A Reassessment of the Social and Economic Benefits of Rural School on Local Communities: The Case of New York State

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Introduction

- The role of **rural schools** in local communities has long been one of the key discussions among planners, education administrators, and policy makers

- School district consolidation has often forced many rural schools to close down to relieve fiscal stress of governments

- Yet, it is unclear to what extent the **socioeconomic impacts of school closure** has on local communities

Introduction

- Lyson (2002) shows that the presence of rural schools provide significant social and economic benefits to local communities

- Among his findings were that compared to rural communities without schools:

  - In smallest rural communities, the presence of a school is associated with **higher housing values**

  - **Higher per capita income from self-employment** is found in communities with schools

  - Higher proportion of workers in communities with school are **employed within their villages**

Lyson's Findings

	Village Population					
	500 or under			**501 to 2,500**		
	School	No School	Difference (school-no school)	School	No School	Difference (school-no school)
Number of Village	36	28		192	41	
Population Characteristics						
Age structure (see note below)						
under 18 (%)	28.7	29.1	-0.4	27.9	27.8	0.1
18-39 (%)	30.4	30.9	-0.5	30.7	31.4	-0.7
40-64 (%)	26.0	26.5	-0.5	25.6	25.9	-0.3
65 yr and over (%)	14.9	13.4	1.5	15.8	14.9	0.9
HH with children (%)	35.8	37.7	-1.9	34.7	35.0	-0.3
Children ages 3-17 enrolled in school (%)	83.8	82.9	0.9	84.1	83.6	0.5
Children ages 3-17 enrolled in priv. school (%)	3.9	4.1	-0.2	5.1	5.2	-0.1
White Population (%)	99.1	98.7	0.4	98.2	95.7	2.5
Non-White Population (%)	0.9	1.3	-0.4	1.8	4.3	-2.5
Housing and Municipal Infrastructure Characteristics						
Average house value ($)	59,508	47,782	11,726.0*	62,329	58,832	3,497.0
Median house value ($)	57,450	43,500	13,950.0	58,450	50,400	8,050.0
Houses built within the past 20 years (%)	15.7	13.5	2.2	19.5	20.3	-0.8
Income and Welfare						
Household income ($)	25,992	26,130	-138.0	26,860	26,752	108.0
Per capita income ($)	11,914	11,574	340.0	10,722	12,201	-1,479.0*
Households receiving public assistance (%)	6.3	7.5	-1.2	6.7	7.1	-0.4
Population in poverty (%)	10.6	11.6	-1.0	10.3	10.2	0.1
Children in poverty (%)	13.1	14.5	-1.4	13.4	13.6	-0.2
Occupational and Employment Characteristics						
Professional, managerial, executive workers (%)	38.4	34.0	4.4*	39.7	35.9	3.8*
Households with wage income (%)	73.5	75.9	-2.4	73.5	74.9	-1.4
Per capita income from wage ($)	8,170	7,861	309.0	8,787	8,586	201.0
HHs with income from self-employment (%)	15.4	12.7	2.7*	12.5	12.6	-0.1
Per capita income from self-employment ($)	711	453	258.0*	652	564	88.0
Residents who work in village (%)	23.0	13.8	9.2*	28.2	16.3	11.9*
Workers who commute < 15 min. to jobs (%)	42.4	36.7	5.7*	41.9	41.9	0.0

