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RELATIONSHIP BETWEEN SOCIAL CAPITAL AND HEALTH INDICATORS IN MEXICO

Domingo Faustino Hernández Angeles, Diana Manuel Gutiérrez,
Edgar Ramírez Medina y Ricardo Zaragoza Castillo[1]

Summary

This study analyzes the relationship between social capital types and access to health services in Mexico. To this end, access to healthcare data from the 2006 ENCASU and 2011 ENCAS was validated using 2006 and 2012 ENSANU results. Indicators were found to be consistent. A statistical analysis of the distribution of social capital and health indicators by region, as well as by rural or urban area, was performed. Later, the correlation between these indicators was analyzed. A positive and significant relationship was identified between bonding social capital and access to health. With regards to bridging capital, no significant results were obtained, however disaggregation based on associations demonstrated that at least some associations are related to access to health; a point later confirmed through the use of a pseudo-panel data model involving triennial age, gender and indigenous status cohorts.

Keywords: social capital, bonding, bridging, linking, health, age cohorts, pseudo-panel.
Classification: JEL C3, D71, I18

Introduction

Social capital is conceptualized as the ability of individuals or groups to use their family, social and institutional networks to obtain an additional advantage (López-Rodríguez and Soloaga, 2012). In the context of poverty, there is strong evidence regarding the effect social capital has on the ability of individuals to increase their sources of income and employment opportunities, as well as their ability to reduce vulnerability to adverse economic or family situations. In particular, social capital contributes to poverty reduction through agreements and cooperation among individuals in areas of shared interest (ECLAC, 2003 and 2007).

Although producing positive effects, social capital may also generate negative outcomes such as discrimination, exclusion and inequality. This is because social networks among the poor are less able to manage public or private resources than networks among wealthier populations. This is

[1]The authors work in the Department of Analysis and Planning at Mexico's Ministry of Social Development (SEDESOL). The opinions expressed herein are those of the authors and do not necessarily reflect those of said institution. (diana.mgtz@gmail.com; ricardozaragozac@gmail.com; domingofaustos@gmail.com; edgarami007@hotmail.com)

because many of the networks among the poor are closed to outsiders. This translates, among other things, into an intergenerational persistence of inequality (López-Rodríguez and Soloaga, 2012).

In recent years, there have been several empirical studies of the Mexican context. Highlights include evidence of a relationship between social capital and educational achievement (Ortega, 2012), wages (Rodríguez-Oreggia, 2012) and poverty (Sandoval and Lima, 2012). Each of these studies found evidence that social capital has a positive impact on educational achievement, wage levels and poverty alleviation. These results are consistent with the international literature on these topics.

Based on their review of some of these international studies, Sapag and Kawachi (2007) claim that a lack of social capital corresponds to poorer health status and is evidenced by increased morbidity and overall mortality. Consequently, high levels of neighborhood-level social capital are associated with lower overall mortality rates due to heart disease and other causes among white women and men[2]. This relationship was also observed in blacks, but was less consistent. The main hypotheses explaining these results are the following: a) social capital can influence the behavior of members of a community by promoting the dissemination of health information, thereby increasing the likelihood that healthy behaviors are adopted (or unhealthy behavior, in the case of negative social capital); b) by joining said community individuals are better equipped to apply for and access services such as water, sanitation and health services; and c) social capital provides emotional support that promotes self-esteem and mutual respect, thus resulting in better health indicators such as mental health (Sapag and Kawachi, 2007).

Additionally, Tamez et al (2005) argue that social capital is linked to physical structure, social structure and social cohesion. Physical structure (defined as access to housing, housing quality or access to drinking water) influences health via exposure to risks and environments that are conducive to health; social structure (i.e., public spaces, income distribution mechanisms and opportunities for exchange/interaction) facilitates collective problem solving; and social cohesion (measured as social integration) is the result of the degree of fitness between the physical and social structure of a community.

Despite these advances, empirical studies in Mexico on the potential relationship between social capital, health conditions and levels of food security of the population are, at best, scarce. One hypothesis is that the level of social capital influences how people face food insecurity episodes, as well as their ability to access medical services and improve their healthcare.

This article aims to identify the relationship between different types of social capital and the main indicators of health in individuals, by seeking to identify potential ways in which public policy may serve to improve a population's access to healthcare.

The first section of the article reviews the evolution of social capital by geographic region, as well as by rural and urban area. The second compares social capital types, as well as health program affiliation and prevalence of overweight/obesity indicators, at the descriptive statistical level. Finally, a correlation analysis between social capital types

[2] The statistics reported to estimate the relationship between mortality and social capital, measured using different proxies, were as follows: for white women reporting reciprocity $r = -0.72$, $p < 0.0005$, IC 95% and $r = -0.40$, $p < 0.01$; and for those reporting civic participation $r = -0.30$, $p < 0.01$. For white men reporting reciprocity $r = -0.40$, $p < 0.05$, IC 95%, $r = -0.44$, $p < 0.0005$; for those reporting civic participation $r = -0.49$, $p < 0.0005$. All results were obtained after controlling for the neighborhood material deprivation variable.

and access to health care is performed. A positive and statistically-significant relationship was found to exist between bonding social capital and several organizations that comprise bridging capital, on the one hand, and access to health, on the other. These results are confirmed by using a pseudo panel data model constructed using triennial cohorts based on age, gender and indigenous status within the population.

1. Social capital types in Mexico

There are several different types of social capital. Some of the most common types include bonding, bridging and linking capital. López-Rodríguez and Soloaga (2012) assert that *bonding* social capital encompasses the closest relationships such as family, close friends and neighbors; *bridging* social capital includes more distant relationships such as coworkers, distant friends, sports clubs, parents associations; and *linking* social capital is made up of relationships between people who do not share the same hierarchical or authority level but *do* share common interests such as occupation, ideology, a need for and use of public utilities, etc.

The relationship of social capital to health indicators in Mexican society is analyzed based on the aforementioned bonding, bridging and linking types. As such, information from the 2011 National Survey of Social Capital (ENCAS) and the 2006 National Survey of Social Capital in the Urban Environment (ENCASU) is used. Both these surveys were performed by the United Nations Development Program (UNDP-Mexico) in coordination with Mexico's Ministry of Social Development (SEDESOL). The analysis contained in this article focuses on the population aged 18 and above, whereas the benefits of social capital only begin to come into play after this age.

The distribution of the population over 18 years of age according to 2011 ENCAS data is shown in Figure 1[3]. The total population is 72.3 million people, of which 49.8 percent are concentrated in the central region and only 22.3 percent in the south. In the northern region, 83.9 percent of the population lives in urban areas while in the southern region only 60.8 percent of the population lives in this type of area. The distribution of the population of the 2011 ENCAS over 18 years is consistent with the distribution of the same age cohort using data from the 2010 Socioeconomic Conditions Module of the National Household Income and Expenditure Survey (MCS-ENIGH), conducted by the National Institute of Statistics and Geography (INEGI) (Figure 1).

[3] In the analysis of social capital types, the geographical distribution of the population is crucial to explaining the incidence and distribution of said capital. Similarly, in making a brief characterization of the population, it is possible to confirm the consistency of the 2011 ENCAS through the use of other relevant sources, such as the National Household Income and Expenditure Survey (ENIGH) and the National Health and Nutrition Survey (ENSANUT). The unit of analysis is comprised of individuals over the age of 18. The 2011 ENCAS includes the urban-rural data as well as three, major geographic regions: the North includes the states of Baja California, Baja California Sur, Coahuila, Chihuahua, Durango, Nayarit, Nuevo León, San Luis Potosí, Sinaloa, Sonora, Tamaulipas and Zacatecas; the Central region includes Aguascalientes, Colima, Distrito Federal, Guanajuato, Hidalgo, Jalisco, Mexico, Michoacán, Morelos, Puebla, Querétaro, Tlaxcala; and the South includes Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatán.

