

# THE LANCET

## Supplementary appendix

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Supplement to: Pollán M, Pérez-Gómez B, Pastor-Barriuso R, et al. Prevalence of SARS-CoV-2 in Spain (ENE-COVID): a nationwide, population-based seroepidemiological study. *Lancet* 2020; published online July 6. [http://dx.doi.org/10.1016/S0140-6736\(20\)31483-5](http://dx.doi.org/10.1016/S0140-6736(20)31483-5).

## **SUPPLEMENTARY MATERIAL**

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## ENE-COVID STUDY GROUP\*

\* Names listed alphabetically within each institution or autonomous community.

### Spanish Ministry of Health

**Faustino Blanco**, Secretario General de Sanidad, Ministerio de Sanidad, Madrid; **Rodrigo Gutiérrez Fernández**, Director General de Ordenación Profesional, Ministerio de Sanidad, Madrid; **Mariano Martín**, Subdirección de Tecnologías de la Información, Ministerio de Sanidad, Madrid; **Saturnino Mezcua Navarro**, Director de Programas, Gabinete Técnico Secretaría General de Sanidad, Ministerio de Sanidad, Madrid; **Marta Molina**, Secretaria General de Sanidad, Ministerio de Sanidad, Madrid; **Juan F. Muñoz-Montalvo**, Subdirección de Tecnologías de la Información, Ministerio de Sanidad, Madrid; **Matías Salinero Hernández**, Jefe de Servicio, Gabinete Técnico Secretaría General de Sanidad, Ministerio de Sanidad, Madrid; **Jose L. Sanmartín**, Subdirección de Tecnologías de la Información, Ministerio de Sanidad, Madrid.

### Institute of Health Carlos III

General Directorate: **Manuel Cuenca-Estrella**, Subdirector General de Servicios Aplicados, Formación e Investigación, Instituto de Salud Carlos III, Madrid; **Raquel Yotti**, Directora, Instituto de Salud Carlos III, Madrid.

General Secretariat: **José León Paniagua**, Secretaría General, Instituto de Salud Carlos III, Madrid.

National Center of Epidemiology: **Nerea Fernández de Larrea**, Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid; **Pablo Fernández-Navarro**, Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid; **Roberto Pastor-Barriuso**, Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid; **Beatriz Pérez-Gómez**, Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid; **Marina Pollán**, Directora, Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid.

National Center of Microbiology: **Ana Avellón**, Centro Nacional de Microbiología, Instituto de Salud Carlos III, Madrid; **Giovanni Fedele**, Área de Orientación Diagnóstica, Centro Nacional de Microbiología, Instituto de Salud Carlos III, Madrid; **Aurora Fernández-García**, Laboratorio de Referencia e Investigación en Enfermedades Víricas Inmunoprevenibles, Centro Nacional de Microbiología, Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid; **Jesús Oteo Iglesias**, Centro Nacional de Microbiología, Instituto de Salud Carlos III, Madrid; **María Teresa Pérez Olmeda**, Laboratorio de Referencia e Investigación en Serología, Centro Nacional de Microbiología, Instituto de Salud Carlos III, Madrid.

National School of Public Health: **Israel Cruz**, Escuela Nacional de Sanidad, Instituto de Salud Carlos III, Madrid; **María Elena Fernández Martínez**, Escuela Nacional de Sanidad, Instituto de Salud Carlos III, Madrid; **Francisco D. Rodríguez-Cabrera**, Escuela Nacional de Sanidad, Instituto de Salud Carlos III, Madrid.

### Harvard T.H. Chan School of Public Health

**Miguel A. Hernán**, Departments of Epidemiology and Biostatistics, Harvard T.H. Chan School of Public Health, Harvard-MIT Division of Health Sciences and Technology, Boston, MA, USA.

### Andalucía

Health Services: **Susana Padrones Fernández**, Dirección de Salud, Distrito Sanitario Sevilla, Sevilla; **José Manuel Rumbao Aguirre**, Dirección Gerencia, Distrito Sanitario Córdoba Guadalquivir, Córdoba.

Laboratory: **José M. Navarro Marí**, Servicio de Microbiología, Hospital Universitario Virgen de las Nieves, Instituto Biosanitario IBs, Granada; **Begoña Palop Borrás**, Servicio de Microbiología, Hospital HRU de Málaga, Málaga; **Ana Belén Pérez Jiménez**, UGC de Microbiología, Hospital Universitario Reina Sofía, Instituto Maimónides de Investigación Biomédica de Córdoba (IMIBIC), Córdoba; **Manuel Rodríguez-Iglesias**, Servicio de Microbiología, Hospital Universitario Puerta del Mar-INIBICA, Cádiz.

### Aragón

Health Services: **Ana María Calvo Gascón**, Centro de Salud de Huesca Rural, Servicio Aragonés de Salud, Huesca; **María Luz Lou Alcaine**, Dirección General de Asistencia Sanitaria, Departamento de Sanidad, Gobierno de Aragón, Zaragoza.

## **Asturias**

Health Services: **Ignacio Donate Suárez**, Jefe de Sección de Ordenación y Gestión, Dirección General de Política y Planificación Sanitarias, Consejería de Salud, Oviedo; **Oscar Suárez Álvarez**, Coordinador de Gestión Asistencial, Dirección de Atención y Evaluación Sanitaria, SESPA Servicio de Salud del Principado de Asturias, Oviedo.

Laboratory: **Mercedes Rodríguez Pérez**, Servicio de Microbiología, Hospital Universitario Central de Asturias (HUCA), Oviedo.

## **Baleares**

Health Services: **Margarita Cases Sanchís**, Coordinadora de Equipos de Atención Primaria, Área de Salud de Menorca, Servei de Salut de les Illes Balears, Menorca; **Carlos Javier Villafáfila Gomila**, Subdirector de Cuidados Asistenciales, Servei de Salut de les Illes Balears, Palma de Mallorca.

Laboratory: **Lluís Carbo Saladrigas**, Servicio de Microbiología, Hospital Mateu Orfila, Mao; **Adoración Hurtado Fernández**, Coordinadora Sección Microbiología, Hospital Can Misses, Ibiza; **Antonio Oliver**, Servicio de Microbiología, Hospital Universitario Son Espases, Instituto de Investigación Sanitaria Illes Balears (IdISBa), Palma de Mallorca.

## **Canarias**

Health Services: **Elías Castro Feliciano**, Gerente de la Empresa GSA 112, Canarias; **María Noemí González Quintana**, Coordinadora Servicio de Urgencias Canario 112, Gestión de Servicios para la Salud y Seguridad en Canarias (GSC), Canarias.

Laboratory: **José María Barrasa Fernández**, Servicio de Análisis Clínicos, Hospital Universitario Nuestra Señora de la Candelaria, Tenerife; **María Araceli Hernández Betancor**, Servicio de Microbiología, Hospital Universitario Insular de Gran Canaria, Gran Canaria; **Melisa Hernández Febles**, Servicio de Microbiología, Hospital General de Gran Canaria Dr. Negrín, Gran Canaria; **Leopoldo Martín Martín**, Servicio de Microbiología, Hospital de La Palma, La Palma.

## **Cantabria**

Health Services: **Luis-Mariano López López**, Director de Enfermería, Gerencia de Atención Primaria de Cantabria, Servicio Cántabro de Salud, Santander; **Teresa Ugarte Miota**, Subdirectora Médico, Gerencia de Atención Primaria de Cantabria, Servicio Cántabro de Salud, Santander.

Laboratory: **Inés De Benito Población**, Servicio de Microbiología, Hospital Sierrallana, Cantabria.

## **Castilla-La Mancha**

Health Services: **María Sagrario Celada Pérez**, Directora de Enfermería Gerencia de Atención Primaria de Toledo, Servicio de Salud de Castilla-La Mancha, Toledo; **María Natalia Vallés Fernández**, Directora General de Atención Primaria, Servicio de Salud de Castilla-La Mancha, Toledo.

