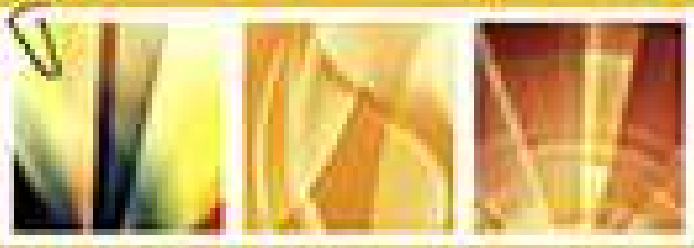


# HLS

Journal of Health Law, Ethics and Regulation



## Healthcare in Low-resource Settings

## Editorial Board

### Editor-in-Chief

#### **Luigi Barberini**

University of Cagliari and University Hospital of Cagliari, Italy | [Curriculum Vitae](#)

### Associate Editors

#### *Gavino Faa*

Professor Emeritus, Department of Medical Sciences and Public Health, University of Cagliari, Italy

#### *Federica Sancassiani*

Department of Medical Sciences and Public Health, University of Cagliari, Italy

### Editorial Board

#### *Saurav Basu*

Indian Institute of Public Health (Public Health Foundation of India), New Delhi, India

#### *Mauro Carta*

Department of Medical Sciences and Public Health, University of Cagliari, Italy

#### *Vittorio Colizzi*

University of Rome Tor Vergata, Italy and Faculty of Science & Technology, Evangelic University of Cameroon

#### *Claudia Fattuoni*

Department of Chemical and Geological Sciences, University of Cagliari, Italy

#### *Simona Gurzu*

George Emil Palade University of Medicine, Pharmacy, Sciences and Technology, Targu-Mures, Romania (UMFST)

#### *Uzzam Ahmed Khawaja*

Division of Pulmonary Medicine and Critical Care, Medicare Cardiac and General Hospital (MCGH), Karachi, Pakistan

#### *Mohsen Khosravi*

Department of Psychiatry and Clinical Psychology, Zahedan University of Medical Sciences, Zahedan, Iran

#### *Massimo Migani*

All Souls Mission, Mutoko, Zimbabwe

#### *Paul Farai Matsvimbo*

Provincial Medical Director for Mashonaland East Province, Zimbabwe

#### *Roy Rillera Marzo*

Department Chair of Public Health, International Medical School, Management and Science University, Malaysia

*Zamzaliza Abdul Mulud*

Faculty of Health Sciences, Universiti Teknologi MARA Selangor, Puncak Alam, Selangor, Malaysia

*Tolbert Nyenswah*

Johns Hopkins University Bloomberg School of Public Health, United States

*Salvatore Sardo*

Department of Medical Sciences and Public Health, University of Cagliari, Italy

#### FOR AUTHORS

##### **SUBMIT YOUR PAPER**

[Guide for Authors](#)

[Benefits for Authors](#)

[How to write a Scientific paper](#)

[How to write a Review article](#)

[Article Processing Charge](#)

#### FOR REVIEWERS

[Benefits for Reviewers](#)

[How to Review](#)

[Thanks to Reviewers](#)

#### INDEXING

[Scopus](#)

[Clarivate](#)

[DOAJ](#)

[Google Scholar](#)

[OpenAlex](#)

[Analytics](#)

#### MOST READ LAST MONTH

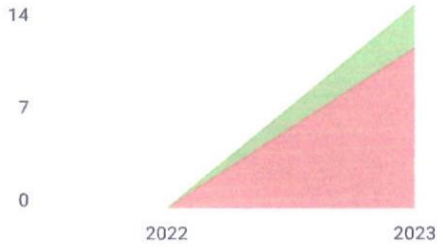
[Efficacy and safety of Camosunate for the treatment of uncomplicated malaria in the University of Benin Teaching Hospital, Benin City, Nigeria](#)

📄 168

[Analysis of the potential reasons for repeated radiography: a study in a](#)



Cited documents    Uncited documents



Documents cited by public policy (Overton)



Documents related to SDGs (UN)

