FOOD, NUTRITION, AND COVID-19

NEJM Perspective: Ensuring nutritional needs of vulnerable children during pandemic is 'critical'

According to a March 30, 2020 Perspective piece in the New England Journal of Medicine (NEJM) co-authored by Dr Erica Kenney, Assistant Professor of Public Health Nutrition, and other Harvard Chan School researchers, schools and child care centers across the US that have closed down because of the COVID-19 pandemic have left millions of children who relied on school meals to now face serious food insecurity.

The authors write that missed meals can lead not only to fatigue and reduced immune response, but also to and long-term developmental, psychological, physical and emotional harms. They offered several recommendations to address children’s food insecurity over the coming weeks and months, including to centralize and widely distribute information about schools and school districts offering meals during school closures. They also suggest providing families with multiple days’ worth of meals, perhaps with drive-
through meal pickup, in order to decrease their social exposures and reduce their time and transportation burden.

The authors further write that “As we grapple with Covid-19, it’s critical to ensure that the nutritional needs of vulnerable children are met in order to avoid exacerbating disparities in health and educational attainment for years to come”.


Read the NEJM Perspective article: Feeding Low-Income Children during the Covid-19 Pandemic


Drs Qi Sun and Jorge Chavarro begin to collect valuable information from nurses in large cohort studies

Since the outbreak of COVID-19 in the US, our cohort investigators initiated an effort to collect COVID-19–related information in our cohort studies, especially the Nurses’ Health Study II and III. Many of our study participants are still actively working as nurses in hospitals and possibly fighting COVID-19 at the frontline. It is therefore critical to understand whether they have access to personal protective equipment (PPE), whether they are under substantial stress, and whether they have a COVID-19 infection. Several of our other cohorts, including the Health Professionals Follow-Up Study and GUTS), also participated. The overall plan is to roll out an online survey to collect information among these cohorts. It is important to emphasize that many investigators from Harvard Medical School and the Harvard TH Chan School of Public Health lead, contribute, and participate in this joint effort.
For example, Dr Sun, Associate Professor, leads, with tremendous support from Dr Walter Willett, Professor of Epidemiology and Nutrition, and Dr Frank Hu, Professor and Chair, the development of a set of brief questions related to potential changes in diet and physical activities during the COVID-19 outbreak, as well as intake of vitamins and other supplements since the outbreak. Participants are also asked to report their weight during the outbreak. Similar work is being undertaken by Dr Jorge Chavarro, Associate Professor of Nutrition and Epidemiology, in Nurses’ Health Study III and GUTS. The investigators feel these questions are important to ask because they can help us understand the impact of social distancing and staying-at-home on diet and physical activity levels and subsequent health consequences. The vitamin questions can help us know whether supplement use may potentially lower the risk of developing severe symptoms or hospitalization after COVID-19 infection.

Currently, a baseline survey has been rolled out and the investigators plan to collect updated information monthly. Dr Andrew Chan, Professor, is working with a UK group to ask our participants to install a symptom tracker, which collects data of COVID-19 symptoms and diagnosis. All these data will be highly valuable for us to understand the impact of the COVID-19 pandemic on both health care workers and people who stay at home, and whether certain characteristics, including vitamin use, diet, and physical activity, predict less or more severe outcomes due to COVID-19 infection. As the outbreak is projected to be lasting for months, collecting these data now is fundamentally critical.

**Drs Walter Willett and Eric Rimm address concerns about food safety and food insecurity during COVID-19**

With COVID-19 now in full swing, many people are questioning the best ways to safely shop, order, and prepare food so as to minimize transmission of the novel coronavirus. Dr Walter Willett, Professor of Epidemiology and Nutrition, and Dr Eric Rimm, Professor of Epidemiology and Nutrition, have addressed these concerns on our Nutrition Source website. They state that although no evidence exists that people can contract the coronavirus disease (COVID-19) from touching food or food packaging that came in contact with the virus due to coughing or sneezing from an infected person, the virus causing COVID-19 can survive on surfaces and objects for a certain amount of time. They therefore caution us to wash our hands regularly, especially after touching frequently handled objects such as door knobs or handles, and stress that social distancing is the most important way for people to reduce risk to themselves and others. Further, Willett and Rimm suggest that eating a healthy diet, remaining physically active, managing stress, and being sure to get enough sleep are critical to keeping immune systems strong.

