Chapter 1
A Geography of Cohabitation in the Americas, 1970–2010

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1 Introduction

In this chapter, we trace the geography of unmarried cohabitation in the Americas on an unprecedented geographical scale in family demography. We present the percentage of partnered women aged 25–29 in cohabitation across more than 19,000 local units of 39 countries, from Canada to Argentina, at two points in time, 2000 and 2010. The local geography is supplemented by a regional geography of cohabitation that covers five decades of data from 1960 to 2010. Our data derive primarily from the rich collection of census microdata amassed by the *Centro Latinoamericano y Caribeño de Demografía* (CELADE) of the United Nations and from the IPUMS-international collection of harmonized census microdata samples (Minnesota Population Center 2014). In preparing these maps over 2 years, the authors retrieved

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the data from CELADE, searched for alternative data for the missing countries and censuses, prepared the digital boundary files, produced the maps and analyzed the results.

Such a degree of effort was required to unveil the rich spatial heterogeneity in cohabitation both across and within countries, heterogeneity that would have remained hidden had the analysis been conducted at the country or even at the province level. This study also examines whether, despite the recent increases in cohabitation, there has been continuity in the regional patterning of cohabitation over the last five decades.

The results have not been disappointing. The following sections show that the geographic analysis of cohabitation has unveiled a substantial amount of spatial heterogeneity both within and across countries, reminding us of the importance of contextual level factors. We also show that the regional patterning of cohabitation has remained relatively unchanged over the last decades, which points to the presence of geo-historical legacies in the present patterns of unmarried cohabitation. However, if the expansion of cohabitation continues at its current pace, such legacies may soon blur. The analysis of the data left us with some unexpected surprises, one being the striking correlation between altitude and the rate of cohabitation observed in all Andean countries, to which we will devote the last section of this chapter.

2 The Motivation for a Map

Although social scientists have not had many opportunities to examine social phenomena using local level data for an entire continent, the few precedents have been extremely illuminating. The Princeton Project on the Decline of Fertility in Europe is one of the most remarkable studies of this scope (Coale and Watkins 1986). Under the guidance and coordination of Ansley Coale, the Princeton project amassed a collection of creative family and fertility life indicators for 1229 provinces in Europe from the late eighteenth century to the mid-twentieth century. The results showed that the unfolding of the fertility transition in Europe occurred under a wide variety of social and economic conditions, often following religious and linguistic contours. The widespread heterogeneity across regions motivated Ansley Coale to develop his praised explanatory framework of the 'willing', 'ready' and 'able' conditions for social change (Coale 1973).

The lack of geographic awareness in social science research is not necessarily because of a lack of interest among researchers (e.g. Billy and Moore 1992; Bocquet-Appel and Jakobi 1998; Boyle 2014; Klüsener et al. 2013; Vitali et al. 2015) but may be attributable to the lack of data and limited access. Surveys' microdata have become the primary statistical source for family studies. Compared with traditional censuses or population registers, surveys offer much greater conceptual detail but more limited geographic detail, basically because of sample size. Conversely, population censuses based on universal enumeration provide detailed geographic coverage although access to such detail is not always available for reasons of confidentiality.

The availability of geographic data affects the research questions and the interpretation of results (Weeks 2004). Large cross-national studies are overwhelmingly conducted at the country level, and in some cases, countries must be grouped to develop statistical representativeness (e.g., European countries are often grouped into northern, western, southern, and eastern countries). Multilevel models are becoming increasingly popular in cross-national research to, at least, account for variance at the country level (e.g., Soons and Kalmijn 2009; Aassve et al. 2013). Rarely is there a multilevel model in which individual factors account for differences across countries or regions, which suggests that, despite the emphasis on individual level explanations, the contextual factors are certainly important.

Little is known regarding within-country differences in cohabitation and even less when the analysis involves more than one country (Quilodrán 1983 and 2001). As in Europe, most cross-national analyses have been conducted at the country level (Rodríguez Vignoli 2005; García and Rojas 2002; Binstock and Cabella 2011; Cerrutti and Binstock 2009). Broadly we know that Central America and the Caribbean have historically had the highest levels of cohabitation and the South Cone countries the lowest (Esteve et al. 2012; Castro-Martín 2002). The Andean countries and Brazil lie somewhere in between. Although the US and Canada are seldom compared to Latin American countries, in light of existing evidence, levels of cohabitation are remarkably lower in the US but not in Canada. The Quebec region has historically had higher levels of cohabitation than the rest of Canada (Le Bourdais and Lapierre-Adamcyk 2004; Laplante 2006).

3   The Making of the Map of Cohabitation

3.1   Gathering the Data

The maps of unmarried cohabitation in the Americas would never have been possible if the information had not been previously collected, processed and disseminated by National Statistical Offices throughout the Americas over the last five decades. Originally, all of our data came from multiple rounds of population censuses accessed through various databases and institutions. For the regional maps, we primarily relied on IPUMS-international census microdata (Minnesota Population Center 2014). IPUMS is the world's largest repository of census microdata, currently disseminating data from 258 censuses from 79 countries, including censuses from the 1960s to the 2010s census rounds. Our regional maps include data from the 2010 round that were not available on the IPUMS website. Therefore, we gathered these data from the respective National Statistical Institutes. The regional maps offer geographic detail of the first or second administrative unit of each country. We have prioritized those administrative units to allow maximum comparability over time. In this regard, the first or second levels of geography (e.g., state level in the US, Mexico and Brazil) scarcely experience changes over time.

Data for the local maps were much more challenging to obtain. Table 1.1 describes the data used to produce the 2000 and 2010 maps of unmarried cohabitation. Table 1.1 presents information regarding the reference year, source of information, sample density, and name and number of the administrative unit used in each of the 39 countries represented. Table 1.1 also provides information regarding the average population and surface per unit. The map depicts data for 32 countries and 15,895 units in the year 2000 and 20 countries and 17,397 units in 2010. The majority of the data came from full counts of census microdata obtained from the CELADE's database. For 14 Caribbean countries and Belize, we used aggregated census data from the Caribbean Community organization (CARICOM). The French National Statistical Institute, INSEE, provided data for Guadalupe, Martinique and French Guiana. Cuban data from 2002 were obtained from the IPUMS international project. Finally, data for Canada, the United States and Colombia were directly accessed through their respective statistical offices.

The number of units and the scale of the analysis employed to produce the local maps of cohabitation vary widely across countries and over time. In all countries except Bolivia, Chile, El Salvador and Honduras, we used the lowest geographical level at which we could estimate the proportion of cohabitation given the available data. Brazil provides the largest number of units with over 5500 municipalities, followed by Mexico (2456 municipalities in 2010), the United States (2071 counties), Peru (1833 districts) and Venezuela (1128 parishes in 2010). In Bolivia, Chile, El Salvador and Honduras, we abandoned the initial idea of using the lowest geographic detail available because of the difficulty of obtaining the corresponding geographic boundary files for the final mapping. In Bolivia, for example, we used the 314 *secciones* instead of the 1384 *cantones*; in Chile, we used 314 *municipios* instead of 2881 *distritos*; in El Salvador, 261 *municipios* in place of 2270 *cantones*; and in Honduras, we used 298 *municipios* instead of 3727 *aldeas*. On the whole, we have a heterogeneous geographic coverage in terms of average population and surface per unit (as shown in Table 1.1) that may not be optimal for some geographic analysis but provides an extremely informative account of the geography of cohabitation in the Americas.

Boundary files for the various countries and geographic units were obtained from multiple sources but primarily from CELADE, websites of National Statistical Institutes and the GADM database website. We used GIS software to assemble the country-specific boundary files and produce a unique shape file for the entire Americas.

