# Impact of Dietary Guidelines Against COVID-19

**Sana Noreen*[1], Sadia Bano[1], Sana Farooq[1], Waseem Khalid[2], Tahira Fatima[1], Ayesha Urooj[1], Maryam Waris[1], Samina Sharif[1], Hanza Natasha Saleem[1]**

[1]University Institute of Diet and Nutritional Sciences, Faculty of Allied Health Sciences, University of Lahore, Punjab, Pakistan.
[2]Department of Food Science, Government College University Faisalabad, Pakistan.

***Corresponding Author's email**: sananoreen.rizwan@gmail.com

## ABSTRACT

Coronavirus illness 2019 is a contagious disease that has become pandemic after rapidly spreading around the world. Diet is a key factor of happiness. The prevalence of coronavirus disease and the illnesses associated with it severe acute respiratory syndrome 2 is caused by the Coronavirus Virus (COVID-19) and can be treated with a healthy diet. Data was gathered using Google Scholar, Medline, Embase, Science Direct and books from studies conducted between 2020 and 2021. Many studies have indicated that eating a nutrient-dense diet and making wise food choices can aid in the development of adaptive immunity. Improvement of micronutrient deficiencies in current COVID-19 infections may promote the immune response to infection in individuals at greatest risk. Supplementation with vitamins D and C, as well as selenium and zinc, has been proven to be potentially beneficial for persons suffering from or at risk of developing respiratory virus diseases, as well as those suffering from nutritional deficiencies. A healthy diet of iron, zinc, and vitamins B12, B6, A, and E is essential for immune function maintenance. Therefore, the aim of this study is to promote healthy eating pattern, a better lifestyle, maintaining a healthy weight, getting adequate sleep, and exercising in their spare time during the COVID-19 pandemic.

**Keywords:** COVID 19, Virus outbreak, Pandemic, Micronutrients, Hypomagnesemia, SARS-CoV-2.

**Article History**
Received: 13 April 2021
Accepted: 20 September 2021
Published: 30 November 2021



## INTRODUCTION

On December 31, 2019, the WHO China country office received notification of pneumonia cases in the city of Wuhan, but no confirmation of the causal cause. The coronavirus causing respiratory syndrome (SARS-CoV-2) coronavirus 2 has spread swiftly and is infecting people in all parts of the world (Lewnard *et al*., 2020). The coronavirus outbreak begins in Wuhan and travels around the world. On February 12, 2020, the World Health Organization (WHO) officially declared the illness (COVID-19) Coronavirus Disease 2019 as

highly communicable (Zu *et al*., 2019). There were 180000 confirmed cases and over 7000 deaths caused by the virus worldwide through March 2020. Despite the fact that the virus is causing symptoms, it continues to affect the patients even after the symptoms have subsided after two weeks, and they are still infectious (Dashraath *et al.,* 2020). Italy was the first country to be impacted, following China, because the virus has had a significant impact on the region (Spinelli *et al*., 2020). Fever, dry cough, breathing difficulty, anosmia, and ultimately respiratory failure are some of the symptoms of coronavirus. The disease's therapy is uncertain, although an anti-viral method that promotes immunomodulation in the virus's management is being employed. (Gasmi and colleagues, 2020) Italy was the first Western country to experience widespread coronavirus infection (Ruiu *et al*., 2020).