Figure 1
Distribution of population aged 18 years and above by geographic region and by rural-urban area, 2011
(Millions of inhabitants)

Region	North			Central			South			National		
Area type	Urb	Rur	Total	Urb	Rur	Total	Urb	Rur	Total	Urb	Rur	Total
2011 ENCAS												
Millions (population)	17.0	3.2	20.2	29.5	6.5	36.0	9.8	6.3	16.1	56.2	16.1	72.3
Rural-urban distribution (%)												
By region	83.9	16.1	100.0	81.9	18.1	100.0	60.8	39.2	100.0	77.7	22.3	100.0
National	30.2	20.2	28.0	52.4	40.5	49.8	17.4	39.3	22.3	100.0	100.0	100.0
2010 MCS-ENIGH												
Millions (population)	16.5	3.3	19.8	30.7	6.0	36.7	10.2	6.1	16.3	57.4	15.4	72.8
Rural-urban distribution (%)												
By region	83.4	16.6	100.0	83.7	16.3	100.0	62.4	37.6	100.0	78.8	21.2	100.0
National	28.8	21.4	27.2	53.5	38.8	50.4	17.8	39.8	22.4	100.0	100.0	100.0

Notes: Urb: urban center. Rur: rural area. MCS-ENIGH: Socioeconomic Conditions Module of the ENIGH.
Source: By the authors, using data from the 2011 ENCAS and 2012 MCS-ENIGH.

Although the 2006 ENCASU is only representative of the urban environment, it is only possible to make a comparison of the urban population distribution of individuals over the age of 18 for the years 2006 and 2011 (Figure 2). The population distribution by geographic region is very similar between the 2006 and 2011 surveys. The north reported 28.6% and 30.2%, respectively; the central region included 56.4% and 52.4%; while the southern region ran 14.9% and 17.4% for the respective periods. This is evidence that the urban area comparisons made between the 2006 ENCASU data and 2011 ENCAS data are valid. Furthermore, the congruence of the population's distribution percentages points to the robustness of both samples' ability to capture the distribution of the population in Mexico.

Figure 2
Distribution of population aged 18 years and above by geographic region in urban areas, 2011
(Millions of inhabitants)

Region	2006 Urban ENCASU		2011 Urban ENCAS	
	Millions of inhabitants	Distribution percentage	Millions of inhabitants	Distribution percentage
North	13.2	28.6	17.0	30.2
Central	25.9	56.4	29.5	52.4
South	6.8	14.9	9.8	17.4
National	45.9	100.0	56.2	100.0

Source: Author data, using 2006 ENCASU and 2011 ENCAS data.

Even when some of the questions used to identify social capital in the 2011 ENCAS are worded differently in the 2006 ENCASU, or do not appear at all, it is generally possible to make reasonable comparisons of urban social capital types by employing the data from both surveys. With regards to bonding social capital, the study considered individuals who asked for money

or help finding a job, for child care or help with a sick person, for help filling out a form or legal advice, and help with moving or solving an insecurity problem (see Figure A1.1 in Annex 1). Said assistance may have been requested from neighbors, friends, relatives, *compadres* or work colleagues. Help was received in response to at least one of the requests for same. For example, if a person reported the need for borrowed money or borrowed money and also claimed to have been given the money they needed, then that person has bonding social capital. The same applies to the rest of the questions which applied to bonding capital.

In all three regions (North, Central and South) the number and percentage of people with capital bonding increased; additionally, differences between regions were reduced. One aspect to note is that in 2006 people with lower percentages of bonding were from the southern region, while in 2011, by contrast, they had the highest percentage. The slower growth of this type of capital seen in the northern region may be related to the major problems of insecurity that this region has faced.

In addition to analysis by geographic region, it is possible to compare social capital according age or year of birth. This is done with an eye to identifying generational behaviors. Because this section analyzes the distribution of social capital, the only results presented were birth-year cohorts grouped decennially.[4] By classifying the population by birth cohorts for 2006 and 2011 (Figure 3), it was determined that levels of bonding capital reported among younger people (birth dates 1981-1993) were significantly higher in 2011 than in 2006. These results may be explained by the fact that needs for support and work instability, along with other major effects of the financial crisis, contribute to young people seeking more help via their closest ties. Therefore, one might say that bonding social capital is related to the life cycle; though high during the first years of life, it decreases with age (Glaeser et al, 2002).

Figure 3
Distribution of bonding social capital among individuals aged 18 and over, by birth-year cohort in urban areas, 2006 and 2011
(Thousands of inhabitants)

Cohort	2006 ENCASU			2011 Urban ENCAS		
	Thousands of inhabitants		Percentages	Thousands of inhabitants		Percentages
	Total	Bonding		Total	Bonding	
1909-1920	91	42	46.4	0	0	0.0
1921-1930	798	65	8.1	190	37	19.7
1931-1940	2,325	197	8.5	2,248	281	12.5
1941-1950	4,170	415	9.9	3,998	738	18.5
1951-1960	6,416	1,070	16.7	5,924	1,392	23.5
1961-1970	7,662	1,106	14.4	9,880	2,394	24.2
1971-1980	9,407	1,874	19.9	15,792	5,008	31.7
1981-1993	15,053	2,013	13.4	18,162	5,273	29.0
Total	45,922	6,781	14.8	56,194	15,123	26.9

Source: By the authors, using 2006 ENCASU and 2011 ENCAS data.

[4] Comparisons of social capital were also performed via three-year age cohorts, but the results were not reported due to the wide scope of the tables. Additionally, no substantive differences to decadal age cohorts were identified.

In order to identify bridging social capital, people's involvement in organizations and groups, such as parent associations, religious groups, sports and recreation clubs, self-help groups and political parties were taken into account (see Figure A2.1 in Annex 1 for related survey questions). Therefore, if a person reported belonging to at least one of the groups or organizations mentioned, then said individual was considered to have bridging capital.

Unlike bonding capital, which increased in urban areas throughout all three geographical regions (and especially among the younger population), bridging capital decreased between 2006 and 2011. The largest drop in bridging capital was recorded in the northern region, where it fell 15.5 percentage points. The north was followed by the central region (7.2 percentage points) and the south (6.6 percentage points). Belonging to any religious group or church largely explains the drop; affirmative answers to the religious affiliation question represented a decline of 3.6 million between 2006 and 2011 (see Figure A1.2 in Annex 1); i.e., 45.7% of urban inhabitants with bridging capital as of 2011. Bridging capital is evenly distributed among age cohorts, except for the 18-30 year old cohort where said capital is decidedly weaker.

Figure 4
Distribution of bridging social capital among individuals aged 18 and over, by birth-year cohort in urban areas, 2006 and 2011
(Thousands of inhabitants)

Cohort	2006 ENCASU (URBAN)			2011 URBAN ENCAS		
	Thousands of inhabitants		Percentages	Thousands of inhabitants		Percentages
	Total	Bridging		Total	Bridging	
1909-1920	91	16	17.2	0	0	*
1921-1930	798	117	14.6	190	0	0.0
1931-1940	2,325	622	26.8	2,248	339	15.1
1941-1950	4,170	1183	28.4	3,998	583	14.6
1951-1960	6,416	1705	26.6	5,924	919	15.5
1961-1970	7,662	1899	24.8	9,880	1,540	15.6
1971-1980	9,407	2,237	23.8	15,792	2,372	15.0
1981-1993	15,053	3,000	19.9	18,162	2,203	12.1
Total	45,922	10,779	23.5	56,194	7,957	14.2

Source: By the authors, using 2006 ENCASU and 2011 ENCAS data.

Conceptually, linking social capital refers to relations between people of different hierarchies with common interests. If a person answered yes to having organized neighbors (i.e., request that a politician intervene to resolve a problem), then said individual is considered to possess linking social capital. Given the information available from surveys on social capital, building a more generalized indicator for linking social capital is problematic (see Figure A3.1, Annex 1). Additionally, the battery of questions that would allow one to address this concept is limited by geographical proximity.[5] For example, relations between coworkers fall outside the survey's purview.

[5] Although the battery of questions does limit the conceptual approximation of linking capital, in the case of Mexico there is no way to add further data which would bolster the measurement of this type of social capital. It should also be noted that we decided to include an analysis of linking social capital because there is congruence between the battery of questions used in 2006 and 2011, which ensures comparability of results (see Figure A1.3, Annex 1).

A greater concentration of linking capital occurred in the southern region. However, a significant drop in linking capital occurred throughout every region: 4.5 percentage points in urban areas as a whole. This would imply an erosion of relations between people who share the same interests (i.e., occupation, ideology, the need for and access to public utilities), but not the same hierarchical level.

One noteworthy point is that, in 2011, the average percentage of people in rural areas with bonding social capital dropped below the national average for all the geographical regions. Among regions, the proportion of people with bonding capital is significantly lower in the northern region. The distribution of urban, versus rural, bonding capital is very similar. Distribution of bonding capital by age cohort, in both rural and urban settings, decreases with age (although it begins to increase among individuals aged 81 to 90). Rural bonding social capital only outpaces urban areas in three cohorts: individuals aged 41 to 70.

