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**IMPACT OF COVID-19 LOCKDOWN ON THE BEHAVIOR AND HEALTH OF
CHILDREN AND ADOLESCENTS IN TAMIL NADU, INDIA**

DIPLOMA THESIS

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ABSTRACT

Background: An unprecedented situation - the lockdown and lockdown with limited restrictions in the movements of people with the goal of containing the spread of the infectious virus that causes coronavirus disease of 2019 (COVID-19) - made India close its academic institutes for over a year. This prolonged closure has exerted unfavorable effects on children and adolescents. At global level, the COVID-19 pandemic has transformed individuals' lifestyles to an extreme extent. Numerous studies highlighted its impact on children and adolescents living in different countries. India stands second in rank in the number of daily active covid cases next to the USA and the second surge in covid infection spread is presently happening. To the best of our knowledge, not many studies have been conducted in India focusing on the impact of COVID-19 lockdown in children and adolescents. In this critical condition, investigating the effects of academic closure and home confinement on various aspects of daily life is necessary for future policy making.

Objective: A comprehensive online survey was conducted to study the effects of COVID-19 lockdown on children and adolescents in the Indian state of Tamil Nadu, with the aim of providing data for public policy-making and the implementation of child and adolescent support programs.

Materials and methods: A total of 650 children and adolescents aged 4-18 years were divided into age groups: 4-7, 7-11, 12-14, 15-16, and 17-18 years. Out of 650 total participants, 56.8% were boys and the remaining 43.2% were girls. The responses to the questionnaire were filled by parents of 288 children aged 4-14 years and for 15-18 age groups, 362 adolescents answered by themselves. Besides demographic information, the questions of this cross-sectional survey focused on eleven major aspects: sleeping patterns, recreational activities, physical characteristics, mental health, education, food habits, medical, virtual, social, awareness and hygiene. An electronic questionnaire designed through Google forms was distributed through WhatsApp groups maintained by different academic institutes in Tamilnadu. Informed consent was obtained from all the participants. Categorical variables were represented as frequencies and percentages. Means and standard deviations were reported for scale variables. The Skewness, Kurtosis and Shapiro–Wilk tests were performed to evaluate the distribution of variables. The chi-square test, posthoc test, one-way ANOVA test, Spearman's correlation coefficients and linear regression analysis were used to assess differences between variables. A p-value of 0.05 was considered statistically significant.

Results: The lockdown gravely affected household income with 34% of participants reporting a 40% loss in income. The lockdown increased screen time and movie watching frequency. It negatively affected and/or altered napping patterns, eating habits, body weight, vision, participatory attitudes, mood, energy levels, hobbies, and decreased memory powers, overall academic performance, outdoor and indoor activities and social interactions. A strong correlation was identified between 16-different combinations of five variables such as sleeping pattern, eating habits, screen time duration, movie watching frequency and online lectures. Linear regression analysis proved that the combination of selected variables such as hygiene habits, energy levels, mood changes, overall academic performance and vision changes were significantly affected by the covid lockdown.

Conclusions: The Lockdown in India severely affected the daily life of all mainly children and adolescents for over a year. More than 70% of variables showed lockdown-mediated negative impacts. Although the lockdown was unavoidable, state governments should have implemented health and welfare programs to mitigate its effects on children and adolescents.

Keywords: India, COVID-19, lockdown, adolescents, children, behaviour, health, age groups

KOPSAVILKUMS

Pamatinformācija: bezprecedenta situācija – mājsede un daļēji pārvietošanās ierobežojumi ar mērķi apturēt 2019. gada koronavīrusa COVID – 19 izraisītās infekcijas slimības izplatību, lika Indijai slēgt savas izglītības iestādes vairāk nekā uz gadu. Šī ieilgusī sociālā distancēšanās ir atstājusi nelabvēlīgu ietekmi uz bērniem un pusaudžiem. COVID-19 pandēmija ir globālā līmenī ārkārtēji pārveidojusi indivīdu dzīvesveidu un daudzos pētījumos uzsvēta pandēmijas ietekme uz bērniem un pusaudžiem, kas dzīvo dažādās valstīs. Indija ieņem otro vietu aktīvo COVID gadījumu skaita ziņā dienā blakus ASV, un pašlaik turpinās otrais Covid infekcijas izplatīšanās pieaugums. Šajā kritiskajā stāvoklī turpmākas valsts politikas veidošanai ir nepieciešami pētījumi par mācību iestāžu slēgšanas un mājsedes radīto ietekmi uz bērniem un jauniešiem dažādās ikdienas dzīves jomās. Indijā šādi pētījumi iztrūkst.

Mērķis: Plaši izpētīt COVID - 19 radīto ietekmi uz bērniem un pusaudžiem Indijas Tamil Nadu provincē nolūkā sniegt datus valsts politikas veidošanai atbalsta programmu izstrādāšanai bērniem un pusaudžiem.

Materiāli un metodes: Tika veikta tiešsaistes aptauja. Kopumā 650 bērni un pusaudži vecumā no 4 līdz 18 gadiem tika sadalīti vecuma grupās: 4-7, 7-11, 12-14, 15-16 un 17-18 gadi. No 650 kopējiem dalībniekiem 56,8% bija zēni un 43,2% bija meitenes. Atbildes uz anketas jautājumiem par 288 bērniem vecumā no 4 līdz 14 gadiem aizpildīja vecāki, savukārt 362 pusaudži vecuma grupā no 15 līdz 18, atbildēja patstāvīgi. Papildus demogrāfiskajai informācijai šī šķērsgrīzuma pētījuma jautājumi bija vērsti uz vienpadsmit galvenajiem aspektiem: miega modeļi, atpūtas pasākumi, fiziskās īpašības, garīgās veselības, izglītības, uztura paradumi, medicīniskā, virtuālā, sociālā izpratne un higiēna. Elektroniska anketa, kas izstrādāta, izmantojot Google veidlapas, tika izplatīta caur WhatsApp grupām, ko uztur dažādi Tamilnadu akadēmiskie institūti. Apstiprināta piekrišana tika iegūta no visiem dalībniekiem. Kategoriskie mainīgie bija pārstāvēti kā frekvences un procenti. Līdzekļi un standarta novirzes tika ziņotas mēroga mainīgajiem. Tika veikti Skewness, Kurtoze un Shapiro-Wilk testi, lai novērtētu mainīgo lielumu sadalījumu. Chi-Square tests, posthoc tests, vienvirziena ANOVA tests, Spearmana korelācijas koeficienti un lineārā regresijas analīze tika izmantoti, lai novērtētu atšķirības starp mainīgajiem lielumiem. P-vērtība 0,05 tika uzskatīta par statistiski nozīmīgu.

Rezultāti: Ar COVID-19 saistītie ierobežojumi smagi ietekmēja mājāsaimniecību ienākumus 34% pētījuma dalībnieku, kuri ziņo par ienākumu samazinājumu 40% apmērā. Mājsede palielināja ekrāna laiku un filmu skatīšanās biežumu. Tas negatīvi ietekmēja un / vai mainīja

ēšanas paradumus, ķermeņa svaru, redzi, attieksmi pret iesaistīšanos, noskaņojumu, enerģijas līmeni, hobijus, diendusas paradumus, un pasliktināja atmiņu, vispārējo akadēmisko sniegumu, negatīvi ietekmēja arī āra un iekštelpu aktivitātes un sociālo mijiedarbību. Spēcīga korelācija tika atrasta ta starp 16 dažādām piecu mainīgo lielumu kombinācijām, piemēram, miega modeli, ēšanas paradumiem, ekrāna laika ilgumu, filmu skatīšanās biežumu un tiešsaistes lekcijām. Lineārā regresijas analīze pierādīja, ka COVID mājsēde būtiski ietekmēja sekojošu izvēlēto mainīgo lielumu kombināciju: higiēnas paradumi, enerģijas līmenis, garastāvokļa izmaiņas, vispārējais akadēmiskais sniegums un redzes izmaiņas.

SECINĀJUMI: Pētījums pierāda, ka Covid ierobežojumi/mājsēde Indijā smagi ietekmēja visu vecumgrupu bērnu un pusaudžu ikdienas dzīvi vairāk nekā gadu. Vairāk nekā 70% mainīgo uzrādīja mājsēdes mediēto negatīvo ietekmi. Lai gan mājsēde bija neizbēgama, valsts valdībām turpmāk būtu jāizstrādā un jāīsteno veselības un labturības programmas, lai mazinātu tās ietekmi uz bērniem un pusaudžiem. Šo pētījumu var izmantot par pamatu valsts rīcības politikas izstrādē.

Atslēgas vārdi: Indija, Covid-19, mājsēde, pusaudži, bērni, uzvedība, veselība, vecuma grupas

LIST OF ABBREVIATIONS

COVID-19	Corona Virus Disease
2019n-CoV	2019 Novel Coronavirus
WHO	World Health Organization
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
MHA	Ministry of Home Affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN	United Nations
RNA	Ribonucleic Acid
RT PCR	Reverse Transcription Polymerase Chain Reaction
MAS	Macrophage Activation Syndrome
MIS	Multisystem Inflammatory syndrome
BNT1162b2	BioNTech
PA	Physical Activity
ST	Screen Time
DES	Digital Eye Strain

1. INTRODUCTION

On 31st December 2019, cases of pneumonia with an unknown etiology were reported to the WHO office in China in Wuhan, China. Some of the cases were patients who were vendors at the Hunan Seafood market or had a history of exposure to the market. (World Health Organization, 5 January 2020). On 2nd January 2021, respiratory samples were obtained and analyzed from 41 patients admitted to the hospital, and the findings indicated the existence of SARS-CoV2 or a novel coronavirus (2019n-CoV) infection. Direct exposure to a seafood market was noted in 27 of the 41 confirmed infected patients (Hunag *et al.* 2020). To prevent the virus from spreading outside the region, a travel ban was implemented, which included the suspension of all modes of transport (World Health Organization, 23 January 2020).

The WHO Director-General declared the 2019 n-CoV outbreak as a global pandemic during a media conference on March 11th, 202. (World Health Organization, 11 March 2020). And later in February 2020, the WHO designated the 2019 novel coronavirus SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) as the official name of the virus and “COVID-19” as the name of the disease caused by the virus (World Health Organization, 11 February 2020).

In India, the first reported case of COVID-19 occurred in the state of Kerala, in a student returning from Wuhan. The Indian government implemented steps to control the infection under the Epidemic Disease Act 1987 (World Health Organization, 2020/2021). On 16 March 2020, K. Palaniswami, the state's former Chief Minister, declared the closure of all educational institutions, theaters, and shopping malls until March 31 (The Hindu, 16 March 2020).

Under the Disaster Management Act 2005, India's Prime Minister announced a 21-day lockdown from 25th March 2020 to 14th April 2020, halting international air traffic and limiting rail travel until 14th April 2020. On 19 April 2020, it was announced that the lockdown will be extended until 3 May 2020. According to the Ministry of Health and Family Welfare, districts were classified into containment zones during the period, namely red, orange, and green zones, based on the frequency of COVID-19 incidents. The previous lockout period has been extended by two weeks, until May 17th, 2020. On the 17th of May 2020, the Ministry of Home Affairs (MHA) and the National Disaster Management Authority (NDMA) announced that the lockdown would be extended until the 31st of May 2020. As of 24 May 2020, India had 73,560 active accidents, 54,440 people who recovered, and 3,867 deaths (World Health Organization, 2020/2021).

On 30 May 2020, the Ministry of Home Affairs (MHA) issued guidelines for a phased reopening, effective from 1 June 2020 to 30 June 2020. The first phase, called unlocking, saw the reopening of some health care facilities, places of worship, restaurants, and shopping centers while the night curfew remained in force. On 03 July 2020, unlock 2 went into effect, extending the night curfew by an hour and allowing for operating hours between 10 p.m. and 5 a.m. It facilitated inter/intrastate travel and people movement through domestic airways and rail services. Reopening of the theatre, stores, cinemas, parks, swimming pool, and gymnasium. Unlock-3 allowed the movement of goods and the continuance of both inter/intrastate and cross-border commerce. From 21st September 2020, a meeting of 100 people was allowed, accompanied by security measures. Teachers and academic personnel have had the ability to visit school buildings in order to conduct online courses. Students in grades 9 through 12 were welcome to visit the school and consult with teachers. Professional training programs were permitted, as well as post-graduate and doctoral studies. Additionally, unlock 05 allowed colleges, universities, educational, and coaching institutions to make autonomous reopening decisions with informed consent prior to resuming these programs. Though online education was still promoted, students wishing to visit the institution were given the choice (World Health Organization, 2020/2021).

To stop the spread of the infection, all the educational institutions in the country have been closed since 16th March 2020. The closure of academic institutes and shift to digitally supported classes from conventional classroom learning taken as a measure to contain COVID-19 has been significantly affecting the children's learning since only certain schools such as private schools have better resources to provide online education while the rest of them who could not adopt the transformative changes, could not provide classes through any other sources causing complete shutdown (Times of India, 16 April 2020).

According to the UNESCO report, 168 million children worldwide have undergone a year-long school closure, while in India, the COVID-19 lockdown and closure of 1.5 million schools across the country has impacted 247 million elementary and secondary school-aged children. Leading up to the pandemic, only 24% of households had access to the internet, and the lack of internet and electronic devices rendered online learning inaccessible to all children. As of March 2021, the UN agency announced that only eight states had reopened kindergarten through grade 12, while fifteen states had reopened grades 9-12 (The Hindu, 25 June, 2020).

Dr. Soonu Udani of the SRCC Children's Hospital (Mumbai, Maharashtra, India), who has treated 45 pediatric COVID-19 infections, discussed the differences in event processing between age groups. Additionally, she clarified that children under the age of ten are oblivious

and only grab pieces of information from television and family conversations, while children over ten show fear of death as they strive to comprehend the severity of the infection. Dr. Minal Kekapture, a child neurologist in Bangalore, recalls seeing four cases of children developing psychosomatic symptoms following a positive COVID-19 examination in a family member. According to research conducted by Dr. Koyeli Sengupta, a developmental behaviour pediatrician, children between the ages of two and three years old encountered anxiety and depression in the form of severe neediness. She recounts an encounter with a mother who told her that her child would not even let her go to the restroom. Additionally, the pediatrician addresses the challenges that teenagers who lack social interaction and privacy pose. (The Hindu, 13 June 2020)

1.1 Objectives

- To determine the effect of lockdown on the health and behavior of children and adolescents
- To determine the difference in impact between age groups
- To examine the correlation between specific factors that contribute to the impact
- To determine predictors of a few noticeable changes observed during the lockdown.

1.2 Hypothesis

Hypothesis 01: Lockdown has a negative effect on children's and adolescents' mental health

Hypothesis 02: Lockdown has a beneficial effect on children's and adolescents' hygiene practices

Hypothesis 03: Lockdown has resulted in a change in children's and adolescents' sleep and napping patterns.

Hypothesis 04: Lockdown has a negative effect on the eating habits of children and adolescents

Hypothesis 05: Lockdown has led to a significant increase in social interaction

2. REVIEW OF LITERATURE

2.1 Etymology and taxonomy

SARS-CoV-2 is a positive-sense single-stranded RNA (+ssRNA) enveloped virus (Lu *et al.* 2020) belonging to the family Coronaviridae under the order *Nidovirales*. (International Committee on Taxonomy of Viruses, 2019). The term “corona” comes from a Latin term meaning “crown” or “halo”. The spikes on the virions appear like a halo around the sun when examined under an electron microscope (Zhu *et al.* 2019).

2.2 Transmission, and incubation period

SARS-CoV-2 is transmitted by respiratory droplets that are infected. Coming into direct or indirect contact of these droplets with conjunctival, oral, or nasal mucous membranes. Immunohistochemical staining of an isolate from COVID-19 positive patient revealed that the virus infected the ciliated, non-ciliated, and goblet cells of bronchus as well as type 1 pneumocytes of lungs and conjunctival mucosa. When the replication potential was compared to SARS-CoV, the SARS-CoV2 replication was not different in alveolar epithelium, while in the conjunctival epithelium their replication was prominent compared to SARS-CoV. (Hui *et al.* 2020)

In a cross-sectional, multicenter study carried by Lachassinne *et al.* (2020), including 22-serological testing combined with RT-PCR from nasopharyngeal and stool swabs were analyzed. The results showed that children who attended daycare centers tested negative on the SARS-CoV-2 RNA while children who tested positive for SARS-CoV-2 serology had contracted it from an adult member of the household who had a lab-confirmed infection. Thus, stating that there was no evidence of transmission in daycare centers and that children are more likely to contract the infection from a household member than from a daycare center.

Epidemiological studies measuring the incubation period was carried out by Tan *et al.* (2020) found that people above 70 years old had a longer mean incubation period represented by 8 days and those below 70 years old, had a shorter mean incubation period, as follows: 4.5 days in 60–69-year-old, 6 days in 50–59-year-old 5 days in subjects <30, 30-29, and 40-49 years old.

2.3 Pathogenesis of SARS-CoV-2

The viral entry is mediated by the binding of the surface S-protein of SARS-CoV-2 with angiotensin-converting enzyme 2, ACE2 (Letko *et al.* 2020) which covers ACEI into type 1-9 ACE and are mostly expressed in lungs, kidneys, intestines, alveolar epithelium II, and heart (Donoghue *et al.* 2000, Zhang *et al.* 2020). The receptor-binding domain (RBD) of S-protein aids the identification of the ACE receptor (Letko *et al.* 2020). As soon as the S-protein binds with the TM protease serine 2 receptor on the host cell, it undergoes structural rearrangement which helps it fuse to the cell membrane of the host (Fehr *et al.* 2015, Watanabe *et al.* 2020). The viral replication begins when the RNA is released into the host cell. The translation of RNA leads to the formation of viral replicase polyproteins namely pp1a and pp1b. Viral proteinases cleave these polyproteins. Polymerase activity aids transcription which subsequently leads to the production of mRNAs which are translated to important viral proteins that contribute to the formation of virions. RNA along with the viral proteins are arranged by the endoplasmic reticulum of the host cell and Golgi apparatus into virions that are released outside the cell in the form of vesicles. These vesicles are introduced into the cytoplasm of the host cell (Shereen *et al.* 2020).

2.4 Clinical manifestations of COVID-19 in adults and children

Mizrahi *et al.* (2020) studied the dynamics of longitudinal symptoms by collecting data from primary care visits and self-reported surveys in Israel. It was observed cough was the most prevalent symptom followed by fever, muscle pain, and fatigue. Results from self-reporting showed the prevalence of symptoms in chronological order: cough, fatigue, myalgia, headache, rhinorrhea, and/nasal congestion. it was found that loss of taste (anosmia) and smell (ageusia) had the highest association with testing positive for SARS-CoV-2. While in hospitalized patients the prevalence of clinical manifestations was characterized by fever, cough, dyspnea, and gastrointestinal manifestations in few patients.

A multicenter multinational cohort study conducted by Götzinger *et al.* (2020) involving 21 European countries analyzed 582 subjects who tested positive for SARS-CoV-2 that was confirmed by PCR testing. The participants were aged ranging from 3 days to 18 years and the median age was 5 years old. Out of the 582, 363 (62%) required admission to the hospital while 48 (8%) required admission to the intensive care unit. 437 (75%) of the subjects did not have co-morbidities. The author observed that fever (65%) was the predominant symptom followed

by symptoms of upper respiratory tract infection in half of the cases and lower respiratory tract symptoms/signs in a quarter of the cases. In 34% of the cases, a chest x-ray was performed and in 47%, there were classical changes suggestive of pneumonia and in 5% of acute respiratory distress syndrome (ARDS). Analysis of respiratory isolates revealed co-infection with other viruses in 5% of the cases and these viruses include enterovirus, rhinovirus, adenovirus, influenza virus, parainfluenza virus, bocavirus, RSV, metapneumovirus and coronavirus of different variants. Oxygen support was required by 13% of the cases and the median duration of mechanical ventilation in these cases was 7 days. The author found that factors such as male sex, being younger than one month old, presence of co-morbidities, symptoms and/or signs of lower respiratory tract infection, proof pneumonia or ARDS on x-ray correlated with admission to the ICU. At the end of the study, four children out of 582 children died. And 4% of the cases needed respiratory support or were symptomatic. Thus, the study group concluded that COVID-19 manifests as a mild disease in children and adolescents and only small part progress to develop severe disease.

In the province of Bergamo in Italy, Verdoni *et al.* (2020) observed 10 patients who presented with Kawasaki like-disease. The involved subjects were 7.5 years old. 50% of the patients fulfilled all the criteria while 50% did not. Those who fulfilled the criteria presented with bulbar non-exudative conjunctivitis, changes in lips and oral cavity, polymorphic rash, erythema and/induration involving the extremities while one patient presented with later cervical lymphadenopathy. Six of the 10 patients had cardiac system involvement manifested by mitral regurgitation (40%), reduced ejection fraction, aneurysm of the >4mm in the left coronary artery (20%) and pericardial effusion (40%) on echocardiography. They evidenced the association of this condition with COVID-19 by the sampling of nasal or oropharyngeal swabs and performing antibody testing. It was found that 2 out 10 (20%) of the patients tested positive on swab analysis and data from antibody testing showed that 8 out 10 patients tested positive for IgG and 3 out 10 tested positives also for IgM. The study team found evidence of Macrophage Activation Syndrome (MAS) in 50% of the patients indicated by increased serum ferritin (>684 ng/mL), decreased platelet count⁹ ($\leq 181 \times 10^9$ per L), increased AST (> 48 IU/L), increased triglycerides, and decreased fibrinogen (≤ 360 mg/dL). This condition was first defined on the 01st May 2020 as Pediatric Multisystem Inflammatory Syndrome (PMIS) by the Royal College of pediatrics and child health whereas WHO recognized it as “Multisystem Inflammatory Syndrome (MIS) in children and adolescents temporally related to COVID-19” (World Health Organization, 2020).

2.5 Diagnostics

The sensitivity and specificity of the rapid antigen test have been 98.33% and 98.73% respectively and it is comparable to RT-PCR whose sensitivity and specificity are 98.73% and 97.06-99.59%. There is an increased chance of patient testing positive during the early phase of infection right after the onset of the symptom where the viral loads are high thus showing the use of this method of testing as a screening tool by primary health care centers in areas of high prevalence. Factors such as symptoms, time of testing since onset, type of sample, and handling of the sample influenced the testing results. One such observation of significance was thick mucus resulting in false-positive antigen testing (Chaimayo *et al.* 2020).

2.6 Prevention

In a study by Polack *et al.* (2020), the BNT1162b2 vaccine was found to have an efficacy of 95% for all subgroups namely age, ethnicity, race, sex, age BMI, co-morbidities that pose risk for COVID-19. It is administered in a two-dose regimen 21 days apart at a dosage of 30 µg each time. The author noted 52% efficacy after the first dose and full efficacy was achieved at least 7 days after the second dose. Adverse effects included mild to moderate pain at the injection site, headache and fatigue. These findings were prominent after the second dose rather than the first and were more common in older subjects than in young adults. But the local site reaction was the same regardless of the first or second dose.

