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Covid-19 and the Employment Situation: A Cluster Analysis for the Rural Parish of Mariscal Sucre

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Abstract

Labor population of the Mariscal Sucre parish faces many challenges given the different problems that arise over time, it is known that within rural life, the means of generating income for families is agriculture to a large extent, but due to the lack of benefits and stability, many have chosen to venture into other labor fields, adding to this is the pandemic caused by COVID-19, which has only widened the existing gap in development with its urban counterpart. In the present research, the statistical methodology of Cluster Analysis was used, applied to certain variables that referred to the time periods 2020 – 2022 respectively, highlighting the difficulty that the inhabitants have to face their day to day, in addition to the fact that the people who dedicate their time to agriculture are already aging, And every time they witness the few guarantees offered by this activity, at the same time that it is a small group of people who have been infected by the COVID-19 virus, but at work level they have mostly been affected greatly.

Keywords: *Parish, agriculture, covid-19, rural life, cluster analysis.*

INTRODUCTION

Sources of jobs are essential for a society to develop, even more so if they are carried out in the rural sector, which does not enjoy the same opportunities as urban society, adding in turn, the impact of the expansion of covid-19, throughout the national territory, affecting work performance on a large scale. resulting in families facing a period of time full of difficulties as household income was compromised.

During the development of the research work, the objective is to provide a logical interpretation to what happened in the workplace, and the degree of affection of the working population, which in many situations paralyzed its operations throughout 2020. Our objective is to determine, through the multivariate statistical technique of Cluster Analysis, the precincts that share a similar labor level within what corresponds to the

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agricultural activity, and the labor situation under dependence of the Mariscal Sucre parish of the Milagro canton.

The research is divided into four points: the first phase includes the literature review, in which data or information that serves as background are reviewed, and facts on which the problem to be treated is supported, and defining in turn the variables that will be included in the analysis; the second phase describes the methodology applied and the information collection instrument used; The third phase puts the methodology into practice, and the results obtained are presented, and finally, the ideas are synthesized into conclusions resulting from the behavior of the variables analyzed.

LITERATURE REVIEW

The rural working population faces a number of adverse situations which have hardly been addressed by the competent state institutions, so much so that it highlights that the level of professionalization of the activity is relatively low, due to the little interest that has been shown over the years. (Stoyanova & Harizanova-Bartos, 2019) (Luna Rivera , Flores Castillo , & Paz Calderón , 2019)

One of the aspects that resonates the most It is the age of farmers in rural areas, the workforce has been well over thirty, and in many cases the workforce tends to be scarce, due to the number of crops that are poorly managed or poorly managed due to lack of guidance or supervision, because every day the techniques applied deserve a more demanding preparation. It is commonly stated that practice allows people's skills to increase, however the level of education is very important because of the positive effect that this entails professionally, for which, for the most part, it tends to be basic. (Alberdi Collantes, 2018) (Svoboda, Lososová, & Zdeněk, 2020) (Villarruel-Fuentes, 2017)

In many cases, the incipient academic preparation becomes It is even more counterproductive when the environment does not provide the necessary opportunities, which is exemplified in the conditions and types of work carried out by the population, which generates a lot of concern due to the low level of income that is perceived, the expenses that they have, reaching the end of the month with an economy in their homes that is difficult to sustain. (Singh & Dutta, 2020) (Alzamora Norena, 2022)

Some people even They look for another source of income, through inclusion in a new business, or to exploit their own resources which they allocate for crops, which do not enjoy the necessary guarantees due to the lack of resources, since they have a high price in the market. Agriculture and other related tasks are not profitable for the surrounding populations, because in certain cases scenarios can occur, such as climate change, constant environmental pollution, or international conflicts that negatively influence the price of the products that the country exports; as well as internal facts such as the existing abuse of intermediaries in marketing chains, which undermine the usefulness and progress of this activity, and not only in these areas, but on a national scale. (Samoilyk, Zos-Kior, Illin, & Illina, 2019) (Malhi, Kaur, & Kaushik, 2021) (Tudi, y otros, 2021) (de León Lázaro , 2018) (Zinchuk, Kutsmus, Kovalchuk, & Charucka, 2018)

