

# **Clustering of fertility among girls aged less than 18 years in the Kintampo North and South Districts of Ghana: The evidence of the Kintampo Health and Demographic Surveillance System**

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# Presentation Outline

- Introduction
- Objectives
- Population and Methods
- Results
- Discussion
- Conclusion
- Acknowledgements



# Introduction

- MDGs cannot be met without a focus on ARH. Yet, no specific goals were set (Bernstein, 2005)
- Good News: adolescent fertility declined in all regions of the world within the last four decades. **However, there are clusters of resistance**
- In Ghana, 27% of teenage girls were pregnant or already mothers in 1980, 22% in 1993, 14% in 1998, stagnated in the last decade to 2008 (ICF Macro, 2010)
- Intra-national differentials, e.g. 22% of 15-19 year olds in Brong Ahafo Region, Ghana (region of Kintampo HDSS) have begun childbearing (GSS et al, 2009). This is one of 3 highest in Ghana, together with Central and Northern Regions.

• Within these regions, there are also clusters of high fertility as yet unexplored



# Introduction Cont'd

- Very little information about adolescent fertility in the Kintampo districts, especially clusters of high adolescent fertility, in spite of the presence of a research centre in Kintampo
- The Kintampo HDSS is in a unique position to explore this phenomenon, with demographic data collected



# Objectives

- Investigate the existence of clusters of fertility among younger adolescent females aged 12-17 years
- Explore how childbearing within clusters are related to proportion in sexual union, age structure, educational attainment, household wealth status, place of residence and ethnicity of adolescent girls between areas of observed clustering and the rest of the KHDSS



# Population and Methods

- Population
  - 17,418 girls aged 12-17 from 2005-2008, contributing 32,888.17 person-years
- Coverage area (Kintampo HDSS): 7162 km<sup>2</sup>,
  - 12 sub-districts: 7 in the north and 5 in the south
  - Differ on: **educational levels, ethnic make-up, wealth, urbanization**
  - Similar on: **age structure**
- Source of data (from Kintampo HDSS database)
  - Live Births
  - Person-years computed mainly from dates of entry and exit
  - Data on marital status
  - Socio -demographic data from necessary tables



# Population and Methods Cont'd

- Variables of interest:
  - Outcome variable: Fertility-live births to girls aged 12-17 (2005-2008)
  - Independent variables:
    1. clusters of higher fertility
    2. Determinants of fertility differentials between clusters : proportion in sexual union, age, education, place of residence, household wealth, ethnicity



# Limitations

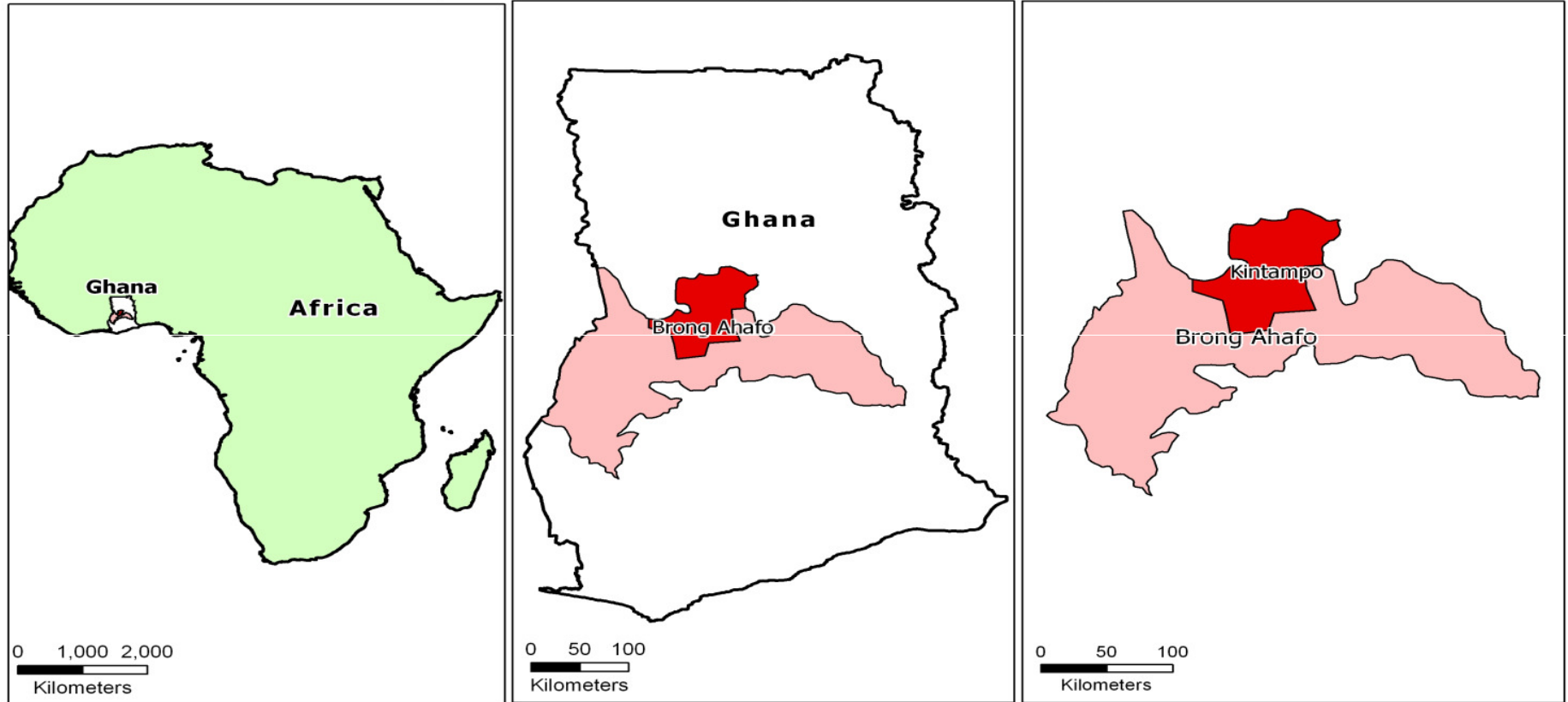
- Proximate determinants: abortion, contraceptive use, breastfeeding cannot be explored because of data constraints
- Religion cannot be explored because of similar reasons
- Under-estimation of births





