BOOK OF ABSTRACTS
& SOUVENIR PROGRAM

DOST-FNRI

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
In partnership with
FNRI Employees' Association, Inc. (FNRI EA, Inc.)

DOST - Food & Nutrition Research Institute
SEMINAR SERIES

50th FSS

GOLDEN YEAR OF DOST-FNRI SEMINAR SERIES

Sheraton Manila Hotel, Pasay City

July 3-4, 2024

MESSAGE

As the lead government agency in food and nutrition research and development in the country, the Department of Science and Technology - Food and Nutrition Research Institute (DOST-FNRI) is proud to share the 2023 results of our researches, as well as the technologies we have developed.

These innovations are designed for our partners in the public, private, and legislative sectors. Our goal is to inform policy-making bodies, offer nutritious food products, and provide policy recommendations to positively impact the nutritional status of Filipinos.

The 50th FNRI Seminar Series (FSS) with the theme, "Golden Year of DOST-FNRI Seminar Series", marks a historic milestone for the Institute. It provides a valuable opportunity to discuss the latest advancements in food and nutrition. We have thoughtfully gathered diverse topics and invited expert speakers to ensure comprehensive coverage across various aspects in these fields. Our hope is that attendees will gain valuable knowledge, engage in inspiring discussions, and connect with fellow professionals.

I am pleased to share the softcopy of the 50th FSS Book of Abstracts and Souvenir Program. The Book of Abstracts contains summary of our R&D outputs and S&T activities that highlight key results, methodologies, implications, applications, and recommendations. On the other hand, the Souvenir Program showcases various DOST-FNRI services, including the list of Technologies Ready for Transfer and Commercialization, the Nutrition Physiology Laboratory, the iFNRI, the National Nutrition Survey Public Use Files, Proficiency Testing Laboratory, newly-developed IEC materials, and the 2024 Public Course Trainings, among others. These resources underscore the Institute's commitment to advance food and nutrition science, technology, and innovation by sharing knowledge that can drive positive health outcomes.

I extend my heartfelt appreciation to the Institute's researchers whose remarkable work are featured in the Book of Abstracts. Their contributions significantly contribute to our collective understanding of food and nutrition.

I warmly welcome all of you to the DOST-FNRI Seminar Series! Let us embark on a knowledge-filled journey together. Stay connected with us through our website (www.fnri.dost.gov.ph) and social media channels (Facebook, YouTube, Twitter, Instagram, and TikTok). Stay tuned for relevant and timely facts, information, and innovative R&D outputs and S&T services of DOST-FNRI.

I sincerely extend our heartfelt gratitude to our sponsors for your continued support to the Institute's endeavors and to all the participants of this event for being with us in every FSS.

Mabuhay tayong lahat!

Atty. Lucieden G. Raz
Deputy Director/Director III
Officer-in-Charge, Office of the Director
DOST-FNRI

TABLE OF CONTENTS

Food and Nutrition R&D Program

TABLE OF CONTENTS

Nutritional Assessment and Monitoring Program

TABLE OF CONTENTS

Graduate Studies

PROGRAM

DAY 1: July 3, 2024		
7:00-8:00 am	Registration	
8:00-8:30 am	Doxology Philippine National Anthem Bagong Pilipinas Hymn DOST Hymn FNRI Hymn	**Ms. Lea B. Landicho** Science Research Specialist II **Mr. Jason Paolo H. Labrador** Science Research Specialist II
	Welcome Remarks	**Ms. Marilou L. Madrid** Overall Chair, 50th FNRI Seminar Series and Supervising Science Research Specialist **Ms. Leah C. Dajay** President, FNRI-EA, Inc. and Supervising Science Research Specialist
	Introduction of Participants	**Ms. Mae Ann SA. Javier** Chair, Registration Committee and Senior Science Research Specialist
8:30-8:45 am	Opening Remarks	**Atty. Lucieden G. Raz** Deputy Director/Director III and OIC, Office of the Director
8:45-9:00 am	Inspirational Message	**Dr. Renato U. Solidum, Jr.** DOST Secretary
9:00-9:30 am	Ribbon Cutting of Poster Exhibit Media Interviews **Ms. Divorah V. Aguila, Planning Officer IV** Emcee	
9:30-9:45 am	**HEALTH BREAK**	

9:45-12:00 pm	**FSS Golden Anniversary Lecture & Testimonial**
	1. *Evolution of FSS (AVP)* 2. *Testimonial: The Seminar Series as Continuing Education for Nutrition and Health Frontliners* **Hon. Presbitero Jose Velasco, Jr.** **Governor, Marinduque** 3. *Global Trends in Food and Nutrition: How Food and Nutrition Research is and should be shared in the Global Arena* **Dr. Gerard Bryan Gonzales** **Associate Professor-Nutrition** Department of Public Health and Primary Care Faculty of Medical and Health Sciences, Ghent University, Belgium and DOST Balik Scientist Open Forum Moderator: **Ms. Divorah V. Aguila, Planning Officer IV**
12:00-1:30 pm	**LUNCH / Launching of New DOST-FNRI Nutrition Standards, Tools, and Guides**
1:30-3:10 pm	**Technical Session I: Undergraduate Research Competition (WINGs: What interests the Next Gen of NDs and Food Techs?)**
1:30-1:40 pm	*Potential Anti-Urolithiatic Activity of Corchorus olitorius L. (Saluyot) Leaves on Calcium Oxalate Crystals as a Functional Food in Kidney Stones Nutrition Therapy* **Almira Janine P. Majam**
1:40-1:50 pm	*Nutrition Knowledge, Eating Practices, and Maternal Characteristics Among Selected Filipino Female Adults Under the Sandwich Generation* **Alyssa P. Arnoco, RND**
1:50-2:00 pm	*The Influence of School Cafeteria Nutrition Label on Lunch Meal Food Choices Among College Students in a University in Manila City* **Lian Jean Go**
2:00-2:20 pm	Q&A
2:20-2:30 pm	*Detection of Honey Adulteration with C3, C4, and CAM Sugar Syrups using Laser-Induced Breakdown Spectroscopy* **Jeremiah A. Abog**
2:30-2:40 pm	*The Development of an Analog Meat Product using Philippine-sourced Elkhorn Seamoss (Kappaphycus alvarezii) Protein Concentrate* **Cecilia Louise P. Yabut**
2:40-2:50 pm	*Formulation of Flour Fortified with Freeze-Dried Malunggay (Moringa oleifera) Seeds: Evaluation of the Functional and Physicochemical Properties* **Karen Go Ngo**
2:50-3:10 pm	Q&A Moderator: **Ms. Lea B. Landicho, Science Research Specialist II**

3:10-3:30 pm	HEALTH BREAK
3:30-4:45 pm	**Technical Session II: TaG These! (Tools and Guidelines)**
3:30-3:45 pm	*Can maternal characteristics help predict risk for low birth weight?* **Ms. Ruby D. Frane** **Senior Science Research Specialist**
3:45-4:00 pm	*Is diet diversity associated with nutritional adequacy?* **Ms. Frances Pola S. Arias** **Science Research Specialist II**
4:00-4:15 pm	*You are what you eat! What is the link between unhealthy diet and risk for non-communicable diseases?* **Ms. Chona F. Patalen** **Supervising Science Research Specialist**
4:15-4:45 pm	Open Forum Moderator: **Ms. Patricia Isabel G. Amita, Science Research Specialist II**

DAY 2: July 4, 2024	
8:00-9:30 am	**Technical Session III: Nutrition for All Ages: Inclusivity in Nutrition Research**
8:00-8:15 am	*How is nuclear science used to measure body composition and energy expenditure among infants and young children?* **Mr. Carl Vincent D. Cabanilla** **Senior Science Research Specialist**
8:15-8:30 am	*What are the nutritional status, dietary intake, and health-seeking behavior of pregnant teens?* **Ms. Emily O. Rongavilla** **Science Research Specialist II**
8:30-8:45 am	*SAGIP: Modelling a school-based nutrition intervention program tailored for Filipino adolescents* **Mr. Jason Paolo H. Labrador** **Science Research Specialist II**
8:45-9:00 am	*Is height associated with blood pressure level?* **Ms. Maria Stephanie N. Parani** **Science Research Specialist II**
9:00-9:15 am	*Is presence of sarcopenia associated with quality of life among community-dwelling older Filipinos?* **Mr. Robby Carlo A. Tan** **Senior Science Research Specialist**
9:15-9:30 am	Open Forum Moderator: **Mr. Michael E. Serafico, Supervising Science Research Specialist**
9:30-9:45 am	HEALTH BREAK

9:45-11:00 am	**Technical Session IV: Unraveling Hidden Hunger**
9:45-10:00 am	*Is vitamin A linked to type 2 diabetes?* **Mr. Johanne B. Guilaran** **Science Research Specialist II**
10:00-10:15 am	*How prevalent is anemia among Filipino households?* **Ms. Glenda P. Azaña** **Senior Science Research Specialist**
10:15-10:30 am	*Are there differences in the prevalence and causes of anemia among school-age kids?* **Mr. Kim Irvin T. Protacio** **Science Research Specialist II**
10:30-11:00 am	Open Forum Moderator: **Dr. Marie T. Bugas, Senior Science Research Specialist**
11:00 am-12:15nn	**Technical Session V: Ensuring Food Safety and Quality through Innovation**
11:00-11:15 pm	*Finding Salmonella in Store-Bought Eggs and Chicken* **Ms. Rose Elaine P. Guilaran** **Senior Science Research Specialist**
11:15-11:30 pm	*Paving the Way for Safer Diets: Results from Total Diet Study on Transfat (TFA) and Minerals* **Ms. Kristine B. Nacionales** **Supervising Science Research Specialist**
11:30-11:45 pm	*Fostering Well-Nourished Learners: Innovating Food Products for School-Based Feeding Programs* **Ms. Carissa Saldaña-Tanda** **Science Research Specialist I**
11:45-12:15 pm	Open Forum Moderator: **Ms. Elyss G. Billedo, Senior Science Research Specialist**
12:15-1:30 pm	**LUNCH / Luncheon Symposium**
1:30-2:45 pm	**Technical Session VI: A Closer Look at Food Environment and Economically Challenged Areas vis-a-vis Nutrition**
1:30-1:45 pm	*Is the food retail market associated with the food intake and nutritional status of mothers and their children?* **Dr. Mildred O. Guirindola** **Supervising Science Research Specialist**
1:45 -2:00 pm	*Sub-national metrics for food system assessment in the Philippines* **Dr. Maria Julia G. Gubat** **Senior Science Research Specialist**
2:00-2:15 pm	*From Isolation to Inclusion: Assessing the health and nutritional status of children and adults in GIDA* **Ms. Charmaine A. Duante** **Chief Science Research Specialist**
2:15 -2:45 pm	Open Forum Moderator: **Ms. Maja Bethzaida S. Decena, Science Research Specialist I**

2:45 3:15 pm	HEALTH BREAK	
	CLOSING CEREMONY	
3:15-3:30 pm	Let's wrap it up!	**Mr. Salvador R. Serrano** Chair, Scientific Technical Program Committee and Supervising Science Research Specialist
3:30-4:00 pm	And the winners are...	**Ms. Vannizsa I. Ramas** Chair, Undergrad Thesis Competition and Senior Science Research Specialist **Mr. Michael C. Pelagio** Chair, Scientific Poster Committee and Science Research Specialist II **Atty. Lucieden G. Raz** Deputy Director/Director III and OIC, Office of the Director **Ms. Marilou L. Madrid** Overall Chair, 50th FNRI Seminar Series and Supervising Science Research Specialist **Ms. Leah C. Dajay** DOST-FNRI EA President and Supervising Science Research Specialist
4:00-4:15 pm	Message of Appreciation	**Mr. Alexis M. Ortiz** Chair, Ways and Means Committee and Chief Administrative Officer Finance and Administrative Division

Ms. Kryztalhyn Mae R. Dilag
Emcee
Science Research Specialist II

Development and Potential Reversal of Type 2 Diabetes: How Critical is Vitamin A in the Regulation of Insulin Responsiveness and Lipid Homeostasis?

Carl Vincent D. Cabanilla, Johanne B. Guilaran, Ma. Lourdes T. Cumagun, Imelda Angeles-Agdeppa, Ph.D., Michael E. Serafico, Adorie D. Sabenecio, Darlah Marcela S. Leonardo, Myquie Nicole R. De Guzman, Cecilia A. Jimeno, and Georg Lietz

Background: Type 2 diabetes is a result of the body's inefficiency to produce or respond to insulin, a glucose-regulating hormone produced by the pancreas. Recent studies suggest a potential link between retinol (vitamin A) and the development of this condition, but the underlying mechanisms are not yet fully understood. This study is part of a multi-center collaboration among Newcastle University, Monash University Malaysia, and DOST-FNRI.

Objective: This study investigated the relationships between anthropometric indices, body composition, blood biomarkers, pancreatic fat, and serum retinol in diabetic and non-diabetic, pre-obese Filipino adults.

Materials and Methods: This case-control study included 26 diabetic patients aged 18-70 years and 26 age and sex-matched controls from San Juan de Dios Hospital, Pasay City. Anthropometric measurements were obtained, and body composition was assessed using a bioimpedance analyzer. Blood samples were collected and analyzed for fasting blood glucose (FBG), glycated hemoglobin (HbA1c), and serum retinol levels. Additionally, pancreatic fat content was measured using magnetic resonance imaging (MRI). Pearson correlation was performed using a data analysis program. The ethical clearance was obtained from both FIERC (FIERC-2020-016) and SJDEFI-IRB (SJIRB-2019-0048/E-MED).

Results and Findings: Results revealed no significant association between body mass index and serum retinol levels across all groups. Body fat exhibited a negative correlation with serum retinol in diabetic individuals (r = -0.50), controls (r = -0.64), and the combined groups (r = -0.55), while muscle mass showed a positive correlation with serum retinol in diabetics (r = 0.56), controls (r = 0.74), and the combined groups (r = 0.62). Additionally, all study groups observed no strong correlations between FBG, HbA1c, pancreatic fat, and serum retinol levels.

Conclusion and Recommendations: Among the parameters studied, body fat and muscle mass significantly correlate with serum retinol. A randomized controlled trial utilizing a calorie-restricted diet is recommended to better understand the importance of vitamin A metabolism in the development and potential reversal of type 2 diabetes, utilizing the data from the UK, Malaysia, and the Philippines.

Is Presence of Sarcopenia Associated with the Quality of Life among Community-Dwelling Older Filipinos?

Robby Carlo A. Tan, Kyler Kenn M. Castilla, Hazel T. Lat, David Kenneth C. Mendoza,
Michael E. Serafico, Marco Mensink, and Lisette CPGM de Groot

Background: The Filipino older population is projected to steadily increase in the coming decades (PIDS, 2022). Sarcopenia is an age-related progressive loss of muscle mass and strength which can affect the functional status and, ultimately, the overall quality of life (QOL) of an individual. In the Philippines, data on sarcopenia is limited.

Objective: This study determined the association of sarcopenia with the quality of life of community-dwelling older Filipinos.

Materials and Methods: This study is a cross-sectional study conducted during the COVID-19 pandemic among 536 older adults aged ≥ 60 years old in the cities of Tarlac, Tacloban and Davao. The muscle mass of the participants was measured through a body impedance analyzer (Tanita MC-780MA). Handgrip strength was assessed using a hand dynamometer (Jamar) while physical performance was evaluated through a short physical performance battery test. QOL was determined using a culturally-validated World Health Organization Quality of Life Brief Version (WHOQOL-BREF) questionnaire and a ≥ 66th percentile was set as high QOL score. The 2019 Asian Working Group Criteria was utilized to identify sarcopenia. Binary logistic regression was performed to determine the association between QOL and sarcopenia while adjusting for age, lifestyle and medication.

Results and Findings: About 24.0% of older adults in the study population were sarcopenic. The sarcopenic group had decreased odds of attaining a higher overall QOL score (OR 0.59; CI 0.38-0.91), as well as in the physical health (OR 0.62; CI 0.40-0.96) and psychological health domains (OR 0.54; CI 0.35-0.82) as compared to the non-sarcopenic group.