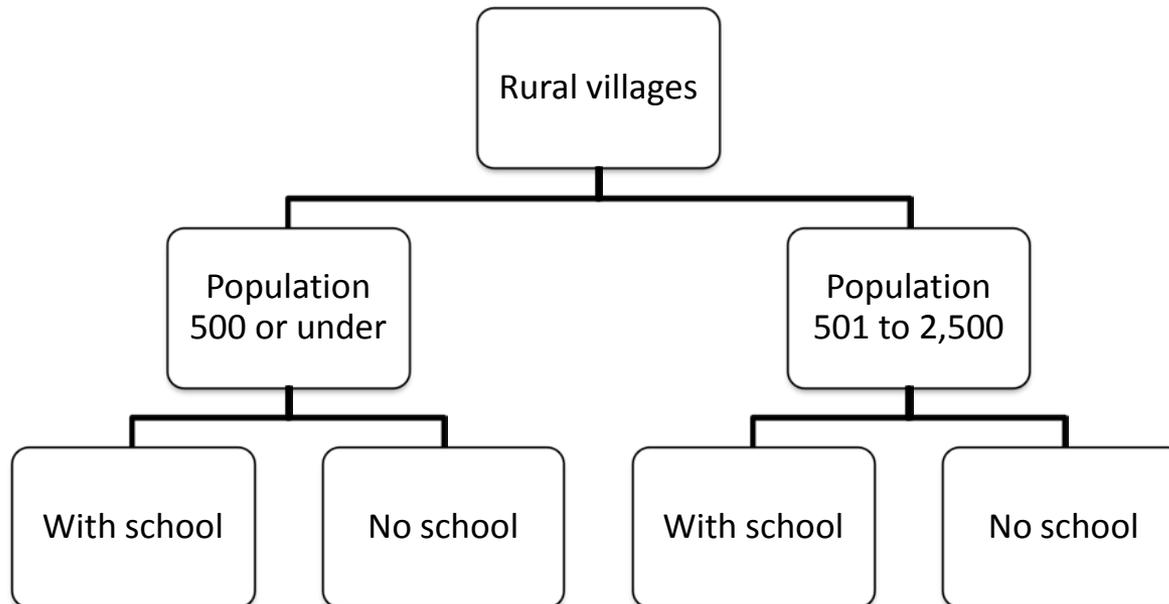* p< 0.05 within community size categories

Introduction

- Lyson's analysis certainly sheds light on the benefits of the presence of schools on rural communities in the 80s (using data from 1990 US Census)

- What about the last two decades? Can we still see the same patterns as Lyson?

- This paper revisits Lyson's hypothesis tests by employing 2000 & 2010 Census and geoinformatic analysis of school locations in New York State.

Data & Methodology

- Data are primarily drawn from two databases:
    1. Census data
        - 2000 Census (short form & long form)
        - 2010 Census (decennial & ACS)
        - Census geography TIGER/Line® shapefile: rural incorporated villages in New York State (NYS) of both 2000 & 2010 Census
    2. Public school directory from NYS Department of Education (2010) and Cornell Program on Applied Demographics (2000)

- **Key variables** include:
    - population characteristics
    - housing characteristics
    - income and welfare
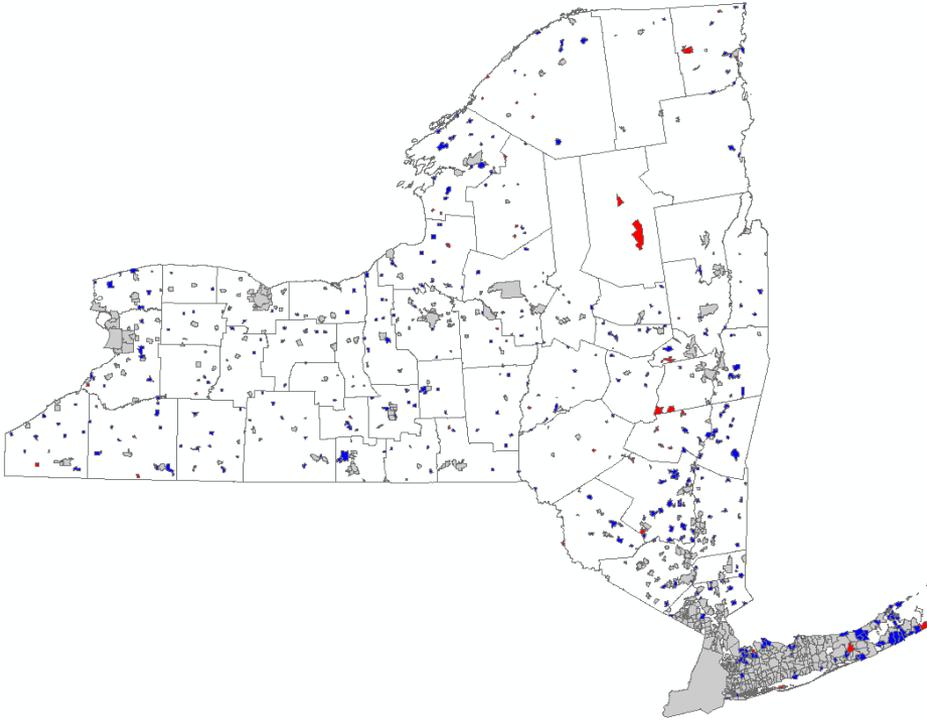   - occupational and employment characteristics

