SEMMELWEIS EGYETEM

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Ph.D. értekezések

3486.

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Interdiszciplináris alkalmazott egészségtudományok

című program

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SOCIOECONOMIC DISPARITIES AS PREDICTORS OF NUTRITION INEQUALITIES AMONG CHILDREN UNDER FIVE IN HUNGARY AND INDONESIA

PhD thesis

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Budapest
2026

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LIST OF ABBREVIATIONS

AVE	: average variance extracted
CDs	: Communicable Diseases
CEBQ	: Child Eating Behaviour Questionnaire
CFA	: Confirmatory Factorial Analysis
CR	: composite reliability
CSDH	: Commission on Social Determinants of Health
DOHaD	: Developmental Origins of Health and Disease
DTP	: Diphtheria, Tetanus, and Pertussis
FAO	: Food and Agriculture Organisation
FIES	: Food Insecurity Experience Scale
GHI	: Global Hunger Index
GNKQ-R	: Qualtrics Survey by General Nutrition Knowledge Questionnaire-Revised
HAZ	: height-for-age
HSBC	: Health Behaviour in School-aged Children
HTMT	: Heterotrait-Monotrait Ratio of Correlations
IYCF	: Infant and Young Child Feeding
JKN	: Jaminan Kesehatan Nasional
LMICs	: Low- and Middle-Income Countries
LPA	: Latent Profile Analysis
MGA	: Multi-Group Analysis
MICOM	: Measurement Invariance of Composite Models
MIS	: Minimum Income Schemes
NCDs	: Non-Communicable Diseases
NFI	: Normed Fit Index
PLS-SEM	: Partial Least Squares Structural Equation Modelling
RMSEA	: root mean square error of approximation
SD	: standard deviation
SDG	: Sustainable Development Goal
SDGs	: Sustainable Development Goals
SEM	: Structural Equation Modelling
SES	: Socioeconomic status

SPSS : Statistical Package for the Social Sciences

SRMR : standardised root mean squared residual

UHC : Universal Health Coverage

UNICEF : United Nations International Children's Emergency Fund

VIF : Variance Inflation Factor

WASH : Water, sanitation, and hygiene services

WAZ : weight-for-age

WHO : World Health Organisation

WHZ : weight-for-height

1. INTRODUCTION

1.1 Background

The United Nations 2030 Agenda for 17 Sustainable Development Goals (SDGs) urges all nations to take immediate action to implement these goals. The United Nations announced the goals with multifaceted aims to end poverty, protect the planet, and ensure prosperity for all. It seeks to eliminate health and social disparities (education) while fostering sustainable economic growth (1). At the core of this agenda is nutrition equity, or fair and just access to healthy food for all people, which may allow them to attain their full health potential, become healthier and more productive, and reduce disparities in health and nutrition outcomes among children. However, malnutrition inequalities remain a significant public health problem that disproportionately affects marginalised populations in low and middle-income countries. Socioeconomic development is a fundamental for achieving equitable nutrition, as adequate nutrition can protect children from impaired physical growth, cognitive deficits, and reduced productivity potential (2).

Over 148 million children under five are stunted as a result of chronic undernutrition, and some 45 million are wasted from acute undernutrition. Health reports from 2023 indicate that in low- and middle-income countries, 22.0% of children under five are stunted, 6.8% are wasted, as overweight continues to increase, reaching a high of 5.6%, which is an indicator of nutritional transition with economic growth (3). This double burden of malnutrition is influenced by social factors and the intersection of these factors, such as economic inequality, low levels of education, and the heterogeneous distribution of healthcare facilities (4,5). Healthy food is more accessible in high-income countries due to the well-established food supply system. However, some low-income areas are experiencing food deserts, where residents have limited access to affordable and healthy foods such as whole grains. vegetables, and fruits (6). In low- and middle-income contexts, poverty leads families into a self-perpetuating vicious cycle of food insecurity, where they decide to feel full rather than empty by getting enough calories instead of a balanced diet for adequate dietary diversity (7).

Socioeconomic gradients emerge differently in the higher-income population, where they are facing a higher risk of obesity from overconsumption of calorie-dense processed foods and sedentary behaviour, and the deprived part of the population is still facing a problem with undernutrition. The SDGs by the United Nations emphasise the need to reduce these inequities if we are to achieve good health for all by 2030, with Goal 2 (Zero Hunger) and Goal 10 (Reduced Inequalities) explicitly addressing them (8). Nevertheless, progress in the nutrition

intervention is limited, and we are concerned that socioeconomic disparities have not been thoroughly investigated, particularly their contributions to nutritional inequalities related to child nutrition status, maternal nutrition knowledge, child feeding practices, household food insecurity, and child eating behaviour.

1.2 Socioeconomic Disparities and Child Nutrition

Socioeconomic status (SES) is a multidimensional construct that, among other factors, typically includes indicators of income, education, occupation, and economic resources. Low economic status and a poor wealth index increase the risk of undernutrition (9–11). For example, children from poor households suffer growth impairments as a result of dependence on monotonous, nutrient-poor diets (9). In addition, the higher maternal education can influence health investment behaviour at each stage of early child development (12,13) as well as adjusting the risk of preterm birth (14).

Differences across countries are striking: undernutrition rates for low-SES groups are higher than 30% in sub-Saharan Africa and South Asia, and between 10% and 30% in transitional economies of Eastern Europe and Southeast Asia, where socioeconomic disparities are beginning to emerge due to rapid socioeconomic transitions (15). Children under five years of age are highly vulnerable, since this is a 'window of opportunity' for nutrition interventions. Malnutrition in early life affects more than children; it is detrimental to future generations and sustains a cycle of poverty (16). These patterns require context-specific analyses to unravel the direct and indirect pathways through which socioeconomic factors shape child nutrition.

1.3 Literature review

A nutrient inequality, either a lack of essential nutrients or an overabundance of unhealthy ones, leads to the health problem known as malnutrition. Individuals of all ages are susceptible to developing this illness. Malnutrition can affect people of any age, but it primarily affects children. Malnutrition might indicate either that a child is not eating enough or that they are eating excessively. Both are detrimental to children's health and stunt their growth. Both undernutrition and overnutrition are considered forms of malnutrition (17). In contrast to their typically developing peers, malnourished children often show signs of delayed maturation in terms of character. Long-term impacts of malnutrition in children have been observed, even after successful treatment. Manifests itself in the onset of mental and digestive disorders, which in certain cases might persist for the rest of the person's life. As an added complication, malnutrition in children may make them lose their appetite (18).

The World Health Organisation (WHO) has set a Global Nutrition Target to decrease the

proportion of stunting children under five by 40% by 2030, as well as achieve the second Sustainable Development Goal of Zero Hunger, which seeks to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture (19). The first two years of a child's life (from conception until the child is two years old) are the most crucial for meeting their nutritional requirements (13,20). After the age of two, a child's growth rate slows compared to the preceding period, and children are considered stunted; thus, it is very important that they receive appropriate nutrition to promote their growth and development during this time (21). The existing literature illustrates unequal headways on these targets, as the prevalence of stunting has dropped from 26% in 2012 to 22% in 2020 (22). However, its prevalence increased to 23.2% in 2024, expected to be driven by socioeconomic gaps and impeded by the COVID-19 pandemic, climate-related disruptions (23).

UNICEF developed a comprehensive conceptual framework to explain the causes of child malnutrition in 1998. The UNICEF conceptual framework categorises causes of child malnutrition into three groups: fundamental, underlying, and immediate (24). According to the UNICEF conceptual framework, the social level was the origin of fundamental causes. The usage of human, technical, and environmental resources is constrained by socioeconomic, religio-cultural, and political activities at the societal level. Insufficient information and discriminatory attitudes at the family level impede access to food, good child care practices, water/sanitation, and health services, and are the root causes of child malnutrition. The underlying reasons, in turn, lead to the direct causes of child malnutrition, which may take the form of insufficient food intake and illnesses, culminating in child malnutrition.

UNICEF's framework describes that malnutrition is influenced by individual factors and social community factors. Many previous studies have proven factors that play an important role in the occurrence of malnutrition, including in individual factors: education of parents, especially mothers (12,25), maternal age during pregnancy (26), short maternal stature (27,28), marital status (29,30), short birth spacing (31), hypertension (32), nutritional status of pregnant women (33), supplementation during pregnancy (30), and infectious diseases during pregnancy (34). Black, et.al. highlighted that the modified framework illustrates dietary, behavioural, and health determinants of optimal nutrition, growth and development, and the influences on them by these underlying causes of food security, caregiving resources, and environmental conditions, which are in turn shaped by economic and social conditions, resources, and governance as basic causes of child growth (35). Immediate causes of child growth and development include feeding practices, eating/feeding behaviours, and early child development

(child factors) (35). Child factors, such as birth weight (36), prematurity (37), infectious diseases in infancy: enteropathy, respiratory infections, malaria, fever, and vaccination (38). Child feeding practices include early initiation of lactation (39), exclusive breastfeeding (40), (44) poor quality food consumption: low dietary diversity (41) and animal food sources (42), anti-nutrient content (43), energy content of complementary feeding, and frequency of feeding (44). Meanwhile, social-community factors that affect malnutrition in children include: food insecurity (45), poor feeding practices (46), belief and norms (47), caregivers (48), paternal maternal smoking (49), access to healthcare (50), health insurance (51), social support network (52), crowded households (53), wealth household (54), water and sanitation (55).

This study goes beyond a simplistic discussion of poverty by using the Fundamental Cause Theory (56). By this theory, SES is a 'fundamental cause' of health inequities because it entails access to flexible resources, such as money, knowledge, power, and social connections, that can be drawn upon to minimise risk regardless of the specific pathway involved (56). Whereas SES effects are mediated by behaviour factors, Link and Phelan (1995) suggest that the association between SES and health remains even when specific mediators change because high-SES individuals can always 'harness' new resources to sustain a health advantage. This is why the structural dominance of SES remains a direct and primary driver of malnutrition in developing countries (57).

Reducing nutrition inequalities is an essential component of the SDGs. Although the incidence of various forms of child malnutrition has been widely documented in the current literature, few studies have anticipated and compared the causes of child malnutrition in developing and developed countries. This dissertation analyses cross-country inequalities, aiming to provide new insights into socioeconomic factors and child malnutrition to promote public health. It raises important questions about how effective a social welfare system in diverse countries, e.g., Hungary (potentially stronger safety nets), can prevent these forms of the double burden compared with those in less developed systems in Indonesia.

1.4 Hungary and Indonesia Conditions

Hungary and Indonesia are of interest as illustrative cases to examine socioeconomic factors and their role in predicting nutritional inequalities among children under five, as they have different levels of economic development, demographic structure, and health status (Table 1). Hungary is a high-income European country with a population of around 9.6 million (58), with a median age of 44.9 years (59) and a total fertility rate of 1.5 children born per woman (60). Indonesia is an upper-middle-income (61), with a population >270 million people (62),

with a median age of 31.4 years (63), and a fertility rate of 2.1 children per woman (64).

The distribution of child nutritional status in Hungary and Indonesia indicated the double burden of malnutrition. Based on 2021 statistical data for Hungarian children aged 4-10 years, underweight (15.3%), and normal weight (61.7%). On the other hand, overweight (14.7%) and obese (8.3%) (65). Whereas the prevalence of child nutritional status based on the Indonesia Nutrition Survey in 2021 is that stunting affects 24.4% of children under five, wasting at 7.1%, and underweight 17.0%, while overweight children were found at 3.8% (66). Furthermore, the Global Hunger Index (GHI) in Hungary was below 5, indicating a level of hunger that is low (67). In contrast, in Indonesia, GHI was higher than in Hungary, as much as 14.6, indicating a moderate hunger level (68).

