Prevalence of social isolation and loneliness by living arrangement among Mexican elderly during the Covid-19 pandemic

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Abstract

Objective. To estimate the prevalence of social isolation (SI) and loneliness by sociodemographic, information and communication technologies use, health behavior, and health status among Mexican older adults (OA) living alone (LA) and those living with others (LWO) during the Covid-19 pandemic. **Materials and methods.** Data from the *Encuesta Nacional de Salud y Nutrición Continua* 2021 conducted in Mexico were analyzed. SI and loneliness were measured using internationally validated scales (LSNS-6 and TILS respectively). Analyses were conducted on adults aged 65 years and older, LA and LWO, considering the survey design. **Results.** Approximately 30% of OA in Mexico were LA in 2021. Among those LA, the percentage of widowhood, low well-being index and suicidal ideation were higher than in those LWO. SI prevalence was similarly high among individuals LA and those LWO (81.1 and 81.9% respectively), while loneliness prevalence was higher among individuals LA (51.5%) compared to those LWO (35.4%). Some differences in the characteristics of OA with higher prevalences of SI and loneliness were observed between those LA and those LWO. **Conclusion.** Targeted interventions are needed to address SI and loneliness in OA, based on whether they are

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Resumen

Objetivo. Estimar la prevalencia del aislamiento social (AS) y soledad por características sociodemográficas, uso de tecnologías de la información y la comunicación, comportamiento saludable y estado de salud en personas adultas mayores (PAM) mexicanas que viven solas (VS) y en aquéllas que viven acompañadas (VA) durante la pandemia de Covid-19. **Material y métodos.** Se analizaron datos de la Encuesta Nacional de Salud y Nutrición Continua 2021 realizada en México. El AS y la soledad se midieron utilizando escalas validadas internacionalmente (LSNS-6 y TILS, respectivamente). Los análisis se realizaron en personas de 65 años o más, VS y VA, considerando el diseño de la encuesta. **Resultados.** Aproximadamente 30% de las PAM en México estaba VS en 2021. Entre las PAM VS, el porcentaje de viudez, bajo índice de bienestar e ideación suicida fueron mayores que en aquéllas VA. La prevalencia de AS fue igualmente alta entre las PAM VS y VA (81.1 y 81.9%, respectivamente), mientras que la prevalencia de soledad fue más alta entre las PAM VS (51.5%) comparada con las PAM VA (35.4%). Se observaron algunas diferencias en las características de las PAM con mayor prevalencia de AS y soledad entre aquellas VS y aquellas VA. **Conclusión.** Se requieren intervenciones dirigidas para abordar el AS y la soledad en

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LA or LWO, while considering the vulnerabilities of each living arrangement.

Keywords: social isolation; loneliness; older adults; living alone; living arrangement; information and communication technologies; Mexico

las PAM que tomen en cuenta si viven solas o acompañadas, y consideren las vulnerabilidades de cada arreglo residencial.

Palabras clave: aislamiento social; soledad; adultos mayores; vivir solo; arreglo residencial; tecnologías de la información y la comunicación; México

The changes in demographic dynamics-such as the aging population, declining marriage and fertility rates, higher divorce rates, increased childlessness, the migration of children, and a growing preference for independent living and privacy-have contributed to the weakening of the structure of social and family networks. As a result, living arrangements have been modified, with a significant proportion of older adults (OA) living alone (LA) worldwide, which has been increasing.[1] Moreover, the excess mortality during the Covid-19 pandemic may have further exacerbated this pattern.

Evidence indicates that OA LA may be more vulnerable to social isolation (SI) and loneliness compared to those living with others (LWO), in part due to the lack of a family support network in their daily lives and a reduced perception of having their emotional and affection needs met;[2-6] however, LA does not imply that individuals experience SI or loneliness.[7] During Covid-19 pandemic lockdowns, SI and loneliness may have been worsened among OA, particularly those LA,[8] who typically receive companionship and support from family and friends outside the home.

SI is commonly defined as the objective lack of (or limited) social contact with others, while loneliness has been defined by some authors as the perception of social isolation or the subjective feeling of being alone.[4] The presence of these conditions in the lives of OA represents a public health concern, as they have been related to worse mental and physical health outcomes, increased utilization of health services, and higher mortality rates.[9] Some studies have found that the frequency of SI and loneliness among OA LA is higher than in those LWO.[10-12] The literature shows that factors such as sociodemographic characteristics, information and communication technologies (ICT) use, health behavior, and health status among others can contribute to SI and loneliness in older adults.[4,9] However, there is limited information regarding OA LA and those LWO, despite its importance for identifying the most vulnerable individuals within each subgroup and for designing targeted strategies to reduce SI and loneliness. In Mexico, no studies have been conducted to assess the prevalence of SI and loneliness among OA of both living arrangements. Thus, this study aimed to estimate the prevalence of SI and loneliness by sociodemographic, ICT use, health behavior, and health status characteristics among Mexican older adults LA and those LWO during the late-stage of the Covid-19 pandemic.

Materials and methods

Data from the *Encuesta Nacional de Salud y Nutrición Continua* 2021 (Ensanut Continua 2021) were used, which is a probabilistic survey with national and regional representativeness. The Ensanut Continua 2021, conducted from August to November in Mexico, collected information from 12 619 households.[13] The 2021 edition of Ensanut Continua is the only one from the 2020-2024 series that includes data on SI and loneliness among older adults, both those LA and those LWO. Of the 2 025 adults aged 65 and over who participated in the survey, 2 001 answered all questions measuring social isolation and loneliness. Living arrangement (LA or LWO) was established when the participants' response to the question "How many people normally live in this household?" and the number of household members (obtained from the list of residents) coincided. The analytical sample included 1 982 OA, of whom 517 were LA and 1 465 were LWO.

Measurement of social isolation and loneliness

Social isolation was measured with the 6-item Lubben Social Network Scale (LSNS-6),[14] which includes three questions to assess social connections with relatives and three corresponding questions to assess social connections with friends: How many relatives/friends do you see or hear from at least once a month? How many relatives/friends do you feel at ease with that you can talk about private matters? How many relatives/friends do you feel close to such that you could call on them for help? In the case of the first question, it was slightly modified as follows: How many relatives/friends do you see (in person or by video call') or hear from (by phone, WhatsApp, Skype, Facebook, etc.) at least once

a month? The response categories were: 1= none, 2= one, 3= two, 4= three or four, 5= five to eight, and 6= nine or more. The responses were recoded and summed to obtain the overall score, which ranged from 0 to 30. Participants were categorized into two groups: those with social isolation (score <12) and those without social isolation (score ≥12).[14] This cutoff point has been used in diverse cultural settings,[6,15] allowing for comparability across populations.

Loneliness was assessed using the Three-Item Loneliness Scale (TILS),[16] which consists of the following questions: How often do you feel that you lack companionship? How often do you feel left out? How often do you feel isolated from others? Responses were recorded on a Likert scale (1= Hardly ever or never, 2= Some of the time, 3= Often) and summed to calculate the overall score (ranging from 3 to 9). Based on a cutoff point used in previous studies to identify all older adults with any level of loneliness, participants were classified as either without loneliness (score <4) or with loneliness (score ≥4).

