the ideal, but not necessarily the most common type of family in any cross-section.

How does this structure affect member's well being?

- Positive effect through economies of scale.
- Negative effect through the political dynamics of eventual family fission
- Stratifying effect through power differentials within the household

Maternal Mortality

- Factors which may reduce risk of death during or after childbirth
  - The availability of care
  - Reduction in work load
- Both of these things will be mediated by a woman's husband's agnatic kinship network (and possibly by her own).

The data

- Family reconstitution of
  - 112,181 baptisms from 1714-1898
  - 23,306 marriages from 1717-1864
  - 94,077 burials from 1717-1898
- Data are particularly good after about 1750.
- Linkage is done via a computer program which uses score optimization.
- A check with scattered village censuses shows the linkage to be quite good.

Sample Linkage

Birth Record
Name: Maria Junasevic
Date: 4/9/1793
Parish: G
Village: Kovac

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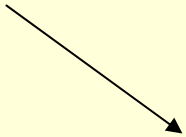

Marriage Record
Husband: Lucas Matossevic
Wife: Maria Junasevic
Parish: G
Wife's Village: Kovac
Date: 11/29/1820

Sample Linkage

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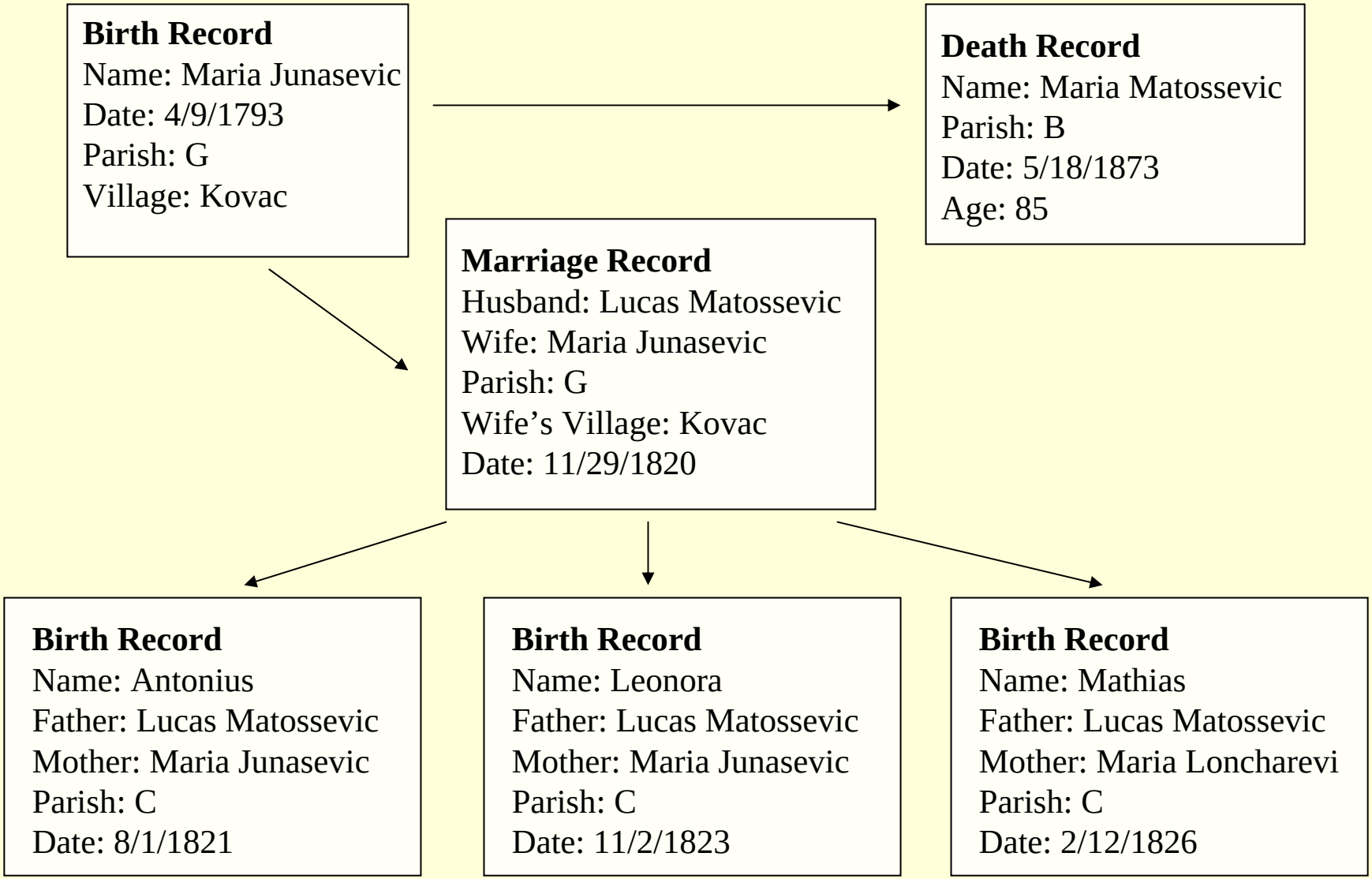