Its characteristic entails a disconnection between the extent of hypoxemia and the repairs of the rather powerful breathing procedure. The median respiratory system seen is often about 50 ml/cmH2O, and hypoxemia is also encountered by people with lower or greater respiratory conformity than the median value. As a result, patients are divided into two groups: "non-ARDS," type 2 ARDS, and type 1 ARDS, each with its own pathophysiology (Gattinoni *et al*., 2020). Prior to the discovery of this unique virus, there were six identified coronaviruses, two of which cause serious sickness and the other four of which produce very moderate symptoms such as a cold. The 2 viruses are (SARS-CoV) severe acute respiratory syndrome coronavirus and (MERS-CoV) Middle East Respiratory Syndrome coronavirus and the. In 2002, over 8000 instances of (SARS-CoV) were recorded in the Chinese province of Guangdong, and in 2003, it severely devastated the world, with 400 and more infected persons reported in Toronto (Kondziolka *et al*., 2020). Coronavirus symptoms include fever, headache, cough, diarrhoea, headache, tiredness, and myalgia. Tang *et al*., 2020 Initially, foreign flights were reduced in quantity, and there was a three-week lockdown in Hubei province. Furthermore, instances are rising all over the world, and it is unclear whether it can be controlled, and non-detection of the virus in other countries would result in a delay in countermeasures. During this period, the virus's epi centers were Italy, Japan, South Korea, and Iran. Lau et al., 2020 The World Health Organization has declared the coronavirus the 6th (PHEIC) an International Public Health Emergency of International Concerns on January 20, 2020, and a pandemic on March 11, 2020. There is a possibility of an increase in COVID instances in Pakistan (Abid *et al*., 2020).

**COVID-19 Outbreak: Pakistan's Present Scenario**

At present, there are a total of 1,305,707 stated progressive cases in the country with 28,972 total deaths and Recovered 1,258,987, The government of Pakistan, according to the Ministry of Health. Last updated on 2nd Jan 2022 at 01:03 am (GMT+5) (Government of Pakistan, https://covid.gov.pk/stats/pakistan) as shown in Table 1.

Three months later, in February 2020, Karachi Pakistan recorded the first case, and a statewide lockdown to limit all unnecessary travel was implemented on March 23, 2020, to regulate the continued spread of sickness, which mostly affects vaccines. The information was gathered from the Provincial Electronic Vaccination Register in order to assess the impact on regular immunisation coverage in Karachi ((Safe Life) the Zindagi Mehfooz Program; ZM EIR). It is an argument that has enabled the collection of real-time data for tracking and evaluating service delivery (Chandir *et al*., 2020).

**Table 1: Statistics of confirmed cases in Pakistan**

| Areas | Confirmed Cases |
|---|---|
| AJK | 34,704 |
| Baluchistan | 33,659 |
| GB | 10,432 |
| Islamabad | 109,396 |
| KPK | 181,757 |
| Punjab | 448,091 |
| Sindh | 487,668 |

After a few weeks of normal operations, the 'smart lockdown' idea was launched and welcomed by authorities as an excellent technique for combating the infection. On August 7, the National Coordination Committee (NCC) reported that the COVID-19 epidemic had been contained thanks to a successful approach, and the country had been deemed open for ordinary operations. The total rose to 295, 236 by September, and a new form of the smart lockdown, 'mini smart lockdown,' was implemented in some regions of the nation. The lack of a strict policy and the lockdown gamble allowed SARS-CoV-2 to spread through social, political, religious, and routine commercial activities, transportation, and tourism. Schools, colleges, and universities reopened (Ali *et al*., 2020).

Pakistan is combating the third wave of the epidemic, which is spreading across its major metropolitan areas after more than a year. Hospitalization rates increased dramatically between the first and second waves. However, following a steady rise, the numbers are beginning to show a tiny reprieve. The positive percentage's seven-day moving average is at 9.8 percent. Regardless of this tendency, vigilance must be exercised. We now know all too well that, while being exponential, these trends are unstable. The continuous decline is dependent, among other things, on collective Standard Operating Procedure (SOP) compliance. While we now have a good understanding of some of these other elements, many remain a mystery (Ali *et al*., 2020).

**Dietary Recommendations in Pandemic Condition**

Diet and nutrition are vital for a healthy immune system. Increased death case rates of enduring illness comorbidity and age with poorer concentration of 25(OH)D have been described to illustrate the character of vitamin D to decrease risk of COVID-19. Vitamin D deficiency, especially among the elderly, is prevalent globally (Gasmi, *et al.*, 2020).