2.7 Age-related incidence and severity

Gudbjartsson *et al.* (2020) studied the pattern of the disease spread in the Icelandic population. The author analyzed samples that were collected from targeted testing and population screening and found out that from 564 children from the target testing group who were below 10 years old from target testing, 6.7% tested positive compared to 13.7% in children who were 10 years or older. In subjects who tested positive and were up to 20 years old, it was found that the positive results increased with age. 848 children under 10 years old from the population screening tested positive while in subjects who were 10 years or old, 100 out of 12,232 (0.8%) subjects who were 10 years and older tested positive. More Females tested positive compared to the males.

In another study in England by Ladhani *et al.* (2020), 540 305 people were tested for infection by SARS-CoV-2 between February 2020 to May 2020, and the number of positive cases was 129,704 (24%). Out of the 35200 children, 1,408 tested positives comprising 4% of the positive cases in children compared to 19.1%-34.9% in adults and older people. Eight children who tested positive died and out of the 3 who were 10-15 years old who died had several co-morbidities. In the rest of the cases, the author found COVID-19 as an incidental finding and not directly the reason for death. They also found that until 3 May 2020, the case fatality rate was <0.5% indicating that there was no excess mortality in England.

In the Netherlands, the Ministry of Health, Welfare and Sport had been reported that the percentage of hospital admissions was 0.2% in 12-17 years old, 0.1% in 4 to 11 years old and 0.8% in 0-3 years old compared to 98.8% in adults. Reports from 40 GP practices between February 2020 to 28 February 2021 shows that out of 222 children under 18 years old, who were tested by swab for SARS-CoV-2, only 4 (1.8%) tested positive compared to 8.2% in adults. The health ministry also observed that test positivity percentage was low in children between 4-11 years old while it was high in children 12-17 years old.

2.8 Impact of lockdown on the physical activity (PA)

A study by Chambonniere *et al.* (2021) during the 55-day National lockdown in France shows that out of 6,491 children who were included in the study, 45.6% of the children and 65.9% of the adolescents were physically active before the lockdown measures had mentioned decreased physical activity during the lockdown while 49% inactive children and 33% inactive adolescents reported increased physical activity during the lockdown. It was reported that children and adolescents who were inactive initially noted a further decrease in their physical activity during the lockdown. The author also states that the location of residence namely rural, urban, or suburban areas correlated with the physical activity of both populations. The outside area of the house influenced physical activity only in children. A decrease in physical activity was characterized by 35.2% in subjects living in rural places, 46.7% living in suburbs, and 47.9% in an urban location. A decrease in physical activity was reported only in 32.8% of children with access to outdoors compared to 64.2% without access to outdoors. 71. of 7% children and 72. of 1% of adolescents who followed 6hours per day sitting time before the lockdown reported an increase in sitting time during the lockdown.

In Germany, Schmidt *et al.* (2020) studied physical activity and screen time pre-lockdown and during lockdown using questionnaires and interviews. The authors found that the increase

and decrease in sports activity during the lockdown correlated with age. Children between 4- to 5-year-old noticed an increase in time of unorganized sport by 11.8 mins while by 17 min per day in 14-17-year-old subjects. The author when analyzing the total duration of sport found out that there was a relationship between age and decreased in sports activity during the lockdown and this was characterized by 2.2 minutes per day in children between 4 to 5 years old and by 16.6 minutes in 14-17-year-old subjects. Activities such as walking, cycling, gardening, and housework were done commonly by adolescents whereas outdoor activities were carried out more by young children. A difference in the duration of house activities was also observed by the study group. The time spent in house activity by 4-5 years old was 136.5 minutes per day whereas in 14-15 years old it was 80.3 minutes per day. Correlation by sex and the type of physical activity was mentioned by the authors as girls spending more time on house activity while boys engaged in activities such as cycling, gardening, walking, and playing outside. People who did not take part in physical activity before the lockdown tended to take part in non-organized sports during the lockdown.

It has been reported that quality of life before the lockdown affects the PA, especially in younger children and females. Physical activity nor screen time spent leisurely before COVID-19 affect the physical activity during the lockdown. It was also noticed that the quality of life decreased during the lockdown period in children and adolescents. However, in subjects who were persistent with physical activity before COVID-19, adverse mental health outcomes and increased screen time activity were not preventable. An increase in physical activity was noticed in a proportion of the population (Wunsch *et al.* 2021).

In another study conducted in Latin America by Roso *et al.* (2020) found a high proportion of physical inactivity in children and adolescents, especially in Brazil and Chile. Inactivity before and peri-lockdown was significant in the pediatric population of Chile. A difference in frequency was noticed for the different sociodemographic populations. The inactivity pre and peri-lockdown were high in females. Males were more active before the lockdown, but this was the opposite during the lockdown period. The physical inactivity levels before and during the lockdown have been, mentioned by the author as a habitual issue that had further worsened during the lockdown. A correlation was found between maternal education and physical inactivity characterized by high maternal education positively correlating with decreased physical inactivity during the lockdown was significant in college students compared to high school or middle school students denoting increased prevalence of physical inactivity in the adolescent population.

Age and sex influence the type and prevalence of physical activity during the early phase of the pandemic. Younger children (5-8 years old) were more likely to participate in playing, unregulated sports activities and roller skates, biking and playing with the scooter compared to the older counterparts (9-13 years old) who participated in workouts/training. Among older children, the training/workouts were performed more by boys than girls. It was reported that age and sex also influenced the sedentary lifestyle of children. Games on the computer or video games were played by boys while activities such as texting, calling friends/family, listening to music, interaction with friends and family, doing hobbies were performed by the girls all while sitting. These activities were predominant in older children compared to young children. In total, a short duration of the sitting was due to school activities while longer times were found to have been spent on recreational activities. The minutes on sitting for educational purpose and total minutes positively correlates with age and sitting for recreational positively correlates with the female sex. During the early COVID-19 period, the probability of taking part in physical activity inside the house in the garage or nearby road or on the side had increased, compared to the pre-COVID-19 period while performing physical activity in a park or footpaths had decreased compared to the times before COVID-19. However, in the children, the probability of performing physical activity in the backyard or on sidewalks or in the nearby roads did not differ from the pre-COVID-19. A considerable proportion of children participated in yoga, dance or martial arts using remote online services. Some used it for taking part in group sport or workout activities while a small proportion used it for training sessions and gym. (Dunton *et al.* 2020)

In a study by Pombo *et al.* (2020), it was found that there was no sex difference in the participation in PA during the COVID-19 lockdown. This was explained by the author as due to lack of space, necessary instruments, and social interaction that allows sex variations in PA during these times. However, it is implied that there is the influence of other factors such as age, presence of outdoor spaces, presence of siblings or other children in the household and working location of the adult on the PA of the subjects. Increased physical activity was noticed in 0-2 years and children who lived with other children. The presence of outdoor spaces especially between 3-9 years of age but it did not influence the older age group children. Conversely, the availability of small spaces did not impact the PA. Parents/adults who worked from home negatively influenced the PA. The authors suggested that adults should make themselves aware and highlight the importance of PA for their children during confinement especially in families with older children with no access to outdoor space and decreased socioeconomic status.

Exceptionally low levels of physical activity have been documented in children and adolescents of 4-6 grades during the lockdown period although before the pandemic the children were found to spend 23.19 mins per day in physical activity. The level of physical activity was different for children of different grades. However, grade 6 students who were entering middle school from elementary school had the highest reported moderate to strenuous physical activity. Gender difference showed that boys performed less PA than girls and had worse mood states which is in line with the finding that physical activity was positively associated with the mood states (Zhang *et al.* 2020). When family coexistence was perceived as easier, the children spent more time exercising. But when parents perceived the family existence as complicated or experienced greater stress, the children engaged in less physical activity (Orgilés *et al.* 2020) The absences of sports activity were reported in males and among 1 year old (Esposito *et al.* 2021).

2.9 Impact of lockdown on the screen time (ST)

The increase in screen time was more prevalent in children and adolescents who live in urban areas than in the countryside. Similarly, A high percentage of children and adolescents who did not have access to outdoor spaces noticed an increase in ST. Physical activity during the lockdown was determined by the screen time habits of children and adolescents before the lockdown (Chambonniere *et al.* 2021). Similar findings on screen time were also found by Wunsch *et al.* (2021) that screen time before COVID-19, regardless of sex difference, was found to influence the physical activity of children and adolescents during the COVID-19 lockdown stating the lower screen time could promote physical activity during the COVID-19 lockdown and act as a protective factor for performing physical activity. Contradicting to previous studies, Schmidt *et al.* (2020) observed that the screen and physical activity increased parallelly. The total increase in screen time comparing the pre and peri-lockdown period ranged from 146.1 to 237.5 min.

During the lockdown period, children spent more time on screen, engaged in less physical activity and slept more than they did before the lockdown. These changes in children's schedules were reported by the countries Spain and Italy. Italian children were found to spend more time on the computer during the lockdown, engaged in less physical activity and slept more duration during the week compared before the lockdown. However, Italy and Spain differed in duration of screen time usage with Spanish children spending a little bit more time than Italian children. Parents who viewed the current situation as severe reported that their

children's screen time went up than the rest. The same applied when the parent's perceived more stress (Orgilés *et al.* 2020).

Oliviero *et al.* (2021) noted screen time with an exception of online lessons increased not only in older children but also among younger children indicated by an increase in the percentage of 1-18-year-old subjects spending more than 3 hours a day on the screen, compared to pre-COVID-19 times.

2.10 Digital Eye Strain (DES) or Computer Vision Syndrome

In a study population from Italy, 65% stated that they were satisfied with attending classes online (Esposito *et al.* 2021). However, there has been an increased prevalence of DES among children and adolescents due to the shift of education to online mode, according to a study by Mohan *et al.* (2021). Children spent more than 5 hours a day on electronic devices out of which more than 2 hours a day were for the purpose of attending online classes. The most used device was a smartphone and some use it below the distance of 18 inches from their eyes. Itching and headache are the most frequently occurring symptoms while the least frequently occurring symptoms include double vision and halo around the objects. The parents report that the online classes are harming their children's vision. Using electronic devices for more than 5 hours, male gender and playing mobile games possesses a risk of developing DES.

2.11 The Psychological impacts of lockdown

Ezpeleta *et al.* (2020) conducted a longitudinal study in Spain to analyze the lockdown situation. The results showed that the relationship of adolescents with their family members such as parents and siblings declined in a small proportion. Many of the adolescents reported maintaining contact with their friends via online platforms. It was found that the tasks provided by the school for completion influenced the stress faced by the family, but the majority reported that they could complete the tasks provided by the school, maintain their routine every day, did hobbies, physical activity, or sports. Furthermore, findings showed adolescents took the responsibility for the adults and household work. Some reported being overburdened by the homework given to them and admitted that they often got bored. Most of the adolescents also reported excessive use of screen time. Reports included having problems with sleep and weight changes. It was observed that the adolescents were afraid to go outside and showed fear of the

future, but the majority expressed liking the lockdown. Suicidal intentions and the wish of death were reported in a small percentage of adolescents.

Mourouveye *et al.* (2020) suggest that lockdown increases social interactions, connections, and a feeling of belongingness. He observed a lower incidence of suicide behavior and hospital admissions during the COVID-19 lockdown with hospital admissions being low during the summer breaks.

A study conducted by Hasan *et al.* (2020), reported that the fear of loss in academics was a link between the stress of online studies and mental distress. Academic stressors are associated with academic delays that negatively impact the mental health of the students and are positively correlated with anxiety symptoms among college students in Bangladesh.

The average time per day spent on the internet and approach to problem-solving were two factors that were both linked to a reduction in depressive symptoms among children and adolescents. On the other hand, addiction to the internet and cellphone, separation anxiety, fear of physical injury, living in areas with strict measures and lockdown, fear of physical injury, social fear, emotion-based coping style, having friends and/or family members who contracted COVID-19, living in urban areas, the outbreak interrupting graduation were linked with increased depressive symptoms. Increased internet usage compared to before the COVID-19 was explained by use for study purposes. Anxiety levels were substantially higher in adolescents compared to children and females experienced anxiety more than males. The anxiety levels correlate positively with the depressive symptoms (Duan *et al.* 2020).

COVID-19 has been causing significant psychological stress in high school and junior high school students. The presenting patterns varied in similarities and differences in both groups. Depressive and stress-related symptoms were found to be more prevalent in high school students than in students at junior high school. Depression and anxiety rates in these populations have substantially increased compared to before the epidemic or pandemic. Positive coping played a protective role in preventing stress, anxiety, and depression in junior high students while negative coping was a factor that determined the risk of these conditions in both high school and junior high students. Positive coping includes a help-seeking attitude, approach problem-solving, judgment skills, thinking and distancing. In addition to positive coping, robustness which is more prevalent in male students was another protective factor. The high educational level of the parents promoted robustness which has been implied by Zhang *et al.* (2020) to promote a positive image of self, significant life satisfaction and extended support.

The study by Fazeli *et al.* (2020) demonstrated positive associations have been found between gaming disorder, sleeplessness, anxiety, depression, and stress with consequences

varying from small to moderate consequences while a negative correlation has been established between adolescent quality of life and sleepless, gaming disorder, depression, anxiety, and stress that is when one of the variables increased, the other variable decreased and the opposite. Some of the established relationships included sleeplessness with gaming disorder, gaming disorder with anxiety, stress and depression, anxiety, stress, and depression with sleeplessness. The effects studied from the analysis indicated that gaming disorder influenced sleeplessness through anxiety, depression and stress with anxiety serving as a strong mediator led by depression and stress. Gaming disorder had a positive correlation with adolescent's stress and depression which in turn had a negative relationship with the quality of life. The two most significant factors that affected the quality of life were stress and depression.

In another study by Chen *et al.* (2020), there was a difference in anxiety symptoms between subjects from Wuhan and people from other urban areas but there was no difference in depressive symptoms. In contrast to that, there was no difference in symptoms of depression and anxiety in families of people who worked in COVID-19 related work or who tested positive for COVID-19. Parenting styles influenced the mental health of adolescents. Adolescents from Wuhan found their parents to be less warm and overprotective. The positive predictor of depressive and anxiety symptoms included relative being infected, online studies, higher grades such as being in high school than in middle school and gender, while residence location or regional factors and the number of siblings also had an indirect influence on these symptoms. Subjects who were the only child perceived overprotectiveness from their parents which contributed to adverse mental outcomes.

In a cross-sectional behavioral study, it was reported that the risk of peer problems was higher in children from Wuhan than in children Huangshi, a city in the southeastern province of Hubei. Less prosocial problems and increased peer problems have been noticed in children between grades 4-6 than in children of grades 2-3. The likeliness of having peer problems was also influenced by gender represented by fewer issues in girls than in boys. Participants who performed physical activity regularly had a very less probability of developing prosocial and hyperactivity-inattention issues compared to their counterparts who did do any physical activity. Children who had an increased risk of developing anxiety and presented with emotional symptoms when parents had anxiety symptoms. There was a positive link between prosocial issues and hyperactivity inattention with the duration of exercise (Liu *et al.* 2021).

Kilincel *et al.* (2020), describes the anxiety level among Turkish adolescents and reported that a high proportion was concerned about their future school life, with some expressing utmost worries and some expressing much concern for the social and economic development. It was

discovered that the major adolescent population received most information regarding COVID-19 from the television and the anxiety level remained unchanged even upon receiving the information while some expressed fears about their health. From the analysis, the authors found that having a COVID-19 positive family member and psychiatric referral impacted the anxiety levels by 4.39 and 3.81 times.

According to the parents of children, the most frequently presenting issues in children was difficulty to concentrate, boredom, irritability, restlessness, loneliness, uneasiness, worrisome, arguing nature with rest of the family, dependency on the parent, anxiousness, angeriness, fear of the infection, reluctant ness, increased eating and worrying when someone left home. Behavioural issues were prevalent in Spanish children and included fighting with a member of the family, had more somatic complaints, hesitated to sleep alone and showed worry when the parent left home. The feelings perceived by Italian children included sadness and loneliness during the lockdown. The caregivers mentioned that family coexistence was reasonably simple during the lockdown with only a small percentage indicating it as difficult or extremely difficult during the lockdown. When family coexistence was difficult, the parents rated that their children presented with restlessness, anxiety and uneasiness and tend to be frustrated, angrier, irritable, had concentration issues and argued more. When the caregivers viewed the situation to be serious in terms of family wellbeing, the children tend to be more concerned, restless, anxious, lonelier, nervous, and uneasy and cried easily, argued more and had difficulties compared to before the lockdown. The level of stress perceived by the parents directly influenced the symptoms presented by the children with more children presenting symptoms when their parents were greatly stressed. In addition to already mentioned symptoms, children facing stress from parents tend to be indecisive, were scared to sleep alone thus leading to stressed parents viewing their children as being less silent (Orgilés *et al.* 2020).

A study by Valadez *et al.* (2020), noticed that there were major variations in both sex and age. Female students displayed a greater degree of concern but also compassion passion and satisfaction. Negative emotions were based on age. Adolescents had less worrying attitudes than children which have been explained by the authors as a cause of increased understanding of the happening. The reason reported for staying at home included avoiding contagion and contracting the infection and avoiding spreading the infection to others. Forced schoolwork and the inability to go out were found to bother the participants. Both children and adolescents exhibited a strong social character and express a desire to interact with their friends. From the findings, the authors hypothesized that allowing students to select their hobbies helped them escape boredom. Doing homework was found to be enjoyable as one of the things. Some

participants expressed depression and concerns while the remaining expressed joy, hope, fear and precaution.

Behaviour changes reported by Uccella *et al.* (2021) showed differences in children less than 6 years old and children between the age of 6-12. The changes were more prevalent in children between 6-12 years old compared to those below 6 years old. The most common observation in children <6 years included sleep problems such as problems falling asleep, waking up at night, irritability, symptoms of stress namely restlessness and separation anxiety. 6-18-year-old children presented with somatic complaints which included shortness of breath sleep problems such as difficulty falling asleep and waking up. The changes in behaviour in both age groups were positively correlated with parental distress as well as pre-existing psychological deficits. Few changes in the behaviour were correlated with parents implementing coping mechanisms especially in below 6 years old but not in the 6-18 age category.

Psychological issues were noted frequently in females and participants who lived in COVID-19 prevalent areas. In Italy, fear of losing their grandparents was more prevalent in children from the Northern parts and in 11-13 years old compared to southern regions and 14-19 years old. The tendency to feel sad occurred in females in the age group 14-19 years and loneliness was described as the primary reason. Missing their school community was slightly more common among girls, subjects from the South and in 14-19 years old. Fatigue was experienced by females and in 14-19 years old than in males and 11-13 years old, regardless of differences in the region. Crying during the day, and feeling agitated were also more experienced by females. The most often overlooked feature of school closure by adolescents was the opportunity to interact with their classmates, regardless of gender age group, or geographic location (Esposito *et al.* 2021).

In a study by Orgilés *et al.* (2021), the prevalence of anxiety and depressive symptoms among children and adolescents of Spain, Italy and Portugal were observed. Compared to Italy and Portugal, participants from Spain scored high on the anxiety and depression scale. Followed by Spain, it has been reported that Italian children compared to Portuguese children were more likely to exhibit depressive symptoms. Children with depressive and anxiety symptoms had parents who expressed stress due to the ongoing pandemic but it is concluded that it has no relationship with the depression and anxiety symptoms. Age and gender variations were also not noted.

Higher levels of generalized anxiety were self-reported before or after the pandemic by 11-17 years old. 62.1 % reported depressive symptoms such as difficulty focusing, inability to

show excitement or pleasure in sports and expressed disappointment. But there was no substantial rise in the incidence of depressive symptoms was observed before or during the pandemic. Older age was connected with parent-reported mental issues only in the female gender. Girls reported a higher quality of life though it was noted to decrease with age in the female gender. High parental education was associated with less identified mental health issues while low parent education possessed a high risk for burden from the pandemic. Serious peer problems and mental health issues were reported in children with a history of migration. Half of the participants between 11-17 years old reported psychosomatic complaints which are similar to the findings by Uccella *et al.* (2021). Approximately half of the sample reported feeling irritated while a substantial proportion of the sample reported having problems sleeping, felt depressed, had headaches and/or presented with a stomachache. Girls were far more impacted in terms of headaches, having depression and stomachaches. Having a living area less than 20 square meters per person also was considered high risk for getting impacted by the pandemic. These high-risk children and adolescents not only reported being more burdened by the pandemic but also reported lower quality of life, emotional issues, behavioural problems, mental health issues, self-reported anxiety, peer problems, hyperactivity, depressive symptoms, as well as anxiety issues (Sieberer *et al.* 2020).

There has been a drastic increase in conduct problems during the lockdown. Hyperactivity inattention symptoms tend to rise in males than females during the lockdown. Children faced the difficulty of keeping track of the passing of time and they could not keep up with their everyday routine prior to the lockdown. All children were found to have an increased sense of boredom excluding females whose mothers did not work or who worked as prior (Cellini *et al.* 2021).

2.12 Relationship between physical activity (PA) and mood status

When analyzing children and adolescents who normally have 160 mins PA per week due to the physical education (PE) classes, it was found that the physical activity affected the mood states of children and adolescents during the COVID-19 period. Analysis of Profile of Mood States (POMS) showed low PA was associated with high scores for negative mood and boys showed worse mood states represented by depression, anger, fatigue, and confusion as well as low PA. No sex difference was reported for positive mood scales. Low PA and the worst mood were reported in grade 4 while the best mood and moderate PA was reported in grade 5. The highest PA was performed by students of Grade 6 (Zhang *et al.* 2020).

2.13 Awareness of COVID-19

In a study by Esposito *et al.* (2021), it was observed that most students understood the adverse effects and a lack of effective management for COVID-19. Regarding this issue, females expressed more concern compared to the males of the study group. Greater awareness about symptoms, diagnosis and infection risk was exhibited by older students, regardless of sex, age, geographical differences, and the kind of school that they attended. All information was received by students via mass media communication while parents were the source of information for children under the age of 13. Compared to the children from the Southern region of Italy, children from Northern regions had more personal contact with a parent or family member who was tested positive for the infection.

2.14 Communicating about COVID-19

Students from the southern region of Italy reported talking about COVID-19 very often with their friends. No geographical variations were noted when asked who they would like to speak to, regarding the infection. Also, approximately half of the students expressed a desire to discuss it with a physician. 6.2% of the females and 5.6 of the males reported measuring their temperature once or many times a day. Half of the subjects also expressed their hesitation to get a swab or blood test done to ascertain whether they were infected with or had previously been infected with the virus (Esposito *et al.* 2021).