Rural villages

- Focusing on **rural villages** (i.e. incorporated villages with population 2,500 or less, by definition)
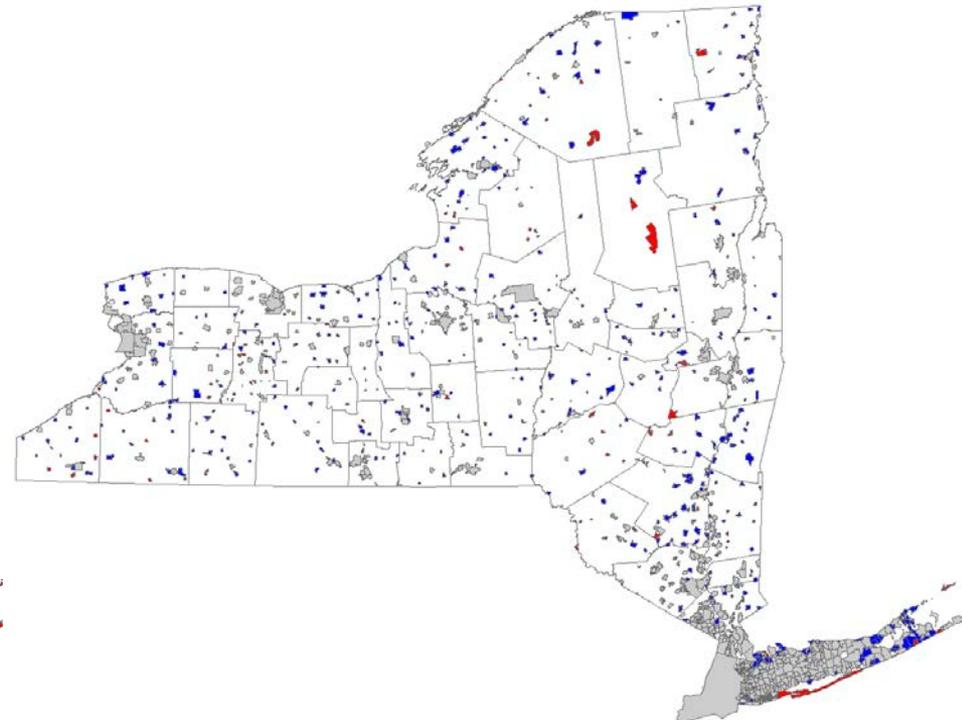- These rural villages are further categorized by total population and presence of public schools