Conclusion and Recommendations: Sarcopenia is associated with a decreased overall QOL score. While the study was conducted during the COVID-19 pandemic, it still provides valuable and relevant input in crafting nutrition and lifestyle interventions for older Filipinos for improved functionality which is critical for older adults' overall resilience in health and well-being in order to contribute to improved QOL.

A Closer Look into the Iron Fortified Rice Distribution Model and its Applicability on the Commercialization of Multi-Nutrient Fortified Rice in the Philippines

Imelda Angeles-Agdeppa, Ph.D., Abbie L. Padrones, Maricar D. Albao,
Trinidad II T. Arcangel, and Engr. Charlie E. Adona

Background: Department of Science and Technology's Food and Nutrition Research Institute (DOST-FNRI) established the effectiveness of rice fortification in combating iron deficiency anemia. Current innovations on iron fortified rice (IFR) include adding multiple micronutrients to address micronutrient deficiencies (e.g. zinc and folic acid deficiency). However, there are no studies on the feasibility of the current IFR distribution model that is applicable to multi-nutrient fortified rice (MFR) in the Philippines.

Objective: This study aimed to determine the feasibility of implementation, commercialization, and financial attribution of MFR in the Philippines through development of a white paper for it.

Materials and Methods: Literature reviews was conducted focusing on existing IFR supply chain in the Philippines, acceptability of MFR in the local and global scenes and micronutrient deficiencies. Sources included terminal reports on previous DOST-FNRI completed studies, licensing agreements with technology adopters, DOST-FNRI monitoring reports, and different databases like Google Scholar, PubMed, and Google Books.

Results and Findings: Based on literature reviews, a shift from the IFR to MFR may incur additional cost, because of the added micronutrients and assuming further that the same equipment and fixed assets used for IFR will be used. For it to be commercialized, the price of fortificants and operational costs must be affordable. The cost of MFR must not be so high as compared with the current price of IFR. MFR needs an intensive advocacy and social marketing for it to be consumed by the population.

Conclusion and Recommendations: The shift from IFR to MFR may entail higher cost of the product, challenges in the implementation process, and commercialization. For it to be consumed, price must be affordable. While it contains multinutrient premix to address the deficiencies, there is a need to get its actual impact on the nutritional status of the populace. Additionally, aligning initiatives with the current rice fortification program in the Philippines is crucial for a seamless transition from IFR to MFR. A ten-year commercialization roadmap for the MFR may be based on the experiences from the scale-up of IFR including efficacy trials, market trials, distribution modelling, advocacy activities, and large-scale modelling.

The Effects of Dietary Fiber and other Non-Digestible Carbohydrates in a Pre-Identified Low Glycemic Index Rice and Stabilized Brown Rice on Gut Microbiota (Phase 1)

Amster Fei P. Baquiran, Diana Glades D. Ronquillo, Melissa S. Borlagdan, Fritz Benedict V. Villacarlos, Charlotte Anne G. Dolores, Adorie D. Sabenecio, Asuncion C. Torres, Jahn Philip R. De Leon, and Aida C. Mallillin

Background: Rice is a main source of carbohydrates, but the carbohydrate quality may differ by rice variety and post-harvest processing. Polishing removes the bran layer containing the non-digestible carbohydrate, which potentially affects the gut microbiota composition and blood glucose regulation.

Objective: This study determined the effect of non-digestible carbohydrates on the human gut microbiota composition and on the glycemic response upon consumption of stabilized brown rice (SBR) or its well-milled rice (WMR) counterpart.

Materials and Methods: A total of twenty-four (24) free-living study participants were given either SBR or WMR as replacement to their usually consumed rice for six weeks. Fecal samples were collected biweekly and analyzed for fecal short-chain fatty acids (SCFA) and gut microbiota composition. Proximate composition, total dietary fiber (TDF), and resistant starch (RS) in rice samples were measured and the glycemic index (GI) were also determined among the human participants.

Results and Findings: Results showed that SBR has slightly lower GI than WMR (71 vs 78). SBR has higher TDF (1.7g/100g) but slightly lower RS (1.14g/100g) than WMR (0.60g/100g and 1.31g/100g, respectively). There was no particular pattern observed in microbiota composition and in SCFA across collection time points. SCFA-producing bacteria including families *Lachnospiraceae*, *Lactobacillaceae*, and *Ruminococcaceae* were shown to have relative abundance correlated with SCFA compositions.

Conclusion and Recommendations: Gut microbiota and glucose responses vary across individuals and the type of rice as well as the length of consumption may not cause significant change in the gut microbiota composition. Upon completion, this two-phase study may provide basis for developing nutritional interventions and policies promoting healthy living particularly for those at risk for diabetes and other related non-communicable diseases.

Determination of Body Composition and Total Energy Expenditure in Filipino Infants and Young Children using Stable Isotope Techniques

Carl Vincent D. Cabanilla, Amster Fei P. Baquiran, Johanne B. Guilaran, Ma. Lourdes T. Cumagun, Roselle C. Sapanghila, Neil M. Tungol, Melissa S. Borlagdan, Aida C. Mallillin, Mary Aguidine F. Ramos, Norman DS. Mendoza, Mario V. Capanzana, Ph.D., and Imelda Angeles-Agdeppa, Ph.D.

Background: Traditional anthropometric measurements alone may not fully capture growth quality during the first 1,000 days. Thus, more comprehensive methods such as body composition (BC) and total energy expenditure (TEE) assessment are needed to better understand growth and its association with later health and development.

Objective: This study aimed to assess the BC and TEE in healthy Filipino older infants and young children using stable isotope techniques such as the Deuterium Dilution Technique (DDT) and the Doubly-Labelled Water (DLW) method following the International Atomic Energy Agency (IAEA) research protocols.

Materials and Methods: A total of one hundred twenty-two apparently healthy infants and children aged 6-23 months, predominantly/exclusively breastfed for three months, residing in Taguig City participated in the study. Anthropometric measurements, 24-hour dietary intake, and household information were collected. Saliva samples were collected before and after dosing and analyzed for ^{2}H enrichment using Fourier Transform Infrared Spectroscopy to determine BC. Urine samples were collected before and after dosing and analyzed for ^{2}H and ^{18}O enrichment using Isotope-Ratio Mass Spectrometry to assess BC and TEE.

Results and Findings: BC results revealed that the mean ± SD percent fat mass of the study participants was 25.6 ± 6.2 %, with girls (26.1 ± 6.8 %) having a higher percent fat mass than boys (25.2 ± 5.7 %). Meanwhile, the mean percent fat-free mass of study participants was 73.6 ± 9.9 %, with boys (74.8 ± 5.7 %) having a higher percent fat-free mass than girls (72.3 ± 12.7 %). The mean TEE of study participants was 671 ± 254 kcal, with boys having a higher TEE (691 ± 218 kcal) than girls (616 ± 245 kcal).

Conclusion and Recommendations: The nuclear techniques used in this study provided more accurate and precise nutritional assessment data than traditional anthropometric measurements could provide. The results can offer valuable insights for developing future interventions to help ensure optimal child growth and development in the country.

Detection of *Salmonella* spp. in Retailed Eggs and Broiler Chicken Using PCR-based Assay

Rose Elaine P. Guilaran, Christine Eden C. Sevilla, Elyss G. Billedo,
Denisse Abbie A. Caballes, Paola Bianca M. Buiser, and Mereil O. Garin

Background: *Salmonella* is a pathogen commonly linked to foodborne outbreaks, mostly affecting eggs and chicken. It causes salmonellosis, leading to symptoms like fever, abdominal pain, diarrhea, nausea, and vomiting. According to a report by DOST Balik Scientist Dr. Homer Pantua, *Salmonella* cases in the Philippines saw a significant jump from 9,000 in 2022 to 13,000 in 2023.

Objective: The study assessed the extent and risk of *Salmonella* contamination. It also investigated the presence of *Salmonella* in retail eggs and broiler chicken across Metro Manila markets. Among the positive samples, the prevalence of the serovar *Salmonella* Enteritidis was also determined.

Materials and Methods: Using a Real-time Polymerase Chain Reaction (PCR) method targeting the iagA gene that is specific for *Salmonella* spp., 168 egg and 144 chicken samples from wet markets and supermarkets were collected and analyzed. The PCR results were verified using conventional confirmatory methods. Additionally, an in-house real-time PCR assay was developed and validated for the specific identification of *Salmonella* Enteritidis within the positive *Salmonella* samples. The method is specific to the safA gene, the short DNA sequence specific to *Salmonella* Enteritidis.

Results and Findings: No *Salmonella* spp. was detected in the egg samples, while 50% prevalence was found in chicken samples. Moreover, 80% of the confirmed *Salmonella* isolates from chicken samples were identified as *Salmonella* Enteritidis.

Conclusion and Recommendations: The Real-time PCR method effectively detected *Salmonella spp.* in the samples within three days, thus shortening analysis time and showing its potential as a valuable tool for food safety risk assessment. The study also identified *Salmonella* Enteritidis, a common cause of human salmonellosis globally, in some of the chicken samples contaminated with *Salmonella*. These findings highlight the importance of implementing enhanced control measures in poultry production to minimize food safety risks linked to chicken consumption.

Maternal Nutritional Status in Early Pregnancy and Gestational Weight Gain of Women in Selected Areas in the Philippines: A Pilot Study

Ruby D. Frane, Charmaine A. Duante, Eva A. Goyena, Ph.D.,
Marvin C. Delos Santos, Hazel T. Lat, David Kenneth C. Mendoza,
Jason Paolo H. Labrador, Merlyn G. Tajan, Tracy Adelaide S. Sanchez,
Kristine Marie N. Benavidez-Fabi, Christia S. Padolina, MD, and Imelda Angeles-Agdeppa, Ph.D.

Background: The nutritional status of pregnant women is assessed using a weight-for-height reference table where pre-pregnant weight equals the standard weight for a given height. Evidence showed that gestational weight gain (GWG) differs according to pre-pregnancy body mass index (BMI), an important predictor of pregnancy outcomes.

Objective: This study assessed the nutritional status in early pregnancy and GWG by trimester among selected Filipino pregnant women, and its association with pregnancy and birth outcomes.

Materials and Methods: Using a prospective study design, 176 Filipino pregnant women aged 15-49 years were recruited by phone interviews from 35 cities and municipalities in the Philippines and were followed up between October 2021 and December 2022. Weight at the first prenatal visit within the 1st trimester was used as the pre-pregnant weight (PPW). Pre-pregnancy BMI was computed using the World Health Organization Classification. Total GWG (tGWG) was computed as the difference between PPW and weight of the last prenatal visit and assessed using the 2009 Institute of Medicine (IOM) recommendations. Adjusted associations of pre-pregnancy BMI and GWG with pregnancy outcomes were determined using logistic regression analysis.

Results and Findings: Among the participants, 15.3% were underweight, 56.8% and 27.8% were normal and overweight/obese, respectively. The mean gestational age at first prenatal visit was 9.6 ± 3.2 weeks and 39.0 ± 2.1 weeks at delivery. The mean birth weight was 2958 ± 441 grams. The mean tGWG obtained was 9.0 ± 4.9 kilograms. The tGWG of underweight (11.3 ± 4.8 kg) and normal-weight women (9.3 ± 4.4 kg) were below the IOM recommendations except for the overweight/obese group (7.2 ± 5.4 kg). From all the outcomes studied, being overweight/obese was significantly associated with a higher risk of more than twice having a cesarean delivery [OR 2.85 (95% CI 1.14-7.13, *p* value=0.025)]. Women who gained weight below the recommended IOM guidelines had significantly decreased odds for cesarean delivery [OR 0.24 (95% CI 0.09-0.67 p value=0.007)].

Conclusion and Recommendations: The study revealed that the tGWG of Filipino women was below the IOM recommendations, particularly among underweight and normal-weight women. Nevertheless, non-adherence to these recommendations did not present any negative pregnancy and birth outcomes in this study. The findings suggest that the use of the IOM recommendations may not be suitable for assessing the GWG of Filipino pregnant women. Hence, a prospective well-designed study is needed to develop country-specific GWG recommendations.

Development and Pilot-Scale Production of Nutribunnets and Nutricocokies and Reformulation of the DOST-FNRI Enhanced Nutribun for School-Based Feeding Programs (SBFPs)

Engr. Charlie E. Adona, Francesca Louise P. Garcia, Carissa T. Saldaña-Tanda,
John Lester G. Ramirez, Engr. Jayson G. Tagaroma, Richard L. Alcaraz,
Jonahver O. Tarlit, Filoteo D. Ponte, Rex B. Castante, and Trinidad II T. Arcangel

Background: In 2020, the Department of Science and Technology – Food and Nutrition Research Institute (DOST-FNRI) developed the Enhanced Nutribun as a nutrient-dense food alternative to hot meals for the School-Based Feeding Programs (SBFPs) of the Department of Education (DepEd). However, there have been concerns about the serving size, sodium content, and shelf life of Enhanced Nutribun. Additionally, the DOST-FNRI developed new products to help overcome taste fatigue in children to increase the diversity of food products available for SBFPs.

Objective: This study reformulated the Enhanced Nutribun by reducing sodium, improving sensory properties, prolonging shelf-life, and decreasing serving size. Likewise, Nutribunnets and Nutricocokies were developed as additional food options for SBFPs.

Methodology: Formulations and processing parameters were optimized and standardized to ensure process repeatability and product consistency. Time and motion study, cost estimate, and shelf-life study at room temperature were also conducted.

Results and Findings: Nutribunnets are bite-sized buns with dark speckles and filling while Nutricocokies are crunchy bite-sized protein-rich cookies. The New Enhanced Nutribun and Nutribunnet are microbiologically safe with acceptable sensory characteristics for 8 days while the Nutricocokies is shelf-stable even for 6 months. Each 80-gram serving of the New Enhanced Nutribun and Nutribunnet provided 15-18% of the recommended energy and 19-21% of protein for male children aged 7-9 years. The sodium content of the New Enhanced Nutribun Squash variant was reduced from 220 mg to 182 mg per 80-gram serving. A 60-gram serving of Nutricocokies provided 18% and 14% of the recommended energy and protein, respectively, of the same age group. These products also contain substantial amounts of micronutrients such as calcium, iron, zinc, and vitamin A.

The production of these products is feasible with minimum monthly sales of 21,400-24,900 packs when priced at ₱12.27-14.03/80-g pack for the New Enhanced Nutribun, 20,000 packs when priced at ₱17.47/80-g pack for Nutribunnet, and 17,500 packs when priced at ₱12.37/30-g pack for Nutricocokies.

Conclusion and Recommendations: The New Enhanced Nutribun had reduced sodium content, improved sensory properties, smaller serving size, and extended shelf-life while the newly-developed products, Nutribunnets and Nutricocokies, are acceptable shelf-stable alternatives to current SBFP food products. The production of Enhanced Nutribun, Nutribunnet, and Nutricocokies proved to be feasible based on the production technology presented. The use of lower-priced but good quality raw materials and higher capacity machinery may be considered to further reduce production costs and increase the profit margin of technology adoptors.

Exposure Assessment of Food Chemical Contamination in Metro Manila: A Pilot Total Diet Study Approach

Kristine B. Nacionales, Rose Elaine P. Guilaran, Elyss G. Billedo, Alexandra Lyne E. David, Alyzza Gail M. Del Mundo, Avegail D. Apor, Ma. Ariza C. Baylosis, Aries G. Lundag, and Ron Elyf E. Placio

Background: Total Diet Study (TDS) is recognized by the World Health Organization (WHO) as the most cost-efficient method for estimating consumer exposure to toxic chemicals in food and assessing associated health risks. While TDS data exists in other countries, the Department of Science and Technology – Food and Nutrition Research Institute (DOST-FNRI) conducted the first TDS in the Philippines. Risk managers and government agencies may use the results in developing science-based policies on food safety issues.

Objective: This project assessed the actual dietary exposure of different population groups (children, adolescents, and adults) to chemical substances in the diet and the food supply in Metro Manila.