3.2   Identifying Unmarried Cohabitation

Latin American censuses have historically provided an explicit category for consensual unions. The examination of the questionnaires of all Latin American and Caribbean censuses conducted between the 1960s and 2010s reveals that the vast majority of cohabitants could be explicitly identified either by the variables 'marital

Table 1.1 Summary of the census data, boundary files and geographic details used to analyze the prevalence of consensual unions in the Americas in the 2000 and 2010 census rounds

Country	Census year (2000/2010 rounds)	Census data provider (2000/2010)	Census sample (%)	Administrive level	Denomination	Number of units (2000/2010)	Average pop. per unit (in last data available)	Average surface area (km²) (in last data av.)
North America								
Canada	2001/2011	STATCAN	20	2	Census division	288/293	114,255	33,961
Mexico	2000/2010	CELADE/INEGI	100	2	Municipality	2,443/2,456	45,793	800
United States	2000/ (2007–2011)	IPUMS	5	3	PUMA	2,071	148,046	4,417
Central America								
Belize	2000/2010	CARICOM/SIB	100	0/1	Single division/district	1/6	41,486	3,828
Costa Rica	2000/2011	CELADE/INEC	100	3	District	459/472	9,372	111
El Salvador	-/2007	CELADE	100	2	Municipality	262	21,924	77
Guatemala	2002/-	CELADE	100	3	Municipality	331	33,949	327
Honduras	2001/-	CELADE	100	2	Municipality	298	20,392	377
Nicaragua	-/2005	CELADE	100	2	Municipality	153	33,609	787
Panama	2000/2010	CELADE/INEC	100	3	*Corregimiento*	592	4,793	126
South America								
Argentina	2000/2010	CELADE/INDEC	100	2/1	Department/province	532/23	1,576,527	120,887
Bolivia	2001/2012	CELADE/INE	100	3	Section	314/339	29,675	3,241
Brazil	2000/2010	CELADE/IBGE	100	3	Municipality	5,507/5,565	34,278	1,530
Chile	2002/-	CELADE	100	3	Commune	342	44,200	2,220

(continued)

Table 1.1 (continued)

Country	Census year (2000/2010 rounds)	Census data provider (2000/2010)	Census sample (%)	Administrive level	Denomination	Number of units (2000/2010)	Average pop. per unit (in last data available)	Average surface area (km²) (in last data av.)
Colombia	-/2005	DANE	100	2	Municipality	1,113	36,995	994
Ecuador	2001/2010	CELADE/INEC	100	3	Parish	995/1,024	14,144	277
French Guyana	-/2008	INSEE (FR)	100[a]	0	Single division	1	219,266	83,299
Paraguay	2002/-	CELADE	100	2	Census district	241	21,424	1,655
Peru	-/2007	CELADE	100	3	District	1,833	14,955	702
Rep. of Guyana	2002/-	CARICOM	100[a]	0	Single division	1	751,230	209,739
Uruguay	1996/2010	CELADE/INE	100	1/2	Department/census tr.	19/229	14,350	769
Venezuela	2001/2011	CELADE	100	3	Parish	1,116/1,128	24,138	812
Caribbean								
Anguilla	2001	CARICOM	100[a]	0	Single division	1	11,430	83
Antigua and Barbuda	2001	CARICOM	100[a]	0	Single division	1	63,863	436
Bahamas	2000	CARICOM	100[a]	0	Single division	1	303,611	13,388
Barbados	2000	CELADE	100	1	Parish	11	22,728	74
Cuba	2002	IPUMS	10	1	Parish	15	745,845	7,382
Dominica	2001	CARICOM	100[a]	0	Single division	1	69,775	754
Dominican Republic	2002/2010	CELADE/ONE	100	3	Municipality	225/386	24,470	125
Grenada	2001	CARICOM	100[a]	0	Single division	1	103,137	360
Guadeloupe	2008	INSEE (FR)	100[a]	0	Single division	1	401,784	1,731

British Virgin Islands	2001	CARICOM	100[a]	0	Single division	1	23,161	169
Jamaica	2001	CARICOM	100[a]	0	Single division	1	2,607,635	11,000
Martinique	2008	INSEE (FR)	100[a]	0	Single division	1	397,693	1,118
Montserrat	2001	CARICOM	100[a]	0	Single division	1	4,303	101
Saint Kitts and Nevis	2001	CARICOM	100[a]	0	Single division	1	46,325	267
Saint Vincent and the Gren.	2001	CARICOM	100[a]	0	Single division	1	106,253	398
Saint Lucia	2001/2010	CARICOM/CSO	100	0	Single division	1	156,741	614
Trinidad and Tobago	2000	CELADE	100	1	Parish	15	74,318	344

Source: Authors' tabulations based on the 2000 and 2010 census rounds
[a]Aggregate data in the census samples

status' (dominant approach) or 'union status' (quite common in Caribbean countries) or by a direct question (e.g., in Brazil and more recently in Argentina and Suriname). In Canada and the United States, the identification of unmarried cohabitation occurred much later, in 1981 and in 1990, respectively. For the United States, cohabiting couples were identified on the basis of their relationship to the head of the household and marital status: the unmarried partner of an unmarried head of household is considered to be in a cohabiting union.[1]

After identifying cohabiting unions, we computed the percentage of cohabiting women among 25-29-year-old women in unions. Women in unions are those who report being married or cohabiting at the time of the census. For the geography of cohabitation, whether one focuses on men or women does not matter.[2]

4 The Increase in Cohabitation in the Americas from a Regional Perspective

The results that are reported in this study stem from extensive analysis of the harmonized Latin American census microdata samples presented in the previous sections. This analysis uses as many census rounds between 1970 and 2000 as possible. Consequently, with the exception of a few areas, the time series generally captures the initial increases in the degree of cohabitation among all unions. The census estimates of the proportion of cohabitation for women 25–29 are equally available for the regions of the various countries. For most countries, these regions remain the same over the entire period of observation, except for Brazil and Haiti, in which the spatial resolution improves, beginning with 26 regions in 1970 and increasing to 135 smaller regions in Brazil and increasing from 9 to 19 in Haiti. There are no regional data for Puerto Rico whereas Cuba, Honduras and Jamaica contribute information only for the 2000 census round. Bolivia, Belize and Costa Rica only provide information accumulated after the 2000 census round. Until the 1990s, there are no data on cohabitation for the United States and Canada.

Geographical details can be gleaned from the two series of maps presented in Maps 1.1 and 1.2. The maps in the first series are of the classic type and have the advantage of familiarity. However, these maps misrepresent the demographic weight of each region, sometimes enormously so. For example, the Amazon basin covers

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[1] Recent research indicates that this approach underestimates US cohabitation levels by 20% compared with direct methods (Kennedy and Fitch 2012). Consequently, we adjusted our estimates to reflect this under-reporting. Our adjusted estimates of the percentage of women who were cohabiting in 2000 exactly match the cohabitation estimates produced for 2002 using a direct cohabitation question (Kennedy and Bumpass 2008).