**Healthcare in Low-Resource Settings**



← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimagor.com" >
```

**SCImago Graphica**

Explore, visually communicate and make sense of data with our [new data visualization tool](#).



Metrics based on Scopus® data as of March 2024

**Leave a comment**

Name

Email

(will not be published)

HOME ARCHIVES

Vol. 11 No. 2 (2023): Transforming Healthcare in Low-Resource Settings: a Multidisciplinary Approach Towards Sustainable Solutions, Part I

## Vol. 11 No. 2 (2023): Transforming Healthcare in Low- Resource Settings: a Multidisciplinary Approach Towards Sustainable Solutions, Part I

Published: 28-12-2023



### TRANSFORMING HEALTHCARE IN LOW-RESOURCE SETTINGS



#### Transmission rate factors among tuberculosis patients in West Kalimantan, Indonesia

Nita Arisanti Yulanda, Kharisma Aji Martadi, Titan Ligita, Ikbal Fradianto, Andikawati Fitriasari

<https://doi.org/10.4081/hls.2023.11799>

0 0 0 0 0

408 PDF: 225 HTML: 8

PDF

HTML



#### Time frame guide for emergency model of care and patient satisfaction in emergency facilities

Hidayatus Sya'diyah, Indra Kurniawan Saputra, Ayu Citra Mayasari, Sukma Ayu Candra Kirana, Diyan Mutyah

<https://doi.org/10.4081/hls.2023.11743>

0 0 0 0 0

597 PDF: 165 HTML: 7

PDF

HTML



#### The relationship between food quantity and diversity with stunting incidence in Indonesia

Noer Kumala Indahsari, Olivia Hertiani, Masfufatun Masfufatun

<https://doi.org/10.4081/hls.2023.11773>

0 0 0 0 0

427 PDF: 206 HTML: 13

PDF

HTML



#### The effect of coping intervention on maternal competency in caring for premature infants at home

Rinik Eko Kapti, Yuni Sufyanti Arief, Mira Triharini, Qori 'ila Saidah, Ari Damayanti Wahyuningrum

<https://doi.org/10.4081/hls.2023.11796>

0 0 0 0 0

590 PDF: 200 HTML: 3

PDF

HTML



### Dark chocolate as a non-pharmacological alternative to reduce dysmenorrhea in adolescents

Ferina Ferina, Dian Nur Hadiani, Yulia Ulfah Fatimah

<https://doi.org/10.4081/hls.2023.11809>

0 0 0 0 0

735 PDF: 290 HTML: 4

PDF

HTML



### The effect of *Dayak* onion brewed water in reducing blood pressure and mean arterial pressure (MAP) in hypertensive patients

Diah Setiani, Rahmawati Shoufiah, Hesti Prawita Widiastuti, Indah Nur Imamah, Rivan Firdaus, Frana Andrianur

<https://doi.org/10.4081/hls.2023.11776>

0 0 0 0 0

451 PDF: 168 HTML: 9

PDF

HTML



### The role of family healthcare in the social development of vulnerable school-aged children groups

Hilda Mazarina Devi, Ronasari Mahaji Putri, Yanti Rosdiana

<https://doi.org/10.4081/hls.2023.11798>

0 0 0 0 0

336 PDF: 158 HTML: 28

PDF

HTML



### Optical membrane for visual screening of mercury determination in drinking water based on polyvinyl chloride and dioctyl sebacate



### Development of a spiritual-based palliative care model for the quality of life of people with HIV/AIDS

Rohman Rohman, Nursalam Nursalam, Tintin Sukartini, Hamidah Hamidah, Supatmi Supatmi, Diah Priyantini, Daviq Ayatulloh, Miciko Umeda

<https://doi.org/10.4081/hls.2023.11737>

0 0 0 0 0 0

455 PDF: 203 HTML: 7



### Evaluating the effect of dental explosion boxes on oral health awareness in preschoolers

Dewi Sodja Laela, Indah Fauziah, Ulfah Utami, Megananda Hiranya Putri, Yonan Heriyanto, Neneng Nurjanah, Irwan Supriyanto, Deru Marah Laut, Nurul Fatikhah, Devy Octaviana

<https://doi.org/10.4081/hls.2023.11750>

0 0 0 0 0 0

477 PDF: 232 HTML: 7



### Effect of using cassava and glycerol as food storage on the quality of bioplastic packaged food

Yosephina Ardiani Supardi, Mimin Karmini

<https://doi.org/10.4081/hls.2023.11778>

0 0 0 0 0 0

787 PDF: 224 HTML: 18



### Factors affecting individual beliefs associated with the quality of life of traditional divers in the coastal area

PDF

HTML



### Cancer risk factors associated with historical contraceptive use and breastfeeding duration

Pipit Feriani, Esti Yunitasari, Ferry Efendi, Ilya Krisnana, Rini Ernawati, Reny Mareta Sari, Nurus Safaah

<https://doi.org/10.4081/hls.2023.11812>

1 0 0 0 0

383 PDF: 177 HTML: 5

PDF

HTML



### The relationship between knowledge and social support with sexual behavior in adolescents

Puji Hastuti, Alesya Putri Jayanti, Astrida Budiarti, Iis Fatimawati

<https://doi.org/10.4081/hls.2023.11762>

0 0 0 0 0

540 PDF: 162 HTML: 3

PDF

HTML



### Increasing young women's knowledge of early marriage issues through audiovisual media intervention

Ega Ersya Urnia, Dini Indo Virawati, Cristinawati B.R. Haloho

<https://doi.org/10.4081/hls.2023.11734>

0 0 0 0 0

560 PDF: 186 HTML: 13

PDF

HTML

### Effectiveness of prenatal yoga on pregnant women's anxiety and duration of labour

Diyan Indrayani, Titi Legiati, Chris Sriyanti