Materials and Methods: Food samples were collected for trans-fatty acids (TFAs) and mineral analysis, reflecting common consumption based on the 2018-2019 Expanded National Nutrition Survey (ENNS). Samples were gathered from wet markets, supermarkets, and fast-food chains across Metro Manila. The Institute formulated TDS design and protocols based on the national food consumption pattern of Filipinos. The established TDS protocols were utilized to provide a more accurate estimate of Filipino exposure to TFAs and minerals. Additionally, an effective method for analyzing TFA and selected minerals in foods using Inductively Coupled Plasma (ICP) techniques was validated.

Results and Findings: A total of 218 pooled food samples were analyzed for TFA, while 59 food samples underwent analysis for minerals (calcium, copper, iron, magnesium, manganese, and zinc). The data on the dietary exposure assessment of the Philippine population to TFA underscores the prevalence of processed and convenience foods in the Filipino diet, with items like sausages, instant noodles, and baked goods consistently appearing as major sources of TFA. On the other hand, the major food contributors to specific minerals exposure from the analyzed samples varied across different age groups.

Conclusion and Recommendations: Data on major food contributors to TFA exposure in the Philippines emphasize the need for interventions, particularly for children and adolescents exposed to processed foods. These findings align with global trends where ultra-processed foods are known to contain high levels of unhealthy fats, including TFAs. Similarly, insights from mineral data across different age groups underscore the importance of specific food items in overall mineral intake, informing targeted dietary recommendations for adequate intake throughout life stages. Based on the results, it is recommended to upscale the existing current TDS design and protocol based on the national dietary pattern of the Filipino population.

Project on Supporting Adolescent Growth in the Philippines (Project SAGIP): A Pilot Study in Marikina City Phase 2

Noelle Lyn C. Santos, Marilou M. Lopez-Madrid, Jason Paolo H. Labrador, Allain Louies P. Dalisay, John Carl L. de Torres, May Ann D. Gironella, Eirene Agustin B. Arnejo, Diana Glades A. Domalanta-Ronquillo, Jacus S. Nacis, Abegail P. Pempeña, Pacita T. Trinidad, and Camile S. Estimado-Canieso

Background: The Supporting Adolescent Growth in the Philippines (SAGIP) is a model school-based nutrition intervention program developed to address the persistent malnutrition among Filipino adolescents and to advance nutrition and health promoting schools.

Objective: This study pilot tested Project SAGIP and determined its acceptability, feasibility, and perceived effectiveness among selected stakeholders.

Materials and Methods: The Project SAGIP, comprised of 3 major components: school-based feeding program with sensory play activities; nutrition and physical awareness activities; and nutrition and health status monitoring, was pilot tested among fifty-six (56), grades 5-8 students, 10-14 years old, in a public school in Marikina City. For 60 school days, the students were provided with standard lunch meals that met about 25% of their energy requirement and 25% of the estimated average requirement for macronutrients, Vitamin A and Iron. Each meal costs PhP 30.52 on average. All students received self-administered activity sheets i.e, daily food hunt activities and physical exercises, and weekly nutrition and food safety activity sheets accomplished over 12 weeks. Monitoring of nutritional status, diet, physical fitness, and biochemical markers were done at baseline and endline. Evaluation of SAGIP was done through in-depth interviews and focus group discussions among study stakeholders.

Results and Findings: Students had a mean age of 11.72 ± 1.18 years, with equal percentage of males and females. The average days of participation in the intervention was 46 days with 78.5% of students having engaged in all program components. The students with normal BMI-for-age increased from 48.0% (n=24) to 58.0% (n=29). The hemoglobin and serum vitamin A improved among males while mean serum zinc of females decreased from 78.16 ug/dL ± 9.46 to 76.40 ug/dL ± 11.60. The endline mean energy intake slightly increased (1668 kcal ± 543 to 1721 kcal ± 462). Students' responses demonstrated awareness of healthy food choices and benefits of engaging in physical activities. School heads and teachers expressed their interest in adopting the SAGIP meals but with considerations on available school resources as well as support from school heads and officials to institutionalize nutrition intervention programs in schools.

Conclusion and Recommendations: This study has successfully established standardized protocols which were found to be feasible and acceptable to proceed to a more extensive school-based trial that would test the effectiveness of SAGIP in improving the nutritional status of Filipino adolescents.

Development and Validation of Predictive Models of Pregnancy Outcome Using National Nutrition Surveys: Focus on Birthweight

Ma. Anna Rita M. Ramirez, Glen Melvin P. Gironella, and Merlyn G. Tajan

Background: Birth weight is a significant determinant of the survival of an infant. Low birth weight (LBW) was estimated at 15% among infants in the world, and more than half of all the low birthweight babies is in Asia (UNICEF-WHO, 2019). In the Philippines, the latest official estimates of low birth weight were at 15% among children born in the past 2 years (PSA, 2023).

Objective: This study identified and evaluated predictive models of low birth weight using the National Nutrition Survey (NNS) data.

Materials and Methods: Random forest classification was done among Filipino children aged 0-71 months with birth weight using 2018-2019 NNS.

Results and Findings: Variables that predicted low birthweight among children are the following: maternal age, height, and educational attainment, gravida, parity, place of delivery of child, months of gestation, occupation, civil status, source of birthweight, area in urban, ever smoking, and ever drank alcohol. Accuracy of the model was at 88%.

Conclusion and Recommendations: Maternal age and height followed by educational attainment, gestation, gravida, parity, place of delivery, occupation, source of birthweight data, civil status, residence in urban, history of smoking and alcohol consumption were identified predictors of low birth weight among Filipino children. Provision and evaluation of programs on education, reproductive health, maternal and child health infrastructure and sustained health promotion campaigns on smoking and alcohol drinking are recommended. Other modeling strategies such as support vector machines, boosting, or neural networks can be done to check for improvements in the accuracy of the machine learning models.

A Prediction Model for Low Birth Weight Using Filipino Maternal Characteristics

Ruby D. Frane, Marvin C. Delos Santos, Jason Paolo H. Labrador, Ma. Anna Rita M. Ramirez, Merlyn G. Tajan, and Erickson E. Fajiculay, Ph.D.

Background: Low birth weight (LBW) remains a persistent problem in the Philippines. A LBW prediction model can be used to make clinical decisions to control LBW, especially in areas with limited access to diagnostic tests.

Objective: This study aimed to develop a prediction model for LBW using maternal characteristics.

Materials and Methods: LBW data was collected from 3,814 female respondents using the 2022 National Demographics Health Survey (NDHS). Multivariate logistic regression was used to predict binary outcome variables. The collected data was split into 80% training and 20% testing sets. The receiver operating characteristic (ROC) area under the curve (AUC), overall accuracy, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were assessed.

Results and Findings: The prevalence of LBW (<2500g) was 14.6%. Logistic regression revealed that age groups 15-19 (OR 1.93, 95% CI 1.23-3.02, p-value= 0.00), and 40-44 (OR 1.53, 95% CI 1.03-2.29, p-value=0.04), listening to the radio less than once a week (OR 1.46, 95% CI 1.13-1.88, p-value=0.00), non-internet users (OR 1.37, 95% CI 1.06-1.77, p-value=0.02), diet groups of plantains, root crops and other tubers (OR 1.27, 95% CI 1.01-1.59, p-value=0.04), and of mangoes, papayas and other fruits (OR 1.32, 95% CI 1.06-1.65, p-value=0.01), and duration of pregnancy (OR 0.67, 95% CI 0.62-0.73, p-value=0.00) were predictors associated with LBW. The prediction model has a ROC-AUC of 0.64, with an overall accuracy of 58%, a sensitivity of 59%, a specificity of 58%, a positive predictive value (PPV) of 0.19, and a negative predictive value (NPV) of 0.89. Upon validation, the model exhibited a ROC-AUC of 0.62 and an overall accuracy of 59.1%. Its sensitivity, specificity, PPV, and NPV were 59.4%, 59.1%, 0.19, and 0.90, respectively.

Conclusion and Recommendations: Six (6) variables were significantly associated with LBW. A further validation study is needed for the acceptance of the prediction model in clinical and public health practices.

Enhancement of Philippine Food Composition Tables (*PhilFCT®*) Online Database and Mobile Application

Kristine B. Nacionales, Ma. Ariza C. Baylosis, Rogel L. Villapaz,
Alexandra Lyne E. David, and Aries G. Lundag

Background: The *PhilFCT®* online database and mobile application are electronic versions of Food Composition Tables (FCT), which store information on the nutritional composition of over 1,500 commonly-consumed foods. These data are used in dietary intake assessments, nutritional research, and epidemiology, as well as agricultural research, food formulation, and assessing food biodiversity and food security. Both PhilFCT® online database and mobile application are the Institute's response on the need for technology advances in data exchange and distribution towards helping the users.

Objective: The project updated the *PhilFCT®* online database specifically addition of trans fatty acids (TFA) data of selected processed foods and maintained the *PhilFCT®* mobile application.

Materials and Methods: The project involved launching of the mobile application, executing enhancements such as addition of new nutrient data to the administrator and users' pages of the online database, and continuously checking of online database for bugs and errors.

Results and Findings: The *PhilFCT®* mobile application was successfully launched on July 5, 2023. A total of 216 TFA data of selected processed foods were added to the online database. The new data on TFA will contribute to the attainment of the Review, Promote, Legislate, Assess, Create awareness, and Enforce (RePLACE) action package of the World Health Organization, which aims to eliminate industrially-produced TFA. The online database reached 481,452 hits in 2023 with users from academe, government agencies, food industry, and international organizations, among others.

Conclusion and Recommendations: Recommendations for improvements include updating with additional nutrients like amino acid profile and incorporating nutrient data for emerging food items. Prioritizing maintenance and security enhancements are also recommended. The call for international harmonization of food composition databases emphasizes the need for global collaboration and dissemination efforts to inform potential users worldwide about *PhilFCT®* and other online food and nutrition information tools of the Institute.

Delights for your Heart: Healthy Recipes and Nutrition Tools for Individuals with Hypertension

May Ann D. Gironella, Idelia G. Glorioso, Eirene Agustin B. Arnejo, Veronica Vianca C. Salazar, Dexter Y. De Leon, John Mark M. Villanueva, Shannen Faye Q. Arevalo, Erika Niña C. Bacolod, John Denver M. Cabillon, Carissa Saldaña-Tanda, Christelle Lois T. Bayalas, Ma. Corazon E. Palompo, Eva L. Rebato, and Milflor S. Gonzales, Ph.D.

Background: Hypertension is recognized as a contributor to premature mortality and is a pivotal but reversible risk factor in the onset of cardiovascular diseases. Developing healthy and suitable recipes can contribute to the dietary management of hypertension.

Objective: This project developed a set of information tools containing recipes that are helpful for hypertension management.

Methodology: Online survey among hypertensive adults (n=50) and interviews with experts (n=5) in internal medicine, nutrition, policy making, and public health were initially conducted. Data collected were utilized in the two-level recipe standardization process. Taste testing among DOST-FNRI sensory panelists (n=10) and estimation of energy and nutrient content including fiber, saturated fat, cholesterol and sodium, and cost using Menu Eval Plus software were conducted. Two-stage pretesting of the developed tools was conducted through online surveys among experts (n=55) and Focus Group Discussions (FGD) among adults with history of hypertension or are currently hypertensive (n=18).

Results and Findings: The project developed three (3) nutrition tools: 2024 DOST-FNRI Menu Guide Calendar, eKusina recipe videos, and a digital recipe booklet. A total of 26 recipes were developed with each serving containing 131–425 calories, 11.4-23.1 g protein, 0.6-10.1 g fiber, substantial micronutrients, and minimal amounts of saturated fat (<16.4 g), cholesterol (<107.8 mg), and sodium (<387.0 mg). Recipes from diverse cuisines were adapted, utilizing local ingredients to create acceptable, affordable, and nutritious recipes. Salt was used sparingly, while spices were generously added for flavor. The cost of the recipes per serving ranged from Php 13.50 to Php 65.00. During the pretesting, the tools were found to be informative, innovative, visually appealing, and were rated with an average overall rating of "very good" by the study participants.

Conclusion and Recommendations: The 2024 DOST-FNRI Menu Guide Calendar and other nutrition tools were developed to showcase recipes and dietary management for individuals with hypertension. Strategic dissemination of the tools via counseling, nutrition education, and social media is recommended for wider coverage and greater impact.

A Closer Look on the Health, Nutritional Status, Dietary Intake and Health Seeking Practices of Teenage Pregnant Women in Selected Areas in CALABARZON

Emily O. Rongavilla, Joanne Jette S. Gulay, Rowena V. Viajar, Eldridge B. Ferrer,
Georgina S. Caraig, and Julieta B. Dorado

Background: Teenage pregnancy is an emerging global problem. Globally, about 13% of young women below 18 years old had given birth in 2022 (UNICEF, 2024). In the Philippines, about 5% teenage women aged 15-19 had given birth. (PSA, 2023).

Objective: This cross-sectional study assessed the nutritional status, dietary intake, feeding practices, and government program participation of teenage pregnant women (TPW) 10-19 years old in CALABARZON.

Materials and Methods: A total of 165 TPW and 28 health implementors as key informants (KI) were the study participants. They were interviewed through mobile phone and video calls during pandemic in 2022. The energy and nutrient intake of TPW using 24-hour food recall were recorded using standard measurement tools.

Results and Findings: The age range of TPW in the study was 13 to 19 years old, with a mean age of 17. Half of them were nutritionally-at-risk (50.0%), 70% had normal blood pressure, 24% had pre-hypertension, and 6% were hypertensive. About half (41.8%) and 65% of TPW met their recommended energy and protein requirements. About half met the requirements for B vitamins, thiamine, riboflavin and one third for calcium, Vit. C and A intakes. Niacin has the highest proportion of TPW who met the recommended intake (86.7%). More than half of them (64%) participated in pre- and post-natal services. However, a much higher proportion followed superstitious beliefs and traditions related to their pregnancy (67.3%) and had food fallacies while pregnant (53.3%).

Conclusion and Recommendations: The study showed that half of the teenage pregnant women in selected areas in CALABARZON are nutritionally-at-risk and majority followed superstitious beliefs, and food fallacies. Early detection/location and regular monitoring of TPWs is recommended with some budget allotment from the government priority programs such as the Adolescent Health and Development Program (AHDP) to ensure improvement in their health and nutritional status. In addition, to maximize the use of multi-media technology in creating extensive awareness on reproductive health and sex education among teenage women.

Comparison of Food Security, Dietary Diversity, and Care Practices of Households with and without Migrant Parent Workers during the COVID-19 Pandemic

Joanne Jette S. Gulay, Rowena V. Viajar, Georgina S. Caraig,
Nesrianne G. Buyco, and Apple Joy D. Ducay

Background: The unprecedented situation in terms of economic upheavals which affected people who lost their jobs and household's financial challenges during the COVID-19 pandemic has profound implications in the household's food security and nutritional state.

Objective: This study examined the food security of households with migrant and non-migrant parent workers during pandemic and compared their dietary diversity and care practices among four-to-nine-year-old children before and during the pandemic.

Materials and Methods: Household participants included 88 primary caregivers with four-to-nine-year-old children, 42 with migrant parent workers and 46 with non-migrant parent workers. Study areas were the three Cities in the National Capital Region (Caloocan, Malabon, and Navotas) and two municipalities in Quezon Province (Atimonan and Padre Burgos). Interviews were conducted through phone calls.

Results and Findings: The proportion of migrant and non-migrant parent workers who were food secure (21.4% and 6.5%) and food insecure (78.6% and 93.5%), respectively, were significantly different during the pandemic compared to pre-pandemic period. Percentage distribution of severely food insecure was significantly higher among households with non-migrant parent workers. Despite being food insecure, both groups were able to eat diverse food groups. Their mean dietary diversity scores increased significantly during the pandemic than before pandemic which may be due to the food assistance they received. Most care practices provided to four-to-nine-year-old children in both households were similar in the two situations.

Conclusion and Recommendations: The COVID-19 pandemic affected the food security of both households with and without migrant parent workers. The provision of additional livelihood to increase household income and local programs such as home food production must be strengthened to improve household food security and protect them during food shocks such as the pandemic without depending on food assistance to be provided to households.