Willett and Rimm offer many suggestions for maintaining food safety as much as possible, including using wipes provided in grocery stores (or bringing your own) and discarding these immediately since the greatest risk to shoppers of contracting viruses is from touching a shopping cart or basket. The coronavirus can remain on hard surfaces such as steel and plastic for up to 3 days. They also advise touching your face when in public places, carrying hand sanitizer and maintaining a distance of at least 6 feet from other shoppers.

*For these and other useful safety tips when grocery shopping or ordering takeout or delivery meals, please visit the Nutrition Source website at:* [https://www.hsph.harvard.edu/nutritionsource/2020/03/25/food-safety-nutrition-and-wellness-during-covid-19/](https://www.hsph.harvard.edu/nutritionsource/2020/03/25/food-safety-nutrition-and-wellness-during-covid-19/)
Drs Willett and Rimm are presently exploring issues that are more related to food insecurity. Their work is very preliminary at this stage, however, but will appear in future issues of *NutriNews* as it further evolves. Dr Willett also discussed food safety issues in a recent webinar with Senator Ed Markey.

The bulk of Willett and colleagues’ response activity, however, has been to develop a special online COVID-19 follow-up for members of their large cohorts; this can let them look at risk factors for severe disease and also direct and indirect health effects of the pandemic.

**Dr Josiemer Mattei and colleagues establish national COVID-19 syndromic surveillance system**

A new national COVID-19 Syndromic Surveillance System has been established as a collaboration between Dr Josiemer Mattei, Donald and Sue Pritzker Associate Professor of Nutrition, and other researchers from Harvard TH Chan School of Public Health, Ponce Health Sciences University, and Puerto Rico Public Health Trust. This research effort will allow the surveillance of signs and symptoms, as well as management, of COVID-19 by the general population of the United States. It will also help identify vulnerable populations and socio-behavioral factors influencing COVID-19. The surveillance is conducted through a voluntary and anonymous 5-minute survey available for free in English and Spanish to any person residing in the United States and its territories. Through the use of geolocators by zip code, and assessing the signs, symptoms, and possible contact to coronavirus, the COVID-19 Surveillance System can identify possible COVID-19 outbreaks and evaluate how the virus behaves in different regions. A real-time dashboard shows the results immediately to the public and to healthcare and public health officials who can respond to these outbreaks. This will allow more effective planning of preventive and treatment services by region and subgroups.

To participate, people can enter daily at https://bit.ly/COVID19SurveyUSA to access the survey link in English or Spanish (other languages to be available soon).

The Harvard Chan School has also posted its current surveillance projects here: https://www.hsph.harvard.edu/coronavirus/surveys-apps-to-track-covid-19/ Dr Mattei’s and co-investigator Dr Sebastien Haneuse’s, Associate Professor of Biostatistics, project is listed at the bottom (“COVID-19 Signs and Symptoms Surveillance System – Behaviors and Inequities”).
In addition to the above survey, Dr Mattei’s PROSPECT cohort in Puerto Rico is extending its ancillary study with the CDC Dengue Branch of PR and Dr Michael Mina’s (Assistant Professor of Epidemiology) lab on seroprevalence of viral exposures, by adding testing of SARS-CoV-2. They are following up with participants to ask about COVID-19 symptoms, testing, and management. The study will help them identify CVD-related risk factors associated with the coronavirus.

**Dr Anne Lusk explores lighted cycle tracks as one transportation solution to mass transit and climate change challenges**

With risks of COVID-19 contagion on mass transit and greenhouse gas emissions from climate change, Dr Anne Lusk, Research Scientist, explores the need for lighted cycle tracks in protected bike lanes for safe, healthy, and equitable 24-hour active transportation. This is because with more global warming, people around the world will need to bike at night when it is cooler. She also sees the need for planting trees in Silva cells to reach maturity and spaced so as not to block the lights.

