

# Community Correlates of Teenage Birth Rates Among Townships in Taiwan: Spatial and Temporal Dimensions

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## Study Purpose

This study analyzed township differences in teenage birth rates (TBR) and associated factors in the years of 1995, 2000, 2005, and 2010 in Taiwan.

## Risk Factors of Teenage Birth Rates

- Factors associated with teen birth include family SES, race/ethnicity, family structure and stability, education resources, other risk behaviors, and knowledge about sex education (Imamura et al., 2007).
- There is great area variation in teen birth rates in Taiwan. The highest teenage birth rates occur in the remote areas in central and eastern parts of Taiwan.
- Geographic variation in teen birth rates is associated with some contextual factors, including divorce rates, employment opportunities, elderly concentration, crime rates, education pattern, poverty et al. (Mollborn, 2010)

## Study Design and Data

- This study is based on an ecological design using township-level data (N=1,436).
- Data were collected in 359 townships in the years of 1995, 2000, 2005, and 2010.
- Taiwan administrative structure has the following geographical hierarchy: counties/cities, townships/districts, and lis(smallest census unit)/villages
- The data came from Taiwan Demography, the City and County Statistics, and Census.

## Measurements

- Outcome Variable: Teenage birth rates (teens aged 15-19, ‰)
- Independent Variables (Township-level Characteristics)
  - Population density (per km<sup>2</sup>)
  - Number of physicians (per 10,000 people)
  - Percentage of college educated residents
  - Percentage of residents over 65 years old
  - Percentage of aborigines
  - Percentage of divorced residents
  - Spending on social welfare

## Analysis

- Geographic Information System (GIS) to create maps
- Local Indicators of Spatial Association (LISA) to identify clusters
- Spatial (Spatial Lag Models) and non-spatial regression models

Table 1 Means of Township-level Characteristics by Year

Year	1995	2000	2005	2010
Pop Density (per Km <sup>2</sup> )	692.93	701.5	675.34	654.5
>65 yr (%)	8.5	9.9	11.25	12.35
Physician (per 10,000 people)	4.26	4.798	5.606	5.553
Divorce (%)	2.727	4.186	4.295	6.737
Aborigines (%)	0.260	0.349	0.474	0.629
High Edu (%)	7.559	10.742	13.246	19.435
Social Spending (NT/per person; 1U.S. dollar=32NT dollar)	789.799	1515.39	848.257	971.514
Teen Birth Rate (‰)	22.5	20	12	4