Nutritional Adequacy in Filipino Children and Nutritional Factors Associated with Stunting: Analysis of Data from the 2019 Expanded National Nutrition Survey

Imelda Angeles-Agdeppa, Ph.D., Cristina G. Malabad, Ma. Lynell V. Maniego,
Cheder D. Sumangue, Apple Joy D. Ducay, and Ma. Evette B. Misagal

Background: Stunting remains a persistent nutrition problem in the Philippines. The 2019 Expanded National Nutrition Survey (ENNS) revealed that three in every 10 children under five years old were stunted.

Objective: This study assessed the food and nutrient intake of children under five and identified significant predictors of stunting.

Materials and Methods: Data from 3,684 children aged 1 to under 5 years old from the 2019 ENNS was examined. Descriptive statistics and multiple logistic regression analysis were performed to analyze significant socio-economic, demographic, and dietary factors associated with stunting.

Results and Findings: The analysis revealed that stunted children had significantly lower consumption and mean daily intake of meat, poultry, eggs, and dairy, as well as lower intake of essential nutrients, including protein, iron, calcium, vitamin C, thiamine, riboflavin, niacin, magnesium, zinc, vitamins E and D, and phosphorus ($p < 0.05$). Multiple logistic regression models revealed that higher birth weight, energy-adjusted vitamin E, and phosphorus intake were associated with reduced odds of stunting. Conversely, residing in households with more than five members, belonging to poorest or poor wealth quintile, and having household heads without any formal education were associated with increased odds of stunting.

Conclusion and Recommendations: Addressing stunting in the Philippines requires a multifaceted approach. Promoting complementary feeding for the earlier years in children's life and continuous promotion of the consumption of nutrient-dense foods, particularly high biological value proteins like meat, fish, poultry, and dairy, is encouraged to prevent nutritional deficiencies. Strengthening existing maternal and child nutrition programs, including health and nutrition education and dietary diversification, through the scaling up of the First 1,000 Days or *Kalusugan at Nutrisyon ng Mag-Nanay* Act, can help reduce stunting in the country.

Snacking Pattern of Filipino Children and its Contribution to their Total Energy Intake

Michael E. Serafico, Eva A. Goyena, PhD, Josie P. Desnacido, and Apple Joy D. Ducay

Background: Snacking can be defined as eating outside the three main meals of the day, regardless of the amount or type of foods consumed. Snacking patterns vary between developing and developed countries. Consequently, the proportion of individuals who snack and the energy and nutrient contributions from snacking differ.

Objective: This study determined the snacking patterns of Filipino children and their contribution to total energy intake.

Materials and Methods: The study utilized secondary, cross-sectional data from two survey years of the Expanded National Nutrition Survey (ENNS) conducted in 2018 and 2019. The 2018-2019 ENNS covered 79 provinces including highly urbanized cities (HUCs).

Results and Findings: A total of 62,877 children aged 3-18 years old who participated in the 2018-2019 ENNS were included in the study. On average, Filipino children consume snacks once a day, usually as afternoon snacks. The frequency of snacking between male and female children did not differ significantly. Moreover, the consumption of snack foods decreased as the children got older. The snack foods frequently consumed were bread, crackers, and sugar-sweetened beverages contributing 216.7 kcal of energy intake for the day. Snack foods contributed 26.1% of the total daily energy intake of Filipino children aged 3-5; 19.5% in 6-9 years old; 15.8% in 10-12 years old; 13.8% in 13-15 years old; and 13.4% in 16-18 years old.

Conclusion and Recommendations: Filipino children usually eat snacks between lunch and dinner. Commonly consumed snack food items include bread, crackers, and sugar-sweetened beverages. Snacking substantially contributes to the energy needs of children although its consumption decreases as the children get older. Studies to explore the influence of peers, food environments, food labeling, and marketing on the consumption of snack foods are recommended.

The Evaluation of Meal Balance Index among Filipinos: 2018 Expanded National Nutrition Survey Results

Imelda Angeles-Agdeppa, PhD, Marvin B. Toledo, Janine Marie S. Dariagan, Fabio Mainardi, Richard G. Cote, Roko Plestina and Nele Silber

Background: Dietary patterns have been shown to correlate with one's nutritional status. However, individuals consume a combination of foods for meals and snacks. Therefore, it is beneficial to examine the nutritional composition of different meals and snacks, along with their patterns.

Objective: This study validated the effectiveness of a nutritional quality index and the extent that it could predict one's daily nutritional intake, along with investigating the relationship between diet quality and food choices.

Materials and Methods: The study made use of the nutritional quality index devised by Société des Produits Nestlè, which uses a scoring metric of 0 to 100 to assess the nutrient content (protein, total fat, fiber, potassium, calcium, iron, sodium, added sugars, and saturated fat) of meals and snacks. The 2018 Expanded National Nutrition Survey (ENNS) food recall data was evaluated alongside exemplary menu plans for three main local dietary patterns. These menu plans are made by a registered nutritionist-dietitian in accordance to the requirements set in the Philippine Dietary Reference Intakes (PDRI).

Results and Findings: Out of 100, the exemplary menu plans scored a total of 72.2, while the 2018 ENNS food recall only scored 46.1. It was also found that calcium, fiber, Vitamin C, and total fat were outside the healthy ranges throughout the meals and that the average meal quality of Filipino adults is poorly aligned with the PDRI recommendations in comparison with the exemplary menu plans.

Conclusion and Recommendations: The use of nutritional quality indices aids in predicting and evaluating one's nutritional intake and diet quality on a per-meal basis. Therefore, further validation of the index in a local setting is recommended so that it may help devise dietary interventions and programs more effectively since individuals consume food in a meal/snack pattern.

Supporting reference: Mainardi F, Drewnowski A, Green H. Personalized Nutrient Profiling of Food Patterns: Nestlé's Nutrition Algorithm Applied to Dietary Intakes from NHANES. Nutrients. 2019 Feb 12;11(2):379. doi: 10.3390/nu11020379. PMID: 30759867; PMCID: PMC6412928.

Epidemiology of Diabetes and Pre-Diabetes in the Philippines in the Last Two Decades

Charmaine A. Duante, Cheder D. Sumangue, Apple Joy D. Ducay,
Chona F. Patalen, Catherine M. Iranzo, and Ma. Lilibeth P. Dasco

Background: Diabetes mellitus is a chronic, progressive metabolic condition characterized by abnormally elevated blood glucose levels. It is the major cause of death, morbidity, and about 40% of healthcare expenses worldwide. It is the fifth leading cause of mortality among Filipinos based on a five-year average starting from 2014.

Objective: This study determined the epidemiology of diabetes and pre-diabetes among Filipino adults in the last two decades (1998-2019).

Materials and Methods: Cross-sectional secondary data of adults 20 years old and above obtained from the 1998 National Nutrition Survey (NNS) to the 2018-2019 Expanded NNS (ENNS) were analyzed. Descriptive and Pearson correlation analyses were done using Stata version 16.0.

Results and Findings: Findings indicated that the national prevalence of diabetes or fasting blood glucose (FBG) of ≥126 mg/dL slightly decreased by 0.5 percentage points from 1998 to 2003. However, it significantly increased from 2008 to 2018-2019. The prevalence of pre-diabetes or FBG of 110 mg/dL to 125 mg/dL decreased from 2003 to 2008 and started to rise in 2013 to 2018-2019. By age group, the prevalence of pre-diabetes was noted to be highest among adults 50-59 years old in the 1998 and 2003 NNS, and in the 2018-2019 ENNS. Likewise, the prevalence of diabetes was highest among adults 50-59 years old from the 1998 to 2008 NNS. Moreover, the prevalence of diabetes showed an increasing trend since the 2013 NNS among all age groups. Generally, the prevalence of pre-diabetes was higher among males than females across survey years except in 2003. Similarly, the prevalence of diabetes is higher among males than females across survey years except in 2003 and 2008. By place of residence, the prevalence of prediabetes is higher among adults residing in rural than in urban areas across survey years except in 2013. In contrast, the prevalence of diabetes was significantly higher among adults residing in urban than in rural areas across survey years.

Conclusion and Recommendations: The study found a consistently high prevalence of diabetes and prediabetes among older adults from 1998 to the 2018-2019 survey, with an increasing proportion observed in both males and females over the 20-year period. But in the past decade, it was also evident that this condition was occurring among the younger age group. Understanding the epidemiology of this disease can lead to more comprehensive ways to monitor and avoid its onset, as well as other comorbidities.

Use of Food Frequency Questionnaire to Assess Relationships between Dietary Habits and NCD risk factors

Chona F. Patalen, Josie P. Desnacido, Apple Joy D. Ducay, Maria Niña Michaela B. Plastina, Antoniette G. Cristobal, and Charmaine A. Duante

Background: Food frequency questionnaires (FFQ) in nutrition surveys are vital in estimating long-term dietary intake and describing the population's dietary habits. The assessment of FFQs is needed to provide accurate dietary information and reliable diet-disease associations.

Objective: This study assessed the relationship of the semi-quantitative FFQ used in the 2013 National Nutrition Survey (NNS), by comparing the FFQ-derived estimates with 24-hour food recall and with biomarkers (fasting blood sugar, total cholesterol, and triglyceride).

Materials and Methods: The study was a secondary, cross-sectional data analysis of the 2013 NNS. Relationship between FFQ-derived estimates and the 24-hour food recall was assessed through Spearman correlation, as well as with their corresponding clinical biomarkers. Moreover, differences between median intakes based on FFQ-derived estimates by different levels of biomarkers were assessed through Kruskal-Wallis Test. Simple linear regression was used to assess trends of fasting blood sugar, triglycerides, and total cholesterol levels against tertile levels of FFQ food categories, and energy and nutrients.

Results and Findings: Estimates from the FFQ and 24-hour food recall indicate a moderate significant correlation particularly for rice and rice products. Meanwhile, a weak significant correlation was noted for bread and bakery products, meat and poultry, corn and corn products, milk and dairy products and beverages, processed/cooked meat and fish, sugars and sweets, and fish and products. For the FFQ-derived estimates and clinical biomarkers, low correlation coefficients were observed in this study. In terms of the median intake, differences for the FFQ-derived estimates for rice and rice products, meat and poultry, processed meat and fish, milk and dairy products and beverages, and fresh fruits and juices were significant by fasting blood sugar, triglyceride, and total cholesterol levels.

Conclusion and Recommendations: Findings show that the FFQ had generally weak correlations with the 24-hour food recall and clinical biomarkers. Higher intakes of select food groups and nutrients had significant impact on fasting blood sugar level and lipid profile. Further validation of the FFQ and refinement focusing on specific nutrients are recommended to improve validity and better illustrate the relationship between dietary patterns and NCD risk factors.

Assessment of the Nutrition and Health Status of Children and Adults in Geographically Isolated and Disadvantaged Areas (GIDA): ENNS, 2018, 2019 & 2021

Charmaine A. Duante, Ma. Lynell V. Maniego, Mary Bernadette M. Velasquez, and Romalyn L. Tordecilla

Background: Geographically Isolated and Disadvantaged Areas (GIDA) are communities with marginalized populations that are physically and socio-economically separated from mainstream society. Due to this situation, GIDA often have weak healthcare systems and lack comprehensive nutrition and health assessments.

Objective: This study assessed the nutritional and health status of children and adults residing in GIDA.

Materials and Methods: Data of children aged 0-59 months and adults aged 20-59 years collected from the 2018, 2019, and 2021 Expanded National Nutrition Survey (ENNS) were analyzed. Descriptive statistics were performed to determine the characteristics of children and adults residing in GIDA. Multiple logistic regression analyses were conducted to determine the predictors of nutritional status among children and adults.

Results and Findings: Regression analyses revealed significant associations between stunting and older age children (24-59 months), vitamin A deficiency (VAD), household food insecurity, and unimproved sources of drinking water [(e.g. unprotected wells, unprotected springs, surface water (e.g. river, dam or lake)]. Underweight among children was associated with older age, anemia, VAD, rural residence, and poor wealth status. Wasting, on the other hand, was associated with younger age (6-23 months), being female, and poor wealth status. Among adults, chronic energy deficiency (CED) was significantly associated with younger age, no grade level of schooling completed, household food insecurity and current smoking, while overweight or obesity was associated with older age, high educational attainment, hypertension, and insufficient physical activity.

Conclusion and Recommendations: Malnutrition continues to exist in the Philippines and is highly prevalent in both children and adults living in GIDA. Findings underscore the need for comprehensive policies and relevant and appropriate intervention programs addressing the multifaceted nature of malnutrition, especially in isolated geographical and locations to improve access to healthcare services and overall well-being.

The Association Between Food Security and Food Cost Among Filipino Households

Patricia Isabel G. Amita

Background: The cost of food is a critical factor influencing food security. In the Philippines, food affordability and accessibility are closely tied to household income. Despite efforts to combat food insecurity, the 2018-2019 Expanded National Nutrition Survey (ENNS) revealed that over half of Filipino families are food insecure.

Objective: This study evaluated the relationship between food security and the cost of household consumption by food groups.

Materials and Methods: Secondary data from the 2018 ENNS was utilized in the analysis, encompassing 20,276 households with complete information on socio-demographic characteristics, household food security, and food consumption. Stata version 16 was used for all statistical tests conducted.

Results and Findings: Households with moderate to severe food insecurity consumed more cereals, rice, vegetables, and starchy roots, and less fruits, meat, fish, poultry, and dairy compared to food-secure households. Food-secure households allocated more budget to animal source foods, dairy, vegetables, fruits, and fats/oils. Conversely, food-insecure households prioritized calorie-dense foods like rice and had significantly lower fruit & vegetable expenditure than food-secure households which suggests a lower dietary variety as food insecurity levels increase.

Conclusion and Recommendations: Household food insecurity was associated with food costs among Filipinos. Food-insecure households tend to spend more on inexpensive, calorie-dense foods, which may lead to poorer diet quality and health risks. This emphasizes the urgent need for targeted interventions to improve food security. Policymakers should prioritize improving job opportunities, expanding educational access, strengthening social support and ensuring that healthy, nutritious food is affordable and available to everyone to effect a fair and sustainable food system.

Association of Individual Dietary Diversity Score and the Nutritional Adequacy of Diet of Filipino Adults

Frances Pola S. Arias and Ma. Lynell V. Maniego

Background: One-third of the global population suffer from micronutrient malnutrition. In several developing countries, dietary diversity scores (DDS) tool is used in evaluating micronutrient adequacy and dietary diversity among children and adults.

Objective: This study determined the association between individual dietary diversity score and nutritional adequacy of diet of Filipino adults (19 to 59 years old) based on the 2018-2019 Expanded National Nutrition Survey (ENNS) pooled data.

Materials and Methods: Cross-sectional food consumption data of 68,529 adults ages 19 to 59 years old obtained from the 2018-2019 ENNS were analyzed. DDS were created by summing the food groups consumed over the past 24 hours. Descriptive and multiple logistic regression analyses were done using Stata version 16.0.

Results and Findings: The average Mean Adequacy Ratio (MAR) of all respondents was 0.60, with niacin, protein, and energy having the highest Nutrient Adequacy Ratios (NAR), while Vitamin C had the lowest NAR. The mean total DDS of Filipino adults was 4.36, with starchy staple (1.00), and organ meats (0.07) having the highest and lowest mean DDS, respectively. MAR and NAR of all nutrients were significantly correlated with the DDS, while Vitamin A and riboflavin had moderate correlation.

Conclusion and Recommendations: This study demonstrated that DDS and MAR were positively correlated, indicating that a more diverse diet will likely have the highest nutrient adequacy. Thus, DDS can be a supplementary screening tool in identifying individuals who need more thorough evaluation of their nutritional status.

Dietary Patterns and their Association to Overweight & Obesity among Filipino Adults: ENNS 2018-2019

Ma. Lilibeth P. Dasco, Ma. Evette B. Misagal, and Apple Joy D. Ducay

Background: Overweight and obesity have been steadily increasing throughout the years and these are influenced by several factors, especially dietary intake. Limited studies in the country exist about dietary patterns and their association with overweight and obesity.

Objective: This study determined the association between dietary patterns and overweight/obesity among Filipino adults, 20 years old and above.