Hungary experienced low child mortality (below 4 per 1000 live births), standing at 2021 (3.3 deaths/1000 live births), 2022 (3.6 deaths/1000 live births), and 2023 (3.0 deaths/1000 live births) (69), as evidence of effective public health since the integration into the EU. WHO data 2021 reported that the infant mortality rate is 3 deaths/1,000 live births, and the neonatal mortality rate is 2 deaths/1,000 live births (70). Whereas Indonesia has suboptimal child mortality (21 deaths/1,000 live births), borne by (87) decentralisation and socio-economic disparities, which surpass the UNICEF threshold of 12 deaths/1000 live births (87), reflecting the impacts of decentralisation and entrenched socioeconomic disparities. WHO data from 2021 in Indonesia reported that the infant mortality rate is 17 deaths/1,000 live births, and the neonatal mortality rate is 11 deaths/1,000 live births (71).

Non-communicable diseases (NCDs) result in death from chronic diseases and non-infectious diseases such as ischaemic heart disease, stroke, cancer, chronic obstructive pulmonary disease, and diabetes mellitus. Death caused by NCDs in Hungary in 2021 was 78.8% (70), while in Indonesia it was lower, 52.2%. The lower death caused by NCDs does not mean a positive impact of healthcare practices; sometimes it means that more common infectious diseases cause deaths. In Hungary, deaths from Communicable Diseases (CDs) were lower than in Indonesia, at 17.9% and 34.7%, respectively.

Universal Health Coverage helps ensure access to prevention, rapid diagnosis, and affordable treatment of Death caused by NCDs, such as diabetes, cancer, or heart diseases, for reducing deaths caused by NCDs. The major challenges include Universal Health Coverage arrangements, regulations, healthcare workforce distribution, and health data availability (72). In Hungary, all children (100%) have access to the Universal Health Coverage, called NEAK (73,74). Whereas in Indonesia, it is called Jaminan Kesehatan Nasional (JKN), and as much as

47,3% children aged <1 year and 40,3% children aged 1-4 years do not have health insurance (75). Prior studies have found that medical insurance is associated with reducing child illness and improving nutritional status (76).

Life expectancy in Hungary was 76.77 years in 2023, less than five years below the EU average, and notably lower than the EU average of 80.1 years (77). Lower parental SES fails to provide children with high-quality health care, and limited social mobility in Hungary results in the inheritance of children's social position and associated health effects due to their parents' education (78). Research has demonstrated that disadvantaged children, including Roma children, exhibit poor health behaviours but also experience higher exposure to harmful addictions and unhealthy eating habits (79).

The recent finding shows (98) that life expectancy in Indonesia increased from about 70.93 years in 2022 to 71.15 years in 2023, indicative of a slow improvement in population health (98). However, previous national research highlights persistent challenges: Indonesian adolescents and adults still have low physical activity levels (80), which may not meet WHO recommendations, and rates of unhealthy dietary patterns, overweight, and obesity remain high in several regions (81).

Table 1 Indicators of sociodemographic, economic, environmental, maternal, and child health (Source: own compilation)

Indicators	**Hungary**	**Indonesia**
Economic level	High-income country	Upper-middle-income country
Population	9.6 million	>270 million
Life expectancy, WHO data	76.77 years	71.15 years
Under-five mortality rate, WHO data	4 deaths/1,000 live births	21 deaths/1,000 live births
Infant mortality rate, WHO data	3 deaths/1,000 live births	17 deaths/1,000 live births
Neonatal mortality rate, WHO data	2 deaths/1,000 live births	11 deaths/1,000 live births
Median age, population pyramid	44.9 years	31.4 years
Child nutrition	Children between 4 and 10 years old who are underweight (15.3%), healthy weight (61.7%), overweight (14.7%), and obese (8.3%), Statista Data 2021	Children under five who are stunting (24.4%), underweight (17.0%), wasting (7.1%), and overweight (3.8%), SSGI Data 2021
Global Hunger Index, 2025	<5, low	14.6, moderate
Deaths caused by NCDs, WHO data	78.8%	52.2%

Deaths caused by CDs, WHO data	17.9%	34.7%
Child health (children under five), UNICEF data	Percentage of surviving infants who received the third dose of Diphtheria, Tetanus, and Pertussis (DTP)-containing vaccine (99%)	Care seeking for Acute Respiratory Infection (ARI), percentage of children (under the age of five) with acute respiratory infection symptoms (75%) Diarrhoea treatment (36%) Percentage of surviving infants who received the third dose of DTP-containing vaccine (78%) Percentage of children aged 36-59 months attending an early childhood education programme (13%)
Maternal health, UNICEF and WHO data	C-section rate (31%) Total fertility rate (1.5 per woman) Maternal mortality ratio (11.65 per 100.000 live births)	C-section rate (17%) Total fertility rate (2.1 per woman) Maternal mortality ratio (140.5 per 100.000 live births)
Environmental health, UNICEF data	Proportion of population using at least basic sanitation services (98%) Proportion of population using safely managed drinking water services (100%)	Proportion of population using at least basic sanitation services (88%) Proportion of population using safely managed drinking water services (30%)
Health coverage for children	100% health coverage for children	As many as 47,3% children aged < 1 year and 40,3% children aged 1-4 years

The effectiveness of child health programmes was demonstrated, among other measures, by vaccination coverage. A higher percentage was highlighted for better vaccination coverage among infants. In Hungary, the survival rate of infants who received the third dose of a DTP-containing vaccine was 99%, while in Indonesia it was only 78%, suggesting lower vaccination coverage among children under five. In addition, other programmes in Indonesia were implemented, but not in Hungary, such as care seeking for children with ARI (75%), children received diarrhoea treatment (36%), and children aged 36-59 months visited an early childhood education programme (13%) (71).

Maternal health, such as the maternal mortality ratio, demonstrates the number of mothers who die during pregnancy or childbirth. The maternal mortality ratio in Hungary was lower than in Indonesia, at 11.65 and 140.5 per 100,000 live births, respectively (70,71).

Malnourished women have twice the risk during pregnancy and childbirth, because poor nutrition increases the primary causes of death, such as haemorrhage, infection, and hypertension (82).

Beyond nutrition, water, sanitation, and hygiene services (WASH) were the most frequently studied environmental interventions, contributing evidence on childhood nutritional status (83). In Hungary, WASH indicators were reported to have higher targets than in Indonesia. The proportion of the population using at least basic sanitation services at 98% in Hungary and 88% in Indonesia. While the proportion of the population using safely managed drinking water services reached 100% in Hungary, it remains 30% in Indonesia (70,71).

1.5 Research Rationale and Original Contribution

Currently, many nutrition programmes have been implemented. However, targeting priority solely by the prevalence of malnutrition, without proper analysis, is insufficiently justified and methodologically weak, making it difficult to implement the same programmes across different socioeconomic conditions. The interventions provided should be based on the direct and indirect causes of changes in nutritional status. Key aspects influencing children's health remain debated, although previous research (84) has examined the relationship between socio-economic determinants and child nutritional status. Compared with previous studies (85–87), which mostly used linear regression of a single economic indicator on child nutrition, our study utilises Partial Least Squares Structural Equation Modelling (PLS-SEM) to estimate multiple dimensions of socioeconomic factors and their implications for undernutrition through food insecurity, maternal nutrition knowledge, child feeding practices, and child eating behaviour. Structural Equation Modelling (SEM) is a multivariate statistical technique that can estimate multiple interacting pathways (path coefficients) within a conceptual model to investigate the risk factors (88). By estimating distinct pathways of variables to nutrition outcomes jointly in a single model, this study can investigate more nuanced associations than those suggested by prior linear models.

Therefore, PLS-SEM also provides strong insights by examining direct and indirect relationships, particularly factors that remain underexplored, alongside socioeconomic factors, maternal nutrition knowledge, food insecurity, child feeding practices, child eating behaviour, child factors, wealth status, and household environment in urban metropolitan cities in different countries, are underexplored together in one path model analysis, following with comparative study between two different countries with different economic levels. Furthermore, this research focuses on urban cities in two countries with different social and economic conditions,

despite substantial cultural, topographic, and regulatory differences between Hungary and Indonesia, which have never been studied to our knowledge. In line with previous studies in cross-country comparison (89,90). The results will be evaluated by examining existing knowledge on the comparability of a variety of data sources and their relationships with socioeconomic factors, health indicators, and child undernutrition status, to compare possible differences in how selected health indicators are presented across variable differences. In addition, cross-country health disparities still persist because countries/territories are at different stages of social development (91). In order to narrow health disparities and achieve universal coverage of health services, greater attention should be given to the nutritional status of children, improvement of dietary quality, and strengthening medical support in low- and middle-income areas.

2. HYPOTHESES AND RESEARCH OBJECTIVES

This research aims to address these gaps by estimating the direct and indirect effects on SES to determine nutrition inequalities (undernutrition) among children aged 36 to 59 months in a Hungarian and an Indonesian metropolitan city, adopting the WHO and UNICEF conceptual framework for childhood stunting, adapted to determinants such as food insecurity, maternal nutrition knowledge, child feeding practices, and child eating behaviour.

2.1 Hypothesis Development

The UNICEF Conceptual Framework of Malnutrition states that basic causes (SES) influence nutritional status through underlying causes (feeding practices, food security) (24,92,93). In developed economies like Hungary, poverty is rare, and calorie sufficiency is generally achieved (94). On the other hand, structural inequalities and poverty in Indonesia still exist. While the deprivation condition, SES, affects child stunting and wasting more strongly in a direct pathway as financial deficit directly constrains the purchasing of basic macronutrients and micronutrients, it also affects the behavioural factors (95).

Hungary has a universal healthcare system (90,91), including prenatal and maternal care (90,91), which effectively eliminates health coverage as an axis of inequality. These results align with the literature on European welfare states, which has established that universal coverage reduces the direct influence of SES on access to health care. Meanwhile, in Indonesia, despite the implementation of the National Health Insurance, literature indicates that large geographic and socioeconomic gaps in quality and access to health facilities (96). Hence, health coverage may be the mediator between SES and the child's health outcome in Indonesia.

The concept of Developmental Origins of Health and Disease (DOHaD) or Barker Hypothesis acknowledges that low birth weight and prematurity are potent predictors for malnutrition later in life (particularly stunting) (97). In resource-deprived areas like India, enhanced maternal education and strong support networks can help prevent low birth-weight from falling behind (98). In low-income settings (Indonesia), biological risks rest on ecological deficits, where the necessary postnatal nutrition and medical assistance for catch-up growth are not available and on child factors, uncompensated mediators of malnutrition (99,100).

2.2 Objective

The analysis is limited to two metropolitan cities, Budapest (Hungary) and Surabaya (Indonesia). Given this limitation, this dissertation refers only to these representative metropolitan samples rather than the national populations in their entirety. This study seeks to uncover how structural factors (SES and household food security), maternal nutrition

knowledge, child factors, and behavioural practices (feeding practices and child eating behaviour) interact across countries. To address this primary aim, this study outlines the specific aims to:

1. Examine the mediation pathways between SES and child malnutrition.
2. Examine the mediating role of health coverage between SES and malnutrition.
3. Investigate the translation of maternal nutrition knowledge into behavioural factors.
4. Assess the influence of early childhood biological risks on malnutrition.
5. Identify the contextual predictors of child feeding practices.
6. Determine whether behavioural factors (feeding practices and child eating behaviour) and/or structural factors (SES) drive as the key predictor of malnutrition.
7. Investigate the direct and indirect effects of socioeconomic factors in predicting malnutrition in Budapest (Hungary) and Surabaya (Indonesia) using Path Analysis.

2.3 Hypotheses

Hypotheses are anchored in established theoretical frameworks (101) most clearly reflected by the UNICEF Conceptual Framework of Malnutrition, which outlines a bounded causal structure. This study hypothesises that distal determinants, such as SES, indirectly influence intermediate variables (e.g., maternal nutritional knowledge, child feeding practices) that are directly associated with nutritional outcomes. The following hypotheses describe the focus of this study:

H1: a) In the Hungarian sample, the negative association between SES and malnutrition is significantly mediated by maternal nutritional knowledge, food insecurity, child feeding practices, and child eating behaviour; b) SES significantly exerts a direct effect on malnutrition in the Indonesian sample.