[2] The degree of correlation between female and male cohabitation rates across local units is 0.93. Concentrating on the 25–29 age group permits the comparison of successive cohorts at an age at which education is already completed and patterns of family formation have become clear. Alternative age groups yielded identical spatial patterning. The degree of correlation between female 25–29 and female 35–39 cohabitation rates across local units is 0.87.
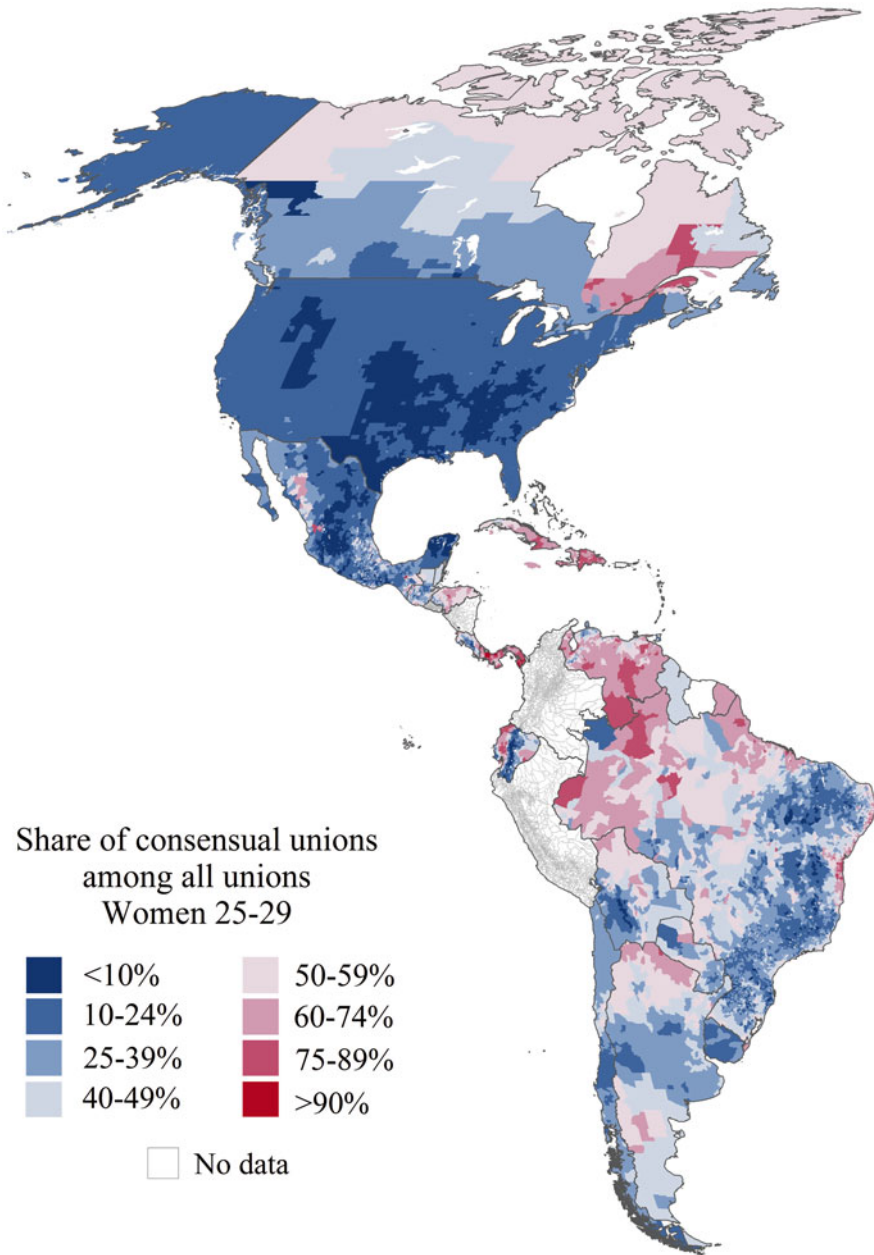
Map 1.1 Share of consensual unions among all 25-to-29-year-old women in a union based on census data from the 2000 census (*Source*: Authors' elaboration based on census microdata from the represented countries (see Table 1.1 for the exact sources))
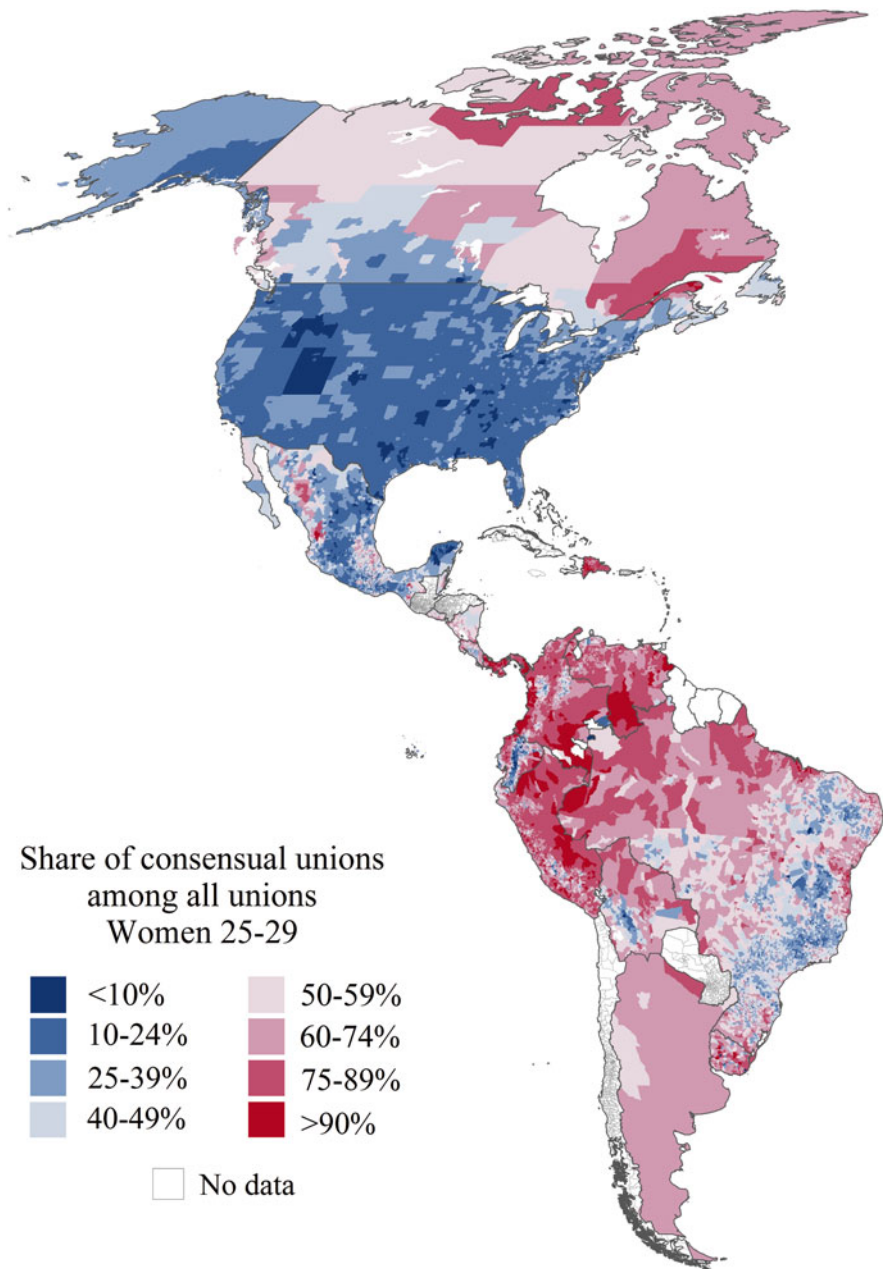
Map 1.2 Share of consensual unions among all 25-to-29-year-old women in a union based on census data from the 2010 census (*Source*: Authors' elaboration based on census microdata from the represented countries (see Table 1.1 for the exact sources))

an extremely large area but is only sparsely populated. Conversely, large urban areas are barely dots on a classic map but may contain sizable portions of a nation's population. To correct for this anomaly, a series of Gastner-Newman cartograms was created, which may look less familiar but do respect the true demographic weight of each region (see Map 1.2). Obviously, the color (shading) codes have been kept constant for the 5 census rounds so that the "darkening" of the map fully captures the ubiquitous American cohabitation boom.

