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ARTICULO

Effects of spaces, electronic devices, and basic services available on households during COVID-19 confinement: A study in the Dominican Republic

Efectos de los espacios, dispositivos electrónicos y servicios básicos disponibles en los hogares durante el confinamiento por COVID-19: Un estudio en República Dominicana

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Abstract: The daily lives of the world population were impacted and went into crisis mode due to the COVID-19 pandemic, which, as of November 2019, has taken over us. The changes in everyday behavior have generated consequences in all aspects of life hindering the labor, education, and recreational sectors. The COVID-19 pandemic has led us to analyze and rethink relevant or predominant factors for choosing a home. The workplace, location of the best schools, safety, and economic aspects are of great influence when it comes to choosing a home. During this past year, not all of these factors played a role since we have been forced to continue with all of our activities from home. But what happened to the population that did not consider space, ventilation, and even access to fresh air or recreation when choosing their home? Where the economic factor, as well as access to work and/or school environments, have always prevailed. With this in mind, a survey was performed in the Dominican Republic with the intent of discovering the effects of spaces, electronic devices, and access to basic services during the COVID-19 pandemic, which are crucial for current telecommuting and distance learning processes.

Keywords: COVID-19; Digital Divide; Household; Confinement effect; Survey.

Resumen: La vida cotidiana de la población mundial se vio impactada y entró en modo de crisis debido a la pandemia del COVID-19, que a partir de noviembre de 2019 se ha apoderado de nosotros. Los cambios en el comportamiento cotidiano han generado consecuencias en todos los aspectos de la vida obstaculizando los sectores laboral, educativo y recreativo. La pandemia del COVID-19 nos ha llevado a analizar y repensar factores relevantes o predominantes a la hora de elegir una vivienda. El lugar de trabajo, la ubicación de las mejores escuelas, la seguridad y los aspectos económicos son de gran influencia a la hora de elegir una vivienda. Durante este último año, no todos estos factores jugaron un papel ya que nos hemos visto obligados a continuar con todas nuestras actividades desde casa. Pero, ¿qué pasó con la población que no consideró el espacio, la ventilación y hasta el acceso al aire libre o la recreación al elegir su hogar? Donde siempre ha prevalecido el factor económico, así como el acceso a entornos laborales y/o escolares. Con esto en mente, se realizó una encuesta en República Dominicana con la intención de conocer los efectos de los espacios, los dispositivos electrónicos y el acceso a los servicios básicos durante la pandemia del COVID-19, que son cruciales para los procesos actuales de teletrabajo y educación a distancia.

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1. Introduction

The global crisis generated by the COVID-19 pandemic has changed the daily lives of the world population, which are crucial for maintaining the physical and mental wellbeing of individuals. Changes in behavior have brought consequences in all life aspects, hindering the labor, education and recreational sectors.1 The change of scenery of having to carry out these activities from home has required spaces and tools that can meet the needs relevant to their undertaking.2 The confinement to which the inhabitants of every country have been subjected to, with the interest of curbing the spreading of the virus, has forced families to perform their daily routines, both work and education-related, jointly and from home. Though not always under suitable conditions in terms of necessary spaces, electronic devices and data and electricity services, which has adversely impacted their lives (Porto Valente C, et., 2022; Saroglou T, et. 2022).

Research submitted from different parts of the world has confirmed the significant changes to the daily lives of the world population (Odriozola-González P. et. 2020; Voitsidis P, et. 2020). A sampling, such as the one carried out by Balanzá-Martínez et al, showed that most participants reported substantial changes in terms of spending time outside by 93.6%, as well as 70.2% for physical activity and a third of the sample presented significant changes to stress management, social support and restful sleep (Balanzá-Martínez V, et. 2020; Lennon M, 2020; Hanzl M., 2020). In France, there was a notable growth in stress (61.6%) and anxiety (60.2%) levels amongst college students during mandatory confinement, increasing the consumption of alcohol during the lockdown period (Husky MM, et. 2020; Jens K, et. 2021). The lack of physical activity in children under the age of 13 during the COVID-19 pandemic lockdown in Portugal showed negative effects, mostly when both parents worked from home, while being positively impacted by having large exterior spaces and the presence of other children at home (Pombo A, et. 2020; Kearns A, 2022).

Negative effects were also reported at an academic level, such as those presented by college students from Arizona State University (ASU) - one of the largest public institutions of the United States, where due to COVID-19, 13% of students had to delay graduation, 40% lost their job, internship or job offer and 29% expected to earn less by the age of 35 (Aucejo EM, 2020; Jens K, et. 2021; Honey-Rosés J, 2020).

In the Dominican Republic, the coronavirus pandemic had such an impact, that to date (October 1, 2020) there is a total of 112,728 positive cases, wherein 88,205 have recovered and 2,108 have died, accounting for a mortality rate of 1.87%. Where Distrito Nacional (30,625 positive cases), Greater Santo Domingo (23,120 positive cases) and Santiago (12,604 positive cases) are the three mains' cities where the virus has spread the most, registering the highest case count (Boletín diario COVID-19., 2020)

Changes in lifestyle behavior have yet to be fully investigated in the Dominican Republic. For this reason, this research is showing a nationwide sampling of the development and unfolding of daily activities amongst the population in their households, in order to determine the effect over each one of the roles and commitments of the household members under the confinement imposed as of March 2020 by the Dominican government. The state of exception and national emergency has been set forth through several decrees ranging from #134-20 of March 19, 2020 issued by former president Danilo Medina to the most recent one #430-20 of September 1, 2020 issued by current president Luis Abinader, wherein mobility has been restricted resulting in a dead-end for supply chains with current and future domino effects (Presidencia de la República Dominicana, 2020)

The measures adopted by the state of emergency of the country are divided by area. For instance, in terms of circulation, there is a restriction on mobility and social activities with a curfew

from 5pm to 6am, which was subsequently amended and is currently from 9pm to 5am on weekdays and from 7pm to 5am on weekends and holidays. Public transportation is only operating from 6am to 6pm at 30% capacity and using a mask at all times is mandatory. In the economics sector, there are limitations over production activities wherein small businesses, that is, those with 10-50 employees, must work with a minimum of 10 people and no more than 50% of their staff. On the other hand, medium and large businesses must operate with no more than 25% of their staff during the tiered and gradual phase. There are also other restrictions on non-essential activities.

National education centers closed their doors as of March 10, only a few months short of ending the school year. At the elementary level, schools cancelled their teaching and administrative activities pushing aside the schooling of the youngest to prioritize their family's as well as their own wellbeing. Thus, the school year ended without fully covering all contents due to scarce resources available in schools which were unprepared to teach students remotely at this level (Empresarial A, 2019). In terms of higher education, universities continued teaching students under the distance learning modality using technological tools that allow them to present content to students. Although this did not always go smoothly as there were many inconveniences to solve such as: power outages, availability of necessary equipment, adequate space for activities, among other variables (Bárcena A, 2020) in addition to other activities inherent to higher education such as practices, laboratories or seminars which were not taught under the same conditions, thus affecting the quality of the education provided.

