General context

Inter-institutional group

- Provide statistical information and build tools.
- Facilitate decision-making for the line ministries to create effective policies in the COVID-19 emergency.

Vulnerability to COVID-19

- Age and comorbidity conditions that represent greater frailty in patients who acquire COVID-19.
- Population: Age over 60 years; comorbidities; cohabitation conditions

Vulnerability index

- Construction of the index from the identification and selection of 13 variables.
- Sources: 2018 National Population and Housing Census, and administrative records.
- Groups generated by k-means method.

Who are the most vulnerable to Covid-19?

Population that, due to its demographic characteristics and health conditions, may have more complications in case of getting COVID-19.

General definitions

Population over 60 years old

Population with comorbidities

Hypertension	Ischemic Cardiopathy	Lung Conditions	Diabetes	Cancer

Population in the following cohabitation conditions:

◉ Overcrowded population

◉ Older adults in single-person households

◉ Older adults cohabiting with youth (20-29)

Inputs

- **NPHC -2018**
- National Identification Archive– **ANI**
- Civil Birth Registry **RCN**

Identification document

- Unique Database of Health Affiliation- **BDUA**
- Individual health care delivery records -**RIPS**

- **Population over 60 years old**
- **Overcrowded population**
- **Older adults in single-person households**
- **Older adults cohabiting with youth (20-29)**

Population with comorbidities

Variables included in the analysis

A review of the behavior of the virus in other countries* and in Colombia at the time the index was constructed made it possible to identify and select the 13 variables that were included in the analysis.

1. **Comorbidities:** diseases that, due to their effect on the immune system of individuals, generate complications after infection with the virus. Five associated diseases were identified, with each one of them a variable defined as the proportion of people in the block with the comorbidity is constructed. These are**:**

1.1. Hypertension

1.2 Diabetes

1.3 Ischemic Cardiopathy

1.4 Chronic Lung Disease

1.5 Cancer

2. **Adult population:** proportion of individuals of 60 years and older in the block level.

3. **Overcrowding:**

3.1 Proportion of households with more than 3 people per room.

3.2 Proportion of households with more than 3 people per sleeping room.

4. **Population density:** ratio between the number of people counted and the area in square meters.

5. **Intergenerational risk:** proportion of households in which highly contagious population groups live with people aged 60 or older**.**

5.1 **High risk:** adults 60 years of age or older, living together with population between 20 and 29 years of age, identified as the group with the highest rate of infection.

5.2 **Medium risk:** adults 60 years of age or older, living in the second most contagious group, between 30 and 59 years of age.

6. **Persons 60 years of age and older in single-person households**

Number of households on the block with a single person 60 years of age or older.

7. **Persons 60 years of age and older in non-family households:**

Number of households on the block in which a person 60 years of age or older lives, in which there is no family nucleus, and the members of the household are not related.

Conformation of groups

The exercise consisted in grouping the blocks of the municipal seats, according to the chosen variables at the block level. To achieve it, we consolidated a data base that has 407,277 rows, which represent all the blocks in municipal seats of the country.

| Population Density	Adults 60 years and older	Overcrowding in rooms	Overcrowding in bedrooms	High intergenera-tional risk	Medium intergenera-tional risk	Hypertension	Diabetes	Ischemic Cardiopathy	EPOC	Cancer	Over 60 years old in single-person households	Persons 60 years of age and older in non-family households
0.023	0.219	-	-	0.025	0.034	0.189	0.064	0.023	0.030	0.046	15	3
0.009	0.073	0.111	0.111	-	-	0.049	-	-	-	0.024	-	-
0.030	0.167	-	-	0.167	-	0.222	0.111	-	-	-	-	-
0.065	0.067	-	-	-	0.025	0.126	0.034	-	0.017	0.050	-	-
0.053	0.186	-	-	0.071	0.071	0.116	0.047	0.023	0.070	0.023	-	-
0.035	0.355	-	-	0.087	0.130	0.197	0.079	0.039	0.039	0.079	2	-

Classification method

◉ **Objective**

To differentiate the characteristics present in the data in the form of groups, through a measure of homogeneity in the observations.