By 1970, fewer than 25 regions of the 224 represented on the map reached a percentage of cohabitation above 50 %. These regions were located in Central America (Panama) and in some areas of Venezuela, Colombia and Ecuador. Most regions at that time had levels below 25 %. None of the 13 regions in Chile reached a level of 25 % until 1990. However, at the time of the 2000 census, 6 regions of these 13 had crossed that threshold. In Brazil, only 11 of 133 regions had passed the lower threshold of 25 % by 1980. By 2010, 115 regions had surpassed that level, and 32 regions had previously surpassed the much higher threshold of 60 % cohabitation rather than marriage. The movement in Argentina is quite similar. In the 1970 census, 5 of 25 regions had cohabitation rates of 25 % or more, and by 2010, all of the regions had crossed that lower threshold. Furthermore, all of the regions had previously crossed the line with more women 25–29 in cohabitation than in marriage. The increase in Mexico is less spectacular before 2000 but accelerates later. Twenty-five of the 32 states reported a share of cohabitation above 25 % in 2010 whereas there were only 6 in 1970, 3 in 1990 and 13 in 2000.

Of all countries, the most striking cohabitation boom may have occurred in Colombia. In 1970, only 2 regions of 30 had more cohabiting than married young women, and 15 regions did not even reach the 25 % threshold. However, in 2005 (the 2005 data are shown in the 2010 census round map), all 33 regions had not only passed the lower but also the upper threshold of 50 %.

As noted earlier, not only the countries with low or moderate levels of "old cohabitation" in 1970 or 1980 saw increases but also the countries with higher levels (e.g., Nicaragua, Panama and Venezuela). These countries were previously above the lower threshold of 25 % to begin with; thus, for these countries, the upper threshold is more relevant. In Venezuela, all of the 24 regions passed the 50 % mark in 2010 whereas there were only 4 regions in 1970. Between 1993 and 2007, our maps show a jump from 8 to 24 regions above the 50 % level for the 25 Peruvian regions. Finally, two-thirds of the 15 Cuban regions joined the fifty-percent group by 2000 and all 10 Panamanian regions joined in 2000 and 2010.

In 1990, the lowest levels of cohabitation were registered in the United States. In that year, cohabitation in the US was lower than in any other American country during the two previous decades. All but one of the 51 US states were below the 25 % threshold in 1990. By 2010, 16 states were above the 25 % level, and there was only 1 state below the 10 % level, compared with 26 states that had less than 10 % cohabitation in 1990. Canadian regions were all above 10 % in 1990; however, only 3 were above 25 %. Two decades later, all of the Canadian 12 regions were above 25 % and 4 had cohabitation levels above 50 %.

A telling manner in which to describe the regional data comprises ranking the regions by level of cohabitation as measured at the earliest date and following the regions as they move up in the ensuing decades. This is performed for 15 countries in Fig. 1.1. In addition, a straight line was included through the provincial data points for each census so that one can see whether the distribution shifted more as a result of the tail being pulled up or the vanguard moving out. In this manner, the lines are essentially parallel in Mexico, Costa Rica, Ecuador and Brazil, indicating that all regions had similar absolute increases in percentages cohabiting, irrespective of their earlier position in the distribution. The majority of the other countries have higher increments in regions that were at the lower end to begin with. This catching-up effect also indicates that the overall increase is because of a slightly greater degree of "new" rather than "old" cohabitation. The primary exception was observed in Chile, in which the increase between the 1990 and 2000 census rounds is largest for the areas that previously had higher cohabitation rates. Finally, El Salvador retained the distribution of 1990 with scarcely any changes in overall levels. If anything, the 2010 census round for El Salvador indicates the disappearance of regional heterogeneity.

The bottom two panels of Fig. 1.1 contain the ranked regional levels for the single census round of 2000, and the slopes of the fitted lines in this instance are indicative of regional homogeneity (flat) or heterogeneity (steeper). Honduras, Jamaica and Trinidad and Tobago have the least heterogeneity in this respect, and Belize, Bolivia and Cuba the most.

Finally, we present the list of 25 regions that, respectively, had the lowest and the highest shares of cohabiting women aged 25–29 in 1970 in addition to the subsequent increments in these rates over the next three decades. As shown in Table 1.2, 24 of the 25 "lowest" regions began with less than 5 % cohabitation, and the increase to levels of up to 40 % can be considered "new cohabitation". The most spectacular of such increases occurred in seven Brazilian regions (Parana, Ceara, Minas Gerais, Santa Catarina, Piaui, Sao Paulo and particularly Rio Grande do Sul), in Argentina (Cordoba), Chile (RM Santiago) and Colombia (Valparaiso). At the other extreme, among the 25 regions with the highest proportions of "old" cohabitation, the majority of these regions consolidated their positions although others increased more than 10 percentage points. The latter are areas in Colombia (Cordoba, Cesar and particularly Choco and La Guajira), Ecuador (Esmaraldas), Venezuela (Portuguesa, Amazonas, Yaracuy, Delta Amacuro) and even in Panama (Colon).

5   The Local View for 2000 and 2010

The regional perspective of the Fig. 1.1 has shown trends in cohabitation over the last four decades and across more than 500 regions across the Americas. From the local perspective, we portray the same indicator but for a number of units forty times higher than the number of regions. The local view substantially increases the resolution of the geography of cohabitation. The local perspective defines more
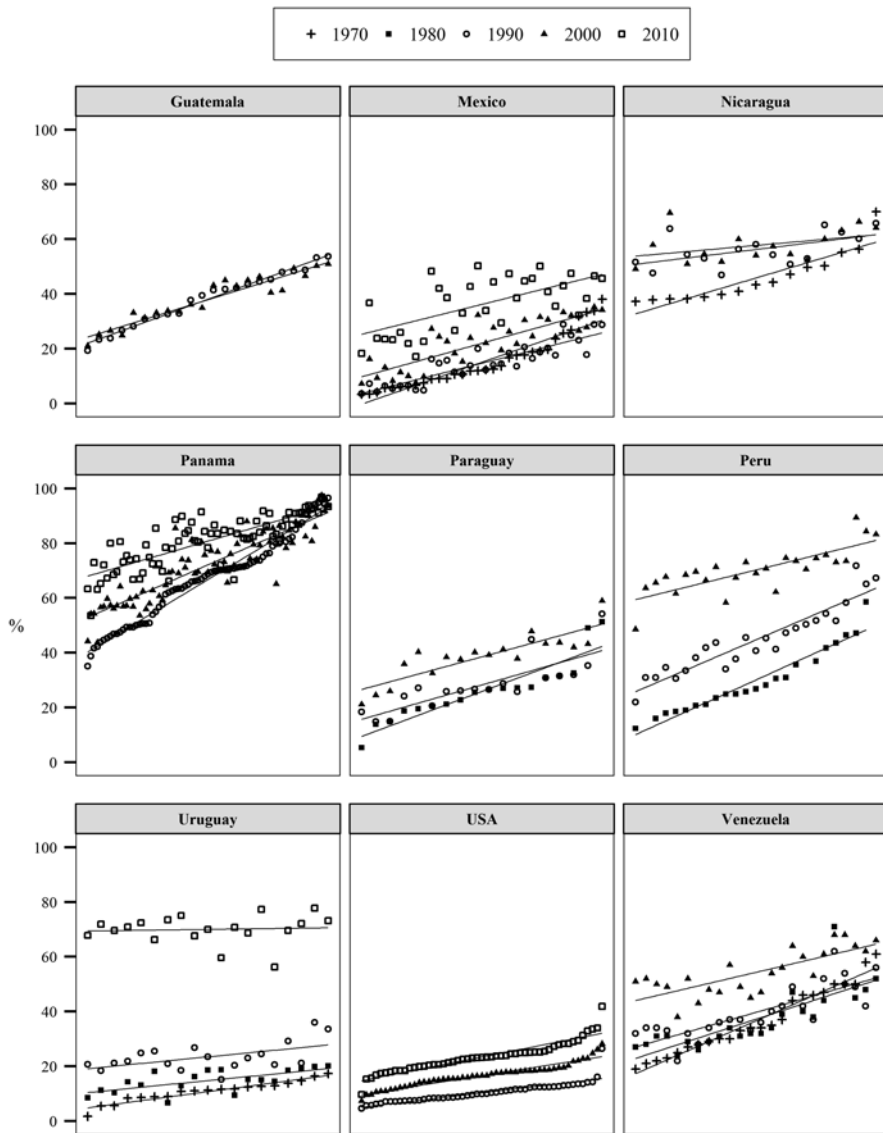
Fig. 1.1 Patterns in the increase in the percent of cohabitation among partnered women 25–29 in regions of Latin America and the Caribbean, various census rounds, 1970–2010 (*Source*: Authors' elaboration based on census samples from IPUMS-International)