Materials and Methods: The study utilized the 2018 and 2019 Expanded National Nutrition Survey (ENNS) data and included 79,530 adults. Alternative Healthy Eating Index (AHEI-2010) was used to characterize dietary quality. This includes 10 components and was summed to obtain the total AHEI-2010 score, ranging from 0 (non-adherence) to 100 (perfect adherence). Higher AHEI-2010 scores indicate healthier diets. Principal Component Analysis (PCA) was used to identify dietary patterns specific to the adult population. Logistic regression analyses were performed to assess the association between the different dietary pattern scores and overweight/obesity with adjustment for potential confounders.

Results and Findings: The mean AHEI-2010 score was 38.7 for women and 38.4 for men, out of a total possible score of 100, indicating poor overall diet quality. Three major dietary patterns were identified through PCA: 1) meat, poultry, and sugar and syrups pattern (MPSP); 2) rice and fish pattern (RFP) and 3) vegetable pattern (VP). Adults consuming an AHEI pattern and RFP (highest tertile) are more likely residing in rural areas. Respondents in the highest tertile of MPSP are more likely to be from the rich and richest wealth quintiles. MPSP and RFP were associated with higher odds of overweight/obesity [highest-tertile adjusted odds ratio (AOR) 1.12, 95% CI: 1.04-1.20; AOR: 1.18, 95% CI: 1.11-1.27, respectively].

Conclusion and Recommendations: Dietary patterns characterized by MPSP and RFP are associated with overweight/obesity. Identifying dietary patterns is important to capture the complexity of the overall diet and interactions of nutrients, whether these promote health or increase the risk of chronic diseases. Moreover, the findings will serve as a basis for nutrition education strategies targeting vulnerable adults.

Association between Height and Blood Pressure among Filipino Adults: Evidences from the Philippine National Nutrition Survey

Maria Stephanie N. Parani, Chona F. Patalen, Ma. Lynell V. Maniego, Catherine M. Iranzo, Ma. Lilibeth P. Dasco, and Charmaine A. Duante,

Background: Raised blood pressure continues to inflict a significant impact on health and well-being among Filipino adults. Identifying and understanding the different risk factors associated with this condition is crucial. One indicator of health that is not often considered is the relationship between height and blood pressure.

Objective: This study investigated whether a positive or inverse association exists between height and blood pressure parameters among Filipino adults.

Materials and Methods: Secondary analysis of cross-sectional data from the 2018-2019 Expanded National Nutrition Survey (ENNS) was utilized. Adult survey participants who have complete data in selected components were included. Measured heights were categorized into sex-specific height quartiles and a linear trend test was performed. Multivariate linear regression models were generated from the association of blood pressure parameters with height.

Results and Findings: Results showed that systolic blood pressure (SBP) values for both sexes decrease as the height increases, on the contrary diastolic blood pressure (DBP) values progressively increase as the height increases. In addition, for each centimeter increase in height among the participants, SBP decreases (Females; -0.261 mmHg, $p<0.001$: Males; -0.012 mmHg, $p=0.589$) while the DBP increases (Females: 0.039 mmHg, $p=0.002$: Males; 0.146 mmHg, $p<0.001$). However, after adjustment to covariates, analyses showed positive associations between height and blood pressure parameters among the study participants.

Conclusion and Recommendations: Height was found to have an inverse association with SBP and a positive association with DBP, which may be attributed to the combined effect of blood flows' hemodynamic and hydrostatic mechanisms. It is recommended to conduct further studies incorporating other factors with underlying connection to height and, subsequently, to the development of raised blood pressure in later years, such as participants' childhood nutrition and adults' dietary habits, lifestyle practices, and sleep duration.

Urban and Rural Prevalences and Determinants of Anemia among School-Aged Children in the Philippines: Evidence from the 2018-2019 Expanded National Nutrition Survey

Kim Irvin T. Protacio, Jomaica Yvonne R. de Joya, and Cheder D. Sumangue

Background: Anemia has long been a persistent public health issue among vulnerable populations, particularly among school-aged children (6–12 years old). The causes of anemia in this group are multifactorial and can vary significantly between different geographical areas.

Objective: This study determined the prevalence of anemia and its contributing factors among school-aged children in both urban and rural settings across the Philippines.

Materials and Methods: The study utilized a secondary, cross-sectional analyses of data from the 2018-2019 Expanded National Nutrition Survey (ENNS). The prevalence of anemia was assessed, and contributing factors were identified using multiple logistic regression independently for urban and rural areas.

Results and Findings: The study revealed a national prevalence of anemia among school-aged children at 13.7%, with rural prevalence at 15.8% and urban prevalence at 10.5%, highlighting a significant rural-urban disparity. Children aged 6-9 years old are more likely to be anemic than those aged 10-12, regardless of living in urban or rural areas. Those who are not beneficiaries of the *Pantawid Pamilyang Pilipino* Program (4Ps) in rural areas and the National Dietary Supplementation Program in urban areas have a higher risk of anemia, underscoring the importance of these initiatives. Additionally, overweight and obese children are less likely to be anemic.

Conclusion and Recommendations: Anemia prevalence among school-age children varies by place of residence. Children aged 6-9 years are more likely to have anemia than those aged 10-12 years. Overweight and obese children are less likely to be anemic, while those who are not beneficiaries of programs like the P*antawid Pamilyang Pilipino* Program (4Ps) and the National Dietary Supplementation Program are at higher risk. These conclusions are specific to the school-aged children included in this study. To address this, targeted interventions should focus on younger children and those not included in government programs, expanding nutritional support and anemia prevention in urban and rural areas.

How Prevalent is Anemia among Filipino Households? An Assessment of the Hemoglobin Level of All Household Members Based on the 2018-2019 ENNS

Glenda P. Azaña, Ma. Lynell V. Maniego, Jomaica Yvonne R. De Joya,
Ma. Lilibeth P. Dasco, and Charmaine A. Duante

Background: Anemia happens when the hemoglobin level of an individual is lower than normal which may lead to various adverse health and nutrition outcomes. In the Philippines, anemia is a persistent public health problem particularly among young children and pregnant women.

Objective: This study determined the prevalence of anemia and the factors contributing to the occurrence of two or more cases of anemia in a household.

Methods: The cross-sectional, secondary data from the 2018-2019 Expanded National Nutrition Survey were utilized with a total of 18,938 households and 87,187 individuals. Descriptive statistics and multivariate logistic regression analysis were carried out using STATA version 15.

Results and Findings: About 22.0% of the households had one anemic member while 7.6% had two or more anemic members. The risk of having two or more cases of anemia was higher in the households with more than five members and with any of the following members: 0-23 months old children; 0-5 years old children; 6-10 years old children; adolescents; chronic energy deficient adults; older persons; lactating mother; and nutritionally at-risk pregnant mother.

Conclusion and Recommendations: Contributory factors to multiple cases of anemia include large household size and varied household composition. The risk of having two or more anemia cases was even higher in households with undernourished members. There is a need to continue the provision of micronutrient supplements particularly among vulnerable groups as they are mostly at-risk of undernutrition. Likewise, implementation of nutrition education and health-related activities like deworming and water, sanitation, and hygiene (WASH) program in the schools and communities should be strengthened and sustained.

Association of Food Environment Typology to Dietary Intake and Nutritional Status of Mothers and Children in a Peri-Urban Province of Cavite, Philippines, during the COVID-19 Pandemic

Mildred O. Guirindola, Ph.D., Ma. Lynell V. Maniego, Eva A. Goyena, Ph.D., and Nesrianne G. Buyco

Background: Food environments are the interface between consumers' food acquisition and consumption within the wider food systems. These shape the dietary behaviors and influence the nutrition and health outcomes of specific populations.

Objective: This study examined the dietary intake and nutritional status of mothers and children in the context of food environment typology in one peri-urban province in the Philippines.

Materials and Methods: This study is a household-based cross-sectional survey using secondary data from 358 households in Cavite, Philippines during the COVID-19 pandemic in 2021. Data were analyzed using the STATA version 15 with a P-value of <0.05.

Results and Findings: The study found that 67% of households purchased food in a combination of formal and informal food environments. Formal food environments are food retail markets that are regulated by the government such as groceries, supermarkets and public market, while informal food environments are those not regulated by the government and often made of semi-permanent structures such as sari-sari store and *talipapa*. About half of the mothers (51.7%) and children (46.4%) buying food in combination food environments met their minimum dietary diversity (MDD), significantly higher than the percentage of mothers and children buying food in either formal or informal food environments. In terms of nutritional status, chronic energy deficiency and obesity among mothers purchasing from informal food environments were significantly higher than among mothers purchasing from other food environments. For children, stunted and underweight were significantly higher in households purchasing from combination food environments while significantly more wasted in households purchasing from informal food environments. Both overweight mothers and children were significantly higher in households purchasing in formal food environments.

Conclusion and Recommendations: The study revealed a lack of diversity in the diets of mothers and children and the persistent undernutrition among children and overweight and obesity among mothers, regardless of the food environment typology. The findings warrant further studies to improve policies on food environment towards shaping healthy food choices.

Assessment of Selected Risk Factors of Non-Communicable Diseases among School-age Children, Adolescents, and Adults in the Philippines

Chona F. Patalen, Charmaine A. Duante, Ma. Lilibeth P. Dasco, Ma. Lynell V. Maniego, Glen Melvin P. Gironella, Apple Joy D. Ducay, Cheder D. Sumangue, Marvin C. Delos Santos, Rod Paulo B. Lorenzo, Antoniette G. Cristobal, and Imelda Angeles-Agdeppa, Ph.D.

Background: Non-communicable diseases (NCDs) are growing global health threats, and these are associated with lifestyle risk factors. Modifiable behaviors, such as smoking, physical inactivity, unhealthy diet, and the harmful use of alcohol all increase the risk of NCDs.

Objective: This study determined the prevalence of selected risk factors of NCDs among school-age children, adolescents, and adults, and tracked the changes or progress in the achievement of the World Health Organization (WHO) 2025 Global NCD targets.

Materials and Methods: Secondary analysis utilizing the cross-sectional data from the 2021 Expanded National Nutrition Survey (ENNS) and previous DOST-FNRI surveys was undertaken. Data of school-age children, adolescents, and adults on socio-demographic, anthropometry, blood pressure measurement, and behavioral risk factors to NCDs were included. Descriptive statistics were carried out using Stata version 15 to determine the general characteristics of the participants and the prevalence of NCD risk factors.

Results and Findings: In 2021, overweight and obesity prevalence among school-age children, adolescents, and adults were 14.0%, 13.0%, and 40.2%, respectively. Overnutrition rates increased in all age groups from 2003 to 2021. For metabolic risk factors, the prevalence of elevated blood pressure among adults was 17.9% in 2021 and the prevalence was declining. In terms of modifiable lifestyle habits, 2.3% of adolescents were current smokers, 13.2% were alcoholic beverage drinkers, and 72.9% were insufficiently physically active. On the other hand, 18.5% of adults were current smokers, 43.6% were current drinkers, and of these, 53.3% were engaged in binge drinking among currently drinking adults, and 41.9% were insufficiently physically active. Smoking rates were declining since 2003, while alcohol drinking and physical inactivity rates did not change.

Conclusion and Recommendations: NCD risk factors, particularly overnutrition rates, were high and affected all age groups. Prioritization of vulnerable groups as identified in this study is crucial to allow targeted interventions or specific actions to reduce prevalence of NCD risk factors. Reduction of NCDs as indicated in the global targets can be attained through systematic, evidence-based programs, and proper monitoring and evaluation.

Eating Practices and Food Intake of Selected 6-9 Years Old School children in Muntinlupa City

Rowena V. Viajar, Emily O. Rongavilla, Joanne Jette S. Gulay,
Glen Melvin P. Gironella, and Nicole R. Gumapac

Background: Undernutrition among Filipino schoolchildren (SC) 5-10 years old is still prevalent. Their mean daily energy and micronutrient intakes were found inadequate (DOST-FNRI, 2022).

Objective: This study determined the characteristics, eating practices, and food intake of selected undernourished public school children in Muntinlupa City.

Materials and Methods: A total of one hundred undernourished school children 6-9 years old were the study participants. Child, household, parent/guardian characteristics and child's food intake using a two non-consecutive day 24-hour food recall were collected.

Results and Findings: Majority of the respondents were biological mothers (76%) of school children, reached high school level (65.7%), with a mean age of 38 years. Almost half (49.5%) of the household heads worked as laborers/unskilled workers and with a mean household size of seven. More than half of the school children were males (58.0%) and second child in the family (32.2%). The common eating practice of most of the children at breakfast was biscuit/bread and coffee/cereal drink/ milk/ chocolate drink (24.2%). The usual lunch was rice and meat/chicken/fish (21.2%). Majority of the children did not meet the recommended energy intake (REI) and the estimated average requirements (EAR) for iron, calcium, vitamins A, and C.

Conclusion and Recommendations: The poor feeding practices at breakfast and absence of fruits and vegetables in the diet are the possible reasons for not meeting the REI and EAR for nutrients. Participation of parents/guardians in government programs such as family planning, backyard gardening, and nutrition education, as well as the children in dietary supplementation, gardening, and nutrition education in school may help address undernutrition and improve eating practices among this age group.

Development of Composite Index for the Assessment of the Philippine Food Systems

Maria Julia Golloso-Gubat, Ph.D.

Background: Food system assessment is vital to rationalize and inform decisions for transformations and policy shifts. While there are several metrics for food system assessment currently available for use, their utility and relevance to the Philippine context is limited.

Objective: This study developed a composite index for the assessment of the local food systems.

Materials and Methods: Indicators were determined by conducting an iterative feedback process involving subject matter experts from relevant disciplines. These indicators were quantitatively operationalized using a set of algorithms to derive a dataset for the subsequent construction of the data model. Principal Component Analysis (PCA) was employed to determine metric domains, and data were normalized using Min-Max method. Following this, the data model was transformed into positive values on a scale of 0 to 100 (with 100 being the highest score, and 0 being the lowest score). Equal weights were applied, scaled to unity sum, based on the premise that all indicators are equally important and interconnected in the food system. The aggregation method applied in the present study is the linear additive approach, i.e., domain scores were derived by the summation of weighted indicator scores. As a test of robustness, the index was subjected to uncertainty test, sensitivity analysis, and simulation test. To demonstrate its utility, the composite index was used to describe the food system status of the seventeen (17) regions in the Philippines.

Results and Findings: The composite index has four (4) quantifiable domains (nutrient adequacy, socio-economic and socio-political conditions, affordability diversity and adequacy of food, and food waste and R&D support), each consisting of relevant indicators. The application of the composite index in the assessment of local food systems indicate differences in sub-national scores across domains, with variations even among regions belonging to the same island groups.

Conclusion and Recommendations: This study demonstrated the utility of a quantitative index to characterize the status of the local food systems. Results highlighted differences in food system concerns and priority areas, providing inputs to guide the development of context-specific programs and policies.

Determinants of Food Insecurity among Municipal Fishing Households during the COVID-19 Pandemic in Kawit, Cavite, Philippines

Kim Irvin T. Protacio, Maria Theresa M. Talavera, DrPH
Angelina R. Bustos, Ph.D. and Sherry B. Marasigan, Ph.D.

Background: Amidst the unprecedented challenges of the COVID-19 pandemic, fishing communities grappled with the impacts on their livelihoods, exacerbating food insecurity and adversely affecting their health and nutrition.

Objective: This study identified the determinants of food insecurity among municipal fishing households in Kawit, Cavite.

Materials and Methods: Utilizing a cross-sectional design and an online household survey, food security status was assessed using the Household Food Insecurity Access Scale (HFIAS) concurrently with the Household Dietary Diversity Score (HDDS) questionnaire to assess household dietary diversity and provide a deeper understanding of the food security status of the fishing households. Multiple logistic regression was employed to analyze factors contributing to food insecurity at the household level.

Results and Findings: Three out of five (60%) households experienced significant food insecurity ranging from mild to severe levels during the COVID-19 pandemic. Although dietary diversity was moderate, with households consuming up to six food groups, fishing households had limited access to other nutrient-dense foods. Determinants of food insecurity included young adult (20-39 years old) household heads, low income (<15,000 pesos), and fewer fishing trips (1 to 2 trips per week). In contrast, direct catch consumption and receiving either financial assistance or both financial and food aid such as "*ayuda*" of rice and canned goods was associated with a reduced likelihood of food insecurity.