Variables

Sociodemographic characteristics: These included age (mean and quinquennial intervals), sex (woman, man), and education (none, elementary school, high school or higher), which was established according to the level of the last school year studied. The well-being index (low, medium, high) was constructed based on the characteristics of the households, as well as the available goods and services.[13] Marital status was categorized as: married/in a common-law union, divorced/separated from a marriage or common-law union, single, or widowed. Residence area was categorized as rural or urban/metropolitan, with 'rural' referring to areas with fewer than 2 500 inhabitants, 'urban' to areas with 2 500 to 99 999 inhabitants, and 'metropolitan' to areas with 100 000 or more inhabitants. The regions (Pacific-North, Border, Pacific-Central, Central-North, Central, Mexico City, State of Mexico, Pacific-South, Peninsula) were defined grouping contiguous states while ensuring that all regions had similar population sizes. For speaking an indigenous language, two categories were used (no, yes). The occupational status in the last week (not working, homemaker, working) was defined as follows: 'Working' if the participants worked at least one hour in the past week, helped in a family business, sold products, assisted with farm work, engaged in other paid activities, or had a job but were absent during the last week. 'Homemaker' if the participants were engaged in housework; and 'Not working' if they did not perform any of the activities described. Participants were asked whether they received financial support through the government's 'Welfare Pension for Older Adults' program (no, yes) and whether they had the right to or access to medical services provided by public, governmental or private institutions (no, yes).

ICT use: The use of a cell phone (no, yes), a computer (no, yes), the internet (no, yes), and social media (no, yes) was assessed. Those who reported using the respective ICT sometimes or always were grouped in the 'yes' category. For the use of social media, those who reported using platforms such as WhatsApp, Facebook, Twitter, YouTube, chat, or others were included in the 'yes' category. Additionally, whether the household had a landline telephone was considered (no, yes).

Health behavior characteristics: Participants were categorized into those who had walked for at least 10 continuous minutes on one or more days in the past 7 days, solely for recreation, sport, exercise, or pleasure (yes), and those who had not (no). They were also grouped into those who currently smoke tobacco every day or some days (yes), and those who do not (no). Participants were further categorized based on whether they had consumed at least one alcoholic drink daily, weekly, monthly, or annually in the past 12 months (yes), or had not consumed alcohol at all (no).

Physical and mental health status: Participants were asked whether a doctor had ever told them they had any of the following conditions: diabetes (no, yes), hypertension (no, yes), high cholesterol (no, yes), and high triglycerides (no, yes). For cardiovascular disease (no, yes), they were asked if a doctor had told them they have or had: a heart attack, angina, or heart failure. Depressive symptomatology (no, yes) was measured using the seven-item Center for Epidemiologic Studies Depression Scale (CESD-7) validated in Mexican older adults.[17] Disability (no, yes) was assessed using the Washington Group Short Set on Functioning (WG-SS), and individuals were categorized as having disability if they experienced a lot of difficulty with or could not do at all in at least one of the functional domains assessed.[18]

Statistical analysis

To describe the population study, for both the OA LA and LWO, we used mean and standard deviation, or the percentage and 95%CI, of sociodemographic characteristics, ICT use, health behavior, and health status characteristics. Student's t-test or Chi-square test was used. The prevalence and 95%CI of SI and loneliness by living arrangement, and by all variables previously de-

scribed in OA LA and those LWO were analyzed. Finally, a map displaying the prevalence of SI and loneliness by living arrangement across the nine regions defined in the Ensanut was created using the R package version 2024.09.0+375. The Chi-square test was used. A *p*-value less than 0.05 was considered statistically significant. The analyses were performed considering the survey's sample design. The data were analyzed using the SVY command of the Stata statistical package, version 15.1.

Results

Characteristics of older adults living alone vs. those living with others

Out of the 1 982 OA studied who participated in the Ensanut Continua 2021, representing 4 957 716 OA, 27.1% (95%CI: 24.3,30.1) lived alone and 72.9% (95%CI: 69.9,75.7) lived with others (table I).

When comparing the characteristics of OA LA vs. those LWO, some significant differences were identified. The percentage of individuals aged 80 or older was higher in the LA subgroup than in the LWO subgroup (20.0 vs. 14.0%, $p= 0.016$). This was also the case for the percentage of individuals who had a low well-being index (44.6% in LA vs. 32.3% in LWO, $p <0.000$), were widowed (60.5 vs. 27.9%, $p <0.000$), divorced (19.3 vs. 4.5%, $p <0.000$), single (15.5 vs. 7.3%, $p <0.000$), used a cell phone (60.1 vs. 52.6%, $p= 0.052$), did not have a landline (58.1 vs. 50.3%, $p= 0.028$), walked for exercise or pleasure in the past 7 days (31.0 vs. 23.3%, $p= 0.005$), and reported suicidal ideation (8.3 vs. 3.8%, $p= 0.002$). No significant differences were observed for the rest of the variables (tables I and II).

Prevalences of social isolation among older adults living alone and those living with others

The prevalence of SI in OA LA was 81.1% (95%CI: 76.3,85.2), and in those LWO was 81.9% (95%CI: 79.1,84.4) (table III).

Among those LA, the prevalence of SI was 86.3% in men and 77.4% in women ($p= 0.022$). The opposite was observed in those LWO (85.5% in women vs. 77.4% in men, $p= 0.001$). Among individuals LA and those LWO, more than 80.0% of those with no education or elementary school education experienced SI, whereas less than 70.0% of those with a high school or higher education reported SI ($p \leq 0.001$). Additionally, individuals in both living arrangements with a low well-being index had a higher prevalence of SI compared to those with a high well-being index, although the difference was marginally significant in the LA subgroup (LA: 83.7 vs. 70.5%, $p= 0.059$ and LWO: 87.0 vs. 74.7%, $p= 0.000$). In the LA subgroup, the prevalence of SI was 91.4% for married OA, compared to 71.9% for those who were divorced ($p= 0.057$). Among individuals LWO who were homemakers, the prevalence of SI was 85.8%, whereas among those who had worked or had not worked in the last week, it was less than 80.0% ($p= 0.029$). Of individuals LA, 87.4% who did not have the right to or access to medical services experienced SI, compared to 75.3% of those who did ($p= 0.006$) (table III).

For OA LA and those LWO, more than 83.0% of those who did not use a cell phone, computer, internet, or social media experienced SI, while less than 76.0% of ICT users experienced SI ($p <0.01$). Among OA LA without a landline telephone, the prevalence of SI was 86.3%, compared to 74.0% in those with one ($p= 0.003$) (table III).