<https://doi.org/10.4081/hls.2023.11763>

0 0 0 0 0



PDF

HTML

### Effect of E-Duva application on knowledge and attitude of visual inspection using acetic acid (VIA) among women of childbearing age

Jasmawati Jasmawati, Siti Raihanah, Ratna Wati

<https://doi.org/10.4081/hls.2023.11789>

0 0 0 0 0

336 PDF: 146 HTML: 5

PDF

HTML

### The effect of family empowerment through education and mentoring on increasing knowledge of exclusive breastfeeding

Kamsatun Kamsatun

<https://doi.org/10.4081/hls.2023.11793>

1 0 0 0 0

423 PDF: 183 HTML: 11

PDF

HTML

### Integration in nursing curriculum for building Islamic nurses' character in Indonesia: a descriptive qualitative approach

Dwi Setiowati, Waras Budi Utomo, Marisca Agustina

<https://doi.org/10.4081/hls.2023.11739>

0 0 0 0 0

332 PDF: 160 HTML: 6

PDF

HTML

### Efficacy of turmeric (*Curcuma longa* Linn) decoction to reduce pain in patients with gastritis

Ismansyah Ismansyah, Frana Andrianur, Rini Ernawati

<https://doi.org/10.4081/hls.2023.11729>

0 0 0 0 0

926 PDF: 274 HTML: 12

PDF

HTML

## Bay leaf decoction water and low-impact aerobic exercise impact on blood cholesterol levels

Ismansyah Ismansyah, Arifin Hidayat, Rini Ernawati

<https://doi.org/10.4081/hls.2023.11733>

0 0 0 0 0

1049 PDF: 299 HTML: 8

PDF HTML

## The influence of religious well-being on the resilience of family spirituality during the COVID-19 pandemic

Yoyok Beki Prasetyo, Faridi Faridi, Nur Lailatul Masruroh, Nur Melizza, Sita Afkarina Mutmainnah

<https://doi.org/10.4081/hls.2023.11747>

0 0 0 0 0

642 PDF: 212 HTML: 50

PDF HTML

## The effect of ethanol extract of *Cosmos caudatus* leaves on the percentage of the cell cycle in *Candida albicans* culture

Lidia Lushinta, Heni Suryani

<https://doi.org/10.4081/hls.2023.11754>

0 0 0 0 0

542 PDF: 172 HTML: 10

PDF HTML

## Relationship between CGOL (Chlorophyll, Ginger, Orange, and Lemongrass) consumption and confirmed COVID-19 cases on pregnant women

Diyan Indriyani, Esti Yunitasari, Ferry Efendi

<https://doi.org/10.4081/hls.2023.11749>

1 0 0 0 0

387 PDF: 172 HTML: 5

PDF HTML

## The impact of soil-transmitted helminths infection on growth impairment: systematic review and meta analysis

James Hadiputra Sunarpo, Kartika Ishartadiati, Andra Agnez Al Aska, Sukma Sahadewa, Ayling Sanjaya

<https://doi.org/10.4081/hls.2023.11742>

0 0 0 0

690 PDF: 18g Supplementary Materials: 11 HTML: 32

PDF

SUPPLEMENTARY MATERIALS

HTML

## The effectiveness of project-based learning on students' academic achievement in emergency nursing study

Arista Maisyaroh, Eko Prasetya Widiyanto, Syaifuddin Kurnianto

<https://doi.org/10.4081/hls.2023.11757>

1 0 0 0

555 PDF: 218 HTML: 6

PDF

HTML

## Nursing student perspectives on clinical instructor performance

Rizeki Dwi Fibriansari, Anggia Astuti, Zainal Abidin

<https://doi.org/10.4081/hls.2023.11758>

0 0 0 0

786 PDF: 287 HTML: 4

PDF

HTML

## The journey of Indonesian nurse migration: a scoping review

Rifky Octavia Pradipta, Ferry Efendi, Abdullah Saleh Alruwaili, Mohammad Rizal Diansya, Anna Kurniati

<https://doi.org/10.4081/hls.2023.11834>

0 0 0 0

650 PDF: 306 Supplementary Materials: 13

HTML: 36

PDF

SUPPLEMENTARY MATERIALS

HTML

## Antibacterial and antibiofilm effects of gold and silver nanoparticles against the uropathogenic *Escherichia coli* by scanning electron microscopy (SEM) analysis

Rini Purbowati, Vania Mitha Pratiwi, Masfufatun Masfufatun, Putu Oky Ari Tania, Ali Khumaeni

<https://doi.org/10.4081/hls.2023.11748>

📄 0 🌱 0 🔄 0 🕒 0

👁️ 527 📄 PDF: 183 👁️ HTML: 8

📄 PDF

📄 HTML

## Relationship between nurses knowledge level and workload about implementation of patient identification

Arsyawina Arsyawina, Hilda Hilda, Supriadi Supriadi, Hesti Prawita Widiastuti, Annisa Syaputri, Joko Spto Pramono

<https://doi.org/10.4081/hls.2023.11756>

📄 0 🌱 0 🔄 0 🕒 0

👁️ 791 📄 PDF: 222 👁️ HTML: 15

📄 PDF

📄 HTML

## The effect of five activities daily living on improving cognitive function in ischemic stroke patients

Frana Andrianur, Dwi Prihatin Era, Arifin Hidayat, Ismansyah Ismansyah, Diah Setiani

<https://doi.org/10.4081/hls.2023.11730>

📄 0 🌱 0 🔄 0 🕒 0

👁️ 557 📄 PDF: 290 👁️ HTML: 9

📄 PDF

📄 HTML

## The impact of sleep toward executive functions among rapidly rotating shift nurses of emergency departments in Indonesia

Lilis Setyowati, Hsiao-Yean Chiu, Anggraini Dwi Kurnia, Nur Aini, Erma Wahyu Mashfufa, Ollyvia Freeska Dwi Marta

<https://doi.org/10.4081/hls.2023.11744>

📄 0 🌱 0 🔄 0 🕒 0

👁️ 476 📄 PDF: 180 👁️ HTML: 10

📄 PDF

📄 HTML