# Location of KHDSS

Kintampo Health and Demographic Surveillance Site, Ghana



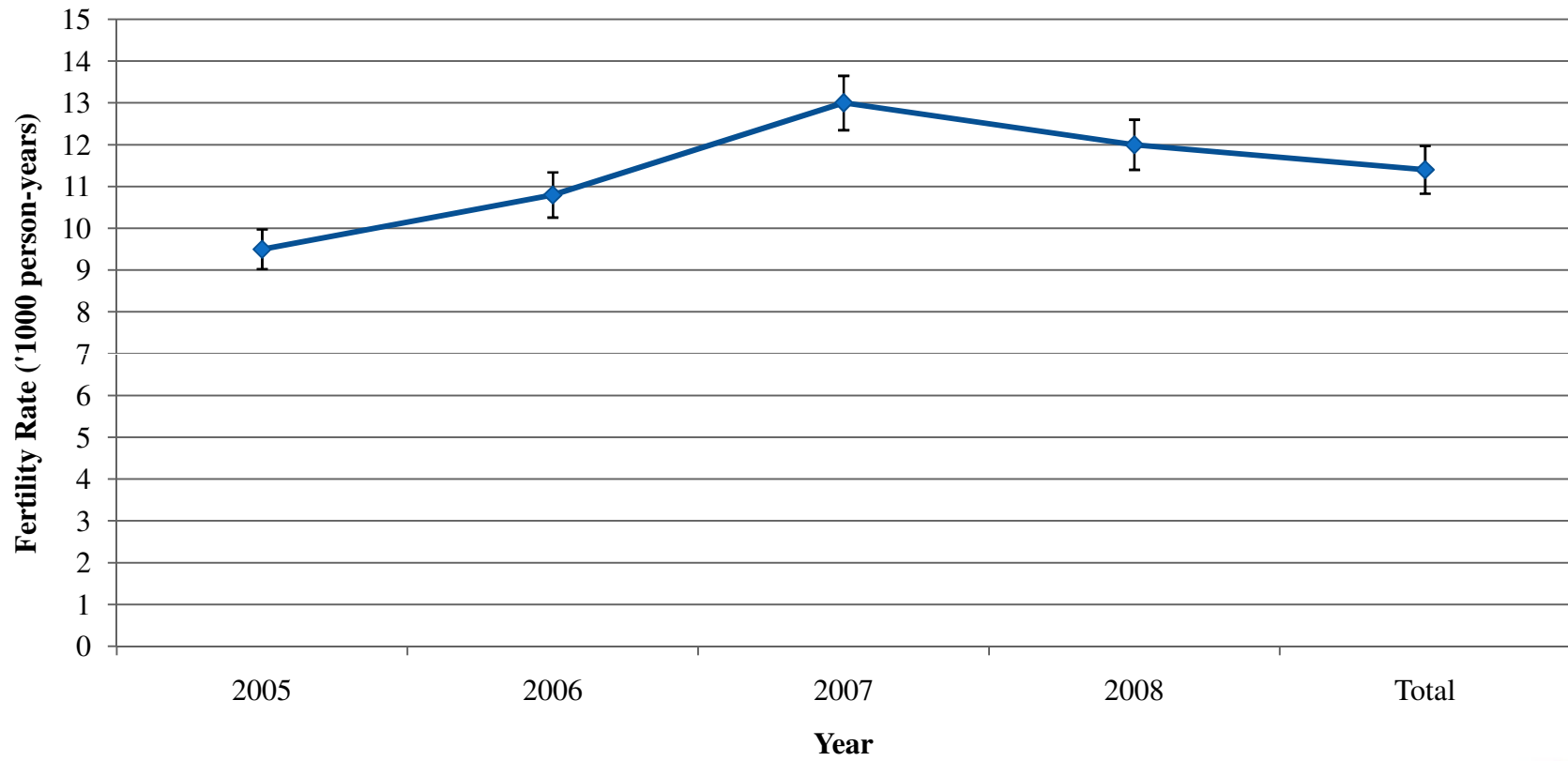
# Methods: Clustering Analysis

- 2 approaches: spatial and spatio-temporal
- Software for clustering: SatScan™
- Uses a scan statistic developed by Kulldorf (1997) to identify the most likely (primary) cluster (a geographical area with a greater than expected fertility within