In view of the foregoing, this study has focused on three specific and crucial aspects of the routine activities of the population: health, the digital divide and space available in households. We also collected general data from survey respondents in a confidential manner while respecting their privacy at all times.

Why did we focus on these three mains aspects? As previously mentioned, mandatory confinement has lead businesses that are attempting to stay afloat, to change and adapt to telecommuting, wherein the employee can fulfill their occupational roles from home. These environment changes have altered many important factors of the family setting.

For instance, according to investigations, telecommuting has impacted transportation, construction, energy and emissions related to internet, while directly affecting the environment and even decreasing energy consumption (O'Brien W, 2020). But they are not all advantages since there is also a need for appropriate spaces (bigger and wider households), lightning, ventilation, computer and office equipment, internet quality and speed, and in countries like the Dominican Republic, alternative energy sources that are reliable in order to avoid the common and constant power outages (Muñuzuri AP, 2022). In addition to this, there are emotional disadvantages, such as employee isolation, mixing telecommuting with family life, as well as assisting children with their distance or online learning.

The developed setting has experienced a challenge with the COVID-19 pandemic pushing the construction sector to reformulate many deep-seated realities (Megahed NA, 2020; V AAR, R V, 2020). As a main source of income, work and interaction, it is necessary to make resilient buildings that integrate both hygiene and wellbeing for its users. Recommendations for new and current household designs, according to world health organizations, are those that integrate green spaces and elements that are visible and accessible. In addition to flexibility, adaptability, shared use and overcrowding of living spaces and compatible functions located within the buildings, as well as reappropriation of the basic principles and archetypes of sustainable architecture, thermal comfort and interior air quality, among other factors (D'alessandro D, et. 2020).

Considering the need for all these factors, which are found nationwide in the Dominican Republic, we sought to gather information on the current status of the residential sector and its members, using the opinion of elderly individuals from all social classes living in the main cities of the country.

2. Methodology

This research was addressed from a quantitative, cross-section and descriptive approach, where the main goal has been to understand the effects over aspects such as healthcare, household and digital divide during the COVID-19 pandemic. The study was carried out through an online survey disseminated nationwide.

In order to ensure that we reach the desired goal, three (3) design phases were established for the study:

- Construction and validation of the instrument.
- Application of the questionnaire
- Analysis of the information

2.1 Survey and Expert Judgment

For this study an instrument was created that allowed obtaining information from aspects such as healthcare, digital divide and households, as well as general data to understand the different characteristics of survey respondents. The questionnaire, which was developed by researchers, was subjected to an expert judgement prior to being used in order to determine its validity.

The selection of expert judges was based on their expertise in areas of healthcare, engineering and technology, along with experience in teaching and research and preparing instruments for data collection in these areas. To this effect, individual evaluations were carried out where each expert filled out a questionnaire comprised of three sections and two Likert scales assigned as follows:

Table 1. Aspects evaluated with their scales

Aspects	Scale
Relevance: the statement fits the research been carried out.	1. Very Low 2. Low 3. High 4. Very High
Clarity: it is easily understood, that is, its syntaxis and semantics are appropriate.	1. Unclear and should be fully modified. 2. Slightly unclear and requires specific modifications. 3. Clear 4. Very clear
1. Unclear and should be fully modified. 2. Slightly unclear and requires specific modifications. 3. Clear 4. Very clear	1. Very Low 2. Low 3. High 4. Very High

Each expert received an e-mail explaining the goal of the test, the purpose of the instrument and the significance of their participation to determine its validity. The information was sent to 20 participants, out of which 14 completed the questionnaire in full. To analyze the concordance amongst experts, we used the Kendall Concordance Coefficient, which ranges from 0 to 1, where 1 means all experts agree and 0 means that they all disagree (Dorantes Nova JA, et. 2016). For our case we had an overall result of 0.65, indicating that some improvements were required in a few of the aspects. These were subsequently amended as suggested by the experts.

Table 2. Reliability Coefficient of the Instrument.

Aspects	Scale
Relevance Aspects	0.802
Clarity Aspects	0.971
Coherence Aspects	0.979
Total	0.974

Cronbach's Alpha was applied to the instrument in order to obtain its reliability coefficient, which in turn resulted in the numbers seen in Table 2. This allowed us to establish that the instrument is overall reliable and in all its dimensions.

2.2 Sampling

According to the Ministry of Public Health in its daily reports on COVID-19, the overall population of the country is 11,159,885 inhabitants, which accounts for the universe of this study. In view of these considerations, the minimum sampling required was estimated using the formula (Ec.1) proposed by Spiegel and Stephens (Spíegel MR, et. 2009).

$$n = \frac{Z^2 \sigma^2 N}{e^2(N-1) + Z^2 \sigma^2} \qquad \text{Ec. (1)}$$

Where (QuestionPro Software de Encuestas, 2020):

n = is the size of the sampling.
N = is the size of the population.
σ = represents the standard deviation of the population (it is common to use a constant number that equals to 0.5)
Z = is the value obtained through levels of trustworthiness. Its value is a constant. Normally you get two values depending on the level of trustworthiness desired, where 99% is the highest level (this value equals to 2.58) and 95% (1.96) is the minimum value accepted to consider the research as reliable.
e = represents the acceptable limit of sampling error, which generally ranges from 1% (0.01) to 9% (0.09), where 5% (0.05) is the standard value used in research.

For this reason, the minimum sample required was 665 survey respondents, with a margin error of 5%, a trustworthiness level of 99% and a heterogeneity of 50%.

The sampling technique established was simple random sampling in order to ensure that all individuals that comprise the population have the same opportunity to be part of the sample (Otzen T, et. 2017), thus allowing an open sample in terms of social status, age and gender.

3. Result

Overall, a total of 667 survey respondents completed the survey. This took place from September 8-25, 2020 in the main cities of the country, particularly on Distrito Nacional, Greater Santo Domingo, Santiago, La Vega, Azua and La Romana.

During the collection of general data, we obtained the following variables: age, gender, number of household members and social class of the population under consideration.

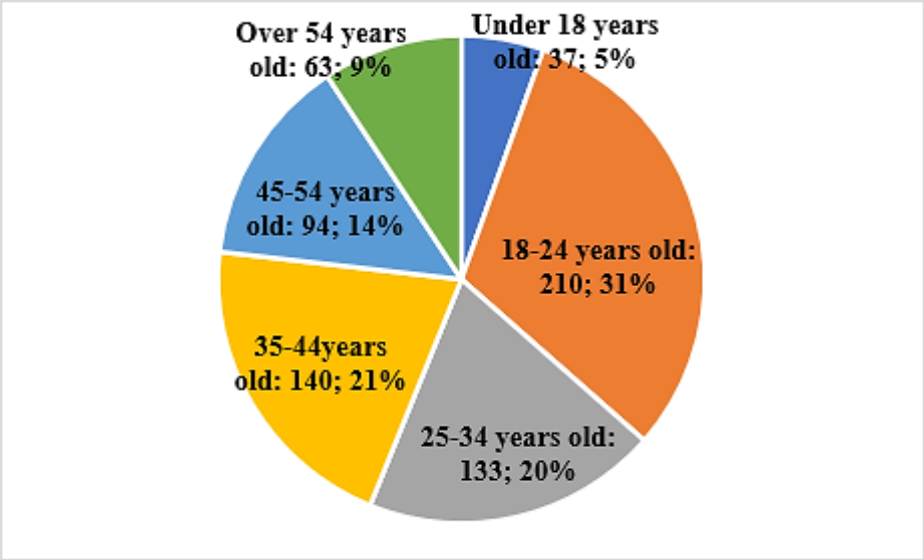


Figure 1. Age range and its results.