◉ **How is it achieved?**

Applying a training algorithm in search of a partition of the set of n observations in K subsets.
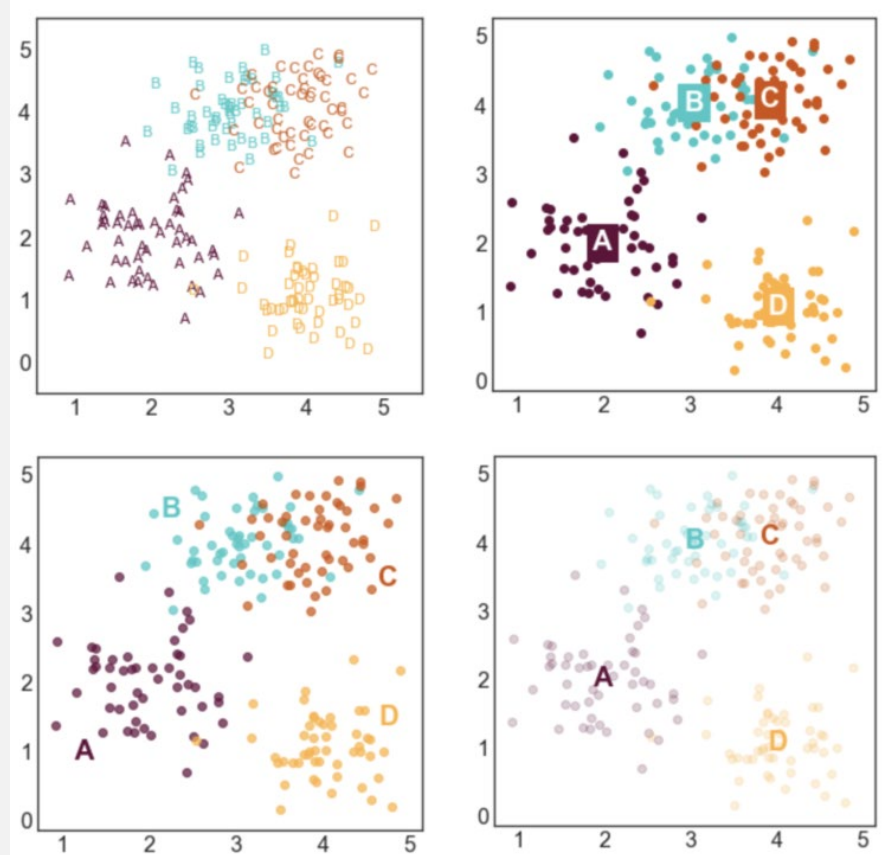
Ordinality criteria

First, the maximum value of each of the variables in each centroid is obtained, a label is assigned, and the number of maxima in each of the groups is counted.

It is then established that the group with the greatest vulnerability is the group with the highest number of maximums; in the event of a tie, it is resolved at random.
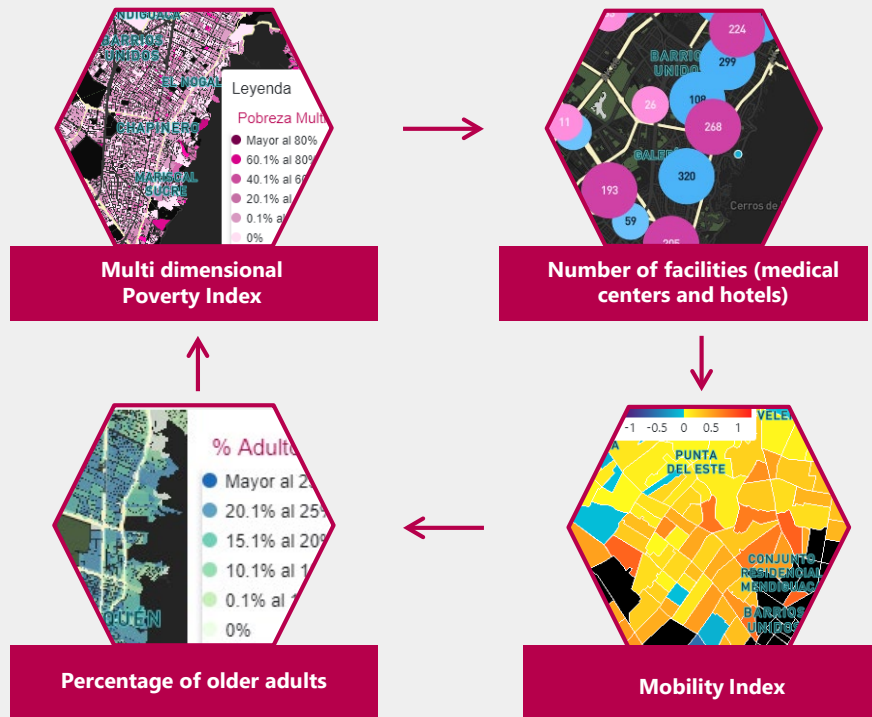
|	Centroides				
	Grupo 0	**Grupo 1**	**Grupo 2**	**Grupo 3**	**Grupo 4**
Densidad poblacional	0.049	0.074	0.038	0.063	0.051
Adultos mayores de 60	0.264	0.183	0.279	0.220	0.115
Hacinamiento en cuartos	0.003	0.010	0.001	0.006	0.012
Hacinamiento en dormitorios	0.007	0.026	0.003	0.017	0.030
Riesgo intergeneracional alto	0.029	0.030	0.028	0.030	0.022
Riesgo intergeneracional medio	0.063	0.057	0.058	0.063	0.039
Hipertensión	0.179	0.155	0.173	0.171	0.103
Diabetes	0.053	0.050	0.048	0.054	0.033
Cardiopatía isquémica	0.025	0.018	0.024	0.021	0.011
EPOC	0.032	0.032	0.033	0.034	0.021
Cáncer	0.053	0.039	0.053	0.045	0.025
Mayores de 60 años en hogares unipersonales	21.41	3.14	55.96	8.40	0.36
Mayores de 60 años en hogares no familiares	1.08	0.21	2.49	0.43	0.06
Número de máximos	3	1	4	3	2