Fig. 1.1 (continued)

clearly the spatial boundaries of the areas with high and low levels of cohabitation. For this occasion, and as an exception to the entire book, the local maps of cohabitation have been edited in color, in shades of blue and red (Maps 1.3 and 1.4). Bluish colors indicate that marriage among women 25–29 in a union is more important than cohabitation, and reddish colors indicate that cohabitation is more important than marriage. The reddening of the map between 2000 and 2010 indicates a

Table 1.2 Changes in the percent of cohabitation among partnered women 25–29 in the 25 regions with the lowest and the highest initial levels of cohabitation in 1970

	25 Regions with the lowest % of cohabiting unions in 1970				25 Regions with the highest % of cohabiting unions in 1970			
	Region	Country	% 1970	% 2000	Region	Country	% 1970	% 2000
1	Azuay	Ecuador	1.6	12.1	Kuna Yala (San Blas)	Panama	90.6	85.1
2	Del Maule	Ecuador	2.4	18.2	Darien	Panama	81.0	82.1
3	Magallanes y Antartica Chilena	Chile	2.5	18.1	Bocas del Toro[a]	Panama	78.4	73.9
4	Tungurahua	Ecuador	2.7	8.7	Los Rios	Ecuador	75.3	74.4
5	Del Libertador General Bernardo O'Higgins	Chile	3.0	19.5	Cocle	Panama	70.7	75.7
6	Parana	Brazil	3.1	28.9	Chiriqui[a]	Panama	69.9	61.4
7	Guanajuato	Mexico	3.3	7.1	Veraguas[a]	Panama	68.6	68.2
8	Cordoba	Argentina	3.3	32.6	Los Santos	Panama	65.3	61.1
9	Ceara	Brazil	3.4	35.7	Apure	Venezuela	60.8	65.6
10	Queretaro	Mexico	3.4	16.2	Esmeraldas	Ecuador	60.7	75.4
11	Santa Catarina	Brazil	3.5	30.4	Cojedes	Venezuela	58.2	62.0
12	Valparaiso	Colombia	3.5	23.9	Choco	Colombia	57.1	87.4
13	Minas Gerais	Brazil	3.7	26.0	Formosa	Argentina	52.1	59.1
14	Loja	Ecuador	3.8	11.6	Colon	Panama	51.7	62.0
15	Region Metropolitana de Santiago	Chile	3.9	24.8	Cordoba	Colombia	50.8	79.5
16	Cotopaxi	Ecuador	3.9	13.6	Amazonas	Venezuela	50.4	67.6
17	Piaui	Brazil	4.0	27.6	Yaracuy	Venezuela	50.2	63.9
18	Aguascalientes	Mexico	4.1	9.3	Delta Amacuro	Venezuela	49.5	67.8
19	Bio-Bio	Chile	4.1	19.0	Guayas	Ecuador	48.3	50.7
20	Sao Paulo	Brazil	4.3	34.8	Panama	Panama	47.4	57.2
21	Chimborazo	Ecuador	4.6	8.5	La Guajira	Colombia	47.4	82.8
22	Cartago	Costa Rica	4.6	15.5	Herrera	Panama	47.1	50.7
23	Rio Grande do Sul	Brazil	4.9	40.6	Portuguesa	Venezuela	46.7	60.6
24	Canar	Ecuador	4.9	16.2	Cesar	Colombia	46.4	74.3
25	Carchi	Ecuador	5.5	19.1	Monagas	Venezuela	46.3	52.9

*Source*: Authors' tabulations based on census samples from IPUMS-International
[a]The decrease in the % of cohabitation unions in these regions can be explained by the creation of a new region in Panama in the 2000 round, which was created from existing regions (Ngöble-Bugle; 2000 = 88.44 %)
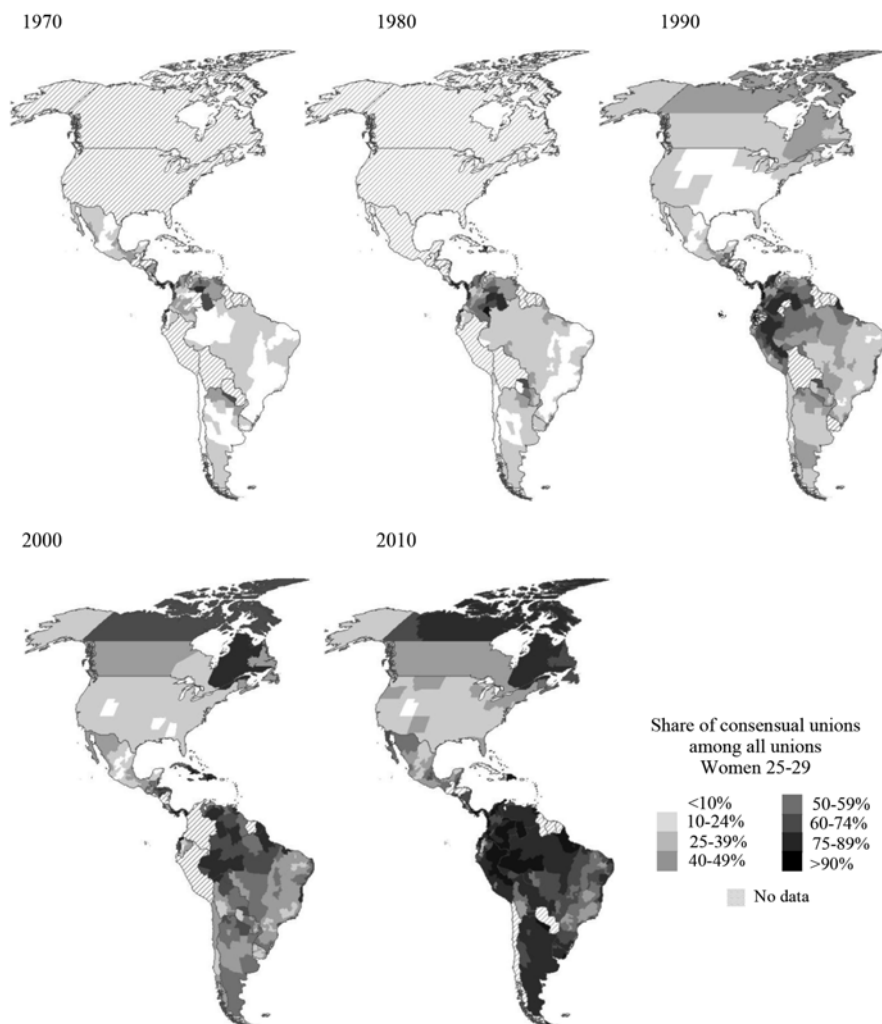
Map 1.3 Evolution of the regional share of consensual unions among all 25-to-29-year-old women in a union based on 1970–2010 census data (*Source*: Authors' elaboration based on census microdata from the represented countries (see Table 1.1 for the exact sources))

substantial increase in cohabitation throughout the Americas. In 2000, 33 % of the 19,255 areas had values of cohabitation above the 50 % level. In 2010, the percentage had increased to 51 %.