Currently, there are no standards for lighting cycle tracks. A community has to hire a lighting specialist to design lighting for a cycle track; few are currently allocating this funding. Lusk sees money for infrastructure and the establishment of standards to build state-of-the-art cycle tracks that include colored, dimmable, LED lights at heights and spacing geared to serve bicyclists of all ages. These cycle track lighting solutions need to be affordable and universal in design but also aesthetic to show the community care to lessen crime. The prescriptive and easy-to-understand lighting and tree planting principles would be in bicycle design guidelines and readily available.

The team for this proposal includes Anne Lusk, Ph.D., individuals with LamLighting in Cambridge, Linda Groat, Ph.D. Professor, University of Michigan Taubman College of Architecture and Urban Planning, and Na Li, Ph.D. Thomas D. Cabot Associate Professor of Electrical Engineering and Applied Mathematics at Harvard.
AWARDS AND RESEARCH PRESENTATIONS

Dr Xuehong (Hong) Zhang, Assistant Professor in the Department of Nutrition, was one of three recipients of the PEER Award at the second annual Zhu Family Center for Global Cancer Prevention symposium, “Novel Diagnostics for Early Cancer Detection”. The event brought together experts from around the world and across disciplines to discuss efforts to build better diagnostic tools for myriad cancers. The symposium also included a moment to honor the three Harvard Chan School researchers who received Prevention and Early Detection for Emerging Researchers (PEER) Awards to help them pursue cutting-edge approaches to detecting early stage cancers.

To read more about the symposium: https://www.hsph.harvard.edu/news/features/cancer-symposium-looks-at-new-diagnostics-for-early-detection/

DISSERTATION DEFENSES

You Wu successfully defended her doctoral dissertation titled "Lifestyle risk factors and risk of breast cancer overall and by subtypes defined by hormone receptor status” on April 23, 2020.


From April 6 to May 1, Dr Chris Duggan (Professor in the Department of Nutrition) and Dr Marie-France Hivert, MD (MGH and Population Medicine) directed their second iteration of an HMS elective entitled "Metabolism, Nutrition and Lifestyle Medicine”. Initially designed as a three times per week seminar for 24 HMS students, the course expanded to include 60 students (due to the limited availability of many other electives due to COVID-19 restrictions) and entailed Monday-Friday lectures, case-based learning, literature reviews and even hands-on cooking demonstrations. The instructors are very grateful to numerous HSPH and teaching-hospital based nutrition faculty and staff for their participation, including Walter Willett, Deirdre Tobias, Helen Delichatsios, Debbie Flynn and many others!

MONDAY NUTRITION SEMINARS

The Department of Nutrition holds its weekly Monday Nutrition Seminar Series every Monday throughout the academic year. The talks are varied, but they highlight the many different aspects of cutting-edge research that is currently being conducted in the fields of nutrition and global public health. These seminars are held from 1:00-1:20 pm and are free and open to the public. Due to coronavirus concerns, the seminars will be presented via Zoom for the rest of the spring semester. A zoom link for viewing will be available one week prior to each seminar.

The following speakers will present their work in May:

May 4: Dr Sheila Isanaka, Assistant Professor of Nutrition & Global Health – "Tackling child undernutrition in vulnerable populations” - NGHP.

May 11: Dr Fang Fang Zhang, Associate Professor, Friedman School of Nutrition, Tufts University – "Diet and Cancer Survival”.

This concludes our Monday Nutrition Seminar Series for Spring 2020. We look forward to seeing you again in the fall when hopefully we will be able to conduct our weekly seminar series in person.
New Faces in the Department!

Dr Lorena S Pacheco
Postdoctoral Fellow

Dr Pacheco received her doctoral degree in Epidemiology from the University of California San Diego-San Diego State University Joint Doctoral Program in Public Health. Her research interests include nutrition, ethnic health disparities, and chronic disease prevention, particularly cardiometabolic disease prevention. She earned her Bachelor of Science in Foods and Nutrition and Master of Public Health, Epidemiology, from San Diego State University. She is a licensed bilingual and multicultural registered dietitian nutritionist, and works with diverse populations, including migrant, minority and underserved, in the U.S. and Latin America, as a dietitian and research collaborator.

Dr Pacheco grew-up in the border region of Tijuana, Baja California, Mexico, and San Diego, California, USA, and is of Chinese, Mexican, and Mediterranean ancestry. She enjoys a physically active lifestyle, reading, and long walks with good conversation...a museum and baseball buff, Lorena loves to travel, explore marketplaces and different cuisines, and cook (collects cookbooks!).