Per block Vulnerability Geovisor
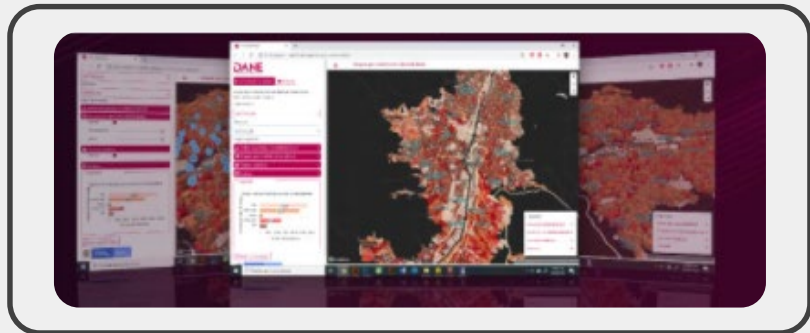
Geospatial information platform, in which you can identify the vulnerability of the environment, neighborhood or block, to the phenomenon of contagion by COVID-19

http://visor01.dane.gov.co/visor-vulnerabilidad/

Multi dimensional Poverty Index

Number of facilities (medical centers and hotels)

Percentage of older adults

Mobility Index

Geovisualization of vulnerability

- ◉ Groups by levels of vulnerability at the block level.

- ◉ Diagrams and filters by territorial levels.

- ◉ Enable layers, transparencies, and 3D views.

- ◉ Video tutorial, methodological note and shapefile download.
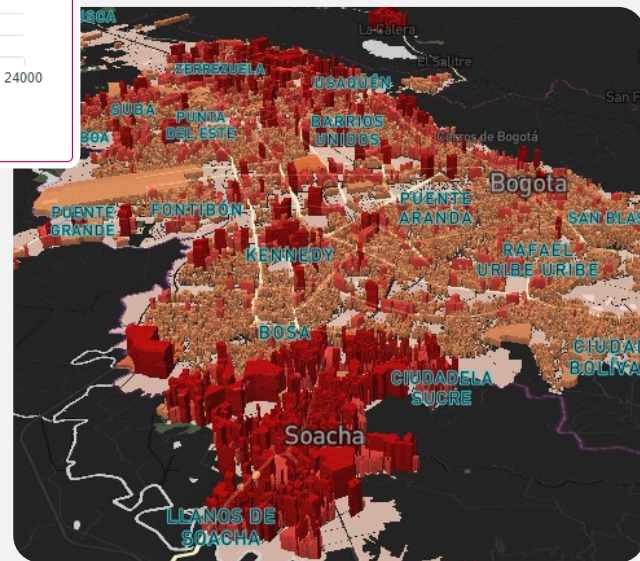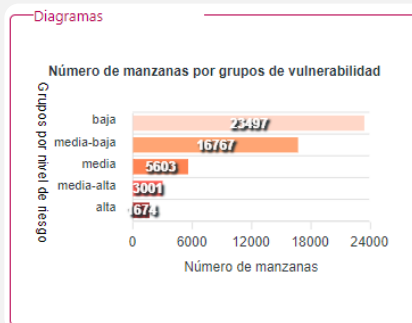
Conclusions

- All municipalities have groups with high and low vulnerability; however, this label does not necessarily represent greater risk.

- The variables that entered the model are demographic and comorbidities, most of which are related to the elderly; the population that in general is the most vulnerable to the Covid 19 , and it is presumed that by having greater prevalence of these variables, the area is more vulnerable.

- Due to the evolution of the pandemic, it is recommended that other identified comorbidities be included.

Pivot Post-Covid: an evidence-based approach to tackle the uncertain

- How can the Data Stewardship approach foster an appropriate transition from an emergency/urgency situation to the post-Covid scenarios?

- What are the main challenges regarding the strengthening of our work on experimental statistics?

- How did the data needs, under an ongoing data revolution, evolved during the Covid-19 pandemic? And how did NSO's adapt to remain fit for purpose.