## The effect of dayak ginger (*Zingiber Officinale Roscoe*) extraction in ginger cookies in reducing emesis gravidarum severity among pregnant women

Ririn Ariyanti, Melyana Nurul Widyawati, Nurasmi Nurasmi, Mardhiana Mardhiana, Ika Yulianti

<https://doi.org/10.4081/hls.2023.11753>

0 0 0 0 0

410 PDF: 217 HTML: 6

PDF HTML

## Identifying the risk factors of schistosomiasis in Indonesia

Christine Christine, Herlina Susanto Sunuh, Fellysca Veronica Margareth Politon, Diana Vanda Daturara Doda

<https://doi.org/10.4081/hls.2023.11760>

0 0 0 0 0

626 PDF: 234 HTML: 8

PDF HTML

## The effect of pregnant mother assistance on stunting prevention behavior

Nursyahid Siregar, Evy Nurachma, Siti Raihanah

<https://doi.org/10.4081/hls.2023.11728>

0 0 0 0 0

356 PDF: 209 HTML: 4

PDF HTML

### FOR AUTHORS

#### SUBMIT YOUR PAPER

Guide for Authors

Benefits for Authors

How to write a Scientific paper

How to write a Review article

Article Processing Charge

### FOR REVIEWERS

# The relationship between food quantity and diversity with stunting incidence in Indonesia

Noer Kumala Indahsari, Olivia Herliani, Masfufatun Masfufatun

Department of Biochemistry, Faculty of Medicine, Universitas Wijaya Kusuma Surabaya, Surabaya, Indonesia

Correspondence: Noer Kumala Indahsari, Department of Biochemistry, Faculty of Medicine, Universitas Wijaya Kusuma Surabaya, Surabaya, Indonesia.  
E-mail: noerkumala@uwks.ac.id

Key words: food quality; food quantity; stunting; toddlers.

Contributions: NKI conceptualization, data curation, formal analysis, methodology, validation, visualization, writing – original draft, review & editing; OH conceptualization, methodology, formal analysis, validation, and writing – original draft, review & editing; methodology, visualization, writing – review & editing; resources, investigation, and writing –review & editing; MM formal analysis, validation, writing – review & editing; resources, supervision, and writing –review & editing; resources, investigation, and writing – review & editing.

Conflict of interest: the authors declare no conflict of interest.

Ethics approval and consent to participate: the research has received ethical approval from the Health Research Ethics Commission, Faculty of Medicine, Universitas Wijaya Kusuma Surabaya, based on ethical certificate No.79/SLE/FK/UWKS/2022. During the research, the researcher pays attention to the ethical principles of information to consent, respect for human rights, beneficence and non-maleficence.

Patient consent for publication: written informed consent was obtained for making patient information to be published in this article.

Funding: this research was supported by a research grant from Universitas Wijaya Kusuma Surabaya with contract number 82/LPPM/UWKS/IV/2022.

Availability of data and materials: all data generated or analyzed during this study are included in this published article.

Acknowledgement: we would like to thank to Universitas Wijaya Kusuma Surabaya for their valuable insight and contributions to this study and manuscript writing.

Received: 12 September 2023.  
Accepted: 14 November 2023.  
Early access: 24 November 2023.

This work is licensed under a Creative Commons Attribution 4.0 License (by-nc 4.0).

©Copyright: the Author(s), 2023  
Licensee PAGEPress, Italy  
Healthcare in Low-resource Settings 2023; 11:11773  
doi:10.4081/hls.2023.11773

*Publisher's note: all claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article or claim that may be made by its manufacturer is not guaranteed or endorsed by the publisher.*

## Abstract

Stunting often a result of inadequate nutrition or malnutrition, can be mitigated by ensuring both sufficient food quantity and dietary diversity. This study aimed to explore the relationship between food quantity and diversity with stunting incidence in toddlers. Employed a cross-sectional design, this observational research involved 39 randomly selected toddlers from a Surabaya Public Health Center in Indonesia. Researchers assessed nutritional status, diagnosing stunting using anthropometric measurements. Food quantity and diversity in the children's diets were evaluated through a semi-Food Frequency Questionnaire (FFQ). Data analysis was conducted using the Chi-Square test in the Statistical Package for the Social Sciences (SPSS). The study revealed a significant relationship ( $p=0.001$ ) between dietary diversity with stunting incidence but found no significant link ( $p=0.892$ ) between food quantity with stunting. Stunting has multifactorial causes, some originating even before a child's birth. After birth, several factors beyond dietary patterns influence stunting. Thus, addressing the causes of stunting necessitates a case-by-case approach and tailored interventions for each child.