The age range of survey respondents is seen in Fig. 1, where the age of the total population surveyed is quite diverse ranging from under 18 to over 54 years old. The highest range belongs to the 18-24 segment (31%) of the surveyed population, which has allowed us to understand the current status of the student population, whose majority is still attending college online. The second highest range belongs to the 35-44 age group (21%). This population has perceived the current situation from a different perspective, being young adults with certain social responsibilities such as working onsite under a strict protocol due to COVID-19, as well as fulfilling obligations related to the household and other household members.

Results showed that the highest percentage of survey respondents were female accounting for 61% and the remaining 39% were male. By correlating the age ranges with genders, we noticed that the highest percentage of survey respondents were female, wherein 22% belong to the 18-24 age group and 14% to the 35-44 segment. Men accounted for 10% in the 25-34 age group and 9% in the 18-24 range.

The household is a relevant factor, where the number of household members is highly significant. Results indicated that the highest percentage of the surveyed population live in households with 3 to 4 members (49%). According to results published by the National Office of Statistics (ONE, for its acronym in Spanish), after completing a survey on Dominican households, it was determined that *"40.4% of households are comprised of 2-3 members, while 31.7% has 5 members, averaging on 3.3 members per home in 2016"* (ONE, 2018).

The hierarchy of social stratification within the Dominican population is defined, mostly, by socioeconomic groups seen as the lower, middle, upper-middle and upper classes. Wherein, the majority of survey respondents, that is, 66%, considered themselves to be part of the middle class. Followed by 24% who stated belonging to the upper-middle class. These were the two socioeconomic groups most prevalent in the study.

Upon analyzing social classes and the number of household members, we were able to determine that middle and upper-middle groups are comprised by 3-4 household members, accounting for 46% of survey respondents (Fig. 2). While 26% of survey respondents accounted for middle and upper-middle class homes with 5 or more household members. And 19% of the middle and upper-class homes have 1-2 members per household. In contrast, out of the 6% of survey

respondents accounting for the lower class, 3% reported having 3-4 household members. While 2% accounted for the upper class. Therefore, the sampling majority belongs to the middle and upper-middle class with structured families of 3 or more members per household.

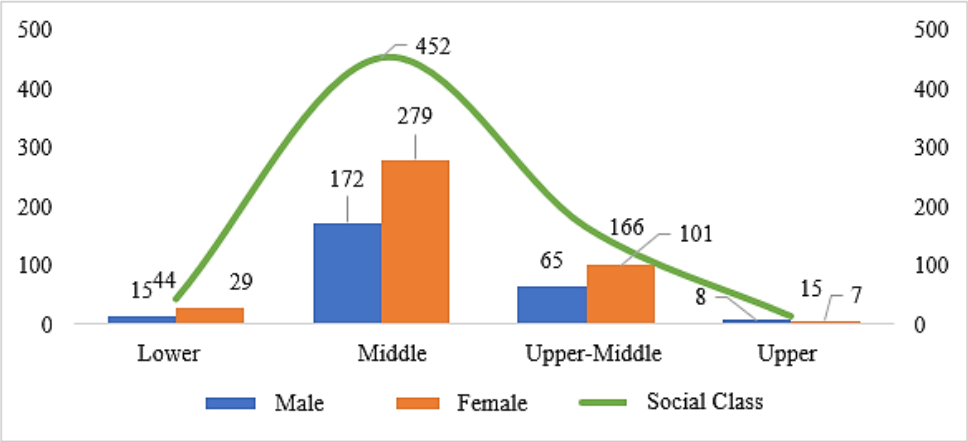


Figure 2. Social class of survey respondents in relation to gender

Final results showed that the highest percentage of survey respondents belongs to the middle and upper classes of the population, being the middle class the most prevalent with households of 3 or more members, while taking into account that the majority of respondents are female.

3.1 Healthcare Aspects

Our research has attempted to collect data on the effects impacting the Dominican population in terms of family life during the COVID-19 pandemic. The perception of the population regarding the evolution of this virus in our country has been one of high interest. The SARS-CoV-2 virus which causes the coronavirus disease – an acute and infectious respiratory condition, mainly known as COVID-19, has affected the world in a disproportionate manner (Ren LL, et. 2020; Beeching N,et. 2020). An unfamiliar disease prior to December 2019, when a group of patients with pneumonia of unknown cause were linked to a seafood marketplace in the province of Hubei in the city of Wuhan, China (Zhu N, et. 2020). Ever since then, this disease has widely spread in humans while crossing borders and causing respiratory, enteric, hepatic and neurological conditions, threatening healthy adults and elderly individuals with preexisting conditions (Surveillances V., 2020)

The easiness and efficiency through which this disease can be transmitted has enabled it to spread quickly in many different countries. The infection rate of the virus is exponential where one infected person can transmit the disease to two or three people. There is also strong evidence that it can be spread by people with mild symptoms or even those who are asymptomatic (Hoehl S., et., 2020; Gates B.,2020). In order to determine whether you are a carrier of the virus, the individual must get one of the two COVID-19 tests available: The Antigen Rapid Test or the Polymerase Chain Reaction (PCR) Test.

According to our collected data, 29% has been tested for COVID-19, while the remaining 71% has yet to be tested. Similarly, 22.5% of the surveyed population presented COVID-19 related symptoms, while 77.5% were asymptomatic. This, in turn, opens a gap of uncertainty and questions (Fig. 3), such as: How many could be asymptomatic? How many are not aware that they are carrying the virus since there was no massive testing to determine the percentage of the infected population nationwide?

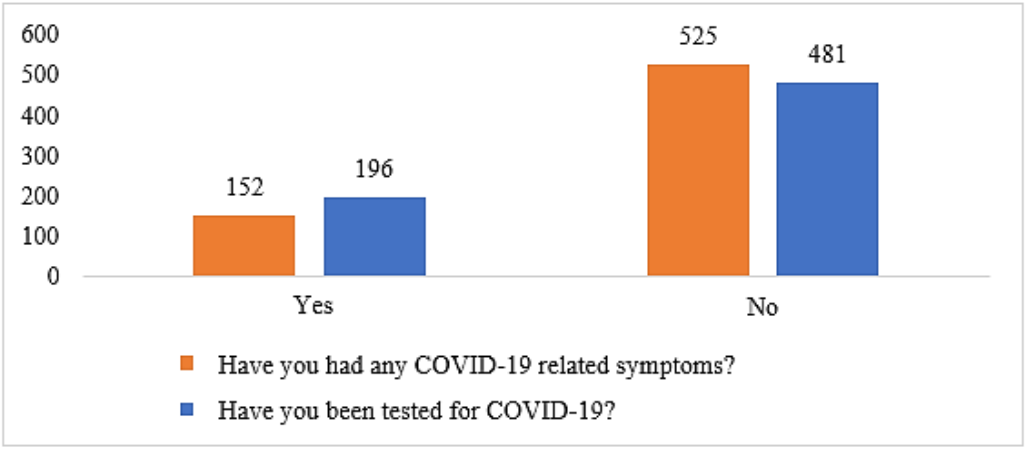


Figure 3. COVID -19 and its connection to the health of survey respondents

Out of the 29% of tested individuals, only 19.2% came back negative, 4.7% were inconclusive and 5% tested positive to COVID-19. Out of the 5% of survey respondents that tested positive, 3% were middle class, 1% was upper-middle class and the remaining 1% was lower class.

