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Review Article

Revisiting COVID-19 Strategies in 2025: Health Trends, Diagnostic Advances, and Nutrition Insights

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Abstract

The novel COVID-19 variant NB.1.8.1 has been classified as a Variant Under Monitoring (VUM) by the World Health Organization, signaling the continued evolution of the pandemic in 2025. This designation highlights the potential impact of ongoing viral mutations on global public health. This review provides a comprehensive overview of the current epidemiological landscape, highlighting key trends, diagnostic innovations, emerging health concerns, and strategic approaches for disease management in the current phase of the pandemic. By June 2025, global test positivity rates have risen to 11%, with India reporting an increase in active COVID-19 cases, reaching 4,866. These indicators point to a resurgence that warrants renewed attention to containment and treatment strategies. In this context, the role of evidence-based nutrition and dietary support has become increasingly significant. Recent findings underscore the importance of targeted nutritional interventions and supplementation in bolstering immune function, reducing symptom severity, and aiding recovery from COVID-19. This article synthesizes the latest scientific evidence on dietary protocols, focusing on key nutrients such as vitamin D, zinc, and omega-3 fatty acids, alongside other bioactive compounds known to enhance immune resilience. It also explores personalized nutrition strategies tailored to individual risk profiles and comorbidities, reflecting a growing trend toward integrative and preventive healthcare. Through an analysis of current data and clinical recommendations, this review aims to support healthcare professionals, researchers, and policymakers in refining COVID-19 response strategies. Emphasizing the intersection of nutrition and infectious disease management, it highlights how dietary science can serve as a vital adjunct to medical treatment in navigating the ongoing challenges of the pandemic.

Keywords: COVID-19, NB.1.8.1 variant; diagnostics; nutrition; dietary management; immune support

1.Introduction

As of mid-2025, the world continues to grapple with COVID-19, now in its sixth year since the pandemic's onset. The emergence of new variants, particularly NB.1.8.1, has raised concerns about transmissibility and immune evasion capabilities (1). Global surveillance data indicates that SARS-CoV-2 activity has been increasing since mid-February 2025, with test positivity rates reaching 11% across 73 reporting countries levels not observed since July 2024 (2). This review examines the current state of COVID-19 health issues, diagnostic methods, and the critical role of nutrition in supporting immune function and recovery.

2. New COVID-19 Variants and Health Issues in 2025

2.1 NB.1.8.1 Variant Characteristics

The NB.1.8.1 variant, first identified on January 22, 2025, represents a significant evolutionary step in SARS-CoV-2 development. This variant is a descendant lineage of XDV.1.5.1, which itself descended from JN.1 (2). By mid-May 2025, NB.1.8.1 comprised 10.7% of global sequences, representing a dramatic increase from 2.5% four weeks prior (1, 2). The variant contains six additional spike mutations compared to the dominant LP.8.1 strain: T22N, F59S, G184S, A435S, V445H, and T478I (2). Laboratory studies have demonstrated that NB.1.8.1 exhibits the highest capacity to attach to human ACE2 receptors among tested variants, suggesting increased transmissibility (1).

2.2 Current Epidemiological Situation

India has experienced a notable resurgence, with active COVID-19 cases rising to 4,866 as of June 5, 2025, up from 4,302 the previous day (3). The country has reported 7 COVID-19-related deaths in 24 hours, including vulnerable populations such as a 5-month-old infant and an 87-year-old individual in Delhi (3).

Variant	First Detection	Global Prevalence (%)	Key Mutations	Transmissibility	Immune Evasion
NB.1.8.1	January 2025	10.7	T22N, F59S, G184S, A435S, V445H, T478I	Enhanced	Moderate
LP.8.1	March 2025	38.0	Multiple spike mutations	High	Moderate
LF.7	2025	Regional	Under investigation	Moderate	Under study
XFG	2025	Regional	Under investigation	Moderate	Under study
JN.1	Late 2024	Declining	Previous mutations	Moderate	Low

Table 1: COVID-19 Variants and Characteristics in 2025

Reference: (1, 2, 3)

3. Current Symptoms and Clinical Presentation

3.1 Symptom Profile for 2025 Variants

The symptom profile for COVID-19 in 2025 remains largely consistent with previous variants, though with some notable variations. Common symptoms include sore throat, cough, muscle pain, fever, and nasal congestion, along with gastrointestinal symptoms such as nausea and diarrhea (1, 5).

