Progress in
Food and Nutrition Studies
(2017-2022)

Progress in Food and nutrition studies (2017-2022)

SEAMEO RECFON

Southeast Asian Ministers of Education Organization
Regional Centre for Food and Nutrition

Editors:
Dr. Judhiastuty Februhartanty
Dr. Jesus C. Fernandez
Prof. dr. Indah Suci Widyahening, PhD
Dr. dr. Herqutanto, MPH, MARS, Sp.KKLP

Compiled by:
Arienta RP Sudibya
Ahmad Thohir Hidayat
Ratna Wulanti
Rizqiyah
Ayu Kristiningrum
Ma Ngoc Yen
Lia Mulyani
Felicia Wilson – MSIB 7

Design and layout:
Aziz Jati Nur Ananda

PREFACE

Research has been one of our Centre's primary mandates since our establishment. This mandate is aimed to generate science-based information in aid of formulating development interventions and policies to address critical problems, aside from enriching the body of knowledge, in food and nutrition in the region. This mandate is of fundamental importance considering that our research outputs provide the substance to our other mandates in capacity building, community development, information dissemination and partnerships that contributes to realizing our vision of becoming "A Centre of Excellence for building capabilities in food and nutrition for all in Southeast Asia."

As a knowledge generating organization, our research scopes have evolved according to the foci of our five-year development plans that are manifested in our flagship programs that adopt a lifespan approach to address the food and nutrition concerns of our stakeholders across various age groups. Our research activities significantly support the implementation of our flagship programs on Early Childhood Care, Nutrition, and Education (ECCNE), Nutrition Goes to School (NGTS) and Nutrition Goes to Workplace (NGTW) as well as other food and nutrition-related programs of the Government of Indonesia as our host country.

We take pride in our research outputs as they contribute to regional food and nutrition discourses. Thus, we decided to publish this compendium of research abstracts from 84 studies conducted from 2017 to 2022 either solely by our Centre staff members, by our research fund grantees, or in collaboration with our partner-institutions. Twenty-one of these studies have been published in reputable national and international refereed journals.

We believe that this compendium will allow researchers, program implementers, policymakers as well as the general public interested in food and nutrition to optimize the use of our research results in ways that will benefit them personally as well as their respective institutions. The abstracts in this compendium are categorized according to the new research areas of our Centre under our current Third Five-Year Development Plan (2021/2022 - 2025/2026), namely: 1) Food Safety, Security and Environment; 2) Optimal Nutrition Throughout the Life Course; and 3) Nutrition, Health, and Productivity Nexus.

We acknowledge and highly appreciate the Government of Indonesia, research colleagues from our partner-institutions, funding donors, and most importantly the respondents of our studies for enabling our Centre to continue carrying out our research mandate through the years.

Dr. dr. Herqutanto, MPH, MARS, Sp.KKLP
Acting Director of SEAMEO RECFON

TABLE OF CONTENTS

vii

x

THE NEW RESEARCH AREAS

Throughout its First and Second Five-Year Development Plans (2016/2027-2020/2021), SEAMEO RECFON's research activities focused on five research areas, namely: Nutrition Policy and Program, Food Safety and Food Security, Nutrition and Disease, Nutrigenomics and Nutrigenetics, and Best Practices in Nutritional Assesment. However, the Centre needed to refocus its research areas resulting from the formulation of its Third Five-Year Development Plan (2021/2022-2025/2026) which brought in the launching of a new flagship program on Nutrition Goes to Workplace (NGTW). Redefining SEAMEO RECFON's research areas was also necessary for the Centre to be more responsive to food and nutrition issues and challenges besetting the Southeast Asian region as well as to be more aligned with the Sustainable Development Goals (SDGs).

The Centre's Research Committee underwent several processes in 2020 to formulate a new set of research areas. These processes included 1) reviewing the profiles of each of the previous research areas (i.e., purpose, approach, target beneficiaries, scope of topics/themes and expected outputs); 2) mapping of the publications produced per research area including their keywords (2015-2020); 3) Mapping of common themes, the target population, nutrition and nutrient/food components covered, and results of studies conducted per research area; 4) generating the new research areas to support the Centre's new vision and mission and SDGs; 5) Defining the objectives and and scope of topics of the new research areas.

Thus, on the 27 September 2021, the Research Committee agreed on the following new research areas:
1. Food safety, food security and food environment
2. Optimal nutrition throughout the life course
3. Nutrition, health, and productivity nexus

Research Area 1. Food Safety, Food Security, and Food Environment

Scope/Definition:

This research area covers exploring new and improving the current knowledge and practices in food safety, food security and food environments as well as their interrelatedness with each other at the community, school, and household levels to fulfil the nutritional well-being across age groups.

Objective:

To generate knowledge, best practices, and policy recommendations that ensure the requirements for food safety and security within the context of a given food environment towards achieving quality human well-being and environmental sustainability.

Specific topics:

Food Safety	Food and Nutrition Security	Food Environment
1. Halal and food safety	1. Dynamics among food security components	1. Sustainable healthy diets
2. Food safety during emergencies and societal transitions	2. Food security in the cultural, social and economic context	2. Food print management
3. Food quality and safety management	3. Food security during emergencies and societal transitions	3. Food waste management and recycling
4. Food safety and socio-cultural taboos/issues	4. Food security governance	4. Food Eco-tourism or Gastrotourism
5. Hazard risk assessment and community exposure	5. Food security and triple burden of malnutrition	5. Food environments and nutritional outcomes
6. Food safety and triple burden of malnutrition		6. Food marketing and labelling
		7. Food value chain
		8. Food tax

Research Area 2. Optimal Nutrition throughout the Life Course

Scope/definition:

This research area covers methods, tools/approaches and interventions to ensure people's optimal nutritional and health status over the life course, including the interaction of nutrient, gene, gut health, other environmental contaminants and diseases. Life course refers to pregnancy, lactating period, infancy, under-five children, school-age children, adolescent, adult, and the elderly.

Objectives:

1. To generate evidence, best/promising practices and policy recommendations on:
   - nutritional assessment
   - diet modelling
   - nutrigenomics/ nutrigenetics
   - gut health
   - disease prevention
2. To design food and nutrient intervention through behavioral dynamics and developmental outcomes towards achieving community optimal nutrition and health status over the life course

Specific topics:

Nutritional Assessment	Diet Modelling	Nutrigenomics/ Nutrigenetics	Gut Health	Disease Prevention
1. Validation of innovative anthropometric assessment for use at the population level 2. Validation of innovative method for biochemical assessment for use at the population level 3. Use of nuclear technology for nutritional assessment and nutrient concent analysis 4. Development and validation of innovative approach for Dietary Assessment 5. Optimal macro and micronutrient requirements for sub-population	1. Development of local-specific Food Based Recommendations (FBRs) 2. Nutrient gap to design complementary food and nutrient interventions (e.g., fortification, food multi mix, etc.)	1. Nutrigenetics/ nutrigenomics and micronutrient status 2. Nutrient requirements for sub-population 3. Nutrigenetics, nutrigenomics, and child growth and cognition 4. Nutrigenetics, nutrigenomics and environmental contaminants	1. Gut health and child growth and cognition 2. Gut health and environmental contaminants	

Research Area 3. Nutrition, Health, and Productivity Nexus

Scope/definition:

This research area focuses on nutrition as a determinant of people's health and productivity, in relation to work and academic performance.

Objective:

To understand and promote the role of nutrition as a determinant of people's health and productivity through decreasing the risk factors of non-communicable diseases

Specific topics:

1. Social determinants of nutrition, health and productivity, including identification of gaps and the relationships among the determinants
2. Development of intervention strategies to improve nutrition, health and productivity, focusing on food-based recommendations and behavior change communication in school and workplace settings
3. Evaluation of the effectiveness of health and nutrition intervention strategies in relation to productivity in work and school settings to strengthen policy implementation

RESEARCH AREA 1

Food Safety,
Food Security,
and Food Environment

FOOD SAFETY

Nutritional quality and food safety at state high school canteens in Indonesia

Titis Sari Kusuma[1,2,3], Yohanes Kristianto[2], Adelya Desi Kurniawati[1], Rahma Micho Widyanto[1], Ilzamha Hadijah Rusdan[1]. Research Report, 2018.

[1]Department of Nutrition, Faculty of Medicine, Brawijaya University, Malang, Indonesia
[2]Department of Nutrition, Polytechnic of Health Ministry of Health Republic of Indonesia, Malang, Indonesia
[3]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Adequate nutrient intake from safe food is required by high school students to support the profound increased in their nutrient requirements.

Objective: The objective of this study was to assess the nutritional quality and safety of foods at 26 state high school canteens.

Method: The researchers carried out interviews with the canteen management in each school, to determine the canteen's duration of existence, tenure of the management team, supervision system deployed, and the constraints encountered by and expectations by the canteen management. The data of nutrient content and safety of foods samples were carried out on 5 food products selected and collected from each school. Assessment of hygiene and sanitation requirements was carried out to school canteens with a checklist developed by SEAMEO RECFON.

Results: Results showed that the number of foods meeting the daily requirement of the students were 40.0% for energy and 36.2% for protein. Vegetables were consumed in small amount. It was observed that only a few school canteens sold fruits or fruit juices rendering a low availability of vitamin A in the foods they offered. Overall score for hygiene and sanitation assessment was 73.9%. Sanitation component of building and constructions, along with sanitation facilities, management, kitchen, and storage mostly met the requirements. However, it was found that some school canteens showed concerning sanitation facilities which could explain microbial contamination occurrence. Formalin, borax, and rhodamine B were found in 42.3%, 29.3%, and 5.4% of food samples, respectively. The developed hygiene sanitation observation checklist for school canteen in this study produced a good validity (71.4%) and reliability (Cronbach's alpha 0.79).

Conclusions: The canteens of state high schools included in this study were offering foods with low nutritional and safety standards, although their facilities generally met the standard requirements. This suggests that the school management needs to prioritize strict implementation of a nutrition/health policy for their school canteen to adhere to the required national standards for nutrition quality and food safety

Keywords: food safety, nutritional quality, school canteen

Model of stakeholders empowerment and participation for the improvement of food safety at SDN 1 Sukaluyu, Bogor

Daisy Indira Yasmine[1,2], Tegar Prakasa P. M. [1], Dian Sukmawati[1]. Research Report, 2019.

[1]Faculty of Social and Political Sciences, Universitas Indonesia, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Food safety is the right of every child for proper growth and development. However, school children are one of the vulnerable groups for unsafe food consumption. School institutions are potential venues for exposing students to unsafe foods sold in their school canteens and by vendors in the school surroundings. Previous studies confirmed the lack of awareness on food safety among school stakeholders such as school teachers, vendors, parents, as well as students.

Objective: This study aimed to to document lessons learned in involving teachers and parents as key stakeholders in designing, implementing and evaluating a school-based food safety program.

Methods: Stakeholders' involvement in developing a school-based food safety program was assessed using a Participatory Action Research (PAR) method. It began with collecting data on the knowledge of students about food safety as the basis for the program design. Other stakeholders such as school teachers, vendors, and parents were included in the discussion about the program design.

Results: The results show that 97% of students knew about safe and healthy food, 42.9% did not know the characteristics of food safe from biological hazards and 47.6% incorrectly identified these characteristics. Additionally, 36.5% did not know the characteristics of foods with chemical hazards and 71.4% incorrectly identified these characteristics. As many as 46% did not know the characteristics of physical hazards and 46% incorrectly identified these characteristics. This fact about the students' lack of knowledge of some food hazards was followed up by holding a public discussion with parents and teachers. All participants jointly agreed to arrange a series of activities to increase knowledge and awareness about food safety which included 1) establishing school cadres assigned for monitoring the availability of snacks at school and educating food vendors; 2) conducting workshops on making healthy and safe food/snacks with parents, 3) advocating the issue of food safety at meetings with the School Principal aiming to the issuance of school policy on monitoring system of the availability of safe/healthy food at the school.

Conclusions: The main obstacle in this program was on deciding the most feasible method for monitoring the street food vendors surrounding the school. Most of them were mobile vendors, making a regular education program less effective. Considering these vendors were part of a larger business institution, supervision needs to be done at this level especially on the use of food ingredients. The second obstacle is related to chemical contamination which is often invisible, so regular laboratory tests are needed. For this purpose, collaboration with various institutions is needed to ensure food safety in schools.

Keywords: community empowerment and participation, elementary school, participatory action research (PAR) method, school-based food safety program

Dietary exposure to mercury and potential heavy metal contaminant from fish in Sambas District, West Kalimantan, Indonesia

Sofia Sofia[1], Nurjannah Nurjannah[1,2], Iflan Nauval[1]. Research Report, 2019.

[1]Public Health Department, Medical School, Universitas Syiah Kuala, Banda Aceh, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Fish is one of important sources of protein. For children, fish intake is very vital to their health to help neurodevelopment. However, when the fish consumed is contaminated with mercury or other heavy metal resulting from illegal small-scale gold mining (*Penambangan Emas Tanpa Izin*/ PETI), this can affect the children's health.

Objective: This study aimed to identify the contaminants of heavy metal in fish and shrimp in Sambas Regency, West Kalimantan, Indonesia, as the area still has active artisanal and small-scale gold mining (ASGM).

Methods: We collected fish samples with 30 specimens from seven fish species and one species of shrimp commonly consumed in the area and analyzed them using Instrumental Neutron Activation Analysis (INAA). Fish consumption was assessed using semi-quantitative food frequency questionnaires (SF-FFQ) to calculate average weekly intake.

Results: The results indicated a variety of contamination in fish and shrimp depending on species, size, metabolism, feeding habit, and environment condition. The concentration ranges of heavy metals were Hg (0.075–7.115 µg/g), Zn (17.850-255.700 µg/g), Co (0.180-0.440 µg/g), Cr (3.040-8.875 µg/g), and Fe (4.250-199.0 µg/g). Most of the Target Hazard Quotient (THQ) for all metal examined was >1, indicating a health risk hazard especially among children consuming fish from the areas. The average weekly intake for fish consumption was 249.7 gr/week while the average protein intake from fish was 45.86 gr.

Conclusions: Most of the heavy metal concentration in fish and shrimp were above recommended levels. Education and awareness programs are required to increase knowledge and understanding about the hazards of mercury and other metals on fish consumption in the area.

Keywords: food frequency, heavy metal, Kalimantan, mercury, target hazard quotient (THQ)

Utilization of MOODLE in writing exposition text learning for high school students

[1]SMAN 2 Pangkalpinang, Bangka, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

This Classroom Action Research (CAR) investigates the learning process of writing exposition text as an effort to campaign for food safety in class XI MIPA 1 (XI Science I) SMA N 2 Pangkalpinang through MOODLE in blended learning context. Based on the experience of being a teacher, it is difficult for students to produce exposition texts during the learning process. For this reason, this study aims to describe the learning process of writing exposition text with the theme of food safety. This study uses a qualitative approach to explore reflective attitudes, behaviors, and experiences. This CAR uses four cycles. The results showed that the socialization of food safety carried out by research assistants from BPOM in Pangkalpinang City was carried out for 45 minutes face to face in a classroom and continued with online discussions using MOODLE by utilizing the forum feature. Furthermore, of the 33 students in class XI Science 1, all of them wrote the exposition text and all students got an exposition text score of ≥ 70 (100%) assessed using the grammarly application. This means that learning exposition text with the theme of food safety by involving experts from BPOM in Pangkalpinang went well where the students reached 100% of the set of standard competency minimum.

Keywords: blended learning, exposition, MOODLE

A framework for the evaluation of government readiness in the implementation and management of halal product assurance

Achmad Syafiuddin[1,2], Alinea Dwi Elisanti[3], Edza Aria Wikurendra[1], Globila Nurika[4], Anisa Ratnasari[1], Dwi Nastiti Iswarawanti[2]. Research Report, 2021.

[1]Universitas Nahdlatul Ulama Surabaya, Surabaya, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Politeknik Negeri Jember, Jember, Indonesia
[4]Universitas Jember, Jember, Indonesia

Background: The Indonesian Government has passed Law No. 33 in 2014 ensuring the provision of halal products for Muslim community of its population. This Law covers materials, production process, assurance system, and product consumption which must meet the standards of MUI and LPPOM. The implementation of the Law is realized by the issuance of halal product certification that is valid for 5 years.

Objective: The purpose of this study was to evaluate the readiness and recommend policies to the provincial government of East Java in implementation of halal product certification.

Methods: East Java province was selected as a study case in relation to its *Nawa Bhakti Satya* program implementation. Using the modified logic model, the study covered the following variables: the presence of written technical policies regarding program implementation, availability, education and knowledge of human resources (task units), standard operating procedures (SOP) for halal product certification services, time needed to complete the halal product certification services, as well as facilities and infrastructure in the implementation of halal product certification. The province's 38 districts were divided into four clusters: Cluster 1 consisting of 14 districts; Cluster 2 with 4 districts; Cluster 3 with 15 districts; and Cluster 4 with 5 districts. K-Mean cluster analysis was applied to identify the readiness of policymakers, implementers, and recipients per cluster on the said the variables with the following category levels: Not ready (score 0-25), Less ready (score 26 -50), Quite ready (score 51-75), and Ready (score 76-100).

Results: Among the clusters, Cluster 4 demonstrated the highest readiness, with strong policies and efficient service times, while Cluster 1 and Cluster 2 showed moderate to low readiness due to gaps in technical policies, SOPs, and human resources. Cluster 3 displayed the lowest readiness across all variables.

Conclusions: This research led to the initial development of an application to support government readiness in implementing halal product certification by producers in Indonesia. However, further research is need to fully develop the application, particularly on the aspects of evaluating readiness and submitting recommendations in real-time and periodically, so that it can be used not only in East Java districts but in all districts/cities in Indonesia.

Keywords: government readiness assessment, halal product certification, policy recommendation

Knowledge on food safety after a year of COVID-19 pandemic in Indonesia

Evi Nurhidayati[1], Grace Wangge[2], Amanda Safiera Ameline[1], Annisa Melati Putri[1], Ayu Kristiningrum[1], Dian Novrianti[1,] and Evi Ermayani[2]. *Acta Medica Philippina* 2022; 56(19): 21-28. doi: 10.47895/amp.v56i19.4006.

[1]Department of Nutrition, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Objective. This study aimed to determine the level of food safety knowledge, and its determinant factors during eating out settings, among Indonesian adults after one year of the COVID-19 pandemic.

Methods. A cross-sectional survey was carried out from April 19 to April 26, 2021, using an online questionnaire. Participants' socio-demographic characteristics, exposure to information, as well as knowledge towards food safety during the COVID-19 pandemic were obtained using a convenience sampling technique. Data collected were subjected to descriptive statistics, chi-square analysis, and logistic regression analysis.

Results. From a total of 551 completed responses, the majority of respondents were female (76.8%), between the ages of 18-25 years (41.2%), had a college (bachelor) degree (65.2%), and lived in Java Island (74.0%). About 45.4% were exposed to food safety information 1-2 times per week and more than half (56.8%) claimed to get trusted sources of food safety information from social media. After adjusting with other variables, the most dominant factor associated with the food safety knowledge during eating out were age (26-32 years) (OR=1.7, 95% CI 1.0-2.7) and gender (female) (OR=1.5, 95% CI 1.0-2.4).

Conclusion. After one-year of COVID-19 pandemic, the most dominant factors related to food safety knowledge are age and gender. Food safety knowledge has no significant association with attitude and practice.

Keywords: food safety knowledge, food safety attitude and practice, COVID-19

Bacterial screening and food handler observation to prevent potential outbreaks due to food provision in a university canteen in Jakarta, Indonesia

Trevino Aristarkus Pakasi[1,2], Dhanasari Vidiawati Trisna[2,3]. *Acta Medica Philippina* 2022; 56(19): 29-33. doi: 10.47895/amp.v56i19.3829.

[1]Klinik Satelit UI Makara, Kampus Universitas Indonesia, Depok, Indonesia
[2]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia
[3]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Objective: Tenants providing daily food in a big campus of approximately 50 thousand population are prone to an outbreak. This study aimed to observe the practice and compliance of food safety among the food providers.

Methods: In a food safety training done for tenants in a university canteen, participants were asked to fill an online questionnaire, then randomly selected for food examination in the laboratory to look for E. coli and coliform bacteria.

Results: Of the 500 tenants, 220 participated in the study but only 168 questionnaires were ready to be analysed. Male and female participants were approximately in similar composition, the same with food handlers and not food handler participants. Half of them finished high school; Higher education was observed among participants that were not food handlers. About ¾ of the participants were the owners who also worked as food handlers. The best food safety practice was washing hands compared to storing raw food, processing food, and storing processed food. Tenants who served uncooked food were significantly found to have higher E. coli, but no coliform containment found in the served food.

Conclusion: We found the best food safety practice was hand washing. The uncooked food menu contained more pathogens than the cooked ones and were not associated with the knowledge and practice of food safety.

Keywords: university's canteen, tenants, food safety

Increasing food safety awareness in research-based learning at MAN 2 Kudus using the RODADE model in developing food additive smart detector during COVID-19 pandemic

Ekadina Dzawil Ulya[1,2], Mutiara Hapsari[1], Lina Kurniawati[1], Dwi Nastiti Iswarawanti[2]. Research Report, 2022.

[1]MAN 2 Kudus, Prambatan Kidul, Kaliwungu, Kudus, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The increasing processed food consumption among school communities is one of the reasons why students need education on hazardous food ingredients.

Objective: The aim of this study was to determine the characteristics and influence of the RODADE (Reading, Observation Application, Documentation, and Evaluation) learning model on food safety topic through a practicum on developing a smart detector for harmful additives in research learning subject at Islamic State Senior High School (ISSHS) 2 Kudus.

Methods: This study used the Classroom Action Research (CAR) method through two cycles in which per cycle included planning, implementation, observation, and reflection.

Results: The result showed increased scores of students' cognitive aspect from cycle 1 to cycle 2 with N-gains of 0.74 and 0.78, respectively which fell within the high category. The completeness of student score in cycle 1 was 80.0%, while in cycle 2 was 83.3%. The same trend was recorded on the psychomotor observation aspect of the students with the highest percentage of 88.5% in cycle 1 and 97.5% in cycle 2.

Conclusions: Apart from increasing students' food safety knowledge, the RODADE model was useful in creating awareness, spirit of cooperation, creativity, courage to develop ideas and innovation among the students particularly related to harmful additives prevention issue.

Keywords: food safety, hazardous additives, RODADE learning model
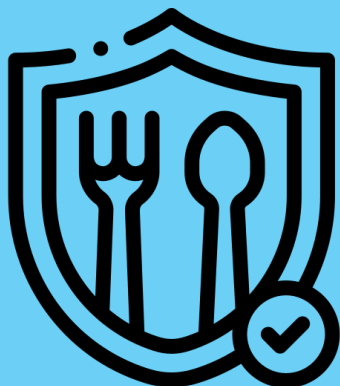
FOOD AND NUTRITION SECURITY

Cash transfer program is more effective to protect poor household's food security compared to food assistance during COVID-19 pandemic: A case study in West Bandung, Indonesia

Isti Kumalasari[1,2], Hastrin Hositanisita[3], Delita Septia Rosdiana[1], Ayu Mutiara Santanu[1], Muchtaruddin Mansyur[2]. Research Report, 2021.

[1]Nutrition program, Faculty of Sport Education and Health, Universitas Pendidikan Indonesia, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Nutrition program, Faculty of Health Sciences, Universitas Alma Ata, Indonesia

Background: The COVID-19 pandemic contributed to the increase in poverty level and food insecurity among households in Indonesia. Thus, the government implemented the provision of cash transfers and food assistance to improve diversity of food intake during this period.