In approximately the year 2000, the highest rates of cohabitation were in Central America, the Caribbean, Colombia and Peru. In all of these countries, the percentage of local units in which cohabitation was more prevalent than marriage reached 80 %. The lowest cohabitation rates were in the United States and Mexico; Canada, Brazil, Bolivia, Paraguay, Argentina, Uruguay and Chile occupied intermediate
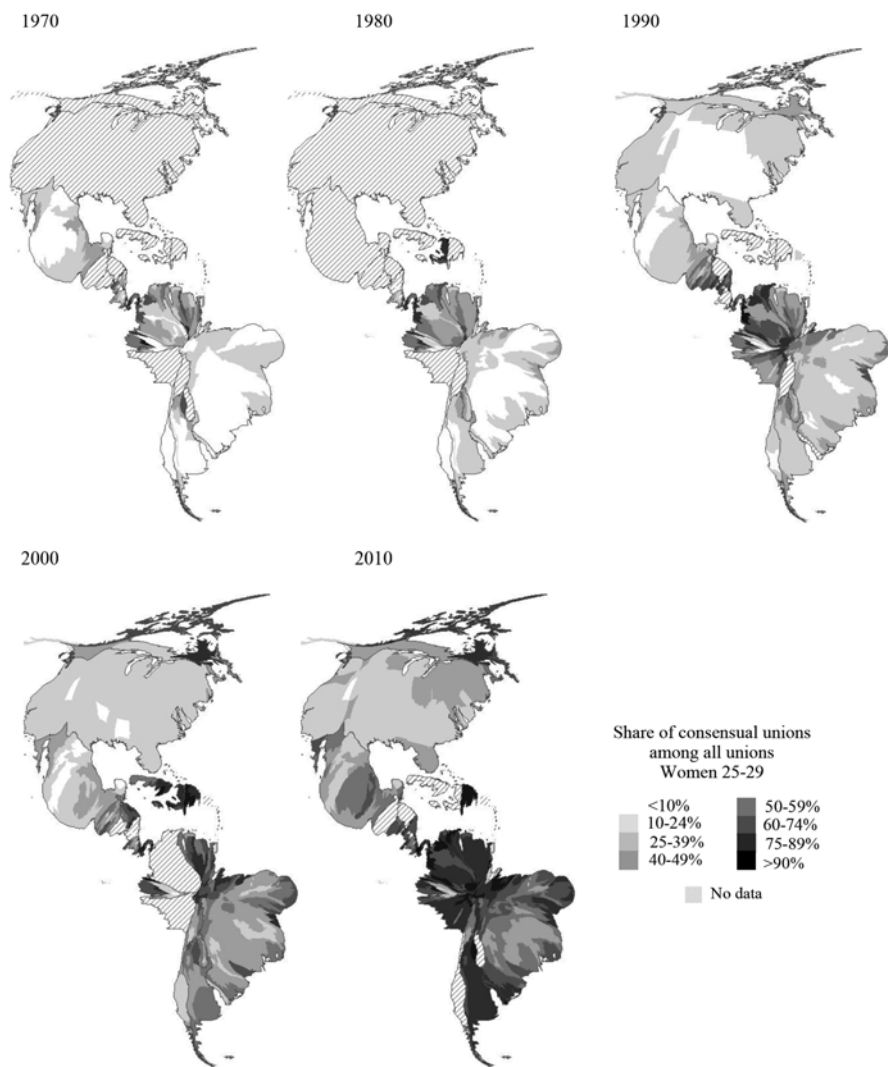
Map 1.4 Evolution of the regional share of consensual unions among all 25-to-29-year-old women in a union based on 1970–2010 census data. Cartogram Map (administrative units are weighted by population in 2000) (*Source*: Authors' elaboration based on census microdata from the represented countries (see Table 1.1 for the exact sources))

positions. However, the country perspective hides a high degree of international heterogeneity.

To assist with the description of the local maps, we created the boxplots displayed in Fig. 1.2, which summarizes local data on cohabitation from 17 countries, showing the median and the interquartile range: longer bars indicate greater heterogeneity within countries. The whiskers represent the lowest and highest values still
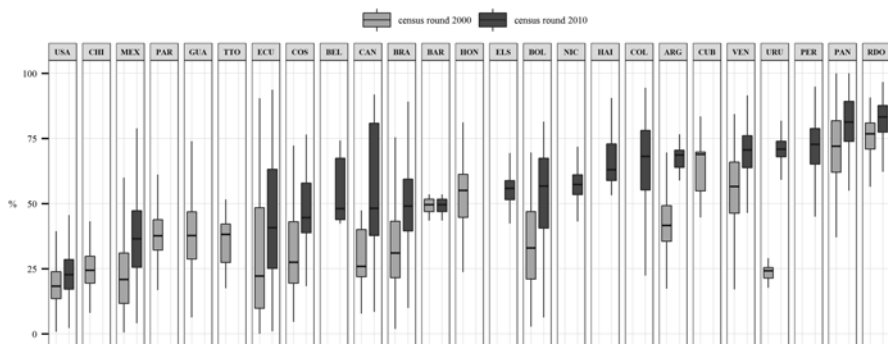
Fig. 1.2 Regional distributions of the proportions of consensual unions among all 25–29-year-old women in a union by country, based on census data from the 2000 and 2010 census rounds (*Source*: Authors' elaboration based on census microdata from the represented countries (see Table 1.1 for the exact sources))

within the 1.5 IQR of the lower and upper quartiles. Countries are ordered on the horizontal axis based on the median level of cohabitation of the most recent census for each country. We excluded those countries for which there was only one observation.

By the year 2000, the median values of cohabitation ranged from 15.2 % in the United Sates to 76.8 % in the Dominican Republic. The United States is the only country in which the median was below 20 %. In the 20–40 % range, there is a diverse group of countries, including Mexico, Canada, Brazil, Uruguay, Argentina, Bolivia, Paraguay, Costa Rica and Trinidad and Tobago. In the 40–60 % range are three Central American countries (El Salvador, Nicaragua and Honduras) as well as Venezuela and Barbados. Above the 60 % median level, there are five countries: Colombia, Cuba, Panama, Peru and the Dominican Republic. By 2010, the median values of cohabitation across local units had increased in all countries. The US still represented the lowest levels of cohabitation although the median had increased from 15.2 % in 2000 to 22.7 % in 2010. The Dominican Republic continued to maintain the record for having the highest levels of cohabitation. The median value of cohabitation increased in that country from 76.8 % cohabitation in 2000 to 83.2 in 2010.

What is most surprising about the boxplots is the substantial amount of internal heterogeneity evident for certain countries. One manner in which to measure such diversity is by looking at the interquantile range (IQR): the distance in percentage points between the 25th and the 75th percentiles. For countries with two time points, IQR values did not change dramatically, which indicates that the relative difference within countries remained stable despite the widespread increase in cohabitation. This is consistent with the results observed at the regional level: regions with the highest levels of cohabitation in the past remain the regions with highest levels of cohabitation in the present. The boxplots and the two local maps corroborate that the regional patterning of cohabitation (regardless of changes in levels between 2000 and 2010) did not change significantly over the last decade.