a period of time) and other secondary clusters not overlapping with it
- Monte Carlo hypothesis testing to obtain the p-values (alpha-level = .05 )



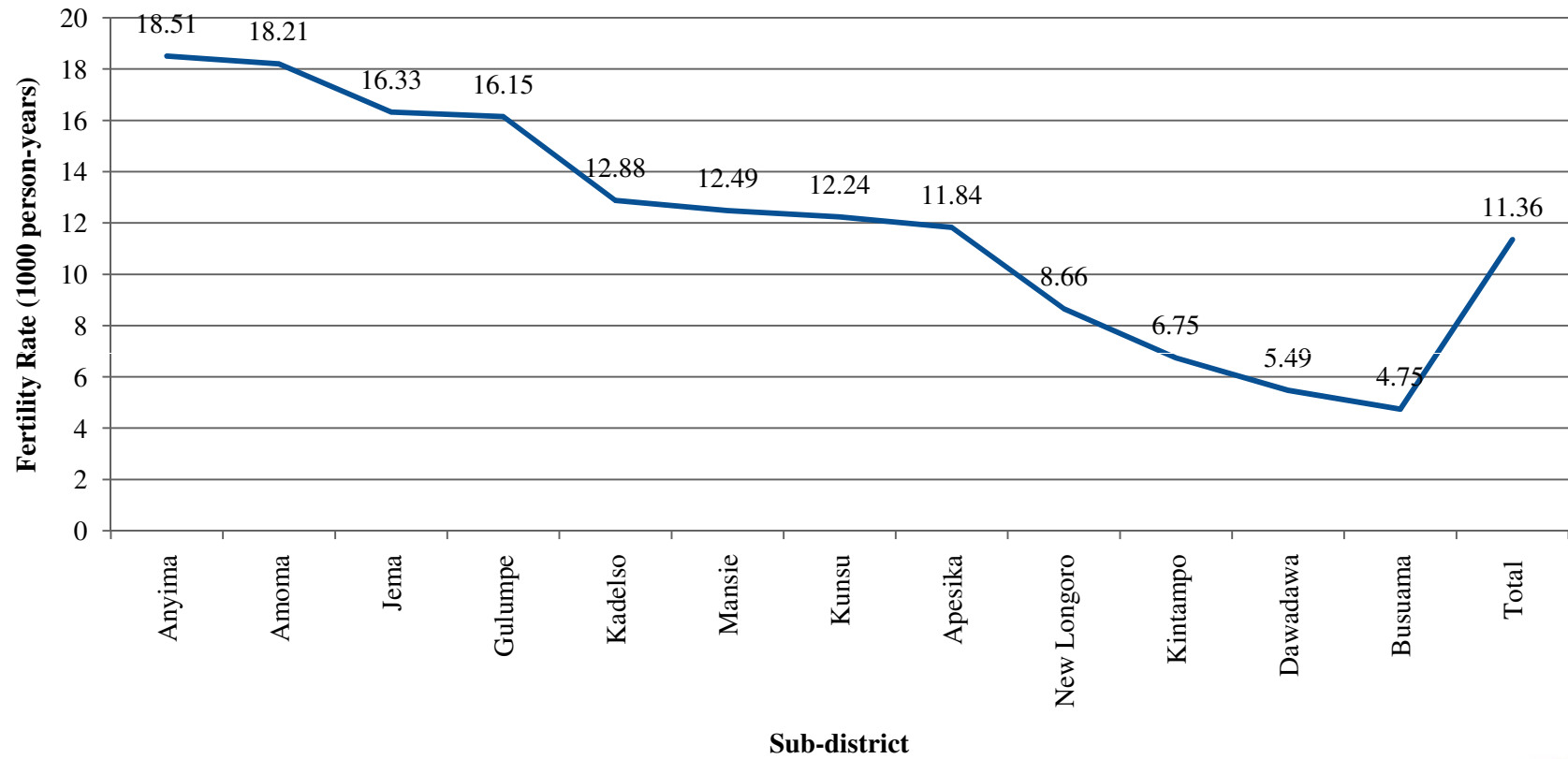
# Results

Fertility Rates for females aged less than 18 years in KHDSS by year, 2005-2008



# Results

Overall Fertility Rates of females aged less than 18 years by sub-district in the KHDSS, 2005-2008