Objective: The aim of this study was to compare households with school children receiving cash transfers and food assistance.

Methods: This study used comparative cross-sectional design, involving a total of 229 households with school-aged children (7-12 years) in West Bandung, Indonesia. Seventy-eight of these households received cash transfer and 151 other households got food assistance every month from the local government. The instruments used were anthropometric equipment, questionnaires, and 24-hour food recall. Data were analyzed using Chi-square and Mann-Whitney tests.

Results: Most of the households that either received cash transfer or food assistance experienced severe (54.6%) food insecurity. Prevalence of undernourished children among these households according to BMI-for-age was 9.6% and 23.2% of these children were suffering from stunting. The average percentage level of energy intake was low (73.89±24.29), while the average percentage level of protein consumption was good (88.16±34.53). There was a significant difference in the level of food security between the two groups (p = 0.001), while the nutritional status (p = 0.899), the level of energy intake (p = 0.979), and protein (p = 906) intake were no difference.

Conclusions: Cash transfer assistance impacts household food security but is not related to nutritional status and energy intake levels of their school-aged children. Households receiving food assistance (BPNT) have lower overall food security but higher food reserve score. The level of educational attainment of fathers and mothers were also significantly associated with household food security in both groups of households. Government assistance is crucial for supporting family food security during a pandemic. Additionally, improvements and equity in education need to be pursued to improve the health status of household members.

Keywords: cash transfer, COVID-19 pandemic, food security, food assistance, school-aged children

Coping strategies of mothers from food insecure households in maintaining adequate dietary intake of children aged 6-23 months during COVID-19 pandemic in urban slum Jakarta: A qualitative study

Saptawati Bardosono[1], Sherly Ardi Vantono[1], Luh Ade Ari Wiradnyani[2], Umi Fahmida[2]. Research Report, 2021.

[1]Department of Nutrition, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Coronavirus disease has spread in Indonesia which necessitated the implementation of the Large-Scale Social Restrictions in Jakarta. This can lead to the risk of food insecurity and the urban slum dwellers could be the most vulnerable group in this situation.

Objective: This study aimed to explore the coping strategies of mothers in maintaining adequate dietary intake of their children aged 6-23 months during COVID-19 pandemic in Jakarta.

Methods: This qualitative study conducted an online in-depth interview in one urban slum area in Jakarta among 22 mothers having children aged 6-23 months and receiving adequate dietary intake (indicated by meeting the Minimum Acceptable Diet) despite experiencing food insecurity. Picture elicitation was done to facilitate the discussions during the online interviews.

Results: This study found three major themes of coping strategies, namely: food coping compromise, financial coping compromise, and social assistance usage. From the three themes, a total of 22 mothers' coping strategies were found to maintain the nutrition of their children aged 6-23 months during the COVID-19 pandemic in Jakarta. Difference in the pattern of the mother's coping strategies were related to mother's education, family income, and the level of food insecurity. Mothers with higher education level experienced more varied coping strategies.

Conclusions: Mothers' educational attainment proved to be a facilitating factor to help them cope during food insecure conditions as well as come up with strategies for maintaining adequate nutrition of their children. Community empowerment programs in urban slum areas may be useful to improve the community's economy during a pandemic. In addition, the government could also actively and effectively provide social assistance to food insecure households who have children aged 6-23 months for preventing stunting.

Keywords: coping strategy, COVID-19 pandemic, food insecurity, young children

Coping strategies of urban households to ensure food security during COVID-19 pandemic: A case study in Indonesia and the Philippines

Dwi N. Iswarawanti[1], Jesus C. Fernandez[1], Arienta R.P Sudibya[1], Pedcris M. Orencio[2], Anna Gale C. Valez[2], Evelyn V. Bigcas[3], Santi Ambarwati[3], Sri Widayanti[3], Risa Rosita[3], Nijma Nurfadhila[3]. Research Report, 2022.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Southeast Asian Regional Centre for Graduate Study and Research in Agriculture (SEAMEO SEARCA), Los Banos, Laguna, the Philippines
[3]Southeast Asian Regional Centre for Tropical Biology (SEAMEO BIOTROP), Bogor, Indonesia

Background: The COVID-19 pandemic has impacted people's livelihood and food security.
Objective: This study was aimed to enhance the understanding of the experiences of urban communities, particularly in Indonesia and the Philippines, in coping with food security issues and concerns during the pandemic as well as the key determinants for such coping mechanisms.
Methods: The study's first phase adopted a quantitative approach through face-to-face interview using a structured questionnaire. One hundred twenty enrolled households from each country were randomly selected. The variables collected were respondent's socio-demographic characteristics, coping strategy (using reduced coping strategy index – rCSI from WFP and CARE), food security status (using Food Insecurity Experience Scale - FIES), and knowledge, attitudes and practice (KAP) related to the dimensions of food security. Chi square and median regression tests were used to analyze the quantitative data. The study's second phase applied a qualitative approach through face-to-face in-depth interviews and focus group discussion. Key informants coming from various sectors were purposively chosen to obtain information on the implementation and challenges of the food security programs from the Indonesian and Philippine governments.
Results: There were 79.3% of households in Indonesia and 84.2% of households in the Philippines who experienced food insecurity during COVID-19 pandemic. The most common form of coping strategy of households in both countries was relying on less preferred and less expensive foods. Determinant factor of food security status of urban households was coping strategy in the case of Indonesia, while income and practices on food security dimensions in the case of the Philippines. The social aid programs in both countries during the pandemic were delivered by various sectors in the form of capacity building/income generating activities, and cash and non-cash transfers.
Conclusions: Urban households in Indonesia and the Philippines adopt common strategy to ensure their food insecurity during pandemic but are determined by different factors. Enhancing the households' KAP on local food-based balanced nutritional diet may empower them during this difficult time. Providing funding support to implement a food production and processing program at both household and community levels can encourage households towards having a sustainable food-oriented behaviors.

Keywords: coping strategies, COVID-19 pandemic, food security, urban

Product development as an effort to improve local food sustainability through   project-based learning for vocational students

Hasan Musthofa[1,2], Sunu Triyatno[1], Andreas Galih[1], Anna Vipta Resti Mauludyani[3]. Research Report, 2022.

[1]SMK Negeri 1 Ponjong, Gunungkidul, Daerah Istimewa Yoyakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]IPB University, Bogor, Indonesia

Background: In Gunungkidul Regency, many students still rely on *tiwul* made from cassava as their staple food. Some students claim that consuming *tiwul* offers several benefits in terms of its nutrient contents and suitability as a complementary food as compared to eating rice. Processing *tiwul* is more complex than processing rice, not everyone can produce it. This makes it challenging for some parents to provide *tiwul* for their children on a regular basis.

Objective: This study aimed to improve students' ability to produce *tiwul* using project based learning model.

Methods: This research was a Classroom Action Research (CAR) through a project-based learning model conducted in two cycles. Each CAR cycle followed the Planning, Implementation, Observation, and Reflection framework of Kemmis and Taggart.   The research was conducted among 28 Grade X TKR B students of National Secondary Vocational School (SMKN) 1 Ponjong Yogyakarta from February to September 2022. Data collection was carried out by observing and documenting student performance and letting them fill in questionnaire, and evaluating the resulting product by culinary expert who assessed taste, texture, aroma, and color. Data analysis was carried out with a quantitative descriptive approach.

Results: The results of the study showed that there was an increase in students' ability to produce *tiwul* products using the project based learning model. The first cycle resulted in a score of 11, in "Good" category. The second cycle produced a higher score of 15 in "Very good" category.

Conclusions: Project-based learning model can facilitate local food product development such as *tiwul*. Future research may need to focus on modifying the process to develop a dry *tiwul* which can be stored longer and distributed in a wider area.

Keywords: *tiwul*, local food, Project Based Learning

Study of nutritional status in children 0-23 months in Sambas Regency, West Kalimantan: A follow-up study

Evi Ermayani, Indriya Laras Pramesthi, Aziz Jati Nur Ananda. Research Report, 2017.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Previous study on pregnant women in Sambas district showed a high prevalence of anemia and chronic energy deficiency which can lead to stunting and anemia in the offspring.
Objective: This follow up study aimed to determine the nutritional status of children in Sambas District and factors associated with their nutritional status
Methods: A cross sectional study was conducted in March-November 2017. A total of 484 children of the pregnant women from the previous study were recruited.
Results: Most of the subjects were 6-9 months old (42.77%) and male (55.2%). Mother, father and grandmother were identified as the caregiver (95,66%, 3,34%, and 1% respectively). Proportion of subject whose born with low birth weight was low (7.03%). Furthermore, only 36.9% of subjects received exclusive breastfeeding. Related with nutritional status, about 20.8% of subjects experienced stunting, and 18.8% was underweight while 11.0% was wasting. As 31.74% experienced mild anemia, 24.90% suffered moderate anemia, while 1.04% had severe anemia. Low food intake, food diversity, and food security affected the nutritional status of the children. Poor sanitation and hygiene practices contributed to morbidity level.
Conclusions: Stunting, underweight, and anemia among children 0-23 months old in Sambas District were still prevalent. Improving, child care through knowledge on nutrition and health for the family, especially mothers, is recommended.

Keywords: anemia, Sambas, stunting, infant, under-two children

The study of the effect of COVID-19 pandemic to infant feeding practices in Indonesia (COVID-19 Mom-Baby Study)

Judhiastuty Februhartanty[1,2], Cahya Ayu Agustin[1,2], Athiya Fadlina[2]. Research Report, 2020.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Department of Nutrition Science, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia

Background: A pandemic like the COVID-19 pandemic can be a challenge to ensure optimal infant feeding practices.

Objective: This study aimed to investigate the infant feeding practices among mothers with infants and its associated factors during the COVID-19 pandemic in Indonesia.

Methods: An online survey was conducted within December 2020. A total of 301 Indonesian mothers aged ≥18 years old, with infants aged <12 months, obtained through convenience sampling completed the survey form. Infant feeding practices were assessed based on current exclusive breastfeeding (EBF) at time of interview (for infant aged 0 to <6 months) and minimum acceptable diet (MAD) (for infants aged 6 to <12 months).

Results: Most subjects were 18-34 years old (88%), lived in Java Island (85.4%), obtained a university level of education (88.1%), received a monthly household income above Rp.7,199,999 (43.2%), and had an infant with comparable age and sex. Feeding practices indicated that 78.9 % of the mothers were practicing exclusive breastfeeding and 73.6% of the children were receiving the MAD. Regarding the effect of COVID-19 pandemic to the feeding practices, 13% of the mothers reported an alteration in their infant feeding practice from what they intended i.e., 13.8% and 13% reported to have increased their breastfeeding frequency and duration, respectively compared to before the pandemic, and 10.3% reported to have introduced complementary feeding earlier than planned. None of them reported to stop breastfeeding. In addition, 93.6% of the mothers revealed that they received support their husband and 70% of them considered such support as the most influential during the period of moving control orders (MCOs).

Conclusions: The study suggests that infant feeding practices during the early stage of the pandemic was considerably favourable with some minor alteration from the original plan. The lesson learned about home support provided by the husband during MCOs can be potentially enhanced and extended to support breastfeeding promotion not only during pandemic but also during normal condition. Breastfeeding promotion program must address more opportunities to develop meaningful co-parenting practices between the mothers and the husbands.

Keywords: COVID-19 pandemic, exclusive breastfeeding, husband support, Minimum Acceptable Diet, online survey

Nutrition of School Age Children: Effects of Covid-19 and Opportunities for enhancing the Nutrition Focus under UKS/M in Indonesia

Luh Ade Ari Wiradnyani, Ahmad Thohir Hidayat, Aziz Jati Nur Ananda. Research Report, 2022.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Prior to the COVID-19 pandemic, Indonesian children aged 5 to 11 faced a triple burden of malnutrition, and the pandemic further exacerbated the risks.

Objective: This study aimed to assess the effects of COVID-19 on the nutrition practices of school-aged children in Indonesia.

Methods: The study employed a mixed-methods approach, including surveys, interviews, focus group discussions, field observations, and a desk review, conducted in three districts in March 2022.

Results: Findings revealed significant changes in children's food consumption during the pandemic, with reduced intake of fruits, red meat/poultry, and dairy, and an increase in carbohydrate and vegetable consumption. Notably, sugary drink consumption rose, affecting nearly 40% of children. Knowledge gaps were identified, indicating insufficient awareness of good dietary practices, especially regarding breakfast, food variety, and food safety. While national policies supported school-aged children's dietary practices, shortcomings in implementation and coordination were evident. The School Health Program, with a focus on handwashing during the pandemic, lacked emphasis on nutrition. Challenges included an unsupportive food environment at schools, lack of data on dietary practices, limited resources, and inadequate nutrition education implementation.

Conclusions: Recommendations include enhancing the food environment around schools, increasing access to nutritious foods for vulnerable families, issuing sub-national policies to reinforce national frameworks, establishing a UKS/M information system, and improving monitoring and evaluation of the program. Integrating dietary practices into Health Screening Tools, raising awareness, capacity building, and involving Parent-Teacher Associations (PTAs) in nutrition education activities were also suggested. Overall, the study emphasizes the need for comprehensive strategies to strengthen policies and programs supporting good dietary practices among school-aged children in Indonesia.

Keywords: COVID-19 impact, School Health Program, dietary practices

Diversity of protein food sources, protein adequacy and amino acid profiles in Indonesia diets: Socio-cultural research in protein transition (SCRiPT)

Helda Khusun[1], Pablo Monsivais[2], Roselynne Anggraini[1], Judhiastuty Februhartanty[1], Elise Mognard[2], Yasmine Alem[3,4], Mohd Ismail Noor[5], Norimah Karim[5], Cyrille Laporte[4], Jean-Pierre Poulain[3,4], Adam Drewnowski[6]. *Journal of Nutritional Science* 2022; 11(e84): 1-8. doi: 10.1017/jns.2022.82.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Department of Nutrition and Exercise Physiology, Elson S. Floyd College of Medicine, Washington State University, Spokane, WA 99202, USA
[3]Taylor's Toulouse University Center and Faculty of Social Sciences & Leisure Management, Taylor's University, Selangor Darul Ehsan, Malaysia
[4]University of Toulouse Jean Jaurès, CERTOP UMR-CNRS 5044, Toulouse, France
[5]Centre for Community Health Studies (ReaCH), Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Bandar Baru Bangi, Malaysia
[6]Center for Public Health Nutrition and Department of Epidemiology, University of Washington, Seattle, WA, USA

The ongoing nutrition transition in lower- and middle-income countries (LMIC) in South East Asia may have a positive impact on protein nutrition. This study assessed the diversity of plant and animal protein food sources in relation to essential amino acid (EAA) adequacy in a population-based sample (N 1665) in Indonesia. Dietary intakes from in-person 24 h recalls provided data on energy and protein intakes (in g/d) from plants (grains, legumes), meat, poultry and fish, and eggs and dairy. Protein diversity scores were based on the number of protein food sources over 24 h. EAA scores were the ratio of amino acid intakes to recommended values. Protein diversity and EAA scores were then compared across multiple socio-demographic indices. Analysis of variance and χ^2 tests were used to test for differences among groups. Energy intakes were 1678 kcal/d for men and 1435 kcal/d for women. Average protein intakes (and prevalence of inadequacy) were 59,4 g/d (41,7 %) for men and 51,5 g/d (51,1 %) for women. In regression analyses, higher protein diversity scores were associated with higher protein intakes, more animal protein and less plant protein and with higher EAA scores. Lower protein diversity scores were associated with lower intakes of lysine, leucine and valine relative to requirements, as well as with lower EAA, rural settings, less wealth and less modernisation. Greater diversity of animal protein food sources, observed among groups of higher socio-economic status, was linked to better amino acid adequacy and protein nutrition.

FOOD ENVIRONMENT

Assessing the validity and reliability of primary school environmental audit questionnaire in Jakarta

Dian Luthfiana Sufyan[1,2], Muhammad Nur Hasan Syah[2], Suci Latifah[3], Utami Wahyuningsih[2], Helda Khusun[1]. Research Report, 2020.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Nutrition Study Program, Faculty of Health Sciences, Universitas Pembangunan Nasional Veteran Jakarta, South Jakarta, Indonesia
[3]Indonesia Ramah Lansia, Yogyakarta, Indonesia

Background: Overnutrition is often caused by an energy imbalance where the amount of energy from food consumed is greater than the amount of energy expended through physical activity. Environmental factors, consumption of energy-dense but nutrient-poor foods, and frequent eating out are some of the reasons why people may overeat. Other factors like lack of access to facilities for physical activity, changes in lifestyle, and advancements in technology can contribute to low physical activity levels. While schools can serve as a platform for promoting healthy habits among students, they can also inadvertently create an environment that encourages overeating and low physical activity, through their curriculum and facilities related to food and snack consumption.

Objective: This study aimed to measure the validity and reliability of Indonesian language adapted version of the Primary School Environmental Audit (PSEA) questionnaire that is used to assess potential obesogenic environment in urban primary schools.

Methods: Structured questionnaire of PSEA was used to interview the school principals, teachers, administrators, and canteen vendors from 27 primary schools in Jakarta. Data on school characteristics like status (public or private), location, total number of students, total number of physical education (PE) teachers, and school land size were collected. Index and scoring assessment were applied throughout the item questions. Spearman's rho correlation coefficient and Cronbach's alpha were performed to examine the construct validity and reliability, respectively.

Results: The results suggested that 62 of the initial 109 item questions were valid and highly correlated (Cronbach Alpha 0.867). The study further showed that these items may compose the overall questionnaire to be able to assess obesogenic environment in other urban primary school.

Conclusions: The Indonesian version of the PSEA questionnaire including the index and scoring system applied to it are valid and reliable and thus can be used to assess the obesogenic environment in Indonesian primary schools.

Keywords: childhood obesity, primary school, obesogenic environment, PSEA

Opportunities and challenges of Sugar-Sweetened Beverages (SSB) tax imposement in Indonesia: A qualitative measure

Judhiastuty Februhartanty[1,2], Cahya Ayu Agustin[1,2], Athiya Fadlina[2]. Research Report, 2020.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Department of Nutrition Science, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia

Background: A pandemic like the COVID-19 pandemic can be a challenge to ensure optimal infant feeding practices.

Objective: This study aimed to investigate the infant feeding practices among mothers with infants and its associated factors during the COVID-19 pandemic in Indonesia.

Methods: An online survey was conducted within December 2020. A total of 301 Indonesian mothers aged ≥18 years old, with infants aged <12 months, obtained through convenience sampling completed the survey form. Infant feeding practices were assessed based on current exclusive breastfeeding (EBF) at time of interview (for infant aged 0 to <6 months) and minimum acceptable diet (MAD) (for infants aged 6 to <12 months).

Results: Most subjects were 18-34 years old (88%), lived in Java Island (85.4%), obtained a university level of education (88.1%), received a monthly household income above Rp.7,199,999 (43.2%), and had an infant with comparable age and sex. Feeding practices indicated that 78.9 % of the mothers were practicing exclusive breastfeeding and 73.6% of the children were receiving the MAD. Regarding the effect of COVID-19 pandemic to the feeding practices, 13% of the mothers reported an alteration in their infant feeding practice from what they intended i.e., 13.8% and 13% reported to have increased their breastfeeding frequency and duration, respectively compared to before the pandemic, and 10.3% reported to have introduced complementary feeding earlier than planned. None of them reported to stop breastfeeding. In addition, 93.6% of the mothers revealed that they received support their husband and 70% of them considered such support as the most influential during the period of moving control orders (MCOs).

Conclusions: The study suggests that infant feeding practices during the early stage of the pandemic was considerably favourable with some minor alteration from the original plan. The lesson learned about home support provided by the husband during MCOs can be potentially enhanced and extended to support breastfeeding promotion not only during pandemic but also during normal condition. Breastfeeding promotion program must address more opportunities to develop meaningful co-parenting practices between the mothers and the husbands.

Keywords: COVID-19 pandemic, exclusive breastfeeding, husband support, Minimum Acceptable Diet, online survey

Developing students' ability in creating biodegradable plastic through project-based learning at SMPN 2 Garut

Atin Kartinah[1,2], Yulisa Nurdiani[1], Eko Retnadi[1], Jesus C Fernandez[2]. Research Report, 2021.

[1]SMPN 2 Garut, Kab. Garut Jawa Barat
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The impact of science and technology on human civilization has led to the era of globalization. However, with this process comes the challenge of creating an educational system that can produce quality human resources. Quality education and learning for sustainable development is a critical effort to address this challenge.

Objective: This study aimed to develop students' ability in making biodegradable plastic using Garut orange peel as the basic ingredient through the Project Based Learning model.

Methods: The subjects were 120 students of class IX of SMP Negeri 2 Garut. This research started from February to November 2021 employing a two-cycle Classroom Action Research. The learning activities were carried out using the Project Based Learning model with practicum methods and Genre Based Approach integrated between Natural Science and English subjects. The integrated activity was held during the 3rd meeting of the 1st cycle where students under the guidance of an English and Science teachers made an innovation design for making biodegradable plastic. At the 10th meeting in cycle 2, an evaluation was carried out by the English and Science teachers with the students on the overall learning process. Then at the 11th meeting, the students were required to make a video of their process and final outputs to produce a biodegradable plastic products from Garut orange peels.

Results: The biodegradable plastic products obtained during the second cycle looked neater and better when they made them in groups compared when they tried to generate them individually during the first cycle. The students were better prepared and confident in implementing and explaining the process of making their biodegradable plastic products during the second cycle. This was evident from the videos that they submitted using English language. In addition, students felt happier with their outputs.

Conclusions: This CAR using the project-based learning model proved effective in enabling students to produce biodegradable plastic from Garut orange peel and encourage them to recycle food wastes as part of sustainable environmental practices.

Keywords: Biodegradable plastic, Garut orange peel, project-based learning

Assessment of the obesogenic environment in primary schools: a multi-site case study in Jakarta

[1]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Childhood overweight and obesity have increasingly been recognized as a significant global public health crisis, including in Asia. This study aimed to assess the obesogenic environment in primary schools in Jakarta, Indonesia.

Methods: A qualitative, multi-site, case study design was used to capture different elements of the school environment and policies related to obesity, with a focus on nutrition and physical activity. An adaptation of the Primary School Environmental Assessment tool was used. Six primary schools in Jakarta were purposively selected based on their location, socioeconomic status, and type (public or private). In addition to direct observation at each school, interviews were conducted with the principal, physical education teacher, canteen staff, street food vendors, and students.

Results: Among the six schools, two were private and four were public. The most popular foods consumed by students were unhealthy, such as deep-fried foods and sugar-sweetened beverages. Students had easy and constant access to unhealthy foods, whereas only limited variation of healthy foods were available in the school canteen. Some schools also allowed the student to have access to street food vendors. School policies related to healthy eating and physical activities had been implemented, mainly in the form of teaching these topics as part of the school curriculum. However, promotion of healthy eating and physical activities by the schools was still limited.

Conclusions: This study showed the usefulness of the Primary School Environmental Assessment tool in identifying obesogenic factors in urban area of Indonesia. Effective implementation of guidelines to foster good nutritional practices and healthy lifestyles at school should be prioritized to improve the health and nutritional status of the students.

Keywords: obesity, school, nutrition environment, children

A study of knowledge, attitude, and practice on sustainable food consumption among Indonesian adolescents

Evi Ermayani, A.A.S. Indriani Oka, Nindhita Priscillia M, Retty Putri Utami Dwipa, Luh Ade Ari Wiradnyani, Helda Khusun, Judhiastuty Februhartanty. Research Report, 2022.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Young generation or adolescents in Indonesia reach 16% of the population which give them an important role as future consumer. While environmental issues in which sustainable food production and consumption become significant, taking art as active smart consumer is necessary. However, the information on the knowledge, attitude, and practice about it among adolescents in Indonesia is still lacking.