Figure 1 Teen Birth Rates in the Years of 1995, 2000, 2005, and 2010 in Taiwan

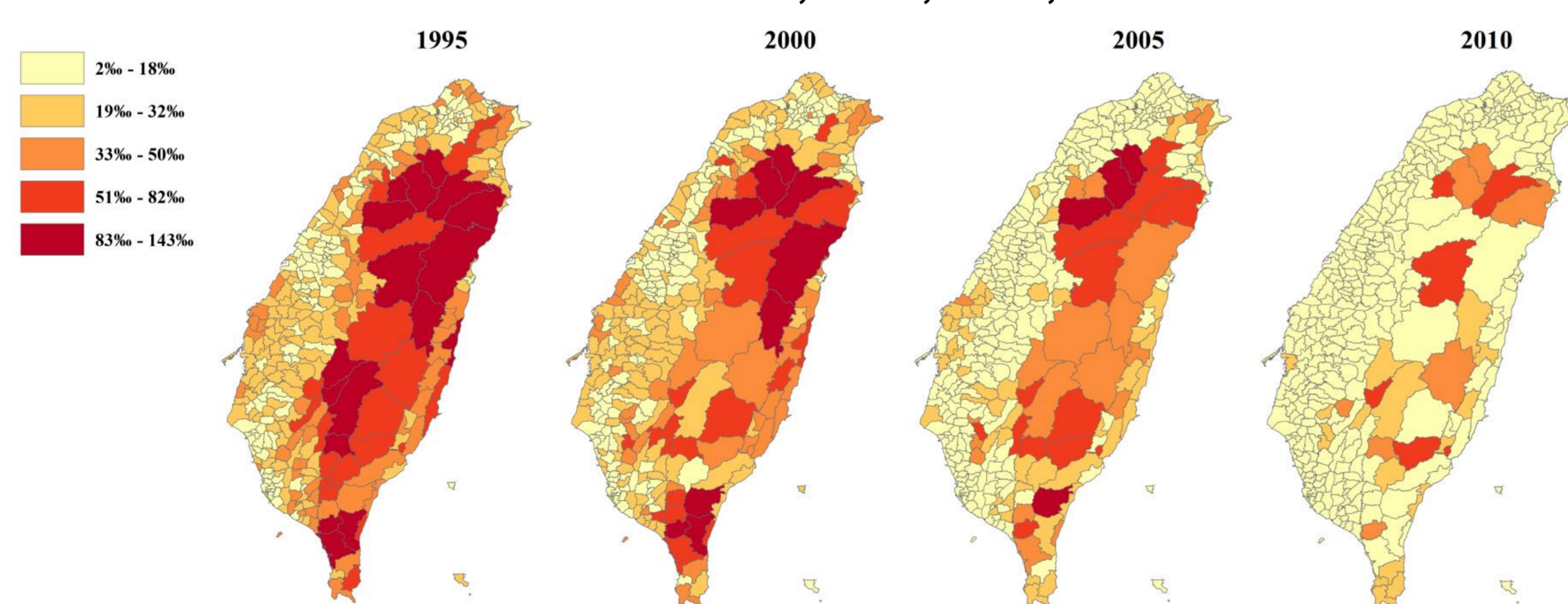


Table 2 Global Moran's I of Teen Birth Rate

Year	1995	2000	2005	2010
Global Moran's I	0.587	0.520	0.456	0.358
P value	<.05	<.05	<.05	<.05

Figure 2 Hot Spots and Cold Spots of Teen Birth Rates in the Years of 1995, 2000, 2005, and 2010 in Taiwan