Figure 5
Bonding social capital among individuals aged 18 and over, by birth-year cohort in urban areas and by rural-urban context, 2011
(Thousands of inhabitants)

Cohort	National			Urban			Rural		
	Individuals	Bonding	Percentage	Individuals	Bonding	Percentage	Individuals	Bonding	Percentage
1909-1920	12	8	62.1	0	0	0	12	8	66.7
1921-1930	207	39	19.0	190	37	19.7	17	2	11.8
1931-1940	2,616	322	12.3	2,248	281	12.5	368	41	11.1
1941-1950	4,975	927	18.6	3,998	738	18.5	977	189	19.3
1951-1960	7,589	1,792	23.6	5,924	1,392	23.5	1,665	400	24.0
1961-1970	12,722	3,205	25.2	9,880	2,394	24.2	2,842	811	28.5
1971-1980	20,128	6,201	30.8	15,792	5,008	31.7	4,336	1,193	27.5
1981-1993	24,036	6,907	28.7	18,162	5,273	29.0	5,874	1,634	27.8
Total	72,286	19,401	26.8	56,194	15,123	26.9	16,092	4,278	26.6

Source: By the authors, using 2011 ENCAS data.

In 2011, the percentage of people with bridging social capital was significantly higher in the south as compared to the central and northern regions. Moreover, it appears that the lifecycle does not have much to do with the distribution of this type of social capital in urban areas; the opposite is true of rural areas.

Figure 6
Bridging social capital among individuals aged 18 and over, by birth-year cohort in urban areas and by rural-urban context, 2011
(Thousands of inhabitants)

Cohort	National			Urban			Rural		
	Individuals	Bridging	Percentage	Individuals	Bridging	Percentage	Individuals	Bridging	Percentage
1909-1920	12		0.0				12	0	0.0
1921-1930	207	2	0.9	190	0	0.0	17	2	10.9
1931-1940	2,616	427	16.3	2,248	339	15.1	368	88	23.8
1941-1950	4,975	724	14.6	3,998	583	14.6	976	141	14.5
1951-1960	7,589	1,285	16.9	5,924	919	15.5	1,665	367	22.0
1961-1970	12,722	2,074	16.3	9,880	1,540	15.6	2,842	534	18.8
1971-1980	20,128	2,995	14.9	15,792	2,372	15.0	4,336	623	14.4
1981-1993	24,036	3,008	12.5	18,162	2,203	12.1	5,875	805	13.7
Total	72,286	10,516	14.5	56,194	7,957	14.2	16,091	2,560	15.9

Source: By the authors, using 2011 ENCAS data.

2. Social capital and health indicators

The initial phase of the analysis to identify potential relationships between social capital and health indicators and food security involves a descriptive statistics comparison by geographic region and rural-urban setting. The first approximation of the relationship between social capital and health indicators involves the following comparison: social capital levels in the geographical regions (i.e., those used in 2011 ENCAS and 2006 ENCASU) are compared with the leading health indicators for the same regions, which, in turn, are compared with 2012 and 2006 ENSANUT data. In the latter comparison, geographic regions are different from social capital, but since the ENSANUT is conducted state-by-state, it is possible to construct ENCAS regions.

Because the sampling units of social capital surveys involve people over 18, ENSANUT indicators are only available for this age group. Enrollment in a healthcare program between 2006 ENSANUT and 2006 ENCASU, by cohort population, shows similar percentages for urban areas (except for cohort 1909-1920); thereby confirming the comparability between surveys to identify the relationship between social capital and healthcare service affiliation (see Figure 7).

Figure 7
Healthcare enrollment among individuals aged 18 and over, by birth-year cohort, 2006
(Thousands of inhabitants)

Age cohort	2006 National ENSANUT			2006 Urban ENSANUT			2006 Urban ENCASU		
	Thousands of people		Percentage	Thousands of people		Percentage	Thousands of people		Percentage
	National	Members		National	Members		National	Members	
1909-1920	181	83	46.2	136	73	53.8	91	76	83.9
1921-1930	1,046	559	53.4	805	482	59.8	798	451	56.6
1931-1940	2,946	1,745	59.2	2,269	1,462	64.4	2,325	1,245	53.5
1941-1950	5,121	3,137	61.3	4,001	2,667	66.7	4,170	2,798	67.1
1951-1960	7,620	4,156	54.5	6,099	3,545	58.1	6,416	3,833	59.7
1961-1970	11,341	5,967	52.6	9,033	4,974	55.1	7,662	3,922	51.2
1971-1980	14,303	6,952	48.6	11,296	5,719	50.6	9,407	4,627	49.2
1981-1993	21,288	8,600	40.4	17,011	7,252	42.6	15,053	6,729	44.7
Total	63,846	31,200	48.9	50,650	26,175	51.7	45,922	23,682	51.6

Source: By the authors, using 2006 ENSANUT and 2006 ENCASU data.

Figure 8
Healthcare enrollment among individuals aged 18 and over, by birth-year, national, 2011-2012
(Thousands of inhabitants)

Age cohort	2012 National ENSANUT			2011 National ENCAS		
	Population		Percentage	Population		Percentage
	National	Enrolled		National	Enrolled	
1909-1920	152	91	59.8	12	**	**
1921-1930	1,076	872	81.0	207	195	94.3
1931-1940	3,252	2,795	85.9	2,616	2,142	81.9
1941-1950	5,766	4,914	85.2	4,975	4,088	82.2
1951-1960	9,934	8,038	80.9	7,589	5,953	78.4
1961-1970	13,220	10,210	77.2	12,722	9,855	77.5
1971-1980	16,031	12,267	76.5	20,128	15,617	77.6
1981-1993	25,308	17,150	67.8	24,036	16,907	70.3
Total	74,739	56,338	75.4	72,286	54,769	75.8

Source: By the authors, using 2012 ENSANUT and 2011 ENCAS data.

Figure 9.
Bonding social capital among individuals aged 18 and over, by birth-year cohort and relevant health indicators, national, 2011 and 2012

Cohort	2011 ENCAS bonding social capital (percentages)			2012 ENSANUT enrolled in healthcare (percentages)			2012 ENSANUT overweight and obese (percentages)		
	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural
1909-1920	62.1	0	66.7	59.8	55.8	72.5	22.3	23.3	19.4
1921-1930	19.0	19.7	11.8	81.0	81.8	78.3	48.7	51.5	39.0
1931-1940	12.3	12.5	11.1	85.9	87.8	79.9	64.6	68.2	53.2
1941-1950	18.6	18.5	19.3	85.2	86.1	82.5	73.6	75.7	66.5
1951-1960	23.6	23.5	24.0	80.9	80.3	83.5	77.4	79.2	70.3
1961-1970	25.2	24.2	28.5	77.2	75.4	84.4	77.8	78.4	75.3
1971-1980	30.8	31.7	27.5	76.5	75.0	82.0	71.1	71.8	68.5
1981-1993	28.7	29.0	27.8	67.8	67.1	69.0	47.9	50.8	42.0
Total	26.8	26.9	26.6	75.4	75.0	76.6	64.7	67.5	56.6

Source: By the authors, using 2011 ENCAS and 2012 ENSANUT data.

Bridging social capital at the national level is higher in the cohort born during the period 1951-1960 (16.9%), who were 51 to 60 years old as of 2011. In urban areas, the 1961-1970 cohort (41-50 years old as of 2011) had the highest percentage of bridging capital (15.6%). While in rural areas the 1931-1940 cohort (71-80 years old as of 2011) was highest at 23.8%.

Enrollment in healthcare, on the other hand, was highest among the 1931-1940 cohort at the national level, as well as in urban areas, at 85.9% and 87.8% respectively. The fact that the 1931-1940 cohort leads all others in social capital in rural areas (23.8%), as well as in healthcare enrollment in the national (85.9%) and urban (87.8%) context is noteworthy.

Figure 10.
Bridging social capital among individuals aged 18 and over, by birth-year cohort and relevant health indicators, national, 2011 and 2012

Cohort	2011 ENCAS bridging social capital (percentages)			2012 ENSANUT enrolled in healthcare (percentages)			2012 ENSANUT overweight and obese (percentages)		
	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural
1909-1920	0.0	0.0	0.0	59.8	55.8	72.5	22.3	23.3	19.4
1921-1930	0.9	0.0	10.9	81.0	81.8	78.3	48.7	51.5	39.0
1931-1940	16.3	15.1	23.8	85.9	87.8	79.9	64.6	68.2	53.2
1941-1950	14.6	14.6	14.5	85.2	86.1	82.5	73.6	75.7	66.5
1951-1960	16.9	15.5	22.0	80.9	80.3	83.5	77.4	79.2	70.3
1961-1970	16.3	15.6	18.8	77.2	75.4	84.4	77.8	78.4	75.3
1971-1980	14.9	15.0	14.4	76.5	75.0	82.0	71.1	71.8	68.5
1981-1993	12.5	12.1	13.7	67.8	67.1	69.0	47.9	50.8	42.0
Total	14.5	14.2	15.9	75.4	75.0	76.6	64.7	67.5	56.6

Source: By the authors, using 2011 ENCAS and 2012 ENSANUT data.

