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Nutritional & Health-Related Environmental Studies Newsletter

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Contents

To our readers

Summer Greetings from Vienna!

I hope that you are all managing to cope during these difficult times of the COVID-19 pandemic. We continued with our activities in the past months as good as we could working from home. We are back in our offices since early July.

Life has changed in the lapse of a few months and the COVID-19 pandemic is negatively affecting nutrition across the world. Estimates of the potential impact of the pandemic on acute child malnutrition (wasting) and related mortality were just published in *The Lancet* by the Standing Together for Nutrition Consortium. In the same issue of *The Lancet*, the leaders of FAO, UNICEF, WFP and WHO called to concerted action on child malnutrition.

We hope that the suggestions for conducting IAEA nutrition studies during the COVID-19 pandemic that we have put together in response to related questions from project counterparts will be useful (page 4). The newsletter also includes reflections from a researcher at our Collaborating Centre in Bangalore, India, on stalled research activities due to COVID-19. Don't miss the UNSCN contribution on the impact of COVID-19 on food systems and food environments including useful links to available resources. Check also the news on our other activities, new publications and success stories.

Presentation at the BBNC

We would like to welcome Janna, who joined us in February as intern and coordinated the compilation of this newsletter.

With best wishes to stay safe and healthy,
Cornelia

To our new readers

The International Atomic Energy Agency (IAEA), an organization within the United Nations (UN) system, is the world's central intergovernmental forum for scientific and technical cooperation in the nuclear field. The Nutritional and Health-Related Environmental Studies (NAHRES) Section, part of the Division of Human Health (NAHU), enhances countries' capabilities to combat malnutrition for better health throughout life. It complements the work of other UN agencies, non-governmental organizations and interested stakeholders in the field of nutrition and health by encouraging the use of accurate nuclear techniques to design and evaluate interventions aimed at addressing malnutrition in all its forms. For example, NAHRES supports the application of stable isotopes to measure micronutrient bioavailability and vitamin A status, changes in body composition and physical activity, and infant feeding practices. The support mechanisms of the IAEA include Coordinated Research Activities (CRA) and the Technical Cooperation (TC) Programme. Check out this guide to learn how these mechanisms work. To read more about our work, visit the Human Health Campus website, where you will find information about stable isotope techniques, our projects, guidance documents and learning materials such as e-learning modules, fact sheets and other publications.

Chilean children doing physical activity at school. (Photo courtesy of S. Gorisek)

Meetings

Protocol revisions for the deuterium dose-to-mother technique

In early March, just before COVID-19 disrupted international travel, face to face meetings, and many other activities, a group of experts met in Vienna to discuss the development of a simpler protocol of the deuterium oxide dose-to-mother technique to quantify intake of human milk and to classify infants as exclusively breastfed or not. The original protocol requires seven saliva samples from both mother and child taken over a two weeks period. The method is logistically challenging, especially for larger sample sizes. With the hope that the method could be shortened and simplified, the IAEA facilitated a meeting of experts to discuss this. With financial support via a grant from the Bill and Melinda Gates Foundation, researchers from New Zealand and Indonesia have developed and validated a simpler method.

The new protocol with four sample windows between day 0 and 14 looks very promising. In addition, a new cut-off of intake of water from other sources was suggested for classification of exclusive breastfeeding. We agreed that more work is needed and a few points were identified for further validation and simulation. Watch this space for updates and our recommendations for a revised and simpler protocol.

The participants of the meeting can be seen on the photo below from left to right: Ms T. Thomas (India), Mr T. Preston (United Kingdom), Ms D. Aly (Indonesia), Ms P. Kaestel (IAEA), Ms C. Slater (United Kingdom), Mr Z. Liu (Australia). In addition, Ms L. Houghton attended virtually from New Zealand.

Participants of the meeting. (Photo courtesy of C. Slater)

News

Interlaboratory study – strengthening the focus on laboratory quality

FTIR being used for analysis of deuterium in water. (Photo courtesy of K. El Kari)

NAHRES organized an interlaboratory comparison study of deuterium in water analysed by FTIR in 2019. More than 40 laboratories took part in the study and received the report with their results in June 2020. The aim of the exercise was to strengthen the focus on high quality laboratory results.