Mothers by type of linkage

Linkage	Mothers		Baptisms	
Baptism and marriage	8,737		37,757	
Father linked to baptism		6,261		27,846
Father not linked to baptism		2,476		9,911
Marriage only	4,465		18,789	
None	16,475		37,712	
All	29,677		94,258	

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The model

- Hazard of dying within 60 days of a birth.
- Includes a random frailty term for kin network.
- For the *j*th birth in the *i*th family network:

$$log(h(t_{ij}))=log(w_i)+log(\lambda_0(t_{ij}))+\beta'\mathbf{x}_{ij}$$

λ_0 is the baseline hazard, w_i is a random frailty effect, and $\mathbf{x}_{ij}$ is a set of covariates.

Key variables

- Crisis period
- Civil/Military distinction
- Size of affinal and consanguineal groups
- Number of husband’s brother’s wives
- Relative age rank in the kin network

Male Labor Withdrawal

- Crisis periods
  - Lead to withdrawal of male labor during wartime.
  - We don’t know if this particular regiment was called up for any particular crisis.
- Civil/Military distinction
  - Duties of military serfs reduced male labor inputs, even in periods of peace.

Economies of Scale

- Number of affinal kin in the same generation:
  - Husband's brothers (hb)
  - Husband's sisters (hz)
  - Husband's brothers' wives (hbw)
- Number of consanguineal kin in the same generation:
  - Brothers (b)
  - Sisters (z)
  - Brother's wives (bw)

Political Division

- The number of hbw's in the household relative to other types of kin will adversely affect health, because hbw's will be more likely to withhold labor and care.
  - The number of husband's brothers' wives contributes both to economies of scale and division.

Stratification

- The age rank of a woman's brother in the household will affect the availability of care and resources.
  - W is the number of wives in the household
  - A is the absolute age rank (1 is the most senior)
  - R is relative age rank:

$$R=(W-A)/(W-1)$$

  - 1 is senior wife, 0 is most junior. Intermediate wives are scaled between 1 and 0.
  - Women without hbw are assigned a rank of 1, and given a dummy variable.

Other Controls

- Physiological variables
  - Age
  - Parity
  - Previous and mean birth interval
  - Twinning
  - Background mortality
- Temporal variables
  - Linear time trend
  - Parity 1 * linear time trend interaction