# Results Cont'd

- Most likely spatial clusters scanning for high fertility rates

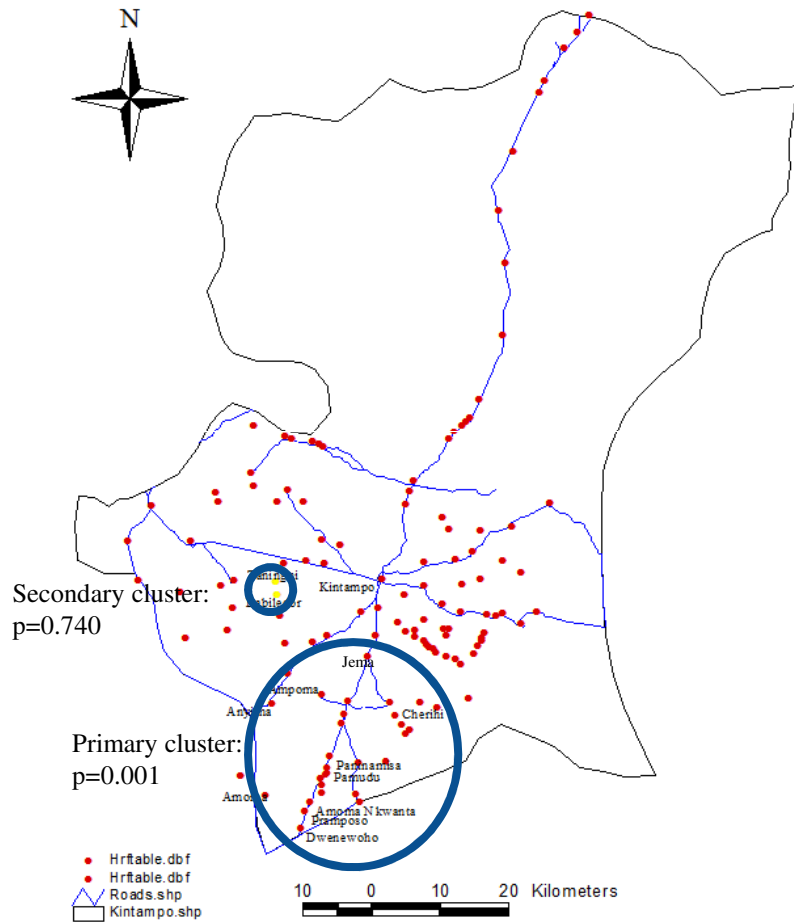
Year	Type	Cluster Villages(n)	Radius (km)	Cases	Expected	Relative Risk	p-value
2005	Most likely	24	11.42	36	14.78	3.666	0.001
2006	Most likely	51	20.74	43	23.96	2.522	0.003
2007	Most likely	9	11.07	30	13.12	2.735	0.004
2008	Most likely	45	17.52	60	39.94	1.673	0.156

- Most likely spatio-temporal cluster scanning for high fertility rates

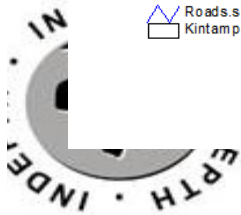
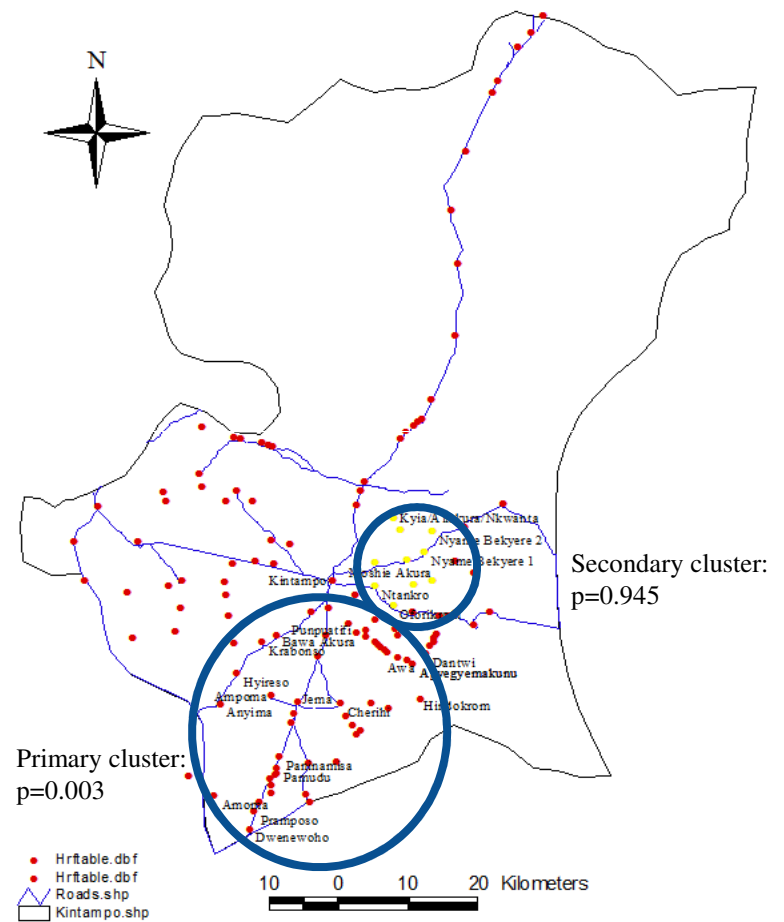
Years	Type	Cluster Villages(n)	Radius (km)	Cases	Expected	Relative risk	p-value
2006-2007	Most likely	5	5.78	35	11.72	3.181	0.002