Symptom Category	Primary Symptoms	Frequency (%)	Severity	Duration
Respiratory	Dry cough, sore throat, shortness of breath	75-85	Mild-Moderate	3-7 days
Constitutional	Fever, fatigue, headache, muscle aches	70-80	Mild-Moderate	2-5 days
Gastrointestinal	Nausea, appetite loss, diarrhea	30-40	Mild	2-4 days
Neurological	Brain fog, cognitive difficulties	25-35	Mild	5-14 days
Sensory	Loss of taste/smell (less common)	15-25	Mild	7-21 days

Table 2: COVID-19 Symptoms and Frequency in 2025

Reference: (1, 3, 5)

4. Diagnostic Methods and Technologies

4.1 Current Diagnostic Approaches

The diagnostic landscape for COVID-19 in 2025 has evolved to include more rapid and accurate testing methods. RT-PCR remains the gold standard, with improved primer designs reducing detection time from 74 minutes to 26 minutes (6).

Test Type	Sensitivity (%)	Specificity (%)	Time to Result	Cost	Primary Use
RT-PCR	95-100	100	26 minutes - 6 hours	High	Confirmation
Rapid Antigen	70-85	95-99	15-30 minutes	Low	Screening
Multiplex RT-qPCR	90-95	98-100	1-3 hours	High	Differential diagnosis
Genome Sequencing	100	100	24-48 hours	Very High	Variant identification
Home Testing Kits	65-80	90-95	15-20 minutes	Low	Self-screening

Table 3: COVID-19 Diagnostic Methods in 2025

Reference: (6)

4.2 Ct Value Interpretation

For nasopharyngeal samples, Ct values provide critical information about viral load and transmission risk: <20 indicates remarkably high viral load, 20-25 high viral load, <30 moderate to low viral load, and 30-33 very low transmitting risk (6).

5. Nutritional Management and Dietary Interventions

5.1 Evidence-Based Nutritional Strategies

Nutrition plays a crucial role in COVID-19 prevention, management, and recovery. Research has demonstrated strong links between dietary patterns and COVID-19 outcomes, with plant-rich diets associated with reduced infection risk and faster recovery (13, 17).

Nutrient	Daily Requirement	Food Sources	Mechanism of Action	Clinical Evidence
Vitamin D	1000-4000 IU	Fatty fish, eggs, fortified foods	ACE2 receptor interaction	Reduced severity, faster recovery
Vitamin C	500-1000 mg	Citrus fruits, berries, vegetables	Antioxidant, immune support	Improved endothelial function
Zinc	8-15 mg	Nuts, seeds, meat, legumes	Immune cell function	Reduced infection duration
Omega-3 fatty acids	1-2 g EPA/DHA	Fish, walnuts, flaxseeds	Anti-inflammatory	Improved survival rates
Vitamin A	700-900 µg	Liver, sweet potato, carrots	Immune response enhancement	Reduced pneumonia risk

Table 4: Key Nutrients for COVID-19 Management

Reference: (10, 16, 17)

5.2 Dietary Recommendations During Active Infection

During active COVID-19 infection, nutritional support should focus on maintaining hydration, supporting immune function, and addressing symptoms that may affect food intake (7, 18).