## **Castilla y León**

Health Services: **Tomás Maté Enríquez**, Servicio de Calidad y Seguridad de Pacientes, Gerencia Regional de Salud de Castilla y León, Valladolid; **Miguel Villa Arranz**, Dirección Técnica de Tecnologías de la Información y la Comunicación, Gerencia Regional de Salud de Castilla y León, Valladolid.

Laboratory: **Marta Domínguez-Gil González**, Servicio de Microbiología, Hospital Universitario Río Hortega, Valladolid; **Isabel Fernández-Natal**, Servicio de Análisis Clínicos y Microbiología Clínica, Complejo Asistencial Universitario de León, León; **Gregoria Megías Lobón**, Unidad de Microbiología, Complejo Asistencial Universitario de Burgos, Burgos; **Juan Luis Muñoz Bellido**, Servicio de Microbiología, Complejo Asistencial Universitario de Salamanca, Salamanca.

## **Cataluña**

Health Services: **Pilar Ciruela**, Sub-direcció General de Vigilància i Resposta a Emergències de Salut Pública, Departament de Salut, CIBER de Epidemiologia y Salud Pública (CIBERESP), Barcelona; **Ariadna Mas i Casals**, Direcció Assistencial d'Atenció Primària, Institut Català de la Salut, Departament de Salut, Barcelona.

Laboratory: **Maria Doladé Botías**, Jefe de Servicio del Laboratorio de Análisis Clínicos y Bioquímica, Laboratorio Clínic Metropolitana Nord, Hospital Universitari Germans Trias i Pujol, Badalona; **M. Angeles Marcos Maeso**, Servicio de Microbiología, Centro de Diagnóstico Biomédico, Hospital Clínic de Barcelona, Barcelona; **Dúnia Pérez del Campo**, Laboratorio Territorial de Girona, Institut Català de la Salut, Girona.

## **Comunidad Valenciana**

Health Services: **Antonio Félix de Castro**, Médico del Servicio de Atención Sanitaria a las Urgencias y Emergencias, Dirección General de Asistencia Sanitaria, Conselleria de Sanitat Universal i Salut Pública, Valencia; **Ramón Limón Ramírez**, Subdirector General de Evaluación de la Gestión Asistencial, Dirección General de Asistencia Sanitaria, Conselleria de Sanitat Universal i Salut Pública, Valencia.

## **Extremadura**

Health Services: **María Francisca Elías Retamosa**, Técnico Superior de la Subdirección de Atención Primaria del Servicio Extremeño de Salud, Mérida; **Manuela Rubio González**, Subdirectora de Atención Primaria, Dirección General de Asistencia Sanitaria del Servicio Extremeño de Salud, Mérida.

## **Galicia**

Health Services: **María Sinda Blanco Lobeiras**, Subdirectora de Atención Primaria del Sergas, Xunta de Galicia, A Coruña; **Alberto Fuentes Losada**, Secretario General de la Consellería de Sanidade, Xunta de Galicia, Santiago de Compostela.

Laboratory: **Antonio Aguilera**, Servicio de Microbiología, Complejo Hospitalario Universitario de Santiago de Compostela (CHUS), Santiago de Compostela; **German Bou**, Servicio de Microbiología, Hospital Universitario A Coruña, A Coruña.

## **La Rioja**

Health Services: **Yolanda Caro**, Directora Enfermería Hospital San Pedro, Logroño; **Noemí Marauri**, Directora Enfermería Atención Primaria, Logroño.

Laboratory: **Luis Miguel Soria Blanco**, Serología, Hospital San Pedro, Logroño.

## **Madrid**

Health Services: **Isabel del Cura González**, Unidad de Investigación, Gerencia Asistencial Atención Primaria, Departamento Especialidades Médicas y Salud Pública, URJC, Red de Investigación Servicios de Salud en Enfermedades Crónicas (REDISSEC), Madrid; **Montserrat Hernández Pascual**, Gerencia Adjunta Procesos Asistenciales Atención Primaria, Madrid.

Laboratory: **Roberto Alonso Fernández**, Servicio de Microbiología Clínica y Enfermedades Infecciosas, Hospital General Universitario Gregorio Marañón, Madrid; **Paloma Merino-Amador**, Servicio de Microbiología y Parasitología, Hospital Universitario Clínico San Carlos, Madrid.

## **Murcia**

Health Services: **Natalia Cabrera Castro**, Servicio de Epidemiología, Consejería de Salud, IMIB-HCUV Arrixaca, Área IV, Servicio Murciano de Salud, Murcia; **Aurora Tomás Lizcano**, Coordinadora Regional de Enfermería, Dirección General de Asistencia Sanitaria, Servicio Murciano de Salud, Murcia.

Laboratory: **Cristóbal Ramírez Almagro**, Servicio de Microbiología, Hospital General Universitario Santa Lucía, Cartagena; **Manuel Segovia Hernández**, Hospital Clínico Universitario Virgen de la Arrixaca, Universidad de Murcia, Murcia.

## **Navarra**

Health Services: **Nieves Ascunce Elizaga**, Public Health and Labour Institute of Navarre, CIBERESP, Pamplona; **María Ederra Sanz**, Public Health and Labour Institute of Navarre, CIBERESP, Pamplona.

Laboratory: **Carmen Ezpeleta Baquedano**, Servicio de Microbiología Clínica, Complejo Hospitalario de Navarra, Pamplona.

## **País Vasco**

Health Services: **Ana Bustinduy Bascaran**, Dirección General de Osakidetza, Vitoria; **Susana Iglesias Tamayo**, Dirección General de Osakidetza, Vitoria.

Laboratory: **Luis Elorduy Otazua**, Servicio de Microbiología, Hospital Universitario Cruces, Barakaldo.

## **Ceuta**

Health Services: **Rebeca Benarroch Benarroch**, Directora General de Sanidad y Consumo, Consejería de Sanidad, Consumo y Gobernación, Ceuta; **Jesús Lopera Flores**, Director Territorial del Instituto Nacional de Gestión Sanitaria, Ministerio de Sanidad, Ceuta.

## **Melilla**

Health Services: **Antonia Vázquez de la Villa**, Gerente del Área Sanitaria de Melilla, Instituto Nacional de Gestión Sanitaria, Ministerio de Sanidad, Melilla.

## **SUPPLEMENTARY METHODS**

### **Study design**

Participants in the ENE-COVID cohort study were selected through a stratified two-stage sampling from the non-institutionalized Spanish population. Due to the large heterogeneity in SARS-CoV-2 virus circulation across Spanish regions, the first level of stratification consisted of the 50 Spanish provinces and the two autonomous cities (Supplementary Figure 1). Furthermore, since SARS-CoV-2 virus transmission was potentially related to the population density, the second level of stratification corresponded to the municipality size within each province, which was grouped into municipalities of <5,000, 5,000–20,000, 20,000–100,000, and  $\geq 100,000$  inhabitants. Within each stratum defined by province and municipality size, census tracts were selected as first-stage sampling units and households in each census tract as second-stage sampling units. All subjects residing in the household were invited to participate in the study.

### **Sample size determination**

The minimum sample size by province was determined for an underlying crude SARS-CoV-2 seroprevalence of 5% or higher during the study period. Assuming an overall design effect of 2 to account for the variance inflation due to correlations among residents in the same household and households from the same census tract, the effective sample size by province was approximately 600 subjects to estimate a seroprevalence of 5% with a precision of  $\pm 2.5\%$  (50% relative error) at the 95% confidence level. In anticipation of a two-third response rate, the minimum sample to be selected in each province increased to 900 subjects.

The minimum sample size required in the 17 autonomous communities of Spain (first-level administrative division integrating several provinces, Supplementary Figure 1) was determined for the same underlying seroprevalence of at least 5%, but a greater precision in these aggregated estimates of  $\pm 1.65\%$  (33% relative error) at the 95% confidence level. Thus, assuming a design effect of 2 for this survey, the effective sample size by autonomous community was approximately 1,320 subjects, which increased to a minimum selected sample of 1,980 subjects after accounting for a two-third response rate.