Objective: This study aimed at investigating the knowledge, attitude, and practice on sustainable food consumption (SFC) among Indonesian adolescents.

Methods: This study used a cross-sectional quantitative online survey. As many as 6,129 adolescents aged 13-18 years participated in the online survey. However, only 1,429 subjects filled out the questions completely and were included in the analysis.

Results: There were more female dan male (69.7% and 30.3% respectively) in this study, where most of them living with family. The results showed that only 24.5% of the respondents familiar with the term SFC concept followed by 34.4% of respondents familiar with term "carbon print". The related concepts most familiar to these adolescents were "no plastic waste movement" (73.8%), Consuming appropriate food quantities (71.4%), and "minimizing greenhouse effect" (61.2%) The attitude of these adolescents on SFC was reflected on their tendency to regard the high importance of "locally produced foods" and "foods obtained from the nearest location" (78.4% and 77.3% of strong agreement respectively). Nearly half (45.8%) admitted having spent 1-3 times per week eating outside the home. Snack and main meal were mostly consumed when eating outside or purchasing online (50.7% and 37.3% respectively). Some highlights on the practices related to SFC done by these adolescents included often bought foods from the nearest location (75%), frequently consumed locally grown foods (69.7%), regularly separated organic and inorganic wastes (52.5%), never arranged food storage and usage based on first-in-first-out concept (20.5%). About half of them having exposure to SFC, where 57% of them obtain the information through media and the rest were from schools. Teachers (46.1%) and family (26.0%) were regarded as influencers on SFC practices.

Conclusions: The study's findings suggest that providing information and education on sustainable food consumption (SFC) could help improve the knowledge, attitude, and practice of Indonesian adolescents.

Keywords: knowledge, attitude, practice, sustainable food consumption, adolescents, Indonesia

Baseline study of Nutrition Goes to School (NGTS) program for improving nutritional status, physical fitness, and cognitive function among adolescent students in Malang

Indriya Laras Pramesthi, Aziz Jati Nur Ananda, Evi Ermayani, Grace Wangge. Research Report, 2018.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Nutrition intervention through adolescent is considered as one of effective strategies in combating malnutrition. Nutrition Goes to School (NGTS) program is designed to contribute to the achievement of better nutritional status, physical fitness, cognitive function. Since 2016, Nutrition Goes to School (NGTS) program has been implemented in several regions in Indonesia, including Malang district.

Objective: This study assessed baseline data on nutrition knowledge, dietary practices, nutritional status, physical fitness, and cognitive function of adolescents prior to NGTS implementation in Malang.

Methods: The overall study was designed as a before-after experimental study with a control group. Four schools were classified in the intervention group (receiving NGTS program i.e., nutrition education, school canteen strengthening, information system support, and leadership/ commitment strengthening) while four other schools were classified in the control group (receiving routine nutrition education). Each group consisted of 375 students. Data collection at baseline was done in April 2018.

Results: The sociodemographic characteristics of the participants were similar, with a comparable proportion of boys and girls in both control and intervention groups. Most AWESOME indicators were comparable between groups, except for the mean score of the coding test in the cognitive domain, which was higher in the intervention group. Nutrition knowledge remained low overall, with only 25% of students demonstrating good knowledge (22% in the control group and 26.6% in the intervention group). Approximately half of the students reported having routine breakfast habits (50% in the control group and 52.4% in the intervention group) and good dietary diversity (53% and 47%, respectively). The prevalence of underweight students was 8.4%, while 19.8% were overweight or obese, with similar proportions in both groups. Anaemia affected nearly 25% of participants across both groups. Additionally, around 90% of the students scored low in physical fitness in both groups.

Conclusions: Baseline findings reveal low nutrition knowledge, poor physical fitness, and a high prevalence of anaemia and overweight/obesity among adolescents in Malang. Moderate dietary diversity and breakfast habits also need improvement. These results underscore the need for the NGTS program, which has the potential to enhance adolescent nutrition and overall well-being.

Keywords: Nutrition Goes to School (NGTS), adolescents, nutrition knowledge, dietary practice, nutritional status, cognitive function, physical fitness

Barriers of implementing a nutrition education program for adolescents in rural Indonesian schools

Purnawati Hustina Rachman[1,2], Anna Vipta Resti Mauludyani[1], Karina Rahmadia Ekawidyani[1], Judhiastuty Februhartanty[2]. *Malaysian Journal of Medicine & Health Science* 2020; 16(SUPP6): 34-45.

[1]Department of Community Nutrition, Faculty of Human Ecology, IPB University, West Java 16680, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Introduction: Nutrition education (NE) is a promising intervention in promoting behavior change. However, in developing countries where it is not included in the national curriculum, many barriers arise.

Objective: The study aimed to explore the teachers' perceived barriers to implementing a nutrition education program for adolescents in rural Indonesian schools.

Methods: A qualitative participatory action research approach was applied in three selected schools in Bogor, Indonesia. Focus group discussion was used as the main method of data collection, involving 12 teachers who have implemented the Health and Nutrition Program for Adolescents. Triangulation was conducted through observation and feedback questionnaire from students. Data from multiple sources were coded, categorized, and thematically analyzed.

Results: The study generated three themes and six subthemes as barriers: 1) capacity of teachers (lack of training and lack of nutrition knowledge), 2) school support (time constraints and lack of funding), and 3) external environment (unhealthy street vendors and parent's lack of nutrition awareness). These barriers could be minimized by establishing a strong commitment of school principals, the inclusion of street-food vendors and parents, and ensuring sufficient training of teachers.

Conclusions: This study highlights the need for schools and program implementers to identify potential barriers prior to commencing NE and also strengthen opportunities within it. The barriers found in this study emphasize the need for advocacy, sufficient training of teachers, and consideration of the external food environment. Further studies are suggested to confirm these findings, involving more informants and different settings, such as in the urban population.

Keywords: teachers, qualitative, module, principal, behavior

Improvement of students and snack vendors behaviour after receiving health promotion program from UKS's cadres

Rina Doriana Pasaribu[1,2], Oslida Marthony[1], Sri Supriyantini[3], Dwi Nastiti Iswarawanti[2,4]. *The Indonesian Journal of Nutrition* 2022; 10(2): 189 – 199. doi: 10.14710/jgi.10.2.189-199.

[1]Politeknik Kesehatan Kementerian Kesehatan RI Medan
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Universitas Sumatera Utara, Medan, Indonesia
[4]Sekolah Tinggi Ilmu Kesehatan Kuningan, Kuningan, Jawa Barat

Background: School Health Program or *Usaha Kesehatan Sekolah (UKS)* aims to improve the students learning achievement by improving their health status including the fulfilment of nutrition so that they can grow and develop optimally. To promote healthy and safe food behavior, UKS empowers students to become the agents of change called as cadres of UKS.

Objectives: This study examined the effect of healthy and safe snacks promotion conducted by students trained as cadres of UKS to improve knowledge, attitude and behavior of student and mobile vendors.

Methods: The research used a pretest-posttest experimental control group design. The first stage of research was training elementary school students as UKS cadres to promote healthy and safe food consumption behavior in their respective schools. The second stage was assessment of 360 randomly selected students and 94 school vendors in 12 different schools. The intervention schools received a packaged of promotion delivered by UKS cadres' while comparison group received poster. Bivariate analysis using t-test, Wilcoxon test and Mann Whitney test were used to assess the differences between the groups.

Results: Increased changes were significantly higher in the intervention groups than the comparison group. Median value of knowledge, attitude and behavior of students before and after interventions showed a significant difference ($p<0.05$). Median change scores of student's knowledges 6.00 (4.00-9.00), student's attitude 4.00 (2.00-6.00), student's behaviour 4.00 (2.00-5.00) and vendor's knowledge 4.00 (2.00-5.75).

Conclusions: The UKS's cadres as trained peer-educators could significantly improve safe and healthy food behavior of students as well as knowledge of snack school vendors.

Keywords: school health program, elementary school, trained students, street vendors, food safety, peer educators

Improving students' competence in balanced nutrition practices by utilizing school environments and project-based local food resources processing

Efadiosti[1,2], Drupadi Dillon[2]. Research Report, 2020.

[1]SMAN 1 Batipuh, Sumatera Barat, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Research has shown that adolescence is a crucial stage for the development of the body's structure and function. However, many adolescents lack a proper understanding of health and nutrition. Studies have found that around half of adolescents do not have breakfast and often rely on food vendors near their schools for their meals. This trend highlights the need for practical nutrition education in school curricula to increase adolescents' knowledge and awareness of proper nutrition. By incorporating such education, adolescents can learn to make informed choices about their dietary habits and promote better health and well-being.

Objective: This research aimed to increase students' competency in nutrition topic using *Discovery Learning* and *Project Based Learning* was conducted in August – November 2020.

Methods: This study was a classroom action research, consisting of three cycles, on school garden vegetables planting. Each cycle was conducted based on the results of the previous cycle. Thirty students of grade 11, High School students in Batipuh, West Sumatra were enrolled to join the study. Then, the students were asked to plant vegetables in the school garden as a medium for learning about balance nutrition. The effect of the learning method was evaluated using students' performance in cognitive, affective and psychomotor aspects. Cognitive performance of the students was assessed using knowledge test, while affective and psychomotor competencies were assessed by observation during learning process. Data were analyzed by calculating the average score of students' performance and proportion of student's with certain grades. Students started with good grade in cognitive performance and persisted with similar grade during the entire study.

Results: During the three cycles, means of cognitive score were 84, 83, and 84, respectively. Scores for affective competencies were 89, 88, and 90, respectively, while 87, 88, and 90 for psychomotor competencies. During the first cycle, almost half of students got excellent and good score for cognitive score, while most students got excellent and good in affective or psychomotor score. However, there was a tremendous decrease in the number of students who got excellent and good scores in cognitive competencies in the second cycle, and regained but very little in the third cycle. The majority of students got excellent and good scores in affective competencies which persisted in the second and third cycle. The percentage of students who got excellent and good scores in psychomotor competencies started high and reached 100 percent in the third cycle.

Conclusions: This study shows that nutrition education for adolescents using practical methods in school curricula contributed to improving psychomotor competency, but not to cognitive nor affective competency.

Keywords: class action learning, learning competency, nutritional balance guideline

Animal and plant protein food sources in Indonesia differ across socio-demographic groups: Socio-cultural research in protein transition in Indonesia and Malaysia

Helda Khusun[1], Judhiastuty Februhartanty[1], Roselynne Anggraini[1], Elisa Mognard[2,3], Yasmine Alem[2,3,4], Mohd Ismail Noor[5], Norimah Karim[5], Cyrille Laporte[4], Jean-Pierre Poulain[2,3,4], Pablo Monsivais[6], Adam Drewnowski[7]. *Frontiers in Nutrition* 2022; 9 (article 762459): 1-8. doi: 10.3389/fnut.2022.762459.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Taylor's Toulouse University Center, Subang Jaya, Malaysia
[3]Faculty of Social Sciences and Leisure Management, Taylor's University, Subang Jaya, Malaysia
[4]CERTOP UMR-CNRS 5044, University of Toulouse Jean Jaurès, Toulouse, France
[5]Faculty of Health Sciences, Community Health Centre, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia
[6]Department of Nutrition and Exercise Physiology, Elson S. Floyd College of Medicine, Washington State University, Spokane, WA, United States
[7]Department of Epidemiology, Center for Public Health Nutrition, University of Washington, Seattle, WA, United States

Background: Plant-based diets in lower-income countries are often associated with inadequate protein nutrition and adverse health outcomes.

Objective: To examine the diversity of protein food sources, in both animal and plant, across diverse socio-demographic groups in Indonesia as compared to Malaysia.

Design: The SCRiPT (Socio Cultural Research in Protein Transition) study was based on population-based samples recruited in Indonesia (N = 1665) and in Malaysia (N = 1604). Data from 24-h in-person dietary recalls in each country were used to construct the frequency counts of protein sources by food group. Protein sources were defined as fish, poultry, red meat (beef, pork, and mutton), eggs, dairy, and plants (cereals, pulses, and tubers). The percent reported frequencies for animal and plant proteins were compared across socio-demographic strata and by country. Analyses were based on one-way Anovas and general linear model regressions adjusting for covariates.

Results: Animal protein frequency counts were 34% of total in Indonesia, but 50% in Malaysia's. Higher reported consumption frequencies for poultry and red meat in both countries were associated with urban living, greater modernization, and higher socioeconomic status, with stronger social gradients observed in Indonesia. Reported fish consumption was higher in Indonesia than in Malaysia. Fish was more likely to be listed by rural island populations in Indonesia and was associated with lower education and incomes. Consumption frequencies for plant-based proteins were associated with lower socio-economic status in Indonesia and in Malaysia.

Conclusions: More affluent groups in both countries reported higher frequencies for meat, eggs, and dairy as opposed to fish. Greater economic development in Southeast (SE) Asia is associated with more animal protein, particularly from poultry, which may displace fish, the traditional source of high quality protein for the region.

Keywords: protein transition, animal protein, plant protein, socio-demoghraphics, fish, Malaysia, Indonesia

The First Indonesian Food Barometer (IFB 1)

Helda Khusun[1,2], Judhiastuty Februhartanty[1,3], Roselynne Anggraini[4], Pramesthi Widya Hapsari[5], Elise Line Mognard[6,7,8,9], Jean-Pierre Poulain[6,7,8,9]. Research Report, 2022.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia | [2]Universitas Muhammadiyah Prof Dr HAMKA, Jakarta 12130, Indonesia | [3]Nutrition Department, Faculty of Medicine, Universitas Indonesia—Dr. Cipto Mangunkusumo General Hospital, Jakarta 10430, Indonesia | [4]Department of Nutrition, Faculty of Sports and Health Sciences, Universitas Negeri Surabaya, Surabaya 60231, Indonesia | [5]Faculty of Health, Jenderal Soedirman University, Purwokerto, Indonesia | [6]Chair "Food Studies: Food, Cultures & Health", Taylor's University, Subang Jaya 47500, Malaysia | [7]Centre for Asian Modernisation Studies (CAMS), Taylor's University, Subang Jaya 47500, Malaysia | [8]Faculty of Social Sciences and Leisure Management, Taylor's University, Subang Jaya 47500, Malaysia [9]Centre d'Études et de Recherche: Travail, Organisation, Pouvoir (CERTOP) UMR CNRS 5044, Université de Toulouse, 31058 Toulouse, CEDEX 9, France

Background: Nutrition transition, refers to the shift in dietary patterns, coupled with decreased physical activity has altered nutritional outcome, including changes in body composition, affecting health of the population. In developing countries, this transition was driven by rapid urbanization and modernization, which also depended on changes in economic, sociological and cultural factors. The role of sociocultural have often been overlooked. The Indonesian Food Barometer was conceptualized to investigate the social, cultural and nutritional determinants of food practices in a multicultural context.

Objective: The purpose of the Indonesian Food Barometer (IFB) was to provide evidence on the relationship of social, cultural, and nutritional determinants of nutrition transition for making contextually relevant recommendations of nutritional and health status of the population.

Methods: This mixed-method study collected data from 1665 adults representing 6 Provinces, 7 ethnicities, from both urban and rural settings. The report provides information on the current dietary behaviors of Indonesians that include among others 1)Spread of food events during the day, 2)Norms and the actual practices of food intake, 3)Socialization of food intake, 4)Eating location, 5)Socio-cultural representations of food, 6)Attitudes towards food safety, healthy eating, animal welfare, genetically modified foods, 7)Indonesian emblematic dishes, 8)Macronutrient intakes indicating nutrition transition based on the daily diet of the Indonesians, 9)Prevalence of overweight and obesity among Indonesian adults.

Results: Among all detailed results, this report highlighted the practices linked with the modernization factors (such as income, education, ownership of assets, type of occupation, household size, number of people living under the same roof). The practices included 1)Emerging practice of eating out and reliance to purchased foods even when eating at home, 2)Highly individualized menu structures during breakfast, lunch, and dinner, 3)Less practice of socialization during all meal times, 4)Emerging practices of doing other activities while eating, 5)Indonesians tended to have snacks anytime, and 6) Deskilling of household food gatekeepers where most of the respondents' meal was cooked by others and emerging proportion of no cooking activity in the house. The study also underlined some significant associations between urban-rural, gender, age, marital status, level of education, occupation, socio-economic level, and ethnicity with the food practices.

Conclusions: The report facilitates the evidence of modernization modalities of food practices with different stages by socio-cultural characteristics. The IFB data can help to improve the food and nutrition policy from being population approach to a target group approach, also to develop not only science-based but also social reality-based policies.

Keywords: food transition, eating practices, sociology of food, modernization, Indonesia

RESEARCH AREA 2

Optimal Nutrition throughout the Life Course

NUTRITIONAL ASSESSMENT

Maternal factors associated with vitamin A concentration in colostrum of postpartum mothers in South Sulawesi Province, Indonesia

Abdul Salam[1,2,3], Dodik Briawan[1], Drajat Martianto[1], Abdul Razak Thaha[3], Andi Imam Arundhana[3] & Luh Ade Ari Wiradnyani[2]. *Malaysian Journal of Nutrition* 2018; 24(4): 559-566.

[1]Department of Community Nutrition, Faculty of Human Ecology, Bogor Agricultural University, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Department of Nutrition, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia

Introduction: Newborns have low vitamin A reserves and rely on breastmilk to meet their vitamin A needs. This study aimed to determine factors associated with vitamin A concentration in colostrum of rural postpartum mothers.
Methods: Out of 180 postpartum women interviewed at seven Community Health Centers in South Sulawesi Province, 160 who met the inclusion criteria were included in the study. Breastmilk (colostrum) samples were obtained shortly after delivery from the breast that was not full and not fed to the infant for at least 30 min. Breastmilk samples of 3-5 ml were collected into sterile plastic tubes using a manual pump. The samples were immediately placed in an icebox and transported to the laboratory within six hours after collection. Vitamin A concentrations were determined using HPLC method. Socioeconomic characteristics, anthropometric measurements, gestational age, and dietary intake of mothers (24-hour recall) were obtained. Bivariate and multiple linear regression analysis were undertaken to determine factors associated with vitamin A concentration in colostrum.
Results: Dietary assessment showed unsatisfactory intake levels of calories, fat, protein, vitamin A, iron and zinc compared to the recommendations for Indonesia. Mean vitamin A concentration in colostrum was 58.2 µg/dl, and about 81.2% of the participants had normal colostrum vitamin A concentration. Iron intake and gestational age were significantly associated with colostrum vitamin A concentrations.
Conclusions: Majority of the postpartum mothers had normal colostrum vitamin A concentration. Maternal dietary intake including iron is important to ensure adequacy of vitamin A in breastmilk.

Keywords: breastmilk vitamin A, colostrum, postpartum mother

Nutrient intake from complementary feeding for stunting among children aged 12-23 months in Susut Subdistrict, Bangli Regency

Kadek Tresna Adhi[1,2]. Research Report, 2018.

[1]Public Health Nutrition School of Public Health, Faculty of Medicine, Udayana University, Denpasar, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Stunting is still one of the chronic nutritional problems that occur in infants. The frequency, variation and consistency of complementary foods given to children can affect the incidence of stunting in children.

Objective: The purpose of this study was to determine the relationship of energy, protein, calcium, iron and zinc intakes to the incidence of stunting in children aged 12-23 months in Susut Subdistrict, Bangli Regency.

Methods: This study used a cross-sectional design that included 207 children aged 12-23 months as samples. Data was collected through interviewing the mothers as respondents using a structured questionnaire related to the characteristics of their children and themselves; and a 24-hour food recall questionnaire to determine the children's food consumption. Data were analysed by Chi-square and Mann-Whitney tests.

Results: Of the 207 children, 27.5% were stunted, 9.2% were obese, 2.9% were undernourished, 1.5% had over nutrition, and 0.5% were thin. Among children with protein intake adequacy less than 70%, 31.58% experienced stunting, while among those with protein intake adequacy of 70% or higher, 27.13% experienced stunting (P=0.679). For iron intake, children with less than 70% adequacy had a stunting rate of 32.61%, compared to 23.48% among those with iron intake adequacy of 70% or higher.

Conclusions: There was no statistically significant difference in the adequacy of micro and macro nutrients intake between children with and without stunting condition in this study.

Keywords: calcium, energy, iron, protein, stunting, zinc

An HPLC Ultraviolet Method using low sample volume and protein precipitation for the measurement of retinol in human serum suitable for laboratories in Low- and Middle-Income Countries

Madhulika Chaudhary-Webb[1], Rosemary L. Schleicher[1], Juergen G. Erhardt[2], Elizabeth C. Pendergrast[3], Christine M. Pfeiffer[1]. *The Journal of Applied Laboratory Medicine* 2019; 4(1): 101–107. doi:10.1373/jalm.2018.027508.

[1]Centers for Disease Control and Prevention, Atlanta, GA
[2]SEAMEO, Jakarta, Indonesia
[3]Battelle, Atlanta, GA

Background: Assessing vitamin A status in populations remains a high public health priority for low- and middle-income countries. However, analytical difficulties with serum retinol measurements persist in international laboratories. Nearly all participants in a Centers for Disease Control and Prevention external quality assessment program use HPLC to measure serum retinol, but round-to-round results failing to meet acceptable criteria suggest the need to provide a straightforward stable HPLC ultraviolet (UV) method that can be adopted by these laboratories to improve performance. We present a protein precipitation HPLC-UV method that measures serum retinol below the deficiency cutoff value (<0.7 µmol/L or 20 µg/dL) that is suitable for low- and middle-income countries and uses commercially available materials.

Methods: Serum (25 µL) added to retinyl acetate was precipitated with acetonitrile (125 µL) to extract retinol. Solvent-based calibration solutions required no extraction. Calibration used either single-point (50 µg/dL) or multipoint solutions (0.52–100 µg/dL). C18 column (4.6 × 100 mm) and acetonitrile with 0.1% triethylamine/water (83/17, v/v) as isocratic mobile phase (1.1 mL/min), achieved baseline separation (7 minutes).

Results: With only 25 µL of serum, the limit of detection was 0.52 µg/dL. Single- and multipoint calibration generated equivalent results. Over several years, between-run imprecision was ≤7.1% in multiple quality-control materials. Overall mean (CV) method bias for NIST-certified reference materials (e-series) was −0.2% (5.8%). Maximally, 180 samples were processed within 24 h.

Conclusions: This method was robust and stable over years and accurately measured serum retinol with low-volume samples. Thus, it may be of interest to low- and middle-income countries and to pediatric and finger stick applications.

Keywords: No keywords were included in the publication.

Intakes of micronutrients and heavy metals in stunted and non-stunted under-two children in urban and rural East Nusa Tenggara, Indonesia: a study using duplicate portion sampling and nuclear analytical technique

Umi Fahmida[1], Arienta Rahmania Putri Sudibya[1], Diah Dwiana Lestiani[2], Syukria Kurniawati[2], Endah Damastuti[2], Woro Yatu Niken Syahfitri[2], Putu Amrytha Sanjiwani[3], Indriya Laras Pramesthi[1], Fitrah Ernawati[4], Muhayatun Santoso[2]. Poster Abstract Presentation (22nd IUNS-International Congress of Nutrition).

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Nuclear Energy Research Organization, National Research and Innovation Agency, Jakarta, Indonesia
[3]Health Polytechnic of Ministry of Health Kupang, Kupang, Indonesia
[4]Health Research Organization, National Research and Innovation Agency, Jakarta, Indonesia

Background: Many studies reported micronutrient intakes of stunted and non-stunted children, but little is known about their intakes of trace elements and heavy metals. Nuclear analytical technique (NAT) can assess micronutrients and heavy metals in food samples which are difficult to estimate using dietary assessment given the limitations in food composition tables.