In 2020, the pandemic generated by covid-19 began, impacting globally, economies were unprotected, and the failure of the health system was very evident; The number of infections skyrocketed, and urban societies suffered, even though they had better services than their rural counterparts. Studies carried out over the last few years have established positions where it is effectively stated that rural society does not have the means to survive an impact like this, likewise, the continuous lack of communication or distance from downtown areas has allowed the number of infections to be negligible in many places. (Callaghan , Lueck , Trujillo , & Ferdinand , 2021) (Boughton, y otros, 2021)

The arrival of COVID-19 is thought to have widened the gaps in socio-economic development in rural areas, greatly delaying their productive activities, due to the situation that led to the closure of many busy businesses in the area. (Altieri & Nicholls, 2020)

Description of the data considered

The research requires that several sources of information be reviewed to clarify the situation previously described, therefore, it is necessary to mention the variables that were considered for this study, which are indicated below, as a description and their respective abbreviation, it should be emphasized that the dataset belongs to the 2020 – 2022 time space.

- Age Range (RE)
- Level of Education (NE)
- Workplace (LT)
- Working Hours (JL)
- Total Monthly Income (TIM)
- Total Monthly Expenditure (TGM)
- Economic Situation at the End of the Month (FDM)
- Carries out other economic activity (ROAE)
- Autonomous Economic Activity (AEA)
- General Health Status (SEG)
- Possession of Insurance (PS)
- Knowledge of covid-19 before it was declared a pandemic (CV)
- Means by which you learned about covid-19 (MSE)
- You have contracted covid-19 (CC)
- Family member infected with covid-19 (FCC)
- Knowledge of measures to prevent COVID-19 infections (CMECC)
- Level of occupational impairment due to covid-19 (NALPC)
- Workplace Biosecurity Procedures to Reduce COVID-19 Infections (PRCC)

METHODOLOGY

The technique used for the development of the research was descriptive or exploratory statistics, which allows a more precise analysis of the data presented, which will strengthen in a certain way the degree of argumentation, and the existing relationships between the various groups.

The collection of information was possible due to the design of two surveys, which fit the two periods of analysis in which this study incurs, which were prepared by the Research Institute of Agricultural Economics and Rural Development, related to the Agrarian University of Ecuador. This is the main instrument to be able to provide a precise explanation to the existing problems in the lifestyle of those who make up the working population of the Mariscal Sucre parish.

In addition, the impact of the pandemic generated by covid-19 is a fundamental aspect, one of the main reasons to understand the degree of impact on the work activity of

the area, so Therefore, the data set obtained is cross-sectional, and for the treatment and applicability of cluster analysis, the Statistical Package for the Social Sciences (SPSS) software was considered.

Cluster analysis, also known as cluster analysis, is a statistical technique that divides the general data set into subgroups (Shamin, Frolova, Klychova, Nigmatullina, & Iskhakov, 2019), always starting from the fact that they have similar characteristics, or that they are of a certain degree homogeneous. (Balaniuk, y otros, 2021)

The purpose of the generation of groupings is to make known the similarities that certain objects analysed may have with each other (Tedesco & Cristiano, 2017), and at the same time define the existing differences between the same groups previously formed, in order to establish certain differentiating aspects that satisfactorily favor the analysis in question. (Darma Putra & Yuli Pratiwi , 2019)

RESULTS

The work uses the application of cluster analysis as one of the many methods of statistical processing, in order to determine the state of the labor situation and the condition of covid-19 in the workers of the Mariscal Sucre parish. The main objective is the identification of the groups that have the highest degree of homogeneity within the two periods of time analyzed, the first being the one where covid-19 was not yet considered a pandemic, and the second where it already presented an outbreak and a higher level of contagion.

In addition, it is necessary to establish that from the matrix of distances, through the Ward method relating it to the Euclidean similarity squared, the precincts of the parish in question, present an assigned numbering, where: Los Aguacates (1), Bellavista (2), La Unión (3), Paz y Bien (4), Finca Sánchez (5), América Pérez (6), Vuelta al piano 2 (7), Bananeros Unidos (8), Los Palmares 1 (9), Legia 1 (10), Legia 2 (11), Maravilla 2 (12), La Libertad (13), San Francisco (14), Estero Verde (15), La Carolina (16), El Carrizal (17), and El Piñoelal (18).