Upon analyzing the results from a social stratification perspective, the asymptomatic majority (359 survey respondents) were middle class. Furthermore, Fig. 4(a) shows the middle class as the group with the highest incidence of symptoms (93 survey respondents). It should be noted that the majority of the surveyed population declared themselves as middle class. By visualizing this information from a percentage and proportional point of view regarding the number of surveys obtained from each social class, as seen on Fig. 4(b), we can determine that the lower class is the socioeconomic group with the highest incidence of COVID-19 related symptoms accounting for 32%, followed by the upper middle class with 26%.

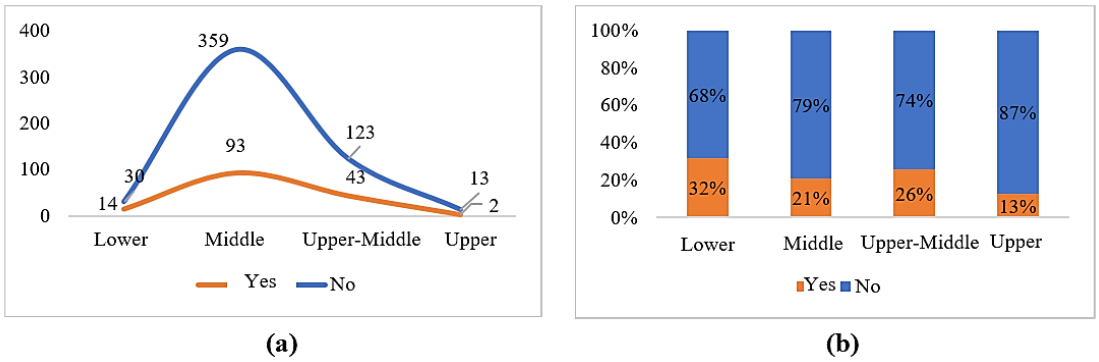


Figure 4. Have you had any COVID-19 related symptoms? Shown per social class.

However, 64.4% of the surveyed population is unaware of their actual health status since they are asymptomatic and believe that they do not need to get tested. It should be noted that given the current situation, there is a scarcity of tests, mainly in countries with limited resources (Matos J.,2020; Vidal Rodríguez T., 2020) resulting in inaccurate statistics regarding the number of cases nationwide (Morel MT, 2020). While increasing the level of concern in many countries without access to testing.

Other questions asked were if any household members had tested positive to COVID-19 and if any household member had died from the disease (Fig. 5). The responses showed that 99.1% had not experienced any death due to COVID-19 within the household, which accounted for 671 survey

respondents. Unfortunately, 0.9%, that is, 6 respondents, had lost a relative due to the COVID-19 virus. On the other hand, 11.2% tested positive out of the remaining 88.8% who reported that no other household member tested positive to the virus.

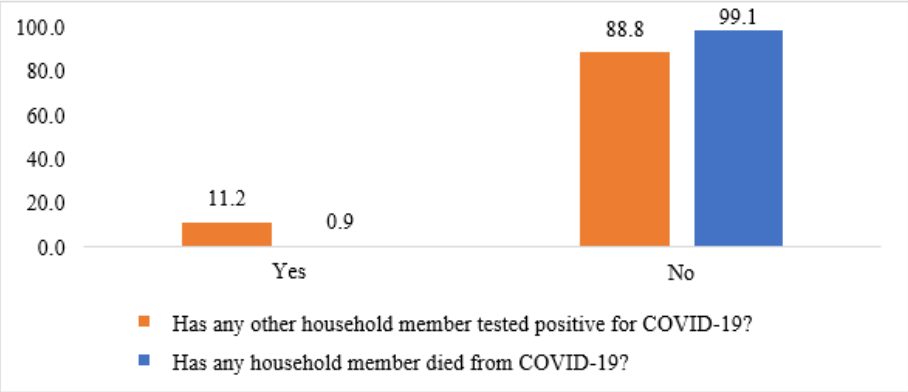


Figure 5. Results for some of the questions asked in the COVID-19 survey.

The Ministry of Public Health (MSP, for its acronym in Spanish) reported back on November 1 of 2020 during news bulletin number 228 (Ministerio de Salud Pública y Asistencia Social, 2020) that the average positivity rate nationwide was 10.26% accounting for a total of 602,101 analyzed samples.

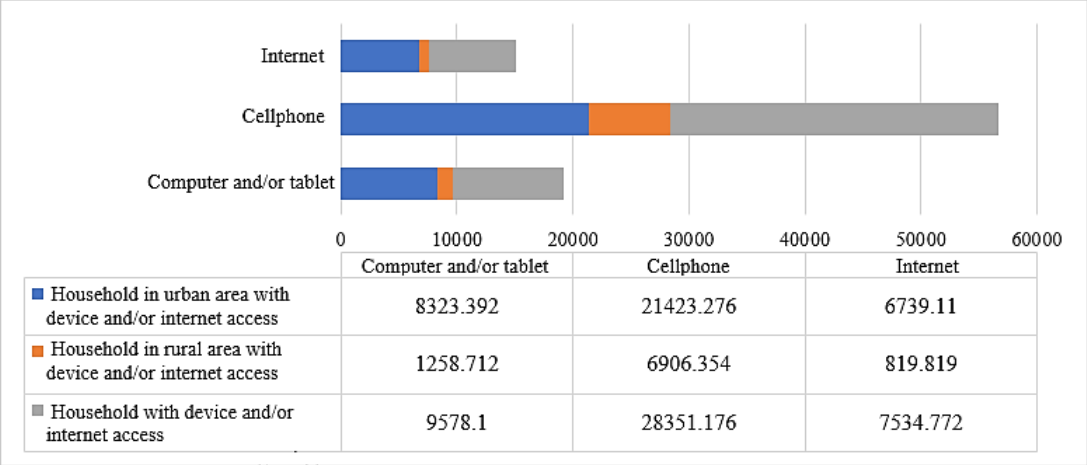
In contrast, the data from news bulletin number 144, (Ministerio de Salud Pública y Asistencia Social, 2020) issued on August 9 of 2020, showed that the positivity rate nationwide was 34.22% for a total of 297,492 analyzed samples.

By comparing news bulletins 144 and 228, we see a declining positivity rate. If we take into account the results of the household members that tested positive, said 11.2% is strongly connected to news bulletin 228, which in turn, allows us to conclude that the positivity rate is low in terms of the samples analyzed in this survey.