NAHRES will soon launch another more comprehensive interlaboratory study that will better address precision as well as accuracy. Stay tuned and get involved!

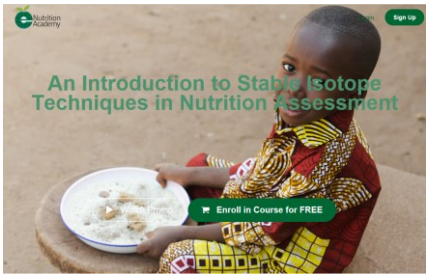
E-taster Course – an Introduction to Stable Isotope Techniques in Nutrition

The e-taster course has reached a milestone of 111 subscribers since its launch in late June 2019!

The e-taster course was developed as a collaboration between the IAEA and the eNutrition Academy, which is an associate of the Nutrition Society, United Kingdom.

The course focuses on three general topics: breastfeeding practices, body composition and energy expenditure.

Check out the course description, get to know the instructor and enroll for free by clicking on the photo!

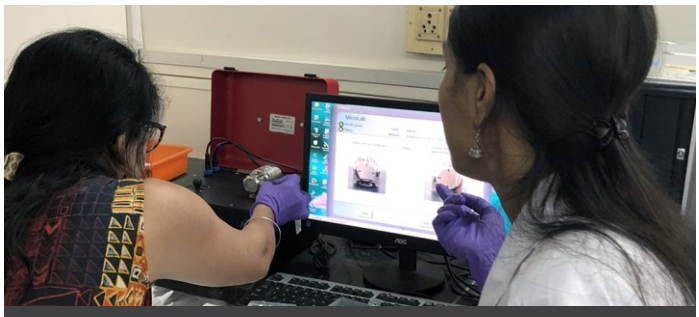


International nutrition course focuses on isotopic techniques for the first time

The 11th edition of the Bangalore Boston Nutrition Collaborative (BBNC) included for the first time designated sessions on the use of isotope techniques in nutrition. Nutrition scientists and health professionals from India, Bangladesh, Nepal, Sri Lanka and Uganda gathered at the St. John's Research Institute (SJRI) in Bangalore, India, from 13-14 January 2020. The BBNC is a two week short-course in International Nutrition Research Methods and was established in 2010 as a partnership between nutrition scientists at SJRI, an IAEA Collaborating Centre in nutrition, the Harvard TH Chan School of Public Health and Tufts University Schools of Medicine and Nutrition in Boston.

During this edition, Ms Loechl presented the role of the IAEA in nutrition programmes and how the IAEA supports its Member States in the use of these stable isotope techniques. She explained what isotopes are, gave examples on the use of stable isotope techniques and how the techniques work for the assessment of body composition, exclusive breastfeeding, total vitamin A body pools, iron absorption, energy expenditure, environmental enteric dysfunction and in cancer. The course participants had also the chance to get hands-on experience in assessing body composition and breastfeeding practices. Experts of SJRI showed the sampling of saliva and administration of the deuterium oxide dose. The analysis of deuterium enrichment was demonstrated in the laboratories of the Department of Nutrition of SJRI.

These sessions enabled participants to gain insight and understanding on how to use stable isotopes in their nutrition-related research. They rated them highly in their evaluations, indicating that they have enriched their knowledge and were enthusiastic about using stable isotope techniques in their research. Check out more details in the related web-article!



Course participant injects sample in a Fourier Transform Infrared Spectrometer. (Photo courtesy of C. Loechl)

Publications

Suggestions for conducting IAEA Nutrition Studies during the COVID-19 pandemic

As nutrition studies recommence during the COVID-19 pandemic, the Nutritional & Health-Related Environmental Studies Section has prepared a document with suggestions on how to minimize the risk of COVID-19 infection during data and sample collection in IAEA-supported nutrition studies. It is also available in Spanish and French!

Train and prepare staff

- Provide extra training for study team members about the importance of hand hygiene, facemasks, respiratory hygiene, and cough etiquette (see WHO infographic).
- Ensure that team members know the right ways to put on, use, and take off masks and gloves.
- Recognize the symptoms of COVID-19 (see CDC infographic). The team should be screened for symptoms and their temperature checked each day.
- Ask team members to stay home if they are sick and send people home if they develop symptoms while at work.