According to the 2012 ENSANUT, the 1931-1940 cohort has the highest national percentage of enrollment in healthcare services (85.9%), followed by the 1931-1940 cohort in urban areas (87.8%)and 1961 -1970 in rural areas (84.4%).

Figure 11.
Healthcare enrollment among individuals aged 18 and over, by birth-year cohort and by urban-rural context, 2012 (Thousands of inhabitants)

Enrollment	National			Urban			Rural		
Cohort	Total	Healthcare (enrolled)	%	Total	Healthcare (enrolled)	%	Total	Healthcare (enrolled)	%
1909-1920	152	91	59.8	116	65	55.8	36	26	72.5
1921-1930	1,076	872	81.0	831	680	81.8	245	192	78.3
1931-1940	3,252	2,795	85.9	2,484	2,182	87.8	768	613	79.9
1941-1950	5,766	4,914	85.2	4,423	3,807	86.1	1,343	1,108	82.5
1951-1960	9,934	8,038	80.9	7,975	6,403	80.3	1,959	1,636	83.5
1961-1970	13,220	10,210	77.2	10,561	7,966	75.4	2,659	2,244	84.4
1971-1980	16,031	12,267	76.5	12,508	9,379	75.0	3,523	2,888	82.0
1981-1993	25,308	17,150	67.8	16,800	11,275	67.1	8,507	5,875	69.0
Total	74,739	56,338	75.4	55,698	41,755	75.0	19,041	14,582	76.6

Source: By the authors, using 2012 ENSANUT data.

The prevalence of overweight and obesity is highest among the 1961-1970 cohort in both national (77.8%) and rural (75.3%) contexts. In urban areas, the 1951-1960 cohort had the highest percentage (79.2%). The fact that the 1909-1920 cohort has the lowest levels of obesity and overweight levels at the national (22.3%), urban (23.3%) and rural (19.4%) levels is extremely interesting.

Figure 12.
Overweight and obesity among individuals aged 18 and over, by birth-year cohort and by urban-rural context, 2012 (Thousands of inhabitants)

	National			Urban			Rural		
Cohort	Total	Overweight and obesity	Percentage	Total	Overweight and obesity	Percentage	Total	Overweight and obesity	Percentage
1909-1920	152	34	22.3	116	27	23.3	36	7	19.4
1921-1930	1,076	524	48.7	831	428	51.5	245	96	39.0
1931-1940	3,252	2,101	64.6	2,484	1,693	68.2	768	408	53.2
1941-1950	5,766	4,243	73.6	4,423	3,350	75.7	1,343	893	66.5
1951-1960	9,934	7,693	77.4	7,975	6,316	79.2	1,959	1,377	70.3
1961-1970	13,220	10,280	77.8	10,561	8,276	78.4	2,659	2,003	75.3
1971-1980	16,031	11,400	71.1	12,508	8,986	71.8	3,523	2,414	68.5
1981-1993	25,308	12,112	47.9	16,800	8,537	50.8	8,507	3,575	42.0
Total	74,739	48,387	64.7	55,698	37,614	67.5	19,041	10,773	56.6

Source: By the authors, using 2012 ENSANUT data.

3. Correlation analysis of social capital types and enrollment in healthcare

A correlation analysis can ascertain the existence of a relationship between two variables. Although it does allow causal inferences to be made, this type of analysis does provide a preliminary indication of the type of results that might be obtained via econometric modeling. It is in this context that correlations between social capital and healthcare are presented below.

Unlike the previous section, three-year age cohorts are used because they add significance to the results[6]. Because unfavorable gender gaps are ordinarily identified for women in Mexico, the gender variable was also used to construct the cohorts. Correlations were performed using levels (number of individuals) and percentages per cohort for each variable. As can be seen in Figure 13, a significant correlation between healthcare enrollment and bonding social capital type was identified for 2006 and 2012. However, the signs change when using levels and percentages. Therefore models in Section 5 were used to determine whether the relationship was positive or negative.

Figure 13.
Correlation between social capital types and enrollment in healthcare services by area and region, 2006-2012

	2006 Encasu - Ensanut		2011 Encas – 2012 Ensanut					
	URBAN		CONTEXT				NATIONAL	
			URBAN		RURAL			
	Corr.	Signif.	Corr.	Signif.	Corr.	Signif.	Corr.	Signif.
BONDING – ENROLLMENT								
Levels	0.85	0.0000*	0.94	0.0000*	0.95	0.0000*	0.96	0.0000*
Percentages	-0.35	0.0094*	-0.34	0.0212*	0.02	0.8887	-0.38	0.0065*
BRIDGING - ENROLLMENT								
Levels	0.85	0.0000*	0.87	0.0000*	0.89	0.0000*	0.93	0.0000*
Percentages	0.01	0.9360	0.02	0.8937	0.24	0.1078	0.12	0.4116
LINKING – ENROLLMENT								
Levels	0.79	0.0000*	0.82	0.0000*	0.93	0.0000*	0.90	0.0000*
Percentages	-0.08	0.5654	-0.06	0.7086	0.08	0.6097	-0.01	0.9467

Note: "Corr" indicates the result of the correlation. "Signif." indicates critical level for determining whether the result is significant or not. Three-year age and gender cohorts.

* Significant at 95%.

Correlations between social capital types and healthcare program type, as well as non-enrollment, were also estimated. With these results, the correlation between bonding capital and enrollment grew stronger. Non-enrollment had the same effect, therefore more information is needed in order to incorporate control variables into the models of the next section.

[6] In the previous sections no significant differences were observed in the data reported by the three- or ten-year cohorts. However, it is relevant to report the results for three-year cohort in Section 3 and Section 4 because they add significance, even as they provide consistency, to the analysis. Additionally, the number of observations per cohort did not indicate any problems with sample size.

Figure 14.
Correlation between social capital types and healthcare program by area and region, 2006-2012

	2006 Encasu - Ensanut (Urban)		2011 Encas – 2012 Ensanut (National)	
	Corr.	Signif.	Corr.	Signif.
BONDING **– SEGURO POPULAR**				
Levels	0.86	0.0000*	0.95	0.0000*
Percentages	0.28	0.0442*	0.25	0.0803*
BRIDGING **– SEGURO POPULAR**				
Levels	0.81	0.0000*	0.92	0.0000*
Percentages	-0.05	0.6973	0.14	0.3418
LINKING **– SEGURO POPULAR**				
Levels	0.81	0.0000*	0.91	0.0000*
Percentages	0.17	0.2353	0.20	0.1559
BONDING **– OTHER HEALTH PROGRAM**				
Levels	0.84	0.0000*	0.93	0.0000*
Percentages	-0.38	0.0053*	-0.47	0.0006*
BRIDGING **– OTHER HEALTH PROGRAM**				
Levels	0.85	0.0000*	0.91	0.0000*
Percentages	0.03	0.8231	0.06	0.7041
LINKING **– OTHER HEALTH PROGRAM**				
Levels	0.78	0.0000*	0.88	0.0000*
Percentages	-0.10	0.4606	-0.07	0.6271
BONDING **– UNENROLLED**				
Levels	0.83	0.0000*	0.92	0.0000*
Percentages	0.36	0.0073*	0.39	0.0047*
BRIDGING **– UNENROLLED**				
Levels	0.85	0.0000*	0.88	0.0000*
Percentages	-0.01	0.9178	-0.13	0.3673
LINKING **– UNENROLLED**				
Levels	0.79	0.0000*	0.87	0.0000*
Percentages	0.08	0.5631	0.01	0.9419

Note: "Corr" indicates the result of the correlation. "Signif." indicates critical level for determining whether the result is significant or not. Three-year age and gender cohorts.

* Significant at 90%.

An analysis of each of the questions used to construct bridging social capital (membership in associations) produced a significant relationship, for both years, between affiliation and belonging to an organization of parents and sports club. In the case of *Seguro Popular* enrollment, an increase in the number of associations with which a relationship is identified was observed between 2006 and 2012. In 2006, membership a parent association was the only organization that had a positive and significant relationship with *Seguro Popular* enrollment; while in 2012,

the number of organizations expanded to include: unions, sports clubs, political parties and other organizations. This may be the result of the wide diffusion of Seguro Popular during the analysis period, which resulted in an increased amount of organizations having information that could be transmitted through their networks.