Analysis of the First Survey Period

Table 1. P1 conglomeration history

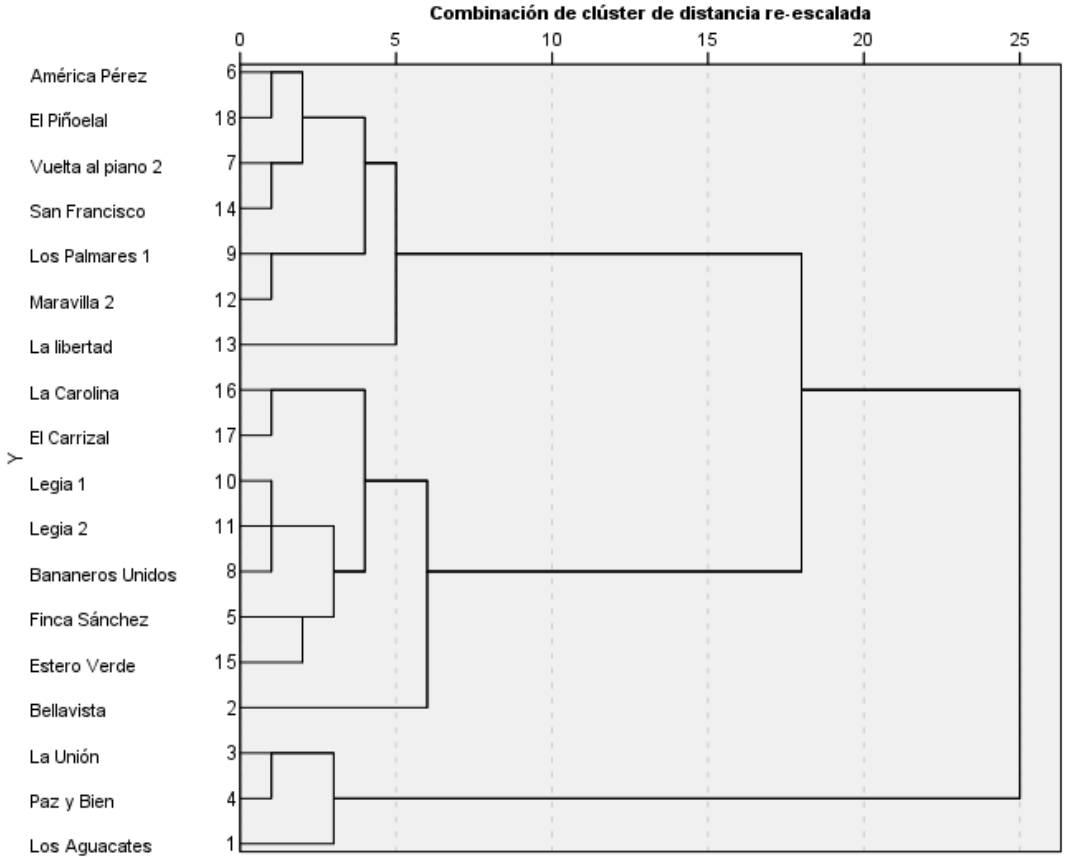
Stage	Combined Cluster		Coefficients	First Stage Cluster Appearance		Next step
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	6	18	,316	0	0	9
2	9	12	,671	0	0	13
3	10	11	1,085	0	0	6
4	16	17	1,675	0	0	12
5	7	14	2,311	0	0	9
6	8	10	3,090	0	3	11
7	3	4	3,974	0	0	10
8	5	15	5,047	0	0	11
9	6	7	6,134	1	5	13
10	1	3	7,993	0	7	17
11	5	8	10,374	8	6	12

12	5	16	12,997	11	4	15
13	6	9	15,872	9	2	14
14	6	13	19,439	13	0	16
15	2	5	23,442	0	12	16
16	2	6	35,953	15	14	17
17	1	2	53,779	10	16	0

Source: Prepared by the authors, based on the Statistical Package for the Social Sciences (SPSS).