Prepare the workplace

- Emphasize hand hygiene and cough etiquette for everyone who attends the facility and ensure that information posters are visible.
- Provide tissues, alcohol-based hand sanitizer, and trash cans in the waiting room and testing areas. Soap and water should be available at all handwashing sinks and in the restrooms.
- Implement strict routine cleaning and disinfection procedures. Surfaces in the data and sample collection areas should be disinfected after each participant.
- All waiting room chairs should be placed at least 1 metre apart (see WHO guidance on adjusting public health and social measures in the context of COVID-19).
- Toys, reading materials, or other communal objects, should be removed.

Sample handling and analysis

- All protective wear and usual high standards of care should be upheld when collecting, handling and analysing biological samples.

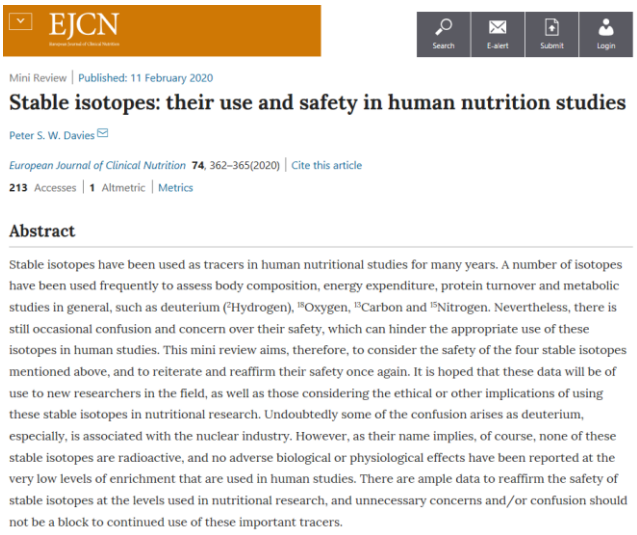
Data and sample collection

- On the day before the appointment, contact the participant to ensure that no one in the family has coronavirus or respiratory symptoms. If so, the appointment must be rescheduled.
- Schedule appointments so that there is no overlap between study participants; only members from the same household should be in the facility at one time.
- Access to the study area must be limited to those members who are essential for data and sample collection. The number of researchers/team members in close contact with the participant should be limited to 1, unless essential for protocol. The participant should only be accompanied by one caregiver if under 18 years of age.
- On arrival:
  a. Consider temperature screening of participants and caregivers for fever and symptoms of COVID-19 prior to entry into the facility.
  b. Consider asking participants over 6 years of age and caregivers to wear a cloth face covering/mask and limit their movement in the facility.
  c. All visitors should be asked to wash hands thoroughly before and after entry into the facility.
- All team members should wear gloves which should be disposed of after each study participant.
- Saliva sampling collection should be undertaken by the participant or caregiver (in the case of an infant or child only if the caregiver is comfortable with the procedure).
- Team members should wear a surgical mask or cloth face covering during contact with participants for saliva sampling.
- Whenever possible during the appointment, at least a 1 metre distance should be kept between the researcher/team member and participant.
- After participants leave, clean all surfaces using EPA-registered disinfectants (if disinfectants are not available, use soap (detergent) and water) — this includes counters, beds, and seating.

Publications

Stable Isotopes: Their Use and Safety in Human Nutrition Studies

A new article on the use and safety of stable isotopes in nutrition studies was published and will be helpful in preparing for ethical approval. The review written by Peter S. W. Davies will soon be available open access in the European Journal of Clinical Nutrition. The article describes the safe use of four stable isotopes, deuterium (^{2}Hydrogen), ^{18}Oxygen, ^{13}Carbon and ^{15}Nitrogen in nutritional assessments to measure body composition, energy expenditure and protein turnover, and in metabolic studies in general. None of these stable isotopes are radioactive, and no adverse biological or physiological effects have been reported at the very low levels of enrichment that are used in human studies.