4. Correlating social capital types and enrollment in healthcare program through the use of pseudo panels

Panel models have significant benefits over other conventional models. For example, they can capture the unobservable heterogeneity of the variables of interest and allow for more degrees of freedom due to the simultaneous use of cross-sectional and time-series analysis (Wooldridge, 2002).

Since panel models require information gleaned from the same individual over time, data availability is scarce. In large part, this is due to the high costs involved. Additionally, panel databases suffer from attrition due to the loss of the individuals being observed, whether as a result, inter alia, of death or emigration. In the absence of a panel database, a pseudo-panel is a viable alternative.

Pseudo panels are constructed using cross-sectional data to create observation units with similar characteristics over time. As such, invariant characteristics such as year of birth, gender and indigenous status are mainly used. Pseudo panel data can help identify relationships between cohort variables corresponding to behavior or characteristics of individuals in the cohort by using the average of the cohort rather than the values of each observation (Deaton, 1985).

Using a pseudo panel also permits researchers to minimize the loss or attrition so typical of panel data. When constructing pseudo panels using cross-sectional surveys, data is gathered through the use of new samples designed to maintain representativeness. Additionally, the pseudo panel technique recognizes measurement error from the outset and explicitly controls for said error (Deaton, 1985). Observations measured with a systematic error can be removed from the data to avoid biased results. However, a high degree of interpretability should be employed to counteract the potential bias associated with the nonrandom elimination of a group of individuals (Russell and Fraas, 2005). This is especially problematic when using nationally-representative surveys in which sample groups of highly differentiated individuals are used. For example, when using a survey designed to capture the political behavior of Mexicans for a pseudo panel one must take into account possible biases arising from observations made in towns or communities governed by use or custom.

Recent studies on pseudo panel consistent estimates and their application to issues related to well-being include Antman and McKenzie (2005), Hill et al. (2007) and Casanova (2008). In regards to other issues, we found literature on the establishment and use of artificial or pseudo panels, including Bourguignon et al. (2004), Russell and Fraas (2005), Bernard et al. (2010), Peterman (2011), Sahagún (2011), and Mora and Muro (2012). The general representation of a pseudo-panel model is presented in Equation 5.1.

$$y_t = \beta_0 + \boldsymbol{X}_t\boldsymbol{\beta} + c + u_t \qquad (5.1)$$

Where $\boldsymbol{X}=(x_1, x_2, \cdots, x_k)$ represents the set of observable variables in the observation unit

(cohort) that does not change over time $X_t\beta = \beta_1 x_{t1} + \cdots + \beta_k x_{tK}$, and where x_{tj} is a variable with an observation unit j in time t, and $\mathbf{E}(u_t|\boldsymbol{x}_t, c) = 0$ and c is an unobservable variable in t = 1, 2,... T. When a constant unobservable variable exists over time, it is known as an unobserved effect. When t represents different time periods for the same individual, the unobserved effect is frequently interpreted as being implicit features of the observation unit. For a random cross-sectional observation i, the basic unobserved effects model is represented by:

$$y_{it} = \boldsymbol{x}_{it}\boldsymbol{\beta} + c_i + u_{it} \qquad (5.2)$$

Where x_{it} is a matrix wherein 1 x k may contain changing observable variables in t though they are fixed at i; changing variables in i and not in t and changing variables in t and i. If individuals i are indexed, then ci is termed an individual effect or is referred to as the individual heterogeneity of observation units (cohort). Meanwhile, u_{it} is known as the idiosyncratic error term or idiosyncratic disturbance, as modified through t and i. The statistical assumptions regarding c are definitive for choosing the most appropriate estimate method, particularly when ci must be considered as a random or a fixed effect. In general terms, random effects translate into a zero correlation between the observable explanatory variables and the unobserved effect:

$$\text{Cov}\,(x_{it}, c_i) = 0 \qquad (5.3)$$

As such, fixed effects do not mean that ci has random properties; rather they indicate a relationship between the unobserved effect and the observable explanatory variables. The pseudo panel time-invariant units of observation are made up of triennial cohorts consisting of individuals according to birth year, sex and indigenous status. Considering the two reference periods (2006 and 2011), a pseudo panel was constructed that employed 187 units of observation. The pseudo panel study representation is represented by Equation 5.4:

$$y_t = \beta_0 + \boldsymbol{X}_t\boldsymbol{\beta} + c + u_t \qquad (5.4)$$

Where $\boldsymbol{Y}_t$ represents enrollment variables (whether total or disaggregated by institution: IMSS, Seguro Popular, ISSSTE, etc.), as well as non-enrollment, in a health program. $\boldsymbol{X}=(x_1, x_2, \cdots, x_k)$ represents the set of observable pseudo-panel variables, which are classified into those related to social capital types and those which are representative of socioeconomic status.

$\boldsymbol{X}_t\boldsymbol{\beta} = \beta_1 x_{t1} + \cdots + \beta_k x_{tK}$, where x_{tj} indicates the variable at time t with $\mathbf{E}(u_t|x_t, c) = 0$ and c = unobservable variables associated with cohorts, such as differences in culture and eating habits among younger population cohorts as opposed to older ones in which t = 1, as well as 2, according to information corresponding to the 2006 ENCASU and 2011 ENCAS, respectively.

Figure 15 presents the variables used in the different models and which are grouped according to their particular use. All variables appearing in the 2006 ENCASU and 2011 ENCAS, with the exception of those for bonding and bridging social capital, employ nearly the same wording and coding for said years.

Figure 15.
Variables used in models

Social capital variables

- Bonding social capital (cap_bond)
- Bridging social capital (cap_brid), comprised of membership in the following organizations:
  - Do not belong to any organization.
  - Belong to neighborhood organization (org_vecinos)
  - Belong to parent organization (org_padres)
  - Belong to union organization (org_sindicato)
  - Belong to religious organization (org_religion)
  - Belong to recreational club (org_club)
  - Belong to aid organization (org_ayuda)
  - Belong to political organization (org_partido)

Socioeconomic status variables

- Cellular phone (cs_cel)
- Conventioanl phone (cs_tel)
- Refigerator (cs_refri)
- Gas heater (cs_estufa)
- TV (cs_tv)
- VCR (cs_vcaset)
- Washing machine (cs_lavadora)
- Own automobile (cs_carro)
- Cook, sleep in same room (cs_cocina)
- Dirt floor (cs_ptierra)
- Water on land holding (cs_aguat)
- Water in dwelling (cs_aguav)
- Bathroom (cs_bano)
- Bathroom with water (cs_banoagua)

Healthcare enrollment variables

- Access to healthcare (sal_ks)
  - Access to IMSS healthcare (sal_imss)
  - Access to ISSSTE healthcare (sal_isste)
  - Access to PEMEX healthcare (sal_pemex)
  - Access to Seguro Popular healthcare (sal_segpop)
  - Access to state ISSSTE healthcare (sal_iestatal)
  - Access to private healthcare privado (sal_privado)
  - No access to healthcare (sal_notiene)

Cohort construction variables

- Age
- Sex
- Indigenous status

The results of the model estimates are described below. The first estimate reviewed the relationship between bridging and bonding social capital has with healthcare enrollment (controlling for individuals' socioeconomic variables). This particular pseudo panel includes 185 observations. Only significant socioeconomic variables where used in the final estimate. The Hausman test[7] was then used to identify the best pseudo-panel data model (fixed or random effects) for each regression. The first and second models explored the relationship between bonding and bridging vis-à-vis enrollment and non-enrollment in healthcare (Figure 16 and Figure 17) considering fixed and random effects, respectively (Annex 2 includes Hausman tests used to determine which type of regression model was appropriate).

[7] The Hausman test, based on an X2 test, considers two hypotheses: Ho = the explanatory variables do not correlate with the error term. Therefore the random effects model is best equipped to explain the relationship between the dependent and explanatory variables under the assumption of efficient and consistent estimators. Ha = the explanatory variables correlate with the error term, and therefore, the model that best-suited to determining the relationship between the dependent and explanatory variables is the fixed effect, preserving only the property of consistency (Wooldridge, 2002).