Conclusion and Recommendations: The results emphasized the critical need for targeted interventions among municipal fishing households particularly during a pandemic. Policy and program efforts should prioritize stabilizing income among small-scale fishing households through diversification, including promoting fish processing and fostering local market cooperatives. Additionally, enhancing fishing opportunities, promoting direct catch consumption of nutrient-dense foods, and providing essential food and financial aid are recommended. Implementing these strategies can mitigate household food insecurity and enhance the well-being of these vulnerable populations.

Behavior Intentions of Nutrition and Health Workers in Educating Mothers through *Pinggang Pinoy*

Salvador R. Serrano

Background: The DOST-FNRI, mandated to address malnutrition in the country, developed *Pinggang Pinoy*. It is a simple and easy-to-understand communication tool about eating the right kinds and amounts of Go, Grow, and Glow foods per meal, getting sufficient hydration, and practicing a healthy lifestyle. Disseminating the information on *Pinggang Pinoy* lies heavily on Barangay Nutrition Scholars (BNSs), Barangay Health Workers (BHWs), and other health workers. However, the country still experiences various persistent forms of malnutrition. The Theory of Planned Behavior (Ajzen 1991), a theory widely applied in health and nutrition behavior, posits that behaviors are immediately determined by behavioral intentions. The behavioral intentions of nutrition and health workers could be significant indicators of behavior change toward educating mothers on basic *Pinggang Pinoy* messages.

Objective: This study determined the degree to which behavioral intentions of nutrition and health workers to educate mothers in selected Metro Manila cities and Laguna are strengthened by watching *Pinggang Pinoy* videos.

Materials and Methods: Respondents (n = 82) included BNSs and BHWs in the cities of Taguig, Pasig, and Makati, and the province of Laguna. Links to the *Pinggang Pinoy* videos and questionnaire were sent online, including the Data Privacy Statement and Informed Consent forms. Respondents answered three Likert Scales to measure their awareness of *Pinggang Pinoy*, attitude, as well as their perceived barriers towards educating mothers using *Pinggang Pinoy*.

Results and Findings: The attitudes, norms, behavioral control, and intentions of almost all of the respondents (99%) may have been strengthened by viewing the *Pinggang Pinoy* videos. Respondents (99%) had prior knowledge of *Pinggang Pinoy* and other basic nutrition concepts due to their education and several years in frontline nutrition and health services and regular access to nutrition and health information. The auditory and visual stimuli in the *Pinggang Pinoy* videos could have reinforced the positive attitude of almost all of the respondents (99%) toward educating mothers and may have added to or refreshed their existing knowledge of basic nutrition. Most of them (86%) expressed the need for more nutrition education support.

Conclusion and Recommendations: The messages in the videos could have affirmed self-expectation and the expectation of others in their role as nutrition educators. Nutrition and health workers may just need more resources, support, training, and security of tenure to translate their positive behavioral intentions into more efficient performance of nutrition education duties. Moreover, *Pinggang Pinoy* as a symbol representing basic nutrition messages may need communication support. A follow-up or related study employing a two-group, pretest, intervention (interactive, like educational games), posttest design with more respondents for control and treatment groups supplemented with Focus Group Discussion (FGD) and Key Informant Interview (KII) to yield higher-order data, more in-depth insights, and conclusive generalizations is recommended.

FSS COMMITTEES

DOST-FNRI Management Committee

Atty. Lucieden G. Raz
Deputy Director & OIC, Office of the Director

Milflor S. Gonzales, Ph.D.
Chief Science Research Specialist
Technology Diffusion and S&T Services Division (TDSTSD)

Charmaine A. Duante
Chief Science Research Specialist
Nutritional Assessment and Monitoring Division (NAMD)

Rosemarie J. Dumag
Chief Science Research Specialist
Nutrition and Food Research & Development Division (NFRDD)

Alexis M. Ortiz
Chief Administrative Officer
Finance and Administrative Division (FAD)

Leah C. Dajay
Supervising Science Research Specialist,
Service Laboratory Group (SLG)
and President, FNRI EA, Inc.

Secretariat

Divorah V. Aguila
Planning Officer IV, Planning Evaluation Unit (PEU)

Marilita A. Aguilos
Planning Officer III, Planning Evaluation Unit (PEU)

Advisory Committee

Chair: Atty. Lucieden G. Raz

Members:

Milflor S. Gonzales, Ph.D.
Charmaine A. Duante
Rosemarie J. Dumag
Alexis M. Ortiz
Leah C. Dajay
Divorah V. Aguila

Overall Organizing Committee

Overall Chair: Marilou L. Madrid

Co-chair: Salvador R. Serrano

Secretariat:

Hazel T. Lat
Jason Paolo H. Labrador
Denniese C. Sy

Scientific Technical Program Committee

Chair: Salvador R. Serrano

Co-chair: Idelia G. Glorioso

Members:

Maja Bethzaida S. Decena
Tricia Camille A. Naniong
Christelle Lois T. Bayalas
Mark Anthony C. Quiambao
Eva L. Rebato
Marlon O. Balitaon
Patricia Isabel G. Amita
Rogel L. Villapaz
Johanne B. Guilaran
Denisse Abbie A. Caballes

Adviser: Milflor S. Gonzales, Ph.D.

Book of Abstracts & Souvenir Program Committee

Chair: Dexter Y. De Leon

Co-chair: Shannen Faye Q. Arevalo

Members:

Idelia G. Glorioso
John Mark M. Villanueva
Erika Niña C. Bacolod
Christelle Lois T. Bayalas
Ma. Corazon E. Palompo
Eva L. Rebato
Lucito A. Sila

Editor: Milflor S. Gonzales, Ph.D.

Registration Committee

Chair: Mae Ann S.A. Javier

Co-chair: Eldridge B. Ferrer

Members:

Ma. Lynell V. Maniego
Apple Joy D. Ducay
Marvin C. Delos Santos
Kelvin Andrew D. Kua
Mary Bernadette M. Velasquez
Claudine Gliban-Peninoy
Ryan Christian B. Broza
Manolito G. Magnaye Jr
Cristian C. Gonzales
Angelo M. Verana
Peter John L. Gerero
Sarah S. Gohilde
Tricia Camille A. Naniong

Documentation & Evaluation Committee

Chair: Kristine B. Nacionales

Co-chair: Trinidad II T. Arcangel

Members:

Rose Elaine P. Guilaran
Jolly C. Cotara
Rogel L. Villapaz
Elyss G. Billedo
Maricar D. Albao
Jordan Vincent P. Tiama
Bless B. Adlaon
Abbie L. Padrones
Ma. Ariza C. Baylosis
Michael Bernard C. Bulawan
Ron Elyf E. Placio
Avegail D. Apor
Meriel O. Garin
Engr. Jayson G. Tagaroma
Claire M. Gacias

Ways & Means Committee

Chair: Alexis M. Ortiz

Co-chair: Jovy S. Medina

Members:

Harold Jonathan D. Ballester
Armilda A. Llegado
Ma. Helen Fortuna R. Pilariza
Ma. Nilda S. Mesiona
Darlene D. Aguilar
Maria Celine E. Recalde
Mary Ann V. Dela Rama
Ma. Mikkaella C. Abalos

Invitation Committee

Chair: Ma. Lilibeth P. Dasco

Co-chair: Glenda P. Azana

Members:

Eva A. Goyena, Ph.D.
Chona F. Patalen
Charina A. Javier
Josie P. Desnacido
Maria Belina N. Nueva Espana
Maria Stephanie N. Parani
Frances Pola S. Arias
Kim Irvin T. Protacio
David Kenneth C. Mendoza
Maylene P. Cajucom
Jemn D. Serrano
Ma. Evette B. Misagal
Rod Paulo B. Lorenzo
Ma. Sheryl C. Velasco
Carl Jethrow R. Camano

Finance Committee

Chair: Bonjobie F. Cajano

Co-chair: James C. Lucena

Members:

Ma Fe A. Carizo
Daisy Ann E. Monter
Rose Ann Q. Basilio

Scientific Poster Committee

Chair: Michael C. Pelagio

Co-chair: Joselita Rosario C. Ulanday

Members:

Dave P. Briones
Junnlit Loraine B. Rivera
Dana Etienna V. Zoleta
Brian Aldrin V. Lagrosas
Mylene B. Martin
Jennifer C. Laurea
John Per A. Globio
Emily Grace A. Udarbe
Herbert P. Patalen
Ma. Lourdes T. Cumagun

Awards Committee

Chair: Mildred O. Guirindola, Ph.D.

Co-chair: Rowena V. Viajar

Members:

Marie T. Bugas, Ph.D.
Emily O. Rongavilla
Georgina S. Caraig
Nesrianne G. Buyco
Maricel C. Muga
Josie P. Desnacido
Nicole R. Gumapac

Promotion & Publicity Committee

Chair: Nichole M. Bristol

Co-chair: Franzis Jayke P. Batallantes

Members:

Kryztalhyn Mae R. Dilag
Erika Niña C. Bacolod
Janel Anne C. Eder
John Mark M. Villanueva
Tristan Gene D. Sario
Jefferson Butch O. Obero
Ciara Claire SB. Kahanap
Mary Baby Joy A. Ricalde
Trina Mae B. Santos
Byron Lei B. Diaz
Carol Ann Luz E. Pacot

Editor: Milflor S. Gonzales, Ph.D.

First Aid Committee

Chair: Marites V. Alibayan

Co-chair: Dave P. Briones

Members:

Dolores B. Bularon
Maribeth S. Castillo
Sheryl O. Gulla

Undergraduate Student Research Competition Committee

Chair: Vannizsa I. Ramas

Co-chair: Czarlyn April Joy G. Mendoza

Members:

Frankie Lycurgus D. Avorque
John Lester G. Ramirez
Carissa T. Saldaña
Allen Jasper D. Diño
Gyle D. Tampil
Ana Katrina V. Loberiano
Robert G. Aduana

Venue, Physical Arrangement, & Transportation Committee

Co-chair (Venue):
Martha A. Hernandez

Chair: **Myrna F. Moe**

Co-chair (Physical Arrangement):
Alvin P. Quetua

Members:

Divorah V. Aguila
Marilita A. Aguilos
Rochelle J. Besmonte
Jazelle Anne S. Calayag
Mary Joyce M. Caranto
Rosemarie B. Vergara
Prime Alyn O. Murcia
Kaye Ann L. Piñas
Judy Ann C. Rance
Ma. Helen Fortuna R. Pilariza

Food & Refreshments Committee

Chair: **Eirene Agustin B. Arnejo**

Co-chair: **May Ann D. Gironella**

Members:

Cyrho T. Sumera
Jonahver O. Tarlit
Ana Maximina C. Reyes
Nesrianne G. Buyco
Veronica Vianca C. Salazar
Winchester Jhem P. Aquino
Mark Justin Z. Carreon
John Denver M. Cabillon

DOST-FNRI-DEVELOPED TECHNOLOGIES READY FOR TRANSFER AND COMMERCIALIZATION

FORTIFIED FOODS

Iron Rice Premix (IRP)

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

Iron Fortified Rice (IFR)

LICENSING FEE*	ROYALTY RATE**
Php 15,000.00	2 %

Iodine-Rich Drinking Water (Tubig Talino)

LICENSING FEE*	ROYALTY RATE**
Php 15,000.00	2 %

Ready-to-Eat Complementary Food (Paste) for Infants and Young Children (Momsie)

LICENSING FEE*	ROYALTY RATE**
Php 100,000.00	2 %

Fortified Rice Mongo Instant Blend

LICENSING FEE*	ROYALTY RATE**
Php 15,000.00	2 %

Fortified Rice Mongo Curls

LICENSING FEE*	ROYALTY RATE**
Php 15,000.00	2 %

MNERK Premix for Pregnant & Lactating Women

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

MNERK Fortified Rice for Pregnant & Lactating Women

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

MNERK Premix for Women of Reproductive Age

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

MNERK Fortified Rice for Women of Reproductive Age

LICENSING FEE*	ROYALTY RATE**
Php 15,000.00	2 %

MNERK Premix for General Population

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

MNERK Fortified Rice for General Population

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

*One-time payment upon signing of the Technology Licensing Agreement (TLA)
**Based on Gross Sales

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
DOST Compound, General Santos Ave., Bicutan, Taguig City 1630
8 837 - 8113 loc. 322
dostfnri47@gmail.com
bdutechnologytransfer@gmail.com
fnri.dost.gov.ph

DOST-FNRI-DEVELOPED TECHNOLOGIES READY FOR TRANSFER AND COMMERCIALIZATION

COMPLEMENTARY FOODS

Rice-Mongo Blend
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Rice-Mongo-Sesame Blend
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Rice-Mongo Crunchies
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Rice-Mongo Curls
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Rice-Mongo-Sesame Snack Curls
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Rice-Mongo-Sesame Instant Blend
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Coco Puff
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Coco Blend
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Coco Bisc
(Public Good Technology)

Licensing and Royalty Fees **WAIVED**

Rice-Mongo with Carrots Snack Curls

LICENSING FEE*	ROYALTY RATE**
Php 15,000.00	2 %

Rice-Mongo with Carrots Instant Blend

LICENSING FEE*	ROYALTY RATE**
Php 15,000.00	2 %

*One-time payment upon signing of the Technology Licensing Agreement (TLA)
**Based on Gross Sales

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
DOST Compound, General Santos Ave., Bicutan, Taguig City 1630
8 837 - 8113 loc. 322
dostfnri47@gmail.com
bdutechnologytransfer@gmail.com
fnri.dost.gov.ph

DOST-FNRI-DEVELOPED TECHNOLOGIES READY FOR TRANSFER AND COMMERCIALIZATION

VEGETABLE-SUPPLEMENTED PRODUCTS

New Enhanced Nutribun Squash Variant
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

New Enhanced Nutribun Carrot Variant
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

New Enhanced Nutribun Yellow Sweet Potato Variant
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

New Enhanced Nutribun Purple Sweet Potato Variant
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

New Enhanced Nutribun Orange Sweet Potato Variant
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

Nutribunnets

LICENSING FEE*	ROYALTY RATE**
Php 5,000.00	1%

Pancit Canton with Squash
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

Nutri Cocokies
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

Bakery Products with Squash
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

Squash Puree

LICENSING FEE*	ROYALTY RATE**
Php 5,000.00	1%

*One-time payment upon signing of the Technology Licensing Agreement (TLA)
**Based on Gross Sales

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
DOST Compound, General Santos Ave., Bicutan, Taguig City 1630
8 837 - 8113 loc. 322
dostfnri47@gmail.com
bdutechnologytransfer@gmail.com
fnri.dost.gov.ph

DOST-FNRI-DEVELOPED TECHNOLOGIES READY FOR TRANSFER AND COMMERCIALIZATION

READY-TO-EAT FOODS

Brown Rice Bar

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

Protein Food Bar

LICENSING FEE*	ROYALTY RATE**
Php 20,000.00	2 %

Fortified Food Bar
for Women of Reproductive Age

LICENSING FEE*	ROYALTY RATE**
Php 20,000.00	2 %

Nutri Calaman-C Juice Drink
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

LH2 Dehydrated Fruit Mix

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

Canned Laing

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

Canned Pochero

LICENSING FEE*	ROYALTY RATE**
Php 50,000.00	2 %

*One-time payment upon signing of the Technology Licensing Agreement (TLA)
**Based on Gross Sales

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
DOST Compound, General Santos Ave., Bicutan, Taguig City 1630
8 837 - 8113 loc. 322
dostfnri47@gmail.com
bdutechnologytransfer@gmail.com
fnri.dost.gov.ph

DOST-FNRI-DEVELOPED TECHNOLOGIES READY FOR TRANSFER AND COMMERCIALIZATION

OTHER TECHNOLOGIES & FOOD PROCESSING EQUIPMENT

Stabilized Brown Rice

LICENSING FEE*	ROYALTY RATE**
Php 20,000.00	2 %

Micronutrient Growth Mix (MGM 6)