EJCN

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Mini Review | Published: 11 February 2020

Stable isotopes: their use and safety in human nutrition studies

Peter S. W. Davies

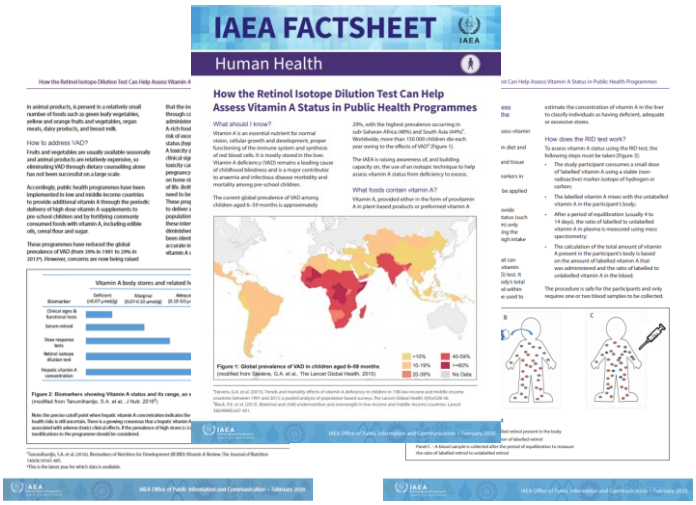
European Journal of Clinical Nutrition **74**, 362–365(2020) | Cite this article

213 Accesses | 1 Altmetric | Metrics

Abstract

Stable isotopes have been used as tracers in human nutritional studies for many years. A number of isotopes have been used frequently to assess body composition, energy expenditure, protein turnover and metabolic studies in general, such as deuterium (^{2}Hydrogen), ^{18}Oxygen, ^{13}Carbon and ^{15}Nitrogen. Nevertheless, there is still occasional confusion and concern over their safety, which can hinder the appropriate use of these isotopes in human studies. This mini review aims, therefore, to consider the safety of the four stable isotopes mentioned above, and to reiterate and reaffirm their safety once again. It is hoped that these data will be of use to new researchers in the field, as well as those considering the ethical or other implications of using these stable isotopes in nutritional research. Undoubtedly some of the confusion arises as deuterium, especially, is associated with the nuclear industry. However, as their name implies, of course, none of these stable isotopes are radioactive, and no adverse biological or physiological effects have been reported at the very low levels of enrichment that are used in human studies. There are ample data to reaffirm the safety of stable isotopes at the levels used in nutritional research, and unnecessary concerns and/or confusion should not be a block to continued use of these important tracers.

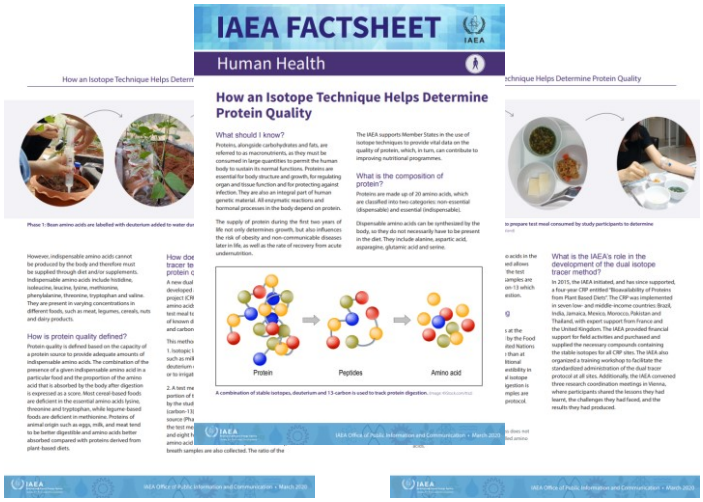
IAEA Factsheet: How the Retinol Isotope Dilution Test Can Help Assess Vitamin A Status in Public Health Programmes



This new factsheet provides information on vitamin A deficiency, strategies to address it, methods to assess vitamin A status and the advantages of using the retinol isotope dilution (RID) test as the only practical assessment method that can be applied across the entire spectrum of vitamin A status. The RID test provides a quantitative estimate of the body's total stores of vitamin A, both in individuals and within a given population. To learn more about the test and how the IAEA supports Member States to use it to improve the assessment of vitamin A status in public health programmes, click here to download the full IAEA Factsheet!