3.2 Digital Divide Aspects

The increasingly changing technologies have impacted citizens in all aspects of life, even more so, in situations as the current one, where they have become the backbone and resolve at work, school and leisure. In many households, this has served as the only way to stay connected with friends and family. But the main issue faced by many inhabitants in this country, is the digital divide the Dominican Republic is in.

In 2015, the National Office of Statistics (ONE, for its acronym in Spanish) completed the "National Survey of Multipurpose Households (ENHOGAR, for its acronym in Spanish)" (Informe general, 2022). For this study, 31,927 households were selected from 23,646 urban areas and 8,281 rural areas. The main results of this study concerning technology and other aspects related to our research are seen in Fig. 6.

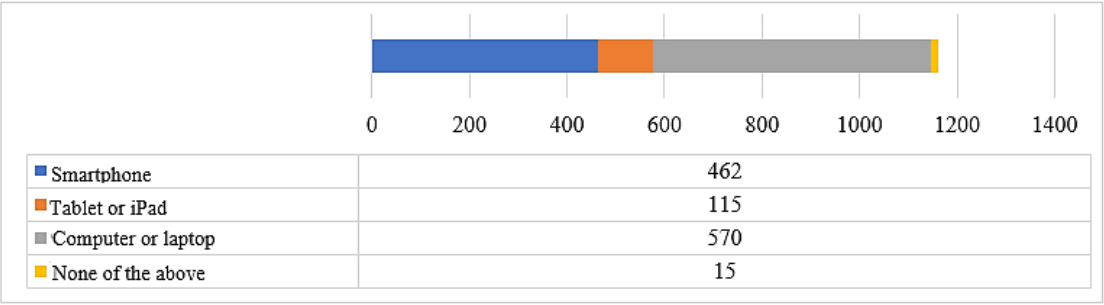


	Computer and/or tablet	Cellphone	Internet
Household in urban area with device and/or internet access	8323.392	21423.276	6739.11
Household in rural area with device and/or internet access	1258.712	6906.354	819.819
Household with device and/or internet access	9578.1	28351.176	7534.772

Figure 6. Households by media trends and access to Information and Communications Technology (ICT). Source: (Informe general, 2022)

The figure above shows that despite 88.8% of survey respondents having access to a cellphone, only 23.6% of households have internet access. This difference is even more pronounced when analyzed by residential area (Fig. 6). This indicates that the effect of the digital divide goes beyond the personal and social development of the population, since it also creates new socioeconomic divisions while intensifying the existing ones and preventing them to benefit from the use of these technologies in their daily lives (Cañón R., 2016)

This research showed that 97.5% (657) of the sampling owns a smartphone, 40.4% (272) owns a tablet or iPad and 81.2% (547) of survey respondents have a computer or laptop. These findings are corroborated by the 2015 National Survey of Multipurpose Households (ENHOGAR, for its acronym in Spanish), wherein the respondents had the necessary equipment to cover their technological needs.



Smartphone	462
Tablet or iPad	115
Computer or laptop	570
None of the above	15

Figure 7. Individuals that use electronic devices for telecommuting and/or academic activities

In regards to telecommuting and/or academic activities (Fig. 7), 49.1% (570) use a computer or laptop for these purposes, and from this group, 38% (215) owned more than two computers or laptops, from which 92% (208) lived in households with three or more members (Table 3). This shows that there would be sufficient devices to undertake both tasks simultaneously.

Table 3. Ratio between the Number of household members and the number of computers.

Number of household members	One computer or laptop	Two computers and/or laptops	More than two computers and/or laptops	Neither a computer nor a laptop	Total
1 to 2 members	65	53	17	11	146
3 to 4 members	125	80	110	19	334
5 or more members	29	57	98	13	197
Total	219	190	225	43	677

Now, unlike the 2015 National Survey of Multipurpose Households, our study showed that all members had internet access in different ways (Fig. 8) wherein the postpaid service plan was prevalent accounting for 60.1% (407), this in turn is compared with the 93.5% (633) that belong to the middle, upper-middle and upper classes.

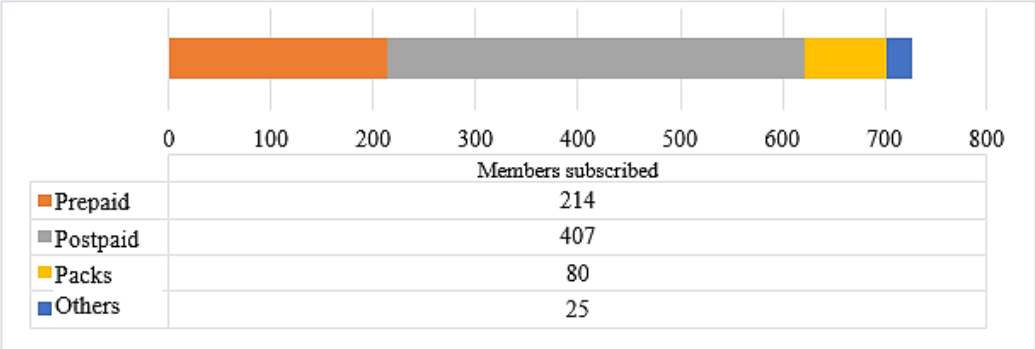


Figure 8. Number of members per type of internet service

Another element evidenced in the results is that 12 respondents hired a prepaid plan and subsequently needed to purchase additional data through a packs format. Table 4 shows this additional data purchasing format, which is the most common amongst the middle class, accounting for 7.7% (52) and 3% (20) in the lower class.

Table 4. Correlation between social status and internet service plans in the Dominican Republic

Social Class	Internet Service Plans				Total
	Prepaid	Postpaid	Packs	Others	
Lower	8	13	20	3	44
Middle	136	288	52	15	452
Upper-Middle	62	102	6	6	166
Upper	8	4	2	1	15

The internet quality and speed reported by respondents ranged between a mean of 2.7 and 2.8 using a scale where 1 is inadequate and 5 is very adequate. This showed that users understand that their internet service quality and speed are within the normal and slightly adequate ranges (Table 5).

Table 5. Perception of users regarding their internet service quality and speed

Item	Mean	Std. Dev.
Internet quality in the household	2.70	0.999
Internet speed in the household	2.83	1.033

Furthermore, 74% (502) of respondents with prepaid and postpaid service plans reported that their internet service quality ranged from normal to very adequate, while 68% (458) said their internet service speed was within these parameters (Table 6).

Table 6. Correlation between the internet service quality in the household and the type of internet service plan

Perception	Type of internet service plan							
	Prepaid		Postpaid		Packs		Others	
	Q	S	Q	S	Q	S	Q	S
Very adequate	20	17	58	48	9	5	3	2
Adequate	62	60	113	119	11	11	8	4
Normal	90	79	159	135	31	30	12	14
Slightly adequate	30	46	70	91	24	27	1	4
Inadequate	12	12	7	14	5	7	1	1

Q: Service Quality, S: Service Speed

As see on Table 7, 52% (262) of respondents that believe their internet service ranges from normal to very adequate use a fiber optic internet connection. In regards to the latest network generation, only 5% (40) receive 5G. This situation concerning internet service quality and speed goes beyond the need for telecommuting and/or academic activities. It became a state policy after President Luis Abinader issued decree 539-20, which sets forth in its 1st article that "it shall be of high interest nationwide the essential right to universal broadband internet access of the latest generation and the productive use of Information and Communication Technologies (ICT)" (Abinader L., 2020). This means that in spite the significant digital divide in our country, the Dominican government has the intention to improve this situation.