It is essential to nutritionally modulate the immune system. Changes in eating patterns, termed inflammation in older adults and immune senescence, contribute to major changes in immunity and inflammation, the population most at risk for COVID-199. Some foods, for example probiotics and omega-3 (PUFA) polyunsaturated fatty acids, have been related to anti-inflammatory comebacks and enriched confrontation Infection of the upper respiratory tract. Dietary position is a key consideration for optimum scenario in individuals afflicted with SARS CoV 2 and may assess the clinical magnitude of COVID 19. Since no vaccination or

**Table 2. Dietary, Food Safety, Supplementation and Breastfeeding Recommendations**

| Organization | Dietary recommendations | Recommendations on supplementation/breastfeeding | Recommendations on food safety |
|---|---|---|---|
| American society for Nutrition ASN (2020) | Whole grains, vegetables, and fruits are emphasized in the healthiest meals; meat servings can be smaller to diminish saturated fat intake; frontier feeding of commercially packaged save up on nutrition packed frozen dinners; ingredients that remain garden-fresh for a week or lengthier. | | |
| UNICEF (2020) | Maintain the consumption of fruits and vegetables; If no fresh produce is available, select safe dry or frozen substitutes; preserved fish oil is high in omega-3 fatty acids, and protein a range of minerals and vitamins; accumulation a standard of balanced snacks; reduce heavily refined foodstuffs create it pleasant and meaningful to prepare and consume. | Females with COVID 19 can last to breastfeed if the mom is too in poor health to breast feed due to COVID 19 contamination or other problems, breast milk leftovers an excellent nutrition for newborns and infants aged 6 to 24 months, she should be aided in delivering breast milk to her newborn safely in every way possible, breathing sanitation during feeding, when available, wear a mask clean hands before and after touching the infant, wipe and sterilize exteriors regularly. | Every unwanted packaging and refuse must be discarded and deposited with a lid in a waste bin; packaging such as containers should be cleaned with an antiseptic before actuality stored or opened; wash hands for at least 20 seconds with water and soap, or use a hand rub based on alcohol, unpackaged items such as veggies and fruits can be carefully wash away underneath flowing water. |
| Dietitians of Canada (2020) | Eat a healthy food ironic in fruits and veggies, whole grains containing | After proper handwashing and when wearing a mask, women who want to breastfeed should be permitted to do so. | There's no indication that COVID 19 is transmitted by consuming or |

| | | | |
|---|---|---|---|
| | foodstuffs and protein, there's no special meal, natural health or supplementation substance to treat or prevent, cure COVID 19. | | handling uncooked vegetables or fruits, fresh fruits and vegetables must be scrubbed or washed below running, cold, filtered water tap prior to consumption; although There are no unusual ones there, measures for food preparation, washing hand is advised afterward pushing away obtained food and before cooking food; Before and after food containers are cleaned, hands should be washed. |
| World Health Organization WHO (2020) | A selection of foods that are fresh and unprocessed can be used to receive minerals, vitamins, calcium, dietary fiber, and antioxidants; drink ample water, avoid fat, salt and sugar. | Females should breastfeed with COVID 19 run through respirational hygiene throughout feeding, where appropriate, using a mask; wash hands before and after holding the child, surfaces used frequently are cleaned and disinfected regularly. | |
| Food and Agriculture Organization FAO (2020) | To maintain a strong immune system, consume a healthy diet; consume a range of diets contained by and group of food, consume lots of vegetables and fruits; consume a diet ironic in nuts, healthy fats and whole grains, restrict salt, sugar, and fat intake, drink water. Regularly, reduce alcohol consumption. | | There is no evidence that by contact with imported foods, COVID-19 will be distributed; store fresh and cooked foods separately; ensure sterile food storage surfaces; properly process foods; store foodstuffs at harmless temperatures, and practice safe water and underdone materials. |

| | | | |
|---|---|---|---|
| The European Food Information Council EUFIC (2020) | In the immune system, adequate intakes of folate, copper, iron, zinc, and selenium vitamin A, vitamin C, vitamin D, vitamin B6 and vitamin B12 play an essential role; these nutrients can usually be received from diet. | In people with particular difficulties in fulfilling nutritional needs, vitamins should be used to the diet, apply nutrients. | Wash hands before and after cooking or consuming food for 20 seconds with soap; Wash vegetables and fruits before and after eating; Clean exteriors and items before and after usage, Have uncooked and cooked foodstuffs apart from each other; Practice various raw and cooked food utensils/chopping boards; Prepare and reheat foods at sufficient temperatures (72C for 2 min); No food packaging needs to be disinfected them. |