Objective: This study aims to compare intakes of micronutrients and heavy metals in stunted and non-stunted under-two children in urban and rural East Nusa Tenggara (NTT), Indonesia using NAT.

Methods: Stunted (length-for-age <-2.00) and non-stunted under-two children, matched for sex and age, were recruited in NTT: Kupang (urban, n=186) and Timor Tengah Selatan (TTS) (rural, n=214). Two-day 24-hour dietary recalls (24HRs) were done, and duplicate portion samples were collected based on foods consumed on the 1st day of 24HRs. Two NATs were used, neutron activation analysis (NAA) to assess Se, Fe, Zn, Cr, Co, Hg and total X-ray Fluorescence (XRF) to assess Ca, Cu, Pb.

Results: Compared to their normal counterparts, stunted children had lower intakes of Ca (12-23mo, both sites, p=0.006) and Fe (6-11mo, TTS, p=0.045). There was no difference in Zn and Se intakes between stunted and normal children. Intakes of heavy metals were higher in Kupang than TTS for Pb (12-23mo, p=0.019) and Cr (6-11mo, p=0.011; 12-23mo, p=0.016). On the other hand, exposure to Hg was higher in TTS than Kupang (6-11mo, p<0.001; 12-23mo, p<0.001) at the level close to the provisional tolerable daily intake. There was no significant difference in exposures to Co and Cu between Kupang and TTS.

Conclusions: The study found that stunted children in both sites had lower Ca and Fe intakes. There was significant difference in exposures to Pb, Cr and Hg between sites. The findings suggest the importance of assessing not only nutrient intakes, but also exposures to heavy metals known to have negative consequence to health and nutritional status. Further study to identify potential food sources as contaminants of Hg particularly in TTS is recommended.

User experience of the modified calorie diary application for monitoring food intake and physical activity

Helda Khusun[1], Aria Kekalih[2], Luh Ade Ari Wiradnyani[1], Roselynne Anggraini[1]. Research Report, 2021.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

Background: The prevalence of overweight and obesity is on the rise in developing countries, including Indonesia. The 2018 Basic Health Research (RISKESDAS) reported a 35.4% prevalence of overweight and obesity in adults, marking an increase from 28.9% in 2013. Obesity plays a significant role as a risk factor for non-communicable diseases (NCDs), contributing to a shift in disease patterns in Indonesia. This increase is attributed to changes in dietary patterns and physical activity stimulated by urbanization and modernization, according to the nutrition transition theory. In 2016, researchers developed the "Mobile Application Calorie Diary" (ACD), an Android-based application for surveying food intake and physical activity in adults.

Objective: The study aimed to modify the ACD for balanced nutrition implementation, incorporating Indonesian food features, and assess the user experience among nutrition experts and the general public.

Methods: The research involved two stages: modifying the ACD and studying user experiences. The modification included adding features such as user profiles, nutritional status, daily caloric intake, energy balance, food diversity, micronutrient adequacy, and articles. The study then conducted in-depth online interviews with 10 nutrition experts and 10 general users to assess and gather feedback on the features of the modified ACD.

Results: The study revealed successful modifications to the ACD, incorporating new features and updating the database. The ACD received positive evaluations for its utility and user-friendliness, catering to both general users and nutrition experts. The most favored feature among users was the daily caloric intake. Users provided valuable feedback to enhance the application's effectiveness in promoting balanced nutrition.

Conclusions: Feedback for the ACD improvement centered around four key areas: 1) expanding the food database, 2) simplifying options for physical activities, 3) categorizing foods for micronutrient intake, and 4) incorporating user guidance instructions. Overall, the application demonstrated its effectiveness in supporting users' dietary and activity monitoring needs, with valuable input provided for future enhancements. The consensus among users suggests that addressing these key improvement areas would further enhance the application's usability and overall impact on promoting balanced nutrition and healthy lifestyles.

Keywords: balanced nutrition, calorie diary application, dietary monitoring, user experience

iMoGiz: Intelligence human anthropometric estimation using convolution neural network

Dwi Miyanto[1], Yunita Indah Prasetyaningrum[2,3], Endri Yuliati[2], Helda Khusun[3], Wisnu Ananta Kusuma[4]. Research Report, 2021.

[1]Information Technology Study Program, Faculty of Computer Science, Universitas Amikom Yogyakarta, Indonesia
[2]Nutrition Study Program Undergraduate Program, Universitas Respati Yogyakarta, Indonesia
[3]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[4]Department of Computer Science, Bogor Agricultural University, Bogor, Indonesia

Background: Measuring nutritional status using anthropometric methods is relatively quick, simple, and cheap. Measurement results can be related to personal nutritional problems or health condition. Maintaining a person's normal anthropometric index is important to prevent the development of non-communicable diseases. However , anthropometric measurements are prone to error either from the observer or instruments. The machine learning technology is promising for predicting the anthropometric values.

Objective: To develop an estimation feature of anthropometric measurements using the Convolutional Neural Network method on the iMoGiz (Intelligence Monitoring Nutritional Status) application as well as to conduct a feasibility test and validation of the results of anthropometric measurements between smartphone cameras and manual measurements.

Methods: We added new feature in the form of anthropometric predictive model on mobile application (MoGiz) by acquired anthropometric data from a group of adolescents. This data was regarded as human anthropometric database. The predictive model was developed by predicting the human contour mask and regressing the attributes of height and weights. It was based on U-Net structure that combined with MobileNetV2 encoders and implemented on android based mobile application, named iMoGiz.

Results: iMogiz could detect the human segmentation mask and gave the height and weight prediction with error loss of 0.3641.

Conclusions: It is important to explore and utilize different models when developing applications for taking human anthropometric measurements. Paying attention to shooting procedures and providing proper background can also greatly improve the accuracy of predicted results.

Keywords: anthropometric method, height and weight prediction, iMogiz

DIET MODELLING

Early study formulation of Torbangun biscuits with Linear Programming method to meet nutrition needs of stunted children aged 12-18 Months

Donal Nababan[1,2]. Research Report, 2017.

[1]School of Health Sciences of North Sumatera, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The 2013 Basic Health Research (RISKESDAS) reported that Pak-Pak Bharat District has the second highest prevalence of severe stunting after Langkat district in North Sumatera. Provision of complementary food in the form of breast milk is one of the ways to improve the nutritional status of children aged 12-24 months. *Torbangun* leaves show potential as a local food ingredient in formulating a complementary food in the form of biscuits.

Objective: The purpose of this research was to formulate a *torbangun* leaf biscuit with linear programming method and to analyze its nutrient content to meet the nutritional requirement of stunted children aged 12-18 months.

Methods: The process of making of biscuits with and without *torbangun* leaves and organoleptic test were conducted at the Culinary Study Program, Faculty of Engineering, State University of Medan while the nutrient content analysis of *torbangun* biscuit was done at the Integrated Laboratory of Health Polytechnic in Surabaya. Organoleptic test included the hedonic rating test for three formulations of *torbangun* biscuit containing 10%, 20%, and 30% *torbangun* leaf powder in every 100-gr biscuit. Thirty trained panelists were recruited for the organoleptic test to provide their ratings using a 5-point scale (i.e., 1 = do not like at all, 2 = dislike, 3 = rather like, 4 = like, and 5 = like very much).

Results: The result of organoleptic test showed that the average value for each test is always higher on the biscuit with 20% of *torbangun* leaf flour. The nutritional values (energy, protein, fat, carbohydrate, vitamin C, ash, water, iron, calcium, and fiber) of *torbangun* leaf biscuits were higher than that of the control biscuit.

Conclusions: The organoleptic test results indicate that biscuits with 20% addition of *torbangun* leaves are the most suitable for 12-14-month old children with stunted condition because of its high nutritional contents. Interventions using *torbangun* as a local food source are needed to improve the nutritional status of children.

Keywords: *torbangun* leaf biscuit, linear programming, stunting

Effect of local specific complementary feeding recommendations on nutrient intakes, anemia, and stunting: Experiences from Sambas (West Kalimantan) and Malang (East Java), Indonesia

Umi Fahmida[1], Indriya Laras Pramesthi[1], Sari Kusuma[1], Dewi Shinta[1], Dwi Nastiti Iswarawanti[1], Dian Kusumadewi[2], Martinus Ginting[3], Imam Jaladri[3], Irwanda[4], Sugeng Iwan[5], Sutomo Rum TK[5], Elok Ekaning Nawangwulan[6], Giri Wurjandaru[7], Doddy Izwardy[7,8]. Research Report, 2019.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON), Pusat Kajian Gizi Regional Universitas Indonesia, Indonesia
[2]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Indonesia
[3]Poltekkes Kemenkes Pontianak, Pontianak, Indonesia
[4]District Health Office of Sambas, Sambas, Indonesia
[5]Poltekkes Kemenkes Malang, Malang, Indonesia
[6]District Health Office of Malang, Malang, Indonesia
[7]Directorate of Nutrition, Ministry of Health Indonesia, Jakarta, Indonesia
[8]Current affiliation: National Institute of Health Research and Development, Ministry of Health Indonesia, Jakarta

Background: Optimized local specific complementary feeding recommendations (CFRs) to improve problem nutrients specific to the area can increase nutrient intakes and expected nutritional outcomes particularly related to anemia incidence and growth.

Objective: The study aimed to evaluate the effect of promoting optimized CFRs on dietary diversity score (DDS), nutrient intake, nutrient density, anemia and growth outcomes, in two areas in Indonesia which represent the typical rural district and remote district.

Methods: A cluster-randomized, non-blinded evaluation among 12-16-month old children was conducted in Malang (East Java) and Sambas (West Kalimantan) representing the typical rural and remote districts in Indonesia. The CFRs, developed using linear programming approach in Optifood, were promoted through nutritionists at Public Health Center for six months through monthly sessions with caregivers in the CFR groups (CFR, n=233 Malang, 215 Sambas) while Non-CFR group (Non-CFR, n=237 Malang, 238 Sambas) mothers received regular CFR promotion via monthly growth monitoring session (Posyandu). DDS, nutrient intakes and nutrient density, hemoglobin, weight and length were assessed at baseline and endline.

Results: DDS was significantly higher at endline in CFR than in Non-CFR group, both in Malang and Sambas. While nutrient intakes were not significantly different between groups, median nutrient densities were significantly higher in CFR group than in Non-CFR group for folate and iron in Malang and for thiamin, calcium and iron in Sambas. In CFR group at endline, servings per week for animal:plant protein foods were 9:10 in Malang and 11:3 in Sambas. At the end of the intervention, anemia and stunting prevalence was significantly lower among children in CFR than in non-CFR group in Sambas, but not in Malang.

Conclusions: Optimized CFRs improved DDS and nutrient density. However, effect on anemia and stunting is affected more by ratio of animal and plant protein. Further investigation on phytate to iron, zinc, calcium molar ratios and their bioavailability is recommended.

Keywords: complementary feeding recommendation, cluster randomized trial, effectiveness, linear programming, local specific CFR, Optifood, Indonesia

Nutrient intake adequacy and food-based recommendation of school-aged children after 6 months intervention of fresh milk supplementation

Nia Novita Wirawan[1,2], Ilmia Fahmi[1], Kanthi Permaningtyas Tritisari[1], Dwi Yanti[2], Umi Fahmida[2]. Research Report, 2019.

[1]Department of Nutrition, Faculty of Medicine, Brawijaya University, Malang, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Tackling stunting requires many alternative approaches. Food-based approach is considered as having higher sustainability, but its ability to fulfill the nutrient gap needs to be proven.

Objective: The aim of this study was to increase nutrient intake, particularly identified problem nutrients (Vitamin B1, Calcium, Zinc, Folic acid) and essential amino acids, (EAA) of school-aged children 8-10 years old.

Methods: This study used randomized controlled trial within a six-month period. A total of 150 children was assigned into with 3 groups of intervention i.e. fresh milk supplementation (FMS), food-based recommendation (FBR) and control group.

Results: The results of the study revealed that sex and father's occupation differed between groups. No differences in nutrient intake between groups except intake of arginine (p-value <.043). Prevalence of inadequacy (PoI) varied across groups and ages. Among girls >9y, PoI for vitamin B1, Ca and Zn were lowest in FMS group (24.4%; 65% and 34.6%, respectively), whereas for boys >9y the lowest PoI for vitamin B1 was found in control (18.5%), Ca in FMS (77%), and Zn in FBR (40.9%). For 8-9y category, the lowest PoI for vitamin B1 and Zn was recorded among children in FBR (16.6% and 40.9%), whereas Ca among children in FMS (41.3%). The compliance of plant protein food source (PPF) was significantly different between 3 groups (50% for FBR, 48% for control and 24% for FMS), even though all protein food source intake compliance were below the recommendation (7.3 times/w for ANF and 5.5 times/w for PPF).

Conclusions: The sufficiency of protein intake may not necessarily result to the adequacy of amino acid intake.

Keywords: FBR, food-based recommendation, fresh milk supplementation, intake, school-aged children

Behavioral-based nutrition education intervention to increase fish consumption among school children using raised bed pool media: Protocol for a Randomized Control Trial

[1]Departement of Nutrition–Faculty of Public Health, Universitas Airlangga, Jl. Mulyorejo Kampus C, Surabaya
60115, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Objective: The aim of the study is to analyze the effectiveness of behavioral based nutrition education to increase fish consumption among school children using raised bed pool media.
Method: This is a randomized control trial involving 104 elementary school children to increase their fish consumption. Children in the intervention group will be given six-sessions nutrition education intervention for 3 months with additional raised bed pool media for education. General Linear Modeling Repeated Measure will be used to assess difference in the increase of fish consumption.
Discussion: Raised bed pool will serve as visual reminder to the children that magnify the effect of nutrition education. The strength of the study is that evidence on the effectiveness of nutrition education intervention using raised bed pool was scare relatively to the abundance body of knowledge related to raised bed garden. Raised bed pool is unique as it provides potential protein source from the fish in the RBP that are lacking from the raised bed garden. The intervention offers the advantage of potentially active ingredients to support behavioral change, such as improved knowledge, attitude, perceived behavioral control and intention.

Keywords: nutrition education, fish consumption, school children, raised bed pool.

Local food-based recommendation using Linear Programming approach for the development of an intervention model to prevent non-communicable diseases amongst oil and gas company workers: Phase I

Muchtaruddin Mansyur[1], Nuri Purwito Adi[2], Umi Fahmida[1], Indah Suci Widyahening[1], Ade Mutiara[3], Rani Herespetiagni[4], Gusnedi[5], Agung Waluyo[6], Aini Yusra[6], Nur Lailatuz Zahra[7]. Research Report, 2020.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Occupational Medicine Specialist Study Program, Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Indonesia
[3]Satuan Kerja Khusus Pelaksana Kegiatan Usaha Hulu Minyak dan Gas Bumi, Jakarta, Indonesia
[4]PT Pertamina Hulu Mahakam, Indonesia
[5]Department of Nutrition, Health Ministry Polytechnic of Padang, Padang, Indonesia
[6]Department of Medical-Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Depok, Indonesia
[7]Department of Nutrition, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia

Background: Given the high prevalence of risk factors for non-communicable diseases in oil and gas workers, health intervention, such as education, that targets behavior changes is needed.
Objective: This study aimed to develop a local food-based recommendation to be delivered as a nursing education module for monitoring the healthy behavior of oil and gas workers.
Methods: A cross sectional study was conducted in February-November 2020. A total of 35 workers consisting of 15 offshore workers and 20 onshore workers in East Kalimantan were recruited.
Results: The subjects were 39.1 years old on average, mostly from Java island and having a university education level (57%). Two-thirds (65%) of the subjects were obese with mean Body Mass Index (BMI) of 25.4 ± 3.2 kg/m^2 while 48% of them had central obesity with mean waist circumference of 89.4 ± 9.3 cm. In general, the workers mostly consumed red meat, processed meat, and fried foods and less consumption of vegetables. This led to high intake of natrium, saturated fat, and cholesterol intake, as well as low intake of dietary fibre, vitamins, and minerals. Regarding stress response, the most dominant stress responses in onshore workers was physical reaction stress while in offshore workers was anger and anxiety.
Conclusions: Based on the findings, two types of modules were developed, i.e., food based recommendation and physical activity, considering the stage of change aspect to decrease the risk of non-communicable diseases and to improve productivity.

Keywords: food-based recommendation, non-communicable diseases, oil and gas workers, physical activity

Local food-based diet optimization using Linear Programming approach to develop an intervention model to prevent non-communicable diseases amongst oil and gas company workers - Phase II

Muchtaruddin Mansyur[1], Nuri Purwito Adi[2], Umi Fahmida[1], Indah Suci Widyahening[1], Ade Mutiara[3], Rani Herespetiagni[4], Gusnedi[5], Agung Waluyo[6], Aini Yusra[6], Nur Lailatuz Zahra[7]. Research Report, 2022.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Occupational Medicine Specialist Study Program, Department of Community Medicine, Faculty of Medicine, Universitas Indonesia
[3]Satuan Kerja Khusus Pelaksana Kegiatan Usaha Hulu Minyak dan Gas Bumi, Jakarta, Indonesia
[4]PT Pertamina Hulu Mahakam, Indonesia
[5]Department of Nutrition, Health Ministry Polytechnic of Padang, Padang, Indonesia
[6]Department of Medical-Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Depok, Indonesia
[7]Department of Nutrition Science, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia

Background: Given the high prevalence of risk factors for non-communicable diseases in oil and gas workers, health intervention, such as education, that targets behavior changes is needed.
Objective: This study aimed to assess the effectiveness of monitoring nursing education modules in improving workers' eating habits and physical activity as well as in controlling blood pressure, Body Mass Index (BMI), lipid profiles (HDL, LDL, cholesterol, triglycerides) and blood sugar in oil and gas workers.
Methods: A quasi experimental study with pre and post control group design was conducted from February to November 2022 using modules that had been developed during phase 1. All workers from Pertamina Hulu Mahakam (PHM) and Donggi Senoro Liquefied Natural Gas (DSLNG) Luwuk Sulawesi Tengah were recruited and randomly assigned to the intervention (n=135) and control (n=61) group.
Results: 92.6% of participants were male and 54.3% had a university educational level. Age difference between the intervention and control group was not significant. The intervention group showed improvement on all compliance components and decreasing risk factors of noncommunicable diseases, such as systolic blood pressure, BMI, waist circumference, LDL cholesterol, triglyceride, and increasing of HDL cholesterol after 6 months of intervention.
Conclusions: The monitoring nursing model was effective in improving the compliance of dietary pattern and nutrient intake, physical activity, self-reflection, self-assessment, self-evaluation, and self-efficacy, as well as maintaining blood pressure, BMI, lipid profile, and blood glucose of the oil and gas workers.

Keywords: food-based recommendation, monitoring nursing model, non-communicable diseases, oil and gas workers

Effectiveness of an integrated nutrition rehabilitation on growth and development of children underfive post 2018 earthquake in East Lombok, Indonesia

Umi Fahmida[1,2], Ahmad Thohir Hidayat[1,2], Anak Agung Sagung Indriani Oka[1,2], Dini Suciyanti[1], Pathurrahman Pathurrahman[3], and Grace Wangge[1,2]. *International Journal of Environmental Research and Public Health* 2022; 19, 2814. doi: 10.3390/ijerph19052814.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Early Childhood Care, Nutrition and Education (ECCNE) Working Group, Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON), Jakarta 10430, Indonesia
[3]East Lombok District Health Office, East Lombok, Selong 83611

Background: In August 2018 Lombok Island in Indonesia was hit by a 7 Richter scale earthquake. This study aimed to assess the effectiveness of comprehensive nutrition disaster rehabilitation, based on the holistic integrated early child development concept, on the growth and development of children under five.
Methods: A community-based intervention was performed in the East Lombok district; four villages in two sub-districts were randomly allocated into intervention or control groups. Mothers of 6–49-month-old children in the intervention group ($n = 240$) attended parenting classes (twice weekly) and received shredded fish/liver/anchovy and optimized complementary feeding/food-based recommendations, developed using linear programming. Health staff from the public health center and teachers from early childhood education (ECE) centers delivered parenting sessions on health–nutrition and care–education. The control group ($n = 240$) received existing health services. Indicators measured at baseline and the end line point were weight, length/height, hemoglobin, feeding practices, psychosocial care (HOME) and maternal stress (SRQ). At the end line point, child development was assessed using BSID-III.
Results: At the end line point, maternal stress and child morbidity (cough) were lower and dietary diversity (+1) in 6–23-month-old children, and weight-for-age Z-score (+0.26) and social emotional score (+10 points) in ≥24-month-old children were higher in the intervention group.
Conclusions: The nutrition rehabilitation intervention delivered through ECE centers has a positive effect on the growth and development of children under five in post-disaster conditions.

NUTRIGENOMICS/ NUTRIGENETICS

Genetic variant of TMPRSS6 in SNP rs855791, iron intake, nutritional status, and psychosocial stimulation as determinant factor of cognitive function among school-aged children (7 – 10-year-old) in Kupang

Putu Amrytha Sanjiwani[1,2], Min Kyaw Htet[1], Umi Fahmida[1]. Research Report, 2017.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Nutrition Department, Kupang Health Polytechnic Ministry of Health, Nusa Tenggara Timur, Indonesia

Background: The spurt in frontal lobe development occurs between the age of 7 and 9 years and in the mid-teenage years. Poor nutrition during this period will have an impact on the developmental functioning of the frontal lobes throughout childhood. Cognitive function in this study, assessed with Intelligence Quotient (IQ) score was the interaction between internal (nature) and external (nurture) factors. *TMPRSS6* is one of the genes involved in iron metabolism and may have impact on cognition. Nutrition, health, and psychosocial stimulation are all important to improve quality of life.
Objective: The study aimed to assess the simultaneous association between TMPRSS6 gene, iron intake, nutritional status, and psychosocial stimulation with cognitive function among school age children (6 – 10 year) in East Nusa Tenggara.
Methods: This study used a cross-sectional approach involving 251 school age children (7 – 10 years old). The study was conducted in East Nusa Tenggara, one of the provinces in Indonesia with high prevalence of stunting. Cognitive function, hemoglobin level, nutritional status, and iron intake, psychosocial stimulation, and mutation in SNP rs855791 TMPRSS6 gene were measured. Cognitive function of the children was assessed using the Wechsler Intelligence Scale for Children (WISC).
Results: The median (25,75 percentile) of cognitive function was 85 (75,93), and most of the children fell under the average category (32.3%). The study showed that the proportion of variant allele among children is more than 0.6. Nutrition, as expressed by HAZ Z-score (p = 0.002), iron intake (p = 0.071, borderline significant) and psychosocial stimulation (p = 0,078, borderline significant) all contribute to cognitive function. There was no significant association found between variation in TMPRSS6 gene in SNP rs855791 and cognitive function (p = 0.929).
Conclusions: This study found that nurture or environmental factor shad the highest contribution to the cognitive function among school children aged 7 – 10 years.

Keywords: cognitive function, Intelligence Quotient (IQ), iron intake, stunting, TMPRSS6 gene

FTO, IRS-1, and VDR mRNA gene expression profile in obese and lean Polycystic Ovarian Syndrome (PCOS) patients and their associations with fatty acid metabolism

Andon Hestiantoro[1,2,3]. Research Report, 2018.

[1]Reproductive Immunoendocrinology Division, Department of Obstetrics and Gynecology, Faculty of Medicine Universitas Indonesia/ Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
[2]Human Reproductive, Infertility and Family Planning Cluster, Indonesian Medical Education and Research Institute (IMERI) – Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia
[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Polycystic ovary syndrome (PCOS) is a multifactorial endocrine-metabolic disorder, resulting from the interference of genomic variants and environmental factors through integrative biological mechanisms. Metabolic dysfunctions, such as insulin resistance, vitamin D deficiency, and dyslipidemia, have long been studied for its association with altered FTO, IRS-1, and VDR gene expression. However, the study of these gene profiles has not been conducted adequately on PCOS patients.