## Introduction

Growth is an important factor in a child's maturation process.<sup>1</sup> When a child fails to reach a common standard height for their age, they can be classified as stunted. It is crucial to fully understand the potential causes and how to address the issue of stunting in children, as stunting leads to irreversible physical and mental damage in the next generation. The prevalence of stunting in toddlers in Southeast Asia ranks first worldwide, according to World Health Organization (WHO) data from 2010 to 2020. The incidence of stunting has been decreasing compared to 2010 (41.60%) but remains high, at 30.10% in 2020. The percentage of stunting in Southeast Asian countries in 2020 is nearly the same as that in African countries, at 31.70%. In 2020, the incidence of stunting among children under five is only 5.70% in European countries and 8.90% in American countries.<sup>2</sup> The high prevalence of stunting is also observed in Indonesia, a Southeast Asian nation. In 2019, the incidence of stunting in Indonesia reached 27.7%, meaning that 28 out of 100 toddlers are affected.<sup>3</sup>

The WHO has established six Global Nutrition Targets for 2025, including a 40% reduction in stunting among children under five.<sup>4</sup> Stunting is a significant concern for both the WHO and the Indonesian government due to its negative short-term and long-term impacts. In the short term, stunting increases mortality and morbidity hampers cognitive and motor abilities, and leads to higher healthcare costs.<sup>4,5</sup> In the long term, stunted individuals may experience short stature, higher obesity rates, reproductive health issues, reduced educational performance, decreased learning abilities, and diminished work capacity and productivity.<sup>5,6</sup>

These impacts are particularly prevalent in lower middle-class economies, particularly in Southeast Asia and Africa.<sup>7</sup>

The leading cause of stunting in preschool-aged children is inadequate fulfillment of nutrition and nutritional energy<sup>8,9</sup>. The results of a study in four villages in Central Java, Indonesia, showed that changes in children's eating patterns were a significant factor in nutritional disorders.<sup>10</sup> Another study emphasized that maternal nutrition deficiency, undernutrition during pregnancy, absence of exclusive breastfeeding (up to six months of age), insufficient complementary feeding, and malabsorption or infectious diseases may lead to nutritional stunting.<sup>11</sup> Yet another study underlines that parents need to be informed about guidelines for healthy eating patterns and the health risks their children may face due to inadequate nutrition. This can change their priorities and perceptions regarding their children's nutrition. Providing better nutrition to children can change their eating patterns.<sup>12</sup> This study aims to identify eating patterns by classifying the quantity, type, and frequency of the food given to children, considering the various age ranges of children. Parental provision of children's nutrition is depicted in terms of the mother's education and the family's income rate. The high prevalence of stunting in the world, as well as in Surabaya, Indonesia, the short-term and long-term adverse effects of stunting, changes in children's eating patterns as preventive measures and for stunting management, form the basis for this research. This study aimed to analyze the relationship between the quantity and diversity of food and the incidence of stunting in toddlers.

## Materials and Methods

### Design study

This research employed a descriptive observational design and utilized a cross-sectional study design. The study was conducted in Surabaya Regency, East Java Province, over a period of approximately four months in late 2022.

### Population and sample

The sample for this study consisted of 39 toddlers from a Public Health Center in Surabaya, selected randomly using a simple random sampling method. The samples were chosen from invitations extended to approximately one hundred toddlers in 15 integrated toddler service centers, both stunted and non-stunted. These toddlers attended the health service center, and a sample of 39 stunted and non-stunted children was ultimately selected. Public health center officers assisted in filtering samples that met the inclusion criteria. This included toddlers who came to the Community Health Center for health check-ups and were willing to participate as respondents by providing informed consent, which was deemed ethically appropriate. Exclusion criteria applied to toddlers who were unwell, unable to visit a health service center, or unwilling to sign an informed consent.