Figure 16
Enrollment in healthcare, random effects

Random-effects GLS regression — Number of obs = 185
Group variable: coh_t — Number of groups = 26

R-sq: within = 0.9818 — Obs per group: min = 1
between = 0.9889 — avg = 7.1
overall = 0.9829 — max = 9

Wald chi2(7) = 6028.46
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

(Std. Err. adjusted for 26 clusters in coh_t)

sal_ks	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
cap_bondi	.491666	.1638532	3.00	0.003	.1705197	.8128123
cap_bridg	.1839313	.1487695	1.24	0.216	-.1076515	.4755142
cs_aguav	.6771885	.2342038	2.89	0.004	.2181575	1.13622
cs_bano	-.2198473	.1616492	-1.36	0.175	-.535874	.0977793
cs_banoagua	.6216134	.1611061	3.86	0.000	.3058513	.9373756
cs_cel	-.2877775	.0944327	-3.05	0.002	-.4728622	-.1026928
cs_tel	-.3465446	.1007567	-3.44	0.001	-.544024	-.1490652
_cons	1.304448	.2311349	5.64	0.000	.8514322	1.757464
sigma_u	0					
sigma_e	3.0178913					
rho	0	(fraction of variance due to u_i)				

Figure 17
Non-enrollment in healthcare, fixed effects

Fixed-effects (within) regression — Number of obs = 185
Group variable: coh_t — Number of groups = 26

R-sq: within = 0.9034 — Obs per group: min = 1
between = 0.9547 — avg = 7.1
overall = 0.9178 — max = 9

F(7,152) = 203.04
corr(u_i, Xb) = 0.1421 — Prob > F = 0.0000

sal_notiene	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
cap_bondi	-.5529829	.110318	-5.01	0.000	-.7709375	-.3350283
cap_bridg	-.0197848	.1273187	-0.16	0.877	-.2713275	.231758
cs_aguav	-.5629952	.183544	-3.07	0.003	-.9256221	-.2003684
cs_bano	1.321886	.1432472	9.23	0.000	1.038874	1.604899
cs_banoagua	-.7999901	.142211	-5.63	0.000	-1.080955	-.5190246
cs_cel	.1930524	.0885422	2.18	0.031	.0181201	.3679848
cs_tel	.3783682	.0802449	4.72	0.000	.2198289	.5369075
_cons	-.9255423	.3788798	-2.44	0.016	-1.674093	-.1769919
sigma_u	1.4171429					
sigma_e	3.2934936					
rho	.15622188	(fraction of variance due to u_i)				

F test that all u_i=0: F(25, 152) = 1.11 — Prob > F = 0.3418

One noteworthy aspect is that only the bonding capital remains significant. It becomes even more relevant in light of the fact that it remains significant even socioeconomic variables are excluded. (Figure A2.1 in Annex 2). When estimating the relationship between social capital types with "no access to health care", estimated as non-enrollment in healthcare services, bonding social capital remains significant but is now the only variable with a negative value. This result is consistent with the positive relation bonding social capital has with access to healthcare. By relating the types of social capital to enrollment in *Seguro Popular*, bonding social capital remains significant and positive; additionally, bridging social capital appears significant, though negative (Figure 18 and 19).

Figure 18 and 19.
Seguro Popular enrollment, fixed and random effects

```
Fixed-effects (within) regression               Number of obs      =       185
Group variable: coh_t                           Number of groups   =        26

R-sq:  within  = 0.9205                         Obs per group: min =         1
       between = 0.9457                                        avg =       7.1
       overall = 0.9234                                        max =         9

                                                F(6,153)           =    295.29
corr(u_i, Xb)  = -0.0358                        Prob > F           =    0.0000
```

sal_segpop	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
cap_bondi	.5518132	.0868608	6.35	0.000	.3802118	.7234146
cap_bridg	-.2990988	.0863349	-3.46	0.001	-.4696613	-.1285363
cs_aguav	.6332752	.06919	9.15	0.000	.4965841	.7699664
cs_cel	-.2211031	.0729885	-3.03	0.003	-.3652985	-.0769078
cs_tel	-.4079399	.0656735	-6.21	0.000	-.5376839	-.2781959
cs_carro	-.1759385	.0737381	-2.39	0.018	-.3216148	-.0302622
_cons	.5250172	.2697443	1.95	0.053	-.0078871	1.057921
sigma_u	.92821735					
sigma_e	2.6030764					
rho	.11280875	(fraction of variance due to u_i)				

F test that all u_i=0: F(25, 153) = 0.94 Prob > F = 0.5569

In estimating participation in neighborhood organizations and parent groups with access to healthcare, participation in both types of groups was significant and positive (Figure 20) [8].

[8] Complete estimates for all types of associations and socioeconomic status control variables are presented in Annex 2.

Figure 20.
Enrollment in healthcare and participation in organizations, fixed effects

```
Fixed-effects (within) regression               Number of obs      =       187
Group variable: coh_t                           Number of groups   =        28

R-sq:  within  = 0.9798                         Obs per group: min =         1
       between = 0.9891                                        avg =       6.7
       overall = 0.9810                                        max =         8

                                                F(5,154)           =   1490.54
corr(u_i, Xb)  = 0.0266                         Prob > F           =    0.0000
```

sal_ks	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
org_vecinos	1.293192	.450445	2.87	0.005	.4033432	2.183041
org_padres	1.390773	.3281089	4.24	0.000	.7425977	2.038948
cs_tv	-.5165218	.0784754	-6.58	0.000	-.6715491	-.3614945
cs_ptierra	.3951543	.1885337	2.10	0.038	.0227082	.7676005
cs_aguav	1.346788	.0889283	15.14	0.000	1.171131	1.522445
_cons	1.493887	.3708135	4.03	0.000	.7613491	2.226425
sigma_u	1.2749187					
sigma_e	3.141562					
rho	.14178529	(fraction of variance due to u_i)				

F test that all u_i=0: F(27, 154) = 1.01 Prob > F = 0.4543

This is consistent if one notes that the significance of participation in both organizations has a negative value with regards to a lack of access to health services, as estimated by the non-enrollment in health services (see Figure 21).

Figure 21.
Non-enrollment in healthcare and participation in organizations, fixed effects

```
Fixed-effects (within) regression               Number of obs      =       187
Group variable: coh_t                           Number of groups   =        28

R-sq:  within  = 0.9087                         Obs per group: min =         1
       between = 0.9601                                        avg =       6.7
       overall = 0.9192                                        max =         8

                                                F(5,154)           =    306.72
corr(u_i, Xb)  = -0.1120                        Prob > F           =    0.0000
```

sal_notiene	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
org_vecinos	-1.547963	.4516977	-3.43	0.001	-2.440286	-.6556395
org_padres	-1.323682	.332028	-3.99	0.000	-1.979599	-.6677643
cs_lavadora	.1430177	.096196	1.49	0.139	-.0470163	.3330517
cs_tv	1.395199	.0986179	14.15	0.000	1.20038	1.590017
cs_aguav	-1.325856	.0897116	-14.78	0.000	-1.503081	-1.148632
_cons	-.9019971	.3512747	-2.57	0.011	-1.595936	-.2080581
sigma_u	1.3359527					
sigma_e	3.1536611					
rho	.15214976	(fraction of variance due to u_i)				

F test that all u_i=0: F(27, 154) = 1.14 Prob > F = 0.3044

With regards to the relationship of participation of organizations with enrollment in Seguro Popular, the significance of participation in parent organizations remains positive (Figure 22).

Figure 22.
Seguro Popular enrollment and participation in organizations, random effects

```
Random-effects GLS regression                   Number of obs      =       187
Group variable: coh_t                           Number of groups   =        28

R-sq:  within  = 0.8730                         Obs per group: min =         1
       between = 0.9648                                        avg =       6.7
       overall = 0.8884                                        max =         8

                                                Wald chi2(8)       =   1647.01
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                              (Std. Err. adjusted for 28 clusters in coh_t)
```

sal_segpop	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
org_padres	1.714268	.3659758	4.68	0.000	.9969683	2.431567
org_sindicato	-.7330377	.3404387	-2.15	0.031	-1.400285	-.0657902
org_religion	-.8522063	.1321397	-6.45	0.000	-1.111195	-.5932173
org_ayuda	-1.919803	.5868781	-3.27	0.001	-3.070063	-.7695434
cs_lavadora	-.0847002	.1565677	-0.54	0.589	-.3915672	.2221668
cs_carro	-.2561056	.1374785	-1.86	0.062	-.5255584	.0133473
cs_tv	-.3875617	.1611076	-2.41	0.016	-.7033268	-.0717967
cs_bano	.8566853	.1420558	6.03	0.000	.5782611	1.13511
_cons	.3200512	.2617889	1.22	0.221	-.1930455	.833148
sigma_u	0					
sigma_e	3.2394156					
rho	0	(fraction of variance due to u_i)				

5. Conclusions and public policy recommendations

Social capital types took different trajectories during the period 2006-2011. Bonding capital presented a significant increase, however, bridging and linking capital decreased. It follows that social capital type has a differential effect on access to health services.