Table 7. Correlation between the internet service speed received and the type of connection technology.

Perception	Type of internet connection technology					Total
	Fiber optic	ADSL	4G	5G	unknown	
Very adequate	49	3	21	9	2	70
Adequate	115	15	73	4	2	185
Normal	98	26	129	11	9	243
Slightly adequate	42	20	79	10	7	147
Inadequate	10	6	22	6	1	32

3.3 Household Aspects

The COVID-19 pandemic has led us to analyze and rethink the main factors or those that usually predominate when it comes to choosing a home. The workplace, location of the best Schools as well as pricing and safety are major influencers when choosing a home (Wang K, et. 2020; Nielsen P v,2021). During the past year, these factors have not been key since we have been forced to continue

these activities from home. But what happened with the population that did not consider space, ventilation and even access to fresh air or recreation when choosing their home? (Sun C, et. 2020). Where the economic factor and accessibility to work and/or school areas have always prevailed. With this in mind, we completed a survey in the Dominican Republic with the intent of highlighting these variables as well as others that do not depend solely on us, such as continuous access to electricity and internet speed and quality required to fulfill the roles that were previously carried out from businesses and institutions.

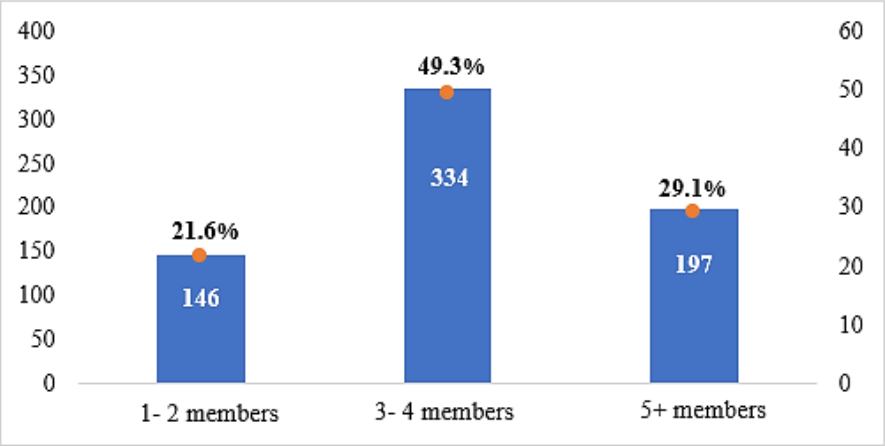


Figure. 9. Number of household members.

According to the National Office of Statistics (ONE, for its acronym in Spanish), the current census of the Dominican population is approximately of 11,159,885 inhabitants (Oficina Nacional de Estadísticas, 2012). Where most households have 3-4 members accounting for 49.3% (334), followed by larger households with 5+ members with 29.1% (197) and a minority of 21.6% (146) of smaller households with 1-2 members (Fig. 9). This could result in overcrowding situations as a potential issue, provided that a dignified and ample space was not considered for the household.

The XI National Census of the Population and Household in the Dominican Republic carried out in 2010, (Oficina Nacional de Estadísticas, 2012) established two types of households which are presented in the structural map of the country as follows: independent house, apartment, single room or back area and ravine. In the sample collected for household aspects, approximately 677 households were represented. As seen on Fig. 10, the highest percentage was for apartments accounting for 54.1%, and independent houses in second place with 44.3% of the sample. It should be noted that these two large household groups have spaces with outdoor access which serve as an escape from the dwelling. Another highlight is that 97% of apartments have a balcony, 61.67 have access to the roof of the building, leaving only 29.33% without any type of outdoor access other than the windows. The data also showed that many apartments have both balcony and roof access, which allowed for different leisurely alternatives.

Independent House	Answers		Case Percentage
Patio	252	29.10%	68.85%
Garden	148	17.10%	40.44%
Terrace	146	16.80%	39.89%
Front Porch	228	26.30%	62.30%
None of the above	93	10.70%	25.41%
	867	100.00%	

Apartment	Answers		Case Percentage
Balcony	291	51.60%	97.00%
Roof Access	185	32.80%	61.67%
None of the above	88	15.60%	29.33%
	564	100.00%	

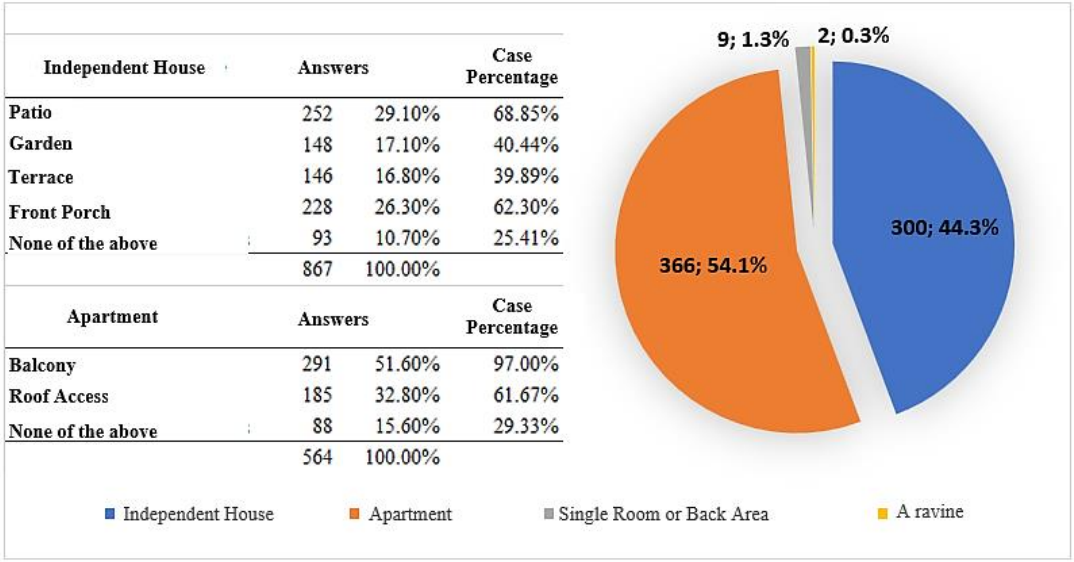


Figure. 10. Types of households and their spaces with outdoor access

On the other hand, Fig. 10 shows how many independent houses include various spaces with outdoor access. Wherein 68.85% of survey respondents reported having a patio, 62.3% have a front porch and 40.44% a garden, while 39.89% have access to a terrace, leaving only 25.41% without any outdoor space available.