Mealtime	Food Items	Nutritional Focus	Hydration
Early Morning	Soaked almonds, walnuts, herbal kadha	Antioxidants, anti-inflammatory	250ml herbal tea
Breakfast	Dal cheela/idli with chutney	Protein, probiotics	200ml buttermilk
Mid-Morning	Coconut water with fruits	Electrolytes, vitamin C	300ml coconut water
Lunch	Rice, dal, vegetables, curd	Complete protein, fiber	200ml water
Evening	Herbal tea with nuts	Immune support	250ml herbal tea
Dinner	Chapatti, dal, vegetables	Balanced nutrition	200ml water
Before Bed	Turmeric milk	Anti-inflammatory	200ml warm milk

Table 5: Sample Diet Plan for COVID-19 Patients

Reference: (18)

6. Supplement Interventions and Clinical Evidence

6.1 Evidence-Based Supplementation

Clinical studies have demonstrated the efficacy of specific supplements in COVID-19 management. A study in hospitalized patients showed that daily supplementation with 150 mg magnesium, 1,000 IU vitamin D3, and 500 µg vitamin B12 reduced the need for oxygen therapy and intensive care support (10).

Study	Population	Intervention	Duration	Primary Outcome	Results	Reference
Iran RCT	64 hospitalized adults	300mg magnesium daily	Hospital stay	Oxygen therapy requirement	9 vs 14 patients needed oxygen	(10)
UK Biobank	372,720 residents	Omega-3 supplements	3+ months	SARS-CoV-2 infection risk	12% lower infection risk	(10)
Norway RCT	34,601 adults	5ml cod liver oil daily	6 months	Infection incidence	No significant difference	(10)
Iran ICU	128 critically ill	1000mg omega-3	14 days	1-month survival	Significantly higher survival	(10)
Serbia Hospital	5 patients	Mg/K/Zn/Citric acid	48 hours	Oxygen saturation	3.6 point increase	(10)

Table 6: Clinical Studies on COVID-19 Supplements

Reference: (10)

7. Prevention and Management Strategies

7.1 Public Health Recommendations

Maintaining prominent levels of vaccination coverage remains the cornerstone of COVID-19 prevention. Public health agencies worldwide—including the World Health Organization—strongly advise individuals to stay up to date with their vaccination schedules, including booster doses, even in the face of evolving variants. This guidance holds irrespective of pending variant-specific vaccines: the protective benefits of current formulations, grounded in a broader immune response, outweigh the risks associated with delaying immunization (2, 4). Timely vaccination not only reduces the incidence of severe disease and death but also mitigates transmission, thus relieving strain on healthcare systems and preserving workforce stability.Hand hygiene and respiratory etiquette continue to be vital. Frequent handwashing with soap or use of alcohol-based sanitizers helps reduce viral spread via surfaces and droplets. Covering coughs or sneezes, wearing masks in crowded or poorly ventilated spaces, and avoiding close contact when symptomatic remains recommended. Public messaging emphasizes the concept of layering these measures—vaccination, masks, hygiene, and distancing—to maintain a strong collective defense, especially during seasonal peaks or emergence of new lineages. Nutritional support is increasingly recognized as an adjunct in prevention strategies. A balanced diet rich in micronutrients (vitamins A, C, D, E; B-complex; zinc; selenium) along with adequate protein and healthy fats supports optimal immune function. Public health campaigns encourage people to maintain such a diet, especially in vulnerable populations—elderly, immunocompromised, pregnant, and poor communities. Efforts include fortification programs, supplementation guidelines, and partnerships with local food systems to ensure access to nutrient-dense foods. Recognizing nutrition as a determinant of immune resilience elevates it to a frontline prevention tool alongside vaccination

and hygiene *(10, 16, 17)*.Education and communication strategies are essential to bolster prevention efforts. Digital platforms, community outreach, and healthcare provider networks deliver culturally tailored messages about vaccine safety, emerging variants, and accessible hygiene practices. Addressing vaccine hesitancy and misinformation is paramount. Transparent communication of evolving evidence, adverse event monitoring, and variant tracking builds trust. Collaboration with community leaders and influencers supports reach in underserved areas. Effective public health messaging is continuous, adapting to changes in epidemiology and variants like NB.1.8.1, reinforcing individual and collective responsibility in disease control (1-4).