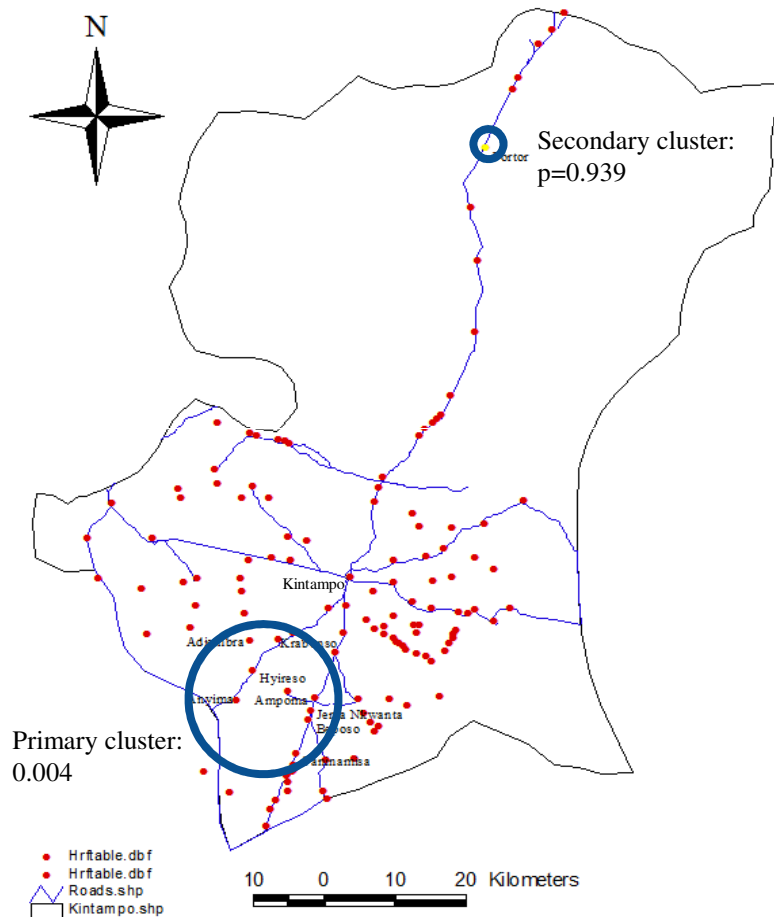
# Spatial (2005)