As a preliminary exercise, correlations between health and social capital variables were estimated in order to identify possible relationships that may exist between these variables. This information was useful to delimit the analysis to be performed based on the constructed pseudo panel. While econometric models allowed for a more robust analysis of the relationship between social capital and access to health, it was found that bonding social capital has a positive effect on increased enrollment in health care institutions. This was reinforced by the identification of a negative relationship between bonding social capital and non-enrollment in healthcare. Additionally, when disaggregated by healthcare program type, bonding social capital was determined to have a positive effect on *Seguro Popular* enrollment.

This implies that, for the period 2006-2011, the closeness of relationships (*bonding* social capital) played a part in increased enrollment in Mexico's social security institutions. Additionally, when disaggregating based on the type of organization to which people belong (*bridging* social capital), parent organizations were discovered to have a positive effect on enrollment levels. This indicates that further studies should be made of the overlaps that may exist between different types of social capital. These may occur due to the fact that although capital constraint can be delimited at a conceptual level, it is difficult to achieve this in practice, whereas the interactions between people are capable of involving up to several types of social capital (Figure 23).

This study represents a preliminary attempt to determine the nature of the relationship between social capital and health. While this issue still requires further studies to address the social capital overlap at the individual level, it is clear that bonding social capital facilitates the dissemination of information related to access to healthcare. In the case of Mexico, this is highly relevant whereas an increase in this type of social capital was recorded during the period 2006-2011. Policymakers should take advantage of the synergies that can be generated on behalf of citizens' health, either by capitalizing upon increased information on healthcare access or good eating habits.

Figure 23.
Overlapping by social capital types (bonding and bridging)

Bonding decomposition	Individuals			Percentage		
	Lack bridging	Have bridging	Total	Lack bridging	Have bridging	Total
Requested and received assistance with:						
Cash loan	8,501,378	2,685,672	11,187,050	76.0	24.0	100.0
Finding work	2,058,795	844,889	2,903,684	70.9	29.1	100.0
Childcare	2,255,359	869,765	3,125,124	72.2	27.8	100.0
Paperwork	1,157,117	461,113	1,618,230	71.5	28.5	100.0
Caring for sick relative	678,237	364,878	1,043,115	65.0	35.0	100.0
Legal assistance	646,465	251,054	897,519	72.0	28.0	100.0

Source: By the authors, using 2011 ENCAS data.

References

Antman, F., and D.McKenzie (2005). "Earnings Mobility and Measurement Error: A Pseudo-Panel Approach", World Bank Policy Research Working Paper No. 3745.

Bernard, Jean-Thomas, Denis Bolduc and Nadège-Désirée Yameogo (2010). "A pseudo-panel data model of household electricity demand". *Resource and Energy Economics* 33 (2011) 315–325.

Bourguignon, Francois, Chor-ching Goh and Dae Il Kim (2004). "Estimating individual vulnerability to poverty with pseudo-panel data". World Bank Policy Research Working Paper 3375. Washington, The World Bank.

CEPAL (2003). Capital social y reducción de la pobreza en América Latina y el Caribe: en busca de un nuevo paradigma. Santiago, Chile.

ECLAC (2007). Social Cohesion. Inclusion and a sense of belonging in Latin America and the Caribbean. Santiago, Chile.

Casanova, Luis (2008). "Trampas de Pobreza en Argentina: Evidencia Empírica a Partir de un Pseudo Panel". Working paper N° 64. Centro de Estudios Distributivos, Laborales y Sociales.

Cuesta, José, Hugo Ñopo and Georgina Pizzolitto (2007). "Using pseudo-panels to measure income mobility in Latin America", Inter-American Development Bank, Working paper N° 625.

Deaton, A. (1985). "Panel Data from Time Series of Cross-sections", Journal of Econometrics 30, pp. 109-126. North Holland.

FAO, 2013. The State of Food and Agriculture 2013. Food Systems for Better Nutrition. Food and Agriculture Organization of the United Nations.

Glaeser, E, D Laibson, and B Sacerdote. (2002), "An Economic Approach to Social Capital." *Economic Journal* 112 (483): 437-458.

INEGI, 2011. Socioeconomic conditions module within ENIGH *(Encuesta Nacional de Ingresos y Gastos de los Hogares 2010).*

López-Rodríguez, Patricia, and Isidro Soloaga (2012). "El capital social como fuerza de la política social", in *Capital social y política pública en México.* López-Rodríguez, Patricia and Isidro Soloaga, eds. Mexico, El Colegio de México.

Mora Rodriguez, Jhon James, and Juan Muro (2012). "Consistent Estimation of Pseudo Panels in the Presence of Selection Bias". Discussion paper No. 2012-26. Economics e-journal.

WHO, 2011. WHO Anthro software (version 3.2.2, January 2011) and macros.

Ortega Díaz, Araceli (2012). "Capital social y logro escolar", in *Capital social y política pública en México.* López-Rodríguez, Patricia and Isidro Soloaga, eds. Mexico, El Colegio de México.

Peterman, William B. (2011). "Intertemporal Substitution in Labor Supply: Evidence from a Pseudo Panel". Federal Reserve Board of Governors.

Rodríguez-Oreggia, Eduardo (2012). "Uso de redes sociales y salarios, evidencia de la Encasu 2006", in *Capital social y política pública en México.* López-Rodríguez, Patricia and Isidro Soloaga, eds. Mexico, El Colegio de México.

Russell Jeffrey E. and John W. Fraas (2005). "An Application of Panel Regression to Pseudo Panel Data". Multiple Linear Regression Viewpoints, 2005, Vol. 31(1). Ashland University.

Sahagún Martínez, Rebeca (2011). "Construcción y uso de un modelo de pseudo-panel aplicado al análisis de la propiedad y número de autos por parte de los hogares en México". Gaceta de Economía. Año 16, Número Especial, Tomo I. Instituto Nacional de Ecología y Cambio Climático.

Sapag, Jaime C., and Ichiro Kawachi (2007). Capital Social y promoción de la Salud en América Latina. pp.11. *Revista de Saúde Pública.*

Sandoval, Héctor, and Martín Lima (2012). "Capital social, ingreso y pobreza en México", in *Capital social y política pública en México.* López-Rodríguez, Patricia and Isidro Soloaga, eds. Mexico, El Colegio de México.

SEDESOL-PNUD, 2007. Encuesta Nacional de Capital Social en el Medio Urbano (ENCASU) 2006.

SEDESOL-PNUD, 2012. Encuesta Nacional de Capital Social (ENCAS) 2011.

SEGOB, 2006. Encuesta Nacional sobre Cultura Política y Prácticas Ciudadanas (ENCUP) 2005.

SEGOB, 2013. Encuesta Nacional sobre Cultura Política y Prácticas Ciudadanas (ENCUP) 2012.

Tamez González Silvia, Valle Arcos Rosa Irene and Eibenschutz Hartman Catalina (2005). Aproximaciones teóricas al concepto de capital social y su vínculo con la salud. *Revista Salud Problema,* año 10, núm. 18 y 19, enero-diciembre 2005.

Wooldridge, J.M., (2002). *The Econometric Analysis of Cross Section and Panel Data,* Cambridge, MIT Press.

Appendix

Appendix 1
Variables used to identify the types of capital

For the construction of the types of capital used in this document (bonding, bridging and linking), persons replying yes to at least one of the questions that correspond to each type of capital were identified. If a person answered yes to more than one question in the battery corresponding to each type of social capital, then the reply was only counted once in the corresponding aggregation of social capital. In the case of bonding capital, it was also determined whether the person obtained the assistance requested through the use of verification questions in the survey.

The total number of observations used for the construction of bonding capital in urban areas in 2011 was 690, expanded to 15,123,366 people. By 2006, it was 326 observations expanded to 6,781,218 people.

In the case of the 2006 ENCASU, survey questions on the topics of moving (29 observations expanded to 853.756 people in the 2011 ENCAS) and violence (33 observations expanded to 933.296 people in the 2011 ENCAS) in the 2011 ENCAS. However, since some observations are repeated in the different questions with which the bonding social capital indicators were constructed, the missing questions are considered to have no significant effect on the construction of the indicator in 2006 and therefore comparability is preserved.