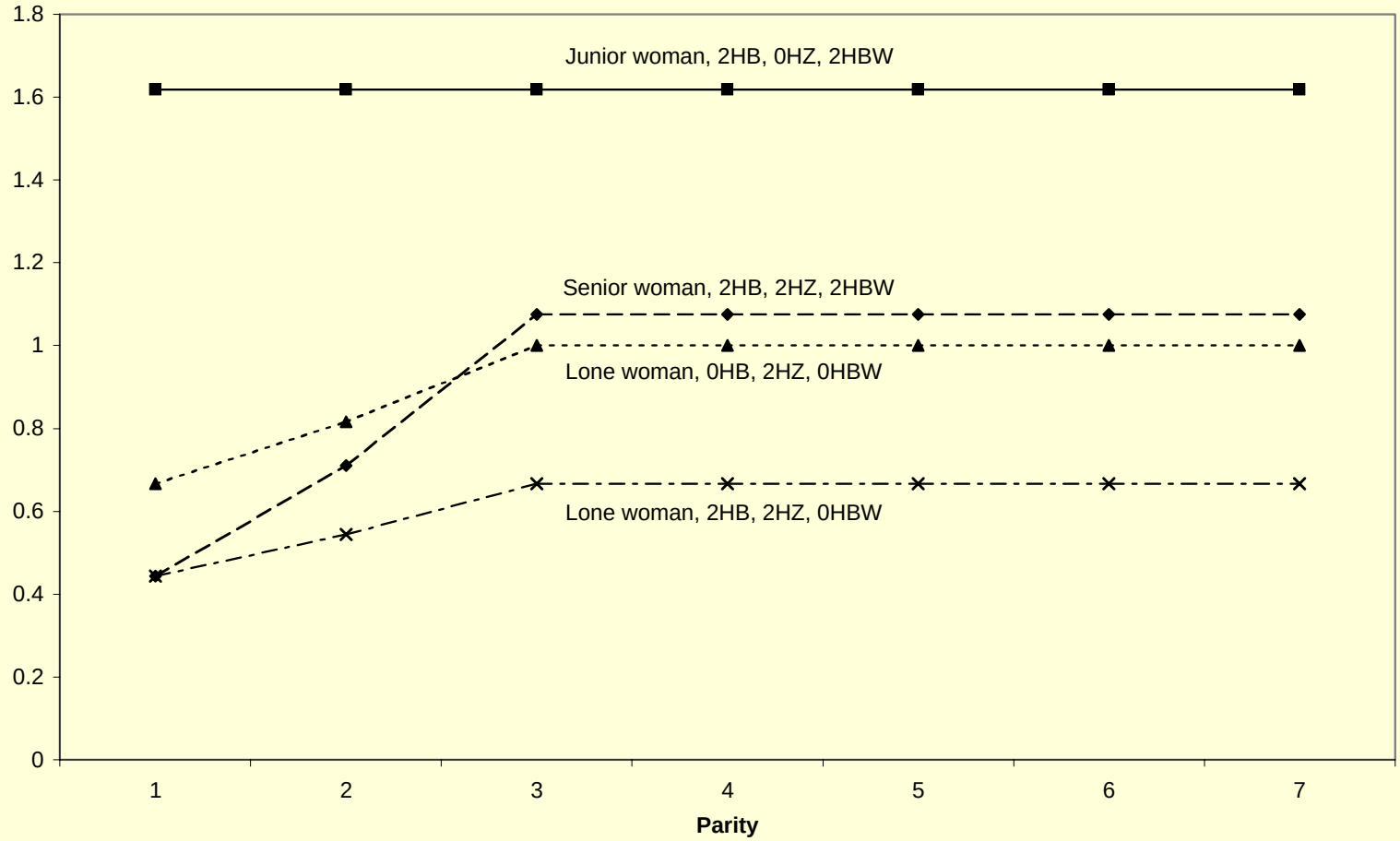
Maternal Mortality Results

Variable	Coefficient	SE
Crisis Period	0.313	0.105***
Parish		
Civil Parish (ref)	-	
B	0.546	0.313*
G	0.109	0.226
O	0.339	0.250‡
S	0.353	0.207*
P	0.346	0.267
V	-0.054	0.255

Maternal Mortality Results (cont)

Variable	Coefficient	SE
# of Adult Affines	-0.238	0.083**
# Adult Consanguines	-0.032	0.038
# of HBW	0.477	0.236*
Relative Rank	-0.396	0.249‡
No HBW	-0.047	0.338
Variance of frailty	0.489	

Change in relative risk over family life-cycle



Infant and Child Mortality

- Additional issue of the age and gender composition of existing siblings and cousins.
  - Positive effect through economies of scale with younger children, and childrearing assistance from older children.
  - Negative effect through resource shortages, particularly as cousins age and household fission approaches (inheritance shares).

The model

- Piecewise Constant Exponential Model
  - 0-1 months, 1-6 months, 6-12 months, 12-24 months, 24-60 months

$$\log(h_{it})=\log(\lambda_t)+\beta'\mathbf{x_{it}}$$

- We want to add two, and possibly three, kinds of frailty
  - Mother effect
  - **Kin network effect**
  - Village effect