H2: a) Health coverage does not significantly mediate the SES and child malnutrition in the Hungarian sample; b) Health coverage significantly mediates the relationship between SES and child malnutrition in the Indonesian sample.

H3: The relationship between maternal nutrition knowledge and malnutrition is mediated by child feeding practices in the Hungarian sample, not in Indonesia.

H4: a) Behavioural variables (feeding practices, maternal nutrition knowledge) mediate the effect of child factors (low birth weight, prematurity) on malnutrition in the Hungarian sample; b) Child factors have a direct effect on malnutrition in the Indonesian sample, with no mediation by behavioural factors.

H5: a) Maternal knowledge and child eating behaviour are positively associated with child

feeding practices in the Hungarian sample; b) The resource availability variables (SES and household food insecurity) are strong positive predictors of child feeding practices in the Indonesian sample.

H6: a) Behavioural factors (feeding practices and child eating behaviour) have a direct effect on malnutrition in the Hungarian sample; b) The structural factors (SES and food insecurity) have a direct effect on malnutrition in the Indonesian sample.

H7: The variables in the structural modelling exhibit greater predictive relevance (Q^2) on child malnutrition in the Indonesian sample compared to the Hungarian sample.

Based on a modified framework from UNICEF (24,92,93), the modified framework in Figure 1 follows three tiers: **Basic Causes**: SES and Wealth. **Underlying Causes**: household food insecurity, maternal nutrition knowledge, and Household Environment. **Immediate Causes**: child feeding practices and child factors (low birth weight, prematurity), child eating behaviour, and health coverage.

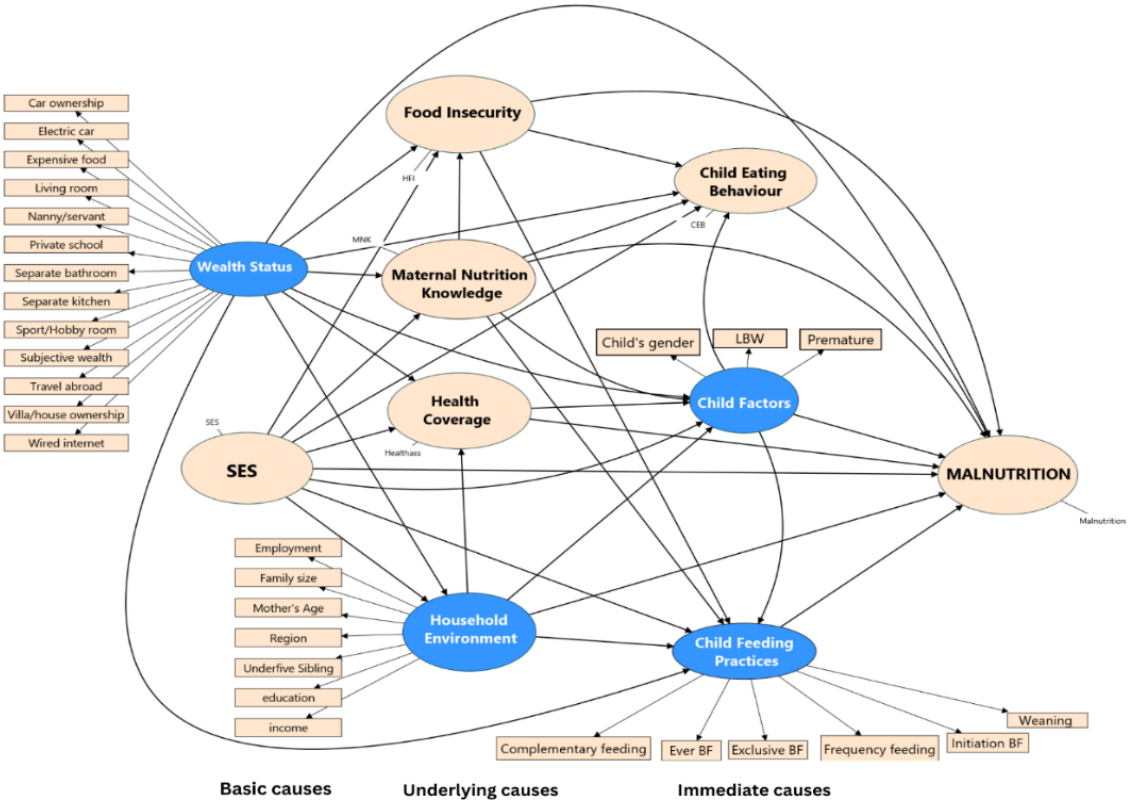

Figure 1 Conceptual Structural Equation Model for Socioeconomic Factors and Nutrition Inequalities (Source: own compilation, modified from UNICEF's Framework)

3. METHODS

3.1 Study area and period

This study employs a case study of two urban area, Surabaya City in Indonesia and Budapest City in Hungary. Surabaya, the capital city of East Java province, has been chosen as a model for Indonesia's fast-urbanising areas with diverse socioeconomic dynamics, as a major industrial and port city. The capital city of Hungary, Budapest, is a typical European high-income urban setting with an embedded social welfare system amid regional disparities. Budapest is divided into the Buda and Pest regions, divided into 23 administrative districts. This study employed five kindergartens, two from Pest and three from Buda. The city of Surabaya is divided into five regions (East, South, Central, West, and North) distributed by 31 administrative districts, which are further subdivided into the lowest administrative units, and each neighbourhood serves public health centres (called Posyandu). This study employed ten administrative districts in Surabaya, with two administrative districts from each region (Figure 2).

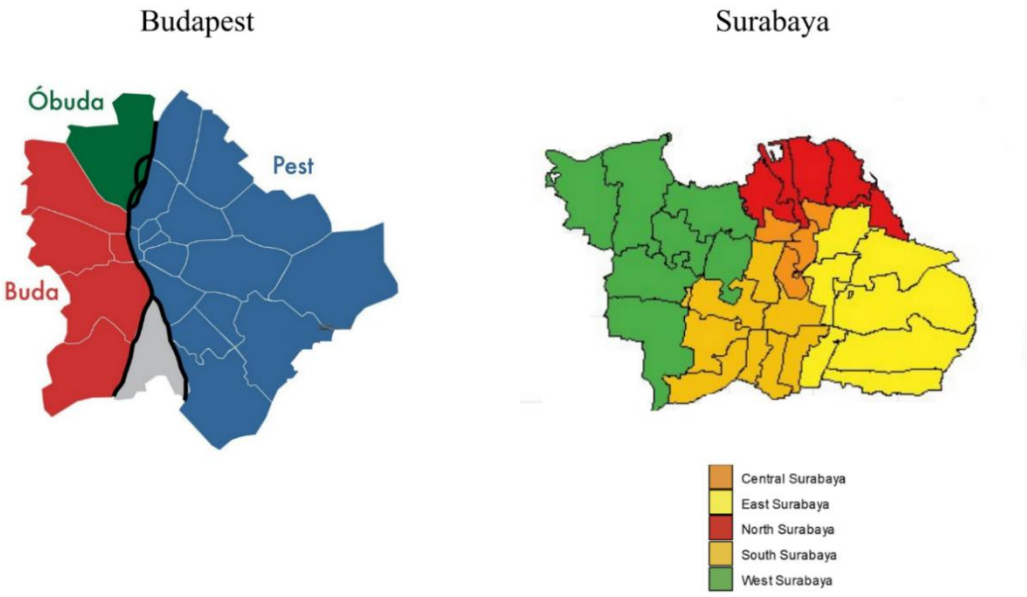

Figure 2 Map of Budapest and Surabaya City (Source: Budapest (102); Surabaya: own compilation with R-Programme)

The study period included the data collection conducted in May 2024 to April 2025 in Indonesia (Surabaya) and from January to June 2025 in Hungary (Budapest), enabling a comparative approach to nutritional inequalities based on responses collected within a short time frame May 2024 to April 2025 in Indonesia (Surabaya) and from January to June 2025 in Hungary (Budapest).

3.2 Study design and sampling

The study employed a cross-sectional design, following the health community survey guidance, to explore the prevalence and predictors of undernutrition and SES among households with a child aged 36-59 months. The survey population was mothers or primary caregivers of children aged 36 to 59 months who attended Public Health Centres (Posyandu) in Surabaya, while in Budapest, it was drawn from kindergartens. During both surveys, mothers or caregivers were recruited from ten districts in Surabaya and five districts in Budapest. The survey location was selected using purposive sampling. All respondents were selected using simple random sampling.

Sample size determination

Sample size and power analysis were calculated from factors including effect size, significance level (α), statistical power (1-β), and the chosen statistical analysis method (103). GPower 3.1.9.4, a software used to calculate statistical power for various statistical tests such as t-tests, F-tests, χ^2-tests, z-tests, correlation tests, and other statistical analyses, was used in this study (Figure 3). GPower can also be used to compute effect sizes and display the results graphically, making it suitable for conducting simulation studies and teaching processes (104). Cohen suggested that correlation effect sizes are 0.1 for "small," 0.3 for "medium," and 0.5 for "large" (105).

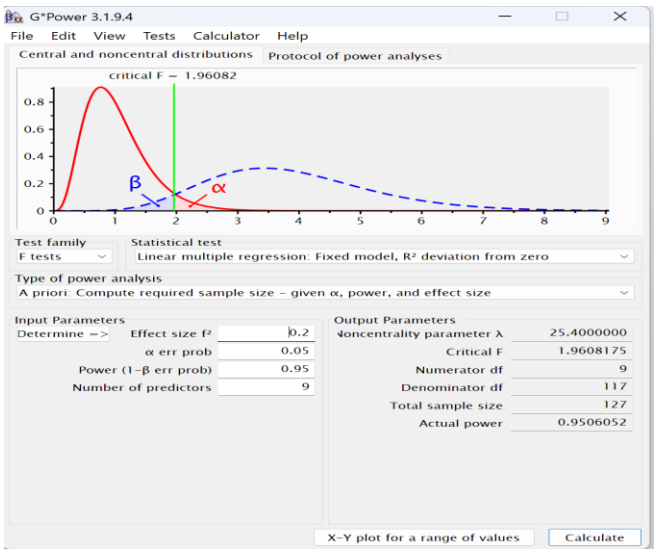

Figure 3 Calculation of Minimum Sample Size for PLS-SEM (*Source: GPower Software*)

The study calculates the minimum sample for statistical tests in this research by determining that the significance level (α) is 0.05, the expected statistical power is 95% (high), the medium effect size of 0.2 (medium), 5% error probability, and the number of predictors (9 latent variables). GPower software calculated the minimum sample size to be 128 households

(106). A total of 657 households in Surabaya were purposively selected with children under five, and 535 households were identified with children aged 36 to 59 months. While in Budapest, 132 households were purposively selected that had at least one child aged 36 to 59 months, but only 128 completed the questionnaire.

3.3 Data quality assurance

The questionnaire was pretested, and the weighing scales were calibrated to ensure data integrity. The questionnaire, based on the literature, was pretested on ten samples before the survey was conducted (107). Before the survey, enumerators and supervisors received training on understanding the questions and delivery, recording of responses, and role-playing exercises. At the end of each day, the enumerator reviewed completed questionnaires for accuracy and completeness and provided feedback to interviewers or supervisors as needed.

The original English questionnaire was translated into Hungarian and Indonesian. The University and Academic Degrees Sworn translation for university and academic diplomas was used to translate the questionnaire, which involved translating university- and academic-diploma-certified documents from one language into another to ensure translation accuracy. The translation of the Hungarian-language (Magyar) questionnaire was certified by the Institute of Specialised Languages at Semmelweis University on 18 October 2024. The Indonesian questionnaire was certified by the Language Centre of Muhammadiyah Surabaya University, with number 001/PB-UMS/EL-Q/II/2024 on 20 February 2024. The five instruments in the questionnaire were intentionally selected to reflect nutritional inequality across socioeconomic levels, as shown in Table 2.