IAEA Factsheet: How an Isotope Technique Helps Determine Protein Quality

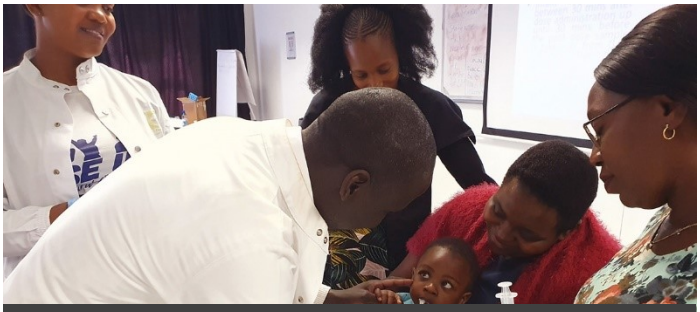
The factsheet summarizes issues around protein quality and demonstrates the advantages of a dual stable isotope tracer technique to help determine protein quality. This new isotope tracer technique compares the concentration of amino acids found in the blood after consuming a test meal to the concentration of a standard protein of known digestibility using isotopes, deuterium and carbon-13. This allows to measure the digestion of amino acids at the small-intestinal level. Read more about this isotope technique and how the IAEA supports Member States in the use of the technique to generate vital data on protein quality that can improve nutritional programmes in the IAEA Factsheet!



Success stories

Nuclear Techniques Help Explain the Various Dimensions of Malnutrition among Children in Botswana

Despite strong economic growth in Botswana over the last two decades, malnutrition has not declined as significantly as in other countries at similar stage of development. In 2019, 31.4% of children below 5 years of age were stunted and anaemia was prevalent in 40%. With IAEA support through a Technical Cooperation (TC) project BOT/6/007, researchers based at the National Food Technology Research Centre in Kanye applied the deuterium dilution technique to measure body composition and found that stunted children had lower fat-free mass, an indication of general tissue loss. Other findings showed that although *tsabana*, iron-fortified sorghum-soybean porridge flour, has been distributed for almost 4 decades, anaemia rates have not gone down. A larger confirmatory study has commenced under the IAEA TC project BOT/6/009 and will include the use of iron stable isotopes to measure how much of the iron in *tsabana* is absorbed for use by the body after consumption. These results will inform the choice of the iron compound added to *tsabana* as this is an important determinant of how much iron is absorbed from the porridge when it is consumed by children. For more information, check out the web-article!



Saliva sampling exercise with a child for body composition assessment. (Photo courtesy of V. Owino)

The Link between *H. pylori* Infection and Iron and Zinc Status among Children: Results from an IAEA Coordinated Research Project (E4.30.25)

Boy blowing in bag to collect breath. (Photo courtesy of T. Mohammed)

Helicobacter pylori infection is a very common bacterial infection with a prevalence of around 80-90% among adults in low and middle-income countries and up to 40% in high-income countries. A recently published web-article highlights the support that the IAEA has provided to a Coordinated Research Project (CRP) that aimed to evaluate the effect of *H. pylori* on gastric acid secretion and on iron and zinc absorption from different fortification compounds in asymptotic individuals in low resource countries since 2011. The ^{13}C-Urea Breath Test was used for the diagnosis of *H. pylori* infection, and other stable isotope techniques were used to provide information on absorption of iron and zinc from compounds with different physical and chemical properties. The CRP results suggest that treatment of *H. pylori* with antibiotics can improve micronutrient absorption and storage, especially of iron. The results also confirm that the effect of *H. pylori* infection on iron and zinc absorption is not uniform, possibly related to the particular *H. pylori* strain and the location of the infection. Please visit the CRP page for more information.

IAEA Doubly Labelled Water (DLW) Database:
If you have collected data on total energy expenditure using DLW, please consider submitting them to this global database!

Success stories

Tailored Food-based Strategies Can Increase the Intake and Absorption of Micronutrients among Young Children, Results of an IAEA Project Show

An IAEA Coordinated Research Project (CRP E4.30.27) brought together researchers from Africa, Asia, Latin America and North America to consider different stable isotope techniques to evaluate context-specific interventions to increase intake and absorption of iron, zinc and vitamin A from mainly plant-based diets with the focus on the first 1000 days of a child's life. In general, it showed that culturally acceptable, locally available, low cost food-based strategies in low and middle-income-countries have the potential to reduce the burden of malnutrition, particularly in more vulnerable populations. For instance, researchers in Guatemala found that enriching traditional white maize tortillas with amaranth resulted in increased iron absorption. Further, researchers from Mexico, Zimbabwe and India demonstrated how different food-based interventions may be used to enhance zinc and vitamin A intake from the diet.