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                        Rural villages
                              │
          ┌───────────────────┴───────────────────┐
    Population                               Population
    500 or under                            501 to 2,500
          │                                       │
    ┌─────┴─────┐                           ┌─────┴─────┐
With school  No school                  With school  No school
```

Where are rural villages?

2000 Places
Total: 1,050

2010 Places
Total: 1,189

		2000	2010*
🟥	Population 500 or less	73	66
🟦	Population 501 to 2,500	272	245
⬜	Population 2,500+ (urban)	705	846

*exclude 32 outliers (based on village's median house value)

Changes in rural villages

Population in incorporated places	Number of places		
	1990	**2000**	**2010**
Rural	**351**	**345**	**342**
<= 500	72	73	72
501 - 1000	106	106	111
1001 - 1500	77	73	69
1501 - 2000	59	57	56
2001 - 2500	37	36	34
Urban	**268**	**271**	**273**
> 2500	268	271	273
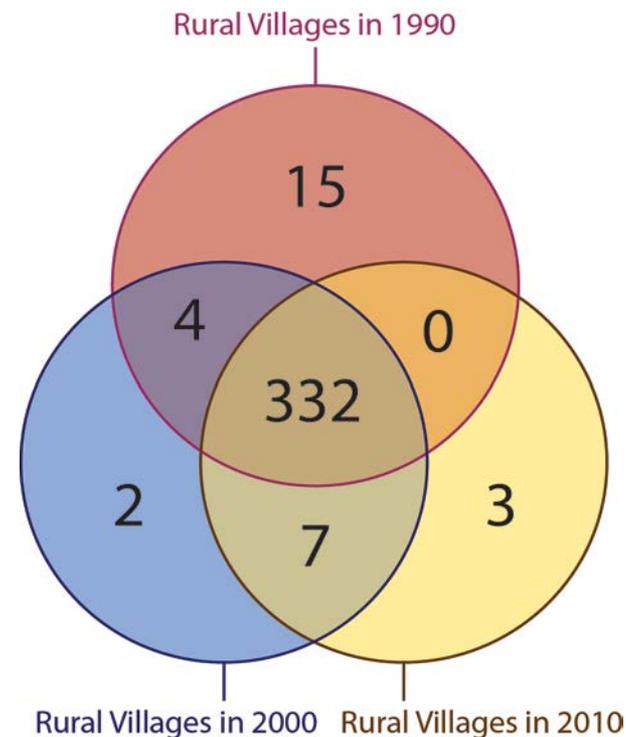
Identifying presence of schools

- To identify rural communities with or without schools, we need to locate public schools in relation to rural communities

- This involves **geocoding addresses** of schools—addresses are spatially referenced to pin down the coordinates of their locations

- Geocoding is a method that transform street addresses (i.e. **1600 Pennsylvania Avenue Northwest, Washington, DC 20500**) into X,Y coordinates (i.e. **38.898331,-77.036394**)

- Once school locations are identified, the ArcGIS **spatial join** operation is used to count the number of schools in each village
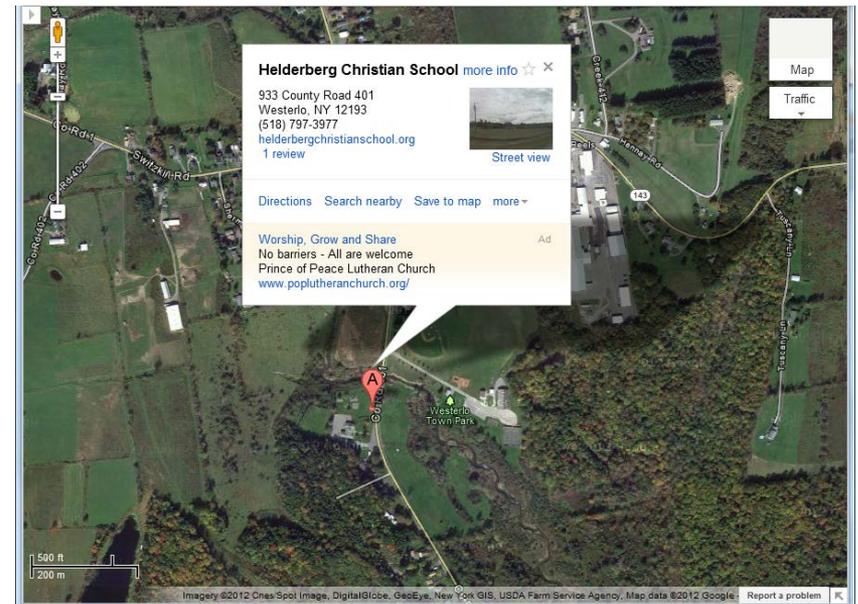
Geocoding Schools

Unmatched Example: PO Box Address

Helderberg Christian School, East Berne, NY
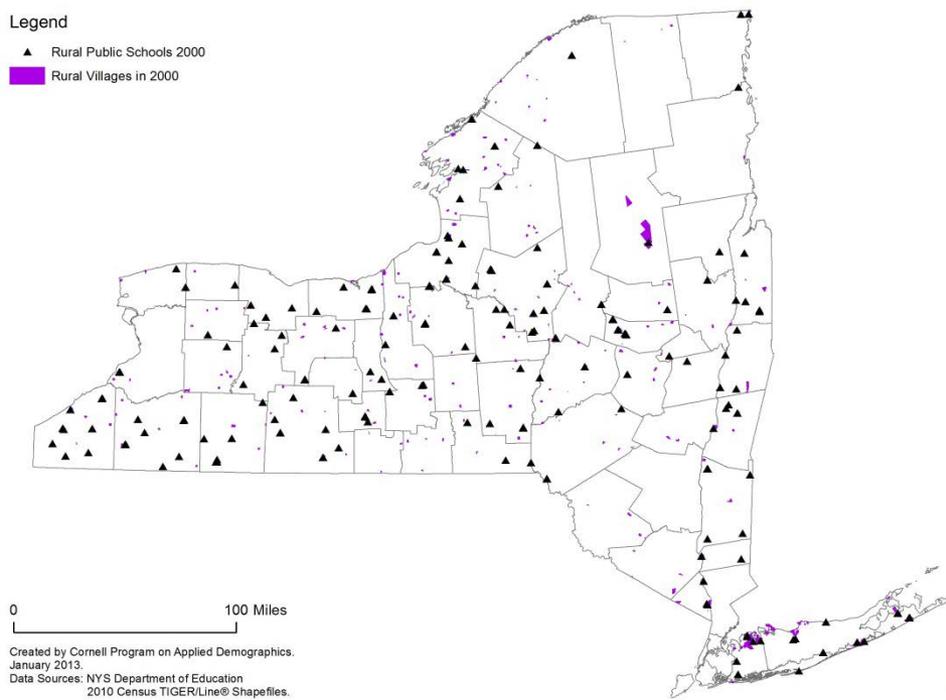

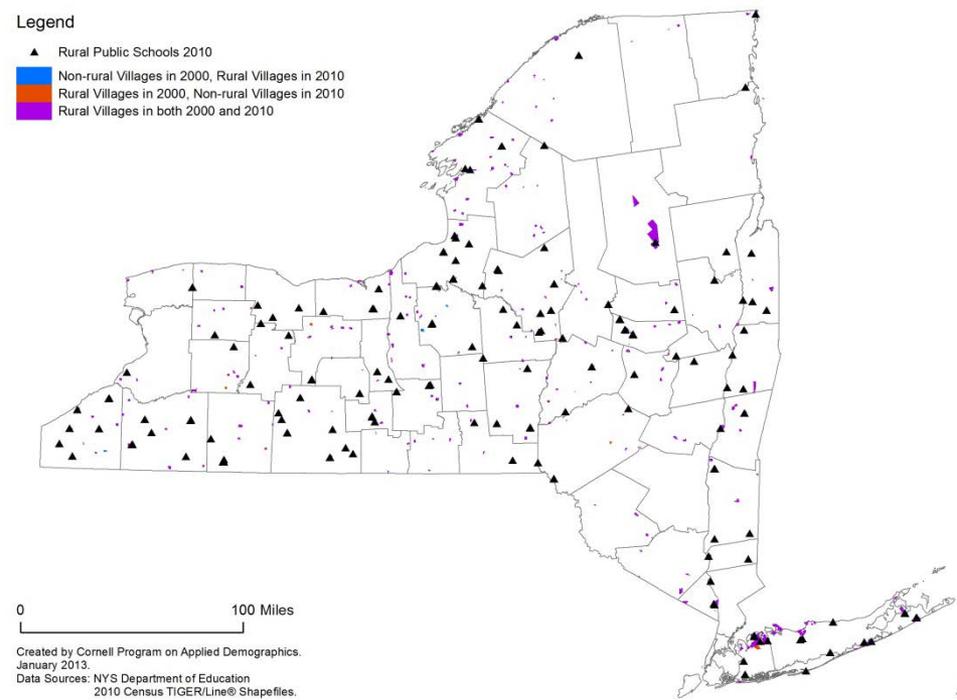PO BOX 225, East Berne, NY 12059   933 County Road 401, Westerlo, NY 12193

Locations of Rural Schools

Rural Schools in 2000

Rural Schools in 2010

Lyson's Findings

	Village Population					
	500 or under			501 to 2,500		
	School	No School	Difference (school-no school)	School	No School	Difference (school-no school)
Number of Village	36	28		192	41	
Population Characteristics						
Age structure						
under 18 (%)	28.7	29.1	-0.4	27.9	27.8	0.1
18-39 (%)	30.4	30.9	-0.5	30.7	31.4	-0.7