7.2 Clinical Management Guidelines

Managing mild to moderate COVID-19 cases typically begins at home, with patients advised to isolate until they meet CDC or WHO criteria—commonly ten days post–symptom onset and 24 hours fever-free without medication. Clinical care focuses on symptom relief and preventing complications. Nutrition plays a dual role in therapy and prevention: high-protein meals, easily digestible foods, and maintaining hydration support general recovery. Micronutrients such as vitamin C, vitamin D, zinc, and omega-3s—while not replacements for medical treatment—may reduce inflammation and bolster host defenses. Dietitians and primary care providers play a vital role in tailoring these recommendations, considering any dietary restrictions or comorbidities like diabetes or renal impairment. Remote monitoring tools enable clinicians to assess at-home patients regularly. Telehealth check-ins, symptom-tracking apps, and pulse oximetry help identify early deterioration. If warning signs—shortness of breath, persistent fever, chest pain, decreased oxygen saturation ($< 94\%$)—are detected, a hospital referral is triggered. Rapid escalation saves lives, particularly in individuals with risk factors (age > 60, obesity, chronic lung or cardiac disease, immunosuppression, pregnancy). Hospitalization criteria include moderate to severe respiratory distress, need for supplemental oxygen, or inability to maintain oral intake. In inpatient settings, standard care involves oxygen therapy, intravenous fluids/nutritional support, corticosteroids, and targeted antivirals like remdesivir or nirmatrelvir–ritonavir. Nutritional strategies—enteral feeds if swallowing difficulties arise, or parenteral support when needed—prevent

catabolism and support immune and respiratory systems. Nutrients such as glutamine and arginine support gut integrity and immune cell function (20,21).

Special attention is needed for long COVID or post acute sequelae. Clinical teams report persistent cognitive disturbances (brain fog, memory loss), fatigue, joint pain, shortness of breath, and gastrointestinal issues weeks or months post infection (3, 15). Multidisciplinary long COVID clinics, employing pulmonologists, neurologists, gastroenterologists, dietitians, and physiotherapists, offer structured rehabilitation. Cognitive therapies, gradual physical activity plans (like graded exercise therapy, where appropriate), breathing exercises, and dietary adjustments (e.g., fiber rich diets for gut symptoms) are tailored to individual needs. Patients receive ongoing assessments to detect and manage symptom clusters, vulnerabilities, and comorbidities. Early intervention appears to improve outcomes. Stratifying severity and personalizing treatment is increasingly important. Biomarkers—CRP, IL 6, D dimer—guide use of immunomodulators. Genetic and metabolomic profiling may soon inform personalized nutrition approaches, such as adjusted micronutrient levels or microbiome targeted therapies. Clinical trials are underway examining vitamin D dosing in early infection or its effect on long COVID fatigue. Robust clinical management integrates empirical medical care with emerging supportive therapies, responsiveness to long term symptoms, and holistic rehabilitation philosophies (22-25).

8. Research Needs

8.1 Emerging Research Areas

Advancing COVID 19 response demands optimized nutritional interventions adapted for specific viral variants. Different variants may modulate immune and inflammatory pathways uniquely; lab and clinical trials are investigating how nutritional factors like vitamin D, omega 3 fatty acids, probiotics, and specific amino acids—interact with variant induced pathogenesis. Early findings suggest vitamin D supplementation may reduce risk of acute respiratory distress in delta lineage infections. Future trials will need variant stratified randomization to clarify these interactions. Personalized nutrition protocols represent a promising frontier. Nutrigenomics explores how genetic variants influence nutrient metabolism and immunity; for instance, polymorphisms in vitamin D receptor or zinc transporter genes could predict individual responses to supplementation (24-26). Coupled with metabolic profiling and microbiome analysis, personalized nutrition could