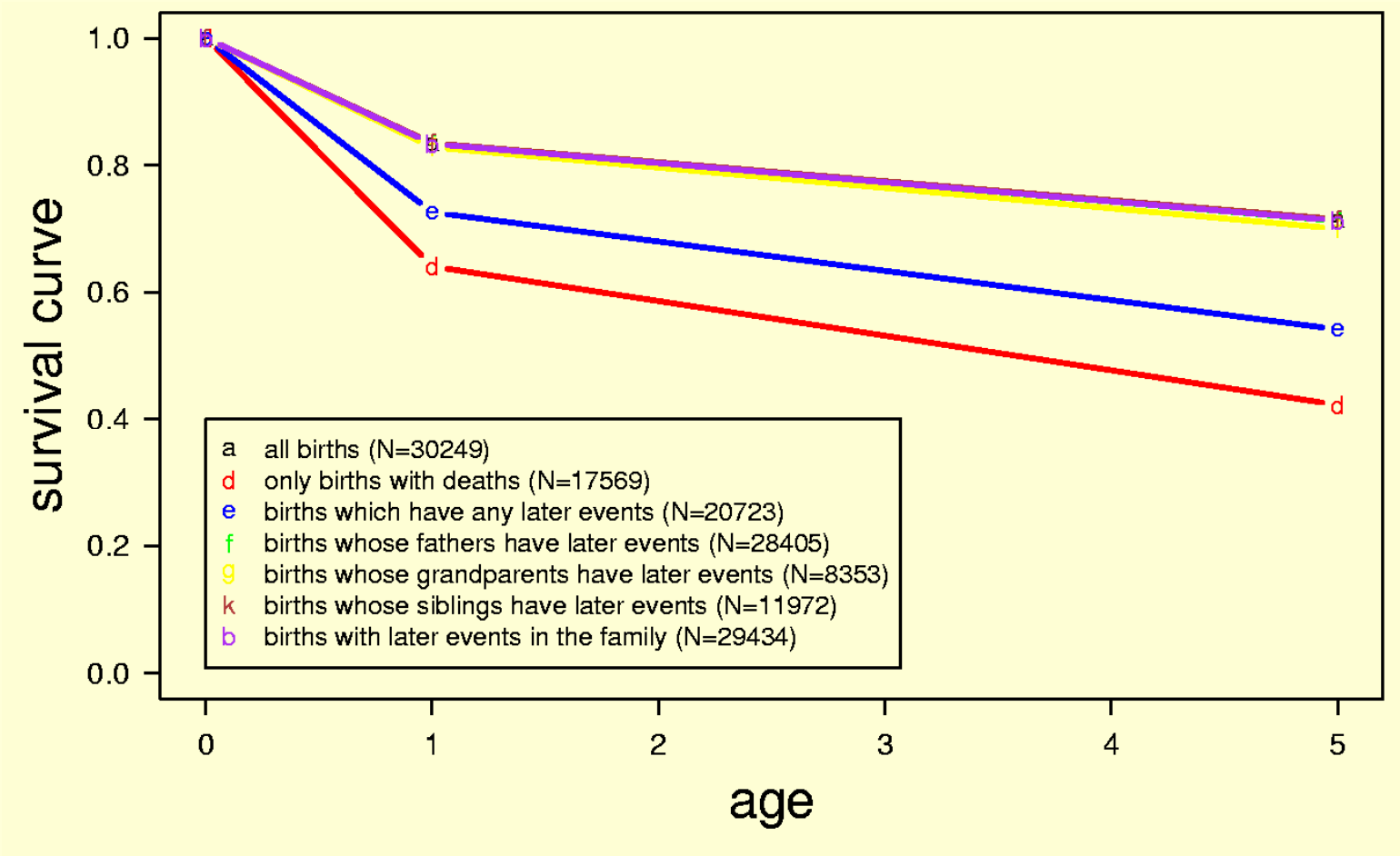
Key Variables

- Number of siblings and cousins in age categories:
  - 0-5 years
  - 5-10 years
  - 10 years until marriage or censoring at 25.

Censoring Observations

- In cases where no death record is recorded, how do you censor an observation?
- We assume all children without an observed death survive to five years of age.
- This approach biases overall death rates, but is hopefully less problematic for covariates.

Survival curves under different censoring rules



Preliminary Results

Variable	Coefficient	SE
Crisis Period	0.190	0.021***
Parish		
Civil Parish (ref)	-	
B	0.513	0.053***
G	0.373	0.034***
O	0.200	0.044***
S	0.564	0.042***
P	0.555	0.033***
V	0.393	0.036***

Preliminary Results (cont)

Variable	Coefficient	SE
# of Adult Affines	-0.005	0.011
# Adult Consanguines	0.003	0.006
# of HBW	-0.020	0.040
Relative Rank	0.004	0.037
No HBW	-0.035	0.050
Variance of frailty	0.082	

Preliminary Results (cont)

Variable	Coefficient	SE
# of Siblings		
0-5 years old	-0.164	0.021***
5-10 years old	-0.013	0.020
10+ years old	-0.063	0.020**
# of Cousins		
0-5 years old	0.028	0.017
5-10 years old	0.076	0.018*
10+ years old	-0.017	0.011

Conclusions

- Family structure has complex, multi-dimensional relationship with members' well-being
- Family planning policy would benefit from an understanding of this relationship in many developing nations.