Objective: This study aimed to analyze the FTO, IRS-1, and VDR mRNA gene expression profile in obese and lean PCOS patients as well as its association with fatty acid metabolism.

Methods: A total of 160 reproductive age women were recruited consecutively according to the predefined inclusive and exclusive criteria. These subjects were classified into 4 groups (40 subjects per group): Lean Control (group A), Lean PCOS (group B), Obese Control (group C), and Obese PCOS (group D). Variables such as age, daily fat intake, BMI, testosterone level, FTO, IRS-1, and VDR mRNA gene expression were assessed and statistically analyzed using ANCOVA (Analysis of Covariance) method and General Linear Model (GLM).

Results: No significant differences were observed between groups in respect to FTO (2.83E-5 ± 1.12E-5 vs. 2.21E-5 ± 5.43E-5 vs. 1.91E-5 ± 3.61E-5 vs. 1.91E-5 ± 3.61E-5, $p = 0.902$) and VDR (1.91E-5 ± 3.61E-5 vs. 1.91E-5 ± 3.61E-5 vs. 9.75E-8 ± 1.63E-7 vs. 3.78E-7 ± 1.17E-6, $p = 0.449$) mRNA gene expression. However, both obese and lean PCOS subjects showed significantly higher IRS-1 mRNA gene expression compared to the control subjects (3.973E-8 ± 5.244E-8 vs. 3.915E-7 ± 1.094E-6 vs. 9.415E-8 ± 2.453E-7 ± 5.884E-7 ± 1.549E-6, $p = 0.021$). No significant correlations were observed between FTO, VDR, IRS-1 mRNA gene expression and daily fat intake.

Conclusions: Altered IRS-1 mRNA gene expression is strongly associated with obesity and metabolic dysregulation in PCOS patients.

Keywords: Fat Mass and Obesity Associated Protein (FTO), Insulin Receptor Substrate – 1 (IRS-1), Vitamin D Receptor (VDR), Polycystic Ovarian Syndrome (PCOS), obesity, fatty acid

Dietary and plasma Carboxymethyl Lysine and Tumor Necrosis factor-α as mediators of Body Mass Index and Waist Circumference among women in Indonesia

Patricia Budihartanti Liman[1,2,3], Rina Agustina[1,3,4], Ratna Djuwita[3,5], Jahja Umar[6], Inge Permadhi[1], Helmizar[7], Adi Hidayat[8], Edith J.M. Feskens[9] and Murdani Abdullah[3,10]. *Nutrients* 2019; 11(12), 3057. doi:10.3390/nu11123057.

[1]Department of Nutrition, Faculty of Medicine, Universitas Indonesia - Dr. Cipto Mangunkusumo General Hospital, Jakarta 10430, Indonesia
[2]Department of Nutrition, Faculty of Medicine, Universitas Trisakti, Jakarta 11440, Indonesia
[3]Human Nutrition Research Center, Indonesian Medical Education and Research Institute (IMERI), Faculty of Medicine, Universitas Indonesia, Jakarta 10430, Indonesia
[4]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[5]Department of Epidemiology, School of Public Health, Universitas Indonesia, Depok 16424, Indonesia
[6]Department of Psychology, Faculty of Psychology, Universitas Islam Negeri Syarif Hidayatullah, Jakarta 15419, Indonesia
[7]Department of Nutrition, Faculty of Public Health, Universitas Andalas, Padang 25163, Indonesia
[8]Department of Community Medicine, Faculty of Medicine, Universitas Trisakti, Jakarta 11440, Indonesia
[9]Division of Human Nutrition, and Health, Wageningen University, 6708 WE, Wageningen, The Netherlands
[10]Department of Internal Medicine, Faculty of Medicine, Universitas Indonesia-Dr. Cipto Mangunkusumo General Hospital, Jakarta 10430, Indonesia

Dietary and plasma carboxymethyl lysine (dCML, pCML) and plasma tumor necrosis factor-α (pTNF-α) may be associated with obesity in affluent society. However, evidence in women from low-middle income countries with predominantly traditional diets is lacking. We investigated the mediator effects of dCML, pCML and pTNF-α on body mass index (BMI) and waist circumference (WC) among Indonesian women. A cross-sectional study was conducted among 235 non-diabetic, non-anemic and non-smoking women aged 19–50 years from selected mountainous and coastal areas of West Sumatra and West Java. Dietary CML, pCML, pTNF-α were obtained from 2×24-h recalls, ultra-performance liquid chromatography-tandem mass spectrometry and enzyme-linked immunosorbent assay, respectively. Between-group differences were analyzed by the Chi-square or Mann-Whitney test and mediator effects by Structural Equation Modeling. The medians and interquartile-ranges of dCML, pCML and pTNF-α were 2.2 (1.7–3.0) mg/day, 22.2 (17.2–28.2) ng/mL and 0.68 (0.52–1.00) IU/mL, respectively, and significantly higher in the WC ≥ 80 cm than in the WC < 80 cm group, but not in BMI ≥ 25 kg/m2 compared to BMI < 25 kg/m2 group. Plasma CML and pTNF-α were positively and directly related to WC (β = 0.21 [95% CI: 0.09, 0.33] and β = 0.23 [95% CI: 0.11, 0.35], respectively). Dietary CML that correlated with dry-heat processing and cereals as the highest contributions was positively related to WC (β = 0.33 [95% CI: 0.12, 0.83]). Ethnicity, level of education, intake of fat, and intake of energy contributed to dCML, pCML and pTNF-α, and subsequently affected WC, while only ethnicity contributed to BMI through dCML, pCML and pTNF-α (β = 0.07 [95% CI: 0.01, 0.14]). A positive direct effect of dCML on pCML and of pCML and pTNF-α on WC was seen among Indonesian women. Dietary CML seems to have several paths that indirectly influence the increases in WC if compared to BMI. Thus, intake of CML-rich foods should be reduced, or the foods consumed in moderate amounts to avoid the risk of central obesity in this population.

Keywords: body mass index, waist circumference, carboxymethyl lysine, central obesity, Indonesian women, tumor necrosis factor-α

Growth, dietary intake, and Vitamin D Receptor (VDR) promoter genotype in Indonesian school-age children

Tiffany Cornelia Angelin[1,2], Saptawati Bardosono[2], Dewi Shinta[1] and Umi Fahmida[1]. *Nutrients* 2021; 13, 2904. doi: 10.3390/nu13092904.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON)-Pusat Kajian Gizi Regional, Universitas Indonesia, Jakarta 10430, Indonesia; [2]Department of Nutrition, Faculty of Medicine, Universitas Indonesia—Dr. Cipto Mangunkusumo General Hospital, Jakarta 10430, Indonesia

Nutrition has been known as a predominant factor associated with stunting. However, some studies have discovered a genetic contribution in calcium absorption that will affect growth, known as the VDR gene. The aim of this study was to assess the association between VDR gene polymorphism and dietary intake towards height-for-age z-score (HAZ) of elementary school children in Malang District, East Java. This study analyzed the baseline of a randomized trial in East Java, Indonesia. School children aged 8–10 years old ($n = 142$) were included in this study. Energy, protein, calcium, and vitamin D intakes were obtained using 4-day 24-h dietary recalls. Two SNPs located in the promoter region of VDR gene were selected (rs11568820 and rs4516035) and analyzed using Real-Time PCR. The result showed a significant correlation between energy and protein intake with HAZ of the children ($p = 0.030$ and $p = 0.016$, respectively). The association between VDR gene and HAZ was not found ($p > 0.05$). Adjusted by other factors, protein intake was significantly correlated with HAZ ($\beta = 0.034$, 95% CI 0.015–0.052, $p < 0.001$, adj. $R2 = 0.089$). The children in our study had a favorable VDR gene genotype, however the effect of VDR gene promoter activity might not be revealed due to very low vitamin D and calcium intake to stimulate intestinal calcium absorption which in turn affects HAZ.

Keywords: stunting; children; height-for-age z-score (HAZ); dietary intake; VDR gene; Indonesia; vitamin D; calcium

GUT HEALTH

Dietary quality of predominantly traditional diets is associated with blood glucose profiles, but not with total fecal Bifidobacterium in Indonesian women

Shiela Stefani[1], Sanny Ngatidjan[1], Monica Paotiana[1], Kurnia A. Sitompul[1], Murdani Abdullah[2,3], Dyah P. Sulistianingsih[2], Anuraj H. Shankar[4], Rina Agustina[1,3,5]. *PLoS One* 2018; 13(12). doi: 10.1371/journal.pone.0208815.

[1]Department of Nutrition, Faculty of Medicine, Universitas Indonesia—Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
[2]Department of Internal Medicine, Faculty of Medicine Universitas Indonesia—Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
[3]Human Nutrition Research Center, Indonesian Medical Education and Research Institute, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia,
[4]Department of Nutrition, Harvard T.H. Chan School of Public Health, Harvard University, Boston, MA, United States of America
[5]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: A high quality modern diet is associated with reduced risk of metabolic disease and diabetes. However, it remains unclear whether the quality of predominantly traditional ethnic diets is associated with such conditions. Moreover, the relationship between dietary quality and microbiota, a potential mediator of metabolic disease, has not been studied. **Objective:** We investigated the relationship of dietary quality of traditional ethnic diets in Indonesia with fasting blood glucose (FBG), HbA1c, and the number of fecal Bifidobacterium. **Design:** A cross-sectional study was conducted in selected districts with predominantly animal- or plant-based traditional diets of West Sumatera and West Java provinces, respectively. A total of 240 apparently healthy women aged 19–50 years were randomly selected from 360 women screened by a cluster sampling design. Dietary quality was assessed by 2-day repeated 24-hour food recall and scored using the Healthy Eating Index (HEI) 2010. FBG was quantified with the enzymatic colorimetric method, and HbA1c by using hexokinase and high-performance liquid chromatography, and total fecal Bifidobacterium by real-time quantitative polymerase chain reaction.
Results: The HEI scores of 99% of women were <51, indicating a low-quality diet. In adjusted multivariate regression, HEI was inversely associated with FBG (ß = -0.403; 95% CI = -0.789 to -0.016; p = 0.041) and HbA1c (ß = -0.018; 95% CI = -0.036 to 0.000; p = 0.048) but was not significantly associated with total levels of Bifidobacterium (ß = -0.007, p = 0.275). Bifidobacterium count was not significantly associated with either FBG or HbA1c levels. **Conclusion:** Low dietary quality is clearly associated with risk of increased markers of blood glucose. However, any mediating role of Bifidobacterium between dietary quality and glucose outcomes was not apparent. Innovative interventions for healthy eating should be implemented to increase dietary quality of populations transitioning from predominantly traditional to modern diets, to reduce the risk of diabetes, especially in women.

Keywords: blood glucose profiles, Bifidobacterium, dietary quality, traditional diets

DISEASE PREVENTION

Increasing awareness on the dangers of cigarettes and drugs and learning achievement in the Indonesian language subject on the topic of observation report text through the 'gotong royong' learning method for grade VIII C students of SMP Negeri 3 Kertek

Ahmat Sodiqin[1,2], Mouhamad Bigwanto[3]. Research Report, 2020.

[1]SMP Negeri 3 Kertek, Central Java, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Universitas Muhammadiyah Prof. Dr. Hamka, Jakarta, Indonesia

Background: This classroom action research is based on the low awareness of students about the dangers of smoking and drugs and the low achievement of learning Indonesian.

Objective: This study aimed to increase understanding of the dangers of smoking and drugs and to improve learning achievement.

Methods: The research was conducted in class VIIC SMP Negeri 3 Kertek Wonosobo Regency from September to October 2020. This study used the mutual cooperation learning method in two cycles. The study's success was determined if students' understanding of the dangers of smoking and drugs and learning achievement reaches a score of 65, and 65% of students meet the curriculum targets.

Results: The results of the first cycle research showed an increase in understanding of the dangers of smoking and drugs as well as learning achievement but still far from the curriculum target. The average post-test 1 score was only 45. The results of the actions in cycle 2 did not show any improvement. The average posttest 2 score is only 40. However, there were good learning activities. During the 'mading' assignment, 18 out of 32 students submitted their work at the end of the lesson. Students were also involved in the search for material about the dangers of smoking and drugs. The results of this study cannot be separated from the factors of distance learning conditions that were carried out during the Covid-19 pandemic.

Conclusions: The study could not detect desired effect on improve understanding of the dangers of smoking and drugs. It appears that distance learning methods such as the mutual cooperation method have not been effectively implemented during the COVID-19 pandemic. To overcome the limitations posed by the pandemic, it is recommended to build awareness of independent learning among students, so that learning goals can be achieved effectively despite the challenges.

Keywords: learning achievement, mutual cooperation method, the dangers of smoking/drugs

Early cardiovascular-metabolic disturbances in first-degree relatives of Type 2 Diabetes Mellitus

Dyah Purnamasari Sulistianingsih[1,2], Nissha Audina Fitri[1], Nindhita Priscillia Muharrani[2], Akterono Dwi Budianto[1], Christian Tricaesario[1]. Research Report, 2020.

[1]Department of Internist, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Type 2 Diabetes Mellitus (T2DM) is characterized by dysregulation of carbohydrate, lipid, and protein metabolism due to insulin secretion and sensitivity disorders. In Indonesia, the prevalence of T2DM reached 10.9% in individuals aged over 15, according to the 2018 Basic Health Research (RISKESDAS). Individuals with T2DM face a 2 to 4 times higher risk of recurrent atherothrombosis and vascular complications compared to non-diabetic individuals. The risk of developing T2DM is substantially higher in individuals with a family history of the disease, especially if both parents are affected. Early beta-cell dysfunction and insulin resistance in first-degree relatives (FDR) of T2DM patients indicate the need for comprehensive investigations into the cardiovascular-metabolic risk profile.

Objective: The study aimed to assess the cardiovascular and metabolic risk in first-degree relatives of T2DM patients (FDR) compared to the normal population. Specific objectives included analyzing inflammatory and anti-inflammatory cytokine profiles, endothelial dysfunction markers, serum uric acid levels, Non-Alcoholic Fatty Liver Disease (NAFLD) incidence, gut microbiota profile, and functional capacity.

Methods: As of December 10, 2020, data from 36 subjects (23 FDR and 13 NFRD) out of the planned 50 have been collected. Preliminary findings focus on dietary assessment, examining the macronutrient intake of male respondents before and after consuming high-fat milk for a 5-day follow-up. Energy, protein, fat, and carbohydrate intake were evaluated using 24-hour food recalls.

Results: While the study is ongoing, initial comparisons reveal varying macronutrient trends between FDR and NFRD. Food recall data collection faced challenges due to the need for virtual interviews, with some respondents lacking the required technology or facing time constraints. Additionally, suboptimal network signals added to the difficulties.

Conclusions: Future research steps include educating respondents on remote data collection procedures, enhancing communication among research team members, and continuing the study until completion. This report provides insights into dietary patterns among respondents, emphasizing the importance of pre-study education for seamless remote data collection. Coordination and communication are crucial to prevent misunderstandings. The study will proceed until all planned subjects complete the research, allowing for a comprehensive analysis of the cardiovascular-metabolic risk profile in FDR of T2DM patients compared to the normal population.

Keywords: cardiovascular-metabolic disturbances, comprehensive investigation, first-degree relatives, Type 2 Diabetes Mellitus

The implementation of AR-STEM to improve student's literacy and lung health awareness

Sari Yuliantini[1,2], Deni Arif Nugroho[1], Mouhammad Bigwanto[3]. Research Report, 2021.

[1]SMP Negeri SATAP Waringin, Kab. Pulau Morotai, Maluku Utara, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Universitas Muhammadiyah Prof. Dr. Hamka, Jakarta, Indonesia

Background: Student's scientific literacy in SMPN SATAP Waringin is low. The implementation of Augmented Reality technology and STEM education (AR-STEM) has been conducted to improve student's scientific literacy and lung health consciousness.

Objective: This study aimed to improve student's scientific literacy and lung health consciousness from the effect of smoking, vaping and the impact of Covid-19 infection.

Methods: This study used the Classroom Action Research (CAR) method through two cycles in which per cycle included planning, implementation, observation, and reflection framework of Kemmis and Taggart. The subjects of this study were 24 grade 8 students of SMPN SATAP Waringin in 2021/2022. Data collection was carried out by observing and documenting students' health awareness and science literation. The data analysis was conducted using a descriptive quantitative approach.

Results: The average of student's science literacy ability of the students in the pretest, 1st cycle posttest and 2nd cycle posttest was 40, 59 and 73, respectively. The number of students who get success in test was increase from 0 at pretest, 8 students in 1st cycle and 20 students in 2nd cycle. And student's lung health consciousness categories were 96% moderate and 4% high before the implementation, 58% moderate and 42% high in 1st cycle, 12% moderate, 67% high and 21% very high in 2nd cycle.

Conclusions: The result of this study indicate that the implementation of AR-STEM improves student's scientific literacy skills and lung health consciousness in SMPN SATAP Waringin.

Keywords: augmented reality, AR-STEM, lung health consciousness, science literacy

Improving herbal food processing learning outcomes through augmented reality-based STEAM learning

Winda Widia Agustina[1,2], Drupadi Dillon[2]. Research Report, 2021.

[1]SMKN 5 Pangalengan, Kab. Bandung, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The prevalence of IDA (Iron Deficiency Anemia) in West Java reached 51.7%. One of the causes of IDA, especially in adolescents, is the lack of nutrition intake during the growth spurt stage. During the online learning of the 2020/2021 academic year in SMKN 5 Pangalengan, 76% of students did not achieve a passing grade with an average score of 65. Therefore, iron biscuit processing skills need to be delivered through AR (Augmented Reality) based on STEAM (Science, Technology, Engineering, and Mathematics).

Objective: The objective of this study was to determine the learning outcomes of students in processing iron biscuits on cognitive, affective, and psychomotor aspects through Augmented Reality-based STEAM.

Methods: The research method used is classroom action research. Research data obtained through 3 cycles, namely tests, observations and documentation to class XI students of the Agribusiness Study Program Agricultural Product Processing. The number of students includes 33 people consisting of 13 males and 20 females.

Results: The results showed that cognitive learning outcomes experienced a significant increase, namely the N-gain was obtained as much as 0.6. The overall average pretest score was 66 in the "Medium" category, and the post-test score was 86 in the "High" category. No students reached affective learning outcomes with the "Very Good" category in cycle 1, but this increased to 30% in cycle 2, and 36% in cycle 3. Psychomotor learning outcomes indicated that no students were in the "Very Skilled" category in cycle 1, but it increased 6% in cycle 2, and 18% in cycle 3.

Conclusions: This study shows the application of AR-based STEAM was able to improve student learning outcomes, especially in the skills of processing anti-anemia iron biscuit products.

Keywords: augmented reality, herbal food, learning outcomes, STEAM

Augmented reality-based Food Card (FCAR) media development in enhancing parents' understanding on nutrition

[1]TPA Miftahul Jannah Su'ud Muhammad
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Children at an early age have various problems in consuming nutritious food, in addition to being intrinsically arising due to a lack of interest in children as well as external factors from parents' understanding of nutrition which still needs to be improved. Therefore, it is necessary to have the right media to increase children's interest and parents' understanding of nutrition so that they can fulfill children's nutrition optimally. This research method is Research and Development with ADDIE development model. The research subjects were 28 parents and 28 kindergarten students at Miftahul Jannah Suud Muhammad TPA, Bandung Regency. The data collection technique that the researcher carried out was quantitative by using a parental understanding test about nutrition, questionnaire sheets, observations and field notes. The results showed that after using Augmented Reality (FCAR)-based Food Card media, parents' understanding of nutrition and children's interest in consuming nutritious food could increase.

Keywords: FCAR, understanding of nutrition, children's interest

RESEARCH AREA 3

Nutrition, Health, and Productivity Nexus

SOCIAL DETERMINANTS OF NUTRITION, HEALTH AND PRODUCTIVITY IN WORK AND SCHOOL SETTINGS, INCLUDING IDENTIFICATION OF GAPS AND THE RELATIONSHIP AMONG DETERMINANTS

Sleep duration and physical activity are associated with central obesity in adolescents of senior high schools: A cross-sectional study

Lilik Sofiatus Solikhah[1], Dono Indarto[2,3,5], Adi Magna P. Nuhriwangsa[2,4], Grace Wangge[5]. Research Report, 2018.

[1]Postgraduate Student of Nutrition Sciences, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Postgraduate Program of Nutrition Sciences, Universitas Sebelas Maret, Surakarta, Indonesia
[3]Departement of Physiology, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia
[4]Study Program of Animal Science, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta, Indonesia
[5]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Central obesity is one of the main risk factors for non-communicable diseases. Previous studies have indicated that sleep duration and physical activity influence central obesity.
Objective: The aim of this study was to investigate the correlation between sleep duration and physical activity and central obesity among adolescents.
Methods: This cross-sectional study involved 286 healthy adolescents (senior high school students) in Yogyakarta using stratified random sampling. They were non-athletes and had $\geq$-2 SD BMI-for-age. Physical activity was analysed with IPAQ-SF and sleep duration with PSQI. Central obesity was measured by waist circumference and Waist Hight Ratio (WHtR).
Results: Prevalence of central obesity among adolescents in Yogyakarta was 24.5%. Subjects who had short sleep duration and low physical activity were 21% and 33.9%, respectively. Sleep duration and physical activity were negatively associated with central obesity r= -0.176; p=0.003 and r= -0.264; p<0.001, respectively.
Conclusions: Sleep duration and physical activity were negatively correlated with central obesity in adolescents in Yogyakarta but the correlation was weak. Further study is required to identify other factors that contribute to central obesity.

Keywords: adolescent, central obesity, physical activity, sleep duration

Research Area 3 | Social Determinants of Nutrition, Health and Productivity in Work and School Settings, Including Identification of Gaps and the Relationship among Determinants

Book development of model of parenting education on play therapy stimulation for growth and development of young children

Atik Badi'ah[1,2], Ni Ketut Mendri[1], Bondan Palestin[1], Titi Sulastri[3], Iskari Ngadiardi[4]. Research Report, 2020.

[1]Nursing Study Program, Polytechnic of Health Ministry of Health Yogyakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Polytechnic of Health Ministry of Health Jakarta III, DKI Jakarta, Indonesia
[4]Polytechnic of Health Ministry of Health Jakarta II, DKI Jakarta, Indonesia

Background: During the toddler stage, the growth and development of children occur very quickly. Knowledge about this and stimulation of play therapy is crucial for a mother to have. Family environment is said to be important because most of the children's life and the early education they receive is in the family. Parenting education for parents who have young children enrolled at PAUD (Early Childhood Education Centre) can be facilitated through assistance given to parents in giving stimulation of play therapy and how to educate the children.

Objectives: The study aimed to develop a book on model of parenting education and stimulation of play therapy in early childhood growth and development.

Methods: This study was a research and development type. The sampling was done by purposive sampling with the criteria of pairs of parents and their young childhood attending the 11 Early Childhood Education (PAUD) schools with daycare in Yogyakarta. The study used qualitative data analysis. The steps in the book development involved the following: 1) Research and information collection, 2) Planning, 3) Develop preliminary form of product, 4) Preliminary field testing, 5) Main product revision, 6) Main field testing, 7) Operational product revision, 8) Operational field testing, 9) Final product revision, and 10) Dissemination and implementation.