### **Allocation of sample to provinces**

A total selected sample of 90,000 subjects was required to achieve the minimum sample size in all provinces and autonomous communities. Given the large heterogeneity in provincial population sizes, the total sample was distributed across provinces according to a compromise allocation. Half of the sample (45,000 subjects) was uniformly assigned to the 52 provinces, a sixth of the sample (15,000 subjects) was uniformly allocated to the 17 autonomous communities and then proportionally to the population size of their provinces, and the remaining third (30,000 subjects) was distributed proportionally to the provincial population size. In this way, the minimum precision required in the estimation of SARS-CoV-2 seroprevalence was achieved in all provinces and single-province autonomous communities, while allowing greater efficiency (that is, lower variance) in multi-province estimates, both at the autonomous and national levels. The resulting allocation of the total sample to provinces is presented in Supplementary Table 1.

### **Within-province sampling**

To ensure a proper representativeness of regions with different population density, the sample allocated to each province was distributed proportionally to the population in the different groups of municipality size (<5,000, 5,000–20,000, 20,000–100,000, or  $\geq 100,000$  inhabitants). In order to optimize field work and avoid excessive sample dispersion, the

subsample corresponding to each municipality size group was selected in two successive stages. First, census tracts (first-stage sampling units) were randomly selected with probability proportional to their size, and then 24 households (second-stage sampling units) were sampled within each selected census tract by simple random sampling without replacement. All subjects residing in the household (analysis units) were invited to participate in the study.

According to the 2019 Continuous Household Survey from the Spanish National Institute of Statistics,<sup>1</sup> the average household size in Spain was 2.50 residents, which would result in an average sample of 60 subjects per census tract. Thus, a total of 1,500 census tracts were selected through the above sampling procedure to reach the required sample of 90,000 subjects. The distribution of the 1,500 census tracts by province and municipality size group is shown in Supplementary Table 2.

#### **SUPPLEMENTARY REFERENCES**

1. Spanish National Institute of Statistics. 2019 Continuous Household Survey. [https://www.ine.es/en/prensa/ech\\_2019\\_en.pdf](https://www.ine.es/en/prensa/ech_2019_en.pdf) (accessed June 12, 2020).



**Supplementary Table 1.** Allocation of total sample to provinces in the ENE-COVID study.

Autonomous community	Province	Population* (N)	Allocation (n)			Sample† (n)	
			Uniform by province	Uniform by AC	Proportional by province		
Andalucía	Almería	716,820	865.4	75.2	457.3	1,380	
	Cádiz	1,240,155	865.4	130.0	791.1	1,800	
	Córdoba	782,979	865.4	82.1	499.5	1,440	
	Granada	914,678	865.4	95.9	583.5	1,560	
	Huelva	521,870	865.4	54.7	332.9	1,260	
	Jaén	633,564	865.4	66.4	404.2	1,320	
	Málaga	1,661,785	865.4	174.3	1,060.1	2,100	
	Sevilla	1,942,389	865.4	203.7	1,239.1	2,340	
Aragón	Huesca	220,461	865.4	147.4	140.6	1,140	
	Teruel	134,137	865.4	89.7	85.6	1,020	
	Zaragoza	964,693	865.4	645.2	615.4	2,160	
Asturias	Asturias	1,022,800	865.4	882.4	652.5	2,400	
Baleares	Baleares	1,149,460	865.4	882.4	733.3	2,460	
Canarias	Las Palmas	1,120,406	865.4	459.1	714.8	2,040	
	Tenerife	1,032,983	865.4	423.3	659.0	1,980	
Cantabria	Cantabria	581,078	865.4	882.4	370.7	2,100	
Castilla-La Mancha	Albacete	388,167	865.4	168.5	247.6	1,260	
	Ciudad Real	495,761	865.4	215.2	316.3	1,380	
	Cuenca	196,329	865.4	85.2	125.2	1,080	
	Guadalajara	257,762	865.4	111.9	164.4	1,140	
	Toledo	694,844	865.4	301.6	443.3	1,620	
Castilla y León	Ávila	157,640	865.4	58.0	100.6	1,020	
	Burgos	356,958	865.4	131.3	227.7	1,200	
	León	460,001	865.4	169.1	293.5	1,320	
	Palencia	160,980	865.4	59.2	102.7	1,020	
	Salamanca	330,119	865.4	121.4	210.6	1,200	
	Segovia	153,129	865.4	56.3	97.7	1,020	
	Soria	88,636	865.4	32.6	56.5	960	
	Valladolid	519,546	865.4	191.0	331.4	1,380	
	Zamora	172,539	865.4	63.4	110.1	1,020	
	Cataluña	Barcelona	5,664,579	865.4	651.2	3,613.7	5,160
		Girona	771,044	865.4	88.6	491.9	1,440
Lleida		434,930	865.4	50.0	277.5	1,200	
Tarragona		804,664	865.4	92.5	513.3	1,500	
Comunidad Valenciana	Alicante	1,858,683	865.4	327.8	1,185.7	2,400	
	Castellón	579,962	865.4	102.3	370.0	1,320	
	Valencia	2,565,124	865.4	452.3	1,636.4	2,940	
Extremadura	Badajoz	673,559	865.4	556.6	429.7	1,860	
	Cáceres	394,151	865.4	325.7	251.4	1,440	
Galicia	A Coruña	1,119,596	865.4	365.9	714.2	1,980	
	Lugo	329,587	865.4	107.7	210.3	1,200	
	Ourense	307,651	865.4	100.6	196.3	1,140	
	Pontevedra	942,665	865.4	308.1	601.4	1,800	
La Rioja	La Rioja	316,798	865.4	882.4	202.1	1,980	
Madrid	Madrid	6,663,394	865.4	882.4	4,250.9	6,000	
Murcia	Murcia	1,493,898	865.4	882.4	953.0	2,700	
Navarra	Navarra	654,214	865.4	882.4	417.4	2,160	
	País Vasco	Álava	331,549	865.4	132.5	211.5	1,200
		Gipuzkoa	723,576	865.4	289.2	461.6	1,620
	Bizkaia	1,152,651	865.4	460.7	735.3	2,040	
Ceuta	Ceuta	84,777	865.4	0‡	54.1	900	
Melilla	Melilla	86,487	865.4	0	55.2	900	
Overall		47,026,208	45,000	15,000	30,000	90,000	

AC, autonomous community.

\* Population by province as of January 1, 2019 obtained from the Spanish National Institute of Statistics.

† Sample size by province adding up the three allocations and rounded to multiples of 60.

‡ The sample uniformly allocated to the 17 autonomous communities was not assigned to the autonomous cities of Ceuta and Melilla.