Turning to the geographic heterogeneity within countries, Canada and Ecuador stand out among the most internally diverse countries regarding the presence of cohabitation. In both countries and in both years, the IQR values spanned approximately 40 % points, which indicates sharp contrasts between areas. When we examine the geography of cohabitation in Canada and Ecuador, we observe that the high and low areas of cohabitation are not randomly distributed across local units. Instead, there is substantial spatial clustering. In Canada, the Quebec region includes the highest levels of cohabitation whereas in the other regions, from Ontario to British Columbia, cohabitation is much lower. In Ecuador, the geographic patterning is neatly structured by the presence of the Andean range. Cohabitation is much lower in the Andes than in the coastal and the Amazon regions.

After Canada and Ecuador, Bolivia, Colombia, Costa Rica, Mexico and Brazil display substantial heterogeneity as well, with IQR values ranging from 20 to 27 percentage points. As in Ecuador, the geography of the Andes is a useful demarcation to describe where the low values of cohabitation are in Bolivia and Colombia. In Costa Rica, the lowest levels of cohabitation are observed in the central region and the highest in the southern portions of the South Pacific (*Brunca*) and Caribbean (*Huetar Atlántico*) regions. The highest levels of cohabitation in Brazil are in the Amazonian basin and along the coast of the northern and northeastern regions. The geography of low and high cohabitation is less clear in Mexico. Cohabitation rates do not coincide with the delimitation of Mexico's states. The clusters of municipalities with the highest levels of cohabitation are in the *Sierra Madre occidental*, Chiapas and Veracruz.

At the opposite end, there are exceptionally homogenous countries among either the low or the high cohabiting countries. The United States, Chile, El Salvador, Nicaragua and the Dominican Republic have IQR values below 10 percentage points. In all of these countries, the IQR values are computed from more than 100 units per country.

6   Cohabitation in the Andean States

One of the most surprising and consistent spatial patterns that emerged from the local maps of cohabitation has been the systematic low rates of cohabitation observed in the municipalities or localities of the Andes Mountains. Largely, this pattern applies to those countries that are politically, culturally and geographically known as the Andean States: Venezuela, Colombia, Ecuador, Peru and Bolivia. The physical geography of the Andean states is clearly structured by the presence of the Andean range that extends along the western coast of South America, stretching from north to south through Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile and Argentina. Along its length, the Andes are split into several mountain ranges that are separated by intermediate depressions. The clearest example of that separation is Colombia, in which the Andes Mountains divide into three distinct parallel chains, called *cordillera oriental, central* and *occidental*. Moreover, in the Andes
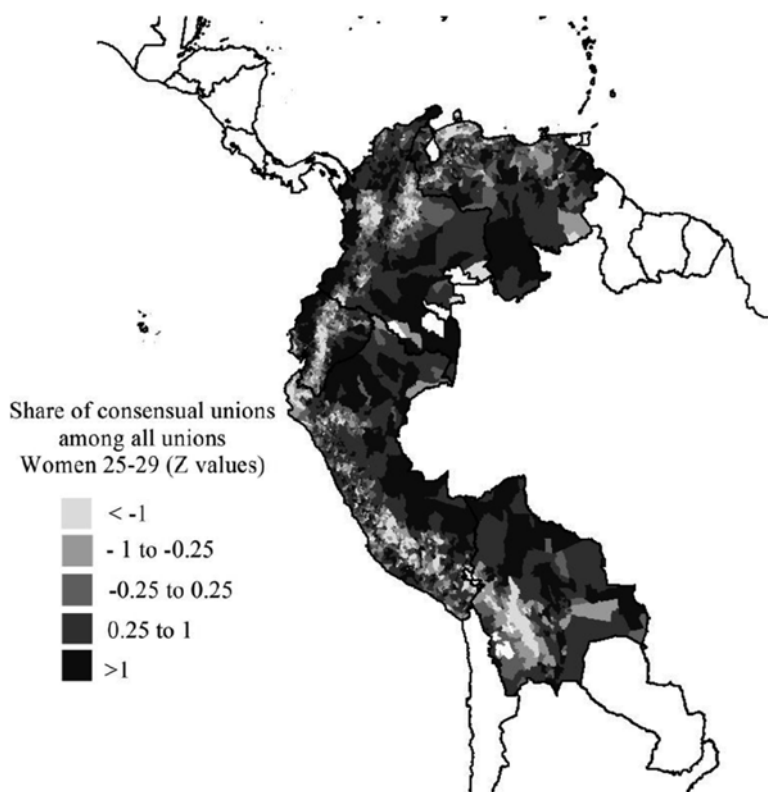
Map 1.5 Standard deviations (z-scores) from each country's mean of the rate of cohabitation among all 25-to-29-year-old women in a union. Based on census data from the last census available for Venezuela, Colombia, Ecuador, Peru, and Bolivia (*Source*: Authors' elaboration based on census microdata from the represented countries (see Table 1.1 for the exact sources))

are several high plains on which major cities such as Quito in Ecuador, Bogotá and Medellín in Colombia, Arequipa in Perú, La Paz and Sucre in Bolivia and Mérida in Venezuela are located.

What is the correlation between the Andes Mountains and cohabitation? In this chapter, we do not provide an answer to this question although we can definitively show the striking correlation that exists between the geography of the Andes and the geography of cohabitation. Although levels of cohabitation are different across the Andean countries, the relation between the two geographies is remarkably strong in all of these countries except Peru.

Map 1.5 shows the local map of cohabitation only for Venezuela in 2001, Colombia in 2005, Ecuador in 2001, Bolivia in 2001 and Peru in 2007. For this map, we used country-specific standard scores, which measure the number of standard deviations of an observation is above the mean. This process enhances the internal geographic differences in cohabitation, controlling by the factor that countries have different levels of cohabitation.
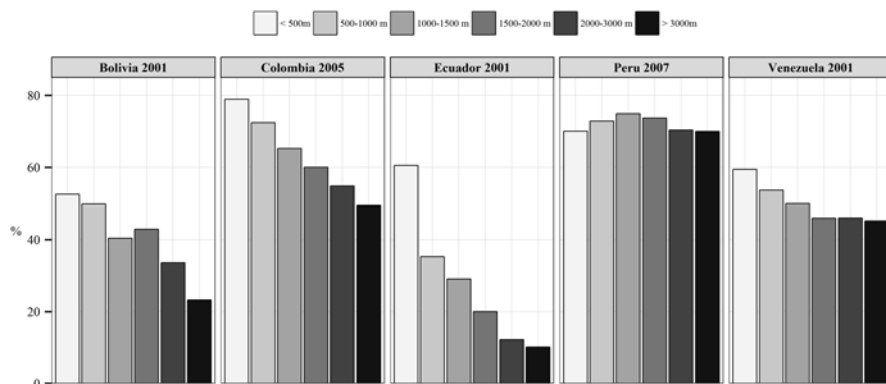
Fig. 1.3 Share of consensual unions by municipality's altitude (in meters) among all 25-to-29-year-old women in a union based on the 2000 census round for the Andean countries (Bolivia, Colombia, Ecuador, Peru and Venezuela) (*Source*: Authors' elaboration based on census microdata from the represented countries (see Table 1.1 for the exact sources))

Ecuador stands out as the country that best exemplifies the structuring power of the Andes with regard to cohabitation. The Andes Mountains run from the north to the south of Ecuador, inland from the coast, and divide the country into three continental regions: the *Costa*, the *Sierra* and the *Oriente*. The *parroquias* (parishes) located in the *Sierra* region show the lowest levels of cohabitation whereas the *Costa* and *Oriente* regions present the highest levels of cohabitation. In Colombia, Bolivia, Venezuela and to a lesser extent, Peru, the areas that have the lowest levels of cohabitation in each country clearly outline the contour of the Andes Mountains.