LICENSING FEE*	ROYALTY RATE**
Php 100,000.00	2 %

Micronutrient Growth Mix (MGM) for Pregnant & Lactating Women

LICENSING FEE*	ROYALTY RATE**
Php 100,000.00	2 %

Extruded Ready-to-Fry Sweet Potato Fries

LICENSING FEE*	ROYALTY RATE**
Php 30,000.00	2 %

Sweet Sorghum Flour

LICENSING FEE*	ROYALTY RATE**
Php 30,000.00	2 %

Enteral Food Formula

LICENSING FEE*	ROYALTY RATE**
Php 20,000.00	2 %

MeaLusog Chicken Pochero

LICENSING FEE*	ROYALTY RATE**
Php 20,000.00	2 %

MeaLusog Pork Picadillo

LICENSING FEE*	ROYALTY RATE**
Php 20,000.00	2 %

MeaLusog Mixed Veggies Arroz

LICENSING FEE*	ROYALTY RATE**
Php 20,000.00	2 %

IFR Rice Blending Machine

LICENSING FEE*	ROYALTY RATE**
Php 25,000.00	5%

Low Heat, Low Humidity Dryer

LICENSING FEE*	ROYALTY RATE**
Php 25,000.00	5%

*One-time payment upon signing of the Technology Licensing Agreement (TLA)
**Based on Gross Sales

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
DOST Compound, General Santos Ave., Bicutan, Taguig City 1630
8 837 - 8113 loc. 322
dostfnri47@gmail.com
bdutechnologytransfer@gmail.com
fnri.dost.gov.ph

DOST-FNRI-DEVELOPED TECHNOLOGIES READY FOR TRANSFER AND COMMERCIALIZATION

INFORMATION, EDUCATION, AND COMMUNICATION (IEC) MATERIALS

Philippine Food Composition Table (PhilFCT) 2019

LICENSING FEE*	ROYALTY RATE**
Php 100,000.00	5%

Philippine Dietary Reference Intake (PDRI)

LICENSING FEE*	ROYALTY RATE**
Php 100,000.00	5%

Food Exchange List for Meal Planning, 4th Edition

LICENSING FEE*	ROYALTY RATE**
Php 100,000.00	5%

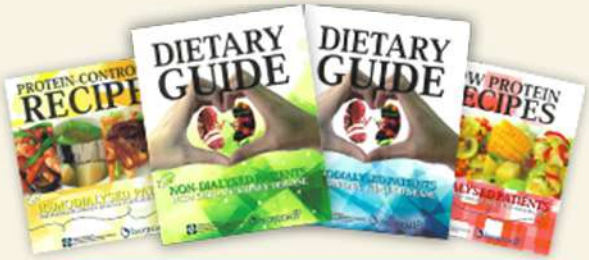
Renal Exchange List

LICENSING FEE*	ROYALTY RATE**
Php 100,000.00	5%

Pinggang Pinoy® Food Plate

LICENSING FEE*	ROYALTY RATE**
Php 30,000.00	2%

Chronic Kidney Disease Materials



LICENSING FEE*	ROYALTY RATE**
Php 25,000.00	5%

Food Grading System Tools
(Public Good Technology)

Licensing and Royalty Fees
WAIVED

*One-time payment upon signing of the Technology Licensing Agreement (TLA)
**Based on Gross Sales

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
DOST Compound, General Santos Ave., Bicutan, Taguig City 1630
8 837 - 8113 loc. 322
dostfnri47@gmail.com
bdutechnologytransfer@gmail.com
fnri.dost.gov.ph

FOCUS

Showcases the synergy of four key components of human nutrition research: metabolism, physical activity, body composition, and nutrition

Link all four research components using advanced technologies and equipment. Data generated from the laboratory will shed more light on understanding the human body and how nutrition and physical activity contribute to improved health, functionality, and quality of life of Filipinos.






LABORATORY EQUIPMENT

BODY COMPOSITION:

- GE Lunar Prodigy Advance (Bone Mineral Densiometer)
- Tanita Body Composition Analyzer MC-780
- SECA 213 Portable Stadiometer

ENERGY EXPENDITURE:

- COSMED K5 Wearable Metabolic System
- COSMED Fitmate Med
- COSMED Quark T12x ECG
- COSMED MicroQuark PC-based Spirometer
- Trackmaster TMX428 Medical Treadmill
- Lode Corival CPET Medical Grade Bicycle Ergometer
- ActiGraph wGT3x-BT Activity Monitor

STRENGTH & CONDITIONING:

- Inspire Fitness M5 Multi-Gym Station
- BOSU Balance Trainer
- Element Fitness Weight Set Hex Dumbbells with PVC Mat
- MicroFET3 handheld dynamometer & inclinometer
- 5030JI Jamar Hydraulic Hand Dynamometer

OPPORTUNITIES AND COLLABORATIONS

The Nutrition Physiology Laboratory is set to cater to the wide-range R&D activities of the DOST-FNRI, stakeholders, collaborators or any institution or individual with similar research interests, such as clinical nutrition, sports science, human kinetics, biochemistry and many more.

NUTRITION PHYSIOLOGY LABORATORY

DEPARTMENT OF SCIENCE & TECHNOLOGY
FOOD & NUTRITION RESEARCH INSTITUTE

DOST-FNRI Building, DOST Compound, General Santos Ave., Bicutan, Taguig

healthyaging.fnri@gmail.com

+639604548276

Department of Science and Technology - Food and Nutrition Research Institute

Proficiency Testing Laboratory

The First

ISO/IEC 17043:2010 Accredited Philippine

Food Proficiency Testing Provider
(PTP-2023-001A)

Why Choose FNRI-PTL?

- Provides accessible, affordable and internationally recognized PT programs
- Produces proficiency test item similar to the matrix commonly analyzed by local testing laboratories
- Provides technical assistance to its participant laboratories

We offer

PT Schemes on following matrices:

- Infant formula
- Milk powder
- Wheat flour
- Corn-based Snack Food
- Powdered Concentrate – Water-based Flavored Drink
- Biscuit
- Processed Meat
- Fruit Drink
- Fortified Rice-Monggo Blend
- Ground Nuts
- Bread

For physico-chemical and nutritional analyses

We also offer

- Reference materials
  (for quality control purposes)
- Training courses on PT provision based on ISO/IEC 17043:2010
- Training courses on RM Development and In-house RM Production

Contact us

837-8113 loc. 310 or
837-2071 loc. 2300

fnri.ptl@gmail.com

http://lab.fnri.dost.gov.ph/ptl

DOST- FNRI, DOST Compound Gen. Santos Ave. Bicutan, Taguig City

Department of Science and Technology
Food and Nutrition Research Institute
DOST-FNRI

eNutrition
The Philippines' Knowledge Center on Food and Nutrition

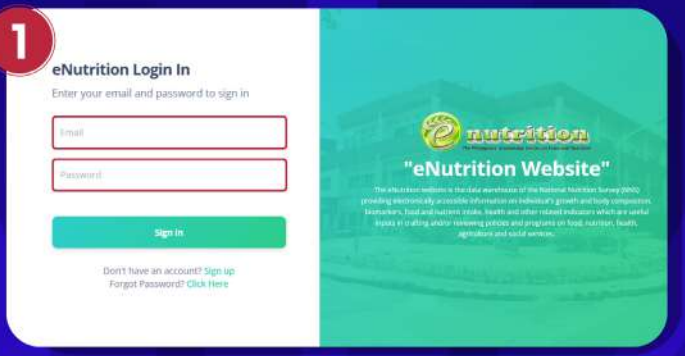
NNS DATA in a Click

The Department of Science and Technology - Food and Nutrition Research Institute (DOST-FNRI) is pleased to inform all researchers, program planners, policymakers, and other stakeholders using our survey data that the Public Use Files (PUFs) of the Expanded National Nutrition Survery (ENNS) can be accessed through the eNutrition website. We encourage the public to maximize the use of these data.

How? *Visit the eNutrition website at enutrition.fnri.dost.gov.ph*

Sign in to the eNutrition website or click sign up to create an account.

1

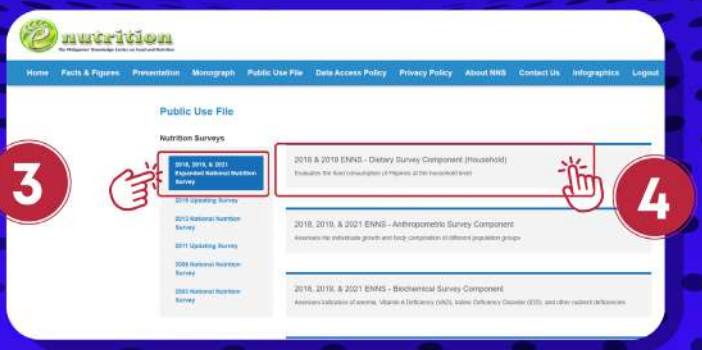


2

Upon signing in, please click on the "Public Use File" button to proceed.

Select the nutrition survey by clicking on it.

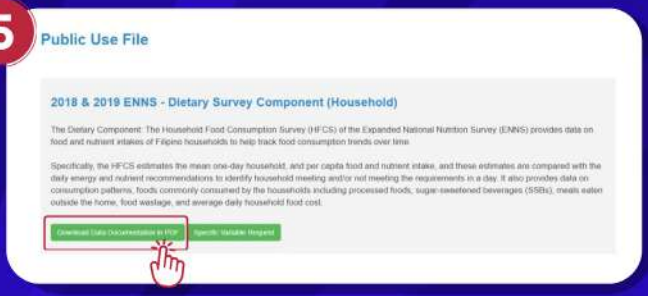
3



4

Upon selecting the specific nutrition survey, the different survey components will be displayed. Simply click on the chosen survey component to check on the available variables.

5



You may click the download button to access the data documentation or request specific variables tailored to your needs.

DOST-FNRI IEC Materials for sale

Ang Mahiwagang Pinggang Pinoy ng Nutrilandia
Nutrition Cartoon Flash Drive Card
(Chapters 1 to 3)

Nutrition Alphabet Workbook

Nutrition Alphabet Flashcard

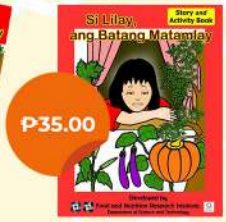
Nutrition Videos Flashdrive Card
(Nutrition Jingles, Nutrisyon is Kool, FNRI Kusina and 5 Puppet videos)

Nutrition Maze

Nutrition Snakes and Ladders

Lutong FNRI: Recipes for Supplementary Feeding Program

Big Book (Lilay)



Coloring Book (Lilay)

Smarter Living, Smarter Eating Recipe Booklet

Healthy Lifestyle Flyers

Comics

Nutrition Puzzles

Pinggang Pinoy Poster

Pinggang Pinoy Puzzle

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
DOST-FNRI

DOST Compound, General Santos Avenue,
Bicutan, Taguig City 1630

8 837 - 2934
8 837 - 3164
8 839 - 1836

dostfnri47@gmail.com
dost.fnri.cpu@gmail.com

fnri.dost.gov.ph

Department of Science & Technology
Food and Nutrition Research Institute

2024 PUBLIC TRAINING OFFERINGS

Training on DOST- FNRI Developed Nutrition Tools and Basic Nutrition Therapy

The training will serve as a refresher course for participants on basic nutrition therapy. It will present the different nutrition tools developed by the DOST-FNRI namely: the Philippine Dietary Reference Intakes (PDRI), Pinggang Pinoy® as well as online softwares, such as HELP Online and Menu Eval Plus.

The training will have hands-on demonstration and application of the software.

DURATION
3 half days
(lecture + workshop)

INTENDED PARTICIPANT
Doctors, nurses, nutritionist-dietitians, health practitioners, educators and students

TRAINING FEE
Php 1,500.00
per participant
(minimum of 10 pax)

Training on 5S of Good Housekeeping and Good Manufacturing Practice (GMP) for Food Industries

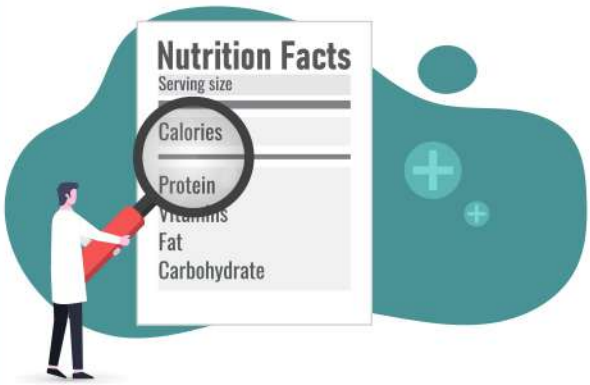
The seminar-workshop aims to provide an appreciation and application of the principles of good manufacturing practice in the workplace. It includes lecture-discussion on 5S of Good Housekeeping, Basic Food Safety and Good Manufacturing Practices.

DURATION
1 day
(lecture + workshop)

INTENDED PARTICIPANT
Food MSMEs, educators and students

TRAINING FEE
Php 1,000.00
per participant
(minimum of 10 pax)

Training on Understanding Nutrition Labeling for Food Industries



The training aims to provide participants with knowledge on the regulatory requirements of nutrition labeling, its purpose, importance, and relevance to good nutrition. The training will give an overview on the process used in analyzing the nutrient content of processed food.

DURATION
1 day
(lecture + workshop)

INTENDED PARTICIPANT
Food MSMEs, educators and students

TRAINING FEE
Php 1,000.00
per participant
(minimum of 10 pax)

Seminar on Food Safety and Safe Use of Food Additives

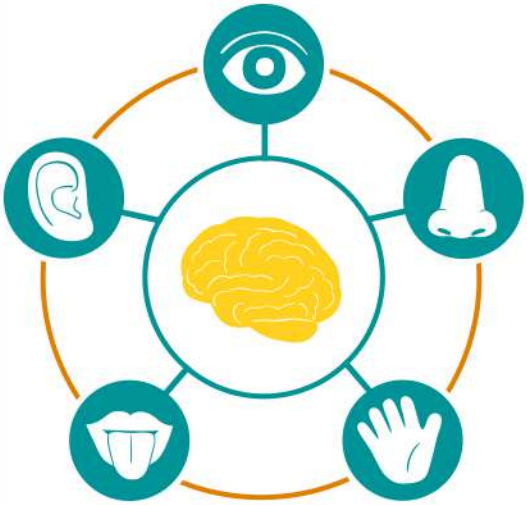
The seminar will discuss the importance of proper use of food additives in processed food products. A lecture on food safety will also be discussed.

DURATION
Half day
(lecture only)

INTENDED PARTICIPANT
Food MSMEs, educators and students

TRAINING FEE
Php 500.00
per participant
(minimum of 10 pax)

Training on Basic Sensory Evaluation



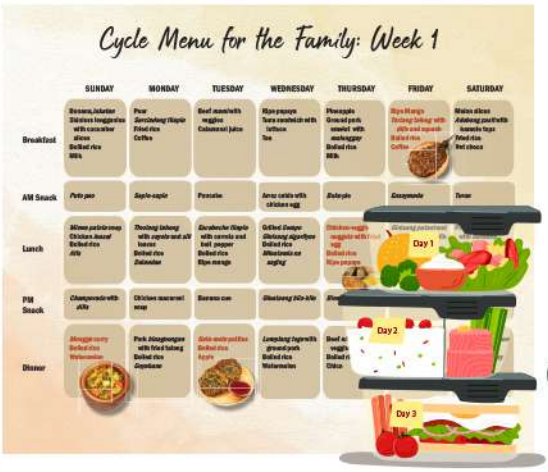
The training includes three modules namely: Overview of Sensory Evaluation, Physical Requirements of Sensory Evaluation, and Human Requirements of Sensory Evaluation. The workshops involve taste and threshold determination.

DURATION
1 day
(lecture + workshop)

INTENDED PARTICIPANT
Food MSMEs, educators and students

TRAINING FEE
Php 1,000.00
per participant
(minimum of 10 pax)

Training on Meal Management and Safe Food Handling



This is a training on basic nutrition, meal management, food safety and hygiene, cycle menu planning and recipe costing.