2.15 Adherence to the guidelines and hygiene measures

It was noted that the majority of the children and adolescents were found to stay inside and not leave home while some left once a week, regarding hygiene measures, children between 11-13 years old reported that they washed hands more than before the lockdown. The use of surgical masks was significantly increased in males and older children compared to females and young adolescents (Esposito *et al.* 2021).

2.16 Stress faced by the parents or caregivers

The parents viewed the lockdown as very critical because of COVID-19. Most of them stated the situation to be bad or extremely bad while a small percent rated the situation as somewhat or not that serious at all. The general level of stress experienced by the parents was mild. No differences had been reported in the perception of easiness of family coexistence regardless of parent's age, sociodemographic factors, and parental stress (Orgilés *et al.* 2020). The situation of the parents was unrelated to the depressive and anxious symptoms of the children and adolescents (Orgilés *et al.* 2021).

2.17 Relationship of children and adolescents with their parents

A percentage of females reported that their relationship with their parents stabilized with the majority reported their relationship stayed the same. A considerable proportion also reported an increase in communication with their parents especially in the Northern region of Italy, where COVID-19 was more prevalent. This positive shift was also noted in students of the age group 14-19 (Esposito *et al.* 2021).

2.18 Changes in dietary behavior

The consumption of ultra-processed food more than 5 times a week was noticed in all countries of Latin America namely Brazil, Chile, Columbia as well as in Spain and Italy (Roso *et al.* 2020).

Hashem *et al.* (2020) conducted a study on the changes in dietary patterns among Egyptian children. 82% reported that there was an association between boredom and a shift in eating habits and 94.6% had reported a rise in electronic and screen time usage. The author discovered a strong positive link between increased appetite and time spent on a smartphone, a laptop, or playing video games. Television viewing and smartphone screen time were related to increased intake of sweet food and consumption of unhealthy food while remote learning and increased electronic device screen time were significantly associated with disregard for fruits and vegetables and reduction in protein serving. Likewise, screen time duration influenced between meals snacking and TV, videogames and mobile screen time were all correlated with midnight snacking.

The dietary habits of adolescents had shifted dramatically during the COVID-19 lockdown with disparities between sexes and educational levels being identified to varying degrees. A significant increase in consumption of meat, poultry, rice, fresh fruits and vegetables, dairy and soybean products were observed. Sex variation in food intake has been noted with females eating fresh fruits and vegetables, and rice more often than males and ate meat, dairy, and soybean products less frequently than males. Consumption of wheat products preserved vegetables, other staple foods had substantially increased and was frequently consumed by males than females. It was noted that graduate students consumed most food more frequently compared to high school and undergraduate students except rice which was more frequently consumed by undergraduate students. Before the pandemic, males drank more beverages than females and graduate students consumed more beverages than undergraduate and high school students. Except for male graduate students, beverage consumption was less than pre-COVID-19 in males and females regardless of educational status. In concerns to beverage type, sweetened drinks were consumed by the majority before and during the lockdown period, but the percentage showed a slight decrease during the lockdown period. Sweetened beverage consumption was noted to be slightly increasing sed females. It was found that a greater proportion of participants stopped or decreased their beverage consumption than those who began or increased their consumption. Participants who stopped or decreased their consumption of fresh fruit, fresh vegetables, soybean products, and dairy products were more likely to do so than those who began or raised their intake of those foods. Similar changes in beverage, fresh fruit and fresh vegetable consumption were observed across educational levels and sexes in various subgroups (Jia *et al.* 2021).

There was a significant rise in consumption of fried potatoes, processed meat and sweetened beverages. There was increased meal intake per day which was prevalent in males more than in females (Pietrobelli *et al.* 2020). Opposite to the previous study, females were observed to have increased food intake compared to males (Esposito *et al.* 2021).

2.19 A shift in the sleep-wake cycle

When parents described the family existence as not easy or perceived greater stress, the children tended to sleep more compared to prior lockdown (Orgilés *et al.* 2020). This is in line with a study conducted by Pietrobelli *et al.* (2020), who also documented an increased tendency to sleep during the lockdown period. Sleeping more than usual was reported more in males and

11-13 years old, as a result of school closure. Problems initiating sleep was often the reason for subjects who had a lack of sleep (Esposito *et al.* 2021).

A huge delay in the bedtime and wake-up time was reported across all age groups, regardless if it was weekday or weekend. Adolescents and children who were of school-going age faced the most disruption in their sleep routine. There was a drastic increase in the percentage of children adolescents between 6-18 years old who went to sleep after 23:00, compared to the pre-lockdown period. Similarly, waking up times showed that most subjects woke up after 8 a.m. This delay was also noticeable over the weekend with subjects waking up after 9 a.m but not to the level of significance. Sleep improvement has been noted in 6–12-year-old. The duration of the sleep increased significantly except in children below 4 years old. There was an increase in sleep latency characterized by a majority of the subjects who took more than 30 minutes while parallelly, there was a decrease in subjects who took 5-15 minutes to sleep. During the lockdown, the tendency to nap decreased with more of 4-5 years old napping less followed by 1-3 years old. On the contrary, adolescents demonstrated a trend towards increased napping. The habit of sleeping next to the parent did not change when compared with before the lockdown. Younger age groups experienced an increased incidence of sleep disorders, most notably trouble falling asleep, anxiety around bedtime, waking up at night, sleep terrors and an increase in nightmares. Inversely, there was a decline in the incidence of bruxism during the lockdown in those participants who previously had the condition. Adolescents appeared to be the least affected group except for issues of falling asleep (Oliviero *et al.* 2021).

Cellini *et al.* (2021) noticed a variation in the age in regards to sleep-wake time. The author reported older children going to sleep late compared to younger children. In fact, children went to bed one hour and eighteen minutes late compared prior to the lockdown. Additionally, during the lockdown period, children woke up one hour and fifty minutes later than they did before the lockdown. Approximation showed that children's sleep-wake cycle was generally changed by one hour and thirty-six minutes. Not only that, children were found to have spent ten hours thirteen minutes in bed with the effect being greater on the younger children. The working status of the mothers such as mothers who were working from home or who did not work was positively correlated with children spending more duration in bed. Furthermore, the quality of sleep was also impacted as a result of lockdown with females having less sleep than males, although the increase was not significant.

3. MATERIALS AND METHODS

3.1 Study design

An online survey was conducted and data was gathered through target sampling of children and adolescents between the age of 4-18 years old who reside in the Indian state of Tamil Nadu. A questionnaire containing 55 questions, developed using google forms was distributed across the state's schools and colleges. To encourage comprehension, the questions were published in English and Tamil, the state's official language. 11 questions collected sociodemographic data while the remaining 44 evaluated participant's behavior and health during the COVID-19 lockdown. For children aged 4-14, 288-parents completed the survey while 362-adolescents between 15-18 years old completed it independently. The online survey was open from 09 February 2021 until 31 March 2021.

3.2 Statistical analysis

Before conducting data analysis, responses were exported and grouped in excel files by age group: 4-7, 8-11, 12-14, 15-16, and 17-18. Statistical analysis was performed using IBM SPSS statistics 26. Descriptive statistics were performed, and the response rate of each question was tabulated in terms of frequencies and percentages.

3.2.1 Distribution of the data

Skewness and Kurtosis, as well as the Shapiro-Wilk and Kolmogorov-Smirnov tests of normality, were used to ascertain the distribution of the data. After confirming the normality of the data, parametric tests were used to conduct further analysis.

3.2.2 Chi-square test and one way ANOVA

The chi-square test was used to assess the statistical significance between the age groups and thirty-nine parameters related to impact on health and behavior during the lockdown, and differences in thirty-one parameters between age groups were determined using one-way ANOVA. The thirty-nine parameters include consumption of nutrient supplement, increase in screen time, ophthalmologic visit, COVID-19 symptoms, diseases diagnosed during the lockdown, hand sanitizer usage, guest visits, night sleep pattern, napping pattern, general food

habit, eating habits, food type consumed during the lockdown, weight changes, screen time increase, ranking of five reason for screen time increase, hours spent on screen every day, hours spent on screen for educational purpose, frequency of watching movies, vision changes, frequency of attending online lectures, participation in online lectures, memory power, academic performance, mood changes, energy levels, hobbies, frequency of interaction, quality of interaction, emotional intelligence, frequency of talking about COVID-19, hygiene habits, handwashing frequency, outdoor activities, indoor activities, ability to be independent, hand sanitizer usage, frequency of guest visits and guests wearing masks and following social guidelines.

3.2.3 Correlation coefficient

Pearson's correlation coefficient was used to find the strength of the relationship between the following variables: Sleep pattern changes and weight changes, sleep pattern changes and mood changes, sleep pattern changes and vision changes, sleep pattern changes and memory power, eating habits and weight changes, eating habits and nap pattern, screen time duration and academic performance, screen time duration and social interaction, screen time duration and emotional recognition, screen time duration and vision changes, screen time duration and recognition of emotions, screen time duration and hobbies, frequency of watching movies and social interaction, frequency of watching movies and academic performance, frequency of watching movies and recognition of emotions, frequency of attending online lectures and academic performance and participation in online lectures and frequency of attending online lectures and impact on participation.

3.2.4 Multiple regression analysis

Multiple regression analysis was used to determine predictors for five variables, namely hygiene habits, energy levels, vision changes, mood changes, and vision changes during the lockdown. Age, handwashing, and disease diagnosis were used as independent variables to assess hygiene practices during the lockdown. Age, changes in outdoor activities, and changes in indoor activities during the lockdown were used as independent variables to predict energy levels, while hours spent on the screen each day, age, interactive frequency, and emotional intelligence during the lockdown were used as independent variables to predict mood changes

during the lockdown. Increased screen time and increases in memory power were used as independent variables to predict vision changes.

3.3 Ethical considerations

The study strictly adhered to the Declaration of Helsinki protocol, as well as the Council of Europe's Oviedo Convention and the Republic of Latvia's legal regulations on data protection and clinical research. On 22 December 2020, an application containing a concise overview of the objective, hypothesis, risks, advantages, confidentiality, and data security was submitted to the University of Latvia's medicine scientific research ethics committee and the application was approved on 23 December 2020.

On the first page of the survey, a clear detailed description of the research team, including the study's intent, was written using simple words in both English and the local language Tamil. The research team provided participants with an assurance of confidentiality and data security, which was upheld. All participants gave consent to participate in the survey upon filling out the questionnaire.

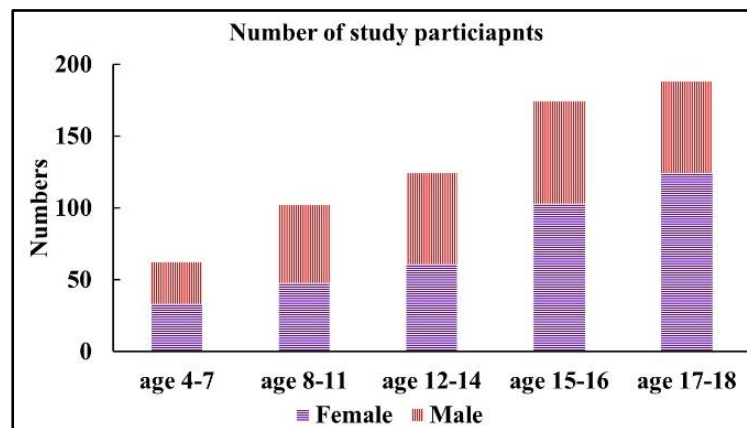
4. RESULTS

4.1 Sociodemographic data

4.1.1 Samples

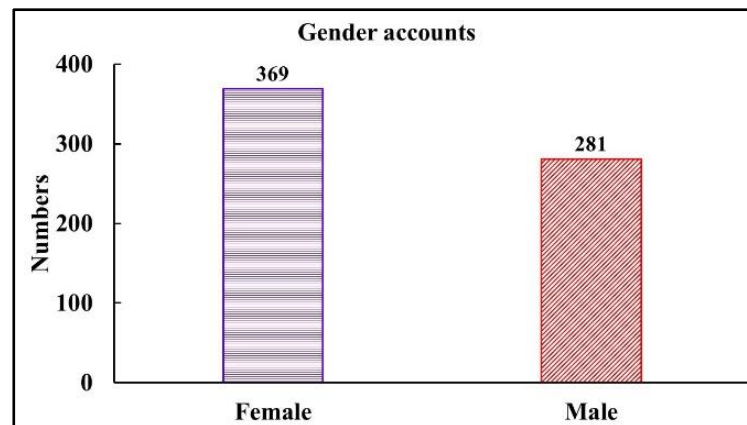
The analytic sample of this study was 650 participants with ages ranging between 4 and 18 years old. They are classified according to their age group into; (i) 62 children (33 – female, 29 male) were 4-7 (9.5%), (ii) 102 children (48 – female, 54 male) were 8-11 years old (15.7%), (iii) 124 children (61 – female, 63 male) were 12-14 years old (19.1%), (iv) 174 adolescents (103 – female, 71 male) were 15-16 years old (26.8%) and (v) 188 adolescents (124 – female, 64 male) were 17-18 years old (28.9%) (Fig.1).

Figure 1: The total number of study participants in five age groups.



Thus, a total of 369 females (56.8%) and 281 males (43.2%) participated in this cross-sectional survey (Fig.2).

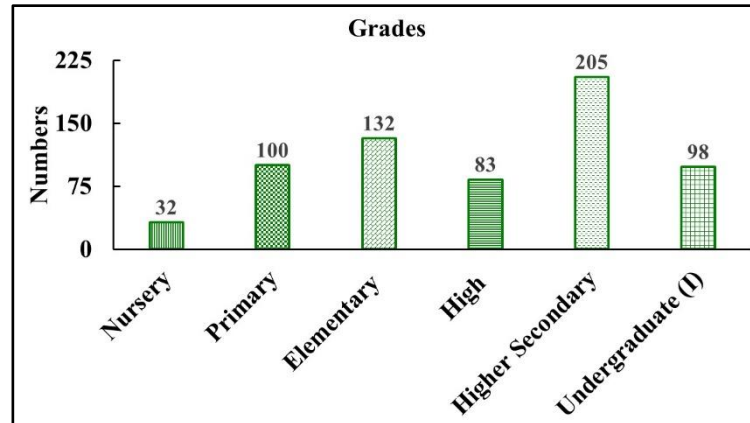
Figure 2: The male and female proportions of study participants.



4.1.2 Grades

Students were from six grades (4.9% - Nursery, 15.4% - Primary, 20.3% - Elementary, 12.8% - High, 31.5% - Higher Secondary School and 15.1% - First year Undergraduate) with two major categories namely school and college students (Fig.3).

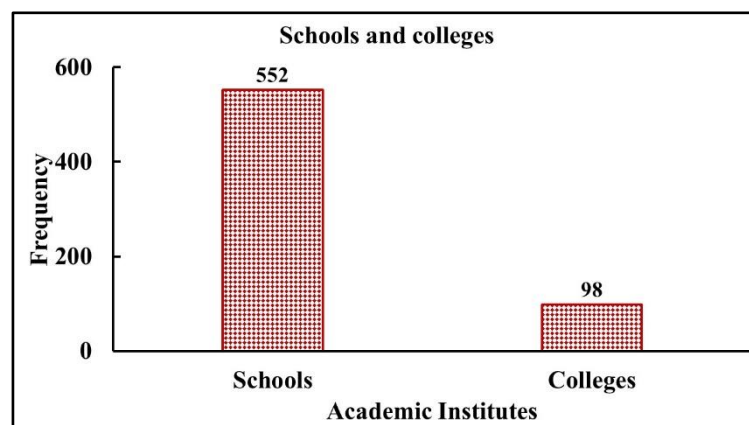
Figure 3: The academic grades of study participants.



4.1.3 Academic institutes

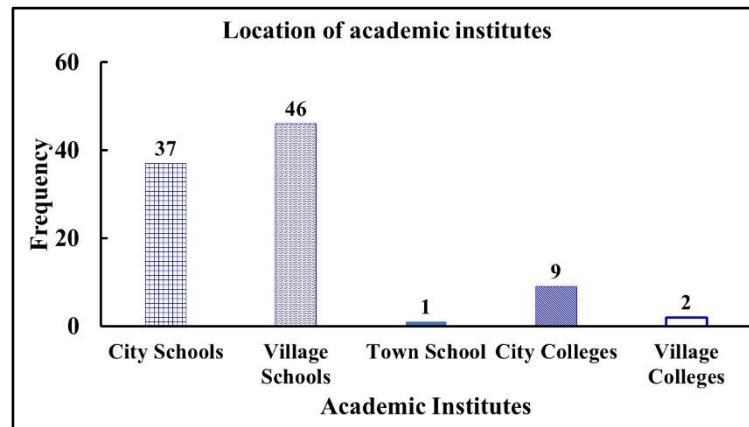
Among 650 study participants, 84.9% were school students from 84 different schools and the remaining 15.1% were college students from 11 different colleges (Fig. 4) across the state, Tamilnadu, India.

Figure 4: The number of students from schools and colleges who participated in the cross-sectional survey.



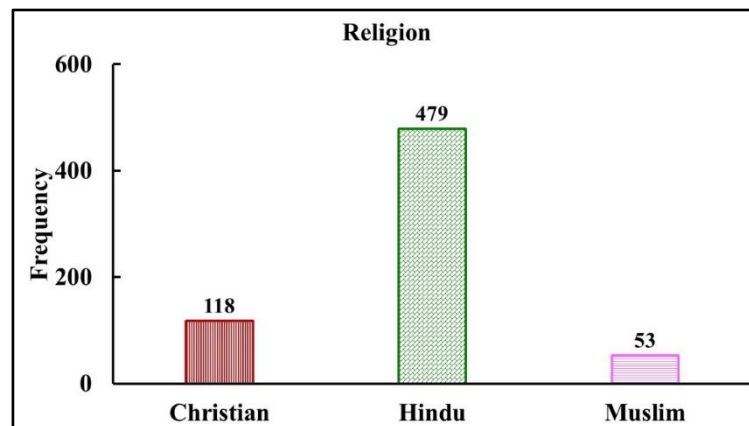
The location of schools and colleges were 1:1 of city and villages, respectively (Fig.5).

Figure 5: Various locations of academic institutes.



Participants belonged to three major religions and were mainly Hindus (73.7%), while 18.2% were Christians and 8.1% (Fig.6).

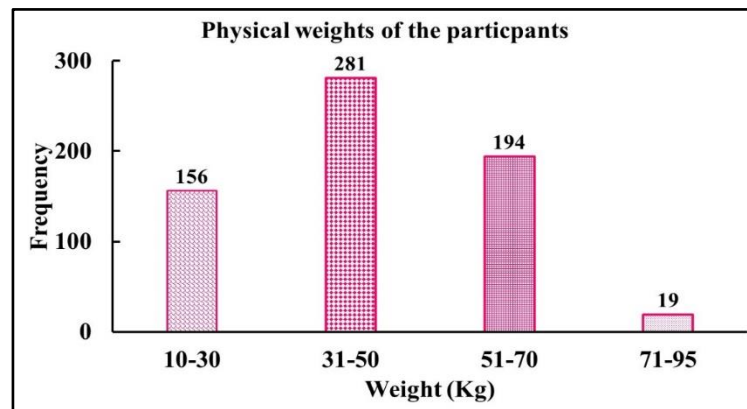
Figure 6: The religions of the study participants.



4.1.4 Baseline characteristics

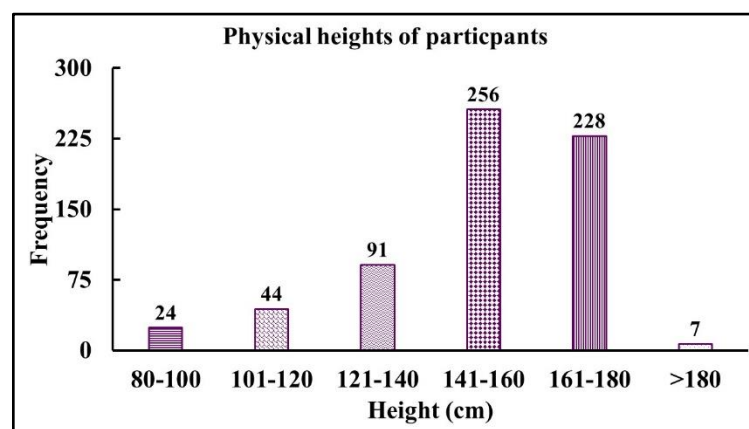
The baseline characteristics such as weight and height were collected from the participants. In children age groups, 24.0% children are in 10-30 kg and 43.2% children are in 31-50 kg body weight ranges. In adolescents age groups, 29.8% of participants are in 51-70 kg and 2.9% are in 71-95 kg body weight ranges (Fig. 7).

Figure 7: The physical weights of all the study participants.



The physical heights of participants were presented in Fig. 8 and 39.4% of participants are in the heights between 141 and 160 cm. The next predominant height group is participants having physical heights between 161 and 180 cm (35.1%). The remaining categories such as 121-140 cm (14.0%), 101-120 cm (6.8%), and 80-100 cm (2.2%) are less in numbers. Only 1.2% of participants were above 180 cm in height.

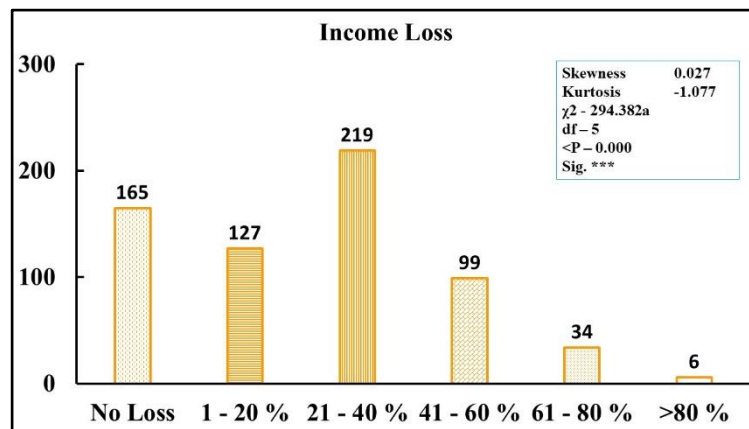
Figure 8: The physical heights of all the study participants.



4.1.5 Income loss

It is a general estimation that the number of poor people (\$2 or less income per day) in India will be increased because of the COVID-19 recession. In this study, we performed a Chi-square analysis of percent income loss by comparing the differences in income percent before and after the complete lockdown. 34 % of study participants revealed a highly significant income loss of up to 40%. 20.0% of participants reported an income loss of 20%. A cumulative total of 21% of participants reported a loss of 60 to 80% and above 80% in income (Fig.9).

Figure 9: The fall in income due to Covid-19 lockdown in the families of study participants.