Table 2 Instruments designed in the study (Source: adapted from standard instruments)

Tools	Name of Module	Definition	Validation	Sources
Appendix A1	Sociodemographic and economic, child health	Open-closed question about general sociodemographic such as region, gender, age, family number; economic, including income and employment; health, including health insurance, childbirth, weight, and height.	No validated	Self-modified
Appendix A2	Food Insecurity Experience Scale Survey Module (FIES-SM)	Eight questions to measure households' experiences of food insecurity	Validated	Food and Agriculture Organisation (FAO)

Appendix A3	Qualtrics Survey by General Nutrition Knowledge Questionnaire-Revised (GNKQ-R)	The 16 questions measure the individuals' understanding of healthy food choices, nutrition/health practitioners' recommendations, nutrient sources, and dietary outcomes.	Validated	University College London (UCL)
Appendix A4	Infant and Young Child Feeding (IYCF)	IYCF guidelines refer to recommendations on feeding practices to ensure optimal outcomes.	Validated	WHO and UNICEF
Appendix A5	Child Eating Behaviour Questionnaire (CEBQ)	The 35-item parent-report questions are used to assess child appetitive traits.	Validated	PhenX ToolKit

Socio-demographic questionnaire (self-modified); FIES-SM (108); GNKQ-R (109); IYCF (110); CEBQ (111)

Identifying eligible respondents

The instruments were developed to be embedded in a survey for data collection on children aged 36 to 59 months. The biological mother was the only primary caregiver eligible to serve as a respondent. Literate participants gave written informed consent before the study, and for illiterate participants, consent was documented with a thumbprint in the presence of a witness. The anonymity of the subjects was well maintained during the research process. Before administering the survey, we needed to verify the respondent's age and distribute a module exclusively for mothers. If the survey was incorporated into a questionnaire for a wider age band, a filter question was recommended to help "set" its application. For instance, the age filter: if the child was younger than 36 months or older than 59 months, they might have been excluded from our dataset. In addition, exclusive criteria were met, and children with a diagnosed chronic illness or who were bedridden, or who had suffered a severe acute illness, were excluded from the study. The same applied to any child with a physical deformity affecting the lower extremities or spine. In households with eligible children, only one was selected for analysis.

3.4 Data Measurement

Data were analysed using sensitive, secure data storage such as Statistical Package for the Social Sciences (SPSS) 27.0 and R 4.5.2 software to ensure confidentiality; missing data were also addressed (listwise deletion or multiple imputation where feasible; i.e., <5% threshold precluding listwise).

3.4.1 Socioeconomic Status (SES)

SES was a combined measure that reflects economic and social family resources. It was built as a quintile-based measure to account for relative deprivation or advantage in each study area. It consisted of four indicators: household income, employment status, subjective wealth status, assets, and parental level of education. Household income: collected as gross monthly household income in local currency (IDR for Indonesia; HUF for Hungary) and classified based on a log transformation of raw income data and subsequent transformation into quintile scores (1 = lowest, 5 = highest) was part of this procedure. Respondents' employment status was measured by a binary self-report (1 = in full-/part- time job; 0 = unemployed). Educational level was defined as the highest schooling level of the mother and coded as an ordinal variable using UNESCO norms (1 = no formal education/primary school; 2 = high school; 3 = undergraduate or higher) (112).

Subjective wealth status was assessed with a Likert-scale question ("How would you rate your household's wealth relative to other households in the community?: 1 = rather better off; 2 = average; 3 = rather better off) that was included as a component of, and contributing directly to the composite score as an ordinal measure of perceived economic standing (87,113). The index was also composed using assets such as car and house or villa ownership, which were expected to be objective measures of household wealth and stability. Car ownership was evaluated through a binary self-report (1 = yes, has at least one; 0 = no); and house/villa ownership: The latter is defined as "having the title deed of house/villa registered in one's name": (1 = ownership; 0 = rented or non-ownership). The total scores were expressed SES in tertiles and categorised as low SES (≤33.33%), middle SES (33.34–66.67%), and high SES (>66.67%) (87).

3.4.2 Household Food Insecurity

Household food insecurity was also considered to evaluate access to sufficient, safe, and nutritious food as a mediator between SES and children's nutritional outcomes. It was measured using the validated eight-item scale by the FAO. FIES-SM items asked about the experience in the last 12 months, for example, "In the past 12 months, was there a time that you were worried that your household would not have enough to eat? or "Did you consume less food than you wished to?" (yes/no responses). Responses were dichotomously scored (1 = yes to the experience of insecurity; 0 = no), and raw scores ranged from 0 to 8. The latter scale was grouped into two categories: food secure (score 0)- and food insecure (score 1–8) (108).

3.4.3 Maternal Nutrition Knowledge

Maternal nutrition knowledge was assessed as a proximal predictor of feeding practices, reflecting caregivers' awareness of children's nutritional requirements. It was adapted from the GNKQ-R, a validated questionnaire that evaluated knowledge in the areas of dietary recommendations, sources of nutrients, and principles of healthy eating (109). The GNKQ-R comprised multiple-choice and true/false items (16 in total for feasibility), with a score of 1 = correct; 0 = incorrect. An overall raw score was derived (0 to the theoretical maximum value); Quintiles were obtained by ranking responses and dividing by equal vertices, so that the variable represented levels of relative knowledge needs rather than absolute cut-offs. We categorised the subjects into low (score ≤ 17), moderate (score 18 – 34), and high (score ≥ 35).

3.4.4 Child Feeding Practices

Assessment of child feeding practices was in accordance with the WHO and UNICEF code for good infant feeding, adopted by the IYCF guidance, by which a composite indicator of six core practices applicable for children under five was utilised (110). Practices were listed as follows a) early initiation of breastfeeding within one hour after birth (yes/no); b) exclusive breastfeeding for 6 months (yes/no); c) baby weaning and continue to breastfeed until the age of two years (yes/no); d) timely introduction of complementary feeding at the start of six months (yes/no); e) minimum meal frequency ($\geq$3 meal per day for breastfed child; yes/no), f) ever breast fed or not, have any experience about breast feed when newborn feed directly on breast (yes/no). All measures were established as constructs for child feeding practices.

3.4.5 Wealth Status and Household Environment

Wealth Status was modelled as a formative latent variable in a broader SES framework. The indicators that showed a household's capability: house/villa, car, electric car, expensive food consumption, living room, paid nanny/servant, private school, and facilities for separate bathroom and kitchen, sport/hobby, subjective wealth status, travel abroad, and wired internet. While the household environment, not directly observed, is a formative latent construct embedded within the latent variable, a reflection of educational level, occupation status, family size, income level, mother’s age, and the number of under-five siblings, it formed rather than reflected the household environmental context to explain overall differences in nutrition inequalities.

3.4.6 Child Eating Behaviour

The CEBQ was a 35-item parent-report scale using a five-point Likert-type scale (never

= 1, rarely = 2, sometimes = 3, often = 4, always = 5). The eight subscales scores were classified in two scales: 1) Food approach indicators (Food Responsiveness FR [5 items], Enjoyment of Food EF [4 items], Desire to Drink DD [3 items], and Emotional Overeating EOE [4 items]; and 2) Food avoidance indicators (Satiety Responsiveness SR [5 items], Slowness in Eating SE [4 items], Food Fussiness FF [6 items], and Emotional Undereating EUE [4 items] (111). The English version was translated into Indonesian and Hungarian for testing. Child eating behaviour was assessed into two stages using RStudio 4.5.2: (a) Confirmatory Factorial Analysis (CFA): testing and confirming the hypothesised factor structure of CEBQ with an Indonesian sample to provide evidence that its measurement properties were robust. This seemed to confirm the questionnaire's suitability and clarity for this group. (b) Latent Profile Analysis (LPA) was utilised to empirically classify children into latent, mutually exclusive subgroups or 'profiles' based on their mealtime behaviour patterns, as measured by the CEBQ.

3.4.7 Malnutrition (Undernutrition)

Child malnutrition, the dependent variable of interest, was a binary measure indicating one or more forms of undernutrition in children under five years of age, using the WHO Child Growth Standards and computed with the WHO ANTHRO 3.2.2 software (114). The key indices: height-for-age (HAZ), weight-for-height (WHZ), and weight-for-age (WAZ) were converted to Z scores for the enrolled data. Stunting, wasting, and underweight indicated that HAZ, WHZ, and WAZ values of the children in the studied population were below −2 Z-scores compared with the median of the referent populations, respectively (115).

3.5 Data Analysis

Partial Least Squares Structural Equation Modelling (PLS-SEM) enables the simultaneous estimation of direct and indirect effects, and enables robust mediation analyses (116,117). In order to adjust for potential confounding, any variables theorised to act as confounding factors that could not be controlled for through study design were included explicitly as direct predictors in our SEM. To address potential confounders, this study implemented the following design controls. More specifically, our sample was limited to an urban setting and to children aged 36-59 months old. This strategic sampling adjusted for differences based on geography (urban versus rural) and variations in age with respect to nutritional needs and childhood development phases, which would otherwise increase the risk of confounding our focal relationships (118).

This study analyses using SmartPLS 4 software. It is used to analyse sophisticated models that contain measured and unmeasured latent variables, including endogenous,

exogenous, and mediating variables. In contrast to path analysis, SEM allows for the causal linkage of both observed and latent variables (119). The mediation study was conducted to predict the indirect effects of the predictors on child malnutrition. Mediation is divided into full and/or partial within the SEM framework (120). PLS-SEM consists of two components: a measurement model and a structural model. In the current study, model fit for each of the models was assessed with root mean square error of approximation (RMSEA), and standardised root mean squared residual (SRMR) (121).

Reliability test measures the extent to which observed variables are internally consistent (composite reliability), and validity test measures how well an indicator or measure reflects its construct. Accordingly, this study assessed construct reliability and validity using composite reliability (CR) and average variance extracted (AVE). The rule of thumb for the CR and AVE is ≥0.60 and ≥0.05, respectively (122). Although PLS-SEM was chosen due to its ability to account for complex relationships and its focus on prediction, the multi-faceted nature of the model, which included several interrelated socioeconomic, behavioural, and contextual factors, raises issues about over-parameterisation and multicollinearity. Hence, this study will perform a severe multicollinearity assessment using VIFs. Furthermore, this study uses MICOM and MGA tests in SmartPLS to measure the 'predictive relevance' of inequality consistently across both the Hungarian and Indonesian samples, by acknowledging that income inequality is not only an absolute measure but also a relative structural constraint that can vary over time and space (123).

3.6 Risk of bias assessment

To improve the credibility and transferability of study results, potential bias was considered conceptually at every stage of the research. All in all, standardised protocols, trained enumerators, and pilot testing reduced the potential for bias in the study design, but there were limitations with self-reported or observation-based data. The use of self-reported breastfeeding practices (such as initiation of breastfeeding, exclusive breastfeeding, etc.) and maternal knowledge was subject to recall and social desirability bias, which results in non-differential misclassification. Secondly, GNKQ-R is not specific to IYCF practices and has been used in the present study as an indirect proxy for maternal nutrition knowledge; this limitation is acknowledged. Third, the present study employed an instrument (questionnaire) that allowed only closed-response selection. This suggested that a relatively limited range of answers was available to respondents.

3.7 Ethical Consideration

Ethical approval had been obtained from the Health Research Ethics Committee-National Institute of Health Research and Development (NHRID), Indonesia: approval Number 039/KE.03/SK/02/2024, date of approval 23 February 2024. Ethical approval was also obtained from *Regionális és Intézményi Tudományos Kutatásetikai Bizottság,* Hungary; SE RKEB 207/2024, with approval date: 29th October 2024. The goals, risks, benefits, and rights of the study, along with parents' responsibilities to participate, were explained in detail in the local language. Data collection began when respondents provided informed written consent.