Going back to the overcrowding factor, which, according to the National Office of Statistics (ONE, for its acronym in Spanish*), is defined as the condition in which there is an overpopulation of individuals living under the same living quarters which are deemed small in terms of the amount of individuals living in it; it is calculated by dividing the number of individuals living at home by the amount of bedroom available (MEPyD, 2018)*. The data collected shows that households in our country usually have 3 bedrooms (363;53.6%) (Fig. 11) and are mostly comprised by 3-4 household members (334;49.3%) (Fig. 9). This denotes a close correlation between the number of people and the number of bedrooms available and how in our country the overcrowding factor is still within acceptable levels.

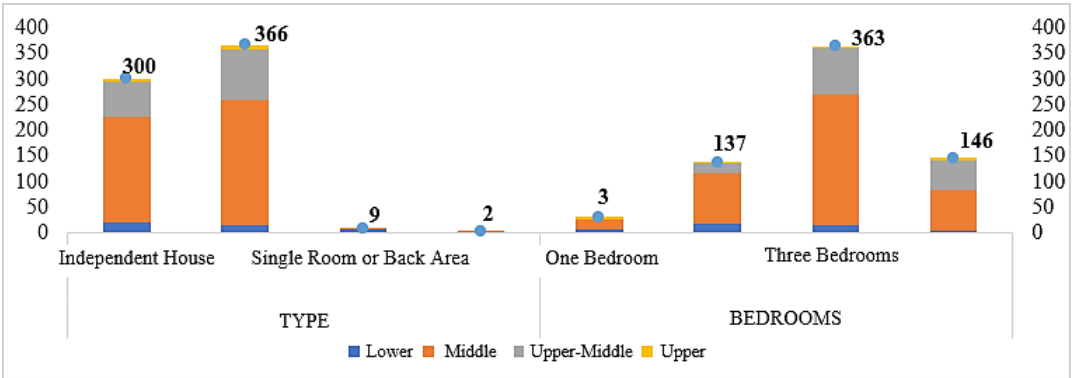


Figure 11. Number of households per type and number of household members.

Another important aspect is how the members feel living in their households. For this reason, we asked about their perception using a scale ranging from adequate to inadequate living spaces. The highest percentage (36.8%) was seen for adequate households, followed by those that deemed it as normal (31.6%) and the respondents who have a high perception of their homes reaching 25.4% for

very adequate (Table 7). A total of 93.8% respondents considered their living spaces as acceptable, leaving 6.2% feel discontent. The acceptance levels regarding ventilation were labelled as normal by most (34.7%), however we left this at the discretion of the respondent.

The household members that do require to work from home and fulfill their occupational duties via telecommuting account for 64.3%, while a minority of 35.7% are not required to work from home. Considering the results shown in Fig. 12, where the socioeconomic class and telecommuting are correlated, it is seen how the middle class is the most benefitted with the autonomy to work from home (300 survey respondents) followed by the upper middle with 103 respondents.

Table 8. Perception of members regarding their household spaces

Perception	Overall space		Ventilation		Workspace	
	Qty.	%	Qty.	%	Qty.	%
Very adequate	172	25.4	170	25.1	96	14.2
Adequate	249	36.8	217	32.1	178	26.3
Normal	214	31.6	235	34.7	251	37.1
Slightly inadequate	38	5.6	49	7.2	135	19.9
Inadequate	4	0.6	6	0.9	17	2.5

Another key factor in this situation is using households as a workspace, which needs to meet or at least appear comfortable for users. Numbers showed that 14.2% deemed their spaces as very adequate, while 26.3% said it was adequate and 37.1% as normal. Only 22.4% stated being discontent, wherein 19.9% said it slightly inadequate and 2.5% reported it was inadequate (Table 8). It is important to clarify that survey respondents had an adequate home to live, but when their homes also become their workspace, it ceases to be adequate.

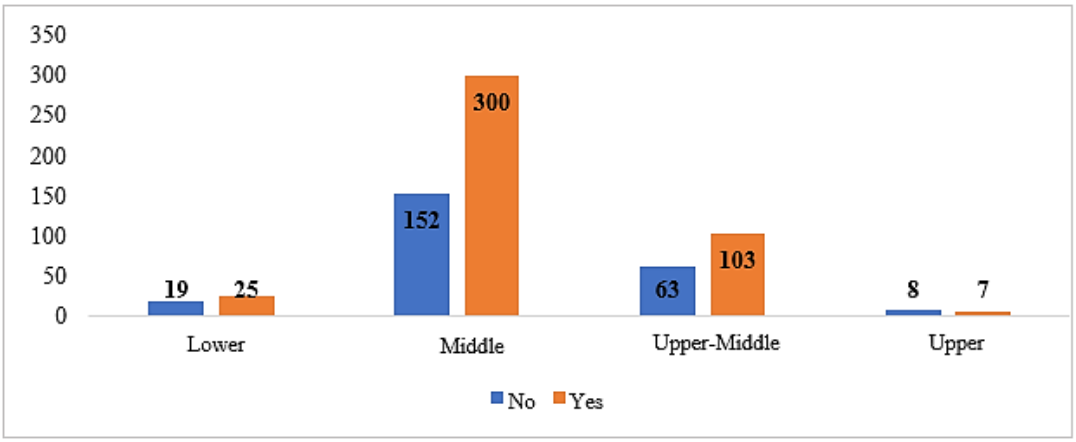


Figure 12. Telecommuting per socioeconomic class.

3.4 Electricity in Dominican households

The economic impact caused by the COVID-19 pandemic is unprecedented. As Gita Gopinath, Chief Economist of the International Monetary Fund (IMF), puts it "the speed in which it has impacted the economy in such a short amount of time is unprecedented (…) it is stronger in terms of magnitude that the global financial crisis from a decade ago." The economic crisis induced by COVID-19 decreased the electricity demand in all countries and the Dominican Republic is not the exception (Troncoso MR.,2020)

Even during these times, our country does not have a full uninterrupted electricity supply (Gómez F., 2015). There are also discrepancies with the fixed electricity rates, (Actis JL, 2014) which leads to question: Has the COVID-19 pandemic had any influence over power outages? Some of the complaints published by national newspapers showed that electricity users reported outages lasting over 20 hours a day, (Tejeda L., 2020; Silvestre S., 2020) which affected the work and remote learning processes of the Dominican population.

The data collected on Fig. 13 regarding the residential electricity bill, indicated that 37.5% of survey respondents argued that their electricity bills have increased by 10-30%. While 24.8% reported that the total percentage of their bill is higher, having increased by 40-60%, and 8.9% said that the increase was by 70-90%, with a 10.5% indicating that the bill increase has doubled (100%) in the past 3 months. By taking an overview we can appreciate that 81.7% saw an increase in the electricity bill, 16% stated that no changes were seen and 2.1% considered that their bills have decreased in comparison with the electricity bills received prior to the pandemic.