In OA LWO who did not walk for exercise or pleasure in the past 7 days, the prevalence of SI was 85.1%, compared to 71.2% in those who did ($p= 0.000$). Among those LWO who did not consume alcohol in the past 12 months, the prevalence of SI was 83.6%, while it was 76.9% in those who did ($p= 0.036$). Furthermore, the prevalence of SI was 83.5% among individuals LWO without high cholesterol, compared to 75.8% among those with high cholesterol ($p= 0.012$). In the LA subgroup, the prevalence of SI was 87.5% among individuals experiencing loneliness and 74.4% among those not experiencing it ($p= 0.002$) (table IV).

For OA LA, the highest prevalence of SI was observed in the Pacific-Central region (90.1%), while the lowest was found in the Border region (64.0%). Among those LWO, the highest prevalence of SI was observed in the State of Mexico region (88.3%), while the lowest was also found in the Border region (73.3%). However, no significant differences were observed by region (figure 1A).

Prevalences of loneliness among older adults living alone and those living with others

The prevalence of loneliness in OA LA was 51.5% (95%CI: 45.8,57.1), and in those LWO was 35.4% (95%CI: 32.9,38.0) (table III).

Among individuals LWO aged 80 years or older, the prevalence of loneliness was 43.2%, while in those aged 65-69 years, it was 30.7% ($p= 0.042$). In women LWO, a higher prevalence of loneliness was observed compared with men (39.4 vs. 30.6%, $p= 0.003$). In the same subgroup, individuals with no education showed a loneliness prevalence of 42.7%, compared to 29.0% in those

Table I

SOCIODEMOGRAPHIC AND ICT USE CHARACTERISTICS OF OLDER ADULTS LIVING ALONE AND THOSE LIVING WITH OTHERS. MEXICO, ENSANUT CONTINUA 2021

Characteristics	*Living alone*				*Living with others*				*p value**
	n	*N (thousands)*	*%*	*95%CI*	*n*	*N (thousands)*	*%*	*95%CI*	
	517	1 342	27.1	24.3,30.1	1 465	3 616	72.9	69.9,75.7	
Sociodemographic									
Age (years)									
Mean	517	1 342	73.8	73.1,74.5	1 465	3 616	72.7	72.3,73.0	0.005
65-69	158	414	30.8	26.7,35.3	585	1 422	39.3	36.6,42.2	0.016
70-74	132	386	28.7	24.0,34.0	396	960	26.5	24.1,29.2	
75-79	112	274	20.4	16.0,25.7	268	728	20.1	17.7,22.8	
80+	115	268	20.0	15.6,25.2	216	507	14.0	12.1,16.2	
Sex									
Woman	311	773	57.6	51.6,63.4	852	2 000	55.3	52.3,58.3	0.497
Man	206	569	42.4	36.6,48.4	613	1 616	44.7	41.7,47.7	
Education									
None	121	293	21.8	17.7,26.7	313	723	20.0	17.8,22.4	0.337
Elementary school	270	626	46.6	40.9,52.4	779	1 856	51.3	48.0,54.7	
High school or higher	126	423	31.5	25.7,38.0	373	1 037	28.7	25.2,32.4	
Well-being index									
Low	256	599	44.6	38.3,51.1	485	1 168	32.3	29.3,35.5	<0.000
Medium	181	461	34.4	29.1,40.0	499	1 152	31.9	29.0,34.9	
High	80	282	21.0	15.7,27.4	481	1 296	35.8	32.2,39.6	
Marital status									
Married‡	27	63	4.7	3.0,7.3	841	2 179	60.3	57.5,63.0	<0.000
Divorced§	90	259	19.3	15.3,24.1	70	164	4.5	3.5,5.9	
Single	81	208	15.5	12.2,19.5	100	264	7.3	5.9,9.0	
Widowed	319	811	60.5	55.0,65.7	454	1 009	27.9	25.3,30.6	
Residence area									
Rural	142	313	23.3	18.7,28.7	344	814	22.5	20.1,25.1	0.776
Urban/Metropolitan	375	1 029	76.7	71.3,81.3	1 121	2 802	77.5	74.9,79.9	
Region									
Pacific-North	71	129	9.6	7.0,13.1	139	276	7.6	6.2,9.4	0.078
Border	38	160	11.9	7.5,18.4	96	423	11.7	9.6,14.1	
Pacific-Central	53	206	15.3	9.9,23.0	113	321	8.9	7.3,10.8	
Central-North	132	203	15.1	12.2,18.6	341	468	13.0	11.3,14.8	
Central	31	120	8.9	5.3,14.7	107	390	10.8	9.1,12.8	
Mexico City	45	96	7.2	5.0,10.2	207	429	11.9	10.5,13.4	
State of Mexico	49	163	12.1	9.1,15.9	146	447	12.4	10.7,14.3	
Pacific-South	51	180	13.4	9.5,18.6	161	555	15.3	13,0,18.0	
Peninsula	47	86	6.4	4.4,9.2	155	307	8.5	7.0,10.2	
Indigenous language									
No	491	1 259	93.8	90.0,96.2	1 381	3 404	94.1	91.2,96.1	0.848
Yes	26	83	6.2	3.8,10.0	84	212	5.9	3.9,8.8	

(continues…)

(continuation)

Occupational status (last week)									
Not working	190	526	39.2	33.2,45.6	458	1 207	33.4	30.5,36.4	0.073
Homemaker	195	485	36.2	30.6,42.1	658	1 576	43.6	40.5,46.7	
Working	132	330	24.6	19.8,30.1	349	833	23.0	20.6,25.7	
Welfare pension for older adults (a government program)									
No	178	467	34.9	30.3,39.7	587	1 425	39.5	36.5,42.6	0.089
Yes	338	872	65.1	60.3,69.7	874	2 180	60.5	57.4,63.5	
Right to or access to medical services									
No	257	649	48.4	42.8,54.1	648	1 569	43.4	40.1,46.9	0.116
Yes	259	692	51.6	45.9,57.2	816	2 043	56.6	53.1,59.9	
ICT use									
Using a cell phone									
No	212	535	39.9	33.3,46.9	721	1 713	47.4	44.4,50.3	0.052
Yes	305	806	60.1	53.1,66.7	744	1 903	52.6	49.7,55.6	
Using a computer									
No	477	1 202	89.6	85.0,92.9	1 351	3 247	89.8	87.1,92.0	0.927
Yes	40	140	10.4	7.1,15.0	114	369	10.2	8.0,12.9	
Using the internet									
No	428	1 059	78.9	73.2,83.7	1 174	2 812	77.8	74.8,80.5	0.688
Yes	89	283	21.1	16.3,26.8	291	804	22.2	19.5,25.2	
Using social media									
No	197	469	58.2	51.1,65.0	469	1 138	59.4	54.7,63.9	0.780
Yes	108	337	41.8	35.0,48.9	282	779	40.6	36.1,45.3	
Having a landline telephone									
No	326	779	58.1	58.1,64.1	765	1 819	50.3	46.8,53.8	0.028
Yes	191	562	41.9	35.9,48.2	700	1 798	49.7	46.2,53.2	

Ensanut: *Encuesta Nacional de Salud y Nutrición*.
N: Expanded population.
* Chi-square test for categoric variables and Student's t-test for continuous.
‡ Including those in a common-law union.
§ Including those separated from a common-law union.

with a high school education or higher (p= 0.007). In both the LA and LWO subgroups, widowed individuals showed higher prevalences of loneliness than married individuals, but the difference was significant only in those LWO (LA: 54.7 vs. 24.4%, p= 0.072 and LWO: 45.0 vs. 30.9%, p= 0.000). In both subgroups, the prevalence of loneliness was also higher in individuals living in rural areas compared to those in urban/metropolitan areas (LA: 65.0 vs. 47.4%, p= 0.006 and LWO: 40.4 vs. 34.0%, p= 0.038). In individuals LWO with a welfare pension for OA (a government program), the prevalence of loneliness was 38.1%, while among those without a pension, it was 31.6% (p= 0.035) (table III).