4. RESULTS

4.1 Prevalence of Malnutrition and SES

Figure 4 presents the prevalence of all categories of undernutrition among children under five years old in Budapest, Hungary, and Surabaya, Indonesia, highlighting marked cross-country inequalities in nutritional status. In Budapest, Hungary, among the 128 children examined, the majority (88.3%) were not stunted, wasted, or underweight. In contrast, among 535 children in Surabaya, Indonesia, only 50.2% were not undernourished, pointing to the high burden of undernutrition in Indonesia.

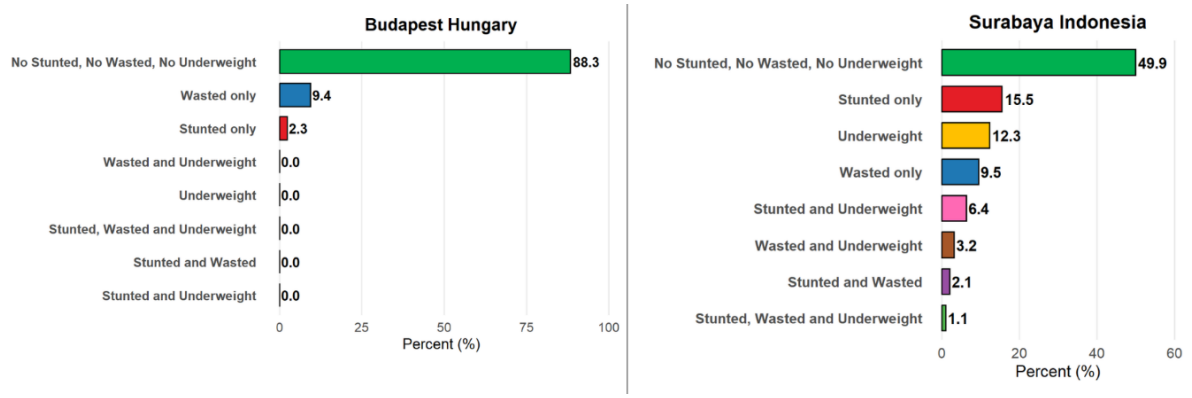

Figure 4 Prevalence of Wasting, Stunting, and Underweight in Hungary and Indonesia included in the study *(n=128, Hungary; n=535, Indonesia), (Source: Primary Data Survey)*

SES in Figure 5 shows that most Hungarian respondents have high-SES (85.9%), with no low-SES respondents, and middle-SES (14.1%). In contrast, most Indonesian respondents have a middle SES (89.5%). Few households have low-SES (5.5%) and high-SES (50%).

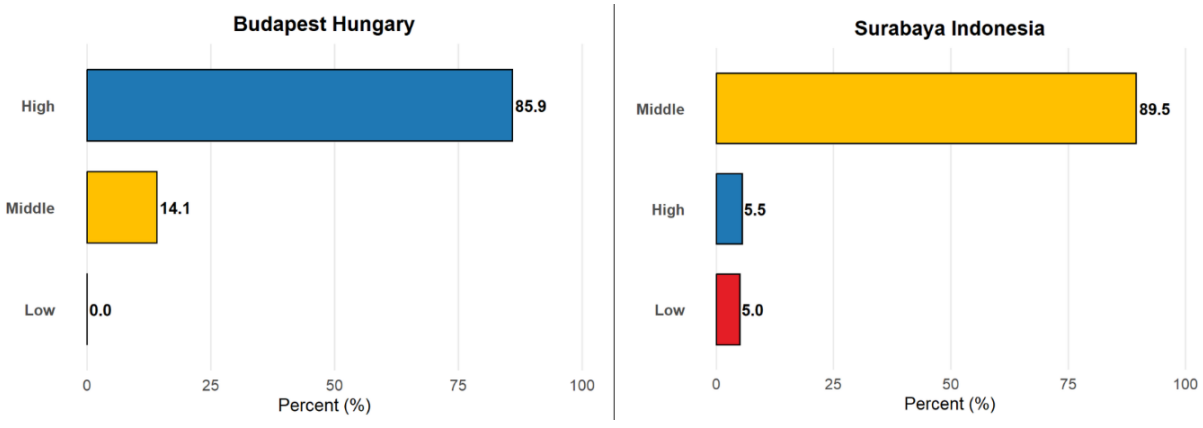

Figure 5 Percentage of SES in Hungary and Indonesia included in the study *(n=128, Hungary; n=535, Indonesia) (Source: Primary Data Survey)*

4.2 Population Characteristics in Hungary and Indonesia

Table 3 presents the bivariate distribution of undernutrition by selected child, maternal,

and socioeconomic characteristics in Hungary (n=128) and Indonesia (n=535), with values reported as percentages. Prematurity was lower among Hungarian malnourished children (1.6%) than in Indonesia (24.5%), with non-prematurity higher at 10.2% and 25.6%, respectively. Low birth weight was 1.6% in Hungary and 5.8% in Indonesia, compared with normal rates of 10.2% and 44.3%, respectively.

Table 3 Data Respondents' Characteristics in Hungary and Indonesia included in the Study *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey)*

Predictors	Prevalence of Malnutrition			
	Hungary		Indonesia	
	Yes n (%)	No n (%)	Yes n (%)	No n (%)
Child's gender				
Boy	9 (7.0)	62 (48.4)	149 (27.9)	122 (22.8)
Girl	6 (4.8)	51 (39.8)	119 (22.2)	145 (27.1)
Prematurity				
Yes	2 (1.6)	4 (3.1)	131 (24.5)	115 (21.5)
No	13 (10.1)	109 (85.2)	137 (25.6)	152 (28.4)
Low Birth Weight				
Yes	2 (1.6)	2 (1.6)	31 (5.8)	19 (3.6)
No	13 (10.2)	111 (86.6)	237 (44.3)	248 (46.4)
Socioeconomic Status				
Low	0 (0.0)	0 (0.0)	19 (3.6)	8 (1.5)
Middle	5 (3.9)	13 (10.2)	241 (45.0)	238 (44.5)
High	10 (7.8)	100 (78.1)	8 (1.5)	21 (3.9)
Income per month				
≤ HUF 230.000 or ≤ IDR 2.300.000	1 (0.8)	0 (0.0)	116 (21.7)	94 (17.6)
HUF 230.001 - 450.000 or IDR 2.300.001 - 4.500.000	1 (0.8)	9 (7.0)	115 (21.5)	121 (22.6)
HUF 450.001 - 570.000 or IDR 4.500.001 - 5.700.000	2 (1.6)	5 (3.9)	22 (4.1)	31 (5.8)
HUF 570.001 – 700.000 or IDR 5.700.001 - 7.000.000	2 (1.6)	15 (11.7)	10 (1.9)	11 (2.1)
HUF 700.001 – 1.000.000 or IDR 7.000.001 - 10.000.000	2 (1.6)	37 (28.9)	4 (0.7)	5 (0.9)
> HUF 1.000.001 or > IDR 10.000.001	7 (5.4)	47 (36.7)	1 (0.2)	5 (0.9)
Maternal education				
Low	0 (0.0)	2 (1.6)	90 (16.8)	60 (11.2)
Moderate	11 (8.6)	67 (52.3)	143 (26.7)	161 (30.1)
High	4 (3.1)	44 (34.4)	35 (6.5)	46 (8.7)
Mother's age:				
<20 years	1 (0.8)	6 (4.7)	1 (0.2)	0 (0.0)
≥20-29 years	2 (1.6)	33 (25.8)	94 (17.6)	77 (14.4)
≥30-39 years	12 (9.3)	74 (57.8)	126 (23.6)	151 (28.2)

≥40-49 years	0 (0.0)	0 (0.0)	47 (8.8)	39 (7.3)
Employment Status				
Employed	15 (11.7)	104 (81.3)	110 (20.6)	114 (21.3)
Unemployed	0 (0.0)	9 (7.0)	158 (29.5)	153 (28.6)
Subjective wealth status				
rather better off	0 (0.0)	1 (0.8)	73 (13.6)	87 (16.3)
average	9 (7.0)	79 (61.7)	184 (34.4)	177 (33.1)
rather worse off	6 (4.7)	33 (25.8)	11(2.1)	3 (0.6)
House Ownership				
Yes	11 (8.6)	98 (76.6)	88 (16.5)	90 (16.8)
No	4 (3.1)	15 (11.7)	180 (33.6)	177 (33.1)
Car Ownership				
Yes	15 (11.7)	108 (84.4)	30 (5.6)	40 (7.5)
No	0 (0.0)	5 (3.9)	238 (44.5)	227 (42.4)
Health insurance				
Yes	15 (11.7)	113 (88.3)	145 (27.1)	141 (26.4)
No	0 (0.0)	0 (0.0)	123 (23.0)	126 (23.6)
Family size				
Small (≤3 members)	4 (3.1)	23 (18.0)	46 (8.6)	45 (8.4)
Medium (4-6 members)	10 (7.8)	88 (68.7)	186 (34.8)	184 (34.4)
Large (> 6 members)	1 (0.8)	2 (1.6)	36 (6.7)	38 (7.1)
Region (Indonesia)				
Central	-	-	37 (6.9)	34 (6.4)
East	-	-	78 (14.6)	71 (13.3)
North	-	-	65 (12.1)	85 (15.9)
South	-	-	68 (12.7)	57 (10.7)
West	-	-	20 (3.7)	20 (3.7)
Region (Hungary)				
Pest	13 (10.2)	78 (60.9)	-	-
Buda	2 (1.6)	35 (27.3)	-	-
Under-five sibling:				
≤2 children	14 (10.9)	112 (87.5)	253 (47.3)	253 (47.3)
≥3 children	1 (0.8)	1 (0.8)	15 (2.8)	14 (2.6)
Child Feeding Practices				
Age at starting complementary feeding				
Less than 6 months	4 (3.1)	33 (25.8)	25 (4.7)	22 (4.1)
6 months	10 (7.8)	74 (57.8)	202 (37.8)	209 (39.0)
More than 6 months	1 (0.8)	6 (4.7)	41 (7.7)	36 (6.7)
Feeding frequency				
2 times	1 (0.8)	2 (1.6)	47 (8.8)	40 (7.5)
2 – 3 times	3 (2.3)	25 (19.5)	156 (29.2)	163 (30.5)
4 – 6 times and more	11 (8.6)	86 (67.2)	65 (12.1)	64 (11.9)
Initiation breastfeeding:				
Within 1 hour	10 (7.8)	79 (61.7)	76 (14.2|)	100 (18.7)
After 1 hour or more	5 (3.9)	34 (26.6)	192 (35.9)	167 (31.2)

Ever breastfeeding				
Yes	14 (10.9)	104 (81.3)	245 (45.8)	251 (46.9)
No	1 (0.8)	9 (7.0)	23 (4.3)	16 (3.0)
Exclusive breastfeeding				
Yes	9 (7.0)	68 (53.1)	97 (18.1)	107 (20.0)
No	6 (4.7)	45 (35.2)	171 (32.0)	160 (29.9)
Baby weaning				
less than 6 months	5 (3.9)	29 (22.6)	53 (9.9)	48 (9.0)
Between 6 months - 24 months	8 (6.3)	59 (46.1)	75 (14.0)	84 (15.7)
24 months or more still breastfeeding	2 (1.6)	25 (19.5)	140 (26.2)	135 (25.2)
Household Food Insecurity				
Food-secure	15 (11.7)	107 (83.6)	155 (29.0)	176 (32.9)
Food-insecure	0 (0.0)	6 (4.7)	113 (21.1)	91 (17.0)
3. Maternal Nutrition Knowledge				
Low	0 (0.0)	1 (0.8)	75 (14.0)	70 (13.1)
Moderate	8 (6.3)	55 (42.9)	190 (35.5)	196 (36.6)
High	7 (5.5)	57 (44.5)	3 (0.6)	1 (0.2)
Child Eating Behaviour				
Food-approach				
Typical/balance eater	7 (5.5)	53 (41.4)	66 (12.4)	58 (10.8)
Avid eater	0 (0.0)	2 (1.6)	71 (13.3)	76 (14.2)
Food-avoidant				
Picky/fussy eater	8 (6.3)	58 (45.2)	18 (3.4)	27 (5.0)
Poor eater	0 (0.0)	0 (0.0)	113 (21.1)	106 (19.8)

No malnourished cases were reported among low-SES in Hungary, while middle-SES at 3.9%, and high-SES at 7.8%. Low-SES contributed 3.6% to malnutrition cases in Indonesia, middle-SES 45.0%, and high-SES 1.5%, indicating a considerable burden among low- and middle-SES groups. In Hungary, the maternal education levels with malnourished children were 0.0% low, 8.6% moderate, and 3.1% high. In Indonesia, these figures were 16.8% low-SES, 26.7% middle-SES, and high-SES 6.5%.