Table A1.1.
Questions used to construct bonding capital, 2006-2011

BONDING					
2006 ENCASU	**Number of observations (validated)**	**Number of persons (validated)**	**2011 ENCAS**	**Number of observations (validated)**	**Number of persons (validated)**
So far this year, how many people have you asked for money?	252	5,330,702	So far this year, have you needed to borrow money? So far this year, how many people have you asked for money?	501	11,187,050
So far this year, how many people have you asked for help to find a job?	1	11,756	So far this year, have you needed help finding a job? So far this year how many people have asked for help to find a job?	109	2,903,684
In (month) how many people did you ask to look after your children?	49	837,433	So far this year, have you needed help looking after your children? So far this year how many people have you asked them to look after your children?	140	3,125,124
In (month) how many people did you ask for help with paperwork (payment of electricity, telephone, IMSS benefits, etc.)?	32	604,751	So far this year, have you needed help with paperwork (trámite: bills, social security benefits, inter alia)? In the last 4 weeks, how many people did you for help to do some paperwork (payment of electricity, telephone, IMSS, etc.)?	93	1,618,230
So far this year, have you needed help to look after a loved one who was seriously ill?	11	237,595	So far this year, have you needed help to look after a loved one who was seriously ill? So far this year how many people have you asked for help to care for a loved one who was seriously ill?	46	1,043,115

Table A1.1. (continuation)

BONDING					
2006 ENCASU	**Number of observations (validated)**	**Number of persons (validated)**	**2011 ENCAS**	**Number of observations (validated)**	**Number of persons (validated)**
So far this year, how many people have asked for help to obtaining legal aid?	3	56,849	So far this year you needed help obtaining legal assistance? So far this year, how many people have you asked for help obtaining legal aid?	38	897,519
NO CORRESPONDING QUESTION			So far this year, have you needed help to moving to a new place of residence (other than your current one)? So far this year how many people have you asked for help moving to a new residence?	29	853,756
NO CORRESPONDING QUESTION			h) help solving a problem caused by violence or insecurity; So far this year how many people have you asked for help to address your violence-related problem?	33	933,296

Source: 2006 ENCASU and 2011 ENCAS.

The total number of observations used for the construction of bridging capital in urban areas in 2011 was 403, expanded to 7,956,599 people. By 2006, it was 573, which was expanded to 10,778,634 individuals.

The 2006 ENCASU did not include a question on membership in political parties (27 observations were expanded to 581.458 people in the 2011 ENCAS). The 2011 ENCAS did not include a question about participation in senior associations or groups (20 observations were expanded 306.513 persons in the 2006 ENCASU).

Table A1.2.
Questions used to construct bridging capital, 2006-2011

BRIDGING					
2006 ENCASU			**2011 ENCAS**		
	Number of observations	**Number of persons**		**Number of observations**	**Number of persons**
What organizations or groups do you belong?			I am going to read a list of organizations and groups. Please indicate if you are, or are not, a member of each:		
a) religious group or church	355	6,847,978	d) religious group	187	3,214,160
b) parent associations	38	612,713	b)parent associations	56	1,245,070
d) unions	71	1,199,223	c) unions	62	1,193,799
e) neighborhood association or group	15	310,985	a) neighborhood association or group	59	1,157,036
f) sports/recreation club	57	1,553,451	e) sports/recreation/ artistic/ cultural	77	1,742,045
g) self-help association (AA, Neurotics Anonymous)	14	288,874	f) self-help association (AA, Neurotics Anonymous, Overeaters Anonymous)	14	322,268
h) other (specify)	42	982,351	h) other (specify)	6	162,595
NO CORRESPONDING QUESTION			g) political party	27	581,458
c) senior associations or groups	20	306,513	NO CORRESPONDING QUESTION		

Source: 2006 ENCASU and 2011 ENCAS.

As regards the construction of linking capital, the battery of questions is very similar for both the 2011 ENCAS and the 2006 ENCASU.

The total number of observations used for linking capital in urban areas in 2011 was 301, which was then expanded to 6,424,377 people. For 2006, 352 observations were expanded to 7,285,158 people.

Table A1.3.
Questions used to construct linking capital, 2006-2011

LINKING					
2006 ENCASU			**2011 ENCAS, Urban areas**		
So far this year, have you organized to do any of the following activities with other neighbors:			In the past 12 months, did you or any member of your household organize to do any of the following activities with other neighbors:		
Question	**Observations**	**Individuals**	**Question**	**Observations**	**Individuals**
Visit municipal offices (as part of delegation) to resolve a problem	244	4,991,001	1) Visit municipal offices (as part of delegation) to resolve a problem	172	4,023,249
Seek the help of a politician to solve a problem	134	2,500,862	2) Seek the help of a politician to solve a problem	90	1,862,592
Participate in a political movement	104	2,175,369	3) Participate in a political movement	73	1,293,872
Notify newspaper or local radio station of a problem	56	1,063,840	4) Notify newspaper or local radio station of a problem	58	1,084,380
File any complaints at a public institution	59	1,287,521	5) File any complaints at a public institution	112	2,314,883
Individuals with linking capital	352	7,285,158	Individuals with linking capital	301	6,424,377

Source: 2006 ENCASU and 2011 ENCAS.

Appendix 2
Hausman tests

Table A2.4
Hausman test for healthcare affiliation

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
cap_bondi	.5077314	.491666	.0160654	.0391999
cap_bridg	.1720655	.1839313	-.0118659	.0450896
cs_aguav	.7014784	.6771885	.0242898	.0634755
cs_bano	-.2769721	-.2190473	-.0579248	.0721393
cs_banoagua	.5749718	.6216134	-.0466416	.0485764
cs_cel	-.1932752	-.2877775	.0945023	.0424785
cs_tel	-.3150571	-.3465446	.0314875	.0220873

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 11.88
Prob>chi2 = 0.1045

Table A2.5
Hausman test for absence of healthcare affiliation

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
cap_bondi	-.5529829	-.503897	-.0490859	.0428418
cap_bridg	-.0197848	-.0082793	-.0115055	.0492793
cs_aguav	-.5629952	-.5864344	.0234392	.0693795
cs_bano	1.321886	1.305031	.0168553	.0787741
cs_banoagua	-.7999901	-.8788539	.0788638	.0530969
cs_cel	.1930524	.3329117	-.1398593	.0463893
cs_tel	.3783682	.3921363	-.0137681	.0241667

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 20.28
Prob>chi2 = 0.0050

Table A2.6
Hausman test for enrollment in Seguro Popular

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
cap_bondi	.5518132	.5155932	.0362199	.0373241
cap_bridg	-.2990988	-.307728	.0086292	.034159
cs_aguav	.6332752	.6418684	-.0085932	.0334486
cs_cel	-.2211031	-.2410428	.0199397	.0436167
cs_tel	-.4079399	-.3971298	-.0108101	.0232812
cs_carro	-.1759385	-.1451541	-.0307844	.0343049

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 12.38
Prob>chi2 = 0.0541

Table A2.8
Hausman test for membership in organizations and membership

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
org_vecinos	1.293192	1.457661	-.1644686	.1367754
org_padres	1.390773	1.343585	.0471883	.1169321
cs_tv	-.5165218	-.4176029	-.0989189	.0342907
cs_ptierra	.3951543	.3833816	.0117727	.0773317
cs_aguav	1.346788	1.234526	.1122621	.0376307

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 11.34
Prob>chi2 = 0.0451

Table A2.10
Hausman test for participation in organizations and absence of membership

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
org_vecinos	-1.547963	-1.677324	.1293616	.1242649
org_padres	-1.323682	-1.266496	-.0571855	.1170233
cs_lavadora	.1430177	.144101	-.0010834	.0421894
cs_tv	1.395199	1.300513	.0946854	.0481014
cs_aguav	-1.325856	-1.218011	-.1078452	.0351462

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 18.19
Prob>chi2 = 0.0027

Table A2.12
Hausman test for participation in organizations and enrollment in Seguro Popular

	Coefficients (b) fix	(B) ran	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
org_padres	1.622557	1.714268	-.0917109	.1701931
org_sindic~o	-.7935971	-.7330377	-.0605594	.1493485
org_religion	-.8807507	-.8522063	-.0285444	.0531178
org_ayuda	-2.025734	-1.919803	-.1059304	.2349513
cs_lavadora	-.1448949	-.0847002	-.0601947	.0519757
cs_carro	-.2639696	-.2561056	-.007864	.0487519
cs_tv	-.4569993	-.3875617	-.0694376	.1124621
cs_bano	.9772943	.8566853	.120609	.0968391

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 7.71
Prob>chi2 = 0.4625