Results: The making of the book "Model of Parenting Education (Stimulation of Playing Therapy for Early Childhood Growth and Development)" was reviewed by 2 expert examiners and tested on 22 PAUD teachers from 11 PAUD and 11 parents of PAUD children in Yogyakarta. The book content consisted of 1) child's growth and development milestones, 2) various plays such as peek-a-boo, hand clapping, etc that can enhance stimulation for child's growth and development, 3) monitoring of child's growth and development. However, due to COVID-19 pandemic, the final stages of publication, including printing and obtaining an ISBN, have not yet been completed.

Conclusions: The model of parenting education and stimulation of play therapy in early childhood growth and development can be tested and applied to early childhood in PAUD.

Keywords: early childhood development, growth, parenting education, stimulation of play therapy

Research Area 3 | Social Determinants of Nutrition, Health and Productivity in Work and School Settings, Including Identification of Gaps and the Relationship among Determinants

64

A multi-level qualitative analysis of sensitive intervention stunting program: from regulation to action

Tri Bayu Purnama[1,2], Nurhayati[1], Syafran Arrazy[1], Grace Wangge[2]. Research Report, 2020.

[1]UIN Sumatera Utara, Medan, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The multisectoral nature of stunting with nutrition-sensitive interventions is still a public health problem. This problem is due to complex factors that affect stunting programs across sectors to accelerate the stunting program for non-nutrition programs.

Objective: This study aimed to identify challenges in implementing nutrition-sensitive interventions on stunting from regulation to implementation of activities.

Methods: A qualitative multilevel approach was used for this research by conducting in-depth interviews, observation, and document review on the supply and demand aspects of the nutrition-sensitive stunting intervention program. Representatives from the Health Office as the first level of program regulation, the Community Health Center as the implementer of the activity, and the community as the target of the activity were interviewed about the impact of regional regulatory innovations on stunting prevalence.

Results: This study revealed that the families of stunting infants were not familiar with activities in the nutrition-sensitive intervention package and were still focused on specific intervention packages. Coordination and collaboration, both internal level and between levels, were not being maximally implemented. The development of innovations in regional regulations had no impact on public health indicators both before and after the design had been implemented.

Conclusions: This research concludes that developing indicators to formulate innovations from the stunting program is essential for formulating practical activities.

Keywords: collaboration-coordination, multilevel analysis, sensitive-intervention, stunting

65

Research Area 3 | Social Determinants of Nutrition, Health and Productivity in Work and School Settings, Including Identification of Gaps and the Relationship among Determinants

Action Research: Optimizing early childhood development through Early Childhood Care, Nutrition, and Education (ECCNE) program (Phase I)

Umi Fahmida, Grace Wangge, Dewi Shinta, Indriya Laras Pramesthi. Research Report, 2020.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: COVID-19 pandemic restrictions forced schools and early childhood education (ECE) centers to be closed and rendered children to study from home. However, tools and guidelines on distance learning for teachers and parents were not available, especially at the ECE level.

Objective: This study aimed to get an overview of the effective distance learning mode for ECE teachers, parents and students.

Methods: A cross sectional, nationwide, online survey using Lime Survey was administered to 1,514 ECE teachers. The invitation to participate in the online survey was shared via Ministry of Education and Culture, social media and professional organization of ECE Teachers. Participants completed the questionnaire in November 2020.

Results: A total of 685 ECE teachers completed the questionnaire. Of those, 83.5 % were from Java island and 77.8% had a bachelor degree level. More than 95% of ECE teachers had difficulties in implementing distance learning, considering only about 44% of ECE centers had internet network facilities and not all children had access to hardware for distance learning. Short message application, including WhatsApp and printed media became the most preferred learning modes by teachers. Difficulties in motivating the children to learn and lack of parental support became another challenge in implementing distance learning.

Conclusions: Distance learning mode using a combination method of short messages (including WhatsApp) and printed media is recommended to be developed to support ECCNE program.

Keyword: COVID-19, early childhood education (ECE) centers, distance learning, teachers, parents

Research Area 3 | Social Determinants of Nutrition, Health and Productivity in Work and School Settings, Including Identification of Gaps and the Relationship among Determinants

66

Baseline study: Process Evaluation of Nutrition Goes to School (NGTS) Program Implementation in Seven Sites in Indonesia

Luh Ade Wiradnyani, Aisyah Nurcita Dewi, A. A. Indriani Oka. Research Report, 2021.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Since 2016, Nutrition Goes to School (NGTS) program is being implemented in several sites in Indonesia with five key components i.e., 1) nutrition education, 2) healthy school canteen strengthening, 3) promotion of physical activity, 4) promotion of healthy behaviors, and 5) utilization of school garden for nutrition literacy.

Objective: This study aimed to document the implementation process of the NGTS program at the school level with specific focus on the baseline knowledge, attitude, and practice (KAP) of the students.

Methods: Data collection was done from December 2020 to February 2021. Each of the NGTS site leaders handled the students' online survey per site. Teachers from each school were requested to randomly select 30 students to fill in the online questionnaire comprising socio-demographic characteristics and KAP data. The study involved 2,192 students from 51 NGTS partner-schools of various levels in Bogor, Cimahi, Cirebon, Jakarta, Klaten, Malang, and Sambas.

Results: Results of the students' online survey and feedback on the NGTS program implementation were discussed with teachers through online focus group discussions in March 2021. Key findings among primary school students included misconceptions about balanced nutrition, lack of vegetable and fruit consumption, low physical activity, and lack of hydration. Among secondary school students, a similar misconception about balanced nutrition was also found. In addition, the understanding of breakfast and packaged food was also lacking. Low coverage of iron tablet consumption among adolescent girls was also found.

Conclusions: Teachers addressed some of the challenges of their students related to the NGTS program implementation which was partly complicated by the COVID-19 pandemic and proposed some innovations to be implemented in the future.

Keywords: baseline study, NGTS, implementation process, KAP, school-based

Research Area 3 | Social Determinants of Nutrition, Health and Productivity in Work and School Settings, Including Identification of Gaps and the Relationship among Determinants

DEVELOPMENT OF INTERVENTION STRATEGY TO IMPROVE HEALTH AND PRODUCTIVITY, FOCUSING ON FOOD-BASED RECOMMENDATION AND BEHAVIOR CHANGE COMMUNICATION IN SCHOOL AND WORK-PLACE SETTINGS

Assessment on process and stage of behavioral change readiness level for weight management based on Trans-Theoretical Model in obese early adolescents in Jakarta, Indonesia

Aria Kekalih[1,2], Dewi Friska[1], Evriyani Djuwita[3], Dian Kusumadewi[1], Fergie Runtu[4], Ficky Huang[4]. Research Report, 2018.

[1]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Indonesia
[2] Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Faculty of Psychology, Universitas Indonesia, Indonesia
[4]Undergraduate Program of Medical Doctor, Faculty of Medicine, Universitas Indonesia, Indonesia

Background: Recent studies have shown an alarming increase in obesity rates among adolescents in Indonesia. According to the 2013 Basic Health Research, the incidence of obesity among adolescents has increased 5 times in just 5 years. This trend has the potential to cause serious problems such as decreased productivity and physical ability, as well as an increased risk of degenerative diseases in the long term. Obesity can also have a negative impact on psychological wellbeing, leading to low self-esteem, depression, and social isolation. It is important to introduce intervention programs from an early age to promote healthy habits and prevent obesity in adolescents.

Objective: The study aimed to validate the Indonesian version of the Processes of Change questionnaire in weight management (P-Weight).

Methods: Indonesian version of the questionnaire was validated using 10 steps of transcultural adaptation, validity and reliability analysis with Cronbach Alpha. Participants were 167 Indonesian adolescents, with the composition of 80 high school and 87 college students. The mean age of all subjects was 17.8 (SD = 2.2) years, and 55.7% were male. BMI ranged from 22.41 to 42.27 (mean = 27.9, SD = 3.9) kg/m 2. Participants completed both the stages and processes questionnaires in weight management (S-Weight and P-Weight). A refined version of the P-Weight consisting of 32 items was obtained based on the item analysis.

Results: The 10 steps of transcultural adaptation were done with the Cronbach Alpha range between 0.605 – 0.830 for internal reliability of each 4 groups based on UK categorization compared to Cronbach Alpha range between 0.705 – 0.891 based on Indonesia categorization and 0.913 for the whole questionnaire. There was a significant correlation between WCE (Weight Consequence Evaluation) component and body mass index in all subjects, high school, and college students ($p<0.001$ with r score 0.363, 0.361 and 0.390 respectively), while a significant correlation between EMR (Emotional Readiness) component and body mass index ($p<0.001$ with r score 0.378) was only found among college students.

Conclusions: The adequate psychometric properties of the P-Weight Indonesian categorization suggest that it is a potential tool to be used in tailored weight management interventions in adolescent.

Keywords: adolescent, obese, P-weight, S-weight, Trans-Theoretical Model

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

Food-Based Recommendation (FBR) interventions and its effectiveness on increasing hemoglobin (Hb) levels in shift women workers in Factory X, a textile factory in West Java

Nuri Purwito Adi[1,2,3], Dian Kusumadewi[1], Shanti Puji Lestari[2], Umi Fahmida[3]. Research Report, 2018.

[1]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Indonesia
[2]Occupational Medicine Specialist Education Program, Faculty of Medicine, Universitas Indonesia, Indonesia
[3]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Factory X, a textile factory where most of its employees are women, practices a shift work operation among its workers. Changes in diet, as well as changes in the metabolic profile of shift workers, increase the risk of nutritional anemia. To meet the adequate nutrition requirement of workers, a nutrient based recommendation is necessary. The Linear Programming (LP) approach formulates Food Based Recommendation (FBR) to meet nutrient requirements given the local food availability, food patterns, food portions, and cost based on problem nutrients in certain populations. LP approach has never been applied in a working population. A set of FBR is valuable for nutrition promotion, as well as nutrition program planning and advocacy.
Objective: To formulate a set of FBR and assess its effectiveness in increasing Hb levels.
Methods: The first phase of this research was a cross-sectional study to develop an optimal FBR for 100 female shift workers. Dietary data were obtained from 1-day weighed diet record combined with repeated 24-hour recall and 5-day food intake tally. LP analysis was performed using Optifood software. Hb levels were examined using HemoCue. The second phase was an intervention study which was carried out for 16 weeks.
Results: Iron and calcium were the problem nutrients among the female workers. FBR produced included weekly messages and factory food menu to fill the existing nutrient gaps. With FBR intervention, 63.3% of the respondents experienced an increase in Hb levels with an increase Hb mean of 0.6 mg/dL (p = 0,000). Multivariate analysis showed the FBR intervention had a significant relationship to the increase in Hb levels (p = 0.001; aOR 4.324; 95% CI 1.778-10.514).
Conclusions: FBR intervention was effective in increasing Hb levels among female workers.

Keywords: food formula, hemoglobin, linear programming, manufacture, women workers

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

70

Development of early childhood educational tools and activities for working mothers

Ali Nina Liche Seniati[1,2], Ermanda Saskia Siregar[1], Natasya Clarissa[1], An Nissa Nur Citra Dien[1], Judhiastuty Februhartanty[2]. Research Report, 2019.

[1]Faculty of Psychology, Universitas Indonesia, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Along with the rise of living costs around the world and the shift in the traditional views of gender roles, comes a need for mothers to enter the workforce. In Indonesia, many middle- and high-income urban families opt to entrust childcare to hired caregivers, while low-income families often enlist the help of relatives and close neighbors to mind their children while the mothers are at work. As both hired caregivers and relatives of low-income families tend to come from lower socioeconomic backgrounds, many are ill-equipped to provide children with the well-balanced diet and adequate cognitive stimulation necessary for children's optimal development.

Objective: The current study attempted to develop an instructional module that offers information and suggestions on age-appropriate cognitive stimulation and nutrition in early childhood.

Methods: Data from interviews with working mothers were used to create an instructional module comprised of 1) an instruction book containing information and suggestions on cognitive stimulation and healthy meal options in early childhood, and 2) an accompanying educational play kit containing various cognitively stimulating toys and activities. FGD and try-out were undertaken to assess the appropriateness and usability of the module. Participants' feedback was later used to revise the module, followed by another try-out.

Results: The developed module was considered appropriate and useful for implementation by working mothers and hired caregivers, and may be suitable for application in early childhood learning centers, daycares, and preschools.

Conclusions: Future studies should ensure applicability of the module across all levels of society.

Keywords: early childhood, early childhood care, early childhood cognitive stimulation, early childhood nutrition, educational tools and activities

Early development process of drama and storytelling scripts as media for nutrition education on balanced diets among elementary school children

Suci Destriatania[1,2], Fenny Etrawati[3], Judhiastuty Februhartanty[2]. *Malaysian Journal of Nutrition* 2019; 25 (Supplement): 123-137.

[1]Nutrition Department, Public Health Faculty, Sriwijaya University, South Sumatera, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Health Promotion Department, Public Health Faculty, Sriwijaya University, South Sumatera, Indonesia

Introduction: The Indonesian Guide on Balanced Nutrition endorsed in 2014 needs to be more widely publicised. One way is to use fun learning methods such as drama and storytelling, especially in schools.

Objective: This study aimed to develop drama and storytelling scripts for educating students on balanced nutrition.

Methods: Sixteen focus group discussions (FDGs) with thematic activities were conducted among 96 mother-child pairs in four elementary schools. The mothers' age ranged from 30-50 years and the children 9-13 years. In-depth interviews were conducted with eight teachers (two from each participating school). The FGDs and interviews were designed to elicit information on knowledge and implementation of balanced nutrition guidelines at three levels, namely: intrapersonal (students), family (mothers) and environment (school teachers). Content analysis was used to identify relevant themes, which were developed into scripts for drama and storytelling.

Results: The students, mothers, and school teachers were not familiar with the general guidelines for balanced nutrition. The lack of variety of the food provided at home was reported. The draft scripts were discussed and modified for accuracy of the nutrition messages that were applied in character dialogues, song lyrics, dramas and storytelling.

Conclusions: Storytelling and drama are effective for use by teachers and mothers for delivering nutrition messages in schools and at home.

Keywords: drama, storytelling, nutrition education, elementary school students, Indonesia

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

72

The effect of healthy food promotion through lunch boxes on the knowledge, attitudes, and habits of elementary school students

Erhamwilda Erhamwilda[1,2], Nurul Afrianti[1], Arif Hakim[1], Imam Pamungkas[1], Putri Nur Tsani[1], Drupadi Dillon[2]. Research Report, 2020.

[1]Universitas Islam Bandung, Bandung, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Bandung City government implemented Beas Beureum Program (Brown Rice Program) or BRP to prevent stunting.

Objective: This research investigated the implementation of this stunting prevention program to elementary school students.

Methods: This research employed a mixed-method design combining quantitative and qualitative approaches. Quantitative data was collected through surveys and qualitative data were collected through in-depth interviews with leaders in the education and culture offices, health department, public health centre staff, elementary school principals, teachers, students, parents, and canteen staff.

Results: The research findings revealed that the stunting prevention program, BRP, was an innovative nutrition campaign. The BRP was implemented as an alternative for nutrition education to habituate elementary school students to consume nutritious and well-balanced food. The planning and the organizing phases had been completed, but the implementation and the monitoring process should be improved. The study found that there were changes concerning lunch boxes and snacking habits found in the elementary schools that consistently implement the program.

Conclusions: The program could change students snacking habits and encourage them to bring healthy homemade lunch boxes.

Keywords: elementary school student, healthy lunch box, KAP, nutrition campaign

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

Improving mathematics literature of nutritional context of SMA students using flipped classroom during the COVID-19 pandemic

[1]SMAN 1 Fakfak, Papua Barat, Indonesia
[1]FK Universitas Udayana, Bali, Indonesia

The purpose of this study was to examine and describe the increase in knowledge/literacy and nutritional numeracy of students in learning mathematics during the Covid-19 pandemic. This study used the flipped classroom method. This research is a classroom action. The research subjects who were subjected to action were students of XI IPS 4 in SMA Negeri 1 Fakfak Papua Barat in the corresponding class of 36 students. The research focus was the knowledge and nutritional numeracy of students. The data collection was done through observation, documentation, field notes, and tests. The data were analyzed descriptively and qualitatively using a flow model, i.e., the data were analyzed from the actions given and developed during the learning process both online and offline. Flow analysis includes data reduction and presentation. The validity of the data was obtained using triangulation techniques: sources and methods. The results showed an increase in students' nutritional knowledge and numeracy. The increase in students' nutritional knowledge was indicated by an increase in the proportion of test scores to the maximum score. In the first cycle, the mean pretest score before the action was 8.03% and became 43.42% after being given the action, or an increase of 35.59%. In the second cycle, the proportion of the mean post-test score after being given the action was 54.94% or an increase of 11.31%. Meanwhile, even though nutritional numeracy can only be measured in the second cycle, the proportion of student numeracy was 78.21% of the maximum score.

Keywords: nutritional literacy, nutritional numeracy, flipped classroom method

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

74

Action Research: Optimizing early childhood growth and development through Early Childhood Care, Nutrition, and Education (ECCNE) program (Phase II): distance learning mode

Umi Fahmida, Grace Wangge, Dewi Shinta, Indriya Laras Pramesthi. Research report, 2021.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia

Background: The COVID-19 pandemic condition that forces children to learn from home brings challenges to the parents. Apart from distance learning mode for children, guidelines are also needed for the parents to accompany their children learning at home. Until now, there are not many tools or guidelines available in any form that can help parents, as well as guidelines for teachers to assist parents at home, especially for the early childhood education (ECE) center or PAUD.

Objective: This research was conducted to develop and pilot test distance learning mode of "Early Childhood Care, Nutrition, and Education" (ECCNE) program which can be effectively adapted by ECE teachers, parents and ECE students.

Methods: Two guidelines were drafted for ECE teachers and parents. An information system and website platform were also developed for monitoring and evaluation along with technical instructions for its use. The guidelines and the information system (using Whatsapp, Youtube and website platforms) were tested on informants who were ECE teachers and ECCNE MOT alumni from three districts in three provinces (Tanjung Jabung Timur in Jambi, Sambas in West Kalimantan dan Lombok Timur in West Nusa Tenggara).

Results: ECE teachers are still most familiar in using hardcopy IEC materials. The participants mentioned the need to add an introduction session from the teacher to the parents regarding the entire process at the beginning of the teacher module. Teachers also need guidance to prepare teaching plan to optimize the use of short messages and other IEC materials; as well as to evaluate the parenting session of ECCNE with distance learning mode.

Conclusions: The study found that ECCNE can be done with distance learning mode for parent classes, preferably using a combination method of short messages and print media. Additional introductory module on how to use the long distance platform and monitoring guideline are needed for implementation of ECCNE using distance learning mode.

Keyword: COVID-19 pandemic, distance learning, early childhood education,

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

The use of KOLAGEN (Kelas Online Gizi SDN Pandeyan) program to improve balanced nutrition behavior among fifth graders of SDN Pandeyan during COVID-19 pandemic

Ajeng Ningtias Irianti Suwandi[1,2], Rahmawati Nur Kumala Putri[1], Ismaryati[1], Drupadi Dillon[2]. Research Report, 2022.

[1]SDN Pandeyan, Yogyakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Good nutrition is essential for the growth and development of school-age children. However, research in Yogyakarta indicates high rates of unhealthy eating habits, with 49.3% obesity and limited knowledge of balanced nutrition among this age group. Schools play a key role in promoting healthy eating habits, but the COVID-19 pandemic has shifted this responsibility to the home. Observations in class 5 of SDN Pandeyan revealed that 55% of students skipped breakfast daily, and 70% brought lunches lacking balanced nutrition.

Objective: This study aimed to improve the behavior of Grade 5 students at SDN Pandeyan during the Covid-19 Pandemic with various activities on balanced nutrition through an online program called KOLAGEN (Kelas Online Gizi SDN Pandeyan).

Methods: This research was a classroom action research (CAR) following the Kemmis & McTaggart model using a spiral cycle consisting of four components namely planning, action, observation and reflection. The KOLAGEN program included activities such as 1) Socialization on the importance of balanced nutrition and breakfast, 2) *Isi Piringku* (or My Plate in English), 3) *Selasa Gizi Kelas 5* (SEGI LIMA in short, which translates as "nutrition session on Tuesday for the fifth graders"), 4) *Sapa Gizi* (an activity to explain the nutritional content and balanced nutrition of the food consumed by students), 5) *Ayo Mencari Tahu* (an activity to practice filling out My Plate with balanced nutrition), 6) *Ragam olahan pangan* (an activity to introduce various food groups such as carbohydrate, protein, fruits and vegetables), and 7) One student one plant (an activity to introduce gardening and develop fondness of vegetable plants).

Results: The results show that 47% of students exhibited behavior according to balanced nutrition in pre-cycle condition and increased to 71% in cycle I and 88% in cycle II. This indicated that the research results have reached the criteria of success.

Conclusions: Some activities need to be modified to be implemented in the future especially the "one student, one plant" activity which will be practiced at school rather than at home.

Keywords: behavior related to balanced nutrition, grade 5 students, KOLAGEN program

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

76

Increasing knowledge on prevention of gadget addiction using "Bogem Kaget" through learning economic activities for Class VII students of SMP Internat Alkausar Sukabumi

Al Kausar Boarding School, Sukabumi, Indonesia

The objective of this classroom action research was to determine the increase in anti-gadget addiction knowledge of the students through the delivery of economic activity learning on economic activity material, and to know the extent to which students respond to the learning process in the knowledge of anti-gadget. This study adopted the classroom action research using Kemmis and Taggar model (1995) and was done in tow cycles from March to November 2020. Written tests such as pretest, cycle reflection test, and absorption test were administered as data collection methods. The data were analyzed using both quantitative and qualitative methods with data triangulation. The subjects of this study were 46 students of class VII SMP Al Kausar. Research results showed that there was a significant increase in the knowledge of students on anti-gadget addiction. Research was successful and confirmed by criteria Pretty good. For percentage data from distributing questionnaires in this classroom action research, the results were obtained as follows: 1. There was a decrease in the threshold number from 80 to 85 which increased above the knowledge threshold by 17.06%. This indicates a significant development because 3 students scored above the 80-85 threshold, and this has an impact to increase the percentage of students above the threshold 80-85. 2. The percentage results relate to student responses to the media *bogem* was shocked obtained proceedings as follows: most students / absolute feel the benefits the media *bogem* was shocked in increasing the knowledge of gadget anti-addiction by 94%, no one rated negative or 0%, and did not respond or abstain in the questionnaire at 6%. So that the majority of students find it useful from the media *bogem* was shocked in increasing the knowledge of gadget anti-addiction. The results showed an increase in student learning outcomes each cycle individually with the percentage of pretest with those who got KKM scores and above KKM were 60.87%, Student scores in the first cycle that reaches the KKM and above the KKM is 95.65% and the value of the second cycle that gets the KKM score and above the KKM is 100%. VII SMP Al Kausar, Sukabumi Regency in the Very Good category. The "*bogem kaget*" proved effective in increasing the knowledge of students on anti-gadget addiction because it is interesting and informative. The material can serve as mechanism to avoid gadget and internet addiction among students and make them aware of balanced nutrition and getting enough rest.

Keywords: knowledge, gadget addiction, and Bogem Kaget

Sustainability-Based Action Teacher (SuBAT) model to improve teacher's health, nutrition status, and performance

Nia Erlina[1,2], Muchtaruddin Mansyur[2], Nengah Suparta[1], Siti Maryam[1], Siti Faridah Wadlikh[1]. Research Report, 2022.