Low, moderate, and high maternal nutrition knowledge levels for malnourished children were 0.0%, 6.3%, and 5.5%, respectively, in Hungary, while they were 14.8%, 35.5%, and 0.6%, respectively, in Indonesia. Malnourished children were not found in food-insecure households in Hungary; however, 11.7% malnourished children were found in food-secure households. Conversely, in Indonesia, 21.1% malnourished children are experiencing food insecurity.

4.3 Measurement Model of PLS-SEM Analysis

4.3.1 Outer Model

The outer model of PLS-SEM is used to test the relationships between the latent variables and their reflective indicators. The first step of this validation process is to ensure that the measurement instruments are valid by assessing their reliability and validity in measuring the latent constructs. The outer model involves three key evaluation metrics: convergent validity, discriminant validity, and construct reliability.

Ensuring Construct Validity:

To ensure this composite is statistically sound, this study applied the protocols for formative measurement validation (Hair et al., 2021) (124): Collinearity Check, examining the Variance Inflation Factor (VIF) for all indicators (e.g., income, education). Since all VIF values are below 3 (or 5) according to the threshold from the SmartPLS Report (125). This indicates that while these dimensions relate to each other, they are not redundant and that they add unique information to the SES construct. Table 4 for the Hungarian and Indonesian Models show that all variables have VIF < 3. The VIF test analysis from the Indonesian data model shows all values are below the threshold (< 3), confirming that there is no multicollinearity between predictor variables. This indicates that the structural model is free of lateral collinearity, so all estimated path coefficients are stable, and each construct (SES and household food security) contributes independently.

Table 4 Variance Inflation Factor (VIF) for Hungarian and Indonesian Model (*Source: Primary Data Survey*).

Variables	Hungary		Indonesia	
	VIF	**Decision**	**VIF**	**Decision**
Child eating behaviour	1	Valid	1	Valid
Complementary feeding	1.913	Valid	1.056	Valid
Education level	1.068	Valid	1.137	Valid
Electric car ownership	2.213	Valid	1.686	Valid
Ever breastfeeding	1.412	Valid	-	-
Exclusive breastfeeding	2.589	Valid	1.187	Valid
Expensive food	2.642	Valid	1.981	Valid
Household Food Insecurity	1	Valid	1	Valid
Family Income	1.068	Valid	1.137	Valid
Initiation Breastfeeding	1.278	Valid	-	-
Low birth weight	1.174	Valid	1	Valid
Maternal nutrition knowledge	1	Valid	1	Valid
Mother Age	1.07	Valid	-	-
Nanny/servant	2.215	Valid	1.829	Valid
Prematurity	1.174	Valid	-	
Private school	2.275	Valid	2.057	Valid

SES	1	Valid	1	Valid
Travel abroad	2.213	Valid	-	-
Weaning	1.81	Valid	1.164	Valid
Health assurance	-	-	1	Valid
Feeding Frequency	-	-	1.01	Valid
Car ownership	-	-	1.159	Valid
Child's gender	-	-	1	Valid
Malnutrition	1	Valid	1	Valid

VIF < 3: valid

Discriminant Validity (Trait correlations within two constructs):

Theoretically, there was a distinction between SES as "human capital" (education, employment) and Wealth as "material/capital" (housing, car ownership). SES will reflect household affordability in processing health information and accessing health care services. While wealth status reflects long-term economic resilience. To ensure that constructs of SES and wealth were not redundant, statistical tests were provided.

a. **Heterotrait-Monotrait Ratio of Correlations (HTMT):** the HTMT ratio between SES and wealth status was below 0.85 (126,127), indicating that two constructs are conceptually distinct in Hungary as well as Indonesia model. Discriminant validity was assessed using the HTMT table 5 below, with values less than 0.85, which is the gold standard for demonstrating construct distinctiveness.

Table 5 HTMT between SES and wealth status in the study (n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)

Construct 1	Construct 2	HTMT Value	Decision
Hungary: SES	Wealth status	0.445	Pass
Indonesia: SES	Wealth status	0.025	Pass

b. **Cross-Loadings Matrix:** examining the indicator loadings in the models. Cross-loadings are not sufficiently sensitive to detect discriminant validity. The sensitivity, introduced earlier in this framework, measures each method's ability to detect when two constructs are equal and discriminant validity is lacking. Specificity is the extent to which an approach will indicate that discriminant validity would occur if two constructs are empirically distinct (128). In this study, every indicator of Wealth (e.g., car ownership) loaded significantly higher on its own construct than it did on SES. Table 6 included the Cross-Loadings between SES and wealth status.

Table 6 Cross-Loadings between SES and wealth status in the study *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Indicators	**Hungary**		**Indonesia**	
	SES	**Wealth Status**	**SES**	**Wealth Status**
Education level	0.372	0.132	0.489	0.322
Income	0.702	0.381	0.560	0.539
Electric car	0.193	0.816	0.190	0.699
Nanny/servant	0.172	0.837	0.390	0.630
Private school	0.106	0.832	0.282	0.755
Travel abroad	0.138	0.782	-	-
Expensive food	-	-	0.265	0.748

Two primary criteria are used to establish convergent validity: factor loadings and AVE. These statistics assess the degree to which indicators converge to reflect their underlying constructs. The outer weights in the model estimation indicate how strongly the observed indicator scores correlate with their underlying constructs or factors. An indicator is considered valid if its loading exceeds 0.70; however, outer loadings of 0.50 or higher may be acceptable in exploratory research. Indicators that do not exceed these thresholds should be removed to improve model quality, as shown in Table 7.

Table 7 Outer loading validation of the latent variables in Hungary and Indonesia included in the study *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey, PLS-SEM Test)*

Latent Variable	**Indicators**	**Outer Loading**	
		Hungary	**Indonesia**
Child Factor	Child's gender	-0.038 / invalid	**0.768 / valid**
	Low birth weight	**0.779 / valid**	**0.602 / valid**
	Prematurity	**0.873 / valid**	0.305 / invalid
Wealth Status	Car ownership	0.293 / invalid	**0.571 / valid**
	House/villa ownership	0.386 / invalid	0.381 / invalid
	Subjective wealth status	-0.625 / invalid	0.238 / invalid
	Affordability of an electric car	**0.762 / valid**	**0.637 / valid**
	Affordability of expensive food	**0.684 / valid**	**0.691 / valid**
		0.776 / valid	**0.694 / valid**
	Affordability nanny/servant	**0.714 / valid**	**0.734 / valid**
	Affordability of private school	**0.654 / valid**	0.491 / valid
	Affordability of travel abroad	0.056 / invalid	0.451 / invalid
	Affordability of wired internet	0.301 / invalid	0.421 / invalid
	Existence of living room	-	0.381 / invalid
	Existence of separate bathroom	0.158 / invalid	0.379 / invalid
		0.239 / invalid	0.335 / invalid

	Existence of separate kitchen		
	Existence of sport/hobby room		
Household Environment	Education level	**0.564 / valid**	**0.772 / valid**
	Employment	0.027 / invalid	0.188 / invalid
	Family size	-0.367 / invalid	0.128 / invalid
	Income	**0.829 / valid**	**0.857 / valid**
	Mother's age	**0.538 / valid**	-0.080 / invalid
	Under-five sibling	-0.125 / invalid	0.162 / invalid
	Region	0.198 / invalid	-0.037 / invalid
Child Feeding Practices	Complementary feeding	**0.695 / valid**	**0.540 / valid**
	Ever breastfeeding	**0.658 / valid**	0.176 / valid
	Exclusive breastfeeding	**0.830 / valid**	**0.676 / valid**
	Feeding frequency	0.210 / invalid	**0.517 / valid**
	Initiation breastfeeding	**0.565 / valid**	-0.154 / invalid
	Weaning practices	**0.817 / valid**	**0.534 / valid**

Outer loading >0.50, valid

As illustrated in Table 7 and Figure 6, some indicators of the latent variables did not meet the criteria; therefore, these indicators must be dropped from the model. While in Table 7 and Figure 7 for the Indonesian Path Model, some data did not meet the threshold for outer loading >0.5, supporting the reliability and validity of the constructs and indicating that the measurement model was an appropriate reflection of the data.

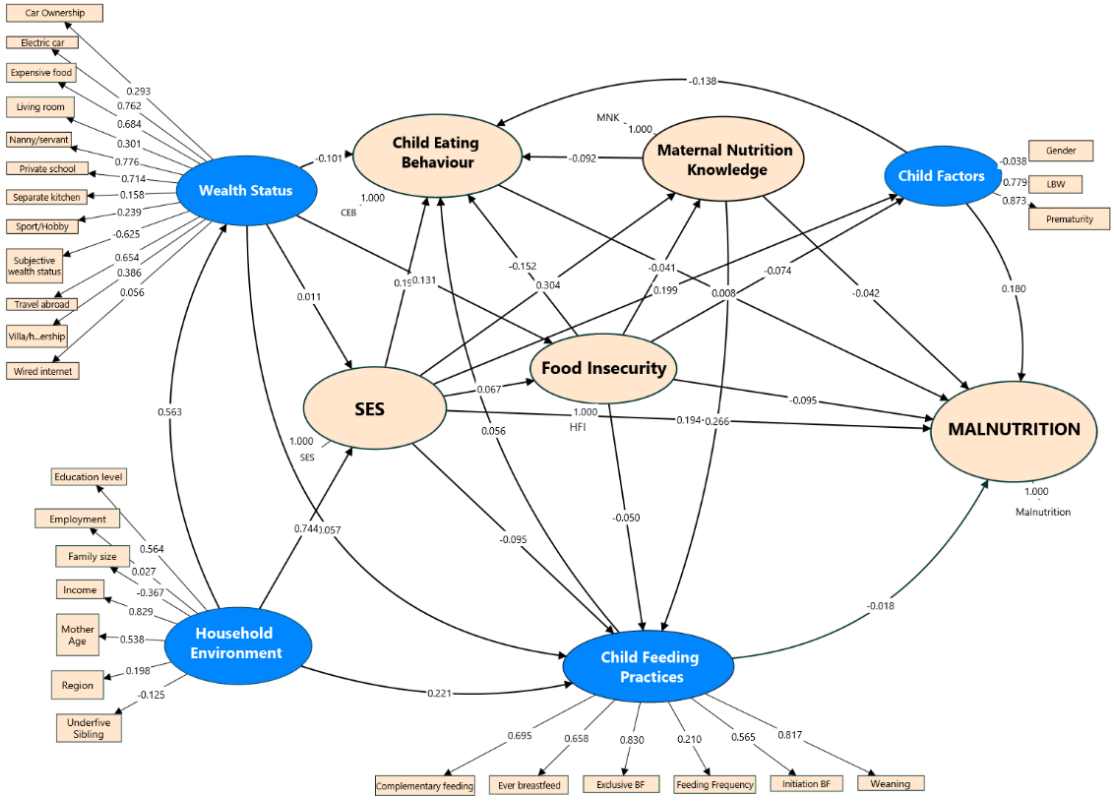

Figure 6 Model path analysis of socioeconomic disparities on nutrition inequalities in Hungary *(n=128, Hungary; Source: Primary Data Survey, PLS-SEM Test)*