indication founded therapy for COVID s19 is available to date, maximizing nutritional consumption by well-balanced meals and using healthy hygiene habits in food collection, preparation and protection is potentially the most efficient path to controlling the continuing risk of viral contamination of minerals and vitamins, including zinc and selenium, as well as vitamin, E, D, C, A, and B complexes which are essential immune system modulators. Furthermore, vitamins, healthy sources of water and fiber are fruit and vegetables, both performing a position in managing diabetes, weight gain, and hypertension, any of the most important risk variables for problems with COVID-19 (de Faria Coelho-Ravagnani *et al.*, 2020).

It is possible to acquire essential nutrients that strengthen the immune system by nutritional ingredients that contain fresh diets (e.g. vegetables & fruits), lean meat, fish, water, milk and other no sugary liquids, and good fats. A balanced food will also decrease the possibility of, or aid control, diabetes, hypertension, muscle atrophy, and obesity are all risk factors that are considered for COVID 19 impediments. No identified supplements be able to eliminate COVID 19, but supplements can alleviate the community wellbeing threats linked with COVID 19 in communities at risk of malnutrition. Breastfeeding supports the immune system of a child, shielding it from viruses and bacterial infections. Along with proper hygiene habits, such as regular alcohol established sanitizers or hand washing with soap and water, the use of personal defense, for example, masks will prevent COVID 19 spread and weakening of the immune system (de Faria, *et al.*, 2020). Recommendations to minimize the nutrition and food security effect of COVID 19 at human, population, national and global levels (Naja *et al.*, 2020).

The minimum daily dietary intake is 75 mg/d for females and 90 mg/d for males for vitamin C. In the current scenario, in order to counteract COVID-19, it is important to be mindful of the particular forms of food that are capable of strengthen our immune response. (Aman *et al.*, 2020).

**Dietary Guidelines**

Here are few competent and legitimate dietary recommendations to stand up to COVID 19:

- It is possible to eat poultry 2-3 days a week and red meat once or twice a week. Using animal-based foods (such as milk, eggs, and fish) and 160g of beans and meat.
- Consume organic veggies (yellow bell pepper, ginger, kale, garlic, broccoli, dried cilantro, lime, and green chili pepper) 2.5 vegetable cups 5 servings of legumes (lentils and beans).

**Table 5. Dietary Advice during COVID-19**

| | **During COVID-19, Diet Advice** |
|---|---|
| **Individual** | • Work to eat nutritious meals to avoid irregular snacks.<br>• Choose foods such as citrus fruits, nuts, dark green leafy vegetables, and dairy products that are high in vitamin A, vitamin B6, vitamin C, vitamin E, and vitamin B12, zinc and iron.<br>• Maintain a decent fitness lifestyle (home-exercises), healthy sleep and meditation.<br>• Refrain from the dissemination of food and dietary consumption misconceptions and COVID-19.<br>• Stop smoke, drugs and alcohol. |
| **Community** | • Identify and support populations within the community at risk of malnourishment, particularly elderly people and patients with chronic diseases.<br>• Spread information of the disastrous effects of hoarding and panic-buying.<br>• Establish a coordinated and effective support mechanism for all community residents to ensure the supply, access, and affordability of important food supplies. |
| **National** | • Defining, funding and supplying a low-cost diet food basket that meets the population's nutritional needs, make sure the practice of the country's native agrarian products, and diminishes dependency on foodstuffs import.<br>• Assemble money to fund the purchase and provision of food.<br>• For staple food and commodities, waive taxes.<br>• Support enterprises in agricultural and food processing.<br>• Building links within private sector, local governments, and foreign organizations.<br>• Sustain high degree of accountability, which is crucial for building confidence, funding and global compliance. |
| **Global** | • Ensuring the continuous flow of foreign markets, preventing any trade barriers would be helpful for holding foodstuff and nourish stocks, as well as agrarian inputs, since deteriorating local situations by now affected by COVID 19 comeback initiatives.<br>• Diminish import duties and other food supply limitations. |