DURATION
3 half days
(lecture + workshop)

INTENDED PARTICIPANT
Food MSMEs, restaurant/carinderia owners, community health workers, food service crew

TRAINING FEE
Php 1,500.00
per participant
(minimum of 10 pax)

Seminar on Good Nutrition and Food Safety During the New Normal

The seminar will discuss basic concepts on nutrition and food safety. Tips on eating healthy and handling food safely to stay healthy during the new normal will also be discussed.

DURATION
Half-day
(lecture only)

INTENDED PARTICIPANT
Community health workers, MSMEs and general public

TRAINING FEE
Php 500.00
per participant
(minimum of 10 pax)

Seminar on DOST-FNRI Developed Recipes for Livelihood

This seminar will feature videos on how to prepare the DOST-FNRI developed recipes such as squash kutsinta, squash siomai, squash leche flan, papaya-pineapple jam, and upo delight.
It will also discuss food safety and food costing that will guide participants on how to start livelihood business.

DURATION
1 day

INTENDED PARTICIPANT
Community health workers, MSMEs and general public

TRAINING FEE
FREE

Training on Advance Sensory Evaluation

The training includes three modules namely: Introduction to Panel Development, Training of Sensory Panelist on color, taste, odor and flavor and Training for the discrimination between levels of stimuli and use of scale. The workshops involve taste and threshold determination.

DURATION

2 days
(lecture + workshop)

INTENDED PARTICIPANT

Food MSMEs, manufacturers, educators and students

TRAINING FEE

Php 6,000.00
per participant
(minimum of 10 pax),
if training will be conducted at DOST-FNRI

Training on Proficiency Testing: Material Preparation, Characterization, Distribution and Data Analysis based on ISO 17043

The training includes five modules namely: Introduction to proficiency testing, ISO/IEC 17043:2010 requirements, Statistical methods for PT:ISO 13528:2015 and other methods, Interpretation and use of scheme results and Accreditation process and benefits

DURATION

3 days
(lecture + workshop)

INTENDED PARTICIPANT

Food MSMEs, manufacturers, food technologists, educators and students, and microbiologists who are working in laboratories who are considering accreditation to ISO/IEC 17043:2010

TRAINING FEE

Php 8,000.00
per participant
(minimum of 10 pax)
if training will be conducted at DOST-FNRI

Training on Microbiological Analysis of Indicator Organism in Food

The training includes Heterotrophic Plate Count, Total Coliform/Fecal Coliform, and E. coli count. The training workshop is designed to build competency in examining potability of drinking water. The workshop also highlights hands-on experience on testing for the enumeration of heterotrophic bacteria, total and fecal coliforms and E. coli using spiked water samples.

DURATION

4 days
(lecture + workshop)

INTENDED PARTICIPANT

- Laboratory Managers
- Microbiologist
- Microbiology Laboratory Technician

TRAINING FEE

Php 10,000.00
per participant
(6-8 participants),
if training will be
conducted at
DOST-FNRI

Training on Microbiological Analysis of Pathogens in Food

The training includes introduction about food microbiology, good microbiological laboratory practices, updates on emerging foodborne pathogens and standard method for their detection according to regulations. The training also highlights the preparation and use of quality assurance program in a food-testing laboratory.

Detection of Salmonella spp., enumeration of Staphylococcus aureus, enumeration of Bacillus cereus, and detection of Listeria monocytogenes. The training demonstrates the testing procedures for the detection and/or enumeration of specific pathogens such as Salmonella, Listeria monocytogenes, Staphylococcus aureus, and Bacillus cereus.

DURATION

4 days
(lecture + workshop)

INTENDED PARTICIPANT

- Laboratory Managers
- Microbiologist
- Microbiology Laboratory Technician

TRAINING FEE

Php 13,500.00
per participant
(minimum of 10 pax)
if training will be
conducted at
DOST-FNRI

DOST-FNRI

Briefing orientation on DOST-FNRI Products and Services

This briefing orientation will discuss the projects and services of the DOST-FNRI including overview of the latest National Nutrition Survey results, food technologies, and the DOST-FNRI developed nutrition tools. Participants can explore possible areas of collaboration with DOST-FNRI

DURATION
1 hour

INTENDED PARTICIPANT
Educators, students, MSMEs, cooperative members and local government officials or personnel

TRAINING FEE
FREE

For more information, you may visit or contact us at:

DOST Compound Gen. Santos Avenue
Bicutan, Taguig City

dostfnri47@gmail.com
itrainfnri@gmail.com

8 837-8113 loc. 323

or visit our website or social media accounts:

iTrain
https://trainings.fnri.dost.gov.ph/

DOST-FNRI /DOST.FNRI @DOST_FNRI @fnri.dost

DOST-FNRI

DOST–FNRI Food & Nutrition Information Resource Station

About FIRSt

The DOST-FNRI Food and Nutrition Information Resource Station (FIRSt) is a data resource for researchers and other interested individuals engaged in food and nutrition work and related activities.

FUNCTIONS

- Implements projects and activities that provide effective library system services;
- Establishes linkages with national and international institutions with food and nutrition-related activities through information networking and ;
- Maintains a computerized data bank of the Institute's R&D resource materials; and
- Serves as the documentation center of the Institute.

CLIENTS

- Nutrition Research Information Network (NUTRINET) members
- Government Organizations
- Non-government Organizations
- Hospital & Medical Institutions
- DOST-FNRI Employees
- Academe
- Others

SERVICES

Reference and Information Services

a. Readers services
b. Current awareness
c. Document Delivery through email
d. Virtual Reference
e. Inter-library Loan
f. DOST-FNRI Library Orientation

Circulation and User Services

a. Information and Referral
b. Photocopying
c. Mini-theater
d. One-Stop Shop

Operating Hours:

OPEN

Mondays to Fridays
8:00 A.M. to 5:00 P.M.

DOST-FNRI Building, Ground Floor, DOST Compound, General Santos Avenue, Bicutan, Taguig City
(02) 8-837-8113 local 324 | (02) 8-837-2071 local 2287
fnri.iru@gmail.com
facebook.com/DOST.FNRI
twitter.com/DOST_FNRI
DOST-FNRI channel

NUTRINET

The NUTRINET is a consortium of libraries of R&D, academic and other special institutions on food, nutrition and related fields that linked up to establish a specialized information system in food, nutrition and related fields.

Contact information:

NUTRINET Secretariat
Food and Nutrition Research Institute
Department of Science and Technology
General Santos Avenue, Bicutan, Taguig City
8-837-81-13 to 14 loc. 324
8-837-20-71 loc. 2287
nutrinet.secretariat@gmail.com

Visit: http://nutrinet.fnri.dost.gov.ph/
Please like our page: fb.com/nutrinet.ph

FSS SPONSORS

50th FSS SPONSORS

PLATINUM SPONSOR

Nestlé Philippines

GOLD SPONSOR

Nutridense Food Manufacturing Corporation

SILVER SPONSOR

Unilever Philippines

BRONZE SPONSORS

Allycel General Merchandise
Great Foods Concepts Inc.
DBP Service Corporation
DOST-National Capital Region
Ma-an's Bakeshop, Co.

OTHER MAJOR SPONSORS

San Miguel Corporation
SwissPharma Research Laboratories, Inc.
Gardenia Bakeries Philippines Inc.
Danrich Bakery
TJN Pasalubong Foods, Inc.
Enrique O. Olonan & Associate Co.
CM & Sons Food Products, Inc.
RCJ Trading and General Merchandise

OTHERS SPONSORS

Science Savings and Loan Association, Inc. (SSLAI)
Aretei Foods Corporation
CBII Philippines International, Inc.
BD Breads and Buns Bakery
Aicee Catering Food Services
La Elena Pension House Rental
Scones and Muffins Bakeshop
JCG Marketing Group, Inc.
Mayora (Vouno Trade and Marketing Services Corporation)
THE LIFE GIVING PRODUCTS & SPECIALTY (MANHU-THE LIFEGIVING BREAD) CORP.
Coca Cola Philippines
Mondelez Philippines, Inc.
Pecto's Bakery
The Generics Pharmacy
GTC Propack Corp.
Amira's Buco Tart Haus
Ajinomoto Philippines

Nestlé Goodnes

GOLD SPONSOR

"More than food, We provide your Nutrition"

Manufactured by:

NUTRIDENSE FOOD MANUFACTURING CORP.

nutridensefmc@yahoo.com.ph
075 600 8251
Brgy. Malanay, Sta. Barabara,
Pangasinan, Philippines

SILVER SPONSOR

Knorr®

Nutri Sarap

PRODUCTS

Source of Vit A
Per 100g product

Reduced Sodium
vs previous formulation

Source of Iron
Per 100g product

High in Vit C
Per 100g product

Source of Calcium
Per 100g product

Our delicious products contain vitamins and minerals

All within the 5g salt recommendation of the WHO per serving

BRONZE SPONSOR

Keeping Up the Nutritious Choices

- Enhanced Nutribun
- Nutri-Cookies
- Nutri-cocokies
- Nutri-Biskid
- Nutri-bunnet
- Nutri-bar Brown Rice
- Banana Chips
- Iron Fortified Rice
- Iron Rice Premix
- Nutripacks Ready to Cook
- Coco puff
- Nutri Instant Cereal Oats
- Rice Monggo Instant Dry Cereal (Ready to Eat)
- Rice Mongo Curls
- Nutri-Food Packs
- Nutri-Fruit Juices
- RTE- Champorado & Arrozcaldo

ALLYCEL
GENERAL MERCHANDISE

09171372468

allycelgenmdse13@gmail.com

BRONZE SPONSORS

GreatFoods
Concepts, Inc.

BRONZE SPONSORS

BAGONG PILIPINAS

DEPARTMENT OF SCIENCE AND TECHNOLOGY
NATIONAL CAPITAL REGION

The Department of Science and Technology - National Capital Region (DOST-NCR) addresses the scientific and technological needs of various sectors in Metro Manila.

Our Mission

We provide Science, Technology and Innovation-based solution anchored on ethical public service, contributing to a better quality of life in the region.

Our Vision

DOST-NCR is widely recognized enabler of Science, Technology and Innovation for sustainable development.

Core Values

- Innovation
- Excellence
- Integrity
- Teamwork
- Empowerment
- Dynamism
- Dedication
- Ethical Governance
- Customer-Drivenness
- Social Responsibility

/dost.ncr @dost_ncr records@ncr.dost.gov.ph ncr.dost.gov.ph +632-8683-7790 to 99 local 1002-1005

DOST-NCR Building, Kasarinlan St., DOST Compound, General Santos Avenue, Bicutan, Taguig City, Metro Manila, 1631

GET TO KNOW MORE ABOUT OUR PROGRAMS AND SERVICES, SCAN QR CODE OR VISIT:
bit.ly/DOSTNCR brochures

SCIENCE BEYOND BORDERS

A campaign that manifests DOST-NCR's commitment to provide solutions and open opportunities **beyond the usual** – beyond borders in terms of distance, industries, nature of business, professions, even personal and professional backgrounds.

#OneDOST4U #ProvidingSolutions #OpeningOpportunities #BeyondBorders

McArthur Highway, Bago Aplaya, Talomo, Davao City
maansbakeshop@gmail.com

+63 917 820 8489
+63 917 863 2586
Maans Bakeshop

OTHER MAJOR SPONSORS

SWISSPHARMA RESEARCH LABORATORIES, INC.

CSE Industrial Park, Bo. Pittland, Cabuyao City, Laguna

(049) 549-2372 to 73
(02) 241-8501 to 04

www.sprli.com.ph

FOOD PRODUCTS OFFERED

BREAD

- Ensaymada
- Pandesal
- Spanish Bread
- Monay
- Hamburger Buns
- Hotdog Buns
- Loaf Bread
- Bread w/ Filling (Tuna, Chicken, Pork)

PASTRY

- Macaroons
- Brownies
- Doughnut
- Cupcakes
- Egg pie
- Croissant

OTHERS

- Pizza
- Nutritious Pack Meals
- Banana Chips
- Camote Chips
- Root Crops

DOST-FNRI ADOPTED TECHNOLOGY

New Enhanced Nutribun (Carrot, Squash, Sweet Potato)
Nutribunnets
Nutricocokies
Iron Fortified Rice

DA-PCC ADOPTED TECHNOLOGY

Karabun Milky Bun

OTHER SERVICES OFFERED

- Toll Manufacturing (Food, Drug and Cosmetic)
- Cell Therapy Center
- Special Clinical Laboratory (Molecular Testing)
- Microbiological Testing
- Veterinary Primary Laboratory
- Pharmacogenomics

OTHER MAJOR SPONSORS

Made with **SOURDOUGH**, **SPROUTED RYE GRAIN** and **MIXED WHOLE GRAINS**

Gardenia HEALTHI Grain®

MULTIGRAIN LOAF

Indulge in the perfect blend of health and taste with Gardenia Healthi Grain® Loaf.
Baked using a combination of high-quality sprouted grain and the harmonius fusion of 10 wholesome grains enhanced by the natural freshness and delightful tangy notes of sourdough, the Gardenia Healthi Grain® Loaf delivers a uniquely flavorful, soft and moist sensory experience.

Food Pairing Suggestions
Enjoy Gardenia Healthi Grain® Loaf with these simple pairings

Gardenia Bakeries (Philippines), Inc.
Gardenia Centre, Star Avenue
Laguna International Industrial Park,
Mamplasan, Biñan, Laguna
Tel. No. 8889-8890

Follow us! GardeniaHealthiGrain

DANRICH bakery
TO GOD BE THE GLORY

Newest Food Innovation

READY TO EAT MEALS

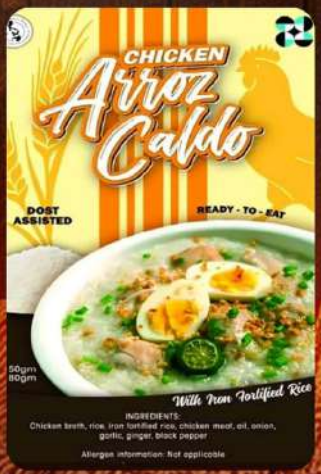
"No need to add Hot water"


Nutribar


Enhanced Nutribun Carrot


Enhanced Nutribun Purple Sweetpotato


Enhanced Nutribun Yellow Sweetpotato



Chicken Arroz Caldo

Champorado


Nutribar


Enhanced Nutribun Squash


Banana Chips


Enhanced Nutribun Orange Sweetpotato

lenie.cuevas@gmail.com
D' EMINENT PLACE, 2/F D DOÑA REMEDIOS TRINIDAD HWY, BALIWAG, BULACAN
Lenie M. Cuevas
0955 298 8408
(044)814 0177

OTHER MAJOR SPONSORS

Office Address: 01 Cal.-Pulilan Road, Paltao, Pulilan, Bulacan
Contact No.: 0917-677-5352
Email Us: outlets@tjnpasalubong.com.ph

facebook.com/tjnpasalubong/
instagram.com/tjnpasalubong/
tjnpasalubong.com/

OTHER MAJOR SPONSORS

Merzci

RCJ TRADING AND GENERAL MERCHANDISE

381 Barangay Santor, Tanauan City. Batangas

Tel. No. 043 406-7960/09988658128

Email Address: rlene_sarsale@yahoo.com

DOST-FNRI

Department of Science and Technology

Food and Nutrition Research Institute

MISSION

As the lead agency in food and nutrition research and development in the country, the DOST-FNRI fights malnutrition with accurate data, correct information, and innovative technologies.

VISION

OPTIMUM NUTRITION for all Filipinos, socially and economically empowered through scientifically sound, environment-friendly and globally competitive technologies.

FNRI CORE VALUES

Excellence
Action-oriented
Teamwork
Sincerity

DOST-FNRI

(02) 8-837-2934

dostfnri47@fnri.dost.gov.ph

fnri.dost.gov.ph

DOST.FNRI

DOST-FNRI

@DOST_FNRI

50th FSS

GOLDEN YEAR OF DOST-FNRI SEMINAR SERIES

Sheraton Manila Hotel, Pasay City

July 3-4, 2024