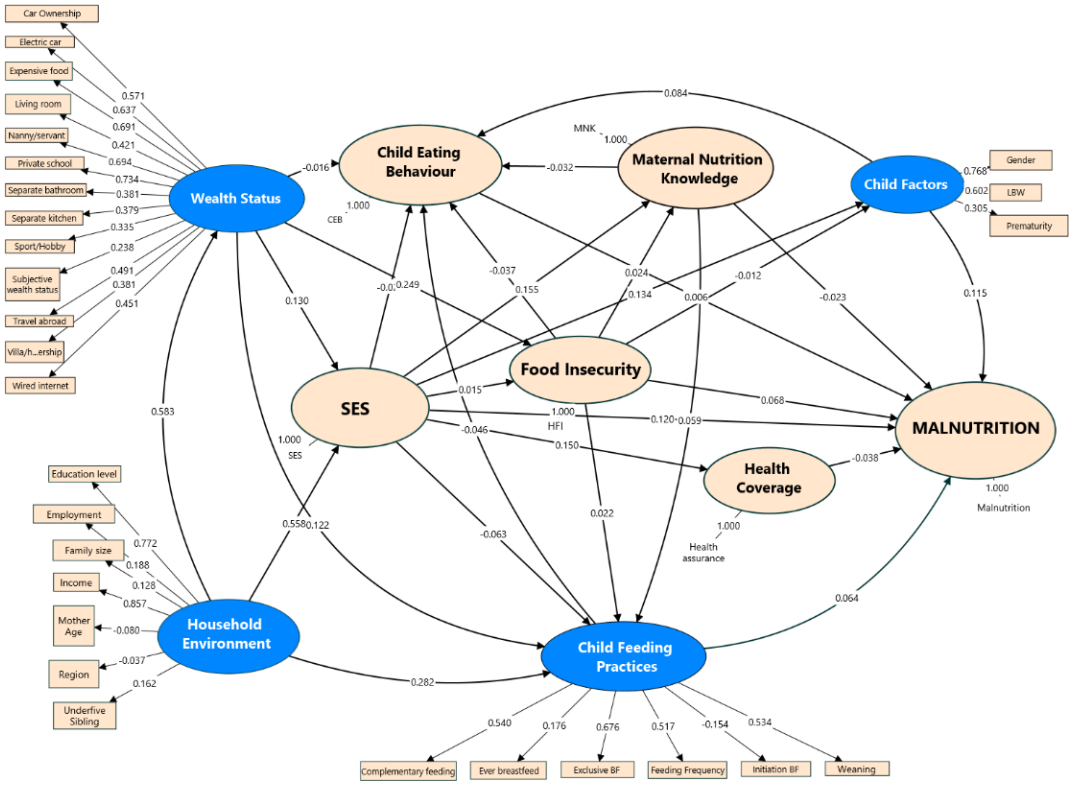

Figure 7 Model path analysis of socioeconomic disparities on nutrition inequalities in Indonesia *(n=535, Indonesia; Source: Primary Data Survey, PLS-SEM Test)*

CR is used to assess internal consistency for indicators loading on each latent variable. CR is a key indicator of reliability in PLS-SEM tests, and an acceptable value for research purposes is ≥ 0.60. Aside from that, all variables in the model have CR values greater than or equal to this threshold, indicating good reliability for each construct (Tables 8 and 9). These results indicate that the measures of the constructs have good internal consistency in measuring the underlying latent variables.

Table 8 Reliability and validity tests of constructs and model fit statistics for the measurement model in Hungary included in the study *(n=128, Hungary; Source: Primary Data Survey, PLS-SEM Test)*

Constructs/Latent Variables	CR	√AVE	Decision
Child factors	0.816	0.831	Valid and reliable
Wealth status	0.913	0.822	Valid and reliable
Household environment	0.702	0.671	Valid and reliable
Child feeding practices	0.842	0.723	Valid and reliable

AVE, average variance extracted; CR, composite reliability

According to the convergent validity analysis based on √AVE values (Tables 8 and 9), all constructs exceeded the cutoff of 0.50, indicating good fit and adequate measurement

validity. All latent variables had √AVE >0.5, indicating that more than 50% of indicator variability can be attributed to this construct. The child factor, house environment, wealth status, and child feeding practices in the Hungarian and Indonesian Path Model are both acceptable. Therefore, the construct in the model met the convergent validity criteria using √AVE: all constructs explained more than 50% of the variance in their indicators.

Table 9 Reliability and validity tests of constructs and model fit statistics for the measurement model in Indonesia included in the study (*n=535, Indonesia; Source: Primary Data Survey, PLS-SEM Test)*

Constructs/Latent Variables	CR	√AVE	Decision
Child factors	0.665	0.710	Valid and reliable
Wealth status	0.851	0.598	Valid and reliable
Household environment	0.802	0.819	Valid and reliable
Child feeding practices	0.690	0.701	Valid and reliable

AVE, average variance extracted; CR, composite reliability

4.3.2 Model Fit of Inner Model

In PLS-SEM, a regression-based approach, the modification indices (MIs) are typically not used because, rather than covariances, the explained variance (R^2) of the dependent constructs is maximised as the objective function. In PLS-SEM, R^2 indicates the degree to which latent independent variables in a model explain the variance in the latent dependent variable. SES can be considered to have moderate predictive power ($R^2 > 0.50$), while other variables have weak predictive power. Table 10 showing R^2 values for Indonesian Modelling can be considered moderate predictive power for SES and wealth status, with R^2 value between 0.25 and 0.50 (129).

Table 10 Inner model fit using R^2 in Hungary *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey)*

Variable	Hungary			Indonesia		
	R^2	R^2 adjusted	Decision	R^2	R^2 adjusted	Decision
Child Eating Behaviour	0.073	0.050	Weak	0.016	0.005	Weak
Child Factors	0.040	0.032	Weak	0.020	0.016	Weak
Child Feeding Practices	0.126	0.109	Weak	0.043	0.034	Weak
Food Insecurity	0.057	0.050	Weak	0.054	0.050	Weak
Health Coverage	-	-	-	0.022	0.021	Weak
Malnutrition	0.084	0.062	Weak	0.037	0.024	Weak

Maternal Nutrition Knowledge	0.091	0.084	Weak	0.026	0.022	Weak
SES	0.579	0.576	**Moderate**	0.418	0.416	**Moderate**
Wealth Status	0.141	0.138	Weak	0.292	0.290	**Moderate**

R^2<0.25 weak; 0.25<R^2<0.50, moderate; R^2>0.75, strong (129)

The model fit test (Table 11) shows that the chosen model is suitable for analysing the relationship between latent variables, providing confidence that we can consider this model a sufficient representation of our data and that it is expected to yield estimates valid for prediction.

Table 11 Model fit indices for the modified structural model *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Rule of Thumb	**Hungary**	**Decision**	**Indonesia**	**Decision**
SRMR	0.090	Fit	0.078	Fit
Q^2 Malnutrition	-0.009	Less predictive	0.016	Predictive
Q^2 SES	0.564	Strong predictive	0.409	Strong predictive
Q^2 Child Factors	0.002	Weak predictive	0.017	Weak predictive
Q^2 Maternal Nutrition Knowledge	0.091	Moderate predictive	0.038	Moderate predictive
Q^2 Household Food Insecurity	0.013	Weak predictive	0.044	Moderate predictive
Q^2 Child Feeding Practices	0.027	Moderate predictive	0.024	Moderate predictive
Q^2 Child Eating Behaviour	-0.001	Less predictive	-0.003	Less predictive
Q^2 Wealth Status	0.129	Moderate predictive	0.283	Strong predictive

SRMR < 0.10: fit; Q^2 > 0: predictive; Q^2 < 0: less predictive; Q^2 < 0.02: weak; Q^2 < 0.15: Moderate; Q^2 < 0.35: Strong

The SRMR values for both Hungary (0.090) and Indonesia (0.078) were below the threshold of the acceptable global model fit (SRMR ≤ 0.01). These results, therefore, statistically validate the structural model and provide a basis for further hypothesis tests in both settings. Predictive relevance (Q^2) is acceptable in Indonesia (>0.15), except for some key constructs which are > 0.15, but weaker in Hungary (< 0) for a few latent variables (such as child eating behaviour and malnutrition) due to low variance and potentially poor external validity, suggesting the potential value of our models acknowledging cross-national differences. However, SES variables have Q^2 values > 0.35, indicating strong predictive ability for malnutrition in both Hungary and Indonesia.

4.3.3 Direct Effects of Structural Model

PLS-SEM test uses bootstrapping, a resampling method that repeatedly draws subsamples from the data to estimate path coefficients and their standard errors. Results are usually reported in the form of t-values or p-values. A relationship is considered statistically significant when the p-value is less than the established threshold of 0.05. The gravity model bootstrapping results are reported in Table 12 for the direct effects on the Structural Model in Hungary.

Table 12 Standardised and unstandardised estimates for direct effects on the structural model in Hungary included in the study *(n=128, Hungary; Source: Primary Data Survey, PLS-SEM test)*

Direct Effect Paths	S (β)	SD	T statistics	P values	Decision
Child Factors → Child Eating Behaviour	-0.137	0.045	3.038	0.002	S
Food Insecurity → Child Factors	-0.078	0.026	2.942	0.003	S
Food Insecurity → Malnutrition	-0.095	0.028	3.379	0.001	S
Household Environment → SES	0.796	0.038	21.044	0.000	S
Household Environment → Wealth Status	0.376	0.048	7.887	0.000	S
Maternal Nutrition Knowledge → Child Feeding Practices	0.290	0.077	3.768	0.000	S
SES → Child Eating Behaviour	0.171	0.060	2.862	0.004	S
SES → Malnutrition	0.196	0.088	2.215	0.027	S
SES → Maternal Nutrition Knowledge	0.304	0.050	6.024	0.000	S
Wealth Status → Child Eating Behaviour	-0.142	0.062	2.273	0.023	S
Wealth Status → Food Insecurity	0.209	0.045	4.670	0.000	S
Wealth Status → SES	-0.111	0.051	2.166	0.030	S

S (β), standardized coefficient; SD, standard deviation; p value < 0.05, significant; →, refers; S, significant

The PLS-SEM structural model direct pathways for the Hungarian subsample (n=128) show several statistically significant predictive relationships, including the importance of SES and household environment in predicting nutritional status among children under five. Due to limited resources directed towards food, food insecurity significantly affected child factors (ß = -0.078, $p < 0.05$) and malnutrition (ß = -0.095, $p < 0.05$). The household environment showed strong positive correlations with SES (β = 0.796, $p < 0.0001$) and wealth status (β = 0.376, $p < 0.0001$), respectively, indicating its importance for economic measures.

The total effect represents a holistic measurement model that accounts for all possible

pathways between two variables in PLS-SEM. The total effect in Hungary Modelling was analysed, as shown in Table 13.