### Data collection

The variables measured in this study included the incidence of stunting, as well as the variety and quantity of food consumed by children under five. All research variables were considered primary. The following methods and instruments were used for research variables. Nutritional status was assessed through anthropometric measurements, including the child's height/length and weight. Measurements were conducted twice: first by public health center officers to screen potential child samples, and second by the

researchers on the day of data collection. Data collected on the day of data collection was used for analysis. The diversity and quantity of children's diets were evaluated using a semi-food frequency questionnaire (FFQ) validated in the "Guidelines for Measuring Household and Individual Dietary Diversity" by the Food and Agriculture Organization (FAO) of the United Nations.<sup>13</sup> The original guideline served as the framework and was adapted to suit Indonesian food patterns. The FFQs were completed by parents or caregivers responsible for the children's daily nutrition.

### Data analysis

Research data, comprising anthropometric measurements (body weight, height) and questionnaires regarding diet and food diversity, were collected. The data were subsequently analyzed using SPSS for Windows version 16. The Chi-Square Test was employed to determine differences in food diversity and its relationship to the number of toddlers' diets.

## Results

Based on Table 1, the characteristics of the respondents are as follows: Data was collected from a sample of 39 children under the age of five. Of these children, 23 (58.97%) were female. The

**Table 1.** Characteristics of research respondents (N=39).

Characteristics of respondents	Number of respondents	
	N	%
Toddler gender		
Man	16	41.03
Women	23	58.97
Toddler age (months)		
1-10	3	7.69
11-20	6	15.38
21-30	13	33.33
31-40	9	23.08
41-50	4	10.26
51-60	4	10.26
An Educational History of the Mother of the Toddler		
Elementary school	4	10
Junior high school	4	10
Senior high school	27	69
Diploma	1	3
Bachelor degree	3	8
Parental income history (IDR)		
<4 million	33	85
4-4.5 million	6	15
>4.5 million	0	0
Food diversity		
Not enough	6	15.4
Enough	22	56.4
Good	11	28.2
Food quantity		
Hard to eat	6	15.4
Sometimes/normally	25	64.1
Really like	8	20.5
Stunting		
Severe stunted	8	20.5
Stunted	21	53.8
Normal	10	25.7
Total	39	100

largest age group among the children was 21-30 months, consisting of 13 children (33.33%). The background of the toddlers' parents was described based on maternal education and family income. Most of the mothers had completed high school (27 individuals, 69%). The majority of parents reported a monthly income of less than IDR 4 million. Height measurements (in centimeters) were compared with the standard anthropometric heights for children based on their age (in months) and sex. A total of 21 children (53.84%) were classified as short.

Food diversity is determined by categorizing the foods in the questionnaire based on their functions, which include carbohydrates (as an energy source), proteins, lipid sources, vitamins, and minerals. Examples of food sources in each category are provided for selection by caregivers. For instance, carbohydrate sources include rice, potatoes, corn, bread, and cereals. Protein and lipid sources encompass fish, meat, legumes, nuts, eggs, milk, and butter. Vitamins and minerals sources include foods like spinach, cabbage, broccoli, carrots, tomatoes, apples, oranges, mangoes, bananas, and water, among others. Food quantity is assessed by inquiring about eating frequency, snack frequency, and the amount of each meal provided. For example, caregivers are asked how much water (in liters) the child consumes in a day.

Based on the data from Table 2, the results indicate a significant relationship between food diversity and the incidence of stunting at the Public Health Center in Surabaya, Indonesia. This relationship is supported by statistical analysis using SPSS for Windows 16, with a p-value of 0.001. However, for the relationship between food quantity and the incidence of stunting at the Public Health Center, there is no evidence of a significant relationship, as the p-value is 0.892, which is greater than 0.05.