OA LWO who did not use a computer showed a loneliness prevalence of 36.5%, compared to 26.4% in those who used one (p= 0.044). A higher prevalence of loneliness was also observed among OA LWO who did not use social media, compared with those who did (38.3 vs. 30.3%, p= 0.050). Among individuals LA, 55.5% of those who did not use the internet experienced loneliness, while 36.4% of those who used it felt lonely (p= 0.004) (table III).

Additionally, for individuals LWO with hypertension, the prevalence of loneliness was 40.8%, while in those without hypertension, it was 31.0% (p= 0.000). In the LA and LWO subgroups, individuals with disability showed higher prevalences of loneliness than those without disability (LA: 64.5 vs. 46.9%, p= 0.010 and LWO: 47.5 vs. 31.2%, p= 0.000). For both subgroups, the prevalence of loneliness was higher

Table II

HEALTH BEHAVIOR AND PHYSICAL AND MENTAL HEALTH STATUS CHARACTERISTICS OF OLDER ADULTS LIVING ALONE AND THOSE LIVING WITH OTHERS. MEXICO, ENSANUT CONTINUA 2021

Characteristics	*Living alone*				*Living with others*				*p value**
	n	*N (thousands)*	*%*	*95%CI*	*n*	*N (thousands)*	*%*	*95%CI*	
Health behavior									
Walked for exercise or pleasure (in the past 7 days)									
No	376	918	69.0	63.8,73.7	1 133	2 773	76.7	73.9,79.2	0.005
Yes	140	413	31.0	26.3,36.2	332	843	23.3	20.8,26.1	
Currently smokes tabacco									
No	464	1 186	89.4	85.6,92.3	1 325	3 280	91.0	89.0,92.7	0.398
Yes	50	140	10.6	7.7,14.4	135	324	9.0	7.3,11.0	
Consumed alcohol (in the past 12 months)									
No	380	959	72.2	67.3,76.6	1 076	2 657	73.5	70.6,76.2	0.608
Yes	135	370	27.8	23.4,32.7	388	957	26.5	23.8,29.4	
Physical and mental health status									
Diabetes‡									
No	385	999	74.4	69.4,78.9	1 073	2 676	74.0	71.3,76.6	0.875
Yes	132	343	25.6	21.1,30.6	391	939	26.0	23.4,28.7	
Hypertension‡									
No	292	746	55.6	50.6,60.5	780	1 974	54.6	51.5,57.7	0.722
Yes	224	595	44.4	39.5,49.4	683	1 640	45.4	42.3,48.5	
Cardiovascular disease‡									
No	505	1 308	97.5	95.4,98.7	1 421	3 528	97.6	96.6,98.3	0.942
Yes	12	33	2.5	1.3,4.6	44	88	2.4	1.7,3.4	
High cholesterol‡									
No	427	1 094	81.5	76.9,85.4	1 156	2 864	79.2	76.7,81.5	0.363
Yes	90	248	18.5	14.6,23.1	308	751	20.8	18.5,23.3	
High triglycerides‡									
No	436	1 122	83.7	79.8,86.9	1 192	2 947	81.5	79.2,83.6	0.330
Yes	81	219	16.3	13.1,20.2	272	668	18.5	16.4,20.8	
Disability (WG-SS)									
No	378	991	73.9	68.4,78.7	1 098	2 684	74.2	71.0,77.2	0.909
Yes	139	350	26.1	21.3, 31.6	367	932	25.8	22.8,29.0	
Depressive symptomatology (CESD-7)									
No (score <5)	211	541	40.3	34.9,46.0	649	1 613	44.6	41.2,48.0	0.224
Yes (score ≥5)	306	801	59.7	54.0,65.1	815	2 002	55.4	52.0,58.8	
Suicidal ideation									
No	481	1 217	91.7	87.7,94.5	1 404	3 469	96.2	94.9,97.2	0.002
Yes	33	110	8.3	5.5,12.3	57	137	3.8	2.8,5.1	

Ensanut: *Encuesta Nacional de Salud y Nutrición.*
N: Expanded population.
WG-SS: Washington Group Short Set on Functioning.
CESD-7: seven-item Center for Epidemiologic Studies Depression Scale.
* Chi-square test.
‡ For each of the conditions evaluated, the following question was asked: Has a doctor told you that you have.....? In the case of cardiovascular disease, the question was: Has a doctor told you that you have or had a heart attack, angina, or heart failure?

among individuals with depressive symptomatology than in those without this symptomatology (LA: 58.2 vs. 41.5%, p= 0.002 and LWO: 46.5 vs. 21.7%, p= 0.000). In both subgroups, individuals with suicidal ideation also showed a higher prevalence of loneliness than those without such ideation (LA: 84.2 vs. 49.1%, p= 0.003 and LWO: 72.8 vs. 33.8%, p= 0.000). Finally, for individuals LA, the prevalence of loneliness was higher in those experiencing SI (55.5%), compared with those not experiencing it (34.2%, p= 0.002) (table IV).

Table III

Prevalence of social isolation and loneliness among older adults living alone and those living with others by sociodemographic and ICT use characteristics. Mexico, Ensanut Continua 2021