- Consume organic veggies (yellow bell pepper, ginger, kale, garlic, broccoli, dried cilantro, lime, and green chili pepper) 2.5 vegetable cups 5 servings of legumes (lentils and beans).
- Eat fruit regular with a serving size of 2 cups (guava, banana, apple, blackcurrant, cantaloupe melon, orange, jackfruit, pineapple, grapefruit, strawberry, papaya, Longman fruit, pumelo) 4 servings (Khan et al., 2021a).
- Use nuts like coconut, pistachio, and almonds.
- Use of clove and black pepper (Khan et al., 2021b).
- Eat entire nuts and grains, 180g of cereal, (oats, buckwheat, millet, wheat, and unprocessed maize, roots such as yam, potato or brown rice) (Noreen et al., 2020).
- Avoid non-regular treats.
- For snacks, instead of foods which are rich in fat, sugar, or salt use raw vegetables and fresh fruits.
- Do not overcook vegetables because it allows essential nutrients such as minerals and vitamins to be lost.
- Choose types without added sugar or salt by using dried or frozen vegetables and fruits.
- Making sure that the foodstuff is prepared and served at appropriate temperatures (for 2 minutes, around 72 ° C).
- Consume unsaturated fats originate in (fish, almonds, avocado, olive oil, soy, corn oil, sunflower and canola) instead of saturated fats (fatty meat, coconut, butter and cheese, palm oils, cream, and ghee),
- Avoid all juices that are carbonated, fizzy, condensed, and all beverages that contain sugar.
- 8 to 10 glasses of water drink per day. It aids to carry blood nutrients, get liberate of left-over, and control the temperature of the body.
- To prevent communication with extra folks and strive to decrease the risk of presence unprotected to COVID 19, feed at home.
- Maintain a balanced workout, yoga, and daily sleep lifestyle. Sufficient sleep can help to facilitate the functioning of the immune system.
- A proper diet will aid in ensuring the body is in the best likely state-owned to combat the infection. The food wellbeing control scheme obligation have adequate personal protective devices for food safety officials and staff to prevent exposure.
- Researchers have found that, through food packaging or food, there is no source of virus adulteration (Faseeha Aman *et al*., 2020).

**What should be done in order to protect?**

Nearly one-third of associations and communities advised that the consumption of fat, salt and sugar be avoided and promoted decreases in the intake of saturated fat in sugar beverages, additional sugar rich foodstuffs, meat servings and other foodstuffs of animal source (de Faria Coelho-Ravagnani, *et al.*, 2020).

**Food Hygiene Practices**

In body of an diseased individual after completing its life cycle, COVID 19 virus has the potential to remain active for up to 72h as a virion on non-living matters (van Thus, if the COVID 19 patient's respiratory discharges originate in interaction with foodstuff, the foodstuffs will convert a fomite (transporter) and uncertainty these things are communicated by new people, as sanitized hands enter the nose, eyes and mouth, the infection is most probable to achieve access to their respirational epithelium. Surfaces of utensils, counters, packing materials, conveyor belts, transport vehicle interiors and all new foodstuffs work locations wherever human interaction with foodstuffs is likely to occur should remain the subject of concern where food

handlers may operate to deter COVID-19 from spreading. It is also most necessary to use personal protective equipment properly and to comply with the recommendations provided by public health agencies, which require daily hand washing after the exchange of products, favorable the use of hand sanitizers, the use of masks and gloves and at least 6 feet maintenance between staff. The marketplace sells a number of antiseptics and sanitizers. If the antiseptic brands suggest that they are nominal against COVID 19 or noroviruses, so SARS-CoV-2 should also be effective against them. (Olaimat *et al.*, 2020).