40-64 (%)	26.0	26.5	-0.5	25.6	25.9	-0.3
65 yr and over (%)	14.9	13.4	1.5	15.8	14.9	0.9
HH with children (%)	35.8	37.7	-1.9	34.7	35.0	-0.3
Children ages 3-17 enrolled in school (%)	83.8	82.9	0.9	84.1	83.6	0.5
Children ages 3-17 enrolled in priv. school (%)	3.9	4.1	-0.2	5.1	5.2	-0.1
White Population (%)	99.1	98.7	0.4	98.2	95.7	2.5
Non-White Population (%)	0.9	1.3	-0.4	1.8	4.3	-2.5
Housing and Municipal Infrastructure Characteristics						
Average house value ($)	59,508	47,782	11,726.0*	62,329	58,832	3,497.0
Median house value ($)	57,450	43,500	13,950.0	58,450	50,400	8,050.0
Houses built within the past 20 years (%)	15.7	13.5	2.2	19.5	20.3	-0.8
Income and Welfare						
Household income ($)	25,992	26,130	-138.0	26,860	26,752	108.0
Per capita income ($)	11,914	11,574	340.0	10,722	12,201	-1,479.0*
Households receiving public assistance (%)	6.3	7.5	-1.2	6.7	7.1	-0.4
Population in poverty (%)	10.6	11.6	-1.0	10.3	10.2	0.1
Children in poverty (%)	13.1	14.5	-1.4	13.4	13.6	-0.2
Occupational and Employment Characteristics						
Professional, managerial, executive workers (%)	38.4	34.0	4.4*	39.7	35.9	3.8*
Households with wage income (%)	73.5	75.9	-2.4	73.5	74.9	-1.4
Per capita income from wage ($)	8,170	7,861	309.0	8,787	8,586	201.0
HHs with income from self-employment (%)	15.4	12.7	2.7*	12.5	12.6	-0.1
Per capita income from self-employment ($)	711	453	258.0*	652	564	88.0
Residents who work in village (%)	23.0	13.8	9.2*	28.2	16.3	11.9*
Workers who commute < 15 min. to jobs (%)	42.4	36.7	5.7*	41.9	41.9	0.0

* p< 0.05 within community size categories

2000 Results

	Village Population					
	500 or under			**501 to 2,500**		
	School	No School	Difference (school-no school)	School	No School	Difference (school-no school)
Number of Village	13	56		125	143	
Population Characteristics						
Age structure						
under 18 (%)	26.0	25.8	0.3	25.6	25.9	-0.3
18-39 (%)	26.7	26.3	0.3	26.6	26.3	0.4
40-64 (%)	33.5	31.6	2.0	31.1	32.3	-1.2*
65 yr and over (%)	13.8	16.4	-2.6*	16.6	15.5	1.1*
HH with children (%)	32.9	32.1	0.8	32.1	33.2	-1.1
Children ages 3-17 enrolled in school (%)	89.8	90.4	-0.6	92.1	92.8	-0.7
Children ages 3-17 enrolled in priv. school (%)	4.0	6.4	-2.3	8.2	10.4	-2.1*
White Population (%)	97.6	96.6	1.0	96.1	95.0	1.1
Non-White Population (%)	2.4	3.4	-1.0	3.9	5.0	-1.1
Housing and Municipal Infrastructure Characteristics						