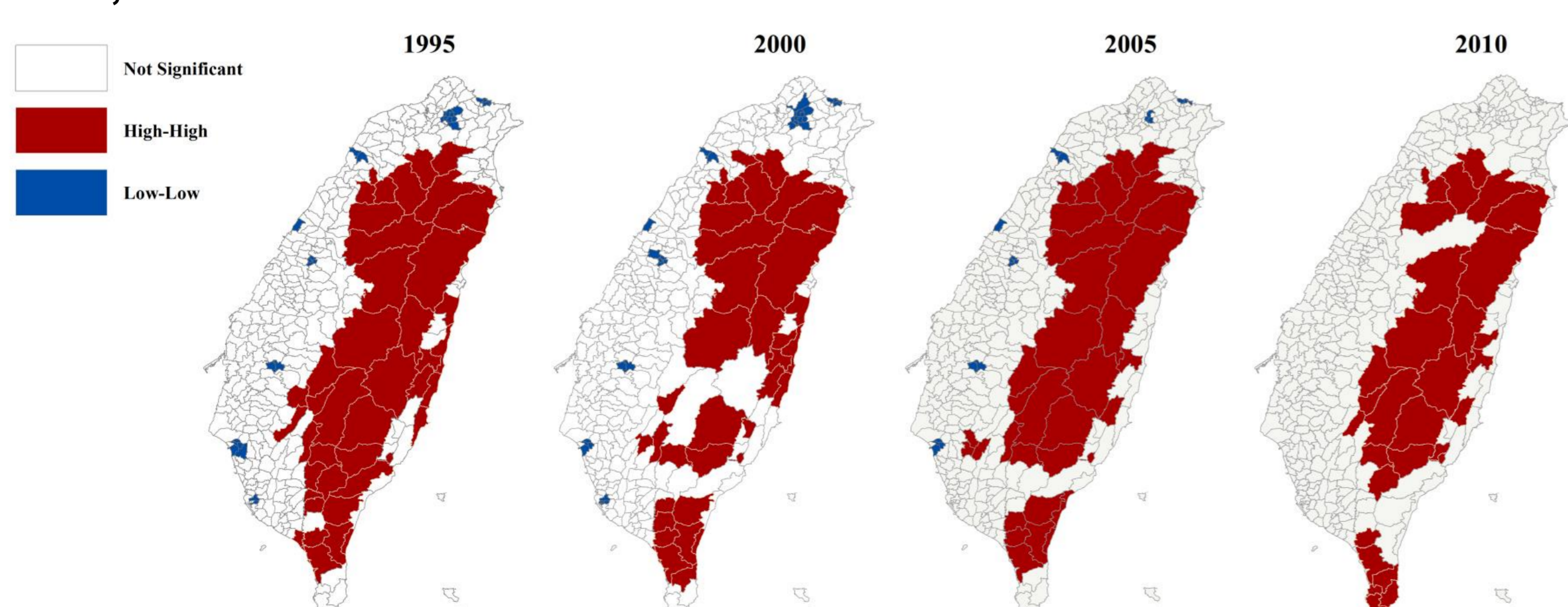


Table 3 Spearman's Correlation Coefficients of Township Characteristics, 1995

	Teen Birth Rate	Pop Density	>65 Yr	Physician	Divorce	Aborigines	High Edu
Teen Birth Rate	-0.359*						
>65 Yr	0.148*	-0.292*					
Physician	-0.268*	0.419*	-0.198				
Divorce	0.394*	0.289*	-0.123	0.196			
Aborigines	0.757*	-0.164*	-0.108*	-0.128*	0.549*		
High Edu	-0.555*	0.657*	-0.304*	0.539*	0.192*	-0.352*	
Social Spending	-0.030	0.457*	-0.092	0.338*	0.410*	0.152*	0.443

\*p<.05

Table 4 The Effects of Township Characteristics on Teen Birth Rates

	1995		2000		2005		2010	
	OLS	Spatial Lag	OLS	Spatial Lag	OLS	Spatial Lag	OLS	Spatial Lag
Pop Density	-0.0252*	-0.0188*	-0.0371*	-0.0304*	-0.0208*	-0.0138*	-0.0103	-0.0071
>65 yr	0.0387*	0.0309*	0.0274*	0.0227*	0.0318*	0.0228*	0.0112	0.0050
Doctor	-0.0012	-0.0017	-0.0032	-0.0032*	-0.0026	-0.0030	0.0000	-0.0007
Divorce	0.1293*	0.0886*	0.0767*	0.0645*	0.0109	0.0035	0.0390	0.0331
Aborigines	0.0089*	0.0081*	0.0059*	0.0053*	0.0101*	0.0084*	0.0129*	0.0080*
High Edu	-0.0548*	-0.0489*	-0.0388*	-0.0363*	-0.0525*	-0.0474*	-0.0397*	-0.0290*
Social Spend	-0.3450*	-0.2095	0.0141	0.0129	-0.0507	-0.0208	0.1082	0.0024
Spatial Lag Term		0.185*		0.145*		0.202*		0.238*

\*p<.05

## Study Results

- Teenage birth rates declined from 22.5 (per 1,000 women) in the year of 1995 to 4 in the year of 2010.
- In 1995, the percentage of elderly, divorce rates, and the percentage of aborigines were positively associated with teenage birth rates, whereas population density and the percentage of college educated people were negatively associated with teenage birth rates.
- In 2010, only the percentage of aborigines and the percentage of college educated people were positively and negatively associated with teenage birth rates respectively.
- The coefficients for the spatial lag are significant and positive in all models.

## Discussion

- The highest teenage birth rates occur in the remote areas in central and eastern parts of Taiwan.
- Two factors are consistently predicting TBR in different time periods which are the high percentage of aborigines and the low percentage of high-educated population.
- Studies have showed that lower SES areas can result in disorganization of local institutes, conventional norms cannot be maintained, and high proportions of people are isolated from the job network system, which may further increase the likelihood of adolescent risky behaviors (Wilson, 1987).
- Since most aboriginal tribes (Bunun, Amis, Atayal, Drekey, Payuan, and Cou tribes) have lower economic profiles than the mainstream Han population and locate in remote, mountainous areas, this result may indicate the inequality within the socioeconomic structure in Taiwan society and the barriers to access to health and social services.
- The positive spatial lag terms in all models indicate that TBR are determined by the spillover effects between neighboring townships regardless of the year.
- Other geographical factors might explain the variation of teenage birth rates in recent years.

## Limitations

- The causal inference of the relationships between township-level characteristics and teen birth rates may be limited due to the cross-sectional study design.
- This study did not include social processing variables (i.e. social capital).
- The results can only be generated to the township level.

## Conclusions

- Education resources and inequality between ethnic groups may have more significant effects on teenage birth rates than health and social service related characteristics.
- The policy makers need to focus on the socioeconomic inequality of a place, rural-urban difference, and cultural differences in ethnic groups.