One manner in which to show the relation between the geography of the Andes and the geography of cohabitation is to examine the relation between altitude and cohabitation. We used GIS software to assign each unit the altitude of its geometric center. Figure 1.3 shows the average rate of cohabitation by each municipality's altitude (in meters above sea level) among all women aged 25–29 in unions. Except in Peru, we observe a negative relation between altitude and cohabitation. In Bolivia in 2001, the average rate of cohabitation in those municipalities located below 500 m was slightly over 50 %. For those municipalities above 3000 m, cohabitation drops to 20 %. Colombia shows the most regular relation between altitude and cohabitation. With every additional 500 m, cohabitation decreases by 6–7 percentage points. The largest contrast in cohabitation between low and high altitudes is in Ecuador: a 60 % cohabitation rate in municipalities below 500 m and 10 % in those above 3000 m. In Venezuela, the decrease of cohabitation with altitude is observed until one reaches 1500 and 2000 m. Peru has a different pattern: the highest levels of cohabitation are observed in those districts located between 1000 and 1500 m high. After that level, cohabitation falls with additional altitude, as in the other Andean states.

What is the relation between altitude and cohabitation? At this point, we cannot provide an answer to this question. Of course, we assume that altitude *per se* has nothing to do with cohabitation; however, in the context of the Andean countries,

altitude may be a proxy for diverse social and cultural family environments that are more or less prone to cohabitation. Is it religion? Perhaps the coastal and Amazonian areas were less heavily Christianized during colonization. In the next chapters, we will address several of the questions that may clarify this puzzling relation.

7   Conclusion

We have traced the geography of cohabitation in the Americas at the regional and local levels. We have also explored changes in time. We have shown that the prevalence of cohabitation, as opposed to marriage, is quite diverse across countries and that in the majority of countries, there is quite substantial regional and local heterogeneity. Such diversity reminds us of the importance of contextual factors. Despite the increase in cohabitation, the regional and local patterning of cohabitation remains scarcely changed, which unambiguously indicates the presence of geohistorical legacies in the most recent geography of cohabitation. The identification of such legacies is one of the major challenges of this book. To the extent possible, geographic diversity will be a constant across the next chapters. The rich geography of cohabitation invites researchers to identify contextual level variables in the lowest possible geographic detail. The rich geography also reminds us that the interaction between individual and contextual level variables is critical to understanding the social and regional patterning of the increase of cohabitation in the Americas.

References

Aassve, A., Arpino, B., & Billari, F. C. (2013). Age norms on leaving home: Multilevel evidence from the European social survey. *Environment and Planning A, 45*(2), 383–401.

Billy, J. O., & Moore, D. E. (1992). A multilevel analysis of marital and nonmarital fertility in the US. *Social Forces, 70*(4), 977–1011.

Binstock, G., & Cabella, W. (2011). La nupcialidad en el Cono Sur: evolución reciente en la formación de uniones en Argentina, Chile y Uruguay. In G. Binstock, J. Melo (Coords) *Nupcialidad y familia en la América Latina actual*. Rio de Janeiro: Ediciones ALAP, Serie Investigaciones No. 1, 35–60

Bocquet-Appel, J. P., & Jakobi, L. (1998). Evidence for a spatial diffusion of contraception at the onset of the fertility transition in Victorian Britain. *Population, 10*(1), 181–204.

Boyle, P. (2014). Population geography: Does geography matter in fertility research? *Progress in Human Geography, 27*(5), 615–626.

Castro-Martín, T. (2002). Consensual unions in Latin America: Persistence of a dual nuptiality system. *Journal of comparative family studies, 33*(1), 35–55.

Cerrutti, M. S., & Binstock, G. P. (2009). *Familias latinoamericanas en transformación: desafíos y demandas para la acción pública*. Santiago de Chile: Naciones Unidas, Comisión Económica para América Latina y el Caribe (CEPAL), 61 pp. ISBN 9789213233337

Coale, A. J. (1973). The demographic transition reconsidered. In *Proceedings of the international population conference* (Vol. I, pp. 53–72). Liege: International Union for the Scientific Study of Population (IUSSP).

Coale, A. J., & Watkins, S. C. (Eds.). (1986). *The decline of fertility in Europe: the revised proceedings of a Conference on the Princeton European Fertility Project*. Princeton: Princeton University Press, 484 pp. ISBN 0691094160 (cloth), 0691101760 (pbk).

Esteve, A., Lesthaeghe, R., & López-Gay, A. (2012). The Latin American cohabitation boom, 1970–2007. *Population and Development Review, 38*(1), 55–81.

García, B., & Rojas, O. (2002). Cambios en la formación y disolución de las uniones en América Latina. *Gaceta Laboral, 8*(3), 391–410.

Kennedy, S., & Bumpass, L. (2008). Cohabitation and children's living arrangements: New estimates from the United States. *Demographic research, 19*(article 47), 1663–1692.

Kennedy, S., & Fitch, C. A. (2012). Measuring cohabitation and family structure in the United States: Assessing the impact of new data from the current population survey. *Demography, 49*(4), 1479–1498. doi:10.1007/s13524-012-0126-8.

Klüsener, S., Perelli-Harris, B., & Gassen, N. S. (2013). Spatial aspects of the rise of nonmarital fertility across Europe since 1960: The role of states and regions in shaping patterns of change. *European Journal of Population/Revue Européenne de Démographie, 29*(2), 137–165. doi:10.1007/s10680-012-9278-x.

Laplante, B. (2006). The rise of cohabitation in Quebec. Power of religion and power over religion. *Canadian Journal of Sociology, 31*(1), 1–24.

Le Bourdais, C., & Lapierre-Adamcyk, É. (2004). Changes in conjugal life in Canada: Is cohabitation progressively replacing marriage? *Journal of Marriage and Family, 66*(4), 929–942. doi:10.1111/j.0022-2445.2004.00063.x.

Minnesota Population Center. (2014). *Integrated public use microdata series, international: Version 6.3* [Machine-readable database]. Minneapolis: University of Minnesota.

Quilodrán, J. (1983). La nupcialidad en las áreas rurales de México. In R. Benítez, J. Quilodrán (comps), *La Fecundidad rural en México*. México: El Colegio de México/UNAM, Cap. 5: 176–193 (Tables 11,12 and 17).

Quilodrán, J. (2001). A la búsqueda de modelos regionales de Nupcialidad. In J. Quilodrán. *Un siglo de matrimonio en México*. México: Centro de Estudios Demográficos Y de Desarrollo Urbano, Colegio de México, Cap.6: 205–251. ISBN 68121014X, 9789681210144.

Rodríguez Vignoli, J. (2005). *Unión y cohabitación en América Latina: modernidad, exclusión, diversidad?* Santiago de Chile: CELADE, División de Población de la CEPAL and UNFPA, Serie Población y Desarrollo 57.

Soons, J. P., & Kalmijn, M. (2009). Is marriage more than cohabitation? Well-being differences in 30 european countries. *Journal of Marriage and Family, 71*(5), 1141–1157. doi:10.1111/j.1741-3737.2009.00660.x.

Vitali, A., Aassve, A., & Lappegård, T. (2015). Diffusion of childbearing within cohabitation. *Demography, 52*(2), 355–377. doi:10.1007/s13524-015-0380-7.

Weeks, J. R. (2004). Chapter 19: The role of spatial analysis in demographic research. In M. F. Goodchild, D. G. Janelle, (Eds.), *Spatially integrated social science*. (pp. 381–399). New York: Oxford University Press.