The history of clusters indicates the linkage that occurs between each pair of enclosures, accompanied by a coefficient that shows the distance between them. For example, in Table 1, he accommodates the pairings in number of stages, where the first ones present a minimum distance such as when combining enclosures 6 and 18 (0.316), in the second stage by combining enclosures 9 and 12 (0.671), in the third stage enclosures 10 and 11 (1.085) are combined, and so on until the last stage; It is worth mentioning that the lower the coefficient, the greater the similarity between enclosures.

Figure 1. Dendogram with Ward P1 Link



Source: Prepared by the authors, based on the Statistical Package for the Social Sciences (SPSS).

The dendogram is based on a structure formed according to the degree of homogeneity between the analyzed enclosures, to determine the number of clusters, an imaginary vertical is drawn, where it is detected that for this first period, 3 groups were obtained, which are detailed below: in cluster number 1 are grouped the Los Aguacates enclosures (1), The Union (3), and Peace and Good (4); in the second cluster are Bellavista (2), Finca Sánchez (5), Bananeros Unidos (8), Legia 1 (10), Legia 2 (11), Estero Verde (15),

La Carolina (16), and El Carrizal (17); in the last group are América Pérez (6), Vuelta al piano 2 (7), Los Palmares 1 (9), Maravilla 2 (12), La Libertad (13), San Francisco (14), and El Piñoelal (18).

Table 2. Mean via Ward P1 method

Ward Method	D	NE	LT	JL	TIM	TGM	FDM	AEA	SEC	PS
1	7,04	1,40	7,03	2,50	2,14	1,67	5,65	0,40	1,43	0,20
2	6,74	1,21	4,57	1,84	2,28	1,76	5,29	0,43	1,19	0,12
3	5,10	1,45	4,88	2,56	1,93	1,41	5,29	0,20	1,07	0,10
Total	6,15	1,35	5,10	2,15	2,12	1,61	5,35	0,34	1,18	0,13

Source: Authors' own elaboration, based on the Statistical Package for the Social Sciences (SPSS)

The Ward method, through the means, allows us to infer in a more exact way in the behavior of the variables within each identified cluster, the enclosures of the first group, it is highlighted that the older working population is found, also most of them perform tasks related to agriculture, their situation at the end of the month is very complicated, The state of health of the population is acceptable, and very few have insurance; In the second group, the fact that they have a slightly better level of income stands out, but at the same time they have a higher expenditure, and in relation to the other two groups, people tend to carry out economic activities on their own, where in most of them agriculture stands out; and in the third group, the level of education or instruction of the workers stands out very little, the working hours they perform indicate that they are very variable, that is, the position they hold does not provide them with the necessary stability.

Validation of P1 clusters

Table 3. P1-factor ANOVA

ROAE					
	Sum of squares	Gl	Quadratic mean	F	Gis.
Between groups	,230	2	,115	5,878	,013
Within Groups	,293	15	,020		
Total	,523	17			

Source: Authors' own elaboration, based on the Statistical Package for the Social Sciences (SPSS)

To verify that the distribution of the groups has been adequate, the one-factor Anova test is carried out, in which, with the inclusion of a variable that is not part of the original set, it refers to whether the person carries out any economic activity on his or her own, allowing the existence of differential aspects between groups to be identified. And this is the case, since the significance value is less than 0.05.

Analysis of the Second Survey Period

Table 4. P2 conglomeration history

Stage	Combined Cluster		Coefficients	First Stage Cluster Appearance		Next step
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	14	18	,934	0	0	7
2	3	4	1,950	0	0	12
3	8	9	3,010	0	0	6
4	5	10	4,086	0	0	14
5	11	15	5,262	0	0	9
6	8	12	6,647	3	0	11
7	6	14	8,249	0	1	10
8	16	17	9,853	0	0	13
9	2	11	12,797	0	5	14
10	6	7	15,893	7	0	15
11	8	13	19,853	6	0	15
12	1	3	24,096	0	2	13
13	1	16	28,873	12	8	16
14	2	5	33,699	9	4	16
15	6	8	40,593	10	11	17
16	1	2	52,998	13	14	17
17	1	6	72,609	16	15	0

Source: Prepared by the authors, based on the Statistical Package for the Social Sciences (SPSS).