enhance host response to infection. Pilot interventions are already evaluating tailored nutrition in diabetic or obese patients diagnosed with COVID-19, comparing outcomes to standard dietary advice. The gut microbiome's role in COVID-19 outcomes draws growing attention. Dysbiosis may enhance susceptibility; early severe disease has been linked to depletion of beneficial *Bifidobacterium* and *Faecalibacterium* strains. Fecal microbiota transplants, targeted probiotics, or prebiotic fiber therapies are under investigation, with pilot data showing improvements in GI symptoms and inflammation(27,28). Sophisticated metagenomic and metabolomic studies will refine our understanding of pathogen–microbiome–immune crosstalk. Integrating microbiome modulation into standard care is a future possibility. Cross-disciplinary trials are exploring adjunctive therapies like polyphenol-rich diets (e.g., blueberries, green tea) to attenuate oxidative stress, and high-dose intravenous vitamin C for hospitalized patients. Mesenchymal stem cell therapy, monoclonal antibodies, and antivirals will continue evolving; nutritional therapies must be explored in combination rather than isolation, to identify synergistic or antagonistic interactions. Adaptive platform trials enable flexible, real-time comparison of nutritional adjuvant strategies against standard of care, enhancing evidence quality (29-31).

8.2 Public Health Implications

A shift toward integrating nutrition into standardized COVID-19 care could reshape public health guidelines. Infection management traditionally centers on pharmaceuticals and vaccines, with minimal attention to dietary factors. However, ample evidence underscores mismatched metabolic states—in malnutrition or obesity—as linked to worse COVID-19 outcomes. Policymakers should consider embedding nutrition screenings in COVID-19 triage systems, supplement distribution programs, and medically supervised nutrition pathways, particularly in lower-resource settings. Nutrition policies intersect with social determinants of health. Food insecurity, poverty, and limited healthcare access exacerbate vulnerability. Thus, public health systems must broaden from individual-centric interventions to structural changes—expanding support for school feeding programs, community food banks, and targeted food vouchers for high-risk groups. Partnerships among health agencies, agricultural sectors, and social services are essential. For example, campaigns to promote vitamin-fortified staples (rice, flour) or routine supplementation for at-risk demographics could reduce population-level susceptibility. Workforce training must evolve(25-28). Frontline health professionals, physicians, nurses, community health workers—require

knowledge on dietary risk stratification, supplementation protocols, and referral pathways to nutrition support services. Continuing medical education modules and official guidance documents can equip them with simple algorithms: e.g., screening diabetic patients for vitamin D deficiency upon COVID 19 diagnosis, or prescribing zinc supplementation in elderly patients. Nutritional literacy combined with viral disease management creates a more holistic and compassionate approach to care. Data collection and monitoring systems also need updating. National databases about COVID 19 should routinely integrate nutritional and anthropometric data, enabling large scale analyses on the effect of nutrition on severity and recovery. Public health surveillance could track rates of deficiency in populations during outbreaks, informing supply or intervention schemes. Post COVID follow up clinics can collect dietary and biologic data to monitor long term consequences and refine future care guidelines. Finally, communication strategies must highlight nutrition as a pillar of resilience—not just a "nice to have." Media campaigns, health advisories, and community events can deliver clear messaging: "Vaccines + Masks + Nutrition = Strong Defense." Behaviors around diet are cultural and habitual; consistent messaging can help normalize nutrient rich diets. Collaborative programs between governmental public health agencies and trusted NGOs can amplify local voices and ensure culturally relevant, sustainable interventions (28,29).

Conclusion

In 2025's dynamic COVID 19 landscape, prevention and management strategies must expand beyond vaccines and hygiene to include nutritional support at every stage—before, during, and after infection. Clinical protocols increasingly reflect this paradigm, recommending dietary support for home care, tailored nutritional guidance in hospitals, and multidisciplinary long term recovery programs. Future research must deepen understanding of variant specific nutritional needs, personalized diets guided by genetics and microbiomes, and transformative public health policies that embed nutrition into standard care frameworks. The integration of dietary science into COVID 19 response holds promise not only for improving individual outcomes but also for enhancing collective resilience in the face of ongoing and future threats.

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