Overall results significantly showed a considerable number of families are suffering from the lockdown.

4.2 Dietary habits, nutrient supplements, disease symptoms, positive and negative mood changes

Tamil cuisine is the most popular food culture within South India and other parts of South Asia. Vegetarian cuisine lies in the healthy habits of Tamil people since ancient periods. In this present study, we provided multiple choice answers for five different variables, data obtained in this study exhibited a definite trend. The increasing age resulted in more combinations of multiple food choices, nutrient supplements, disease symptoms, positive and mood changes. (Appendix).

4.3 Chi-square test and one-way ANOVA

Consumption of nutrient supplements was significantly higher in 15–16-year-olds, at 38.5 % than in other age groups during the lockdown period. The chi-square test revealed a statistically significant association between age group and nutrient supplement intake. Likewise, in comparison to other age groups, 15–16-year-olds (90%) and 17-18-year-olds (89%) reported significantly more screen time. Statistically, age group was associated with an increase in screen time.

Ophthalmologic visits were most often found in 17–18-year-olds (17%), followed by 14 % in 15–16-year-olds. Between age group and ophthalmologic visits, a statistically significant association was observed. COVID-associated symptoms were often found in adolescents aged 15-16 (52%). There was a clear association between age group and COVID-19 symptoms. Diseases were diagnosed increasingly in the 4–7-year-old children (13%) and lowest in 17–18-year-old (10%).

Age group and diseases diagnosed during the lockdown were associated statistically. Hand sanitizer usage was significantly associated with age group and characterized by highest usage in 8–11-year-old (76%) and lowest in 15–16-year-old adolescents (36%). The guest visit was highly noted in the household of 15–16-year-old (56%). Chi-square test revealed independence of age group and guest visit (Table 1).

Table 1: Impact of lockdown on nutrient supplements, screen time increase, ophthalmologic visits, disease symptoms, co-morbidities, hand sanitizer usage and guest visits.

Variables	Responses	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Nutrient Supplement	Yes	14 (23)	25 (24.5)	42 (34)	67 ^a (38.5)	55 (29)	$\chi^2 - 9.337a$ df – 4 Sig. 0.053 **
	No	48 (77)	77 (75.5)	82 (66)	107 (61.5)	133 (71)	
Screen Time Increase	Yes	46 (74)	85 (83)	95 (77)	156 (90)	168 (89)	$\chi^2 - 18.050$ df – 4 Sig. 0.00 ***
	No	16 (26)	17 (17)	29 (23)	18 (10)	20 (11)	
Ophthalmologic Visits	Yes	2 (3)	7 (7)	16 (13)	25 (14)	32 (17)	$\chi^2 - 11.825$ df – 4 Sig. 0.019 ***
	No	60 (97)	95 (93)	108 (87)	149 (86)	156 (83)	
COVID-19 symptoms	Yes	21 (34)	35 (34)	39 (31.5)	90 (52)	95 (51)	$\chi^2 - 21.739$ df – 4 Sig. 0.000 ***
	No	41 (66)	67 (66)	85 (68.5)	84 (48)	93 (50)	
Co-morbidities	Yes	8 (13)	7 (7)	15 (12)	19 (11)	18 (10)	$\chi^2 - 2.370$ df – 4 Sig. 0.668 NS
	No	54 (87)	95 (93)	109 (88)	155 (89)	170 (90)	
Hand Sanitizer Usage	yes	43 (69)	77 (75.5)	88 (71)	112 (64)	129 (69)	$\chi^2 - 225.646$ df – 4 Sig. 0.000 ***
	No	19 (31)	25 (24.5)	36 (29)	62 (36)	59 (31)	
Guest Visits	Yes	26 (42)	38 (37)	58 (47)	98 (56)	99 (53)	$\chi^2 - 3.228$ df – 4 Sig. 0.520 NS
	No	36 (58)	64 (63)	66 (53)	76 (44)	89 (47)	

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

The prevalence of sleeping more during the lockdown was high in 15-16 years old (32%) while the prevalence for sleeping less continuously was high in 17-18 years old (26%). Likewise, frequently interrupted sleep was greater in 17-18 years old (7%). There was independence between age group and night sleep and no difference was noticed across age groups (Table 2).

Table 2: Impact of lockdown on the overall night sleep patterns.

Patterns	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No	36 ^a (58.1)	34 ^a (33.3)	58 (46.8)	78 (44.8)	78 (41.5)	ANOVA F - 2.219 df - 4 Sig. 0.0656 (NS)
Yes, my child sleeps more	16 (25.8)	40 ^a (39.2)	37 (29.8)	56 (32.2)	49 ^a (25.5)	
Yes, less continuous	7 (11.3)	24 (23.5)	23 (18.5)	29 (16.7)	48 (26.1)	
Yes, frequently interrupted	3 (4.8)	4 (3.9)	6 (4.8)	11 (6.3)	13 (6.9)	Chi-Square
Total (N)	62	102	124	174	188	$\chi^2 - 18.67$ df - 12 Sig. 0.097 (NS)

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

The occurrence for napping shorter than before was high in 4-7 years old (16%), new-onset napping was highly reported in 17-18 years old (23%). The tendency to nap less frequently (7%) during the lockdown was mostly noted in 17-18 years old (Table 3).

Table 3: Impact of lockdown on the napping patterns.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No, No changes	27 (43.5)	56 (54.9)	74 (59.7)	98 (56.3)	69 (36.7)	ANOVA F - 2.4913 df - 4 Sig. 0.042 (***)
Shorter than before	10 (16.1)	6 (5.9)	5 (4)	8 (4.6)	21 (11.2)	
Did not nap before but naps now	6 (9.7)	18 (17.7)	21 (16.9)	24 (13.8)	43 (22.9)	
Less frequently	4 (6.5)	2 (2)	2 (1.6)	7 (4)	13 (6.9)	Chi-Square $\chi^2 - 84.17$ df - 16 Sig. 0.000 (***)
Stopped napping	11 (17.7)	15 (14.7)	10 (8.1)	19 (10.9)	16 (8.5)	
Longer than before	4 (6.5)	5 (4.9)	10 (8.1)	18 (10.3)	26 (13.8)	
More frequently	0	0	2 (1.6)	0	0	
Total (N)	62	102	124	174	188	

Values in parantheses indicate percentages.

Contrary to the above findings, 4-7 years old (18%) were found to stopped napping in comparison to other age groups. 17-18 years old were also found to mostly nap longer than prior to the lockdown. Napping more frequently was reported only in 12-14 years old (2%). Statistical analyses showed that the napping pattern was affected within age groups and between age groups by the lockdown.

The food habits of varied significantly among and between the age groups evidenced in both Chi-square and one-way ANOVA tests (Table 4). Thus, a significant relationship between age groups and food habits was noticed. Adolescents (15-18-years old) preferred non-vegetarian foods as compared with children (4-14-years old).

Table 4: Applicable food habits of the participants.

Food Habits	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Vegetarian	2 (3)	7 (7)	19 (15)	16 (9.2)	15 (8)	ANOVA F - 9.097
Non veg	19 (31)	33 (32)	33 (27)	109 (62.6)	104 (55.3)	df - 4 Sig. 0.000 (***)
Veg + eggs	5 (8)	10 (10)	4 (3)	3 (1.7)	9 (4.8)	
Veg + meat	16 (26)	16 (16)	26 (21)	12 (6.9)	14 (7.5)	
Veg + meat and eggs	20 (32)	36 (35)	42 (34)	34 (19.5)	46 (24.7)	Chi-Square χ^2 - 59.86 df - 24 Sig. 0.000 (***)
Total (N)	62	102	124	174	188	

Values in parantheses indicate percentages.

No change was mostly noted in 4-7 years old (66%). Eating more frequently was prevalent among 17–18-year-old (18%) while eating less frequently was also greatest in 17-18-year-old (18%). Analysis of food quantity showed 17-18 years old (17%) ate more food per meal while 17-18 years old were also found to eat less quantity per meal showing 17-18 years experienced changes in frequency and quantity of meal consumed during the lockdown.

The Chi-square test also showed enough evidence to conclude that there is a significant relationship between age group and change in eating habits during the lockdown. There was also a difference in means noted across age groups for change in eating habits (Table 5).

Table 5: Impact of lockdown on eating habits.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No changes	41 (66.1)	56 (54.9)	68 (54.8)	99 (56.9)	68 (36.2)	ANOVA F – 5.001
More frequently	5 (8.1)	13 (12.8)	14 (11.3)	16 (9.2)	33 (17.6)	df - 4 Sig. 0.000 (***)
Less frequently	7 (11.3)	10 (9.8)	14 (11.3)	15 (8.6)	23 (12.2)	
More per meal	2 (3.2)	16 (15.7)	15 (12.1)	28 (16.1)	32 (17)	Chi-Square χ^2 - 84.17
Less per meal	7 (11.3)	7 (6.9)	13 (10.5)	16 (9.2)	32 (17)	df - 16 Sig. 0.00 (***)
Total (N)	62	102	124	174	188	

Values in parantheses indicate percentages.

The age group with the highest percentage with no reported changes is 4-7 years old (57%). Consumption of fruits and vegetables was highest in 12-14 years old (40%) while consumption of fried food products was prevalent in 17-18 years old. The Chi-square test also showed enough evidence to conclude that there is a significant relationship between age group and type of food consumed during the lockdown. There was also a difference in means noted across age groups for change in food type consumed (Table 6).

Table 6: Changes in the preference of food type during the lockdown.

Changes	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No changes	35 (56.5)	58 (56.9)	58 (46.8)	95 (54.6)	101 (53.7)	ANOVA F – 0.538
Fruits and Veggies	20 (32.3)	32 (31.4)	49 (39.5)	57 (32.8)	61 (32.4)	df - 4 Sig. 0.708 (NS)
Fried Food	7 (11.3)	12 (11.8)	17 (13.7)	22 (12.6)	26 (13.8)	Chi-Square
Total (N)	62	102	124	174	188	χ^2 – 3.41 df - 8 Sig. 0.906 (NS)

Values in parantheses indicate percentages.

Prevalence for gaining weight during the lockdown was high in 17-18 years old (46%) while losing weight was also high in 17-18 years old (18%). The Chi-square test also showed enough evidence to conclude that there is a significant relationship between age group and weight gain during the lockdown. There was also a difference in means noted across age groups for change in weight (Table 7).

Table 7: Changes in body weight during the lockdown.

Changes	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No changes	40 (64.5)	50 (49.0)	65 (52.4)	81 (56.6)	68 (36.2)	ANOVA F – 4.582
Gained weight	13 (21.0)	46 (45.1)	49 (39.5)	71 (40.8)	86 (45.7)	df - 4 Sig. 0.000 (***)
Lost weight	9 (14.5)	6 (5.9)	10 (8.1)	22 (12.6)	34 (18.1)	
Total (N)	62	102	124	174	188	Chi-Square χ^2 – 27.723 df - 8 Sig. 0.001 (***)

Values in parantheses indicate percentages.

Prevalence for watching YouTube as the reason for ST increase was high in 4-7 years old (52%) while videogames posed a reason for increased screen time more prevalently in 8-11 year old. Increased screen time for social purposes was prevalent in 4-7 years old (8%) while being on social media was the reason for screen time increase in 15-16 years old (10%). Screen time increase due to educational purpose was highly noted in 17-18 years old (72%). There was a significant relationship between age group and reason listed for the increase in screen time and differences of means were noted across age groups on performing one way ANOVA (Table 8).

Table: 8 Various reasons for increased screen time during the lockdown.

Reasons	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Watching YouTube	32 (51.6)	33 (32.4)	27 (21.8)	23 (13.2)	15 (8.0)	ANOVA F – 23.827
Video games	5 (8.1)	16 (15.7)	21 (16.9)	19 (10.9)	16 (8.5)	df - 4 Sig. 0.000 (***)
Social purposes	5 (8.1)	5 (4.9)	1 (0.8)	5 (2.9)	5 (2.7)	
Being on social media	0	0	4 (3.2)	18 (10.3)	16 (8.5)	Chi-Square $\chi^2 - 106.480$
Educational purpose	20 (32.3)	48 (47.1)	71 (57.3)	109 (62.6)	136 (72.3)	df - 16 Sig. 0.000 (***)
Total (N)	62	102	124	174	188	

Values in parantheses indicate percentages.

Chi-square test shows a statistically significant association between the ranking of screen time reason and age group ($\chi^2 - 49.741$, $p = 0.000$) thus rejecting the null hypothesis. Overall data revealed that all the age groups ranked educational purpose as in it first place. Covid-19 lockdown transformed the entire educational system in India evidenced in our study results. Almost more than 70% of participants spent more time on educational purposes (Table 9).

Table 9: Different rankings of the five reasons for increased screen time during Covid-19 lockdown.

Ranking	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Educational purpose	38 (61.3)	66 (64.7)	82 (66.1)	125 (71.8)	139 ^a (73.9)	ANOVA F – 0.1496
Video call	3 (4.8)	1 (1)	1 (08)	6 (3.4)	7 (3.7)	df - 4 Sig. 0.963 (NS)
Watching YouTube	15 (24.2)	24 ^a (23.5)	27 ^a (21.8)	16 ^a (9.2)	13 ^a (6.9)	
Playing videogames	5 ^a (8.1)	10 (9.8)	13 (10.5)	13 (7.5)	13 ^a (6.9)	Chi-Square $\chi^2 - 49.741$
Social media	1 (1.6)	1 ^a (1)	1 ^a (0.8)	14 (8.0)	16 ^a (8.5)	df - 16 Sig. 0.000 (***)
Total (N)	62	102	124	174	188	

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

The duration of hours spent on screen was highest in 15-16 years (8%) indicated by more than 8 hours of screen time per day. 27-70% of participants report spending 1-3 hours per day on screen, 23-46% spending 3.5-5 hours and 5-25% of the participants spending more than 8 hours. Chi-square test showed a statistically significant association between screen time (in hours) and age group ($\chi^2 = 103.045$, $p = 0.000$). One way analysis of variance also showed a significant difference between screen time hours across age groups (Table 10).

Table 10: Hours spent in the screen time during Covid-19 lockdown.

Hrs Spent	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
1-3 hours	43 (69.4)	51 (50.0)	66 (53.2)	60 (34.5)	50 (26.6)	ANOVA F – 22.887
3.5-5 hours	14 (22.6)	38 (37.3)	38 (30.6)	80 (46.0)	57 (27.1)	df - 4 Sig. 0.000 (***)
5.5-8 hours	3 (4.8)	11 (10.8)	15 (12.1)	21 (12.1)	47 (25.0)	Chi-Square $\chi^2 = 103.045$
> 8 hours	2 (3.2)	2 (2.0)	5 (4.0)	13 (7.5)	34 (21.3)	df - 12 Sig. 0.000 (***)
Total (N)	62	102	124	174	188	

Values in parantheses indicate percentages.

45-92% of the participants report spending 1-3 hours per day for education purposes. Between 2% to 22% of the participants reported spending 3.5-5 hours per day for education purposes, 2 to 12 % spent 5-8 hours of screen time for educational purposes and 1-2% spent more than 8 hours. A significant association between age group and screen time hours for the educational purpose was established using chi-square test and one-way analysis of variance found a difference in means across age groups for screen time hours on educational purpose (Table 11).

Table 11: Screen time hours spent for educational purposes during Covid-19 lockdown.

Edu Hrs	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
1-3 hours	57 (91.9)	86 (84.3)	98 (79.0)	127 (73.0)	85 (45.2)	ANOVA F – 20.995
3.5-5 hours	1 (1.6)	16 (15.7)	22 (17.7)	38 (21.8)	77 (41.0)	df - 4 Sig. 0.000 (***)
5-8 hours	3 (4.8)	0	3 (2.4)	8 (4.6)	22 (11.7)	Chi-Square $\chi^2 = 91.533$
> 8 hours	1 (1.6)	0	1 (0.8)	1 (0.6)	4 (2.1)	df - 12 Sig. 0.000 (***)
Total (N)	62	102	124	174	188	

Values in parantheses indicate percentages.

The prevalence for watching more than one movie per day was high in 17-18 years old (9.6%) and the prevalence of watching movies every day was high in 8-11 years old (18%). Watching a movie on the weekends was greatest for 8-11 years old (27%) while 17-18 years old (34%) showed a prevalence of watching movies once in a few days. The prevalence of watching movies less frequently was high in 4-7 years old (39%). There was a statistically significant association between age group and frequency of watching movies as well differences in means across the age groups (Table 12).

Table 12: Frequency of watching movies during Covid-19 lockdown.

Frequency	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Less frequent	24 (38.7)	16 (15.7)	18 (14.5)	34 (19.5)	38 (20.2)	ANOVA F – 3.0389
Once in few days	14 (22.6)	33 (32.4)	41 (33.1)	53 (30.5)	64 (34.0)	df - 4 Sig. 0.0167 (***)
Only on weekends	12 (19.4)	27 (26.5)	24 (19.4)	45 (25.9)	42 (22.3)	
Every day one movie	9 (14.5)	18 (17.6)	18 (14.5)	25 (14.4)	26 (13.8)	Chi-Square $\chi^2 - 29.130$ df - 16
Every day more than one movie	3 (4.8)	8 (7.8)	23 (18.5)	17 (9.8)	18 (9.6)	Sig. 0.0231 (***)
Total (N)	62	102	124	174	188	

Values in parantheses indicate percentages.

Over 50% of the participants reported no change in vision while the prevalence of vision worsening was high in 17-18 years old (29%) and prevalence of vision improvement was high in 15-16 years old (12%). There was also a significant association between memory power and age group and differences in vision changes across age groups (Table 13).

Table 13: Changes in the eye vision during Covid-19 lockdown.

Changes	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Worsened	5 (8.1)	12 (11.8)	18 (14.5)	36 (20.7)	55 (29.3)	ANOVA F – 5.910
Improved	3 (3.2)	7 (6.9)	13 (10.5)	21 (12.1)	11 (5.9)	df - 4 Sig. 0.000 (***)
No change	54 (88.7)	83 (81.4)	93 (75.0)	117 (67.2)	122 (64.9)	
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 31.128$ df - 8 Sig. 0.000 (***)

Values in parantheses indicate percentages.

Active participation compared to prior was greatest in 4-7 years old as well as a considerable percentage of 4-7 years old (42%) also participated the least compared prior to the lockdown. 15-16 years old and 17-18 year old reported no change in frequency of attending online classes compared prior to the lockdown. A significant association was observed between age group and attending online classes as well as differences across age group have also been observed (Table 14).

Table 14: Frequency of attending online lectures during Covid-19 lockdown.

Frequency	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No more often	8 (12.9)	8 (7.8)	10 (8.1)	9 (5.2)	15 (8.0)	ANOVA F – 5.789 df - 4 Sig. 0.000 (***)
No less often	26 (41.9)	41 (40.2)	42 (33.9)	48 (27.6)	29 (15.4)	
Yes	28 (45.2)	53 (52.0)	72 (58.1)	117 (67.2)	144 (76.6)	
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 36.408$ df - 8 Sig. 0.000 (***)

Values in parantheses indicate percentages.

More active participation was recorded highest in 12-14 years old and less active participation was greatest in 4-7 years old. No significant relationship was noted between age group and participation in online classes as well no difference was noted across age groups (Table 15).

Table 15: Impact of online classes in the participatory attitudes during Covid-19 lockdown.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No changes	21 (33.9)	32 (31.4)	33 (26.6)	45 (25.9)	43 (22.9)	ANOVA F – 0.8820 df - 4 Sig. 0.4742 (NS)
More active	11 ^a (17.7)	26 (25.5)	48 ^a (38.7)	52 (29.9)	56 (29.8)	
Less active	30 (48.4)	44 (43.1)	43 ^a (34.7)	77 (44.3)	89 (47.3)	
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 13.303$ df - 8 Sig. 0.1018 (NS)

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

A high prevalence in the decline of memory power was noted in 8-11 years old (40%) while improvement in memory power was high noted in 15-16 years old (25%). A significant relationship was noted between age group and memory power and no difference was noted across age groups (Table 16).

Table 16: Changes in the memory powers during Covid-19 lockdown.

Changes	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No change	34 (54.8)	46 (45.1)	64 (51.6)	98 (56.3)	91 (48.4)	ANOVA F – 0.0392
Declined	14 (22.6)	41 ^a (40.2)	37 (29.8)	33 ^a (19.0)	62 (33.0)	df - 4 Sig. 0.9969 (NS)
Improved	14 (22.6)	15 (14.7)	23 (18.5)	43 (24.7)	35 (18.6)	
Total (N)	62	102	124	174	188	Chi-Square χ^2 – 18.437 df - 8 Sig. 0.0182 (***)

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

Improvement in academic performance was prevalent in 12-14 years old (36%) while declining performance was highly noted in 8-11 years old (48%). A significant relationship was noted between age group and school performance during the lockdown as well as no differences were noted across age groups (Table 17).

Table 17: Overall academic performance during Covid-19 lockdown.

Performances	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No change	25 (40.3)	31 (30.4)	43 (34.7)	79 (45.4)	85 (45.2)	ANOVA F – 3.8756
Improved	16 (25.8)	22 (21.6)	45 (36.3)	68 (39.1)	48 (25.5)	df - 4 Sig. 0.000 (***)
Declined	21 (33.9)	49 (48.0)	36 (29.0)	27 (15.5)	55 (29.3)	
Total (N)	62	102	124	174	188	Chi-Square χ^2 – 40.070 df - 8 Sig. 0.000 (***)

Values in parantheses indicate percentages.

Improvement in mood was prevalent in 12-14 years old (28%) while the declining mood was highly noted in 17-18 years old (38%). A significant relationship was noted between age

group and mood changes during the lockdown and differences were noted across age groups (Table 18).

Table 18: Changes in the moods during Covid-19 lockdown.

Changes	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No Change	36 (58.1)	52 (51.0)	59 (47.6)	90 (51.7)	74 (39.4)	ANOVA F – 3.8206
Improved	15 (24.2)	23 (22.5)	34 (27.4)	45 (25.9)	43 (22.9)	df - 4 Sig. 0.000
Worsened	11 (17.7)	27 (26.5)	31 (25.0)	39 (22.4)	71 (37.8)	(***)
Total (N)	62	102	124	174	188	Chi-Square χ^2 – 17.153 df - 8 Sig. 0.0286 (***)

Values in parantheses indicate percentages.

The more energetic attitude was prevalent among 8-11 years old (28.4%) and less energetic attitude was highly prevalent in 17-18 years old (40%). A significant relationship was noted between age group and energy levels during the lockdown and differences were noted across age groups (Table 19).

Table 19: Changes in energy levels during Covid-19 lockdown.