Average house value ($)	101,015	120,457	-19,441.7	119,136	176,822	-57,685.7*
1990 Value	76,670	91,427	-14,757.0	90,424	134,208	-43,784.0
Median house value ($)	79,300	63,800	15,500.0	72,300	72,800	-500.0
1990 Value	60,189	48,424	11,765.0	54,875	55,255	-380.0
Houses built within the past 20 years (%)	15.1	10.1	5.0*	13.6	13.8	-0.2
Income and Welfare						
Household income ($)	45,230	42,523	2,706.8	42,290	53,536	-11,246.0*
	34,330	32,275	2,055.0	32,098	40,634	-8,536.0
Per capita income ($)	21,659	21,351	308.4	21,555	26,051	-4,495.9*
	16,439	16,205	234.0	16,360	19,773	-3,413.0
Households receiving public assistance (%)	2.6	3.5	-0.9	2.9	2.6	0.3
Population in poverty (%)	8.5	12.3	-3.8*	10.5	9.6	0.9
Children in poverty (%)	11.9	17.6	-5.7*	13.3	13.0	0.3
Occupational and Employment Characteristics						
Professional, managerial, executive workers (%)	29.4	28.4	1.0	32.9	35.7	-2.7*
Households with wage income (%)	75.0	74.5	0.5	72.6	74.4	-1.9*
Per capita income from wage ($)	14,634	13,578	1,055.2	14,744	18,069	-3,325.2*
HHs with income from self-employment (%)	12.9	13.2	-0.4	11.8	13.3	-1.5*
Per capita income from self-employment ($)	1,024	1,657	-632.6	1,305	1,864	-559.2*
Residents who work in village (%)	20.9	16.8	4.1	24.2	18.1	6.0*
Workers who commute < 15 min. to jobs (%)	34.9	32.4	2.5	37.0	32.4	4.5*

2010 Results

| | Village Population | | | | | |
| | 500 or under | | | 501 to 2,500 | | |
	School	No School	Difference (school-no school)	School	No School	Difference (school-no school)
Number of Village	21	54		103	139	
Population Characteristics						
Age structure						
under 18 (%)	24.3	22.8	1.6	23.5	23.1	0.4
18-39 (%)	25.4	25.6	-0.2	25.4	25.8	-0.4
40-64 (%)	35.4	35.4	0.0	34.7	35.1	-0.4
65 yr and over (%)	14.9	16.3	-1.4	16.3	16.0	0.4
HH with children (%)	30.4	28.0	2.4	28.4	28.2	0.3
Children ages 3-17 enrolled in school (%)	92.0	92.4	-0.4	92.1	91.2	0.8
Children ages 3-17 enrolled in priv. school (%)	4.5	4.6	-0.1	9.0	7.2	1.8
White Population (%)	97.8	95.8	2.0*	95.0	94.0	1.0
Non-White Population (%)	2.2	4.2	-2.0*	5.0	6.0	-1.0
Housing and Municipal Infrastructure Characteristics						
Average house value ($)	164,483	126,470	38,012.9	156,597	152,825	3,771.9
1990 Value	98,589	75,805	22,784.0	93,862	91,602	2,260.0
Median house value ($)	98,250	87,600	10,650.0	96,900	99,900	-3,000.0