The history of clusters for the precincts in the second period establishes certain changes, which are reflected in the coefficient between the pairs formed. In this case, Table 2 accommodates the pairings in number of stages, where the first ones have a smaller distance between the pairs of related precincts, for example, stage 1 composed of 14 and 18 (0.934), in the second stage by combining precincts 3 and 4 (1.950), in the third stage precincts 8 and 9 (3.010) are combined, and so on until the last stage; It is worth mentioning that similar to the previous period, the lower the coefficient, the greater the similarity between enclosures.

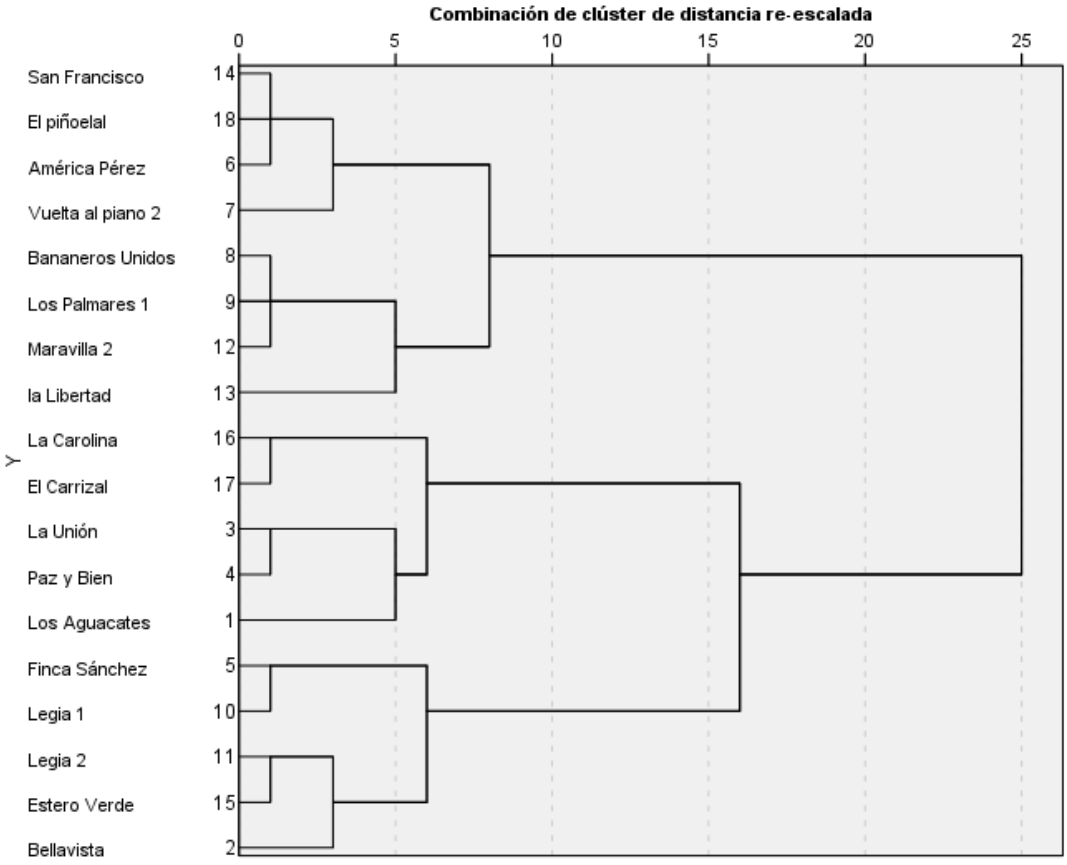


Figure 2. Dendogram with Ward P2 Link

Source: Prepared by the authors, based on the Statistical Package for the Social Sciences (SPSS).