It is often recommended that healthy food practices lower the risk of pollution, which is as follows:

- Prior to feeding, wash fruits and vegetables.
- Wash, scrub and clean objects and surfaces at all times prior to and afterward use.
- Keep prepared and uncooked foodstuffs apart, as that will protect the destructive microorganisms from spreading to cooked foods from raw foods.
- To avoid cross-contamination, use various Utensils and cutting boards for cooked and raw foods.
- Staff of the food service should wear masks when cooking a meal.
- Strain not to view or wholesale the self-service security unwrapped food.
- Sanitize surfaces that have come into touch with consumers or staff sometimes, such as door knobs, counters, shopping carts. (Faseeha *et al.*, 2020).

**Recommendations for Hospitals**

Several facets of this communicable infection resemble metabolic activities exposed to arise throughout latent subclinical magnesium deficiency. Hypomagnesemia is comparatively normal theoretical event that frequently goes unrecognized since the clinical setting rarely measures magnesium levels. Magnesium is the greatest predominant intra cellular cation subsequently potassium. It is implicated in >600 enzymatic responses in the body, containing individuals occurring in COVID 19 patients displaying exaggerated immune and inflammatory responses. For the prevention and treatment of COVID19, concurrent magnesium and vitamin D supplementation may be important. Eating nutrient-dense foods that meet existing proposed U.S. trends. For the promotion of immune system tolerance, dietary recommendations are important. A daily supplement of 350 mg of magnesium can be considered for usual healthy persons taking precautions to avoid contamination or those having moderate COVID 19 indications, particularly if the dietary intake is minimal. Unless otherwise recommended by a certified medical practitioner, moderate regular concluded the counter supplementation of vitamin D3 or vitamin D2 must stay below the existing 4000 IU per day of UL. In COVID 19 patients with mild to extreme hypokalemia, cytokine storm, or possible hypomagnesemia, life-threatening care teams in the intensive care unit may want to suggest magnesium distillation. The normal adult dosage for the treatment of hypomagnesemia is (8 mEq) 1 g of 4-dose intravenous magnesium per 6 hrs (slight hypomagnesemia) or up to 250 mg/kg over a span of 4 hrs (severe hypomagnesemia (Wallace *et al.*, 2020).

**Nutrition of a COVID-19 Patient in the Intensive Care Unit**

It is necessary to follow the international guidelines on diet in the intensive care unit. Any unique nourishment problems for patients of COVID 19 in the intensive care unit should be illustrated for the optimization of diet regulation of COVID

19 patients in the intensive care unit, we suggest a flow map (Thibault *et al.*, 2020).

**Social Distancing**

Social distance steps are one of the key methods for minimizing coronavirus 2 spread (SARS-CoV-2) virus that effects coronavirus disease in 2019 in the absence of a vaccine (COVID 19) (Weill, *et al* 2020). State and local governments have imposed social distancing steps to deter the transmission of the novel coronavirus disease. These initiatives included prohibitions on large social gatherings; openings of schools; closures of entertainment centers, gyms, pubs, and eating areas for restaurants; and orders for shelter in location (Charles Courtemanche *et al.*, 2020). The daily rising cases and demises of COVID 19 have contributed to global lockout, quarantine and some constraints. To avoid the COVID 19 pandemic, the lockout, one of the social exclusion prohibitions, has been demonstrated and shown that the dissemination of the virus can be greatly decreased by this protective ban (Atalan, 2020).

## CONCLUSION

The pandemic of Covid-19 is still a big threat worldwide. The solution to this worldwide public health problematic is not straightforward, since the cause is multidimensional and intertwined with multiple economic, social and cultural aspects. To protect against viruses, it is compulsory to obtain and retain good dietary status. The general advice is to eat a food focused mainly on additional ingredients, such as vegetables, whole grains, fruits, low-fat forms of milk and balanced fats (fish oil and olive oil), and to reduce the ingestion of high-salt sugar and high calorie and refined foods. Dietary supplements (i.e. vitamin C and vitamin D, selenium plus zinc) should be given to persons with or at danger of viral respirational illness or deficit. Breast milk, also in women afflicted with COVID 19, is the best and healthiest food for babies and breast feeding must be promoted. At the person level, the value of keeping the right lifestyle during routine COVID-19 pandemic exercise balanced and nourishing foods.