Changes	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No change	35 (56.5)	44 (43.1)	57 (46.0)	95 (54.6)	78 (41.5)	ANOVA F – 3.4758
More energetic	16 (25.8)	29 (28.4)	34 (27.4)	34 (19.5)	34 (18.1)	df - 4 Sig. 0.008
Less energetic	11 (17.7)	29 (28.4)	33 (26.6)	45 (25.9)	76 (40.4)	(***)
Total (N)	62	102	124	174	188	Chi-Square χ^2 – 21.813 df - 8 Sig. 0.00528 (***)

Values in parantheses indicate percentages.

Having more pronounced hobbies was prevalent in 15-16 years old (45%) while having less pronounced hobbies during the lockdown was prevalent in 4-7 years old (26%). There was no association between age groups and hobbies nor differences noted across age groups (Table 20).

Table 20: Changes in hobbies during Covid-19 lockdown.

Changes	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No change	27 (43.5)	39 (38.2)	47 (37.9)	65 (37.4)	74 (39.4)	ANOVA F – 0.6511
Less pronounced	16 (25.8)	25 (24.5)	25 (20.2)	31 (17.8)	39 (20.7)	df - 4 Sig. 0.6263 (NS)
More pronounced	19 (30.6)	38 (37.3)	52 (41.9)	78 (44.8)	75 (39.9)	
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 5.321$ df - 8 Sig. 0.7228 (NS)

Values in parantheses indicate percentages.

Social interaction for a longer duration was more prevalent in 12-14 years old (22%) while less duration interaction was noted in 8-11 years old (9%). More frequent interaction was highly noted in 4-7 years old (60%) and less frequent interaction was more prevalent in 17-18 years old (19%). There was no statistical significance between interaction frequency and age groups nor differences across age groups (Table 21).

Table 21: Impact of Covid-19 lockdown on the interactive frequency

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No changes	8 (12.9)	11 (10.8)	20 (16.1)	34 (19.5)	30 ^a (16.0)	ANOVA F – 2.0731
More time	12 (19.4)	22 (21.6)	27 ^a (21.8)	36 (20.7)	19 (10.1)	df - 4 Sig. 0.0831 (NS)
Less time	1 ^a (1.6)	10 (9.8)	13 (10.5)	15 (8.6)	17 (9.0)	
More frequent	37 ^a (59.7)	48 (47.1)	43 ^a (34.7)	69 (39.7)	87 (46.3)	Chi-Square $\chi^2 - 31.591$
Less frequent	4 ^a (6.5)	11 (10.8)	21 (16.9)	20 (11.5)	35 ^a (18.6)	df - 16 Sig. 0.0113 (NS)
Total (N)	62	102	124	174	188	

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

The quality of interaction increased mostly in 4-7 years old (40%) as well as in 15-16 years old (35%) and decreased mostly in 17-18 years old (28%). There was no statistical significance between age group and interaction quality nor differences across age groups (Table 22).

Table 22: Influence of Covid-19 lockdown on the quality of interaction.

Influences	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Increased	25 (40.3)	45 (44.1)	39 (31.5)	61 (35.1)	66 (35.1)	ANOVA F – 0.8229
Decreased	13 (21.0)	18 (17.6)	29 (23.4)	41 (23.6)	52 (27.8)	df - 4 Sig. 0.5108
No change	24 (38.7)	39 (38.2)	56 (45.2)	72 (41.4)	70 (37.2)	(NS)
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 7.344$ df - 8 Sig. 0.5000 (NS)

Values in parantheses indicate percentages.

Emotional intelligence i.e. the ability to recognize emotions had improved during the lockdown especially in 4-7 years old (60%) along with a majority of 8-11 years old (57%), 15-16 years old (51%) and 17-18 years old (52%) and had declined in 12- 14 years old (13%). There was no statistical significance observed between age groups and emotional intelligence so as for differences across age groups (Table 23).

Table 23: Impact of Covid-19 lockdown on the ability to recognize other people’s emotions and the corresponding acts.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Improved	37 (59.7)	58 (56.9)	55 (44.4)	89 (51.1)	97 (51.6)	ANOVA F – 1.4132
Declined	7 (11.3)	10 (9.8)	16 (12.9)	11 (6.3)	15 (8.0)	df - 4 Sig. 0.2279
No change	18 (29.0)	34 (33.3)	53 (42.7)	74 (42.5)	76 (40.4)	(NS)
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 10.181$ df - 8 Sig. 0.2525 (NS)

Values in parantheses indicate percentages.

Talking about COVID-19 several times a day was high in (4-7 years old, 40%) while talking once a day was high in 15-16 years old (18%). Talking once in a few days was also very high in 4-7 years old (39%). Not talking about COVID-19 was greatest for 8-11 years old (19%) compared to other age groups. There was no statistical significance between age group and talking about COVID-19 nor differences across age groups (Table 24).

Table 24: Frequency of talking about Covid-19 during Covid-19 lockdown.

Frequency	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Several times a day	25 (40.3)	29 (28.4)	43 (34.7)	68 (39.1)	62 (33.0)	ANOVA F – 1.3906 df - 4
Once a day	9 (14.5)	22 (21.6)	22 (17.7)	32 (18.4)	35 (18.6)	Sig. 0.2356 (NS)
Once in few days	24 (38.7)	32 (31.4)	38 (30.6)	57 (32.8)	68 (36.2)	
Not at all	4 (6.5)	19 (18.6)	21 (16.9)	17 (9.8)	23 (12.2)	Chi-Square χ^2 – 12.795 df - 12
Total (N)	62	102	124	174	188	Sig. 0.3842 (NS)

Values in parantheses indicate percentages.

A decline in hygiene habits was more prevalent among 12-14 years old (11%) while improvement in hygiene habits was more prevalent among 8-11 years old (60%). There was independence between age group and hygiene habits and no difference of means across age groups were observed on performing one way ANOVA (Table 25).

Table 25: Impact of Covid-19 lockdown on the hygiene habits.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No change	23 (37.1)	33 (32.4)	43 (34.7)	72 (41.4)	70 (37.2)	ANOVA F – 1.1085 df - 4
Improved	36 (58.1)	61 (59.8)	68 (54.8)	94 (54.0)	102 (54.3)	Sig. 0.3515 (NS)
Declined	3 (4.8)	8 (7.8)	13 (10.5)	8 (4.6)	16 (8.5)	
Total (N)	62	102	124	174	188	Chi-Square χ^2 – 6.559 df - 8 Sig. 0.5848 (NS)

Values in parantheses indicate percentages.

The prevalence of washing hands obsessively was high in 17-18 years old (19%) and high in 8-11 years old (46%) for washing hands after going to the toilet and between. Irregular handwashing was highly reported in 15-16 years old (5%) while washing hands after every visit to the toilet were prevalent among children aged 4-7 years old (27%). Contrary to the finding previously in 15-16 years old, washing hands before the meal were highly prevalent in 15-16 years old (32%). Statistically significant association was noted between age group and handwashing frequency during the lockdown but there were no differences in means across age groups (Table 26).

Table 26: Impact of Covid-19 lockdown on the frequency of handwashing.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Obsessive	2 ^a (3.2)	3 ^a (2.9)	11 (8.9)	17 (9.8)	35 ^a (18.6)	ANOVA F – 1.2021 df - 4
After toilet and in between	27 (43.5)	47 (46.1)	55 (44.4)	62 (35.6)	61 (32.4)	Sig. 0.3086 (NS)
Not regularly	1 (1.6)	3 (2.9)	3 (2.4)	9 (5.2)	8 (4.3)	
After every visit to the toilet	17 (27.4)	17 (16.7)	23 (18.5)	30 (17.2)	39 (20.7)	Chi-Square $\chi^2 - 34.965$ df - 16
Before every meal	15 (24.2)	32 (31.4)	32 (25.8)	56 (32.2)	45 (23.9)	Sig. 0.0040 (***)
Total (N)	62	102	124	174	188	

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

An increase in outdoor activities was highly prevalent among participants aged 4-7 years old (26%) while a decrease in outdoor activities was highly prevalent among participants aged 17-18 years old (65%). Statistically significant association was noted between age group and outdoor activities during the lockdown and there was also a difference across age groups (Table 27).

Table 27: Impact of Covid-19 lockdown on the outdoor activities.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
No changes	24 (38.7)	23 (22.5)	46 (37.1)	45 (25.9)	41 (21.8)	ANOVA F – 5.4833
Increased	16 (25.8)	22 (21.6)	21 (16.9)	22 (12.6)	25 (13.3)	df - 4 Sig. 0.0002 (***)
Decreased	22 (35.5)	57 (55.9)	57 (46.0)	107 (61.5)	122 (64.9)	
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 28.384$ df - 8 Sig. 0.0004 (***)

Values in parantheses indicate percentages.

An increase in indoor activities was prevalent in 15-16 years old (57%) while a decrease in indoor activities was noted mostly in 4-7 years old (24%). No change was noted mostly by 12-14 years and (43%) and 8–11-year-old (43%). Nearly 50% of the 17–18-year-old report increase in indoor activities while 15% report a decrease in indoor activities. Statistically significant association was noted between age group and indoor activities during the lockdown and there was also a difference across age groups (Table 28).

Table 28: Impact of Covid-19 lockdown on the indoor activities.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Increased	24 (38.7)	40 (39.2)	45 (36.3)	99 (56.9)	95 (50.5)	ANOVA F – 3.7442
Decreased	15 (24.2)	19 (18.6)	26 (21.0)	25 (14.4)	29 (15.4)	df - 4 Sig. 0.0051 (***)
No change	23 (31.7)	43 (42.2)	53 (42.7)	50 (28.7)	64 (34.0)	
Total (N)	62	102	124	174	188	Chi-Square $\chi^2 - 18.801$ df - 8 Sig. 0.0160 (***)

Values in parantheses indicate percentages.

The ability to be independent during the lockdown was highest noted in 17–18-year-old (52%) while the ability to be independent was highly noted in 15-16 years old (53%). Contrarily, the inability to be independent was prevalent in 4–7-year-old (49%). A significant association was noted between age group and ability to be independent (Table 29).

Table 29: Impact of Covid-19 lockdown on the ability to be independent.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Independent even before	15 (24.2)	25 (24.5)	37 (29.8)	63 (36.2)	66 (35.1)	ANOVA F – 7.9731 df - 4 Sig. 0.000 (***)
More independent now	17 (27.4)	51 (50.0)	60 (48.4)	93 (53.4)	97 (51.6)	
Not independent	30 (48.4)	26 (25.5)	27 (21.8)	18 (10.3)	25 (13.3)	
Total (N)	62	102	124	174	188	Chi-Square χ^2 – 51.758 df - 8 Sig. 0.000 (***)

Values in parantheses indicate percentages.

The prevalence of using hand sanitizer 2 times per day was high 17-18 years old (40%) while the prevalence for using hand sanitizer 3 times a day was high in 15-16 years old (30%). Using hand sanitizers more than 3 times a day was highest recorded in 8-11 years old (52%). There was independence between age group and hand sanitizer usage and no difference was noted across age groups (Table 30).

Table 30: Impact of Covid-19 lockdown on the frequency of hand sanitizer usage.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
2 times	13 (30.2)	23 (29.9)	21 ^a (23.9)	37 (33.0)	51 ^a (39.5)	ANOVA F – 1.5022 df - 4 Sig. 0.2005 (NS)
3 times	12 (27.9)	14 (18.2)	28 (31.8)	33 (29.5)	30 (23.3)	
> 3 times	18 (41.9)	40 ^a (51.9)	39 (44.3)	42 (37.5)	48 (37.2)	
Total (N)	43	77	88	112	129	Chi-Square χ^2 – 11.330 df - 8 Sig. 0.1837 (NS)

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

More frequent guest visits were prevalent in the household of 12-14 years old (21%) while less frequent guest visits were more prevalent in the household of 4-7 years old (85%) and the household of 8-11 years old (8%) reported highest no guest visits in comparison to other age groups. There was no statistical significance between age group and guest visits nor difference in means across age groups (Table 31).

Table 31: Impact of Covid-19 lockdown on the frequency of guest's visits.

Impacts	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Not at all	2 (7.7)	3 (7.9)	3 (5.2)	5 (5.1)	4 (4.0)	ANOVA F – 0.3726
More frequent	2 (7.7)	6 (15.8)	12 (20.7)	14 (14.3)	14 (14.1)	df - 4 Sig. 0.8282 (NS)
Less frequent	22 (84.6)	29 (76.3)	43 (74.7)	79 (80.6)	81 (81.8)	
Total (N)	26	38	58	98	99	Chi-Square $\chi^2 - 3.755$ df - 8 Sig. 0.8785 (NS)

Values in parantheses indicate percentages.

The highest percentage of guests following social guidelines and wearing facemasks was prevalent in the household of 12-14 year old (72%) while not wearing facemasks or following social guidelines was also high in the household of 12-14 year old (14%). Greatest for wearing a facemask and following social guidelines were prevalent in 17–18-year-old (35%). There was no statistical significance between age group and guests wearing a facemask and following social guidelines nor differences between age groups (Table 32).

Table 32: Facemasks and social distancing followed by the guests during the lockdown.

Responses	age 4-7	age 8-11	age 12-14	age 15-16	age 17-18	Statistics
Yes	15 (57.7)	25 (65.8)	42 ^a (72.4)	58 (59.2)	52 (52.5)	ANOVA F – 0.8261
Sometimes	9 (34.6)	10 (26.3)	8 (13.8)	28 (28.6)	35 ^a (35.4)	df – 4 Sig. 0.5093 (NS)
No	2 (7.7)	3 (7.9)	8 (13.8)	12 (12.1)	12 (12.1)	
Total (N)	26	38	58	98	99	Chi-Square $\chi^2 - 10.233$ df – 8 Sig. 0.2491 (NS)

^aSignificant in Post Hoc Test. Values in parantheses indicate percentages.

4.4 Correlation analyses

This present study is an extensive research study and studied intensively. In order to determine the correlation between different variables during the covid-19 lockdown, we analyzed a different combination of variables. Table 33 presents the strong and statistically significant correlations between those various variables.

Table 33: Correlations between different variables to evaluate the realistic effect of Covid-19 lockdown.

Variables	Pearson Correlation (ρ)	P (2-tailed)	Significance
I. Sleeping			
Sleeping and weight changes	0.883	<0.001	***
Sleeping and mood changes	0.922	<0.001	***
Sleeping and vision changes	0.562	<0.001	***
Sleeping and memory power	0.887	<0.001	***
II. Eating habits			
Eating habits and weight changes	0.890	<0.001	***
Eating habits and nap pattern	0.960	<0.001	***
III. Screen time duration			
Screen time duration and academic performance	0.737	<0.001	***
Screen time duration and social interaction	0.783	<0.001	***
Screen time duration and emotion recognition	0.767	<0.001	***
Screen time duration and vision changes	0.521	<0.001	***
Screen time duration and hobbies	0.772	<0.001	***
IV. Movie watching frequency			
Movie watching frequency and social interaction	0.861	<0.001	***
Movie watching frequency and academic performance	0.866	<0.001	***
Movie watching frequency and emotions recognition	0.860	<0.001	***
V. Online lectures			
Online lectures and school academic performance	0.640	<0.001	***
Online lectures and participatory impact	0.799	<0.001	***

4.4.1 Changes in sleep pattern

Pearson correlation shows a strong correlation between sleep pattern changes and weight changes ($\rho = +0.9$), sleep pattern changes and mood changes ($\rho = +1.0$), changes in sleep pattern and vision changes ($\rho = +0.6$) and changes in sleep pattern and memory power ($\rho = +1.0$). There is a perfect positive correlation between sleep pattern changes with memory power ($\rho = +1.0$) and mood changes, ($\rho = +1.0$) independently indicating as the sleep pattern

changes increase, there is an increase in memory power changes as well as mood changes (Table 33).

4.4.2 Eating habits

There is a strong correlation between eating habits and weight changes ($\rho = +0.9$) and eating habits and napping patterns ($\rho = +1.0$). There is a perfect positive correlation between eating habits ($\rho = +1.0$) and napping pattern ($\rho = +1.0$) indicating as the changes in eating habits increase, there is also an increase in napping pattern changes.

4.4.3 Screen time duration

There is a strong correlation between screen time and academic performance ($\rho = +0.7$), screen time duration and social interaction ($\rho = +0.8$), screen time duration and emotion recognition ($\rho = +0.8$), screen time duration and vision changes ($\rho = +0.5$), screen time duration and hobbies ($\rho = +0.8$).

4.4.4 Frequency of watching movies

There is a strong correlation between frequency of watching movies and social interaction ($\rho = +0.9$), frequency of watching movies and academic performance ($\rho = +0.9$), frequency of watching movies and emotional recognition ($\rho = +0.9$).

4.4.5 Online lectures

There is a strong correlation between online lectures and academic performance ($\rho = +0.6$) and online lectures and impact on participation ($\rho = 0.8$).

4.5 Linear stepwise regression analysis for most important variables

The strength of a dependent variable and one or more independent variables was determined using linear stepwise regression analysis. The significance of associated predicting factors was by comparing P-values ($p \leq 0.005$ highly significant).

Handwashing frequency ($p < 0.001$) and diseases diagnosed during the lockdown period ($p = 0.02$, $p < 0.05$) predicted the hygiene habits of the participants during the lockdown with handwashing frequency being the strongest predictor while age ($p = 0.443$, $p > 0.05$) was not found to be a predictor (Table 34).

Table 34: Predictors of hygiene habit during Covid-19 lockdown.

Predicting factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	0.462	0.102		4.550	<.001	0.26	0.66
Age	0.009	0.011	0.019	0.768	0.443	-0.01	0.03
Handwash	0.309	0.011	0.747	26.904	<.001	0.29	0.33
Disease	0.125	0.054	0.064	2.299	0.022	0.02	0.23

Age ($p < 0.001$), outdoor activities ($p < 0.001$), and indoor activities ($p < 0.001$) during the lockdown period were the strongest predictors of the energy levels of participants during the lockdown period (Table 35).

Table 35: Predictors of energy levels during Covid-19 lockdown.

Predicting factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	-0.312	0.051		-6.116	<.001	-0.41	-0.21
Age	0.099	0.011	0.150	9.087	<.001	0.08	0.12
Outdoor	0.151	0.024	0.152	6.407	<.001	0.10	0.20
Indoor	0.763	0.023	0.799	33.708	<.001	0.72	0.81

Emotional recognition ($p < 0.001$), interactive frequency ($p < 0.001$), screen time hours ($p < 0.001$) and age ($p = 0.05$) were predictors of mood changes during the lockdown period (Table 36).

Table 36: Predictors of mood changes during Covid-19 lockdown.

Predicting factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	0.134	0.046		2.896	0.004	0.04	0.22
Age	-0.021	0.010	-0.032	-2.003	0.046	-0.04	0.00
Screen time hours	0.301	0.025	0.346	12.147	< .001	0.25	0.35
Interactive frequency	0.069	0.016	0.109	4.330	< .001	0.04	0.10
Emotional recognition	0.497	0.021	0.557	23.547	< .001	0.46	0.54

Age ($p < 0.001$) and changes in memory power ($p < 0.001$) were found to be the strongest predictors for academic performance during the lockdown period (Table 37).

Table 37: Predictors of academic performance during Covid-19 lockdown.

Predicting factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	0.655	0.078		8.351	< .001	0.50	0.81
Age	-0.079	0.013	-0.126	-5.982	< .001	-0.11	-0.05
Increase in screen time	0.019	0.064	0.008	0.296	0.768	-0.11	0.14
Changes in memory power	0.880	0.029	0.837	30.148	< .001	0.82	0.94

On contrary, while the tendency in screen time increase did not predict the academic performance. Age ($p < 0.001$) and hours spent on screen time during the lockdown ($p < 0.001$) were found to strongly predict the vision changes during the lockdown (Table 38)

Table 38: Predictors for vision changes during Covid-19 lockdown.

Predicting factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	2.355	0.074		31.896	< .001	2.21	2.50
Age	-0.247	0.019	-0.405	-12.714	< .001	-0.28	-0.21
Screen time hours	0.539	0.026	0.655	20.576	< .001	0.49	0.59

5. DISCUSSION

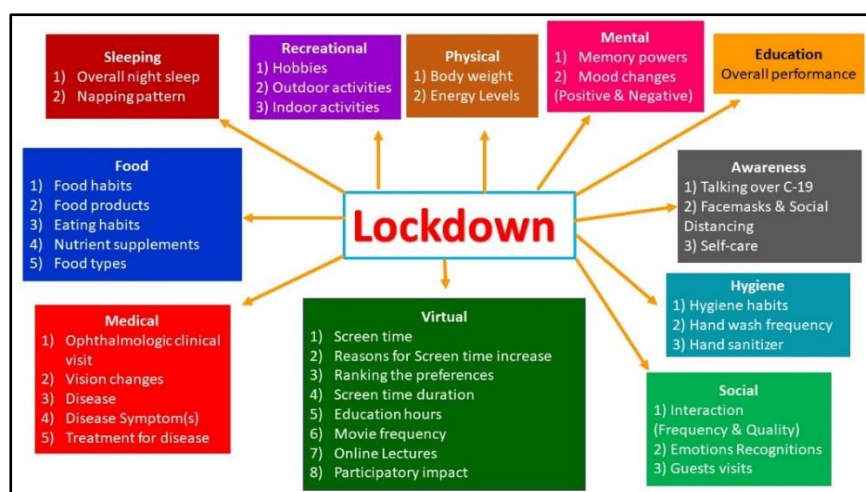
Tamil Nadu is a southern Indian state with a population of approximately 72.1 million in 2021. In terms of GDP, it is India's second-largest economy, with an 83 percent literacy rate in 2020. Due to the spread of COVID-19, the state was put under a strict lockdown from March to September 2020. Educational facilities are shut down and lectures were moved to online platforms. Children and teenagers around the country were significantly impacted by the lockdown. (Bruni *et al.* 2021, Mallik and Radwan 2021, Ravens-Sieberer *et al.* 2021) Additionally, there was an increase in anxiety and depression symptoms among children and adolescents along with behavioural issues due to the lockdown (Valadez *et al.* 2020).

The sample size of the study was 650 with ages ranging between 4-18 years old who were enrolled in Nursery through undergraduate education. 552 participants were studying at school while 98 participants were enrolled in colleges.

Our cross-sectional survey showed a fall in annual income due to the lockdown in 75% of the household and a downgrade in economic status during the crucial period. Reports from another study conducted across 24 districts of the state in India in March 2021, showed an increase in child labour from 28% to 78% that had been previously reported. Additionally, it was reported that more than 90% of the children mentioned economic upheaval as the reason for them choosing to work (The Hindu, 12 March 2021).

Besides the demographic information, the questions of our cross-sectional survey focused on eleven major aspects such as sleeping patterns, recreational activities, physical characteristics, mental health, education, food habits, medical, virtual, social, awareness and hygiene.

Figure 10: A schematic representation of the overall study design of the cross-sectional survey.