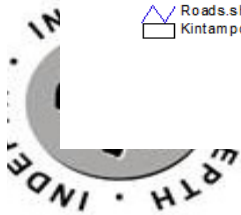
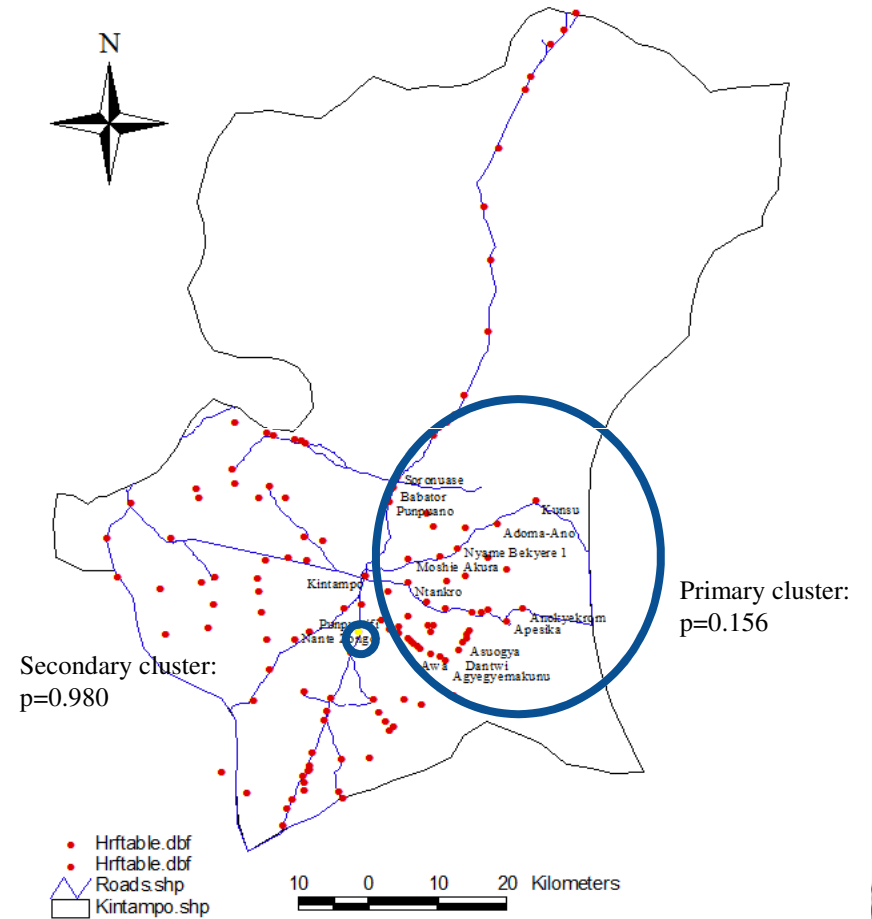
# Spatial (2006)



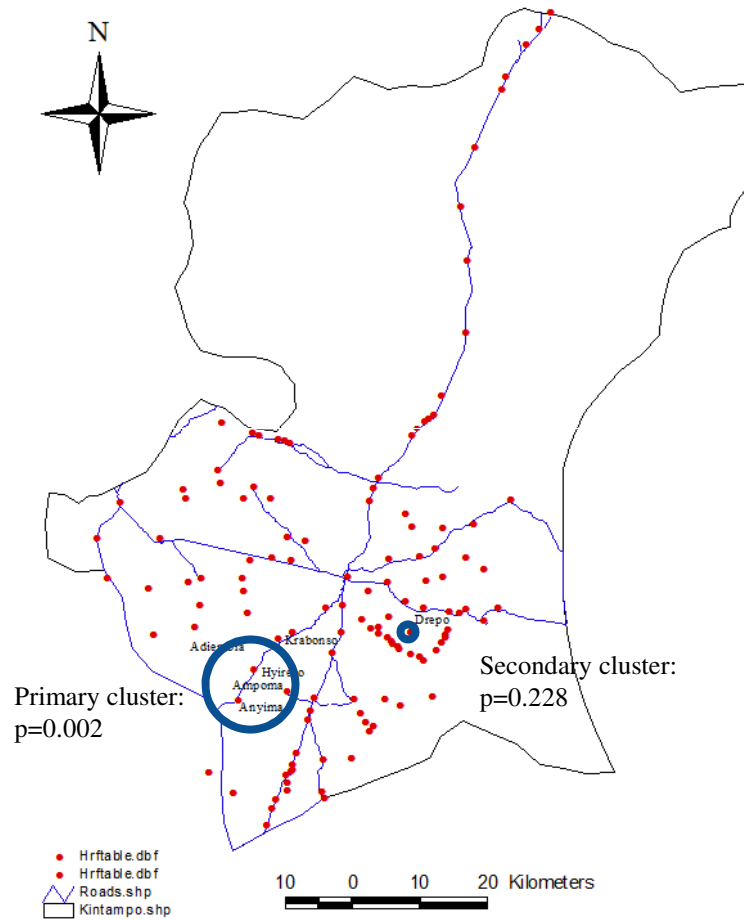
## Spatial (2007)