Please check out the related web-article for more information (also available in Spanish) and visit the CRP page for details about this research project. page.

Preparing amaranth enriched tortillas in Guatemala. (Photo courtesy of J. T. Rodríguez)

Join our symposium at the Micronutrient Forum 5th Global Conference 2020 which will now be virtual and CONNECTED!

Due to COVID-19 the Global Conference had been postponed and will now be virtual, starting on 9 November.

Our symposium:
Vitamin A intervention programs – Time to reassess how to measure need and impact

The objectives of the symposium are to explain the use of the RID technique for the assessment of vitamin A status across the whole spectrum – from deficiency to toxicity, to describe the validity of the RID technique in populations and individuals with inflammation, to summarize new biomarkers to help identify population subgroups exposed to high intakes of vitamin A, and to consider potential policy and programme implications of this work and additional research needs to further understand them.

Isotope dosing in a school in South Africa. (Photo courtesy of South African Medical Research Council)

NAHRES Special - SJRI

COVID-19 pandemic and its impact on EED assessment in young children: a researcher's reflection

With special thanks to N. Shivakumar, St. John's Research Institute, IAEA Collaborating Centre in Bangalore, India

I became part of an IAEA CRP, with reach across the world involving 8 countries, in the year 2017. This CRP brings together experts from the field of gut function, particularly in children, at risk of a condition, known as environmental enteropathy, which adversely affects gut function and in turn growth. Throughout the CRP period, the experience has been enriching with interactions and discussions offering multi-faceted intellectual inputs/insights, from all the researchers on the team. The team has been receptive and responsive to technical and analytical issues that have been driven by data collected in pilot studies. The dedication to the cause is applaudable, with smooth organization of project activities by the IAEA.

The CRP events (organized meetings by the IAEA) and research activities (field recruitment and sample collection) were uninterrupted in the first 2 years of the CRP kick-off. After a consensus on a standardized approach and protocol, we were successful in completing 6 pilot studies and 12 breath tests in children in a span of 6 months, at the St. John's Research Institute. However, the surge of the global pandemic has created enough havoc, and among all health and economic modalities that are affected, non-COVID-19 research has taken a back seat. This CRP involves a vulnerable target population of young children aged 12-15 months, who need to be recruited from backward societies characterized by crowded settlements with poor sanitation.

The study procedures entail close contact of study staff with the participating children and collection of biological samples like urine, blood, breath and faeces. This poses an unique challenge for a) recruitment, as the study staff need to commute in risky settings creating fear for the safety of their families, b) St. John's being a COVID-19 hospital causes reluctance among the primary caregivers to bring in their children to the facility, furthermore c) collection of biological samples is always risky for the sample handlers. As the chief scientific investigator, one is responsible for the study team and the participants, and mishaps arising from any research activity, related or not related to COVID-19, could be attributed to the crisis, instilling doubt about running such an activity. Any level of precaution taken in such a situation may dim in contrast to the risks associated with it. To add to this, Bangalore, where the research site is located, is witnessing a rise in cases, becoming a hotspot of COVID-19, with ever changing status of a complete or partial lock-down, making it difficult to plan recruitment. A collective decision was thus taken to stall CRP related research indefinitely, till the situation is predictable and allay the fears in everyone. With betterment of the crisis, plans are in place, to sterilize the research ward and to ensure minimal contact with participants from required number of staff. In practical terms, research activities would resume only by early next year, when we hope to accelerate the process to keep up with the project timeline.