Assessment of mental health changes during the lockdown showed improvement in mood status in 23-27% of the participants while the worsening mood was reported mostly in 17-18 years old by 38%. 48-60% of the study participants reported no changes in mood. This study additionally demonstrated significance between age group and mood changes as well as age being a predictor for changes in mood which could be explained by the presence of family members and increase in interaction as well as a sense of belongingness as observed by Mourouvaye *et al.* (2020).

As a precautionary step to avoid covid infection, the participants improved the hygiene practices during the lockdown. 54 to 60% of children and adolescents reported improvement in their hygiene habits compared to 5-9% who reported a decline. However, observations showed that age was not a predictor of hygiene practices during the lockdown. The majority characterized by 32-46% of the participants reported washing their hands after every visit to the toilet as well in between with prevalence of this trend in 8-11 years old (46%). More than 60% reported using hand sanitizer and 42-52% of the participants also reported using hand sanitizer more than 3 times a day. Proper and frequent hand hygiene is one of the effective strategies to prevent the infection of the COVID-19 virus (Huang *et al.* 2021). Our study revealed that a positive behavioral change towards hand hygiene and this could be due to an increased literacy level during the last few decades. As per the 2020 census, a steady and pronounced increase in literacy rate in India and the state Tamilnadu was revealed and the literacy rates were 77.7% and 82.9%, respectively (Government databases: <https://censusindia.gov.in>, http://www.tnenvi.nic.in/Content/Demography_1168.aspx?format=Print).

Studies of the sleeping pattern showed no changes in 42-58% of the participants however it was high in 8-11 years indicated by 39% reporting sleeping more during the lockdown period. While Pietrobelli *et al.* (2020) showed a general increase in sleeping, Esposito *et al.* 2021 found this pattern in 11-13 years old, and our study showed 8-11 years old to be prone to sleeping more. The tendency to sleep less continuously (26%) during the next and to have frequently interrupted sleep (7%) was reported in 17-18 years old. 44-60% reported no changes in their napping pattern and 10-23% reported having begun napping compared to the pre-lockdown period. In 4-7-year-olds, the prevalence of napping shorter than normal was high (16 %). The likelihood to sleep less often during the lockdown was most noticeable among those aged 17-18. (7 %). In contrast to the previous results, 4-7-year-olds (18%) were found to have started napping earlier than other age groups. Additionally, 17-18-year-olds were found to sleep significantly longer than they did prior to the lockdown. Only children aged 12-14 were

recorded to nap more frequently (2%) Our study found a significance between age group and napping pattern but not sleeping pattern. The home confinement due to the indefinite closure of academic institutes resulted in more temptations to daily and frequent napping. This napping was not messy, rather it was more intentional and consistent. India is not having the habit of napping in academic institutes and workplaces. Lockdown influenced more napping has public health implications. In a cross-sectional study, Ghazizadeh et al. (2020) observed that increased naps had significantly higher odds of metabolic syndrome and vascular risk factors including central obesity, obesity, hypertriglyceridemia, and (impaired fasting glucose (IFG)) or diabetes.

No change in the eating pattern was noted in 36-66% of the cases. The most frequent eaters were 17–18-year-olds (18%), while the least frequent eaters were also 17–18-year-olds (18 %). Food quantity analysis revealed that 17–18-year-olds (17%) consumed more food per meal, while 17–18-year-old also consumed less food per meal, indicating that 17–18-year-old encountered shifts in meal frequency and quantity consumed during the lockdown. Significance between age group and eating habits was confirmed in our study. The age group with the largest number of individuals reporting no changes is four to seven years old (57 %). Consumption of fruits and vegetables was highest among 12–14-year-olds (40%) with a majority (33-40%) of the reporting eating fruits and vegetables during the lockdown consistent with findings of Jia *et al* (2021), while 17–18-year-olds were the age group with prevalence in consuming fried food products (14%) which mostly noted in all age groups by Pietrobelli *et al.* (2020). Prevalence of gaining weight was high in 17-18 years old (46%) compared to (37%) who reported no changes. One of the lifestyle patterns that changed during lockdown is the increased prevalence of food delivery to home, called fast foods. The fried food items compromise a major portion of fast foods. The adolescents fondly prefer to consume fried foods in larger frequencies. In a large prospective cohort study, Taveras et al. (2005) comprehensively examined the associations of fried food consumption with body mass index. They found that increased consumption of food prepared away from home was more common among children and adolescents. In our present study also, we noticed that adolescents preferred more fried foods as compared with children's age groups.

Health studies showed that 60-80% found no changes in vision but 8-30% reported a decline in vision especially 15-16 and 17-18 years old. Boyle *et al.* (2020) reported that vision loss and delayed cataract surgeries are the potential impacts of the COVID-19 pandemic. The need for ophthalmologic visits was marginally high in 17-18 years old. 87-93% reported that no disease was diagnosed during the lockdown while there was a smaller proportion who did

have a disease diagnosed during the lockdown. Interestingly, disease diagnosis and handwashing frequency predicted the hygiene practices of the children and adolescents

Screen time changes were significant among age groups with more than 80% reporting a significant increase which is in line with the study by Hashem *et al.* (2020). Screen time increase was noted across all age groups including younger children as corroborated by Oliviero *et al.* (2021) 61-74% reporting screen-time increase due to educational reasons. A majority reported spending 1-3 hours on screen time for educational purposes (45-92%). The prevalence of watching YouTube as a reason for increased screen time was highest among 4–7-year-old (52%), whereas videogames were a more prevalent reason for increased screen time among 12–14-year-olds (17 %). Increased screen time for social purposes was prevalent among 4–7-year-old (8%), whereas social media use was the primary explanation for increased screen time among 15–16-year-olds (10%). Increased screen time for educational purposes was highly reported in 17–18-year-olds (72%). Adolescents aged 17-18 years old were highly likely to spend a significant amount of time on screens per day (> 8 hours) regardless of a specific purpose. Watching movies once in a few days was common among participants. The frequency of attending online lectures did not change in the majority of the population (45-77%) but the participation in online lectures was not active in 35-48% with a high prevalence in 4-7 years old (48%). Participation in online classes correlated with attending the online lectures, according to our study. 45-56% reported no changes in memory power followed by a high prevalence in decline in memory power by 22-40% and mostly noted in 8-11 years old (40%). A significant decline in academic performance was noted between 29-50% of the participants and very commonly in 8-11 years old who had previously also noted a decline in memory power. The changes in memory power and academic performance were significant with various age groups. The frequency of watching had a strong correlation with academic performance indicating the frequency of watching a movie to be related to the academic performance of the participants. Our study also showed screen time duration to be a strong predictor of mood changes in children and adolescents.

This study discovered a major impact of lockdown on the outdoor activities with a 36-65% reduction in participants carrying out activities outside which was also highly noted in 17-18 years old (65%). On contrary, 39-57% of the participants reported an increase indoor activity with high prevalence in 15-16 years old (57%) which could be attributed to the ease with which families coexisted during the lockdown period (Orgilés *et al.* 2020). While no significant changes were noted in energy levels, 17-40% of the subjects reported feeling less energetic throughout the day with a high prevalence in 17-18 years old (40%). Our study confirmed the

significance of energy across different age groups while also finding that age, outdoor and indoor activities were strong predictors of energy levels during the lockdown.

There a positive impact of lockdown on the interaction frequency and quality characterized by 35-60% percent of the children and adolescents reported having increased social interaction as suggested by Mourouvaye *et al.* (2020) while 32-44% reported improved quality of interaction. 44-60% noticed an improvement in emotional intelligence during the lockdown period with high improvement noted in 4-7 years old (60%). Talking about COVID-19 was also highly reported with many talking several times a day about the topic. The frequency of interaction was found to be a strong predictor of mood changes and interestingly, had a positive correlation with the frequency of watching movies. Half of the participants reported being more independent during the lockdown than before.

6. CONCLUSIONS

The present research study intensively assessed the six hypotheses formed and recorded the observed changes and this study concludes the following:

- Negative mood effects were observed in 17–18-year-olds, while other age ranges showed no change in mood.
- Overall, hygiene habits improved among children and adults, as shown by increased handwashing frequency and use of hand sanitizers.
- There were no significant shifts in sleep patterns, but there was a tendency for 8–11-year-olds to sleep more and a tendency for 17–18-year-olds to be sleepless. No differences in napping patterns were found, except for 20% who began napping during the lockdown relative to the pre-lockdown period.
- Lockdown was found to have a beneficial effect on the type of food eaten, with an increase in fruit and vegetable consumption.
- During the lockdown, interaction frequency and quality had increased.
- Screen time increased dramatically, and the primary explanation was for educational purposes.
- Lockdown significantly reduced outdoor activities undertaken by children and adolescents and increased indoor activities.
- Aside from the hypotheses, evaluation of impact among age group showed 17-18 years to face negative impact mostly as a result of the COVID-19 lockdown
- The present study proves that the COVID-19 lockdown/restrictions in India have severely impacted the day-to-day lives of children and young adolescents of all ages for more than a year. More than 70% of the variables showed lockdown-mediated negative impacts. Although lockdown was inevitable, the state government should from here on out develop and implement health and welfare programs to reduce its effect on children and young adolescents. This research can be effectively used as a basis for the state in its policy development.

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9. APPENDIX

Table 1 Combinations of 11-multiple choice answers from the age group of 4 to 7

SL.No.	Multiple Answers	Frequency
1	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
2	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	3
3	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
4	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	2
5	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
6	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
7	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products, 11-Milk Products,	1
8	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
9	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products,	1
10	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
11	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
12	1-Meat, 2-Eggs, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
13	1-Meat, 3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
14	1-Meat, 4-Fruits, 5-Snacks, 11-Milk Products,	1
15	1-Meat, 5-Snacks, 8-Rice Products,	1
16	1-Meat, 5-Snacks, 9-Wheat Products, 10-Legumes,	1
17	1-Meat, 8-Rice Products, 10-Legumes,	1
18	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks	1
19	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
20	2-Eggs, 3-Vegetables, 5-Snacks, 8-Rice Products, 11-Milk Products,	1
21	2-Eggs, 3-Vegetables, 8-Rice Products, 11-Milk Products,	1
22	2-Eggs, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
23	2-Eggs, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
24	2-Eggs, 4-Fruits, 6-Dried Fruits, 9-Wheat Products, 10-Legumes,	1
25	2-Eggs, 4-Fruits, 8-Rice Products,	1
26	2-Eggs, 4-Fruits, 8-Rice Products,	1
27	2-Eggs, 5-Snacks, 11-Milk Products,	1
28	2-Eggs, 5-Snacks, 8-Rice Products,	1
29	2-Eggs, 5-Snacks, 8-Rice Products, 11-Milk Products,	1
30	2-Eggs, 6-Dried Fruits, 7-Nuts,	1

31	2-Eggs, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
32	2-Eggs, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
33	2-Eggs, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
34	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products,	1
35	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
36	3-Vegetables, 4-Fruits, 8-Rice Products, 10-Legumes,	1
37	3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
38	3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
39	3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	4
40	3-Vegetables, 4-Fruits, 10-Legumes, 11-Milk Products,	1
41	3-Vegetables, 4-Fruits, 11-Milk Products,	1
42	4-Fruits, 8-Rice Products, 9-Wheat Products,	1
43	4-Fruits, 8-Rice Products, 10-Legumes,	1
44	4-Fruits, 8-Rice Products, 11-Milk Products,	1
45	5-Snacks, 6-Dried Fruits, 8-Rice Products, 10-Legumes,	1
46	5-Snacks, 6-Dried Fruits, 8-Rice Products, 11-Milk Products,	1
47	5-Snacks, 7-Nuts, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
48	5-Snacks, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
49	5-Snacks, 8-Rice Products, 10-Legumes,	3
50	5-Snacks, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
51	6-Dried Fruits, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
52	8-Rice Products, 9-Wheat Products,	1
53	8-Rice Products, 10-Legumes, 11-Milk Products,	1
54	9-Wheat Products, 10-Legumes,	1
	Total	62

Table 2 Combinations of 11-multiple choice answers from the age group of 8 to 11

SL.No.	Multiple Questions	Frequency
1	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-	1
2	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 10-Legumes, 11-Milk Products,	3
3	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 11-Milk Products,	1
4	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
5	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
6	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts	1
7	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 11-Milk Products,	1
8	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1

9	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 10-Legumes	1
10	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
11	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 9-Wheat Products, 11-Milk Products,	1
12	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	2
13	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products	1
14	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
15	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
16	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	2
17	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes	1
18	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
19	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
20	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 8-Rice Products, 10-Legumes	1
21	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	2
22	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits,	1
23	1-Meat, 2-Eggs, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
24	1-Meat, 2-Eggs, 4-Fruits, 8-Rice Products, 11-Milk Products,	2
25	1-Meat, 2-Eggs, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
26	1-Meat, 2-Eggs, 5-Snacks, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
27	1-Meat, 2-Eggs, 5-Snacks, 9-Wheat Products,	1
28	1-Meat, 2-Eggs, 8-Rice Products), 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
29	1-Meat, 2-Eggs, 9-Wheat Products, 11-Milk Products,	1
30	1-Meat, 3-Vegetables, 4-Fruits, 5-Snacks,	1
31	1-Meat, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
32	1-Meat, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products	1
33	1-Meat, 3-Vegetables, 8-Rice Products, 11-Milk Products,	1
34	1-Meat, 8-Rice Products), 9-Wheat Products, 10-Legumes	1
35	1-Meat, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
36	2-Eggs, 10-Legumes, 8-Rice Products, 11-Milk Products,	1
37	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
38	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 11-Milk Products,	1

39	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10-Legumes	1
40	2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
41	2-Eggs, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11- Milk Products,	1
42	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
43	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
44	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes	1
45	2-Eggs, 3-Vegetables, 8-Rice Products	1
46	2-Eggs, 3-Vegetables, 8-Rice Products, 11-Milk Products,	1
47	2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	1
48	2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	2
49	2-Eggs, 3-Vegetables, 9-Wheat Products,	1
50	2-Eggs, 4-Fruits, 5-Snacks, 8-Rice Products, 11-Milk Products,	1
51	2-Eggs, 4-Fruits, 5-Snacks, 9-Wheat Products,	1
52	2-Eggs, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
53	2-Eggs, 4-Vegetables, 6-Dried Fruits, 8-Rice Products, 11-Milk Products,	1
54	2-Eggs, 8-Rice Products, 11-Milk Products,	1
55	3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
56	3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products), 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
57	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products	1
58	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
59	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
60	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
61	3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products	1
62	3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes	1
63	3-Vegetables, 4-Fruits, 7-Nuts,	1
64	3-Vegetables, 4-Fruits, 7-Nuts, 11-Milk Products,	1
65	3-Vegetables, 4-Fruits, 7-Nuts, 9-Wheat Products, 11-Milk Products,	1
66	3-Vegetables, 4-Fruits, 8-Rice Products	1
67	3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
68	3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes	1
69	3-Vegetables, 5-Snacks, 9-Wheat Products,	1
70	3-Vegetables, 6-Dried Fruits, 8-Rice Products, 11-Milk Products,	1
71	3-Vegetables, 8-Rice Products	1
72	3-Vegetables, 8-Rice Products, 11-Milk Products,	1

73	3-Vegetables, 8-Rice Products, 9-Wheat Products,	1
74	3-Vegetables, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
75	4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products,	1
76	4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products,	1
77	4-Fruits, 6-Dried Fruits, 8-Rice Products, 11-Milk Products,	1
78	4-Fruits, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products,	1
79	4-Fruits, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
80	4-Fruits, 8-Rice Products, 11-Milk Products,	1
81	4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
82	4-Vegetables, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 11-Milk Products,	1
83	4-Vegetables, 8-Rice Products, 11-Milk Products,	1
84	4-Vegetables, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
85	5-Snacks, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
86	5-Snacks, 8-Rice Products, 11-Milk Products,	1
87	5-Snacks, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
88	5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
89	6-Dried Fruits, 7-Nuts,	1
90	6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
91	8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
92	8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
93	9-Wheat Products, 10-Legumes, 11-Milk Products,	1
94	9-Wheat Products, 11-Milk Products,	1
95	Wheat Products, 10-Legumes, 11-Milk Products,	1
	Total	102

Table 3 Combinations of 11-multiple choice answers from the age group of 12 to 14

SL.No.	Multiple Answers	Frequency
1	1-Meat, 2-Eggs, 3-Vegetables, 10-Legumes,	1
2	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 10-Legumes, 11-Milk Products,	4
3	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 11-Milk Products,	1
4	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 11-Milk Products,	1
5	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
6	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 11-Milk Products,	2
7	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
8	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products, 10-Legumes, 11-Milk Products,	1

9	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	2
10	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 7-Nuts, 11-Milk Products,	1
11	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products,), 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
12	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
13	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
14	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11- Milk Products,	2
15	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	4
16	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
17	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
18	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 11-Milk Products,	1
19	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
20	1-Meat, 2-Eggs, 4-Fruits, 5-Snacks, 6-Dried Fruits.	1
21	1-Meat, 2-Eggs, 4-Fruits, 5-Snacks, 7-Nuts, 9-Wheat Products, 11-Milk Products,	2
22	1-Meat, 2-Eggs, 4-Fruits, 7-Nuts, 8-Rice Products, 11-Milk Products,	1
23	1-Meat, 2-Eggs, 8-Rice Products,	1
24	1-Meat, 2-Eggs, 8-Rice Products, 5-Snacks, 11-Milk Products,	1
25	1-Meat, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
26	1-Meat, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products,	1
27	1-Meat, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
28	1-Meat, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
29	1-Meat, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
30	1-Meat, 3-Vegetables, 4-Fruits, 8-Rice Products, 5-Snacks,	1
31	1-Meat, 3-Vegetables, 5-Snacks, 8-Rice Products,	1
32	1-Meat, 3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
33	1-Meat, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
34	1-Meat, 4-Fruits, 5-Snacks, 7-Nuts, 9-Wheat Products, 11-Milk Products,	1
35	1-Meat, 4-Fruits, 9-Wheat Products, 11-Milk Products,	1
36	1-Meat, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
37	1-Meat, 5-Snacks, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
38	1-Meat, 8-Rice Products, 11-Milk Products,	2

39	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
40	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products,	1
41	2-Eggs, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
42	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products,	1
43	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
44	2-Eggs, 3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
45	2-Eggs, 3-Vegetables, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
46	2-Eggs, 3-Vegetables, 8-Rice Products,	1
47	2-Eggs, 3-Vegetables, 8-Rice Products, 10-Legumes,	1
48	2-Eggs, 3-Vegetables, 8-Rice Products, 11-Milk Products,	1
49	2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	1
50	2-Eggs, 3-Vegetables, 9-Wheat Products, 11-Milk Products,	1
51	2-Eggs, 3-Vegetables, 11-Milk Products,	1
52	2-Eggs, 3-Vegetables, 8-Rice Products, Fruits - பழங்கள்	1
53	2-Eggs, 4-Fruits, 5-Snacks, 8-Rice Products,	1
54	2-Eggs, 5-Snacks, 8-Rice Products,	1
55	2-Eggs, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
56	2-Eggs, 8-Rice Products, 11-Milk Products,	5
57	3-Vegetables, 10-Legumes, 11-Milk Products,	1
58	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 11-Milk Products,	1
59	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products,	1
60	3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products,	1
61	3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products,	1
62	3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products,	3
63	3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
64	3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
65	3-Vegetables, 4-Fruits, 8-Rice Products,	1
66	3-Vegetables, 4-Fruits, 8-Rice Products,), 9-Wheat Products, 11-Milk Products,	1
67	3-Vegetables, 4-Fruits, 8-Rice Products, 10-Legumes,	1
68	3-Vegetables, 4-Fruits, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
69	3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
70	3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
71	3-Vegetables, 5-Fruits, 8-Rice Products,	4
72	3-Vegetables, 5-Snacks,	1
73	3-Vegetables, 5-Snacks, 8-Rice Products,	1
74	3-Vegetables, 5-Snacks, 8-Rice Products, 11-Milk Products,	2

75	3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
76	3-Vegetables, 7-Nuts, 8-Rice Products,	1
77	3-Vegetables, 7-Nuts, 8-Rice Products, 11-Milk Products,	1
78	3-Vegetables, 7-Nuts, 9-Wheat Products, 11-Milk Products,	1
79	3-Vegetables, 8-Rice Products,	3
80	3-Vegetables, 8-Rice Products, 10-Legumes,	1
81	3-Vegetables, 8-Rice Products, 11-Milk Products,	2
82	3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
83	3-Vegetables, 8-Rice Products, 11-Milk Products,	1
84	3-Vegetables, 9-Wheat Products,	1
85	4-Fruits, 5-Snacks, 8-Rice Products,	1
86	4-Fruits, 5-Snacks, 8-Rice Products, 11-Milk Products,	1
87	4-Fruits, 5-Snacks, 8-Rice Products, 11-Milk Products,	1
88	4-Fruits, 8-Rice Products,	1
89	4-Fruits, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
90	4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
91	5-Snacks, 6-Dried Fruits, 8-Rice Products,	1
92	5-Snacks, 8-Rice Products,	1
93	5-Snacks, 8-Rice Products, 11-Milk Products,	2
94	5-Snacks, 9-Wheat Products, 11-Milk Products,	1
95	7-Nuts, 8-Rice Products, 11-Milk Products,	1
96	8-Rice Products, 8-Rice Products, 11-Milk Products,	1
97	8-Rice Products, 9-Wheat Products,	1
98	8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
99	8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
	Total	124

Table 4 Combinations of 11-multiple choice answers from the age group of 15-16.