## Spatial (2008)



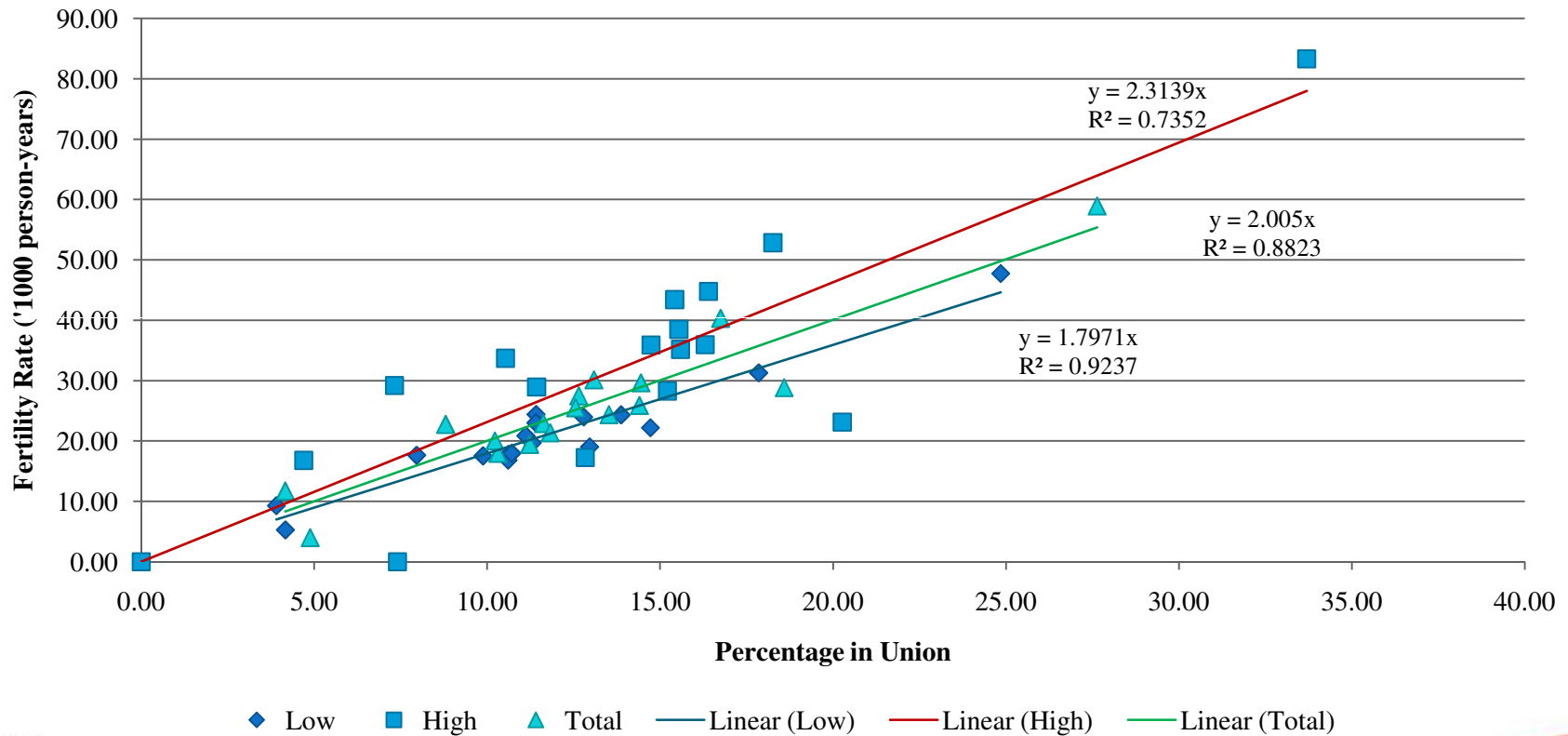
# Spatio-temporal (2006-2007)