**Supplementary Table 2.** Distribution of selected census tracts by province and municipality size group in the ENE-COVID study.\*

Province	Population by municipality size group <sup>†</sup> (N)				Total (N)	No. of selected census tracts by municipality size group				Total
	<5,000	5,000–20,000	20,000–100,000	≥100,000		<5,000	5,000–20,000	20,000–100,000	≥100,000	
Álava	46,261	33,514	0‡	251,774	331,549	3	2	0	15	20
Albacete	95,571	39,358	79,909	173,329	388,167	5	2	4	10	21
Alicante	105,147	297,047	889,085	567,404	1,858,683	2	7	19	12	40
Almería	97,696	158,358	262,233	198,533	716,820	3	5	9	6	23
Ávila	75,396	24,500	57,744	0	157,640	8	3	6	0	17
Badajoz	220,882	146,348	155,627	150,702	673,559	10	7	7	7	31
Baleares	58,709	252,255	422,431	416,065	1,149,460	2	9	15	15	41
Barcelona	261,460	875,736	1,723,578	2,803,805	5,664,579	4	13	26	43	86
Burgos	100,436	12,323	68,378	175,821	356,958	5	1	4	10	20
Cáceres	172,340	85,772	136,039	0	394,151	11	5	8	0	24
Cádiz	27,489	160,886	601,047	450,733	1,240,155	1	4	14	11	30
Castellón	81,173	103,102	223,959	171,728	579,962	3	4	8	7	22
Ciudad Real	95,407	182,047	218,307	0	495,761	4	9	10	0	23
Córdoba	118,739	179,214	159,325	325,701	782,979	4	5	5	10	24
A Coruña	113,347	344,718	415,820	245,711	1,119,596	4	10	12	7	33
Cuenca	93,297	48,342	54,690	0	196,329	9	4	5	0	18
Girona	185,385	248,263	235,544	101,852	771,044	6	8	7	3	24
Granada	168,225	321,298	192,693	232,462	914,678	5	9	5	7	26
Guadalajara	82,162	54,720	120,880	0	257,762	6	4	9	0	19
Gipuzkoa	61,155	279,934	195,072	187,415	723,576	2	11	7	7	27
Huelva	99,794	141,233	137,180	143,663	521,870	4	6	5	6	21
Huesca	86,294	81,035	53,132	0	220,461	7	7	5	0	19
Jaén	141,480	204,713	174,372	112,999	633,564	5	7	6	4	22
León	160,394	80,015	95,289	124,303	460,001	8	4	4	6	22
Lleida	158,978	136,996	0	138,956	434,930	7	6	0	7	20
La Rioja	72,830	68,612	24,220	151,136	316,798	8	7	2	16	33
Lugo	116,709	114,602	98,276	0	329,587	7	7	6	0	20
Madrid	147,979	454,479	1,273,988	4,786,948	6,663,394	2	7	19	72	100
Málaga	128,615	108,519	706,611	718,040	1,661,785	3	2	15	15	35
Murcia	13,818	225,966	586,054	668,060	1,493,898	0	7	18	20	45
Navarra	208,303	166,673	77,585	201,653	654,214	12	9	4	11	36

(Table continues)

**Supplementary Table 2** (continued).

Province	Population by municipality size group <sup>†</sup> (N)				Total (N)	No. of selected census tracts by municipality size group				Total
	<5,000	5,000–20,000	20,000–100,000	≥100,000		<5,000	5,000–20,000	20,000–100,000	≥100,000	
Ourense	111,980	90,438	0	105,233	307,651	7	6	0	6	19
Asturias	79,013	222,717	229,604	491,466	1,022,800	3	9	9	19	40
Palencia	57,000	25,568	78,412	0	160,980	6	3	8	0	17
Las Palmas	7,485	164,260	466,089	482,572	1,120,406	0	5	14	15	34
Pontevedra	68,674	314,489	264,138	295,364	942,665	2	10	9	9	30
Salamanca	108,255	77,636	0	144,228	330,119	6	5	0	9	20
Tenerife	70,731	151,023	446,414	364,815	1,032,983	2	5	14	12	33
Cantabria	123,461	145,696	139,382	172,539	581,078	8	9	8	10	35
Segovia	72,229	29,226	51,674	0	153,129	8	3	6	0	17
Sevilla	120,306	476,307	523,216	822,560	1,942,389	2	10	10	17	39
Soria	43,749	5,489	39,398	0	88,636	8	1	7	0	16
Tarragona	169,294	170,308	226,174	238,888	804,664	5	5	7	8	25
Teruel	74,828	23,419	35,890	0	134,137	9	3	5	0	17
Toledo	276,023	195,802	223,019	0	694,844	11	7	9	0	27
Valencia	274,378	486,662	1,009,796	794,288	2,565,124	5	10	19	15	49
Valladolid	97,723	59,997	63,414	298,412	519,546	4	3	3	13	23
Bizkaia	112,419	239,796	352,712	447,724	1,152,651	3	7	11	13	34
Zamora	84,485	26,648	61,406	0	172,539	8	3	6	0	17
Zaragoza	152,124	117,548	20,024	674,997	964,693	6	4	1	25	36
Ceuta	0	0	84,777	0	84,777	0	0	15	0	15
Melilla	0	0	86,487	0	86,487	0	0	15	0	15
Overall	5,699,628	8,653,607	13,841,094	18,831,879	47,026,208	263	299	440	498	1,500

\* Within each of the 1,500 selected census tracts, 24 households of an average size of 2.50 residents were sampled to give rise to a total selected sample of 90,000 subjects.

<sup>†</sup> Population as of January 1, 2019 obtained from the Spanish National Institute of Statistics.

<sup>‡</sup> There were 23 empty population strata formed by cross-classifying provinces and municipality size groups.

**Supplementary Table 3.** Diagnostic performance of point-of-care test\* for IgG and IgM antibody detection in serum and blood samples from venipuncture and finger prick in a preliminary validation for the ENE-COVID study.

	IgG antibodies				IgM antibodies				Total (n)
	Venipuncture		Finger prick		Venipuncture		Finger prick		
	Positive (n)	Negative (n)	Positive (n)	Negative (n)	Positive (n)	Negative (n)	Positive (n)	Negative (n)	
Serum sample									
PCR-confirmed case†	77	20	NA	NA	71	26	NA	NA	97
Control‡	0	53	NA	NA	1	52	NA	NA	53
Sensitivity, % (95% CI)	79.4 (70.0–86.9)				73.2 (63.2–81.7)				
Specificity, % (95% CI)	100.0 (93.3–100.0)				98.1 (89.9–100.0)				
Blood sample§									
PCR-confirmed case†	46	10	46	10	36	20	39	17	56
Control‡	0	103	0	103	1	102	1	102	103
Sensitivity, % (95% CI)	82.1 (69.6–91.1)		82.1 (69.6–91.1)		64.3 (50.4–76.6)		69.6 (55.9–81.2)		
Specificity, % (95% CI)	100.0 (96.5–100.0)		100.0 (96.5–100.0)		99.0 (94.7–100.0)		99.0 (94.7–100.0)		

NA, not applicable.

\* COVID-19 IgG/IgM Rapid Test Cassette, Zhejiang Orient Gene Biotech, Co, Ltd., Zhejiang, China (Reference GCCOV-402a).

† PCR-confirmed COVID-19 cases among health personnel from a large hospital in Madrid, Spain, with samples collected at least 10 days after onset of symptoms.

‡ Controls with serum samples collected before December 8, 2019 for diagnosis of other pathogens.

§ Matched venous and finger-prick blood samples from PCR-confirmed COVID-19 cases.

**Supplementary Table 4.** Diagnostic performance of immunoassay\* for IgG antibody detection in serum samples in a preliminary validation for the ENE-COVID study.

	IgG antibodies		Total (n)
	Positive (n)	Negative (n)	
PCR-confirmed case†			
≥10 days from onset of symptoms	72	10	82
≥14 days from onset of symptoms	52	6	58
Control‡	0	42	42
Sensitivity, % (95% CI)			
≥10 days from onset of symptoms	87.8 (78.7–94.0)		
≥14 days from onset of symptoms	89.7 (78.8–96.1)		
Specificity, % (95% CI)	100.0 (91.6–100.0)		

\* SARS-CoV-2 IgG for use with ARCHITEC, Abbott Laboratories, IL, USA (Reference 06R8620).

† PCR-confirmed COVID-19 cases with serum samples collected at least 10 days after onset of symptoms. Of them, 58 cases provided serum samples at least 14 days after onset of symptoms.

‡ Controls with serum samples collected before December 8, 2019 for diagnosis of other pathogens.