Characteristics	Prevalence of social isolation						Prevalence of loneliness					
	Living alone			Living with others			Living alone			Living with others		
	n	%	95%CI	*n*	%	95%CI	*n*	%	95%CI	*n*	%	95%CI
	434	81.1	76.3,85.2	1215	81.9	79.1,84.4	284	51.5	45.8,57.1	527	35.4	32.9,38.0
Sociodemographic												
Age (years)												
65-69	130	77.1	67.3,84.6	480	79.7	74.9,83.7	83	50.7	40.6,60.7	188	30.7	26.7,35.0
70-74	115	83.8	73.1,90.9	318	80.4	75.1,84.8	73	53.2	42.4,63.8	135	36.0	30.2,42.3
75-79	91	78.7	67.6,86.8	231	85.1	79.0,89.6	65	50.7	38.3,63.1	107	38.4	31.8,45.4
80+	98	85.9	75.9,92.3	186	86.1	81.2,89.9	63	51.0	40.8,61.1	97	43.2	36.2,50.5
			0.469*			0.162*			0.979*			0.042*
Sex												
Woman	259	77.4	70.8,82.8	735	85.5	82.2,88.3	166	49.1	42.5,55.7	340	39.4	36.3,42.6
Man	175	86.3	80.2,90.7	480	77.4	73.2,81.1	118	54.7	46.4,62.7	187	30.6	26.3,35.2
			0.022*			0.001*			0.245*			0.003*
Education												
None	109	91.6	85.6,95.3	277	89.8	86.0,92.7	67	53.5	43.2,63.4	134	42.7	36.3,49.5
Elementary school	234	83.8	77.1,88.9	673	86.3	83.4,88.7	160	53.3	45.8,60.7	283	36.2	32.4,40.2
High school or higher	91	69.9	59.5,78.6	265	68.4	61.4,74.7	57	47.4	36.4,58.6	110	29.0	24.1,34.3
			0.001*			0.000*			0.588*			0.007*
Well-being index												
Low	221	83.7	77.1,88.6	426	87.0	83.5,89.9	145	53.0	45.1,60.7	183	37.4	32.8,42.2
Medium	155	84.4	76.6,89.9	416	84.7	80.7,88.0	102	54.9	44.2,65.2	193	36.9	31.9,42.1
High	58	70.5	56.5,81.4	373	74.7	69.0,79.7	37	42.7	31.6,54.6	151	32.4	28.3,36.7
			0.059*			0.000*			0.280*			0.271*
Marital status												
Married‡	24	91.4	74.3,97.5	691	81.2	77.9,84.2	8	24.4	9.6,49.5	249	30.9	27.6,34.4
Divorced§	70	71.9	60.0,81.4	54	78.7	65.9,87.6	46	52.5	41.5,63.4	29	35.5	23.6,49.5
Single	65	79.0	66.6,87.6	82	75.9	62.7,85.5	42	45.8	33.2,59.1	41	36.0	26.5,46.8
Widowed	275	83.8	78.4,88.1	388	85.3	81.1,88.7	188	54.7	47.7,61.5	208	45.0	40.2,50.0
			0.057*			0.202*			0.072*			0.000*
Residence area												
Rural	122	83.7	74.9,89.8	289	82.5	77.5,86.5	87	65.0	54.3,74.3	134	40.4	35.1,45.9
Urban/Metropolitan	312	80.4	74.6,85.1	926	81.7	78.4,84.6	197	47.4	40.8,54.1	393	34.0	31.2,36.9
			0.490*			0.781*			0.006*			0.038*

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(continuation)

Indigenous language												
No	414	81.5	76.5,85.6	1 139	81.5	78.7,84.1	271	52.0	46.2,57.8	492	35.0	32.4,37.7
Yes	20	75.8	52.7,89.8	76	87.1	73.0,94.4	13	43.1	24.1,64.4	35	42.4	32.1,53.4
			0.530*			0.368*			0.432*			0.184*
Occupational status (last week)												
Not working	158	80.4	71.4,87.1	362	78.5	73.0,83.2	112	49.1	41.2,57.0	160	34.9	29.7,40.4
Homemaker	169	83.9	76.4,89.4	569	85.8	82.1,88.9	105	53.0	43.2,62.6	251	36.3	32.5,40.3
Working	107	78.2	68.7,85.5	284	79.2	73.0,84.3	67	53.0	42.0,63.8	116	34.5	29.2,40.3
			0.583*			0.029*			0.781*			0.862*
Welfare pension for older adults (a government program)												
No	143	75.5	66.5,82.7	481	80.0	75.5,83.8	97	51.6	41.8,61.3	197	31.6	27.4,36.0
Yes	291	84.4	78.2,89.1	730	83.0	79.8,85.8	187	51.6	44.8,58.3	330	38.1	34.6,41.8
			0.072*			0.191*			0.991*			0.035*
Right to or access to medical services												
No	226	87.4	81.3,91.6	558	84.6	80.6,87.9	151	56.2	48.7,63.4	239	35.9	32.1,40.0
Yes	207	75.3	68.0,81.4	657	79.9	76.1,83.3	132	47.0	39.3,54.8	288	35.1	31.6,38.8
			0.006*			0.069*			0.080*			0.768*
ICT use												
Using a cell phone												
No	193	89.5	82.1,94.0	647	89.0	85.9,91.5	124	55.4	47.2,63.2	255	35.7	32.3,39.4
Yes	241	75.6	69.1,81.1	568	75.4	71.3,79.2	160	48.9	41.7,56.1	272	35.1	31.5,39.0
			0.005*			0.000*			0.222*			0.821*
Using a computer												
No	410	83.8	79.1,87.6	1 143	83.7	81.0,86.1	267	52.8	46.8,58.6	494	36.5	33.9,39.1
Yes	24	58.4	42.0,73.1	72	65.4	53.0,76.0	17	40.5	23.2,60.6	33	26.4	18.6,36.0
			0.000*			0.000*			0.252*			0.044*
Using the internet												
No	373	85.3	80.1,89.2	1 017	85.3	82.5,87.8	246	55.5	49.1,61.7	431	36.1	33.0,39.3
Yes	61	65.7	54.5,75.4	198	69.8	62.6,76.2	38	36.4	26.5,47.5	96	33.1	27.3,39.4
			0.000*			0.000*			0.004*			0.434*
Using social media												
No	170	83.8	76.5,89.1	398	84.8	80.9,88.1	112	52.0	43.2,60.6	183	38.3	33.3,43.6
Yes	71	64.2	54.0,73.3	175	61.7	54.4,68.5	48	44.6	33.5,56.3	90	30.3	25.0,36.1
			0.000*			0.000*			0.306*			0.050*
Having a landline telephone												
No	285	86.3	81.3,90.1	652	83.7	80.3,86.6	183	52.6	45.2,59.8	294	37.8	33.9,41.8
Yes	149	74.0	65.5,81.1	563	80.0	75.9,83.6	101	50.0	41.2,58.7	233	33.1	29.4,37.0
			0.003*			0.132*			0.656*			0.115*

Ensanut: *Encuesta Nacional de Salud y Nutrición.*
* Chi-square test.
‡ Including those in a common-law union.
§ Including those separated from a common-law union.

Among OA LA, the highest prevalence of loneliness was observed in the Pacific-Central region (73.0%), while the lowest was observed in the Peninsula region (43.4%). For those LWO, the Pacific-South region had the highest prevalence of loneliness (38.7%), while the State of Mexico region had the lowest (32.2%). However, differences by region were not statistically significant (figure 1B).