During her stay here, Dr Pacheco’s primary mentor will be Dr Frank Hu; her secondary mentor will be Dr Josiemer Mattei, both within the Department of Nutrition. Also, beginning this July with her Yerby Fellowship, Dr Pacheco’s secondary mentor will be Dr Steven Gortmaker.

Faculty Appointments and Reappointments

Ganmaa Davaasambuu, ScD has been reappointed as Assistant Professor in the Department of Nutrition.

For more information, contact: hfarmer@hsph.harvard.edu
Ask the Expert: The role of diet and nutritional supplements during COVID-19
To understand more about the link between nutrition and immunity, and existing evidence on nutrient status, supplementation, and infection, we spoke with Dr. Wafaie Fawzi, Dr. Walter Willett, and PhD student, Dr. Ibraheem Abioye.
[Also available in Spanish: https://www.hsph.harvard.edu/nutritionsource/2020/04/13/pregunte-al-experto-el-rol-de-la-dieta-y-los-suplementos-nutricionales-durante-covid-19/]

Food safety, nutrition, and wellness during COVID-19
Many are wondering how to safely shop, order, and prepare food to minimize transmission of the novel coronavirus. Although there is currently no evidence of people developing COVID-19 from touching food or food packaging, here are some tips for safely handling food, as well as other resources for staying well at home.
[Also available in Spanish: https://www.hsph.harvard.edu/nutritionsource/2020/03/27/seguridad-de-los-alimentos-nutricion-y-bienestar-durante-covid-19/]

Spotlight on Vitamin D
Few foods naturally contain vitamin D, though some foods are fortified with the vitamin. For most people, the best way to get enough vitamin D is taking a supplement because it is hard to eat enough through food. Learn more: https://www.hsph.harvard.edu/nutritionsource/vitamin-d/

Call for Abstracts ! ! !

Dear friends and colleagues,

I am excited to inform you of a newly launched article collection hosted by the Journal of Visualized Experiments (JoVE, the leading peer-reviewed, PubMed-indexed video methods journal), for which Drs Teresa Fung, Sharon Kirkpatrick, Walter Willett and I serve as guest editors, and which is now accepting abstracts.

The topic of the collection is “Innovative methods of dietary assessment and analysis”. This collection will serve as a seminal video record of novel methods, tools, and datasets that facilitate assessment and analysis of human diet and food consumption, and aims to set the standard for reproducibility within the community for years to come.

Please visit this link for information about the collection scope and how to submit an abstract: https://scholar.harvard.edu/files/sabri/files/call_for_abstracts_jove_methods.pdf. There is no deadline for submitting an abstract, and we welcome you to do so at your convenience.

Feel free to share this invitation with any potentially interested colleagues. Kindly direct any inquiries to sbromage@mail.harvard.edu.

Sincerely,

Sabri Bromage
Research Fellow
COVID-19: Coronavirus Disease 2019

Virology

SARS-CoV-2 is a new virus belonging to the Coronavirus family, which includes less pathogenic strains responsible for the common cold, as well as the virus responsible for SARS and MERS. It is genetically related to the coronavirus responsible for the SARS outbreak in 2003, the closest identified relative was isolated from bats.

- Spike (S) glycoprotein
  - Trimeric structure resembling coronaviruses or SARS
  - Responsible for receptor binding, membrane fusion, and hemagglutination
  - Target for eliciting host neutralizing antibody
- Unique SARS-CoV-2 polymorphism enables S activation by human furin protein (found in lungs, liver, and small intestine), which may explain the association of COVID-19 with liver failure
- Hemagglutinin-esterase (HE) protein
- Matrix (M) transmembrane glycoprotein
  - Most abundant structural protein
  - Determines shape of viral envelope
- Envelope (E) protein
  - Interacts with M to form viral envelope
  - Important for virus infectivity

Clinical

Symptoms
- Fever, 87.9% (only 44% at time of diagnosis)
- Dry cough, 87.9%
- Fatigue, 38.6%
- Sputum production, 31.4%
- Dyspnea, 18.6%
- Myalgia/myalgias, 14.8%
- Sore throat, 13.9%
- Rash, 13.1%
- Chills, 11.4%
- Reckless/worrying, 5%
- Risk of death, 4.3%
- Bell’s palsy, 3.7%