## Discussion

A similar study conducted in Bangka Belitung yielded results indicating a significant correlation between eating patterns with the incidence of stunting in children under five years old. Negative eating behavior was associated with a 4.89 times higher likelihood of stunting compared to positive eating behavior. The data collection instruments used in that research, including height measurement, height-for-age standard graphics, the Child Feeding Questionnaire (CFQ), and the Child Eating Behavior Questionnaire (CEBQ), were quite similar to those used in this study. The findings from the Bangka Belitung research align with the results of our study.<sup>14,15</sup>

The fulfillment of proper nutrition for children differs for each age group. Babies aged 0-6 months receive balanced nutrition exclusively through breastfeeding, as breast milk is considered the

gold standard for baby nutrition, containing all the necessary nutrients.<sup>16,17</sup> Infants and children aged 6-24 months are in a period of rapid growth and development, with increasing physical activity and a higher risk of exposure to infection. Complementary foods are introduced alongside continued breastfeeding, which is recommended until the age of 2 years.<sup>16</sup> This stage also involves teaching clean living habits to prevent infectious diseases. Children aged 2-5 years experience rapid growth and high physical activity levels, often making their own food choices. Therefore, the quantity and variety of their food must receive special attention. A balanced diet in sufficient quantities, consumed regularly, is essential for achieving balanced nutrition. Clean living habits are equally important and must be emphasized.<sup>18,19</sup>

Food diversity involves various food groups, including staple foods, side dishes, vegetables, fruits, and water, with diversity within each group. This diversity is vital for maintaining a balanced nutritional diet. Dietary Diversity Score is a measure of diversity in food consumption that is built through assessing the quality and quantity of nutrition for children under five. A diverse range of food types, consumed in sufficient quantities, leads to higher dietary diversity scores, resulting in excellent nutritional status for children under five.<sup>20</sup>

While prenatal and postnatal nutritional deficiencies and enteric and systemic infections contribute to stunting, several studies emphasize the primary role of Environmental Enteric Dysfunction (EED). EED is a common disorder affecting the structure and function of the small intestine and is prevalent in children living in areas with poor sanitation. Mechanisms leading to growth failure in EED include intestinal "leakage," high intestinal permeability, intestinal inflammation, bacterial translocation, systemic inflammation, and nutrient malabsorption.<sup>21,22</sup>

Preventing stunting offers more diverse short- and long-term benefits compared to managing its consequences. Prioritizing stunting prevention requires the involvement of decision-makers, program designers, and implementers. Stunting prevention programs should address conditions specific to each age group, such as promoting exclusive breastfeeding for babies aged 0-6 months, ensuring adequate complementary food for babies over 6 months up to 2 years old, and establishing physical activity programs to stimulate growth in children aged 2-5 years. These prevention programs should conclude with the evaluation of program results, especially through height measurements.<sup>23,24</sup> This study has several limitations, and more trustworthy results could be achieved by increasing the sample size or conducting research on a larger scale. Additionally, conducting research for specific age ranges and considering the gender of the children could provide more specific results, as there are indications that gender influences children's eating habits.

**Table 2.** Relationship between diversity and food quantity with stunting.

Variables	Nutritional status			Total	p
	Severe stunted	Stunted	Normal		
Food diversity					
Not enough	4	7	0	11	0.001
Enough	3	13	3	19	
Good	1	1	7	9	
Food quantity					
Hard to eat	2	3	1	6	0.892
Sometimes/normally	4	14	7	25	
Really like	2	4	2	8	



## Conclusions

The study revealed a significant relationship between food diversity with the incidence of stunting. However, it did not find a significant relationship between food quantity with stunting. This implies that stunting is influenced by a multitude of complex factors, including maternal eating patterns, sanitation, parenting, and more. Therefore, focusing solely on dietary factors, such as quantity and diversity, may not be sufficient to address stunting comprehensively. Based on these findings, it is advisable to conduct further research by segmenting the sample into gender-specific groups and considering different stages of dietary needs for infants, babies, and children. Furthermore, targeted interventions, such as economic stimulation and health education, are needed to enhance family income and maternal knowledge. These interventions require active involvement from healthcare providers, the government, and the community to effectively combat stunting.