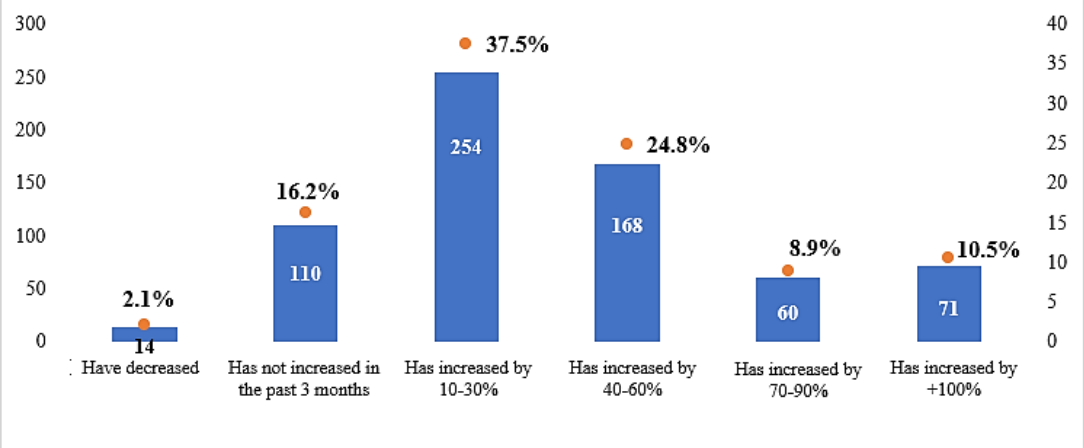


Figure 13. Electricity bill for the household

It should be noted that Table 9 shows how the middle class continues to be most affected socioeconomic class in terms of electricity bills. Up to 167 middle-class homes reported increases by 10-30% while 120 households reported higher electricity bills by 40-60%.

Table 9. Electricity bill in terms of socioeconomic class.

Social Class	Decreased	Has not increased in the past 3 months	Has increased by 10-30%	Has increased by 40-60%	Has increased by 70-90%	Has increased by +100%
Lower	2	12	11	11	5	3
Middle	4	75	167	120	38	48
Upper Middle	8	22	67	35	16	18
Upper	0	1	9	2	1	2

Concerning power outages, 39.9% of the population reported an increase while 38% said they remained the same as prior months, 9.5% did not report any outages and 12.7% argued that they had decreased (Fig. 14).

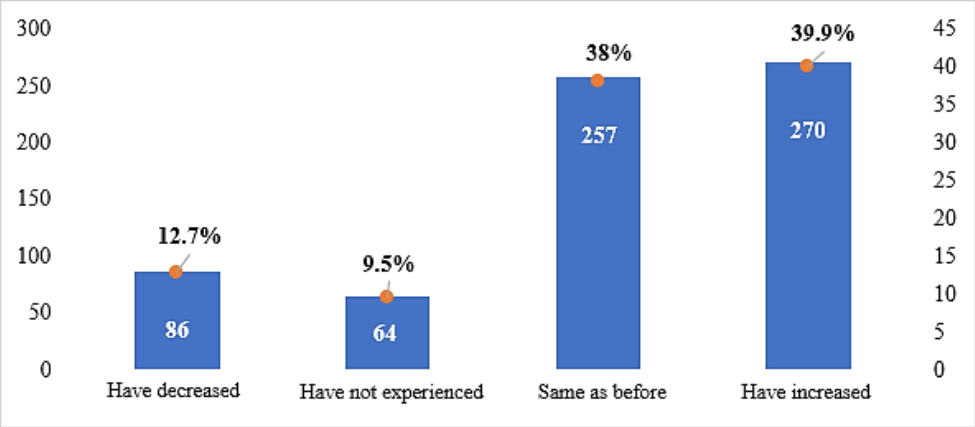


Figure 14. Power outages.

It is unsettling how, even though both professional and education tasks are being carried out from home, where electronic devices are key to fulfill these roles, which require electricity to be operated, as well as the internet connections, the power outages not only remain a constant but have also increased.

Given that work and schooling duties have been brought home, a considerable increase in the energy consumption of households is to be expected. Similarly, a decrease on the electricity demand within the commercial and industrial sector is also normal since many of these have been closed as part of the preventive measures against the spread of COVID-19 (Troncoso MR., 2020). However, this does not justify the increase of power outages, provided that the network is geared not to supply the required demand in larger urban areas of the country. This is something that needs to be analyzed for similar situations in the immediate future.

4. Conclusions

In order to gather the opinions of the Dominican population regarding their current living situation during the COVID-19 global pandemic, a survey was completed to collect data on healthcare, digital divide and household aspects, in addition to the general information of survey respondents. With a sampling of 667 respondents nationwide, which exceed the sampling universe required for the Dominican population, we reached the following conclusions in terms of the proposed aspects.

The study results on the Dominican population showed that a higher percentage of respondents considered themselves to be part of the middle class (66%). While obtaining a higher response percentage from females (61%) than males (39.9%).

From a healthcare perspective, 77.5% of the population has not been affected by the virus reporting no symptoms, although there exists the possibility that they are asymptomatic. It should be noted that the scarcity of tests in the country could limit the reach to a higher percentage of the population. Only 29% of survey respondents were tested for COVID-19, wherein 19.2% tested negative, 4.7% received inconclusive results and 5% tested positive.

In regards to the digital divide, results showed that individuals have the necessary equipment for telecommuting and academic activities. However, 83% reported a growth in power outages which directly affects their performance. Another important aspect directly affecting online social activities, work and study during the pandemic is internet quality and speed. User satisfaction ranged from normal to slightly acceptable wherein social status was a key factor. This shows that a significant divide in terms of technology continues to exist among social classes.

It should also be mentioned that all survey respondents in our sampling had internet access, which is not an accurate representation of the reality in the Dominican Republic. National surveys have shown how 11% of individuals with internet service live in rural areas. This reflects a great inequality that, directly or indirectly, makes a difference during the pandemic in terms of access to a dignified education and being able to effectively work from home.

The survey showed how in the Dominican Republic there is a low level of overcrowding since most households are comprised by 3 to 4 members (49.3%), in residential buildings with 3 bedrooms (53.6%). Apartments (54.1%) are the predominant type of household amongst the respondents, while independent houses account for the second highest group of the sampling (44.3%). Other highlights worth mentioning are that 97% of apartments have a balcony, 61.67% have roof access while 29.33% have no type of outdoor access in addition to household windows. Similarly, 68.65% of independent houses have a patio, 62.3% have a front porch, 40.44% have a garden and 39.89% have access to a terrace. This improves wellness conditions under home confinement.

Nevertheless, families believe that their homes are adapted for normal living, but with the confinement, said adaptation is no longer suitable since it does not provide full adequacy for telecommuting. The household members required to work from home Account for 64.3%. While the perception of users regarding workspace in the household in terms of having the necessary comfort is said to be very adequate by 14.2%, adequate by 26.3% and normal by 37.1%.

If we breakdown the electricity rates from the past few months, 81% argued that there has been an increase, while 16.2% reports it is the same and 2.1% said it has decreased in comparison to their electricity bills issued prior to the pandemic. As per power outages, 39.9% of the population considers they have soared, 38% believes they are about the same as previous months, 9.5% reported not having experienced any and 12.7% argued they have decreased.

Author contributions: Y.G.F. and I.C.P. conceived and designed the entire experimental procedure assisted with the planning of the survey and the expert judgment, they also carried out the Drafting-Preparation of the original draft and interpretation of the results, in the same way, they provided constructive instructions on the methodology used for the preparation. G.R.C. worked on the preparation and interpretation of results. All authors contributed equally in the preparation of this manuscript.

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