**Supplementary Table 5.** Response rates for point-of-care test and immunoassay by sex, age, and income, ENE-COVID study, April 27–May 11, 2020, Spain.\*

Sex, age, income	Eligible sample (n)	Contacted sample (n)	Sample with POC test (n)	Response rate† (%)		Sample with assay (n)	Response rate† (%)	
				Eligible	Contacted		Eligible	Contacted
Men (years)								
<1	206	187	119	57.8	63.6	14	6.8	7.5
1–4	1,601	1,336	864	54.0	64.7	205	12.8	15.3
5–9	2,477	2,140	1,528	61.7	71.4	632	25.5	29.5
10–14	2,612	2,285	1,736	66.5	76.0	1,187	45.4	51.9
15–19	2,384	2,083	1,594	66.9	76.5	1,318	55.3	63.3
20–24	2,359	1,939	1,402	59.4	72.3	1,231	52.2	63.5
25–29	2,424	1,829	1,255	51.8	68.6	1,104	45.5	60.4
30–34	2,666	2,047	1,435	53.8	70.1	1,298	48.7	63.4
35–39	3,335	2,630	1,940	58.2	73.8	1,774	53.2	67.5
40–44	4,059	3,312	2,447	60.3	73.9	2,241	55.2	67.7
45–49	4,056	3,403	2,609	64.3	76.7	2,377	58.6	69.9
50–54	3,788	3,207	2,510	66.3	78.3	2,288	60.4	71.3
55–59	3,591	3,121	2,435	67.8	78.0	2,251	62.7	72.1
60–64	3,241	2,807	2,251	69.5	80.2	2,080	64.2	74.1
65–69	2,494	2,181	1,738	69.7	79.7	1,598	64.1	73.3
70–74	2,036	1,818	1,368	67.2	75.2	1,272	62.5	70.0
75–79	1,601	1,404	1,009	63.0	71.9	933	58.3	66.5
80–84	1,062	910	583	54.9	64.1	535	50.4	58.8
85–89	751	637	374	49.8	58.7	343	45.7	53.8
≥90	363	292	152	41.9	52.1	136	37.5	46.6
Women (years)								
<1	209	189	121	57.9	64.0	15	7.2	7.9
1–4	1,582	1,316	817	51.6	62.1	174	11.0	13.2
5–9	2,165	1,862	1,318	60.9	70.8	550	25.4	29.5
10–14	2,504	2,206	1,692	67.6	76.7	1,096	43.8	49.7
15–19	2,389	2,060	1,633	68.4	79.3	1,336	55.9	64.9
20–24	2,227	1,837	1,411	63.4	76.8	1,248	56.0	67.9
25–29	2,398	1,851	1,363	56.8	73.6	1,225	51.1	66.2
30–34	2,652	2,112	1,603	60.4	75.9	1,463	55.2	69.3
35–39	3,199	2,678	2,072	64.8	77.4	1,910	59.7	71.3
40–44	3,999	3,410	2,698	67.5	79.1	2,495	62.4	73.2
45–49	3,925	3,404	2,766	70.5	81.3	2,557	65.1	75.1
50–54	3,803	3,372	2,769	72.8	82.1	2,536	66.7	75.2
55–59	3,758	3,366	2,780	74.0	82.6	2,577	68.6	76.6
60–64	3,197	2,862	2,349	73.5	82.1	2,174	68.0	76.0
65–69	2,686	2,366	1,854	69.0	78.4	1,712	63.7	72.4
70–74	2,428	2,165	1,583	65.2	73.1	1,464	60.3	67.6
75–79	1,886	1,665	1,166	61.8	70.0	1,073	56.9	64.4
80–84	1,561	1,358	848	54.3	62.4	763	48.9	56.2
85–89	1,265	1,064	599	47.4	56.3	529	41.8	49.7
≥90	720	544	284	39.4	52.2	244	33.9	44.9
Census tract income‡								
<5th	5,070	4,165	2,865	56.5	68.8	2,382	47.0	57.2
5–25th	21,370	17,953	13,278	62.1	74.0	11,229	52.5	62.5
25–50th	23,975	20,421	15,356	64.1	75.2	13,096	54.6	64.1
50–75th	21,650	18,540	14,074	65.0	75.9	11,804	54.5	63.7
75–95th	18,499	15,888	12,183	65.9	76.7	10,583	57.2	66.6
≥95th	5,095	4,288	3,319	65.1	77.4	2,864	56.2	66.8

POC, point of care.

\* Response rates among 95,659 eligible subjects with available age.

† Response rates for point-of-care test and immunoassay among eligible and contacted subjects.

‡ Categories based on percentiles from province-specific distributions of census tract average income in 2017.

**Supplementary Table 6.** Seroprevalence of SARS-CoV-2 by province, ENE-COVID study, April 27–May 11, 2020, Spain.

Autonomous community	Province	No. of participants	Point-of-care test, % (95% CI)	No. of participants	Immunoassay, % (95% CI)	Both tests positive,* % (95% CI)	Either test positive,* % (95% CI)
<b>North</b>							
Asturias	Asturias	1,550	1.9 (1.3–2.8)	1,454	1.4 (0.8–2.3)	1.1 (0.6–1.8)	2.2 (1.5–3.2)
Cantabria	Cantabria	1,504	3.6 (2.3–5.7)	1,354	2.9 (1.9–4.6)	2.2 (1.2–3.9)	4.3 (2.9–6.4)
Galicia	A Coruña	1,275	1.8 (1.1–2.9)	1,058	1.0 (0.5–1.8)	0.5 (0.2–1.2)	2.3 (1.3–3.9)
	Lugo	813	2.2 (1.1–4.4)	672	1.1 (0.5–2.4)	0.8 (0.3–2.3)	2.7 (1.3–5.5)
	Ourense	686	2.9 (1.9–4.5)	492	0.7 (0.2–2.8)	0.3 (0.0–2.3)	2.8 (1.5–5.1)
	Pontevedra	1,296	2.2 (1.7–3.0)	883	1.5 (0.7–3.0)	1.0 (0.4–2.6)	3.0 (2.0–4.5)
La Rioja	La Rioja	1,323	3.4 (2.5–4.7)	1,088	3.5 (2.1–5.7)	2.1 (1.3–3.5)	4.9 (3.4–7.0)
Navarra	Navarra	1,744	5.7 (4.3–7.5)	1,587	4.6 (3.2–6.5)	3.8 (2.7–5.5)	6.9 (5.2–9.2)
País Vasco	Álava	692	7.4 (5.5–9.9)	595	4.4 (2.9–6.8)	3.4 (2.0–5.7)	9.4 (7.0–12.5)
	Gipuzkoa	951	2.5 (1.4–4.5)	878	2.4 (1.2–4.7)	1.6 (0.7–3.9)	3.0 (1.7–5.0)
	Bizkaia	1,195	4.0 (2.6–6.0)	1,042	2.9 (1.6–5.0)	2.2 (1.1–4.3)	4.8 (3.1–7.1)
<b>Centre</b>							
Castilla-La Mancha	Albacete	1,058	11.7 (8.8–15.3)	925	12.8 (9.6–17.1)	10.3 (7.2–14.7)	14.7 (11.6–18.5)
	Ciudad Real	1,163	10.2 (7.9–13.2)	1,058	11.0 (8.1–14.7)	9.5 (7.1–12.6)	12.3 (9.3–16.2)
	Cuenca	851	13.2 (10.4–16.6)	760	13.6 (10.2–17.8)	11.3 (8.5–14.7)	15.3 (11.6–20.0)
	Guadalajara	814	10.4 (7.5–14.3)	681	10.0 (6.6–14.9)	8.5 (5.3–13.3)	12.5 (9.1–17.1)
	Toledo	1,179	8.9 (5.4–14.4)	970	11.1 (7.0–17.2)	9.5 (5.6–15.7)	11.8 (7.6–17.9)
Castilla y León	Ávila	667	6.6 (4.6–9.4)	595	5.7 (4.0–8.1)	5.2 (3.4–7.8)	7.6 (5.5–10.3)
	Burgos	887	4.9 (3.2–7.5)	824	4.6 (2.8–7.5)	3.6 (2.1–6.2)	6.2 (4.0–9.6)
	León	886	6.1 (4.0–9.2)	700	6.0 (3.4–10.4)	4.9 (2.7–8.8)	8.0 (5.1–12.1)
	Palencia	740	8.0 (4.7–13.2)	657	4.3 (2.4–7.6)	3.7 (2.0–6.8)	6.9 (4.8–9.9)
	Salamanca	809	7.5 (5.2–10.7)	760	7.9 (5.5–11.2)	6.6 (4.5–9.5)	8.9 (6.2–12.5)
	Segovia	548	11.8 (8.9–15.4)	474	12.4 (8.2–18.4)	11.4 (7.4–17.1)	14.2 (10.3–19.2)
	Soria	707	14.4 (11.6–17.8)	647	13.0 (10.0–16.7)	11.1 (8.2–14.7)	17.6 (14.2–21.6)
	Valladolid	1,084	5.9 (3.9–8.6)	999	4.4 (2.9–6.6)	3.7 (2.4–5.6)	6.4 (4.4–9.0)
	Zamora	651	6.8 (4.1–11.2)	500	3.9 (1.6–9.6)	3.8 (1.5–9.5)	7.5 (4.0–13.7)
	Madrid	Madrid	3,186	11.3 (9.8–13.0)	2,489	11.5 (9.9–13.3)	9.5 (8.0–11.2)