## References

1. Taqwin T, Ramadhan K, Hadriani H, et al. Prevalence of stunting among 10-year old children in Indonesia. *J Glob Pharma Technol* 2020;12:768-75.
2. WHO. Stunting prevalence among children under 5 years of age (%) (model-based estimates) [Internet]. The Global Health Observatory Explore a world of health data. 2023 [cited 2023 Mar 3]. Available from: <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-jme-stunting-prevalence>
3. BPS. PROFIL STATISTIK KESEHATAN 2019 [HEALTH STATISTIC PROFILE 2019]. 4201005th ed. Santoso B, editor. Jakarta: ©Badan Pusat Statistik, Jakarta - Indonesia; 2019. 1-14 p.
4. Kemenkes. buletin stunting 2018 [Stunting Bulletin 2018]. 2018;1163-78.
5. Maulina R, Qomaruddin MB, Prasetyo B, et al. The Effect of Stunting on the Cognitive Development in Children: A Systematic Review and Meta-analysis. *Stud Ethno-Med* 2023;17:19-27.
6. Mustakim MRD, Irawanto, Irawan R, et al. Impact of Stunting on Development of Children between 1-3 Years of Age. *Ethiop J Health Sci* 2022;32:569-78.
7. Rachmah Q, Mahmudiono T, Loh SP. Predictor of Obese Mothers and Stunted Children in the Same Roof: A Population-Based Study in the Urban Poor Setting Indonesia. *Front Nutr* 2021;8:710588.
8. Kinyoki DK, Ross JM, Lazzar-Atwood A, et al. Mapping local patterns of childhood overweight and wasting in low- and middle-income countries between 2000 and 2017. *Nat Med* 2020;26:750-9.
9. Surani E, Susilowati E. The Relationship Between Fulfilment of Basic Needs with the Incidence of Stunting In Toddlers. *J Ners* 2020;15:26-30.
10. Prendergast AJ, Humphrey JH. The stunting syndrome in developing countries. *Paediatr Int Child Health* 2014;34:250.
11. De Sanctis V, Soliman A, Alaaraj N, et al. Early and Long-term Consequences of Nutritional Stunting: From Childhood to Adulthood. *Acta Biomed* 2021;92:e2021168.
12. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: Conception to adolescence. *J Law Med Ethics* 2007;35:22-34.
13. Kennedy G, Ballard T, Dop M. Guidelines for measuring household and individual dietary diversity. Food and Agriculture Organization of the United Nations (FAO). European Union: Policy and Support Branch, Office of Knowledge Exchange, Research and Extension, FAO; 2010. 1-60 p.
14. Diana R, Rachmayanti RD, Khomsan A, Riyadi H. Influence of eating concept on eating behavior and stunting in Indonesian Madurese ethnic group. *J Ethn Foods*. 2022;9(1).
15. Elni E, Julianti E. The Correlation between Feeding Habit Factor and The Incidence of Stunting in Children Under Five Years. *J Keperawatan Padjadjaran*. 2020;8(3):283-91.
16. Sebayang SKKSK, Dibley MJMJ, Astutik E, Efendi F, Kelly PJJPJ, Li M. Determinants of age-appropriate breastfeeding, dietary diversity, and consumption of animal source foods among Indonesian children. *Matern Child Nutr* 2020;16:48.
17. Mok KT, Tung SEH, Kaur S. Picky Eating Behaviour, Feeding Practices, Dietary Habits, Weight Status and Cognitive Function Among School Children in Kuala Lumpur, Malaysia. *Malaysian J Med Heal Sci* 2022;18:10-8.
18. Kemenkes. Peraturan Menteri Kesehatan Republik Indonesia no 41 tahun 2014 [Regulation of the Minister of Health of the Republic of Indonesia no 41 of 2014]. Jakarta; 2014.
19. Krisnana I, Azizah R, Kusumaningrum T, Has EMM. Feeding patterns of children with stunting based on WHO (world health organization) determinant factors of behaviours approach. *Indian J Public Heal Res Dev* 2019;10:2756-61.
20. Yari Z, Amini M, Rasekhi H, et al. Dietary diversity and its relationship with nutritional adequacy in 24 to 59 months old children in Iran: study protocol. *BMC Nutr* 2022;8:118.
21. Kuralneethi S, Sariman S, Ulaganathan V. Gender and age differences in the relationship between calorie, macronutrients intake and growth status of school-aged Aboriginal children at Labu, Negeri Sembilan. *Br Food J* 2021;123:1384-96.
22. Owino V, Ahmed T, Freemark M, et al. Environmental enteric dysfunction and growth failure/stunting in global child health. *Pediatrics* 2016;138:e20160641.
23. Mar'Ah Has EM, Asmoro CP, Gua WP. Factors Related to Father's Behavior in Preventing Childhood Stunting Based on Health Belief Model. *J Keperawatan Indones* 2022;25:74-84.
24. Dewey KG, Begum K. Long-term consequences of stunting in early life. *Matern Child Nutr* 2011;7:5-18.