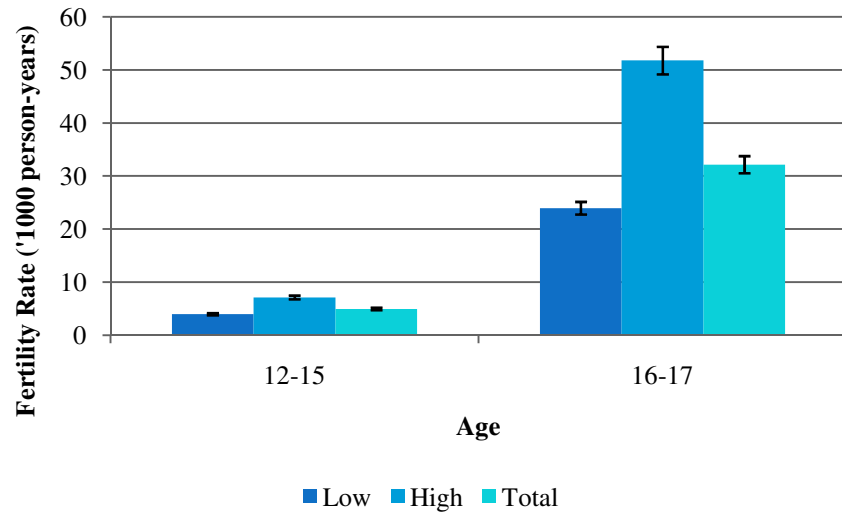


# Results

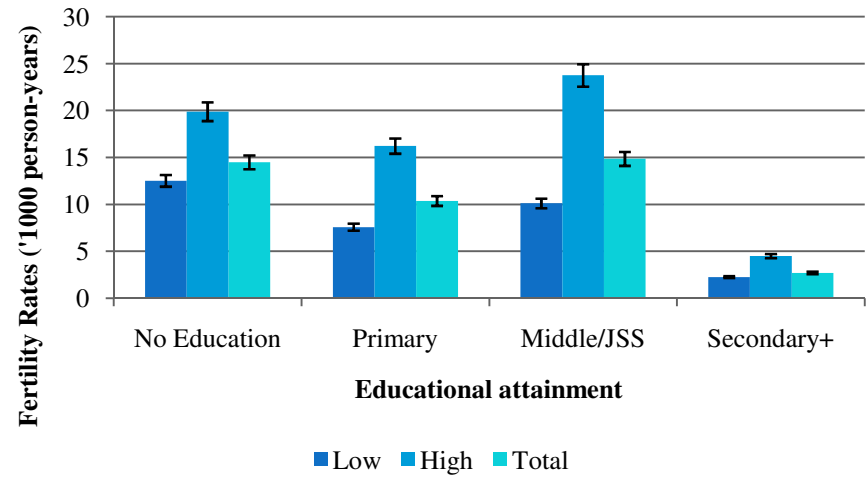
Figure 4: Linear Relationship between percentage of females aged less than 18 in sexual unions and fertility rates in KHDSS, 2005-2008



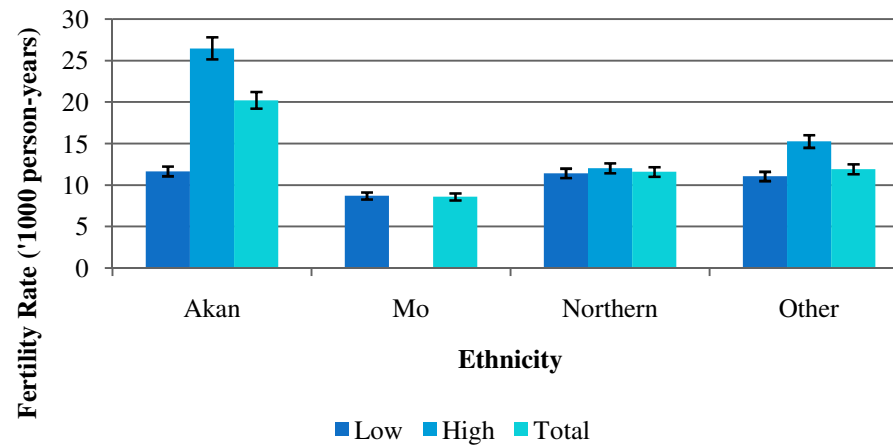
**Fertility rate of females aged less than 18 years by age-group in Kintampo HDSS, 2005-2008**



**Fertility rates of girls aged less than 18 years by educational attainment in Kintampo HDSS, 2005-2008**



**Fertility rates of females aged less than 18 years by ethnicity in the Kintampo HDSS, 2005-2008**



# Discussion

- Births to girls aged less than 18 years account for about 3% of all births for every year from 2005 to 2008 in the KHDSS. Fertility rates by year differ only slightly.
- Anyima, Amoma and Jema sub-districts have majority of villages in the most likely (primary) clusters from 2005-2007 and the overall highest fertility rates for females aged less than 18 years in the KHDSS. Fertility rate (12-15 years) 7/1000 person-years
- The overall lowest fertility rates: Kintampo, Dawadawa and Busuama sub-districts, located in the north of the KHDSS. Fertility rate (12-15 years) 4/1000 person-years
- Case in point: Paninamisa in Amoma sub-district, in the most likely spatial (primary) cluster from 2005-2007. Average population of 110 girls aged 12-17, but recorded about 4 births on average every year



# Discussion

- Key determinants: age, education, place of residence (in low fertility areas) ethnicity (high fertility areas)
- Household wealth not important in both areas
- Why do Anyima, Amoma and Jema sub-districts have the highest fertility rates in KHDSS for girls under 18?
  - Entry into sexual union
  - Supervision
  - Social learning
  - Ethnicity, Culture, Lineage
  - Rational Adaptation: *pursuit of material goods?*



# Conclusion

- From 2005-2007, the most likely primary spatial clusters were located mainly in the Anyima, Amoma and Jema sub-districts, in south of the KHDSS
- Affected groups were 16-17 years, typically had Junior Secondary education and were of Akan ethnicity in the 3 sub-districts
- A fertility rate of 5 per 1000 person-years for girls aged 12-15 in the KHDSS demonstrates an appreciable level of defilement, considering that more of them are likely to be sexually active
- Policywise, the 3 sub-districts require greater effort in any ARH intervention within the district
- More studies are needed to investigate the socio-economic and cultural causes of fertility among younger adolescents, particularly in the 3 sub-districts



# Acknowledgements

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- SaTScan™ is a trademark of Martin Kulldorff. The SaTScan™ software was developed under the joint auspices of (a) Martin Kulldorff, (b) the National Cancer Institute and (c) Farzad Mostashari of the New York City Department of Health and Mental Hygiene
- Kintampo Health Research Centre is a member site of the INDEPTH Network.



Thanks for your  
attention!!!