Risk stratifying factors:
- Cardiovascular disease
- Hypertension
- Diabetes
- Chronic Respiratory Disease
- Cancer (any)
- Elderly, generally >60y
- Immunosuppressed status

Diagnostics
- Currently a symptomatic diagnosis of COVID-19 while awaiting definitive virological diagnosis
- RT-PCR against SARS-CoV-2 transcripts is the current gold standard diagnostic test
- Highly specific
- Variable sensitivity based on testing kit
- Serological antibody tests are in development and may detect both acute and prior infection
- Imaging
  - Imaging is not recommended for screening, but common chest CT findings include ground-glass opacities, consolidation, and crazy-paving patterns, in a bilobar peripheral distribution

Laboratory Findings

- Common findings: lymphopenia (most common laboratory finding), thrombocytopenia, leukopenia, CRP
- Less common findings: ALT, ALP, CK, D-dimer
- In severe cases: tachypnea, 1WBG, 1L, 1L, 1L, 1L

Clinical Course
- Clinical outcomes: mild disease, pneumonia, severe pneumonia, acute respiratory distress syndrome (ARDS), septic shock
- Case fatality rate (CFR) estimated at 2%, but given that many mild cases have gone undiagnosed, CFR is likely lower

Investigational Treatment
- There are currently no FDA-approved treatments directed against COVID-19 at this time (3/14/20). However, a variety of therapies are under investigation. These include repurposing of:
  - Antivirals: remdesivir, favipiravir
  - Antibiotics: chloroquine/hydroxychloroquine
  - Immunosuppressive medications: tocilizumab
  - Transfusing antibodies against SARS-CoV-2 analogs/SARS-CoV

Investigational Prevention
- It is expected that COVID-19 vaccine development will take a minimum of one year

Pathophysiology

Type I Pneumocyte
- Ciliated epithelial cell
- 3% of alveolar epithelium
- Secretes pulmonary surfactant to decrease lung surface tension
- Act as alveolar epithelial stem cells, proliferating in settings of lung inflammation and damage
- Expressed Angiopoietin Converting Enzyme 2 (ACE2) which is implicated in the Renin-Angiotensin Aldosterone System and the pathogenesis of hypertension

Type II Pneumocyte
- Cuboidal epithelial cell
- 97% of alveolar epithelium
- Secretory pulmonary surfactant
- Act as alveolar epithelial stem cells, proliferating in settings of lung inflammation and damage
- Expressed Angiopoietin Converting Enzyme 2 (ACE2) which is implicated in the Renin-Angiotensin Aldosterone System and the pathogenesis of hypertension
- Viral RNA is translated by the cell's machinery into non-structural proteins that are cleaved into proteases, an RNA-dependent RNA polymerase, and structural proteins
- Replication complex forms to make more RNA
- Viral proteins and RNA assembled into new virus in the Golgi

Immune Response

Innate Immune System
- Delayed or suppressed Type I Interferon (IFN) response during initial infection
- Viral replication triggers hypoxic inflammatory conditions and cytokine storm
- Inflamed of activated neutrophils and inflammatory monocytes/macrophages
- Serum neutrophils and activated pro-inflammatory cytokines are associated with severity of disease

Adaptive Immune System
- T helper cells Th1/Th17 are induced
- Specific antibodies not yet established
- Serum lymphopenia may be related to an antiviral response of bone marrow suppression

Treatment

SYMPTOMS
- Subjective or low-grade fever
- Dry cough
- Myalgia and arthralgias
- Nasal congestion
- Headache
- Sore throat

MILD
- 14d home quarantine
- Return precautions
- Support care: encourage eating and drinking, acetaminophen for comfort/fever
- Avoid or be cautious with ibuprofen

MODERATE
- Airborne isolation
- Supportive care: conservative fluid management, acetaminophen for comfort/fever
- Respiratory support
- Treat complications:
  - Suspected sepsis: empiric antibiotics
  - Flu vaccination
  - Asthma/COPD: bronchodilators

SEVERE
- As above plus:
  - Advanced ventilatory support