[1]Universitas Pendidikan Ganesha, Bali
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The 2030 Agenda for sustainable development recognizes health, nutrition, and education as part of the main challenges for sustainable development. Health is a state of being free from disease, both physically and mentally. Consumption of unbalanced nutrition can lower the immune system which can contribute to loss of independence, disease complications, increased health care costs and short-term mortality. Performance will be disrupted if the health level decreases. Achieving the goals on the 2030 agenda requires innovative intervention models for sustainability in health and education. The Sustainability-Based Action Teacher (SuBAT) is an innovative intervention model that supports the Education for Sustainable Development (ESD) approach. SuBAT requires personal, environmental, and work support. SuBAT combines the health and employee performance areas.

Objective: This study aimed to produce a feasible SuBAT model to improve the health, nutritional status, and performance of primary school teachers.

Methods: The feasibility of the SuBAT model in terms of validity, practicality, and effectiveness criteria was assessed. The research adapted the educational research design (R&D), including preliminary studies, model development and trials (limited scale and wide scale). This study involved elementary school teachers from 3 level 3 accredited schools in Bali Province who were sampled purposively. This research used a Mix-Method approach with Sequential Explanatory Design. Data collection methods included interviews, observation, documentation, tests, questionnaires, and FGDs. Data analysis techniques were carried out quantitatively and qualitatively.

Results: The study proved that the SuBAT model was valid, practical and effective to improve the health, nutritional status, and performance of elementary school teachers. After the SuBAT health promotion program was implemented, participants experienced an increase in health quality which was marked by changes in blood pressure, blood sugar levels, and uric acid to normal. In addition, participants also experienced an increase in knowledge about health and nutritional status as well as an increase in performance. The SuBAT health promotion program has an implementation percentage of 94.43%.

Conclusions: Improving health quality can be a time-consuming process, and it's important to make healthy alternatives accessible to everyone. To optimize the program, an affordable alternative healthy food catalog should be provided to participants with economic limitations. Consistency in program implementation is also crucial for achieving optimal results.

Keywords: health promotion, non-communicable disease, nutritional status, sustainability, teacher performance

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

78

Development of project-based learning e-modules on the nutrition integrated work and energy topics to improve cognitive learning outcomes of Class X students

Ratu Mulyanengsih[1,2], Isna Juita Nurhidayah[3], Muhammad Dzakiruddin[4]. Research Report, 2022.

[1]SMAN 30 Jakarta, Jakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Universitas Negeri Jakarta, Jakarta, Indonesia
[4]UIN Sunan Ampel, Surabaya, Indonesia

Background: Almost one third of Indonesian adolescents aged 15-18 years old are stunted, while many also have overweight and obesity problem. Nutrition education can be done by integrating nutritional information and concepts into certain subjects, one of which is physics. Subject in physics which in line with the concept of nutrition are work and energy. In work and energy subject, it discusses the concept of the relationship between work, energy, the law of conservation of energy, the concept has strong relationship with nutrition which is a source of energy needed to do work. This research is a development research with the ADDIE model, which has 5 stages, Analyze; (2) Design; (3) Develop; (4) Implement; and (5) Evaluate [19]. **Objective:** The purpose of this study is "Produce feasible and effective PBL e-module learning media to improve learning outcomes and increase understanding of the importance of nutritional intake among adolescents", which can be accessed on smartphones.
Method: The e-module was tested on 36 grade X MIPA students at SMAN 30 Jakarta. The study was conducted from March to October 2022. The method used is a quasi-experimental method using a pretest-posttest control group design. The media is validated by media experts and material experts using instruments.
Results: Based on the calculation of validation of media experts and material experts on the PBLbased nutrition-integrated business and energy (E-MUEGIZ) E-module, it is included in the very valid category, meaning that the media is suitable for use. While Based on the value of N-Gain it can be said that the E-Module of effort and energy integrated nutrition (E-MUEGIZ) can increase understanding of the importance of nutrition as a source of energy.
Conclusions: The PBL-BASED Integrated Effort and Energy E-Module (E-MUEGIZ) is effective in improving students' cognitive learning outcomes. And based on student responses, the E-MUEGIZ module can increase understanding of the importance of nutrition as a source of energy and the importance of nutrition in student growth and development activities and processes.

Keywords: cognitive learning, effort and energy, e-module development, nutrition, problem based learning

Research Area 3 | Development of Intervention Strategy to Improve Health and Productivity, Focusing on Food-based Recommendation and Behavior Change Communication in School and Work-place Settings

Development of PRISAT (Productivity Risk Self-Assessment Tool) to early detection of non-communicable diseases risk factors that reduces urban workers productivity

Risti Rosmiati[1,2], Nila Reswari Haryana[1], Hardi Firmansyah[1], Erni Rukmana[1], Yatty Destani Sandy[1], Tyas Permatasari[1], Caca Pratiwi[1], Helda Khusun[2], Latifah Nurfazriah Rahman[1], Esi Emilia[1], Atmarita[3]. Research Report, 2022.

[1]Universitas Negeri Medan, Medan, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Indonesia Food Fortification Coalition

Background: The rising prevalence of non-communicable diseases (NCDs) is closely related to rapid urbanization. NCDs have a significant impact on worker's productivity, making it crucial for companies to prioritize employee health and nutrition to reduce absenteeism and improve overall performance. Early detection and diagnosis of NCDs is essential, highlighting the need for a flexible and mobile self-assessment tool for urban workers. Such tool could help in preventing and reducing the number of NDCs among the urban workers.

Objective: To develop and test the validity and reliability of the Productivity Risk Self-Assessment Tools (PRISAT) to predict non-communicable disease risk factors that reduces the urban workers' productivity.

Methods: Using Delphi method, PRISAT's face validity was tested using cognitive interviews with 10 urban workers, content validity using expert review, and internal consistency reliability and test-retest reliability based on 2 online surveys involving 100 urban workers in Indonesia. Variables measured included Risk Factor (Obesity, Hypertension, Diabetes, High Blood Cholesterol, Consumption of high saturated fat, belly circumference, Active tobacco consumption, Job Stress) and NCDs for urban worker. Data were analyzed using Cronbach α for internal consistency reliability and intraclass correlation coefficient (ICC) for test-retest reliability. This instrument contains eight questions that describe each risk factor that has the most influence on NCDs. The scoring was developed based on the NCDs risk factor prediction model from IFLS wave 4 and 5 longitudinal research data

Results: Cognitive interviews and expert feedback suggested modifications to improve the clarity of PRISAT. The test results showed that PRISAT is an assessment instrument that has good reliability and good sensitivity and specificity values.

Conclusions: PRISAT is a reliable and valid instrument for early detection of NCDs risk factors in urban workers. Based on the input when testing the instrument regarding the process of adding scores to each question item, in the future it is necessary to develop a web-based PRISAT or android application. This can make it easier for users to get the total score automatically without calculating manually.

Keywords: non-communicable disease, productivity, reliability, urban workers, validity

Research Area 3 | Development of Intervention Strategy to Improve
Health and Productivity, Focusing on Food-based Recommendation and
Behavior Change Communication in School and Work-place Settings

80

EVALUATION OF THE EFFECTIVENESS OF THE INTERVENTIONAL STRATEGY TO STRENGTHEN POLICY

The effectiveness of nutritional educational comic on increasing hemoglobine level among anemic adolescent girls

Annasari Mustafa[1,2], Sugeng Iwan[1], Carissa Cerdassari[1], Rani Nurmayani[1], Muchtaruddin Mansyur[2,3]. Research Report, 2018.

[1]Health Polytechnic of Malang, Malang City, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Indonesia

Background: Iron deficiency anemia remains a significant nutritional issue in Indonesia, particularly among adolescent girls. This problem is largely due to inadequate dietary intake and a lack of knowledge about nutrition and anemia. To address this, targeted interventions, such as educational comics focused on nutrition and local food ingredients, are necessary to improve nutritional knowledge in this demographic.

Objective: This study aimed to evaluate the effectiveness of comic-based nutrition education on dietary patterns, nutrient intake, and haemoglobin (Hb) levels in anemic adolescent girls.

Methods: This was a pretest-posttest quasi-experiment. Nutrition education using the comic strip "Balanced Nutrition, Lost Anaemia" was delivered over four months as a form of intervention for nutritional problems. Nutritional problems were determined from 24-hour food recall data and food records for six days prior to education, which were analyzed using Nutrisurvey 2008 and linear programming. The effectiveness of nutrition education was determined by comparing energy intake using paired t-tests, and protein, fat, carbohydrate, calcium, iron, vitamin A, and vitamin C intake using the Wilcoxon test before and after nutrition education. This study was conducted in one of the Islamic boarding schools (pesantren) in Malang, Indonesia. A total of 281 pesantren students (santri) adolescent girls with anemia (Hb <12 g/dL) who were screened for anemia using cyanometry were included in this study.

Results: After the nutrition education, there were increased energy, protein and vitamin C intake ($P < 0.001$); increased Hb levels ($P < 0.001$) among the adolescent girls. A total of 69 santris (82.15%) experienced normalisation of their Hb levels (no anaemia).

Conclusions: Providing nutrition education using comics that contain colourful images makes the message easier to understand and implement, results effectively increases energy and nutrients intake and reduces the prevalence of anaemia among adolescent girls.

Keywords: adolescents, Islamic boarding school, nutrition comic, nutritional anaemia

LC-LQAS Program monitoring using LC-LQAS (Large Country-Lot Quality Assurance Sampling) method for the scale up program on Iron and Folic Acid (IFA) supplementation in four provinces of Banten, West Java, West Nusa Tenggara and Riau Provinces and the scale up program on Zinc and ORS for the treatment of childhood diarrhoea in three provinces of West Nusa Tenggara, West Java, and Banten Provinces of Indonesia

Luh Ade Ari Wiradnyani[1], Aria Kekalih[2], Nia Novita Wirawan[3]. Research Report, 2018.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Indonesia
[3]Department of Nutrition, Faculty of Medicine, Universitas Brawijaya, Indonesia

Background: Iron-folic acid (IFA) Tablet supplementation is one of the main strategies proposed to increase intake of iron during pregnancy and thus reduce the risk of iron-deficiency anaemia among pregnant women.

Objective: It assessed coverage and adherence of IFA supplements among pregnant women, and usage of zinc and ORS for diarrhea treatment in children. Knowledge, attitudes and practices of mothers, caregivers and health workers related to anemia, IFA, diarrhea management were also evaluated.

Methods: Data was collected in four provinces, i.e., Riau, Banten, West Java, and West Nusa Tenggara from December 2017 to January 2018. This study used Large Country-Lot Quality Assurance Sampling (LC-LQAS) method for monitoring the scale-up program on Iron and Folic Acid (IFA) Supplementation in four provinces of Indonesia and the scale-up program on Zinc and Oral Rehydration Solution (ORS) for childhood diarrhea treatment.

Results: Coverage of ≥90 IFA tablets was only 55%, and as the consequence, the compliance was low, i.e. 41. 4%. These might be related with the findings that (1) 30% of health providers gave the women <30 tablets in each ANC visit, which was the reason for poor compliance reported by the women, (2) quality of health and nutrition education during ANC visit was not sufficient given the low knowledge of health providers and the women (despite the adequate number of ANC visits). Coverage of ORS and Zn for childhood diarrhoea treatment, and the correct use of them was low, in which only around 21.8% of caregivers received both ORS and zinc, and only 4.6% of caregivers gave full course of ORS and zinc. These might be related to insufficient exposure of caregivers and health providers towards childhood diarrhoea treatment, particularly the use of ORS and zinc. Only 21.6% of health providers had ever heard of *Lintas Diare*, 61.7% had poor knowledge, and 27.2% had favorable attitude.

Concluisons: Quality of the ANC has to be improved, specifically in disseminating information on anaemia and IFAS to pregnant mothers. The inadequate knowledge of health providers (including the main/basic ones) must be seen as priority for further action and should be addressed through more systematic and structured approaches. Given the limited knowledge and unfavorable attitude of *posyandu* cadres on maternal anaemia and IFAS, as well as childhood diarrhoea and its treatment, role of *posyandu* cadres should be directed more to monitor mothers' compliance to take IFA tablets among pregnant women, as well as ORS and Zinc among children with diarrhoea, compared to deliver health education to mothers.

Keywords: Large Country-Lot Quality Assurance Sampling, Iron and Folic Acid Supplementation, Oral Rehydration Solution, Zinc

A nutrition educational module improves knowledge of nutrition among pre-schooler

Muharni[1,2], Lily Restusari[1], Sri Mulyani[1], Fitri[1], and Drupadi Dillon[2]. Research Report, 2018.

[1] Polytechnic of Health Ministry of Health Riau, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Prevalence of nutritional issues among preschool children in Indonesia are high due to inadequate food intake and a lack of public knowledge about balanced nutrition. To address this, nutrition education should be introduced as early as possible, not only at home but also integrated into education institutions. However, there is currently no specific nutrition education program implemented in preschools in Riau Province. Therefore, research is needed to develop a nutrition education module to improve knowledge of nutrition among preschoolers in this province.

Objective: To evaluate the effect of the nutrition educational module on knowledge of nutrition among preschool children.

Methods: This was a quasi-experiment with pre- and post-test and control group design conducted in 5 government kindergarten in 3 different districts at Riau Province, Indonesia. The study involved 636 (307 for intervention group and 357 for control group) students. Twelve nutrition education activities were given in four consecutive days a week to intervention group based on Nutrition Educational Module of Preschool Children. All the activities were delivered by teacher that had been trained for the module. Changes in student nutrition knowledge before and after the intervention were collected and analyzed by two-way ANOVA. Results were considered significant at $P < 0.5$.

Results: The study found an increase in nutrition knowledge score from 75.70 to 81.54 among control group, 74.51 to 88.29 among intervention group (all $p < .000$).

Conclusion: Nutrition educational module for preschool children could improve nutrition knowledge among preschool children.

Keywords: preschool children, nutrition education, module, kindergarten

Development of the learning package and training materials on adolescent nutrition and health

Rinaldi Ridwan, Cut Novianti Rachmi, Luh Ade Wiradnyani, Harry Kurniawan, Tulus Ciptadi Akib. Research Report, 2018.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Adolescent nutrition receives prime attention in recent years as it is considered a pivotal period to nutrition improvement both for future generations and in later life. For this reason, a collaborative project between UNICEF Indonesia and SEAMEO RECFON called AKSI BERGIZI was carried out.

Objective: The objective of the study was to develop a learning package consisting of 1) student handbook on adolescent health and nutrition, 2) module/facilitation guide for teachers including interactive learning tools/materials on multi-sectoral adolescent nutrition behavioral change communication (BCC) for adolescent students (boys and girls), 3) module/facilitator guide and materials for trainings of the district facilitators and the school teachers.

Methods: A desk review was conducted initially to explore the existing learning materials and modules related to adolescent health and nutrition in Indonesia and outside Indonesia. As many as 116 modules both in Indonesian language and English were identified and have been used in diverse settings. The module development stage involved the following steps: 1) series of consultation meeting with relevant government officials, UNICEF team, and other stakeholders, 2) drafting the modules, 3) review of modules by multiple stakeholders, 4) drafting revision of the modules, 5) pretesting the modules (for facilitators/teachers in Klate and Caringin-West Java, and for students in Klaten and Bogor-West Java), 5) second round of consultation meeting with government officials, and 6) finalization of the modules/facilitation guide/handbook. The pretesting was carried out through focus group discussions with junior and senior high school students, separated between girls and boys. In general, the student handbook was well-accepted by the students and the content was considered easy to understand.

Results: The finalized student handbook consisted of 36 sessions with the following themes and topics: 1) First phase – Understanding the human life cycle and 'where I am now.' (Introduction, Nutrition and life cycle, Puberty and self-concept); 2) Second Phase – What it takes to grow up healthy (Balanced nutrition, My plate, Protein: the body constructor, Fruits and vegetables consumption, Micronutrients, Food exchange, Sugar, salt, and fat, Food and beverage labels, School canteen and healthy snacks, Intake vs activity, Different kinds of physical activity, Body Mass Index and malnutrition, Anemia and iron, Healthy breakfast, Personal hygiene, Menstrual hygiene management, Mental health); 3) Third Phase – Healthy social life (Friendship and healthy relationship); 4) Fourth Phase – Understanding vulnerabilities and risks (Student's street-mass fighting and peer pressure, Bullying, Road safety, Sexual violence, Pregnancy, Child marriage and its risks, Sexually transmitted infection, HIV and AIDS, Drug abuse, Non-communicable diseases, Transmission of disease, Internet use); 5) Fifth Phase - Staying healthy for a better future (Financial planning, Plan your future, Exhibition).

Conclusions: The process of the module development provided the following insights: 1) A broad topic such as health and nutrition is feasible to be designed into a learning package suited for adolescents, 2) The learning package must contain carefully crafted creative methods to ensure students' understanding on the topics, 3) Involvement of all related stakeholders in the module development is essential for the module to be inclusive and well-received by the students.

Keywords: AKSI BERGIZI, health and nutrition for adolescents, Indonesia, learning package

The impact of Program Gizi Anak Sekolah (ProGAS) on nutrition knowledge and practice, nutritional status, physical fitness, and school attendance among primary school students

Umi Fahmida[1], Luh Ade Ari Wiradnyani[1], Indriya Laras Pramesthi[1], Roselynne Anggraini[1], Judhiastuty Februhartanty[1], Gina Meutia[2], Nikendarti Gandini[2], Nunuk Supraptinah[2], Tania Barendz Sumiaty[2], Jeffry Pupella[2]. Research Report, 2017.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]World Food Program (WFP), Indonesia

Background: Nutrition problems among primary school children potentially increases risk to diseases, reduces school attendance, thus leads to poor academic performance. Indonesian Ministry of Education and Culture in 2017 launched the second year of school feeding program called *Program Gizi Anak Sekolah* (ProGAS) targeted to 100,136 children from 11 Districts in five food insecure provinces.

Objective: This study evaluated the impact of three fundamental packages of the program i.e., healthy breakfast, nutrition education, and character building on nutrition knowledge and practice, nutritional status, physical fitness, and school attendance of primary school students.

Methods: Mixed-methods data collection was conducted involving 497 students from 24 schools from 4 Districts (Sorong, Jayapura, Manggarai Barat, and Maluku). Questionnaire and 24-hour Food Recall were used to evaluate nutrition knowledge, hygiene practices, school attendance, and dietary practices. Physical fitness and nutritional status were assessed using Harvard step test and anthropometric measurement. School principals, teachers, and parents' perspectives on the program were also obtained by in-depth interviews.

Results: Through 120 days of meal, ProGAS 2017 effectively improved dietary diversity, meal frequency, practice of hand washing, nutrition knowledge, and school attendance. Children also familiarized themselves with praying, queuing, and be responsible to their dirty dishes. However, breakfast portion and nutrition education were not optimally delivered. There was no significant improvement in the children's nutritional status and physical fitness. Enthusiasms from the students, parents, and teachers on the program were reported; but challenges to implement the program at the school as planned and lack of monitoring from District office were identified.

Conclusions: ProGAS 2017 provided a positive impact on dietary and hygiene practices, yet nutrition education and optimized diet/menu is necessary to achieve better impact on the children's nutritional status.

Keywords: breakfast, dietary practice, hygiene practice, Indonesia, ProGAS school feeding program

Endline study of Nutrition Goes to School (NGTS) Program for improving nutritional status, physical fitness, and cognitive function among adolescent students in Malang

Evi Ermayani, Aziz Jati Nur Ananda, Roselynne Anggraini, Indriya Laras Pramesthi, Grace Wangge. Research Report, 2019.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: SEAMEO RECFON has been implementing the Nutrition Goes to School (NGTS) program in various districts and cities across Indonesia since 2017. However, impact of the program at the school level have not been adequately measured or documented. This lack of data makes it difficult to assess the effectiveness of NGTS and identify areas for improvement.

Objective: Following up the baseline study in 2018, this endline study aimed to assess the endline information on nutrition knowledge, dietary practice, nutritional status, physical fitness, and cognitive function of the adolescent students one year after the implementation of NGTS program in Malang.

Methods: Similar methodology during the baseline survey was also applied in this endline study. Four schools were assigned as the intervention group and other four schools as the control group. About 95 students per school were recruited to constitute a total of 375-380 subject per group. In addition, food samples from selected school canteen were analyzed against its safety components. Data collection at endline was done in April 2019.

Results: Subject of the study had a comparable proportion between boys and girls. The sociodemographic characteristics of the subjects were similar except that the intervention group had a slightly higher pocket money compared to the control group. Generally, 9.5% of the students were underweight and 13.8% were overweight/obese, with comparable proportion in both groups. Nearly 22% of the subjects were comparably anemic in both groups. In terms of dietary diversity, more than 50% students in both groups were having good dietary diversity score (51% and 55% for control and intervention group, respectively). After the program, more students in the intervention group had better breakfast practices where 48.9% in the intervention group had breakfast everyday while in control group 39.8%. Proportion of the subjects with good knowledge were similar between groups (i.e., 17.6% in the control vs 20.8% in the intervention groups). Almost all students in both groups had low physical fitness scores. There was a significant difference on the cognitive function based on coding assessment (i.e., 67 vs 71 median score for control vs intervention groups). Related witch food sold in the canteen, there were some dangerous chemicals found whiche were illegal coloring agent Rhodamin B, followed by formalin, Borax and formaldehyde found both in control and intervention group.

Conclusions: The research results can serve as valuable documentation and reference material for SEAMEO RECFON and the assisted education units to plan and implement NGTS more effectively, taking into account the unique conditions of each school.

Keywords: baseline study, NGTS, nutritional status, physical fitness, cognitive function

Strengthening the implementation of tobacco free area with special focus on school-going adolescents

Grace Wangge. Research Report, 2019.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: This scientific paper critically evaluates the prevalence of smoking among adolescents in Indonesia and explores the role of the school community in mitigating this issue.
Objectives: The study aimed to identify various risk factors, including the age of initiation, parental influence, peer pressure, and the accessibility of cigarettes.
Methods: The study drew on the results of national-level surveys, including the National Basic Health Research (RISKESDAS) for the years 2013 and 2018 and the Global Youth Tobacco Survey (GYTS) 2014 for Indonesia. A desk review and secondary data analysis were conducted to identify risk factors for adolescent smoking behavior. The study also included a policy review to assess existing support at national and sub-national levels.
Results: The findings reveal that Indonesia faces a significant challenge with adolescent smoking, with the country ranking third globally in cigarette consumption. The prevalence of smoking has increased over the years, affecting both active and passive smokers, particularly children. Exposure to smoking behavior in adults significantly influences children, leading to early experimentation with cigarettes. The study highlights the importance of tobacco-free areas in schools, supported by government regulations, such as Ministerial Regulation Number 64/2015. However, the effectiveness of these measures requires continuous evaluation.
Conclusion: Adolescent smoking in Indonesia is a complex issue with multifaceted influences. While existing policies provide a foundation, the study suggests comprehensive strategies to address this public health concern effectively which can include enhanced parental education, inclusion of anti-smoking curriculum in schools, and stricter enforcement of no-smoking regulations. The need for community involvement and awareness campaigns is emphasized, targeting not only students but also family members and community leaders.The proposed recommendations aim to strengthen preventive measures, increase awareness, and foster a tobacco-free environment in schools and communities. The findings contribute to ongoing efforts to curb adolescent smoking and promote a healthier future for Indonesia's youth.