Researchers at the IAEA Collaborating Centre in Bangalore in the COVID-19 era. (Photo courtesy of N. Shivakumar)

N. Shivakumar demonstrating the collection of breath. (Photo courtesy of N. Shivakumar)

NAHRES Special - UNSCN

Launched! UNSCN Nutrition 45 – Nutrition in a Digital World

With special thanks to A. Mora and S. Oenema, UNSCN Secretariat

The 45th issue of UNSCN Nutrition was launched on 9th July 2020. This year's edition examines the complexity of the digital world for improved nutrition. Digital technology, in and of itself, cannot fix the world's food and nutrition problems, nor mend its dysfunctional food systems. However, once improving nutrition is deemed a priority, digital technologies are important tools. But if the potential of digital technologies to improve nutrition is phenomenal, so are the risks that these technologies might entail.

The theme of *UNSCN Nutrition 45: Nutrition in a Digital World* was chosen long before the COVID-19 outbreak. The pandemic has highlighted even more both the benefits and the intrinsic risks associated with digital technologies. Digitalization has played a key role in the past five months, enabling vital parts of the world economy to continue functioning, allowing us to remain connected and giving us access to numerous public services- including those directly related to the pandemic. However, the negative aspects must be considered. Gaps in equality can widen as a consequence of unequal access to technology and digital literacy, digital channels facilitate the proliferation of misinformation on food and nutrition, and ethical and human rights issues concerning data privacy and ownership of personal information arise. UNSCN Nutrition 45 aims to enhance our knowledge and further the debate on the duality of innovative digital technologies and their role in helping to achieve sustainable healthy diets and progressively realize the right to adequate food.

The articles included in this issue analyze the relation between digital technologies and nutrition from a range of different food systems perspectives – from food production, transformation and distribution to digital food marketing and retail; from behavioural change and capacity-building, including through social media, to the generation, processing and use of data; and from the protection of vulnerable groups to issues of inequality and human rights.

The potential of digital processes and technologies to accelerate food system transformation for sustainable healthy diets has not yet been sufficiently investigated, let alone understood. Thus, we hope *UNSCN Nutrition 45: Nutrition in a Digital World* can play a role in building a common understanding that can drive joint action and initiatives to transform food systems and improve people's nutrition.

COVID-19 and food systems

The COVID-19 pandemic is a health and human crisis threatening the food security and nutrition of people around the world. Since March 2020, UN agencies have worked within their own mandates to protect and promote nutrition and healthy food systems. Contributing to the COVID-19 response, UNSCN has compiled a list of available resources and key readings with a focus on nutrition and food systems.

In addition to this, UNSCN has focused on the impacts of COVID-19 on people's food environments – the points of interaction between people and the food system. As the pandemic spreads, this interaction between people and the food system is changing at an unimaginable speed and taking on greater importance in everyday life. UNSCN has developed two articles on the impact of COVID-19 on food environments.

The first, Food Environments in the COVID-19 Pandemic analyses impacts and positive policy actions to deliver sustainable healthy diets for all, including options for governments to adapt and mitigate impacts on food environments, and current nutrition advice.

To better understand how people are experiencing and adapting to changes within their food environment, UNSCN conducted an online survey. Results are reflected in the article COVID-19: The evolving impact on how people meet the food system.

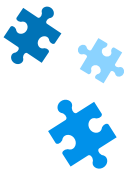
The COVID-19 pandemic has showed us once again the fragility of food systems and the interconnectedness of social protection, healthcare and food systems. It is clear that business as usual is not the solution. Concerted action is needed not only to avoid negative impacts of the disease, but also to transform our food systems and make them more resilient, more sustainable and nutrition centered to deliver healthy diets for all. As stated by the UN Secretary General in its Policy brief The Impact of COVID-19 on Food Security and Nutrition, "*addressing the COVID crisis requires us to work together across sectors and borders both to mitigate the immediate impacts and to reshape food systems so they support healthy diets for all and do more to make food production and consumption aligned to sustainable development*".

Puzzle corner

Below, a 7-word sentence is depicted with images. Use the instructions (hyphen (-) means subtract) to change the words into a correct sentence. Can you decipher what the sentence says?





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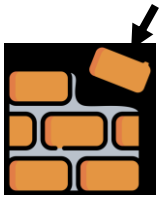

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Do you want to know the answer? Write us an e-mail to nahres@iaea.org and we will send you the solution!

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Feedback

The NAHRES Team appreciates your feedback! If you have any questions or comments, please send them to:
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Impressum

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