The dendogram groups the enclosures according to their degree of homogeneity, to determine the number of clusters, a vertical is drawn, where it is detected that for this second period 4 groups were obtained, which are detailed below: in cluster number 1 are grouped the enclosures Los Aguacates (1), La Unión (3), Paz y Bien (4), La Carolina (16), and El Carrizal (17); in the second cluster are Bellavista (2), Finca Sánchez (5), Legia 1 (10), Legia 2 (11), and Estero Verde (15); in the third group are América Pérez (6), Vuelta al piano 2 (7), San Francisco (14), and El Piñoelal (18), and in the last group Bananeros Unidos (8), Los Palmares 1 (9), Maravilla 2 (12), La Libertad (13).

Table 5. Mean via Ward P2 method

Ward Method	D	NE	LT	JL	TIM	TGM	FDM	AEA	SEC	PS	CV	MSE	CC	FCC	CMECC	NALPC	PRCC
1	6,98	1,36	6,13	2,03	1,98	1,62	5,51	0,42	1,40	0,25	0,16	0,27	0,19	0,20	0,73	3,57	1,55
2	6,80	1,20	4,08	1,93	2,31	1,69	5,37	0,53	1,29	0,20	0,20	0,24	0,10	0,14	0,90	4,20	1,29
3	5,22	1,67	5,15	2,24	2,21	1,62	5,21	0,39	1,17	0,21	0,38	0,82	0,05	0,06	0,81	3,43	1,59
4	5,20	1,17	3,98	2,31	1,79	1,39	5,39	0,20	1,14	0,08	0,14	0,14	0,02	0,02	0,69	2,43	1,67
Total	6,14	1,34	4,87	2,11	2,08	1,59	5,38	0,39	1,26	0,19	0,22	0,35	0,09	0,11	0,79	3,46	1,51

Source: Prepared by the authors, based on the Statistical Package for the Social Sciences (SPSS).

The Ward method uses means to describe the behavior of the variables within each cluster identified in this second time space. In the precincts of the first group, it is highlighted

that there is the oldest working population, also most of them perform work related to agriculture, their situation at the end of the month is very complicated, the health status of the population is acceptable, few are those who have insurance, in turn the infections of covid-19 have been low for both workers and their families respectively; In the second group, the fact that they have a slightly better level of income stands out, but at the same time they generate slightly higher expenses in relation to their counterparts, people tend to carry out economic activities on their own, where in most of them agriculture stands out, workers demonstrate that they have the knowledge to avoid catching COVID-19, although at the same time the pandemic affected them to a greater extent compared to the other groups; In the third group, the level of education or instruction that the workers have stands out, in addition to the fact that they claim to have taken into account certain indications before COVID-19 has been declared a pandemic, highlighting that it was mostly due to the comments of other people; In the last group, the working hours they work indicate that they are highly variable, that is, the position they hold does not provide them with the necessary stability, in addition to indicating that procedures were carried out to reduce COVID-19 infections.

Validation of P2 clusters

Table 6. P2-factor ANOVA

ROAE					
	Sum of squares	Gl	Quadratic mean	F	Gis.
Between groups	,270	3	,090	4,319	,024
Within Groups	,292	14	,021		
Total	,562	17			

Source: Prepared by the authors, based on the Statistical Package for the Social Sciences (SPSS).

To verify that the distribution of the groups has been adequate, the one-factor anova test is carried out, therefore, a variable that was not part of the original set of data is included, it refers to whether the person carries out any economic activity on his own, allowing to identify the existence of differential aspects between the groups, And this is the case, because the significance value is less than 0.05.

CONCLUSIONS

The employment situation of the population of the Mariscal Sucre parish lacks state support due to the growing difficulties they must face, leading many to abandon the main activity such as agriculture, so much so that young people are gradually venturing into industries, in search of economic stability.

The level of income is not enough for people to cover their expenses, causing most to have problems to make ends meet, causing them to carry out activities on their own in some situations, which help to mitigate the situation to some extent.

The arrival of covid-19 has increased a state of absolute poverty that only increases with the passage of time, generating growing uncertainty, leading to the abandonment of land, and this despite the fact that the level of infections has been minimal due to the lack of communication with the urban environment.

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