Keywords: adolescent smoking, policy recommendation, tobacco free environment

Smoke Signals: Unravelling the nexus between adolescent smoking habits and nutritional status - A comprehensive analysis of RISKESDAS 2018 data

Grace Wangge[1], Yessi Crosita[2], Edi Putra[2], Eflita Meiyetriani[1], Cahyuning Isnaini[1], Dian Putri M. Saraswati[1], Ahmad Thohir Hidayat[1], Ratna Wulanti[1]. Research Report, 2019.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Center for Public Health Innovation (CPHI), Faculty of Medicine, Udayana University, Indonesia

Background: Indonesia ranks third globally in tobacco consumption, and exposure to cigarette smoke is prevalent, affecting approximately 85% of households. While there are numerous studies on the association between parental smoking and childhood growth issues, few focus on adolescence. The 2018 RISKESDAS data indicates an increase in teenage smokers from 7.2% in 2013 to 9.1% in 2018. Adolescence is a vulnerable period, and factors like parental smoking, nutritional intake, physical activity, and socio-economic conditions can impact nutritional status.
Objective: The study aimed to investigate the link between parental smoking and adolescent nutritional status, considering various risk factors such as parental smoking behavior.
Methods: The research utilized a cross-sectional study design, analyzed secondary data from the 2018 RISKESDAS and conducted interviews at SMAN 10 Depok. The sample included 100 adolescents aged 10-19 years, and data analysis involved univariate and bivariate methods.
Results: Preliminary findings revealed a substantial prevalence of teenage smoking and indicated a correlation between parental smoking and adolescent smoking behavior.
Conclusion: The study provided valuable insights to inform targeted interventions and health promotion strategies, emphasizing the need for comprehensive school-based programs to address the complex interplay of factors influencing adolescent health.

Keywords: adolescent smoking, parental smoking, nutritional status, RISKESDAS

Documentation of three components of Aksi Bergizi (on training, advocacy, and monitoring for adolescent nutrition pilot in Klaten and Lombok Barat Districts)

Luh Ade Wiradnyani, Cut Novianti Rachmi. Research Report, 2018.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The importance of adolescents' health and nutrition in contributing to nutrition improvement both for future generations and in later life is further addressed through a pilot project of *Aksi Bergizi* implemented in Klaten and Lombok Barat districts.

Objective: This study aimed to document the three components of the *Aksi Bergizi* program namely: 1) Weekly Iron-Folic Acid Supplementation (WIFAS) and breakfast at school program implementation, 2) Literacy session activities and monitoring, and 3) School mobilization.

Methods: Preliminary assessment on implementation of weekly IFA supplementation (WIFAS) was carried out by visiting Puskesmas and schools in September-October 2018 (Klaten), and December 2018 (Lombok Barat). The literacy session activities started from the cascade trainings from national trainers to district facilitators to conducting the weekly Aksi Bergizi learning session at school level. School mobilisation planning and implementation at school level was facilitated through two peer support trainings.

Results: The implementation of the Weekly Iron Folic Acid Supplementation (WIFAS) program in schools generally fell below recommendations. Challenges included lack of program socialization, inadequate supplies, low student compliance, and insufficient human resources. While the majority of schools (75%) had implemented WIFAS weekly, many did not record tablet consumption. Similarly, 75% of schools implemented breakfast together at school but only for classes which received an *Aksi Bergizi* session. Literacy sessions were conducted through a cascade training system, and key learnings highlighted the need for careful facilitator selection, thorough preparation, and systematic coaching. *Aksi Bergizi* sessions, including breakfast and IFA tablet consumption, were held weekly in Klaten and Lombok Barat. Implementation challenges included assuring sustainable changes instead of ceremonial activities, lack of financial and logistic support, limited participation from low-income students, lack of parent's involvement, and scheduling issues due to tight school schedules.

Conclusions: A quality monitoring system is needed to ensure *Aksi Bergizi* learning sessions are carried out according to standards and achieve the desired results. The potential use of School Operational Assistance (BOS) funds to support *Aksi Bergizi* should be explored. Schools must submit regular reports to local education, religious, and health offices to support program implementation. School mobilization relied on the use of Peer Support Groups, where students played a key role in disseminating key messages, coordinating face-to-face activities, initiating the school mobilization implementation, becoming a role model of practicing *Aksi Bergizi* in their daily life, and assisting the teachers. A stronger commitment from schools is required to ensure the consistent execution of *Aksi Bergizi* activities.

Keywords: Aksi Bergizi, breakfast, Indonesia, literacy session, school mobilization, WIFAS

Strengthening nutrition education in school feeding program to improve nutritional knowledge, dietary practices, and nutritional status

Umi Fahmida[1], Ahmad Thohir Hidayat[1], Indriya Laras Pramesthi[1], Roselynne Anggraini[1], Luh Ade Ari Wiradnyani[1], Djoko Stio Sudjatmoko[2], Bambang Hadi Waluyo[2]. Research Report, 2018.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Directorate of Primary Education, Ministry of Education and Culture, Jakarta, Indonesia

Background: Minister of Health Regulation No. 41 of 2014 on Balanced Nutrition Guidelines specifically emphasizes the importance of breakfast as one of the special messages for school children. Thus, Ministry of Education and Culture launched the School Children's Nutrition Program/*Program Gizi Anak Sekolah* (ProGAS) in 2016 with Banten and East Nusa Tenggara as the piloting provinces. Considering the impact of ProGAS, the coverage was expanded in 2018. To achieve optimal nutritional practice improvements, the expansion in 2018 focused on improving the menus according to nutrient gaps and strengthening the nutritional education targeting students, teachers and parents.

Objective: The aim of this study was to cassess the effect of Indonesian school feeding programs (ProGAS) with or without nutrition education in improving nutritional knowledge and practices and nutritional status of the school children.

Methods: The study was a Cluster Randomized Controlled Trial conducted in rural area in East Lombok, West Nusa Tenggara, Indonesia. Participants of the study were primary school children in the fourth grade from 20 schools. The schools were assigned to either one of the four groups (5 schools/group) that received: (1) 120 days school feeding program (ProGAS), (2) ProGAS with strengthened nutrition education (ProGAS+NE), (3) nutrition education (NE), and (4) control. Groups with NE received food-based recommendations which was developed using linear programming.

Results: Children with good nutritional knowledge increased by 26% and 25% in PROGAS+NE and NE groups as compared to only 10% in PROGAS and control. PROGAS+NE showed the biggest increase in DDS (by 2 food groups) as compared to other groups. Anemia decreased in groups receiving PROGAS (21.3% and 11.4% in PROGAS and PROGAS+NE) while the prevalence increased in groups without PROGAS (by 2.2% and 8.9% in NE and control). Stunting also decreased in groups receiving PROGAS (by 3.7%% and 5.3% in PROGAS and PROGAS+NE) while the prevalence increased or remained in groups without PROGAS (by 3.0% and 0.3% in NE and control). There was no between-group difference in BMI-for-age.

Conclusions: Strengthening the nutrition education aspect of ProGAS resulted in better improvement of children nutrition knowledge, dietary practice and nutritional status. Ensuring the sustainability of the PROGAS+NE program will help improve the nutritional status of these school children.

Keywords: anemia, dietary practices, Indonesia, linear programming, nutrition knowledge, school-aged children, PROGAS school feeding program, stunting

School readiness to adopt a school-based adolescent nutrition intervention in urban Indonesia

Yessi Octaria[1,2], Apriningsih Apriningsih[1,3], Cesilia M Dwiriani[4], Judhiastuty Februhartanty[2].

[1]Centre for Public Health Innovation, Udayana University, Denpasar, Bali 80232, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Universitas Pembangunan Nasional "Veteran" Jakarta, Depok, West Java 16415, Indonesia
[4]Department of Community Nutrition, IPB University, Bogor, West Java 16680, Indonesia

Objective: To identify school community readiness to adopt a school-based adolescent nutrition intervention.

Design: Cross-sectional study: mixed-methods design. The community readiness model was used to guide instrument development and qualitative analysis. Quantitative data were presented using descriptive statistics. Each statement was rated on a seven-point Likert scale, thereby producing scores between 1 (strongly disagree) and 7 (strongly agree). Setting: Ten of the twenty current public secondary schools in Bogor, Indonesia. Participants: Ninety teachers and ten school principals.

Results: Eating behaviour problem awareness was present among all participants; awareness of efforts to improve eating habits was also present, but these efforts were perceived as having low efficacy. Support from the City Education Authority and Health Authority was present, but the support type did not match the perceived needs. Nutrition education had not been implemented across the entire school community due to competing priorities. Existing nutrition policies did not provide concrete scenarios and clear guidelines for nutrition-friendly schools. The availability and accessibility of healthy foods at schools were considered to be key factors in improved adolescent nutrition. Positive attitudes existed among respondents towards the implementation of various nutrition programmes, and the median and mode were seven in all types of school-based intervention.

Conclusions: The school community readiness level regarding school-based adolescent nutrition interventions is currently in the action phase, implying that community leaders have begun organising efforts to address issues in adolescent nutrition and are aware of their consequences. Future support should be directed towards improving existing efforts and offering concrete ideas and clear policy guidelines for implementation.

Keywords: school readiness, adolescent, nutritional status, diet

Evaluating the effectiveness of supplementary nutrition and infant/young child feeding (Pemberian Makan Bayi dan Anak – PMBA) education for improving nutritional status in underweight children aged 6-23 months in Indonesia

Muchtaruddin Mansyur[1,2], Aria Kekalih[2], Umi Fahmida[1], Ahmad Thohir Hidayat[1], Evi Ermayani[1], A.A Sagung Indriani Oka[1]. Research Report, 2019.

[1]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[2]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

Background: It is important to know the efficacy of providing supplementary food (*Pemberian Makanan Tambahan-PMT*) to toddlers in improving their nutritional status, especially for underweight toddlers in Indonesia. This will require assessing the ability of under-aged children to accept the *PMT* program. Additionally, an educational program for Infant and Child Feeding (*PMBA*) modules should be provided to complement the provision of *PMT*. This will help mothers increase their knowledge and skills in providing nutritious and affordable food for their toddlers based on their socio-economic conditions.

Objectives: This study aimed to obtain an overview of the effectiveness of providing *PMT* biscuits and *PMBA* education nationally, as well as specific to the regions of study implementation for the improvement of the nutritional status of underweight children aged 6-23 months.

Methods: This study was a Randomized Controlled Trial (RCT). The control group was the group without *PMT* with routine *PMBA* education conducted at selected integrated health post areas (Group 1). The intervention group consists of 2 groups: *PMT* according to the Ministry of Health's recommendation (8 pieces/day) with routine *PMBA* education conducted at selected integrated health post areas (Group 2), and *PMT* with adjusted recommendation (4 pieces/day) with education on optimizing local food (Group 3).

Results: The subjects in the 3 groups did not show significant differences in gender, family type, and age. Majority of the children were primarily cared for by their mothers (>95%), and belonged to households having two children. Median age of children ranged from 13 to 14 months, and caregivers' median age ranged from 30 to 31 years. No significant differences were observed in the household characteristics among the educational groups. The majority of families had a core family structure, and mothers predominantly held a homemaker role. Fathers often worked in private sectors. Primary Health Centers (*Puskesmas*) were the most frequently visited healthcare facilities due to their proximity. *Posyandu*, an integrated health service post, showed good utilization, especially in terms of immunization and counselling. A significant proportion of households experienced varying degrees of food insecurity. The PMBA + PMT (Full) group showed improvements in Acute Respiratory Iinfections, while the PMBA and PGS-PL + PMT (Reduced) groups exhibited positive changes in diarrhea rates. All groups demonstrated improvements in these feeding practices in terms of emphasizing Minimum Diet Diversity, Minimum Food Frequency, and Minimum Acceptable Diet, with the PGS-PL + PMT (Reduced) group consistently showing the highest compliance.

Conclusions: The educational interventions positively influenced various aspects, leading to enhanced caregiver knowledge and improved child health and feeding practices. These findings emphasize the importance of tailored educational strategies in promoting holistic child well-being.

Keywords: IYCF education, nutritional status, supplementary feeding, underweight children,

Baseline and endline repeated cross-sectional surveys for the program on an improved WIFA supplementation program for school-going adolescent girls in West Java and Banten Provinces in Indonesia

Umi Fahmida, Indriya Laras Pramesthi, Min Kyaw Htet, Adhika Dibya, Sari Kusuma. Research Report, 2020.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Based on RISKESDAS data, the nationwide prevalence of anemia among adolescent girls and women of reproductive age (15-24 years) is 18.4%. Based on national guidelines (MoH, 1998), it was recommended to give one IFA tablet weekly for 16 weeks consecutively, plus one IFA tablet daily during menstruation for 10 days to adolescent girls.

However, the program was not yet implemented effectively due to lack of availability of IFA tablets, limited promotion of the intervention and no clear channel for distribution. The Ministry of Health revised the anemia prevention guidelines in 2016 and suggested taking IFA tablets all year round, but there was little uptake of this recommendation. To address this, NI Indonesia suggested a trial of iron and folic acid supplements for teenagers enrolled in school in Banten and West Java. In order to provide benchmark estimates, monitor the

implementation mid-way, and assess the improvement at the end of the project period, baseline and endline surveys were done.

Objective: To assess the IFA supplementation (IFAS) coverage, consumption, supply, exposure to IEC materials and knowledge and practices related to IFAS amongst adolescent girls and teachers as well as to assess how the IFAS program is implemented at the school, sub-district, district, province ad central levels.

Methods: The respondents of the quantitative part consisted of school going adolescent girls aged 12-19 years in both junior and senior high schools (n=3,600), school teachers and school coordinators (n=238) in charge for IFAS or School Health Program (n=240). In the qualitative component, a total of 48 focus group discussions were conducted among school going adolescent girls and in-depth interviews were conducted with school heads/coordinators (n=40) and representatives from Puskesmas (n=40) and officials from Ministries of Health, Education and Religious from district (n=23), provincial (n=12) and central (n=13) levels who were involved in IFAS program. Data collection of the first round survey was conducted in March – July 2018 involving 120 junior and senior high schools in West Java and Banten, while the final survey was done in October – December 2019 by re-randomizing 120 schools in the same sub-districts as selected in the first round survey.

Results: There was high prevalence of anemia in both provinces (51.3%). Although significantly more adolescent girls received any scheme of IFA tablets in the past 1 year in this end-line than baseline survey (56% vs 30%), the increase was not significant based on 24 tablets/year or 12 tablets/6mo. Consequently, no increase was observed for IFA consumption in the end-line. Among those who received IFA tablets in the end-line survey, only 6 tablets were received and 2 tablets were consumed in the past 1 year. Despite the absence of improvement in coverage and consumption of IFA tablets, there was improvement in knowledge of adolescent girls and teachers in this end-line survey. More teachers reported that they had been exposed to IFA program, had implemented IFA program in their school and had ensured the adolescent girls to consume IFA tablets in the school. In this end-line survey, more schools in Banten province already had peer educators who assisted in the distribution of IFA tablets and recording compliance to taking IFA tablets.

Conclusions: Compared to the baseline survey in April 2018, improvement in commitment from government in central, province to district levels to allocate budget for IFA procurement and socialization was documented in this endline survey. The collaboration across different sectors was improved as evidenced by involvement of not only District Health Office but also District Education Office, District Religious Affair Office, District Planning Board and Community Welfare at District Government.

Keywords: adolescent girls, anemia, Banten, West Java, WIFA supplementation,

Endline study: Process evaluation and implementation of Nutrition Goes to School (NGTS) program at schools and madrasah

Luh Ade Wiradnyani, Aisyah Nurcita Dewi, A. A. Indriani Oka. Research Report, 2021.

Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: The baseline study on the implementation process of NGTS program and students' KAP (knowledge, attitude, practice) survey was conducted in early 2021. An endline study on this is needed including documenting lessons learned and best practices during the implementation of the NGTS program.

Objectives: The objective of this study was to compare the KAP of the students between baseline and endline as the basis for formulating NGTS program improvements.

Methods: Data collection of the endline study was done from October to December 2021, six months after the baseline information was collected. Similar methodology used during the baseline survey was also applied for this endline study. A total of 1,669 students from 51 schools of various levels in 7 NGTS sites (i.e., Bogor, Cimahi, Cirebon, Jakarta, Klaten, Malang, and Sambas) participated in the online survey. Several online focus group discussion sessions (FGD) with the students and teachers, and also in-depth interviews (IDI) with head of schools and madrasah were conducted separately.

Results: The key findings from the students included their acceptance towards the NGTS program and its activities, eating breakfast and doing physical activity together virtually, as well as webinar routinely conducted during schooling from home. Teachers appreciated the program as it exposed them to nutrition and health topics. They encountered challenges in conducting the school garden component of the program as impacted by the Covid-19 pandemic, and also on the lack of parental involvements. The school heads highlighted some key success of the program implementation which included uniform understanding about the program to create sense of belonging and full commitment of all members of the school communities.

Conclusions: The acceptance of the NGTS Program by the students and the commitment of teachers, and heads of school-partners to implement the program mean that the NGTS activities can be integrated into the school's routine agenda to be implemented by assigned teachers/ personnel.

Keywords: endline study, NGTS implementation, school community, school-based

A systematic review: School-based blood pressure control intervention model for elementary school teachers

Sugma Agung Purbowo[1,2]. Research Report, 2022.

[1]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia

Background: Hypertension is a health problem whose prevalence is increasing throughout the world. Consumption of foods high in calories and salt, emotional stress, and sedentary living contribute to the increase in obesity and hypertension rates. One-third of the lifetime of someone of productive age is regularly spent at work so the workplace will also influence behavior. Workplace-based health behavior interventions will be very efficient because subjects come regularly to the place so that their progress can be easily monitored and assessed. There is still little research on school-based blood pressure control at teachers' work sites, especially in Indonesia.

Objective: This research was aimed to seek scientific evidence on the effects of a school/workplace-based multicomponent intervention model on controlling blood pressure among elementary school teachers/workers and identifying its constituent components.

Methods: Article searches were conducted through Pubmed, Cochrane Library, Google Scholar, and EBSCOhost databases as well as manual searching with no time duration. Two researchers independently selected articles. Articles had to include participant characteristics, the intervention model, workplace location, and outcomes in terms of blood pressure values or staging. Two researchers independently assessed bias based on EPHPP.

Results: The results show no specific studies on a school-based blood pressure control intervention model for teachers were found, so other studies deemed equivalent were sought. Eleven studies meeting inclusion criteria and of good quality were identified. Nine studies (82%), including RCTs, quasi-experiments, and pre-post studies, showed a significant effect/outcome in the form of decreased blood pressure/hypertension. The multicomponent approach proved effective in reducing blood pressure in sedentary, adult, male, or female employee types. This approach also had a better effect compared to single-component approaches focusing on improving diet patterns, increasing physical activity, and enhancing medication adherence. All studies included education/information and intention/motivation components, while environmental components were the least utilized.

Conclusions: Workplace-based multicomponent intervention models have an effect on reducing blood pressure/hypertension in employees. Similar effects can be expected in the elementary school teacher population. The multicomponent approach is promising, though the number of components and subcomponents depends on the resources of the provider/company. Improvement of standards in experimental study reporting needs enhancement for balanced comparisons, enabling more accurate and objective systematic review results.

Keywords: dietary behavior, health promotion, hypertension, physical activity, school, teacher, workplace

Designing a web-based information system to monitor school-based nutrition promotion program implementation in Indonesia

Nurul Dina Rahmawati[1,2], Rahmad Mahendra[3], Heninggar Septiantri[3], Cahya Ayu Agustin[2,4], Muhammad Mishbah[3], Rizka Fahmia[5], Arina Nurul Ihsani[1], Aziz Jati Nur Ananda[2], Jesus C. Fernandez[2]. Research Report, 2022.

[1]Department of Public Health Nutrition, Faculty of Public Health, Universitas Indonesia, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) - Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Faculty of Computer Science, Universitas Indonesia, Indonesia
[4]Department of Nutrition, Faculty of Medicine, Universitas Indonesia - Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
[5]Department of Epidemiology, Faculty of Public Health, Universitas Indonesia, Indonesia

Background: Nutritional issues in Indonesia, such as stunting and obesity among school-age children, remain a major concern. Current interventions focus on adolescents through school-based programs, addressing imbalanced diets and physical inactivity as key risk factors. In response, SEAMEO RECFON initiated the Nutrition Goes to School (NGTS) program to improve children's nutritional status. A system to monitor the program's implementation in schools is needed.

Objective: The purpose of this study was to design the very first web-based information system to monitor School-based Nutrition Promotion (SBNP) program implementation using the experience of the Nutrition Goes to School (NGTS) Program in Indonesia.

Methods: The development of this information system consisted of two main activities, namely: (1) identifying the key monitoring indicators, 2) developing the information system through several specific steps, such as providing high-fidelity mockup, testing the usability from the high-fidelity mock-up, developing the application based on the usability test result, and evaluating the application using User Acceptance Test (UAT) form to check the functionality of the system to make sure that the target users can input the required information and get back usable result for further needs (n=5). Qualitative information based on Technology Acceptance Model (TAM) was also obtained to understand both the perceived usefulness and ease of use of the system from the user's perspective.

Results: This study found that the monitoring indicators reflected the variations in the progress of activities conducted by the partner schools in the NGTS Program, and 100% of the system features were executed according to their functions. Respondents confirmed that the information system was easy to use and beneficial to them in reporting the activity progress of their schools and SEAMEO RECFON in monitoring the NGTS program implementation.

Conclusions: This study developed effective monitoring indicators and an information system for the NGTS program, demonstrating full functionality and positive user feedback, along with a comprehensive user guide to ensure ease of use.

Keywords: information system, Nutrition Goes to School (NGTS), school-based nutrition program; SIPP-NGTS, web-based program monitoring

School-based nutrition education improves breakfast-related personal influences and behavior of Indonesian adolescents: A cluster randomized controlled study

Rahayu Indriasari[1,2], Ulfah Nadjamuddin[1], Dian Sidik Arsyad[3], and Dwi Nastiti Iswarawanti[2,4].

[1]Department of Nutrition Science, Faculty of Public Health, Hasanuddin University, Makassar, South Sulawesi 90245, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) – Pusat Kajian Gizi Regional (PKGR) Universitas Indonesia, Indonesia
[3]Department of Epidemiology, Faculty of Public Health, Hasanuddin University, Makassar, South Sulawesi 90245, Indonesia
[4]Institute of Health Science of Kuningan, Kuningan, West Java 45561, Indonesia

Background: Many adolescents in developing countries skip breakfast. Innovative nutrition education (NE) strategies are needed to enhance knowledge and skills related to the breakfasts of adolescents in a low socioeconomic setting.

Objectives: The study aimed to evaluate short- and long-term effects of a multi-strategy, school-based NE intervention on adolescents' breakfast-related personal influences and behaviors.

Methods: This intervention study used a cluster randomized controlled trial design and was conducted in 4 senior high schools in Makassar, Indonesia. The multi-strategy NE intervention was delivered for 3 months. Data were collected using a self-administered questionnaire and a 3-day breakfast recall (face-to-face interview). Wilcoxon, McNemar, and Mann-Whitney tests were used to determine intra- and intergroup differences.

Results: Unlike knowledge, improvement was observed in attitude and self-efficacy scores in the intervention groups (IGs) (P < 0.01) but no significant changes were observed in the control group (CG). More students showed improved motivation in the IG than in the CG (P > 0.05). Changes in breakfast frequency and macronutrient intake from breakfast were greater in the IG than in the CG (P < 0.05).

Conclusions: A multi-strategy NE intervention is effective in producing positive changes in breakfast-related attitude, self-efficacy, and motivation of adolescents from a low-middle socioeconomic setting. The intervention improved breakfast frequency and nutrient intake. This intervention has promise for sustaining the observed changes over the long-term.

SEAMEO RECFON

Southeast Asian Ministers of Education Organization
Regional Centre for Food and Nutrition
2025

SEAMEO RECFON Office

Jl. Utan Kayu Raya No.1A, RT.1/RW.8, Utan Kayu Utara, Kec.
Matraman, Kota Jakarta Timur, Daerah Khusus Ibukota Jakarta 13120

www.seameo-recfon.org   information@seameo-recfon.org