## CONFLICT OF INTEREST

The authors declared that present study was done in absence of any conflict of interest.

## ACKNOWLEDGEMENT

The authors declared that there is no acknowledgement

## AUTHOR CONTRIBUTIONS

SB, TF and AU collected the data. SN and BR analyzed the data: MW, SS and HS wrote an article. All authors interpreted the data, critically revised the manuscript for important intellectual contents and approved the final version.

## REFERENCES

Abid, K., Bari, Y. A., Younas, M., Tahir Javaid, S., & Imran, A. (2020). <? covid19?> Progress of COVID-19 Epidemic in Pakistan. *Asia Pacific Journal of Public Health*, *32*(4), 154-156.

Ali, A., Zhongren, M., & Baloch, Z. (2020). Covid-19 in Pakistan and potential repercussions for the world: is the infection on the verge of endemicity?. bmj, 369.

Aman, F., & Masood, S. (2020). How Nutrition can help to fight against COVID-19 Pandemic. *Pakistan Journal of Medical Sciences*, *36*(COVID19-S4).

Atalan, A. (2020). Is the lockdown important to prevent the COVID-19 pandemic? Effects on psychology, environment and economy-perspective. *Annals of medicine and surgery*, *56*, 38-42.

Berloto, S., Notarnicola, E., Perobelli, E., & Rotolo, A. (2020). Italy and the COVID-19 long-term care situation. *Country report in LTCcovid. org, International Long Term Care Policy Network, CPECLSE*, *30*.

Chandir, S., Siddiqi, D. A., Setayesh, H., & Khan, A. J. (2020). Impact of COVID-19 lockdown on routine immunisation in Karachi, Pakistan. *The Lancet Global Health*, *8*(9), e1118-e1120.

Courtemanche, C., Garuccio, J., Le, A., Pinkston, J., & Yelowitz, A. (2020). Strong Social Distancing Measures In The United States Reduced The COVID-19 Growth Rate: Study evaluates the impact of social distancing measures on the growth rate of confirmed COVID-19 cases across the United States. *Health Affairs*, 10-1377.

Daniyal, M., Ogundokun, R. O., Abid, K., Khan, M. D., & Ogundokun, O. E. (2020). Predictive modeling of COVID-19 death cases in Pakistan. *Infectious Disease Modelling*, *5*, 897-904.

Dashraath, P., Jeslyn, W.J. L., Karen, L.M. X., Min, L. L., Sarah, L., Biswas, A., & Lin, S. L. (2020). Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. American journal of obstetrics and gynecology, 222(6), 521-531.

de Faria Coelho-Ravagnani, C., Corgosinho, F. C., Sanches, F. L. F. Z., Prado, C. M. M., Laviano, A., & Mota, J. F. (2021). Dietary recommendations during the COVID-19 pandemic. *Nutrition Reviews*, *79*(4), 382-393.

Gasmi, A., Noor, S., Tippairote, T., Dadar, M., Menzel, A., & Bjørklund, G. (2020). Individual risk management strategy and potential therapeutic options for the COVID-19 pandemic. *Clinical Immunology*, *215*, 108409.

Gasmi, A., Tippairote, T., Mujawdiya, P.K., Peana, M., Menzel, A., Dadar, M., & Bjørklund, G. (2020). Micronutrients as immunomodulatory tools for COVID-19 management. *Clinical Immunology*, 108545.

Gattinoni, L., Chiumello, D., & Rossi, S. (2020). COVID-19 pneumonia: ARDS or not?. *Critical care*, *24*(1), 1-3.

Government of Pakistan. Pakistan statistics. http://covid.gov.pk/

Jayawardena, R., & Misra, A. (2020). Balanced diet is a major casualty in COVID-19. *Diabetes & metabolic syndrome*, *14*(5), 1085.