1990 Value	58,890	52,507	6,383.0	58,081	59,879	-1,798.0
Houses built within the past 20 years (%)	9.6	7.8	1.9	8.2	9.1	-0.9
Income and Welfare						
Household income ($)	50,582	45,690	4,892.5	49,699	51,311	-1,612.3
	30,318	27,386	2,932.0	29,789	30,755	-966.0
Per capita income ($)	26,577	22,595	3,981.8	25,719	25,304	415.2
	15,930	13,543	2,387.0	15,416	15,167	249.0
Households receiving public assistance (%)	1.7	1.9	-0.2	2.1	2.3	-0.1
Population in poverty (%)	14.1	14.0	0.1	11.7	11.4	0.3
Children in poverty (%)	17.5	19.2	-1.7	15.6	14.8	0.8
Occupational and Employment Characteristics						
Professional, managerial, executive workers (%)	30.2	29.7	0.5	34.5	32.7	1.8
Households with wage income (%)	74.7	71.3	3.5	72.5	72.2	0.3
Per capita income from wage ($)			-			-
HHs with income from self-employment (%)	10.2	11.8	-1.6	10.7	11.3	-0.7
Per capita income from self-employment ($)			-			-
Residents who work in village (%)	23.6	14.3	9.3	22.7	19.8	2.9*
Workers who commute < 15 min. to jobs (%)	25.7	22.0	3.7	6.6	8.9	-2.4*

Summary of Regression Findings

	1990 (Lyson's results) Village Population		2000 Village Population		2010 Village Population	
	500 or under	501 to 2,500	500 or under	501 to 2,500	500 or under	501 to 2,500
	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)
Housing and Municipal Infrastructure Characteristics						
Average house value ($)	+*	+*	-	-*	+	+
Income and Welfare						
Household income ($)	-	+	+	-*	+	-
Per capita income ($)	+	-*	-	-*	+	+
Occupational and Employment Characteristics						
Per capita income from self-employment ($)	+*	+	-	-*		
Residents who work in village (%)	+*	+	+	+*	+	+*

Discussions & Conclusions

- Different patterns are observed from data of both 2000 and 2010 compared to Lyson's results (1990 Census)
  - Smallest rural communities with schools have **lower average house values in 2000**, but **higher in 2010**
  - The larger rural communities with school experienced **lower household and per capita income** in 2000
  - **Lower per capita income from self-employment** in communities with school in 2000
- Gaps in average house value are large in 2000 (prior to 2008 economic crisis), but the patterns reverse in 2010, reflecting **stability in house value in communities with schools**
- Further studies include panel analysis (1990-2010) and examination of distance from village center to school.