SL. No.	Multiple Answers	Frequency
1	1-Meat, 8-Rice Products, 9-Wheat Products,	1
2	1-Meat, 2-Eggs,	1
3	1-Meat, 2-Eggs, 3-Vegetables, 11-Milk Products,	1
4	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 10-Legumes,	1
5	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 10-Legumes, 11-Milk Products,	10
6	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 11-Milk Products,	5
7	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 11-Milk Products,	1
8	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1

9	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
10	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products,	2
11	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products,	1
12	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10- Legumes,	1
13	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	2
14	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	4
15	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	2
16	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
17	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11- Milk Products,	3
18	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
19	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products,	1
20	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	2
21	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
22	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11- Milk Products,	2
23	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	3
24	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 9-Wheat Products,	1
25	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 9-Wheat Products, 11-Milk Products,	1
26	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
27	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	4
28	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	1
29	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
30	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	2
31	1-Meat, 2-Eggs, 3-Vegetables, 9-Wheat Products, 10-Legumes,	1
32	1-Meat, 2-Eggs, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
33	1-Meat, 2-Eggs, 4-Fruits, 5-Snacks, 8-Rice Products,	1
34	1-Meat, 2-Eggs, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
35	1-Meat, 2-Eggs, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1

36	1-Meat, 2-Eggs, 8-Rice Products,	1
37	1-Meat, 2-Eggs, 8-Rice Products, 11-Milk Products,	2
38	1-Meat, 2-Eggs, 8-Rice Products, 9-Wheat Products,	1
39	1-Meat, 2-Eggs, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
40	1-Meat, 3-Vegetables, 4-Fruits, 11-Milk Products,	1
41	1-Meat, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products,	1
42	1-Meat, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
43	1-Meat, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
44	1-Meat, 3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
45	1-Meat, 3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
46	1-Meat, 3-Vegetables, 5-Snacks, 8-Rice Products,	1
47	1-Meat, 3-Vegetables, 5-Snacks, , 8-Rice Products, 9-Wheat Products,	1
48	1-Meat, 3-Vegetables, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
49	1-Meat, 3-Vegetables, 8-Rice Products,	3
50	1-Meat, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	1
51	1-Meat, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	2
52	1-Meat, 5-Snacks, 6-Dried Fruits, 8-Rice Products,	1
53	1-Meat, 5-Snacks, 8-Rice Products,	1
54	1-Meat, 5-Snacks, 8-Rice Products, 9-Wheat Products,	1
55	1-Meat, 8-Rice Products,	1
56	1-Meat, 8-Rice Products, 10-Legumes,	1
57	1-Meat, 8-Rice Products, 11-Milk Products,	1
58	1-Meat, 8-Rice Products, 9-Wheat Products,	1
59	1-Meat, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
60	11-Milk Products,	1
61	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 11-Milk Products,	1
62	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
63	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
64	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 11-Milk Products,	1
65	2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
66	2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
67	2-Eggs, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
68	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products,	1
69	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1

70	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
71	2-Eggs, 3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products,	1
72	2-Eggs, 3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
73	2-Eggs, 3-Vegetables, 8-Rice Products,	1
74	2-Eggs, 3-Vegetables, 8-Rice Products, 11-Milk Products,	1
75	2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
76	2-Eggs, 4-Fruits, 5-Snacks, 8-Rice Products, 11-Milk Products,	1
77	2-Eggs, 4-Fruits, 9-Wheat Products, 10-Legumes,	1
78	2-Eggs, 5-Snacks, 7-Nuts, 9-Wheat Products, 11-Milk Products,	1
79	2-Eggs, 6-Dried Fruits, 8-Rice Products,	1
80	2-Eggs, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
81	2-Eggs, 8-Rice Products, 9-Wheat Products,	1
82	3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
83	3-Vegetables,	2
84	3-Vegetables, 3-Vegetables, 8-Rice Products,	1
85	3-Vegetables, 4-Fruits, 5-Snacks,	1
86	3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits,	1
87	3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
88	3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
89	3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
90	3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	2
91	3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products,	1
92	3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
93	3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 11-Milk Products,	1
94	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 11-Milk Products,	1
95	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products,	1
96	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
97	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
98	3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products,	1
99	3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
100	3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 11-Milk Products,	1
101	3-Vegetables, 4-Fruits, 8-Rice Products,	2
102	3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
103	3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1

104	3-Vegetables, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
105	3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
106	3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
107	3-Vegetables, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk	1
108	3-Vegetables, 6-Dried Fruits, 8-Rice Products,	1
109	3-Vegetables, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
110	3-Vegetables, 7-Nuts, 10-Legumes, 11-Milk Products,	1
111	3-Vegetables, 8-Rice Products,	6
112	3-Vegetables, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
113	3-Vegetables, 8-Rice Products, 11-Milk Products,	3
114	3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
115	4-Fruits,	1
116	4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
117	4-Fruits, 8-Rice Products,	3
118	4-Fruits, 9-Wheat Products, 11-Milk Products,	1
119	5-Snacks,	1
120	5-Snacks, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products,	1
121	5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
122	5-Snacks, 9-Wheat Products,	1
123	8-Rice Products,	3
124	8-Rice Products, 11-Milk Products,	1
125	8-Rice Products, 9-Wheat Products, 11-Milk Products,	2
126	Products,	1
	Total	174

Table 5 Combinations of 11-multiple choice answers from the age group of 17-18

SL.No	Multiple Answers	Frequency
1	1-Meat, 2-Eggs, 3-Vegetables, 10-Legumes, 8-Rice Products,	1
2	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits,	1
3	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 11-Milk Products,	1
4	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
5	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 10-Legumes, 11-Milk Products,	7
6	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	2
7	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1

8	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products,	1
9	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9- Wheat Products, , 10-Legumes, 11-Milk Products,	1
10	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 10-Legumes, 11-Milk Products,	1
11	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1
12	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products,	1
13	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, , 10-Legumes,	1
14	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, , 10-Legumes, 11-Milk Products,	3
15	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	5
16	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products,	1
17	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 10-Legumes, 11-Milk Products,	4
18	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	2
19	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products,	1
20	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products,	2
21	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 10-Legumes,	1
22	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, , 10-Legumes,	1
23	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, , 10-Legumes, 11-Milk Products,	1
24	1-Meat, 2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	2
25	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks,	1
26	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
27	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 10- Legumes, 11-Milk Products,	1
28	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1
29	1-Meat, 2-Eggs, 3-Vegetables, 5-Snacks, 10-Legumes,	1
30	1-Meat, 2-Eggs, 3-Vegetables, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1
31	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	2
32	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1
33	1-Meat, 2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, , 10-Legumes,	1
34	1-Meat, 2-Eggs, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
35	1-Meat, 2-Eggs, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1

36	1-Meat, 2-Eggs, 5-Snacks, 8-Rice Products,	1
37	1-Meat, 2-Eggs, 5-Snacks, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	3
38	1-Meat, 2-Eggs, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
39	1-Meat, 2-Eggs, 8-Rice Products, 11-Milk Products,	1
40	1-Meat, 3-Vegetables, 10-Legumes,	1
41	1-Meat, 3-Vegetables, 4-Fruits, 11-Milk Products,	2
42	1-Meat, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 10-Legumes, 11-Milk Products,	1
43	1-Meat, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
44	1-Meat, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 11-Milk Products,	1
45	1-Meat, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
46	1-Meat, 3-Vegetables, 4-Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk	1
47	1-Meat, 3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
48	1-Meat, 3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products,	1
49	1-Meat, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	1
50	1-Meat, 5-Snacks,	2
51	1-Meat, 5-Snacks, 7-Nuts, 8-Rice Products,	1
52	1-Meat, 5-Snacks, 8-Rice Products,	2
53	1-Meat, 5-Snacks, 8-Rice Products, 9-Wheat Products,	1
54	1-Meat, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
55	1-Meat, 5-Snacks, 8-Rice Products, 10-Legumes,	1
56	1-Meat, 6-Dried Fruits, 7-Nuts, 8-Rice Products,	1
57	1-Meat, 8-Rice Products,	1
58	1-Meat, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
59	1-Meat, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
60	1-Meat, 8-Rice Products, 11-Milk Products,	1
61	2-Eggs, 3-Vegetables, 4-Fruits,	1
62	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9- Wheat Products, 10-Legumes, 11-Milk Products,	1
63	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
64	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
65	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
66	2-Eggs, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
67	2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1

68	2-Eggs, 3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 9-Wheat Products, 11-Milk Products,	1
69	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products,	1
70	2-Eggs, 3-Vegetables, 4-Fruits, 8-Rice Products, 11-Milk Products,	1
71	2-Eggs, 3-Vegetables, 5-Snacks, 8-Rice Products,	1
72	2-Eggs, 3-Vegetables, 8-Rice Products, 11-Milk Products,	1
73	2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products,	2
74	2-Eggs, 3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
75	2-Eggs, 5-Snacks, 8-Rice Products, 9-Wheat Products,	2
76	2-Eggs, 5-Snacks, 9-Wheat Products, 11-Milk Products,	1
77	2-Eggs, 8-Rice Products, 9-Wheat Products, , 10-Legumes, 11-Milk Products,	1
78	2-Eggs, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1
79	3-Vegetables,	3
80	3-Vegetables, , 8-Rice Products,	1
81	3-Vegetables, , 8-Rice Products, 9-Wheat Products,	1
82	3-Vegetables, 10-Legumes, 11-Milk Products,	3
83	3-Vegetables, 11-Milk Products,	1
84	3-Vegetables, 3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products,	1
85	3-Vegetables, 4-Fruits, 5-Snacks,	1
86	3-Vegetables, 4-Fruits, 5-Snacks, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	3
87	3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	1
88	3-Vegetables, 4-Fruits, 5-Snacks, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
89	3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products,	1
90	3-Vegetables, 4-Fruits, 5-Snacks, 8-Rice Products, 9-Wheat Products,	1
91	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts,	1
92	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 11-Milk Products,	1
93	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 11-Milk Products,	2
94	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 10- Legumes, 11-Milk Products,	2
95	3-Vegetables, 4-Fruits, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 9-Wheat Products, 11- Milk Products,	2
96	3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products,	1
97	3-Vegetables, 4-Fruits, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products,	1
98	3-Vegetables, 4-Fruits, 8-Rice Products,	3
99	3-Vegetables, 4-Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
100	3-Vegetables, 4-Fruits, 9-Wheat Products,	1
101	3-Vegetables, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products,	1

102	3-Vegetables, 5-Snacks, 6-Dried Fruits, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
103	3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 10-Legumes,	1
104	3-Vegetables, 5-Snacks, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
105	3-Vegetables, 5-Snacks, 8-Rice Products, 8-Rice Products,	1
106	3-Vegetables, 6-Dried Fruits, 7-Nuts, 8-Rice Products, 10-Legumes,	1
107	3-Vegetables, 6-Dried Fruits, , 8-Rice Products,	1
108	3-Vegetables, 7-Nuts, 11-Milk Products,	1
109	3-Vegetables, 7-Nuts, 9-Wheat Products, 10-Legumes, 11-Milk Products,	1
110	3-Vegetables, 8-Rice Products,	5
111	3-Vegetables, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
112	3-Vegetables, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	5
113	3-Vegetables, 8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
114	3-Vegetables, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
115	3-Vegetables, 8-Rice Products, 11-Milk Products,	4
116	3-Vegetables, 9-Wheat Products,	2
117	3-Vegetables, 9-Wheat Products, , 10-Legumes, 11-Milk Products,	1
118	3-Vegetables, 9-Wheat Products, 11-Milk Products,	1
119	4-Fruits, 6-Dried Fruits,	1
120	4-Fruits, 8-Rice Products,	1
121	4-Fruits, 8-Rice Products, 10-Legumes, 8-Rice Products,	1
122	5-Snacks,	1
123	5-Snacks, 11-Milk Products,	1
124	5-Snacks, 8-Rice Products,	1
125	5-Snacks, 8-Rice Products, 10-Legumes, 11-Milk Products,	1
126	5-Snacks, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1
127	5-Snacks, 8-Rice Products, 9-Wheat Products, 8-Rice Products,	1
128	6-Dried Fruits, 7-Nuts,	1
129	7-Nuts, 8-Rice Products, 9-Wheat Products, , 11-Milk Products,	1
130	8-Rice Products,	3
131	8-Rice Products, 9-Wheat Products, , 11-Milk Products,	2
132	8-Rice Products, 10-Legumes, 11-Milk Products,	1
133	8-Rice Products, 5-Snacks, 8-Rice Products,	1
134	8-Rice Products, 9-Wheat Products, 11-Milk Products,	1
135	9-Wheat Products, 11-Milk Products,	1
	Total	188

Table 6: Multiple combinations of nutrient supplements from 18-multiple choice answers by age group 4-7.

SL.No.	Nutr	Frequency
1	Calcium supplements, Iron supplements, Vitamin A, Vitamin C	1
2	Calcium supplements, Vitamin A	1
3	Calcium supplements, Vitamin B, Vitamin C	1

4	Calcium supplements, Vitamin B1, Vitamin B3	1
5	Iron supplements	1
6	Iron supplements, Multivitamin supplement	2
7	Multivitamin supplement	2
8	Vitamin A, Vitamin B, Vitamin B12	1
9	Vitamin A, Vitamin B, Vitamin C	1
10	Vitamin C	1
11	Vitamin D	1
12	Vitamin K	1
	Total	14

Table 7: Multiple combinations of nutrient supplements from 18-multiple choice answers by age group 8-11

SL.No.	Nutr	Frequency
1	Calcium supplements	3
2	Calcium supplements, Iron supplements	2
3	Calcium supplements, Iron supplements, Vitamin A	1
4	Calcium supplements, Iron supplements, Vitamin C	1
5	Calcium supplements, Iron supplements, Vitamin E	1
6	Calcium supplements, Vitamin C, Vitamin D	1
7	Iron supplements	3
8	Iron supplements, Multivitamin supplement	1
9	Multivitamin supplement	8
10	Vitamin B3	1
11	Vitamin D	2
12	Vitamin D, Vitamin B5	1
13	Zinc	1
	Total	26

Table 8: Multiple combinations of nutrient supplements from 18-multiple choice answers by age group 12-14.

SL.No.	Nutr	Frequency
1	Calcium supplements	3
2	Calcium supplements, Iron supplements	1
3	Calcium supplements, Iron supplements, Multivitamin supplement	4
4	Calcium supplements, Iron supplements, Multivitamin supplement, Iodine, Zinc	1
5	Calcium supplements, Iron supplements, Vitamin A, Vitamin C, Zinc	1
6	Calcium supplements, Iron supplements, Vitamin A, Vitamin D, Zinc	1
7	Calcium supplements, Iron supplements, Vitamin B, Vitamin B2	1
8	Calcium supplements, Iron supplements, Vitamin C, Vitamin D	1
9	Iron supplements	1
10	Iron supplements, Multivitamin supplement	1
11	Iron supplements, Vitamin A	1

12	Iron supplements, Vitamin C	1
13	Iron supplements, Vitamin C, Zinc	1
14	Multivitamin supplement	13
15	Multivitamin supplement, Vitamin B12, Iodine, Zinc	1
16	Multivitamin supplement, Vitamin C	1
17	Multivitamin supplement, Vitamin C, Vitamin D	1
18	Vitamin A	1
19	Vitamin A, Vitamin C, Vitamin D	1
20	Vitamin B	1
21	Vitamin C	1
22	Vitamin D	1
23	Zinc	3
	Total	42

Table 9: Multiple combinations of nutrient supplements from 18-multiple choice answers by age group 15-16.

SL.No.	Nutr	Frequency
1	Calcium supplements	3
2	Calcium supplements, Iron supplements	1
3	Calcium supplements, Iron supplements , Vitamin B7, Vitamin B12	1
4	Calcium supplements, Iron supplements, Multivitamin supplement	5
5	Calcium supplements, Iron supplements, Multivitamin supplement, Zinc	1
6	Calcium supplements, Iron supplements, Vitamin B6, Vitamin B12, Zinc	1
7	Calcium supplements, Iron supplements, Vitamin C	1
8	Calcium supplements, Iron supplements, Vitamin C, Vitamin E	1
9	Calcium supplements, Iron supplements, Vitamin D, Zinc	1
10	Calcium supplements, Multivitamin supplement	1
11	Calcium supplements, Vitamin A, Vitamin K	1
12	Calcium supplements, Vitamin B, Vitamin C	1
13	Calcium supplements, Vitamin B, Vitamin C, Iodine, Zinc	1
14	Calcium supplements, Vitamin C	2
15	Calcium supplements, Vitamin D, Vitamin B12	1
16	Calcium supplements, Vitamin D, Zinc	1
17	Calcium supplements, Vitamin E, Zinc	2
18	Iodine	1
19	Iron supplements	4
20	Iron supplements, Multivitamin supplement	2
21	Iron supplements, Vitamin A, Vitamin D	2
22	Iron supplements, Vitamin A, Vitamin D, Vitamin E	1
23	Iron supplements, Vitamin B	1
24	Iron supplements, Vitamin C	1
25	Iron supplements, Vitamin D, Iodine	1
26	Iron supplements, Vitamin E, Zinc	1
27	Iron supplements, Zinc	2

28	Multivitamin supplement	9
29	Multivitamin supplement,	1
30	Multivitamin supplement, Zinc	1
31	Vitamin A	4
32	Vitamin A, Vitamin C, Vitamin D	2
33	Vitamin B	1
34	Vitamin B, Vitamin B12, Vitamin E, Zinc	1
35	Vitamin B5, Vitamin B12, Zinc	1
36	Vitamin B6	1
37	Vitamin C, Vitamin E	1
38	Vitamin C, Vitamin K	1
39	Vitamin C, Zinc	1
40	Vitamin K, Zinc	1
41	Zinc	1
	Total	67

Table 10: Multiple combinations of nutrient supplements from 18-multiple choice answers by age group 17-18.

SL.No.	Nutr	Frequency
1	Calcium supplements	3
2	Calcium supplements, Iron supplements	1
3	Calcium supplements, Iron supplements, Multivitamin supplement	4
4	Calcium supplements, Iron supplements, Multivitamin supplement, Iodine	1
5	Calcium supplements, Iron supplements, Vitamin A, Vitamin C	1
6	Calcium supplements, Iron supplements, Vitamin B2	1
7	Calcium supplements, Iron supplements, Vitamin C	1
8	Calcium supplements, Iron supplements, Vitamin E	1
9	Calcium supplements, Iron supplements, Vitamin E, Iodine	1
10	Calcium supplements, Iron supplements, Vitamin E, Zinc	1
11	Calcium supplements, Iron supplements, Zinc	1
12	Calcium supplements, Multivitamin supplement	2
13	Calcium supplements, Multivitamin supplement, Zinc	1
14	Calcium supplements, Vitamin A	1
15	Calcium supplements, Vitamin A, Vitamin B	1
16	Calcium supplements, Vitamin A, Zinc	1
17	Calcium supplements, Vitamin B2, Vitamin B6, Zinc	1
18	Calcium supplements, Vitamin C,	1
19	Iron supplements	4
20	Iron supplements, Multivitamin supplement	1
21	Iron supplements, Vitamin A, Vitamin C	1
22	Iron supplements, Vitamin A, Vitamin D	1
23	Iron supplements, Vitamin C	1
24	Iron supplements, Vitamin D	2
25	Multivitamin supplement	3
26	Multivitamin supplement, Iodine	1
27	Multivitamin supplement, Vitamin C, Vitamin D	1

28	Multivitamin supplement, Zinc	1
29	Vitamin A	2
30	Vitamin A, Vitamin C	1
31	Vitamin A, Vitamin D, Vitamin K	1
32	Vitamin C	1
33	Vitamin C-	1
34	Vitamin C, Iodine	1
35	Vitamin C, Vitamin B12, Zinc	1
36	Vitamin C, Zinc	2
37	Vitamin D	1
38	Vitamin D, Vitamin B1	1
39	Vitamin E	2
40	Vitamin K, Vitamin B6, Vitamin E	1
	Total	55

Table 11: Multiple combinations of disease symptoms from 6-multiple choice answers by age group 4-7.

SL.No.	Symptoms	Frequency
1	Aches and pain	2
2	Cough	8
3	Cough, Runny nose	1
4	Fever	1
5	Fever, Cough, Runny nose	1
6	Fever, Runny nose	2
7	Headache	1
8	Headache, Tiredness	1
9	Runny nose	1
10	Runny nose, Aches and pain	1
11	Sore throat	1
12	Sore throat, Tiredness	1
	Total	21

Table 12: Multiple combinations of disease symptoms from 6-multiple choice answers by age group 8-11.

SL. No.	Symptoms	Frequency
1	Cough	7
2	Cough, Headache	1
3	Cough, Runny nose	1
4	Fever	3
5	Fever, Cough	4
6	Fever, Cough, Headache	1
7	Fever, Cough, Runny nose	1
8	Fever, Runny nose	1
9	Headache	2
10	Headache, Aches and pain	1

11	Headache, Sore throat	1
12	Headache, Sore throat, Tiredness	2
13	Headache, Tiredness	3
14	Other symptoms	1
15	Runny nose	3
16	Runny nose, Sore throat	1
17	Tiredness	2
	Total	35

Table 13: Multiple combinations of disease symptoms from 6-multiple choice answers by age group 12-14.

SL. No.	Symptoms	Frequency
1	Aches and pain	1
2	Aches and pain, Tiredness	1
3	Cough	4
4	Cough, Sore throat, Aches and pain, Tiredness	1
5	Fever	1
6	Fever, Cough	1
7	Fever, Cough, Headache	2
8	Fever, Cough, Runny nose	1
9	Fever, Cough, Runny nose, Headache	1
10	Fever, Cough, Runny nose, Headache, Sore throat, Aches and pain, Tiredness	1
11	Fever, Cough, Runny nose, Headache, Tiredness	1
12	Fever, Headache	1
13	Fever, Sore throat	1
14	Headache	9
15	Headache, Aches and pain, Tiredness	2
16	Headache, Aches and pain, Tiredness,	1
17	Headache, Tiredness	2
18	Other symptoms	1
19	Runny nose	3
20	Runny nose, Aches and pain, Tiredness	1
21	Runny nose, Loss of sense of smell or taste, Sore throat, Tiredness	1
22	Runny nose, Other symptoms	1
23	Tiredness	1
	Total	39

Table 14: Multiple combinations of disease symptoms from 6-multiple choice answers by age group 15-16.

SL. No.	Symptoms	Frequency
1	Aches and pain	2
2	Aches and pain, Tiredness, Other symptoms	1
3	Cough	5
4	Cough, Aches and pain	1

5	Cough, Headache	2
6	Cough, Other symptoms	2
7	Cough, Runny nose	2
8	Cough, Runny nose, Headache	3
9	Cough, Runny nose, Headache, Sore throat	1
10	Cough, Runny nose, Headache, Tiredness	1
11	Cough, Runny nose, Sore throat, Tiredness	1
12	Cough, Runny nose, Tiredness	1
13	Cough, Sore throat, Tiredness	1
14	Fever	5
15	Fever, Cough	1
16	Fever, Cough, Headache	2
17	Fever, Cough, Headache, Tiredness	2
18	Fever, Cough, Runny nose	1
19	Fever, Cough, Runny nose, Headache	1
20	Fever, Cough, Runny nose, Headache, Loss of smell or taste, Conjunctivitis	1
21	Fever, Cough, Runny nose, Headache, Loss of smell or taste, Sore throat, Tiredness	1
22	Fever, Cough, Runny nose, Headache, Sore throat, Aches and pain, Tiredness	1
23	Fever, Cough, Runny nose, Headache, Tiredness	1
24	Fever, Cough, Runny nose, Sore throat, Aches and pain, Tiredness	1
25	Fever, Headache	2
26	Fever, Headache, Sore throat	1
27	Fever, Headache, Sore throat, Tiredness	2
28	Fever, Other symptoms	1
29	Fever, Runny nose	1
30	Fever, Runny nose, Headache	1
31	Fever, Runny nose, Headache, Aches and pain, Tiredness	1
32	Fever, Tiredness	2
33	Headache	16
34	Headache, Aches and pain	1
35	Headache, Aches and pain, Tiredness	2
36	Headache, Conjunctivitis, Tiredness	1
37	Headache, Tiredness	4
38	Loss of smell or taste	1
39	Loss of smell or taste, Tiredness	1
40	Other symptoms	1
41	Runny nos	1
42	Runny nose	3
43	Runny nose , Headache, Tiredness, Other symptoms	1
44	Runny nose, Headache	1
45	Runny nose, Headache, Sore throat, Aches and pain	1
46	Runny nose, Sore throat	1
47	Sore throat	1
48	Sore throat, Tiredness	1

49	Tiredness	2
	Total	90

Table 15: Multiple combinations of disease symptoms from 6-multiple choice answers by age group 17-18.