Discussion

While the Ensanut[13,19-21] monitors various aspects of population health, it has also been useful in understanding the landscape of certain mental health issues,[22-24] providing data on prevalence,[23] needs,[24] and outcomes, which in turn can contribute to the design of public policies and interventions. The mental health landscape is

Table IV

Prevalence of social isolation and loneliness in older adults living alone and those living with others by health behavior and physical and mental health status characteristics. Mexico, Ensanut Continua 2021

Characteristics	Prevalence of social isolation						Prevalence of loneliness					
	Living alone			Living with others			Living alone			Living with others		
	n	%	95%CI	*n*	%	95%CI	*n*	%	95%CI	*n*	%	95%CI
Health behavior												
Walked for exercise or pleasure (in the past 7 days)												
No	320	83.0	77.7,87.2	965	85.1	82.3,87.5	219	54.1	48.5,59.6	410	36.6	33.8,39.5
Yes	113	76.5	66.1,84.5	250	71.2	64.0,77.4	65	47.0	36.5,57.7	117	31.5	25.8,37.8
			0.191*			0.000*			0.202*			0.149*
Currently smokes tabacco												
No	390	81.1	76.0, 85.3	1105	82.4	79.4,85.0	258	52.5	46.6,58.4	479	35.2	32.6,37.9
Yes	41	79.8	63.4,90.0	105	76.2	66.1,83.9	25	47.0	32.8,61.7	47	38.4	29.1,48.7
			0.856*			0.154*			0.483*			0.538*
Consumed alcohol (in the past 12 months)												
No	323	82.1	76.5,86.6	910	83.6	80.6,86.3	202	50.7	43.9,57.5	391	35.6	32.5,38.8
Yes	109	77.9	68.2,85.3	304	76.9	70.3,82.4	81	54.7	45.3,63.8	135	34.8	29.5,40.5
			0.382*			0.036*			0.488*			0.830*
Physical and mental health status												
Diabetes‡												
No	323	81.2	75.1,86.0	902	82.0	78.7,84.8	204	50.2	43.4,57.0	386	36.0	32.9,39.3
Yes	111	81.0	70.6,88.3	313	81.7	77.0,85.6	80	55.2	44.0,66.0	141	33.7	28.9,38.9
			0.977*			0.897 *			0.462*			0.478*
Hypertension‡												
No	247	82.8	76.6,87.6	649	81.8	78.1,84.9	151	47.2	38.8,55.7	248	31.0	27.6,34.7
Yes	186	79.0	70.8,85.4	565	82.1	78.5,85.2	132	56.8	48.1,65.0	279	40.8	37.2,44.5
			0.421*			0.890*			0.144*			0.000*
Cardiovascular disease‡												
No	425	81.3	76.5,85.4	1 184	82.1	79.3,84.7	276	51.1	45.3,56.8	508	35.3	32.7,37.9
Yes	9	73.5	40.1,92.0	31	71.8	56.2,83.5	8	66.3	34.1, 88.2	19	40.9	26.4,57.1
			0.535*			0.101*			0.349*			0.486*
High cholesterol‡												
No	360	82.7	77.6,86.7	977	83.5	80.6,86.1	233	51.6	45.5,57.7	396	34.0	31.1,37.0
Yes	74	74.4	58.2,85.9	238	75.8	69.2,81.4	51	50.9	37.3,64.3	131	40.8	34.8,47.1
			0.238*			0.012*			0.924*			0.056*

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(continuation)

High triglycerides‡												
No	365	81.6	76.7,85.7	1 000	82.4	79.3,85.0	235	50.9	45.0,56.9	413	34.3	31.3,37.3
Yes	69	78.6	61.2,89.5	215	79.9	73.9,84.8	49	54.3	39.9,67.9	114	40.6	34.0,47.6
			0.678*			0.383*			0.668*			0.107*
Disability (WG-SS)												
No	314	79.6	74.0,84.2	913	80.9	77.4,84.0	189	46.9	41.3,52.6	341	31.2	28.3,34.3
Yes	120	85.5	76.3,91.5	302	84.6	80.6,87.9	95	64.5	51.9,75.4	186	47.5	41.6,53.5
			0.230*			0.147*			0.010*			0.000*
Depressive symptomatology (CESD-7)												
No (score <5)	172	78.8	72.3.84.1	527	79.5	75.0,83.3	95	41.5	33.6,50.0	139	21.7	18.1,25.8
Yes (score ≥5)	262	82.7	76.7,87.4	688	83.9	80.5,86.7	189	58.2	51.2,64.9	388	46.5	42.9,50.2
			0.286*			0.080*			0.002*			0.000*
Suicidal ideation												
No	402	80.5	75.3,84.8	1 165	81.8	78.8,84.4	254	49.1	43.2,54.9	482	33.8	31.3,36.5
Yes	29	86.2	64.6,95.5	47	83.8	69.7,92.0	29	84.2	61.4,94.7	42	72.8	58.3,83.6
			0.521*			0.746*			0.003*			0.000*
Social isolation												
No (score ≥12)	-	-	-	-	-	-	35	34.2	24.0,46.1	88	31.2	25.0,38.1
Yes (score <12)	-	-	-	-	-		249	55.5	49.2,61.6	439	36.4	33.5,39.3
									0.002*			0.184*
Loneliness												
No (score <4)	185	74.4	66.7,80.9	776	80.7	77.0,83.9	-	-	-	-	-	-
Yes (score ≥4)	249	87.5	82.0,91.4	439	84.1	80.0,87.4	-	-	-	-	-	-
			0.002*			0.184*						

Ensanut: *Encuesta Nacional de Salud y Nutrición.*
WG-SS: Washington Group Short Set on Functioning.
CESD-7: seven-item Center for Epidemiologic Studies Depression Scale.
* Chi-square test.
‡ For each of the conditions evaluated, the following question was asked: Has a doctor told you that you have.....? In the case of cardiovascular disease, the question was: Has a doctor told you that you have or had a heart attack, angina, or heart failure?