(Table continues)

**Supplementary Table 6** (continued).

<b>Autonomous community</b>	<b>Province</b>	<b>No. of participants</b>	<b>Point-of-care test, % (95% CI)</b>	<b>No. of participants</b>	<b>Immunoassay, % (95% CI)</b>	<b>Both tests positive,* % (95% CI)</b>	<b>Either test positive,* % (95% CI)</b>
<b>East</b>							
Aragón	Huesca	733	4.4 (2.3–8.3)	647	4.0 (1.7–9.1)	3.2 (1.4–7.5)	4.9 (2.4–9.6)
	Teruel	688	3.3 (1.7–6.2)	629	2.4 (1.2–4.7)	1.6 (0.7–3.7)	4.2 (2.4–7.2)
	Zaragoza	1,331	4.9 (3.6–6.6)	1,199	3.2 (2.1–4.9)	2.4 (1.4–4.2)	5.9 (4.5–7.7)
Cataluña	Barcelona	3,696	7.0 (5.7–8.6)	3,375	6.8 (5.6–8.3)	5.9 (4.7–7.3)	8.2 (6.8–10.0)
	Girona	905	2.6 (1.8–3.8)	792	1.8 (1.1–3.0)	0.8 (0.4–1.6)	3.9 (2.5–6.1)
	Lleida	710	3.8 (2.4–6.0)	637	2.6 (1.5–4.6)	2.3 (1.2–4.2)	4.4 (2.7–6.9)
	Tarragona	1,012	1.4 (0.8–2.4)	936	1.1 (0.5–2.6)	0.6 (0.2–2.4)	2.1 (1.3–3.3)
Comunidad Valenciana	Alicante	1,572	2.6 (1.9–3.6)	1,335	2.4 (1.4–4.0)	1.6 (0.9–2.8)	3.5 (2.4–5.0)
	Castellón	803	2.9 (1.5–5.8)	740	2.5 (0.9–6.5)	1.8 (0.5–5.9)	4.0 (2.1–7.5)
	Valencia	1,913	2.1 (1.4–3.3)	1,706	1.3 (0.6–2.6)	1.0 (0.4–2.5)	2.5 (1.6–4.0)
Murcia	Murcia	1,391	1.4 (0.8–2.4)	1,233	1.6 (0.8–3.1)	0.9 (0.4–2.0)	2.1 (1.3–3.6)
<b>South/southwest</b>							
Andalucía	Almería	986	1.6 (0.8–3.3)	646	1.8 (0.9–3.5)	1.3 (0.5–3.2)	2.7 (1.4–4.8)
	Cádiz	1,385	1.6 (1.0–2.6)	1,252	1.5 (0.8–2.9)	0.8 (0.3–1.7)	2.4 (1.5–3.7)
	Córdoba	1,117	2.6 (1.6–4.1)	884	2.0 (0.7–5.4)	1.8 (0.6–5.4)	3.7 (1.7–7.8)
	Granada	1,024	2.8 (1.7–4.4)	743	2.3 (1.3–4.2)	1.2 (0.5–2.7)	3.7 (2.3–5.9)
	Huelva	930	1.2 (0.5–2.7)	827	0.5 (0.2–1.6)	0.2 (0.0–1.7)	1.4 (0.6–3.2)
	Jaén	1,062	4.0 (2.7–5.7)	863	2.5 (1.3–5.0)	1.7 (0.7–3.9)	4.2 (2.7–6.4)
	Málaga	1,464	4.0 (2.6–5.9)	1,228	3.4 (2.1–5.6)	2.9 (1.6–4.9)	5.2 (3.5–7.8)
	Sevilla	1,805	2.3 (1.5–3.3)	1,043	1.9 (0.9–3.7)	1.1 (0.4–2.8)	3.4 (2.3–4.9)
Extremadura	Badajoz	1,583	2.6 (1.7–4.1)	1,458	2.2 (1.4–3.3)	1.0 (0.5–1.9)	3.8 (2.7–5.3)
	Cáceres	1,201	3.0 (1.8–5.0)	1,132	4.0 (2.3–6.7)	2.1 (1.2–3.7)	4.7 (2.8–7.8)
<b>Islands</b>							
Baleares	Baleares	1,372	2.3 (1.6–3.5)	1,176	1.8 (1.1–3.0)	1.1 (0.5–2.2)	3.2 (2.2–4.7)
Canarias	Las Palmas	1,244	1.9 (1.2–2.9)	1,149	0.7 (0.3–1.3)	0.2 (0.1–0.6)	2.4 (1.6–3.7)
	Tenerife	1,124	2.7 (1.2–6.0)	996	2.3 (1.3–4.1)	1.4 (0.5–3.5)	4.0 (2.3–6.8)
<b>Autonomous cities</b>							
Ceuta	Ceuta	838	1.2 (0.6–2.3)	503	2.3 (1.0–5.0)	1.3 (0.3–5.0)	2.8 (1.5–5.3)
Melilla	Melilla	927	1.8 (1.2–2.8)	687	0.9 (0.5–1.7)	0.3 (0.1–1.1)	2.7 (1.6–4.5)

\* Seroprevalence with both tests positive and either test positive among participants with available results from point-of-care test and immunoassay.