Khan, A. U., Ema, I. J., Faruk, M., Tarapder, S. A., Khan, A. U., Noreen, S., & Adnan, M. (2021). A Review on Importance of Artocarpus heterophyllus L.(Jackfruit). *Journal of Multidisciplinary Applied Natural Science*.

Khan, A. U., Talucder, M. S. A., Das, M., Noreen, S., & Pane, Y. S. (2021). Prospect of The Black Pepper (Piper nigrum L.) as Natural Product Used to an Herbal Medicine. *Open Access Macedonian Journal of Medical Sciences*, *9*(F), 563-573.

Kondziolka, D., Couldwell, W. T., & Rutka, J. T. (2020). Introduction. On

pandemics: the impact of COVID-19 on the practice of neurosurgery. *Journal of neurosurgery*, *133*(1), 1-2.

Lau, H., Khosrawipour, V., Kocbach, P., Mikolajczyk, A., Ichii, H., Schubert, J., & Khosrawipour, T. (2020). Internationally lost COVID-19 cases. *Journal of Microbiology, Immunology and Infection*, *53*(3), 454-458.

Lewnard, J.A., & Lo, N.C. (2020). Scientific and ethical basis for social-distancing interventions against COVID-19. *The Lancet. Infectious diseases*, *20*(6), 631.

Naja, F., & Hamadeh, R. (2020). Nutrition amid the COVID-19 pandemic: a multi-level framework for action. *European Journal of Clinical Nutrition*, 1-5.

Noreen, S., Rizwan, B., Khan, M., & Farooq, S. (2020). Health benefits of Buckwheat (Fagopyrum esculentum), potential remedy for diseases, rare to cancer: A mini Review. *Infectious Disorders Drug Targets*.21(6).

Olaimat, A. N., Shahbaz, H. M., Fatima, N., Munir, S., & Holley, R. A. (2020). Food safety during and after the era of COVID-19 pandemic. *Frontiers in Microbiology*, *11*, 1854.

Ruiu, G., & Ruiu, M. L. (2020). Violation of lockdown norms and peaks in daily number of positive cases to COVID-19 in Italy. *Emerald Open Research*, *2*(25), 25.

Saeed, U., Sherdil, K., Ashraf, U., Younas, I., Butt, H. J., & Ahmad, S. R. (2021). Identification of potential lockdown areas during COVID-19 transmission in Punjab, Pakistan. *Public health*, *190*, 42-51.

Spinelli, A., & Pellino, G. (2020). COVID-19 pandemic: perspectives on an unfolding crisis. *Journal of British Surgery*, *107*(7), 785-787.

Tang, K., Wang, Y., Zhang, H., Zheng, Q., Fang, R., & Sun, Q. (2020). Cutaneous manifestations of the Coronavirus Disease 2019 (COVID-19): A brief review. *Dermatologic therapy*, *33*(4), e13528.

Thibault, R., Seguin, P., Tamion, F., Pichard, C., & Singer, P. (2020). Nutrition of the COVID-19 patient in the intensive care unit (ICU): a practical guidance. *Critical Care*, *24*(1), 1-8.

Ullah, R., Rana, M. S., Qadir, M., & Usman, M. (2020). First COVID-19 related death in Pakistan in a patient with a travel history in Saudi Arabia. *Asian Pacific Journal of Tropical Medicine*, *13*(8), 375.

Wallace, T. C. (2020). Combating COVID-19 and building immune resilience: a potential role for magnesium nutrition?. *Journal of the American College of Nutrition*, *39*(8), 685-693.

Weill, J. A., Stigler, M., Deschenes, O., & Springborn, M. R. (2020). Social distancing responses to COVID-19 emergency declarations strongly differentiated by income. *Proceedings of the National Academy of Sciences*, *117*(33), 19658-19660.

Zu, Z.Y., Jiang, M.D., Xu, P.P., Chen, W., Ni, Q.Q., Lu, G.M., & Zhang, L.J. (2020). Coronavirus disease 2019 (COVID-19): a perspective from China. *Radiology*, 200490.