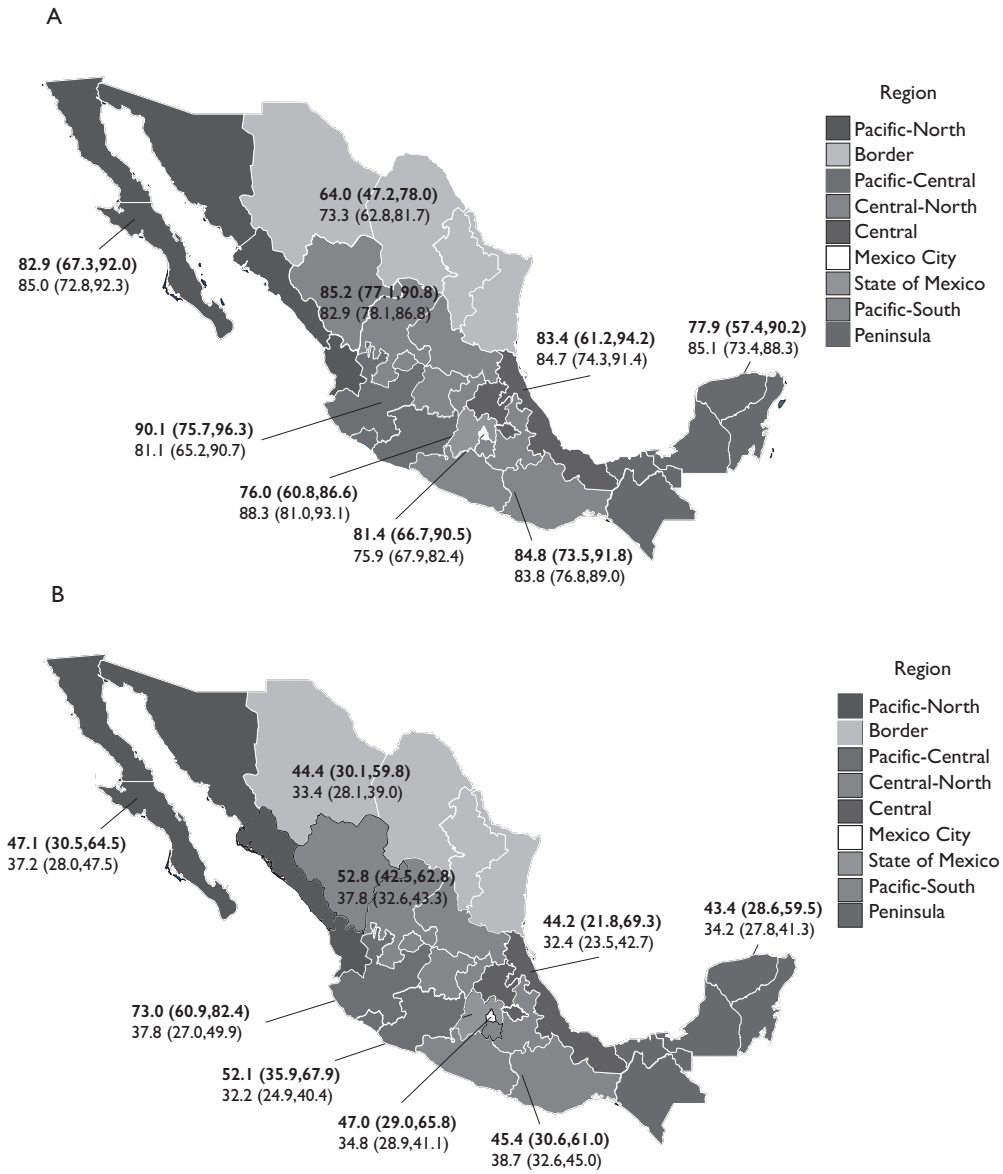
characterized by a high global burden, affecting millions of people –a situation exacerbated by events such as the Covid-19 pandemic[25] and by a significant gap in available support, especially for vulnerable populations–the reason for this contribution focusing on the population over 65 years of age LA and LWO. The study of SI and loneliness in OA is crucial, as both constitute public health problems with significant negative repercussions on mental and physical health, including an increased risk of dementia, cardiovascular disease, and premature death.[9,26] Understanding SI and loneliness is fundamental for developing interventions, informing policies, and improving quality of life, as research demonstrates that social connection is vital for overall well-being.

Based on data from the Ensanut Continua 2021, this study estimated that 27.1% of OA aged 65 and over in Mexico were LA in 2021 during the Covid-19 pandemic, which doubles the estimate (12.4%) from the Ensanut Continua Covid-19 conducted in 2020.[27] This figure more closely resembles what is typically observed in countries with more individualistic social structures, rather than in countries with more family-oriented structures, such as those in Latin America.[1] The increase in the percentage of OA LA observed in Mexico could be explained in part by the loss of partners and other relatives with whom the OA cohabitated, or because a higher proportion of OA LWO may have died compared to those LA.

In other countries, research has shown that among OA LA the prevalence of SI and loneliness is higher than among those LWO.[10-12,28,29] LA in old age can make individuals more vulnerable to SI, as the absence of the emotional and instrumental support, that cohabitation may provide, can make it more difficult to cope with

daily life, have the motivation to maintain relationships, and stay connected. The results of this study showed a similarly high prevalence of SI (objective lack of social contacts) in both OA LA and those LWO (81.1 and 81.9% respectively) during the pandemic. In Mexico, lockdown measures for OA, such as staying home and limiting in-person social contacts, were maintained continuously throughout the pandemic, which could have drastically increased their SI regardless of their living arrangement. Furthermore, the low use of ICT among OA LA and those LWO may have contributed to SI by limiting their options for staying in touch with others virtually.

Despite the similar prevalence of SI observed between both subgroups in our study, the prevalence of loneliness (perceived SI or the subjective feeling of being alone) was higher among OA LA (slightly over



Percentages (95%CI) in older adults living alone are shown in bold text, while data for those living with others are shown in non-bolded text.
Ensanut: *Encuesta Nacional de Salud y Nutrición*.

Figure 1. Prevalences of A) social isolation and B) loneliness across the nine regions covered by the Ensanut Continua 2021. Mexico

half) compared to those LWO (just over a third), which is consistent with the findings of other authors.[10,29] Our results can be explained in part by the fact that, while SI can contribute to loneliness,[30] the two are often not highly correlated. Moreover, it has been suggested that the quality of relationships is more strongly associated with loneliness than quantity.[31] Thus, during the Covid-19 pandemic lockdown in Mexico, LWO may have provided OA with opportunities for meaningful connections and support within the household. In contrast, OA LA may have experienced more loneliness, as they likely had fewer opportunities for meaningful daily connections and received less emotional and practical support. This may have been further exacerbated by the higher proportion of OA LA who were older, had a low well-being index, and were widowed, all of which are known characteristics associated with loneliness.[32]

Regardless of living arrangement, the prevalence of SI was higher among OA who had no or low education, a low well-being index, and who did not use a cell phone, computer, internet or social media. The prevalence of loneliness was higher among OA who lived in rural areas, had disability, depressive symptomatology, or suicidal ideation, as well as among widowed individuals and those with no or low education. However, in the case of the latter two, the difference was not statistically significant in the LA subgroup. Findings from a previous study analyzing data from 2020 Ensanut Continua Covid-19 suggest that OA LA who are widowed or have no or low education, are more vulnerable to loneliness.[27] These findings are consistent with those of previous studies on SI[33-36] and loneliness[4,29,32,37] in the general population of OA.

In the LA subgroup, the prevalence of SI was higher among men, those who were married, did not have the right to or access to medical services, did not have a landline telephone, and experienced loneliness. Research in OA supports these results.[4,33,34,36] Individuals LA were already at higher risk of SI, and men may have been even more vulnerable, as they tend to be less willing to broaden their social circles and have close friends. Being male has been associated with SI in other studies.[34] Spouses can be a significant source of social support for OA, and some studies have found that those without a spouse are more likely to experience SI.[34] However, during the pandemic in Mexico, married individuals who LA were the most vulnerable to SI, although the difference was statistically marginal. In Mexico, couples can live apart together (LAT) –that is, maintain their relationships while living in separate household– due to migration or mutual agreement. During the pandemic, individuals LA and married may have primarily relied on their spouse for social interaction and did not maintain broader social ties. In contrast, individuals LA and unmarried might have developed more diverse social ties prior to the pandemic and may have more likely to maintain them despite the confinement. These findings highlight the importance of not assuming cohabitation or social connectedness based solely on marital status. Lack of access to medical services and a landline phone may have limited ways of interacting with others or staying connected. Loneliness may have generated negative social biases, avoidance behaviors, and reduced motivation to seek social contact,[4] leading OA to become more isolated, especially those LA.