**Supplementary Table 7.** Seroprevalence of SARS-CoV-2 by age group, ENE-COVID study, April 27–May 11, 2020, Spain.

Age (years)	No. of participants	Point-of-care test, % (95% CI)	No. of participants	Immunoassay, % (95% CI)	Both tests positive,* % (95% CI)	Either test positive,* % (95% CI)
<1	240	1.1 (0.3–3.5)	29	0.0 (0.0–11.9)	0.0 (0.0–11.9)	0.0 (0.0–11.9)
1–4	1,681	2.1 (1.3–3.4)	379	3.5 (1.7–6.8)	2.6 (1.2–5.5)	4.0 (2.1–7.4)
5–9	2,846	3.1 (2.2–4.2)	1,182	3.6 (2.3–5.7)	2.9 (1.7–4.9)	4.8 (3.3–7.0)
10–14	3,428	4.0 (3.1–5.0)	2,283	4.1 (3.1–5.5)	3.5 (2.5–4.7)	5.4 (4.2–7.0)
15–19	3,227	3.7 (2.9–4.8)	2,654	3.8 (2.8–5.0)	3.1 (2.3–4.3)	4.6 (3.6–5.9)
20–24	2,813	4.5 (3.5–5.7)	2,479	5.5 (4.3–7.0)	3.7 (2.7–4.9)	6.6 (5.3–8.1)
25–29	2,618	4.7 (3.6–6.2)	2,329	5.4 (4.1–7.1)	3.9 (2.8–5.5)	6.5 (5.1–8.3)
30–34	3,038	4.0 (3.1–5.2)	2,761	4.3 (3.3–5.4)	3.3 (2.4–4.4)	5.1 (4.1–6.4)
35–39	4,012	4.7 (3.8–5.8)	3,684	4.8 (3.9–6.0)	3.6 (2.8–4.6)	6.0 (5.0–7.3)
40–44	5,145	5.2 (4.4–6.1)	4,736	4.7 (3.9–5.7)	3.8 (3.0–4.6)	6.2 (5.3–7.3)
45–49	5,375	5.8 (4.9–6.8)	4,934	5.1 (4.2–6.2)	4.1 (3.3–5.2)	7.1 (6.1–8.3)
50–54	5,279	5.8 (4.9–6.9)	4,824	4.9 (4.0–5.9)	4.2 (3.3–5.2)	6.6 (5.5–7.7)
55–59	5,215	5.9 (5.0–6.9)	4,828	4.9 (4.1–5.9)	3.9 (3.1–4.9)	6.9 (5.9–8.0)
60–64	4,600	5.8 (4.8–6.9)	4,254	4.1 (3.3–5.2)	3.5 (2.7–4.6)	6.3 (5.3–7.5)
65–69	3,592	6.1 (5.0–7.4)	3,310	4.9 (3.8–6.3)	4.1 (3.1–5.3)	7.2 (5.9–8.7)
70–74	2,951	6.6 (5.4–8.1)	2,736	4.6 (3.5–5.9)	3.8 (2.8–5.1)	6.8 (5.6–8.3)
75–79	2,175	5.7 (4.5–7.4)	2,006	4.2 (3.0–5.9)	3.4 (2.4–5.0)	6.5 (5.0–8.5)
80–84	1,431	5.3 (3.8–7.3)	1,298	5.0 (3.4–7.4)	3.9 (2.4–6.1)	6.7 (4.8–9.1)
85–89	973	6.0 (4.2–8.7)	872	3.6 (2.1–6.1)	3.4 (2.0–6.0)	6.7 (4.5–9.8)
≥90	436	5.4 (3.0–9.5)	380	2.4 (1.1–5.3)	1.9 (0.8–4.8)	4.8 (2.6–8.8)

\* Seroprevalence with both tests positive and either test positive among participants with available results from point-of-care test and immunoassay.

**Supplementary Table 8.** Seroprevalence of SARS-CoV-2 by general characteristics, ENE-COVID study, April 27–May 11, 2020, Spain.

Characteristic	No. of participants	Both tests positive,* % (95% CI)	Either test positive,* % (95% CI)
Overall	51,958	3.7 (3.3–4.0)	6.2 (5.8–6.6)
Sex			
Men	24,817	3.6 (3.3–4.0)	6.2 (5.7–6.7)
Women	27,141	3.7 (3.3–4.1)	6.2 (5.7–6.7)
Nationality			
Spaniard	49,520	3.6 (3.3–4.0)	6.2 (5.8–6.6)
Other	2,178	4.8 (3.5–6.6)	7.1 (5.6–9.1)
Occupation†			
Active worker	23,763	4.3 (3.9–4.8)	6.9 (6.4–7.5)
Unemployed	3,981	2.2 (1.7–2.9)	4.8 (3.8–6.0)
Student	3,060	3.8 (2.8–5.0)	6.0 (4.9–7.3)
Retired	10,932	3.7 (3.1–4.5)	6.7 (5.9–7.5)
Permanent/temporal disability	1,342	2.6 (1.5–4.4)	4.9 (3.5–6.9)
House person	3,033	2.4 (1.7–3.3)	5.5 (4.5–6.8)
Unpaid social work	42	3.1 (0.7–12.1)	4.5 (1.4–13.6)
Other	839	2.3 (1.4–3.8)	5.4 (3.7–7.7)
Occupation sector‡			
Telecommuting	10,947	4.9 (4.3–5.5)	7.5 (6.8–8.3)
Retail	1,515	3.8 (2.5–5.8)	5.7 (4.2–7.8)
Transport	731	4.5 (2.7–7.6)	7.5 (5.1–11.0)
Police/firefighters/public safety	589	5.2 (3.1–8.5)	7.6 (5.2–11.2)
Cleaning	748	3.0 (1.7–5.3)	5.7 (3.8–8.4)
Healthcare	1,048	8.3 (6.1–11.2)	11.7 (9.2–14.7)
Nursing home/other social work	947	6.6 (4.7–9.2)	9.5 (7.2–12.6)
Home caregiver	372	2.5 (0.9–6.7)	5.8 (3.1–10.6)
Other	6,865	2.6 (2.1–3.2)	5.0 (4.4–5.8)
Household size (residents)			
1	4,456	3.2 (2.6–4.1)	5.5 (4.6–6.4)
2	12,894	4.1 (3.5–4.8)	6.7 (6.0–7.6)
3–5	32,140	3.6 (3.2–4.1)	6.2 (5.7–6.7)
≥6	2,468	2.5 (1.5–4.1)	4.7 (3.4–6.4)
Census tract income§			
<5th percentile	2,382	3.5 (2.2–5.5)	6.6 (4.5–9.5)
5–25th percentile	11,229	3.9 (3.1–4.9)	6.0 (5.1–7.1)
25–50th percentile	13,096	3.6 (2.9–4.5)	6.2 (5.3–7.3)
50–75th percentile	11,804	3.3 (2.7–4.2)	5.9 (5.1–6.8)
75–95th percentile	10,583	3.7 (2.9–4.6)	6.2 (5.3–7.3)
≥95th percentile	2,864	4.6 (3.4–6.4)	7.3 (5.6–9.4)
Municipality size (inhabitants)			
≥100,000	15,974	4.9 (4.3–5.6)	7.7 (7.0–8.5)
20,000–100,000	15,553	3.0 (2.6–3.6)	5.3 (4.8–6.0)
5,000–20,000	10,727	2.4 (1.9–3.0)	4.7 (4.0–5.5)
<5,000	9,704	2.9 (2.2–3.9)	5.3 (4.4–6.5)

\* Seroprevalence with both tests positive and either test positive among participants with available results from point-of-care test and immunoassay.

† Among participants aged 17 years or older.

‡ Among active workers during lockdown.

§ Categories based on percentiles from province-specific distributions of census tract average income in 2017.

**Supplementary Table 9.** Seroprevalence of SARS-CoV-2 by self-reported clinical characteristics, ENE-COVID study, April 27–May 11, 2020, Spain.

<b>Characteristic</b>	<b>No. of participants</b>	<b>Both tests positive,* % (95% CI)</b>	<b>Either test positive,* % (95% CI)</b>
Symptoms compatible with COVID-19†			
Asymptomatic	34,016	1.2 (1.1–1.5)	3.4 (3.1–3.7)
Paucisymptomatic	10,669	3.0 (2.5–3.5)	5.5 (4.9–6.1)
Symptomatic	7,273	15.3 (13.8–16.8)	19.3 (17.7–21.0)
≤14 days ago	2,155	11.9 (9.9–14.3)	16.3 (14.0–18.9)
>14 days ago	5,118	16.6 (14.8–18.5)	20.5 (18.6–22.5)
PCR status			
Never done	50,594	3.2 (2.9–3.6)	5.8 (5.4–6.2)
Negative	1,134	6.5 (4.7–9.1)	9.4 (7.2–12.0)
Positive (≤14 days ago)	31	50.2 (27.0–73.4)	66.4 (42.0–84.3)
Positive (>14 days ago)	195	87.6 (81.1–92.1)	91.8 (86.3–95.3)
Contact with confirmed case			
No contact	47,385	2.6 (2.3–2.9)	4.9 (4.6–5.3)
Household member	860	32.8 (27.5–38.5)	38.9 (33.2–44.9)
Non-cohabitating family member/friend	1,284	11.4 (9.2–14.1)	16.4 (13.6–19.7)
Co-worker	1,461	8.1 (6.4–10.3)	12.6 (10.3–15.3)
Cleaning staff/housemaid/caregiver	78	8.5 (4.0–17.3)	13.8 (8.1–22.7)
Client‡	888	9.0 (6.6–12.2)	12.8 (10.1–16.2)
Contact with symptomatic person			
No contact	42,894	1.9 (1.7–2.2)	4.2 (3.9–4.5)
Household member	3,728	13.9 (12.1–16.1)	17.4 (15.3–19.7)
Non-cohabitating family member/friend	2,037	10.5 (8.5–13.0)	14.9 (12.6–17.5)
Co-worker	2,221	8.5 (7.0–10.4)	12.7 (10.8–14.9)
Cleaning staff/housemaid/caregiver	96	4.4 (2.0–9.8)	7.3 (3.6–14.2)
Client‡	980	8.2 (6.0–11.1)	11.7 (9.3–14.8)