SL. No.	Symptoms	Frequency
1	Aches and pain	1
2	Aches and pain, Tiredness	1
3	Conjunctivitis, Tiredness	1
4	Cough	4
5	Cough, Headache	1
6	Cough, Headache, Loss of smell or taste	1
7	Cough, Headache, Loss of smell or taste, Sore throat	1
8	Cough, Runny nose	3
9	Cough, Runny nose, Headache	1
10	Cough, Runny nose, Headache, Tiredness	1
11	Cough, Runny nose, Headache, Tiredness, Other symptoms	1
12	Cough, Runny nose, Loss of smell or taste, Sore throat, Tiredness	1
13	Cough, Runny nose, Tiredness	2
14	Cough, Tiredness	1
15	Fever	2
16	Fever, Cough	3
17	Fever, Cough, Headache	2
18	Fever, Cough, Headache, Loss of smell or taste, Sore throat, Tiredness	1
19	Fever, Cough, Headache, Sore throat, Aches and pain, Tiredness	2
20	Fever, Cough, Headache, Sore throat, Tiredness	1
21	Fever, Cough, Loss of smell or taste, Sore throat	1
22	Fever, Cough, Runny nose, Headache	5
23	Fever, Cough, Runny nose, Headache, Sore throat	1
24	Fever, Cough, Runny nose, Headache, Sore throat, Tiredness	1
25	Fever, Cough, Runny nose, Headache, Tiredness	2
26	Fever, Cough, Runny nose, Loss of smell or taste, Sore throat	1
27	Fever, Cough, Runny nose, Sore throat	1
28	Fever, Cough, Runny nose, Sore throat, Aches and pain, Tiredness	1
29	Fever, Headache, Sore throat, Tiredness	2
30	Fever, Headache, Tiredness	1
31	Fever, Runny nose, Tiredness	3
32	Headache	7
33	Headache,	1
34	Headache, Aches and pain	1
35	Headache, Aches and pain, Tiredness	2
36	Headache, Conjunctivitis	1
37	Headache, Loss of smell or taste, Sore throat, Tiredness	1
38	Headache, Tiredness	3

39	Other symptoms	3
40	Runny nose	10
41	Runny nose, Aches and pain	2
42	Runny nose, Headache	1
43	Runny nose, Headache, Loss of smell or taste, Tiredness	1
44	Runny nose, Headache, Sore throat, Aches and pain, Conjunctivitis, Tiredness	1
45	Runny nose, Other symptoms	1
46	Runny nose, Other symptoms,	1
47	Runny nose, Sore throat	2
48	Runny nose, Tiredness	2
49	Tiredness	5
	Total	95

Table 16: Multiple combinations of positive mood changes from 7-multiple choice answers by age group 4-7.

SL.No.	Positive Moods	Frequency
1	Calm	1
2	Confident	1
3	Confident ,Thoughtful	1
4	Confident, Playful/energetic	4
5	Confident, Playful/energetic, Calm	2
6	Confident, Playful/energetic, Determined, Calm	1
7	Confident, Thoughtful, Calm	1
8	Determined, Calm	1
9	Optimistic	1
10	Optimistic, Confident	1
11	Optimistic, Confident, Playful/energetic, Calm	1
12	Optimistic, Empathetic	2
13	Optimistic, Playful/energetic	2
14	Optimistic, Playful/energetic, Calm	1
15	Playful/energetic	20
16	Playful/energetic, Calm	14
17	Playful/energetic, Determined, Thoughtful, Empathetic	1
18	Playful/energetic, Thoughtful	4
19	Playful/energetic, Thoughtful, Calm	2
20	Thoughtful, Calm	1
	Total	62

Table 17: Multiple combinations of positive mood changes from 7-multiple choice answers by age group 8-11.

SL.No.	Positive Moods	Frequency
1	Calm	4
2	Confident	2
3	Confident, Calm	2

4	Confident, Determined	1
5	Confident, Determined, Thoughtful	1
6	Confident, Determined, Thoughtful, Empathetic, Calm	1
7	Confident, Playful/energetic	7
8	Confident, Playful/energetic,	1
9	confident, Playful/energetic, Calm	1
10	Confident, Playful/energetic, Calm	1
11	confident, Playful/energetic, Determined	1
12	Confident, Playful/energetic, determined, Thoughtful	1
13	Confident, Playful/energetic, Thoughtful	1
14	Confident, Thoughtful	2
15	Empathetic	2
16	Optimistic	2
17	Optimistic, Confident, Calm	1
18	Optimistic, Confident, Determined	1
19	Optimistic, Confident, Determined, Calm	1
20	Optimistic, Confident, Playful/energetic	1
21	Optimistic, Confident, Playful/energetic, Determined	1
22	Optimistic, confident, Playful/energetic, Determined, Thoughtful	1
23	Optimistic, Confident, Playful/energetic, Determined, Thoughtful, Calm	1
24	Optimistic, confident, Playful/energetic, Determined, Thoughtful, Empathetic	1
25	Optimistic, Confident, Playful/energetic, Determined, Thoughtful, Empathetic	1
26	Optimistic, confident, Playful/energetic, determined, Thoughtful, Empathetic, Calm	1
27	Optimistic, Playful/energetic	6
28	Optimistic, Playful/energetic, Empathetic, Calm	1
29	Optimistic, Playful/energetic, Thoughtful	1
30	Playful/energetic	38
31	Playful/energetic, Calm	2
32	Playful/energetic, Determined, Empathetic	1
33	Playful/energetic, Determined, Thoughtful, Empathetic, Calm	1
34	Playful/energetic, Empathetic	1
35	Playful/energetic, Thoughtful	8
36	Thoughtful	2
37	Thoughtful, Calm	1
	Total	102

Table 18: Multiple combinations of positive mood changes from 7-multiple choice answers by age group 12-14.

SL.No	Positive Moods	Frequency
1	Calm	14
2	Confident	6
3	Confident,	2

4	Confident, Calm	1
5	Confident, Playful/energetic	4
6	Confident, Playful/energetic,	1
7	Confident, Playful/energetic, Calm	4
8	Confident, Playful/energetic, Determined, Empathetic, Calm	1
9	Confident, Playful/energetic, Determined, Thoughtful	1
10	Confident, Playful/energetic, Determined, Thoughtful, Empathetic, , Calm	1
11	Confident, Playful/energetic, Thoughtful	1
12	Confident, Playful/energetic, Thoughtful, Empathetic	2
13	Confident, Thoughtful, Calm	2
14	Confident, Thoughtful, Empathetic	1
15	Determined, Calm	2
16	Empathetic	1
17	Empathetic, Calm	1
18	Optimistic	6
19	Optimistic, Confident, Calm	1
20	Optimistic, Confident, Determined, Calm	1
21	Optimistic, Confident, Playful/energetic	1
22	Optimistic, Confident, Playful/energetic, Determined	1
23	Optimistic, Confident, Playful/energetic, Determined, Thoughtful,	1
24	Optimistic, Confident, Playful/energetic, Determined, Thoughtful, Calm	1
25	Optimistic, Confident, Playful/energetic, Determined, Thoughtful, Empathetic	2
26	Optimistic, Confident, Playful/energetic, Empathetic, Calm	1
27	Optimistic, Playful/energetic	4
28	Optimistic, Playful/energetic, Calm	1
29	Optimistic, Playful/energetic, Empathetic	1
30	Playful/energetic	37
31	Playful/energetic,	2
32	Playful/energetic, Calm	8
33	Playful/energetic, Determined	3
34	Playful/energetic, Empathetic,	1
35	Playful/energetic, Optimistic	2
36	Playful/energetic, Thoughtful	3
37	Playful/energetic, Thoughtful,	1
38	Playful/energetic, Thoughtful, Calm	1
	Total	124

Table 19: Multiple combinations of positive mood changes from 7-multiple choice answers by age group 15-16.

SL. No.	Positive Moods	Frequency
1	Calm	20
2	Confident,	8
3	Confident, Calm	4

4	Confident, Determined, Empathetic,	3
5	Confident, Determined, Thoughtful,	1
6	Confident, Empathetic, Calm	1
7	Confident, Playful/energetic,	8
8	Confident, Playful/energetic, Calm	4
9	Confident, Playful/energetic, Determined,	1
10	Confident, Playful/energetic, Determined, Thoughtful,	2
11	Confident, Playful/energetic, Determined, Thoughtful, Calm	1
12	Confident, Playful/energetic, Empathetic,	1
13	Confident, Playful/energetic, Empathetic, Calm	2
14	Confident, Playful/energetic, Thoughtful,	2
15	Confident, Playful/energetic, Thoughtful, Calm	9
16	Confident, Playful/energetic, Thoughtful, Empathetic, Calm	4
17	Confident, Thoughtful,	2
18	Confident, Thoughtful, Calm	1
19	Confident, Thoughtful, Empathetic,	1
20	Determined,	1
21	Determined, Thoughtful,	1
22	Empathetic,	3
23	Optimistic,	7
24	Optimistic, , Confident, Playful/energetic, Determined, Thoughtful, Empathetic, Calm	1
25	Optimistic, , Confident, Thoughtful,	2
26	Optimistic, Calm	1
27	Optimistic, Confident,	2
28	Optimistic, Confident, Determined, Calm	1
29	Optimistic, Confident, Playful/energetic, Calm	2
30	Optimistic, Confident, Playful/energetic, Determined, Thoughtful, Empathetic, Calm	3
31	Optimistic, Confident, Playful/energetic, Thoughtful, Calm	1
32	Optimistic, Confident, Playful/energetic, Thoughtful, Empathetic, Calm	1
33	Optimistic, Confident, Thoughtful,	1
34	Optimistic, Confident, Thoughtful, Calm	1
35	Optimistic, Confident, Thoughtful, Empathetic	1
36	Optimistic, Confident, Thoughtful, Empathetic, Calm	1
37	Optimistic, Playful/energetic,	5
38	Optimistic, Playful/energetic, Calm	1
39	Optimistic, Playful/energetic, Thoughtful,	1
40	Optimistic, Playful/energetic, Thoughtful, Calm	1
41	Optimistic, Thoughtful,	1
42	Playful/energetic	1
43	Playful/energetic,	25
44	Playful/energetic, Calm	7
45	Playful/energetic, Determined,	1
46	Playful/energetic, Determined, Thoughtful,	2
47	Playful/energetic, Empathetic,	2

48	Playful/energetic, Empathetic, Calm	2
49	Playful/energetic, Thoughtful,	4
50	Playful/energetic, Thoughtful, Calm	2
51	Thoughtful,	9
52	Thoughtful, Calm	4
53	Thoughtful, Empathetic, Calm	1
	Total	174

Table 20: Multiple combinations of positive mood changes from 7-multiple choice answers by age group 17-18.

SL. No.	Positive Moods	Frequency
1	Calm	19
2	Confident	13
3	Confident, Calm	7
4	Confident, Determined	1
5	Confident, Determined, Calm	2
6	Confident, Determined, Empathetic	1
7	Confident, Determined, Thoughtful	2
8	Confident, Determined, Thoughtful, Calm	10
9	Confident, Empathetic, Calm	3
10	Confident, Playful/energetic	1
11	Confident, Playful/energetic, Calm	3
12	Confident, Playful/energetic, Determined	1
13	Confident, Playful/energetic, Determined, Calm	1
14	Confident, Playful/energetic, Determined, Empathetic	1
15	Confident, Playful/energetic, Determined, Empathetic, Calm	1
16	Confident, Playful/energetic, Empathetic	1
17	Confident, Playful/energetic, Thoughtful	3
18	Confident, Playful/energetic, Thoughtful, Empathetic, Calm	2
19	Confident, Thoughtful	3
20	Confident, Thoughtful, Calm	1
21	Confident, Thoughtful, Empathetic, Calm	1
22	Determined, Calm	1
23	Determined, Thoughtful, Calm	2
24	Determined, Thoughtful, Empathetic	1
25	Empathetic	2
26	Optimistic	3
27	Optimistic, Calm	1
28	Optimistic, Confident	2
29	Optimistic, Confident, Determined, Calm	1
30	Optimistic, Confident, Determined, Thoughtful	1
31	Optimistic, Confident, Determined, Thoughtful	6
32	Optimistic, Confident, Determined, Thoughtful, Calm	4
33	Optimistic, Confident, Playful/energetic	3
34	Optimistic, Confident, Playful/energetic, Calm	1

35	Optimistic, Confident, Playful/energetic, Determined, Thoughtful, Calm	3
36	Optimistic, Confident, Playful/energetic, Determined, Thoughtful, Empathetic, Calm	3
37	Optimistic, Confident, Playful/energetic, Thoughtful	1
38	Optimistic, Confident, Playful/energetic, Thoughtful, Calm	2
39	Optimistic, Confident, Thoughtful, Calm	2
40	Optimistic, Confident, Thoughtful, Empathetic	1
41	Optimistic, Determined	1
42	Optimistic, Determined, Calm	1
43	Optimistic, Playful/energetic	3
44	Optimistic, Playful/energetic, Calm	1
45	Optimistic, Playful/energetic, Determined	1
46	Optimistic, Playful/energetic, Thoughtful, Empathetic	1
47	Optimistic, Thoughtful	1
48	Optimistic, Thoughtful, Calm	2
49	Optimistic, Thoughtful, Empathetic, Calm	1
50	Playful/energetic	24
51	Playful/energetic, Calm	10
52	Playful/energetic, Determined	2
53	Playful/energetic, Determined, Thoughtful	1
54	Playful/energetic, Empathetic	2
55	Playful/energetic, Empathetic, Calm	2
56	Playful/energetic, Thoughtful	4
57	Playful/energetic, Thoughtful, Calm	2
58	Playful/energetic, Thoughtful, Empathetic	1
59	Playful/energetic, Thoughtful, Empathetic, Calm	1
60	Thoughtful	9
61	Thoughtful, Calm	1
	Total	188

Table 21: Multiple combinations of negative mood changes from 7-multiple choice answers by age group 4-7.

SL. No.	Negative Moods	Frequency
1	Cranky/moody	2
2	Cranky/moody, Irritated	1
3	Cranky/moody, Violent	1
4	Insecure/scared/ Worried	7
5	Insecure/scared/ Worried, Cranky/moody	1
6	Insecure/scared/ Worried, Irritated	2
7	Insecure/scared/ Worried, Restless/nervous	5
8	Irritated	7
9	Irritated, Restless/nervous	1
10	Irritated, Sad	1
11	Irritated, Violent	1
12	Not Responded	16

13	Pessimistic	1
14	Pessimistic, Cranky/moody, Irritated	1
15	Restless/nervous	7
16	Restless/nervous, Violent	1
17	Sad	3
18	Violent	4
	Total	62

Table 22: Multiple combinations of negative mood changes from 7-multiple choice answers by age group 8-11.

SL. No.	Negative Moods	Frequency
1	Cranky/moody	6
2	Cranky/moody, Irritated	2
3	Cranky/moody, Irritated, Restless/nervous	1
4	Cranky/moody, Restless/nervous	2
5	Cranky/moody, Violent	1
6	Insecure/scared/ Worried	8
7	Insecure/scared/ Worried, Cranky/moody	2
8	Insecure/scared/ Worried, Irritated	2
9	Insecure/scared/ Worried, Restless/nervous	3
10	Insecure/scared/ Worried, Sad	2
11	Irritated	13
12	Irritated, Restless/nervous	3
13	Irritated, Violent	2
14	Irritated, Violent, Sad	1
15	Not Responded	20
16	Pessimistic	4
17	Pessimistic, Cranky/moody, , Irritated	1
18	Pessimistic, Insecure/scared/ Worried	1
19	Pessimistic, Restless/nervous	1
20	Restless/nervous	14
21	Restless/nervous, Sad	3
22	Restless/nervous, Violent	1
23	Sad	8
24	Violent	1
	Total	102

Table 23: Multiple combinations of negative mood changes from 7-multiple choice answers by age group 12-14.

SL. No.	Negative Moods	Frequency
1	Cranky/moody	2
2	Cranky/moody, Restless/nervous	2
3	Cranky/moody, Violent, Sad	1
4	Insecure/scared/ Worried	8
5	Insecure/scared/ Worried, Cranky/moody, Irritated	1

6	Insecure/scared/ Worried, Irritated, Restless/nervous	1
7	Insecure/scared/ Worried, Irritated, Restless/nervous	1
8	Insecure/scared/ Worried, Irritated, Sad	1
9	Insecure/scared/ Worried, Restless/nervous	2
10	Irritated	20
11	Irritated, Restless/nervous	1
12	Irritated, Restless/nervous, Sad	3
13	Irritated, Restless/nervous, Violent, Sad	1
14	Irritated, Sad	1
15	Irritated, Violent	4
16	Not Responded	23
17	Pessimistic	5
18	Pessimistic, Cranky/moody	1
19	Pessimistic, Cranky/moody, Violent	1
20	Pessimistic, Insecure/scared/ Worried, Cranky/moody	1
21	Pessimistic, Irritated	2
22	Pessimistic, Restless/nervous	1
23	Pessimistic, Sad	2
24	Restless/nervous	13
25	Restless/nervous, Sad	1
26	Restless/nervous, Violent	5
27	Sad	16
28	Violent	3
29	Violent, Sad	1
	Total	124

Table 24: Multiple combinations of negative mood changes from 7-multiple choice answers by age group 15-16.

SL.No.	Negative Moods (age 15-16)	Frequency
1	Cranky/moody	1
2	Cranky/moody, Irritated, Restless/nervous, Violent	1
3	Cranky/moody, Irritated, Restless/nervous, Violent, Sad	1
4	Cranky/moody, Irritated, Sad	2
5	Cranky/moody, Irritated, Violent, Sad	2
6	Cranky/moody, Restless/nervous	1
7	Cranky/moody, Restless/nervous, Sad	2
8	Cranky/moody, Sad	3
9	Insecure/scared/ Worried,	12
10	Insecure/scared/ Worried, Cranky/moody, Irritated, Restless/nervous	3
11	Insecure/scared/ Worried, Cranky/moody, Irritated, Violent	1
12	Insecure/scared/ Worried, Irritated	4
13	Insecure/scared/ Worried, Irritated, Sad	2
14	Insecure/scared/ Worried, Irritated, Sad	7
15	Insecure/scared/ Worried, Restless/nervous, Sad	1
16	Insecure/scared/ Worried, Sad	1
17	Irritated	20

18	Irritated, Restless/nervous	1
19	Irritated, Restless/nervous, Sad	5
20	Irritated, Restless/nervous, Violent	1
21	Irritated, Restless/nervous, Violent, Sad	1
22	Irritated, Sad	7
23	Irritated, Violent	2
24	Irritated, Violent, Sad	4
25	Not Responded	27
26	Pessimistic	7
27	Pessimistic, Cranky/moody, Irritated,	1
28	Pessimistic, Insecure/scared/ Worried, Cranky/moody	4
29	Pessimistic, Insecure/scared/ Worried, Restless/nervous	1
30	Pessimistic, Irritated, Restless/nervous, Violent, Sad	1
31	Pessimistic, Irritated, Sad	2
32	Pessimistic, Irritated, Violent, Sad	1
33	Pessimistic, Sad	1
34	Restless/nervous	9
35	Restless/nervous, Sad	5
36	Sad	29
37	Violent	1
	Total	174

Table 25: Multiple combinations of negative mood changes from 7-multiple choice answers by age group 17-18.

SL. No.	Negative Moods (age 17-18)	Frequency
1	Cranky/moody	8
2	Cranky/moody, Irritated	4
3	Cranky/moody, Irritated, Restless/nervous	4
4	Cranky/moody, Irritated, Restless/nervous, Sad	2
5	Cranky/moody, Irritated, Restless/nervous, Violent	2
6	Cranky/moody, Irritated, Restless/nervous, Violent, Sad	1
7	Cranky/moody, Irritated, Sad	3
8	Cranky/moody, Irritated, Violent, Sad	3
9	Cranky/moody, Sad	1
10	Insecure/scared/ Worried	9
11	Insecure/scared/ Worried, Cranky/moody, Irritated, Restless/nervous	5
12	Insecure/scared/ Worried, Cranky/moody, Irritated, Sad	5
13	Insecure/scared/ Worried, Cranky/moody, Restless/nervous	1
14	Insecure/scared/ Worried, Cranky/moody, Sad	1
15	Insecure/scared/ Worried, Irritated	2
16	Insecure/scared/ Worried, Irritated, Restless/nervous	1
17	Insecure/scared/ Worried, Irritated, Restless/nervous	2
18	Insecure/scared/ Worried, Irritated, Restless/nervous, Violent	2
19	Insecure/scared/ Worried, Irritated, Sad	3
20	Insecure/scared/ Worried, Restless/nervous,	1
21	Insecure/scared/ Worried, Restless/nervous, Sad	1

22	Irritated	19
23	Irritated, Restless/nervous	1
24	Irritated, Restless/nervous, Sad	6
25	Irritated, Restless/nervous, Violent	2
26	Irritated, Restless/nervous, Violent, Sad	1
27	Irritated, Sad	14
28	Irritated, Violent, Sad	2
29	Not Responded	17
30	Pessimistic	7
31	Pessimistic, Insecure/scared/ Worried	1
32	Pessimistic, Insecure/scared/ Worried, Cranky/moody	5
33	Pessimistic, Insecure/scared/ Worried, Restless/nervous	2
34	Pessimistic, Insecure/scared/ Worried, Sad	2
35	Pessimistic, Irritated, Sad	2
36	Pessimistic, Restless/nervous	1
37	Pessimistic, Sad	2
38	Restless/nervous	6
39	Restless/nervous, Sad	4
40	Sad	27
41	Violent	4
42	Violent, Sad	2
	Total	188

DOCUMENTATION PAGE

This Diploma Thesis “Impact of COVID-19 Lockdown on the Behaviour and Health of Children and Adolescents in Tamil Nadu, India “ was developed at the Faculty of Medicine of the University of Latvia.

With my signature, I attest, that this research has been carried out without aid or assistance. Used information was obtained only from indicated sources and the electronically submitted copy of this diploma work complies with printout.

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