We also found that in the LWO subgroup, the prevalence of SI was higher among women, those who were homemakers, did not walk for exercise or pleasure, and did not have high cholesterol. Contrary to what has been observed by many authors, a few studies in OA have observed that women are more vulnerable to SI.[34] In Mexico, women and homemakers LWO may have faced more household responsibilities and fewer opportunities for outside interaction, especially during the pandemic. Other authors have reported that physically active OA are less likely to experience SI, arguing that, as OA tend to integrate regular physical exercise with social interactions, this may help reduce the risk of SI.[35] In our study, not walking for exercise or pleasure could indicate lower engagement in public or community spaces and less social contact. Likewise, not having a medical condition such as high cholesterol could indicate reduced interaction with healthcare providers and, consequently, less activation of support networks.

In the OA LA subgroup, the prevalence of loneliness was higher among individuals who did not use the internet and who experienced SI. OA LA who did not use the internet may have had more limited possibilities for meaningful connection during the pandemic, as internet use can provide social support and opportunities to participate in activities of interest.[4,38] As discussed previously, SI can contribute to loneliness in OA.[4,30] In a study conducted at the onset of the Covid-19 pandemic in the U.S., bivariate correlations revealed that, regardless of whether individuals were LA or LWO, higher levels of loneliness were associated with more SI.[8] In our study, the lack of social contacts outside the home may have further increased the sense of loneliness among people LA.

In the OA LWO subgroup, loneliness was more prevalent among older individuals, women, those receiving a welfare pension for OA (a government program), individuals who did not use a computer, did not use social media, and those with hypertension. Older age and being female have been associated with loneliness in OA in previous studies.[24,39] The oldest individuals may be more vulnerable to loneliness due to age-related con-

ditions such as functional difficulties, the loss of family members, diminished social roles, and shrinking social networks.[39] Female OA may be more likely to experience loneliness due to psychologically distressing life events (such as the loss of a spouse), personality traits, or social roles.[39] In a bivariate analysis conducted at the onset of the Covid-19 pandemic in the U.S., loneliness was associated with younger age and female gender only in the OA LWO subgroup.[8] Receiving a welfare pension for OA (a government program) could generate conflicts within the household (regarding resource management), which could influence the emotional well-being of OA. In a systematic review was found that social media use was associated with lower levels of loneliness.[40] Not using a computer or social media may have made OA LWO more vulnerable to loneliness by reducing opportunities for meaningful social contact. Although some studies have shown that loneliness is a risk factor for hypertension, an inverse association has also been reported.[41] Hypertension may affect emotional well-being and social engagement, increasing the vulnerability of OA to loneliness. Further studies are needed to better understand the differences observed according to living arrangement.

The analysis by region showed that in OA LA the highest prevalence of SI and loneliness was observed in the Pacific-Central region, while the lowest prevalences (more than 25 percentage points lower than the highest) were found in the Border and Peninsula. Among OA LWO the highest prevalence of SI was found in the State of México and the lowest in the Border region, while for loneliness, prevalences were more homogeneous across regions. Although these differences were not significant, data suggest that the region could contribute to SI and loneliness in OA, particularly in the LA subgroup.

A variety of strategies have been proposed in the literature to address SI and loneliness in OA.[4,9] Our data suggest that in Mexico, the design of interventions should focus on individuals with no or low education, low well-being index, and no use of ICT, as well as those who are widowed, live in rural areas, have disability, depressive symptomatology, or suicidal ideation. Our results also suggest that targeted interventions for individuals LA and those LWO are needed, considering the vulnerabilities of each living arrangement evidenced in this study. Among OA LA some potential interventions could include: 1) promoting personalized support networks and group activity programs (in-person or virtual), with particular attention to men and married individuals who may have lost key ties, 2) facilitating access to the internet and landline telephones, 3) promote digital literacy, focusing on the social uses of the internet (video calls, messaging, community platforms), for maintaining emotional connection with family, friends, or stakeholders, 4) design community programs that combine social activities with health promotion, and 5) ensuring access to health services not only as basic services but also as bridges for social contact. On the other hand, among OA LWO the following recommendations could be made: 1) identifying and strengthening emotional support for those at risk of loneliness (despite being surrounded by other people), particularly older individuals and women, 2) promoting spaces for meaningful connection both inside and outside the home for homemakers, through recreational group activities or volunteering, 3) promoting recreational physical activity, not only as a healthy habit but also as a means of connection and integration, 4) incorporating the emotional and relational components into physical health programs, especially for individuals with chronic conditions such as hypertension, and 5) supporting the use of technology (computers and social media), beyond mere access, by encouraging its use to create and maintain emotional bonds.

One of the strengths of the study is that this is, to our knowledge, the first population-based study to describe the prevalence of SI and loneliness in LA and LWO subgroups according to sociodemographic, ICT use, health behavior, and health status characteristics. For the analysis, a nationally representative sample from Ensanut Continua 2021 was used, which ensures the results are reliable and applicable to Mexican adults aged 65 years and older living alone and living with others. SI and loneliness indicators were measured with scales validated and used in population studies in various countries. Our results support that SI should be conceptually distinguished from living arrangements and marital status. This study also presents some limitations that should be considered. All variables are based on participants' self-reports. SI and loneliness estimates could be influenced by the used cutoff point; future analyses could explore different cutoff points.

In conclusion, our results showed that while OA LA and those LWO presented similar prevalences of SI during the Covid-19 pandemic, the prevalence of loneliness was higher among OA LA compared to those LWO, although it was also elevated in the latter subgroup. These findings underline the vulnerability of Mexican OA without support networks within the home to loneliness, while also indicating that cohabitation does not necessarily ensure meaningful emotional connections. This study revealed differences in the characteristics of OA with higher prevalences of SI and loneliness between those LA and those LWO. These results may be specific to the Covid-19 pandemic period in Mexico, so further research is needed. Our findings provide valuable insights into the magnitude of the SI

and loneliness problem among OA LA and those LWO. Targeted interventions are needed to address SI and loneliness in OA, according to the living arrangement, and considering the vulnerabilities of individuals in the LA and LWO subgroups.

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Authors' contributions

Conceptualization: RR-V, ALRV. Methodology: RR-V, LF-L, AA-L. Formal analysis: ALRV, LF-L. Writing original-draft: RR-V. Writing-review and editing: RR-V, AA-L, EL-P. All authors approved the final version of the manuscript.

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