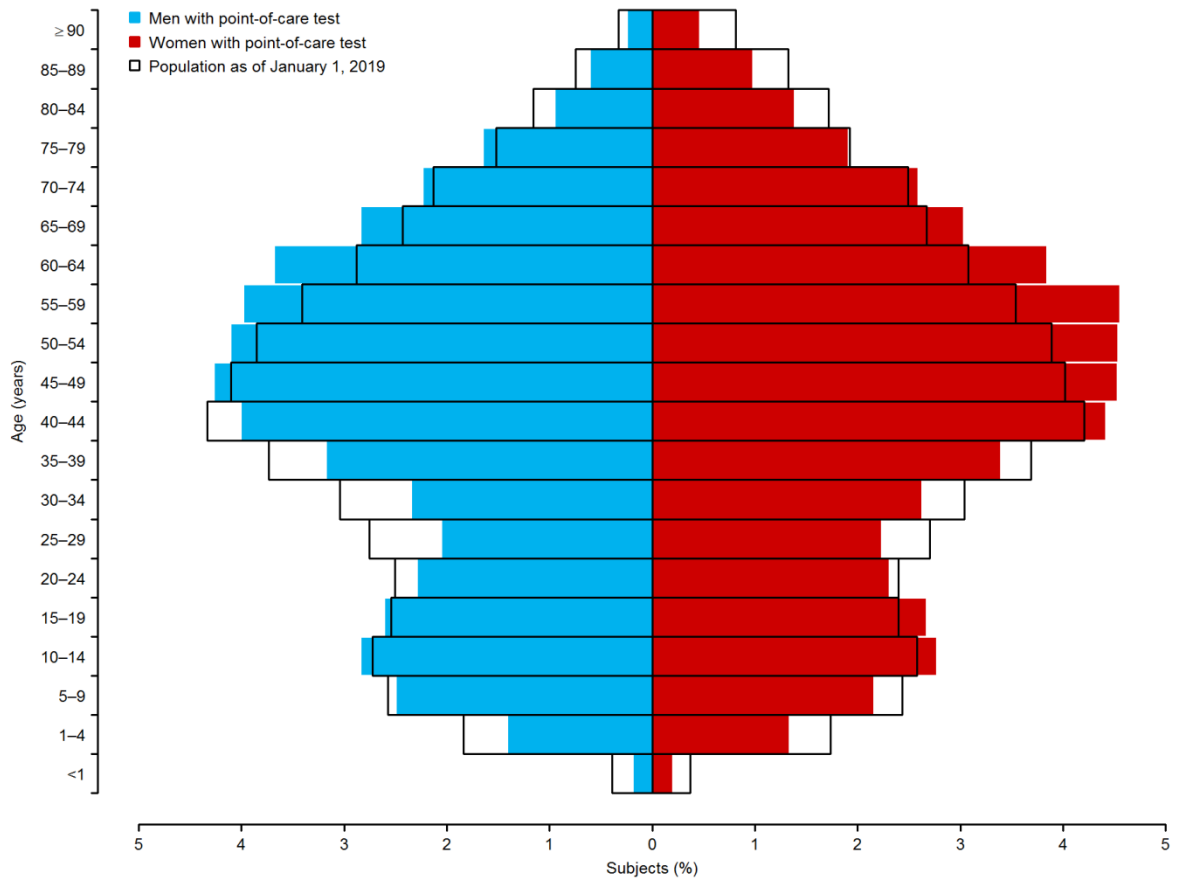
\* Seroprevalence with both tests positive and either test positive among participants with available results from point-of-care test and immunoassay.

† Asymptomatic (no symptoms), paucisymptomatic (1–2 symptoms without anosmia), and symptomatic (anosmia or ≥3 symptoms among fever, chills, severe tiredness, sore throat, cough, shortness of breath, headache, and nausea/vomiting/diarrhea).

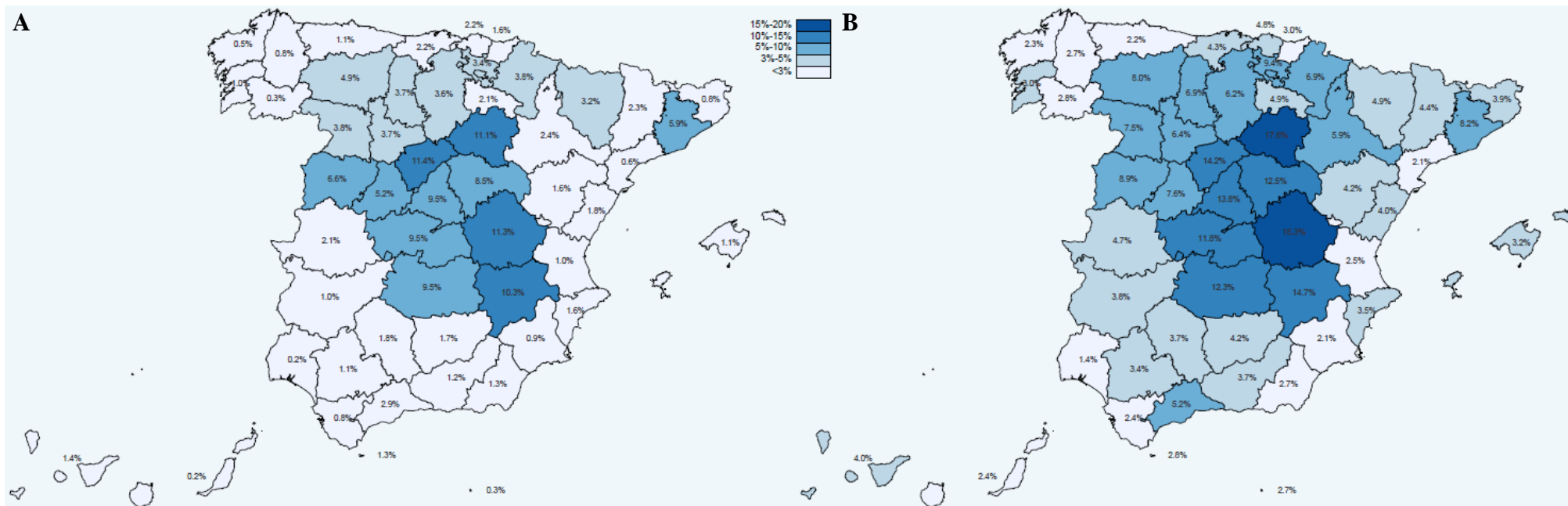
‡ Client or patient if health worker.



**Supplementary Figure 1.** Provinces, autonomous communities, and autonomous cities (Ceuta, Melilla) of Spain.



**Supplementary Figure 2.** Sex and age distribution of participants with point-of-care test compared with the Spanish population, ENE-COVID study, April 27–May 11, 2020, Spain.



**Supplementary Figure 3.** Seroprevalence of SARS-CoV-2 by province with both point-of-care test and immunoassay positive (A) and either point-of-care test or immunoassay positive (B), ENE-COVID study, April 27–May 11, 2020, Spain.

Seroprevalence among 51,958 participants with available results from both point-of-care test and immunoassay.