Table 13 Standardised and unstandardised estimates for total effects on the structural model in Hungary included in the study *(n=128, Hungary; Source: Primary Data Survey, PLS-SEM test)*

Total Effect Paths	**S (β)**	**SD**	**T statistics**	**P values**	**Decision**
Child Factors → Child Eating Behaviour	-0.137	0.045	3.038	0.002	S
Food Insecurity → Child Factors	-0.078	0.026	2.942	0.003	S
Food Insecurity → Malnutrition	-0.107	0.028	3.850	0.000	S
Household Environment → Food Insecurity	0.142	0.063	2.238	0.025	S
Household Environment → Malnutrition	0.146	0.062	2.342	0.019	S
Household Environment → Maternal Nutrition Knowledge	0.224	0.040	5.587	0.000	S
Household Environment → SES	0.754	0.030	25.020	0.000	S
Household Environment → Wealth Status	0.376	0.048	7.887	0.000	S
Maternal Nutrition Knowledge → Child Feeding Practices	0.290	0.077	3.768	0.000	S
SES → Malnutrition	0.208	0.082	2.554	0.011	S
SES → Maternal Nutrition Knowledge	0.301	0.049	6.091	0.000	S
Wealth Status → Child Eating Behaviour	-0.175	0.064	2.724	0.006	S
Wealth Status → Child Factors	-0.037	0.022	1.716	0.086	S
Wealth Status → Food Insecurity	0.200	0.049	4.103	0.000	S
Wealth Status → Malnutrition	-0.048	0.023	2.069	0.039	S
Wealth Status → Maternal Nutrition Knowledge	-0.042	0.019	2.201	0.028	S
Wealth Status → SES	-0.111	0.051	2.166	0.030	S

S (β), standardised coefficient; SD, standard deviation; p value < 0.05, significant; →, refers; S

The direct-effect paths in the PLS-SEM model for the Indonesian subsample (Table 14) indicated several empirically significant pathways. SES had a positive effect on child factors (S (β) = 0.141, p = 0.001); health coverage (S (β) = 0.150, p <0.0001); malnutrition (S (β) = 0.122, p = 0.003); and maternal nutrition knowledge (S (β) = 0.155, p <0.0001).

Table 14 Standardised and unstandardised estimates for direct effects on the structural model in Indonesia included in the study *(n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Direct Effect Paths	S (β)	SD	T statistics	P values	Decision
Child Factors → Malnutrition	0.107	0.047	2.301	0.021	S
Household Environment → Child Feeding Practices	0.227	0.075	3.030	0.002	S
Household Environment → SES	0.596	0.038	15.636	0.000	S
Household Environment → Wealth Status	0.540	0.039	13.928	0.000	S
SES → Child Factors	0.141	0.043	3.265	0.001	S
SES → Health Coverage	0.150	0.040	3.788	0.000	S
SES → Malnutrition	0.122	0.041	2.943	0.003	S
SES → Maternal Nutrition Knowledge	0.155	0.040	3.890	0.000	S
Wealth Status → Food Insecurity	0.212	0.038	5.583	0.000	S
Wealth Status → SES	0.086	0.041	2.112	0.035	S

S (β), standardized coefficient; SD, standard deviation; p value < 0.05, significant; →, refers; S

Table 15 shows the total effects on the structural model in Indonesia. The linkage of SES was significant on malnutrition (S (β) = 0.130, p = 0.001), maternal nutrition knowledge (S (β) = 156, p < 0.0001), child factors (S (β) = 0.140, p = 0.001) and health coverage (S (β) = 0.150, p < 0.0001), indicating bidirectional economic dynamics behind such relationships between them among children in the study area.

Table 15 Standardised and unstandardised estimates for total effects on the structural model in Indonesia included in the study *(n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Total Effect Paths	S (β)	SD	T statistics	P values	Decision
Child Factors → Malnutrition	0.108	0.047	2.316	0.021	S
Household Environment → Child Factors	0.089	0.029	3.051	0.002	S
Household Environment → Child Feeding Practices	0.170	0.058	2.932	0.003	S
Household Environment → Food Insecurity	0.141	0.026	5.359	0.000	S
Household Environment → Health Coverage	0.096	0.026	3.682	0.000	S
Household Environment → Malnutrition	0.096	0.027	3.483	0.000	S
Household Environment → Maternal Nutrition Knowledge	0.103	0.026	3.934	0.000	S
Household Environment → SES	0.642	0.031	20.441	0.000	S

Household Environment → Wealth Status	0.540	0.039	13.928	0.000	S
SES → Child Factors	0.140	0.043	3.264	0.001	S
SES → Health Coverage	0.150	0.04	3.788	0.000	S
SES → Malnutrition	0.130	0.04	3.237	0.001	S
SES → Maternal Nutrition Knowledge	0.156	0.04	3.949	0.000	S
Wealth Status → Food Insecurity	0.216	0.036	5.981	0.000	S
Wealth Status → SES	0.086	0.041	2.112	0.035	S

S (β), standardized coefficient; SD, standard deviation; p-value < 0.05, significant; →, refers; S

4.3.4 Indirect Effects and Mediation Analysis of Structural Model

PLS-SEM showed that both direct and indirect effects of latent variables on childhood malnutrition were observed among children under the age of five in Hungary (Figure 8). In the mediation analysis (Table 16), SES did not have a direct effect on malnutrition, but it had a statistically significant indirect effect ($p < 0.05$), resulting in a non-significant total effect and full mediation by the mediating factors. Household food insecurity showed significant direct ($p < 0.05$) and indirect ($p < 0.05$) effects, with a significant total effect indicating partial mediation. Whereas the household environment had no direct effect but significant indirect and total effects ($p < 0.05$), indicating full mediation.

Table 16 Mediation effects (standardised) on child malnutrition in the structural modelling of Hungary included in the study *(n=128, Hungary; Source: Primary Data Survey, PLS-SEM test)*

Latent Variables	**P value**			**Mediation Analysis**
	Direct Effect	**Indirect Effect**	**Total Effect**	
Socioeconomic Status	S*	NS	S*	No mediation
Child Factors	NS	NS	NS	Not applicable
Child Eating Behaviour	NS	NS	NS	Not applicable
Child Feeding Practices	NS	NS	NS	Not applicable
Household Food Insecurity	S**	NS	S**	No mediation
Health Coverage	-	-	-	Not applicable
Household Environment	NS	S*	S*	Full mediation
Maternal Nutrition Knowledge	NS	NS	NS	Not applicable
Wealth Status	-	S*	S*	Full mediation

*p < 0.05, ** p < 0.01; NS, not significant; S, significant

The path analysis (Table 17) further elucidated these relationships, with notable significant indirect paths from household environment through SES, maternal nutrition knowledge, and food insecurity, as well as wealth status to food insecurity, which were also significant for the indirect effect, underscoring the mediating roles of household environment and wealth status in exacerbating nutrition inequalities.

Table 17 Mediation path analysis on child malnutrition in Hungary included in the study *(n=128, Hungary; Source: Primary Data Survey, PLS-SEM test)*

Indirect Effect Paths	S (β)	SD	T statistics	P values	Decision
Household Environment → SES → Malnutrition	0.156	0.072	2.175	0.030	S
Household Environment → SES → Maternal Nutrition Knowledge	0.242	0.043	5.619	0.000	S
Household Environment → Wealth Status → Child Eating Behaviour	-0.053	0.025	2.095	0.036	S
Household Environment → Wealth Status → Food Insecurity	0.078	0.019	4.123	0.000	S
Wealth Status → Food Insecurity → Child Factors	-0.016	0.007	2.377	0.017	S
Wealth Status → Food Insecurity → Malnutrition	-0.020	0.008	2.594	0.010	S
Household Environment → Wealth Status → Food Insecurity → Malnutrition	-0.007	0.003	2.470	0.014	S

S (β), standardised coefficient; SD, standard deviation; p-value < 0.05, significant; →, refers

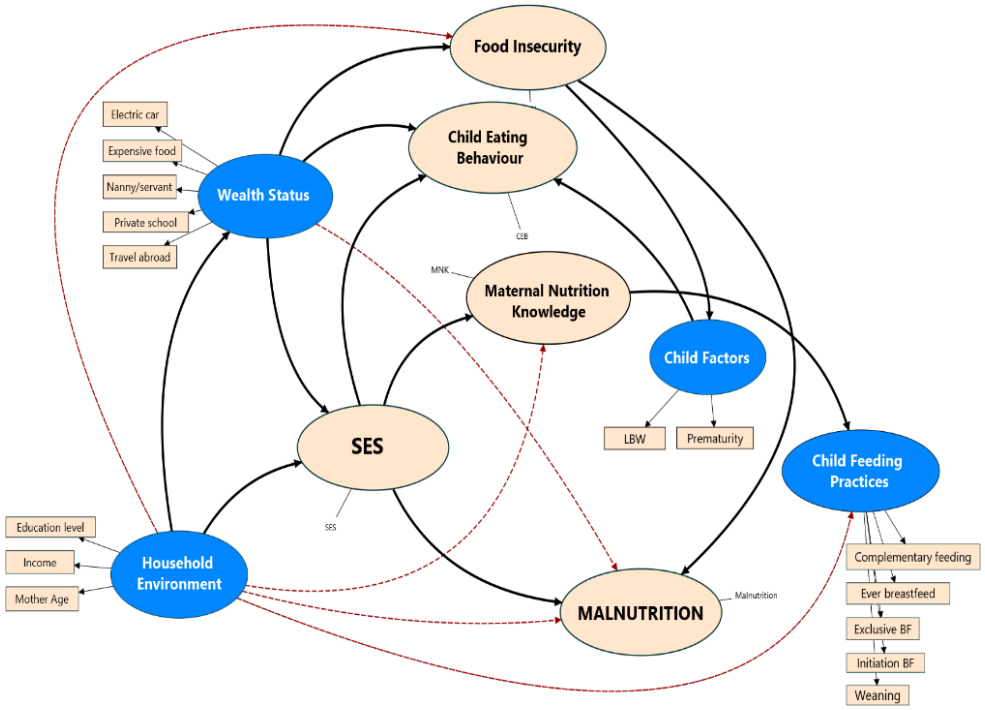

Figure 8 Model path diagram of socioeconomic disparities on nutrition inequalities in Hungary *(n=128, Hungary; Source: Primary Data Survey, PLS-SEM test)*

The mediation model for Indonesia identified several significant paths linking multiple predictors to child malnutrition. SES was the only variable that was partially mediated, with highly significant direct, indirect, and total effects (Table 18, Figure 9).

Table 18 Mediation effects (standardised) on child malnutrition in the structural modelling of Indonesia included in the study *(n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Latent Variables	P value			Mediation Analysis
	Direct Effect	Indirect Effect	Total Effect	
Socioeconomic Status	S**	S*	S**	Partial mediation
Child Factors	S*	NS	S**	No mediation
Child Eating Behaviour	NS	NS	NS	Not applicable
Child Feeding Practices	NS	NS	NS	Not applicable
Household Food Insecurity	NS	NS	NS	Not applicable
Health Coverage	NS	NS	NS	Not applicable
Household Environment	NS	S**	S**	Full mediation
Maternal Nutrition Knowledge	NS	NS	NS	Not applicable
Wealth Status	NS	NS	NS	Not applicable

*p < 0.05, ** p < 0.01; NS, not significant; S, significant

There are significant indirect paths that were identified (Table 18 and Figure 9), and with the household environment being an important upstream predictor having direct effect on malnutrition (S(β) = 0.041, p = 0.050) and indirect effects via child factors (S(β) = 0.007, p = 0.014) and maternal nutrition knowledge (S(β) = 0.078, p < 0.001). Wealth status exerted the same prediction relationship on malnutrition indirectly through some chains which were operating through the SES, including pathways to child model (S(β) = 0.001, p = 0.021), food insecurity (S(β) = 0.001, p = 0.050), maternal nutrition knowledge (S(β) = 0.001, p = 0.039), health coverage (S(β) = 0.001, p = 0.045), and direct transmission via SES (S(β) = 0.007, p = 0.016).

Table 19 Mediation path analysis on child malnutrition in Indonesia included in the study *(n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Indirect Effect Paths	S (β)	SD	T statistics	P values	Decision
Household Environment → SES → Child Factors	0.084	0.027	3.062	0.002	S
Household Environment → SES → Health Coverage	0.089	0.024	3.659	0.000	S
Household Environment → SES → Malnutrition	0.073	0.026	2.770	0.006	S
Household Environment → SES → Maternal Nutrition Knowledge	0.092	0.025	3.743	0.000	S
Household Environment → Wealth Status → Food Insecurity	0.114	0.023	5.001	0.000	S
Household Environment → Wealth Status → SES	0.047	0.023	2.032	0.042	S

Household Environment → SES → Child Factors → Malnutrition	0.009	0.005	1.864	0.049	S

S (β), standardized coefficient; SD, standard deviation; p value < 0.05, significant; →, refers; S, significant

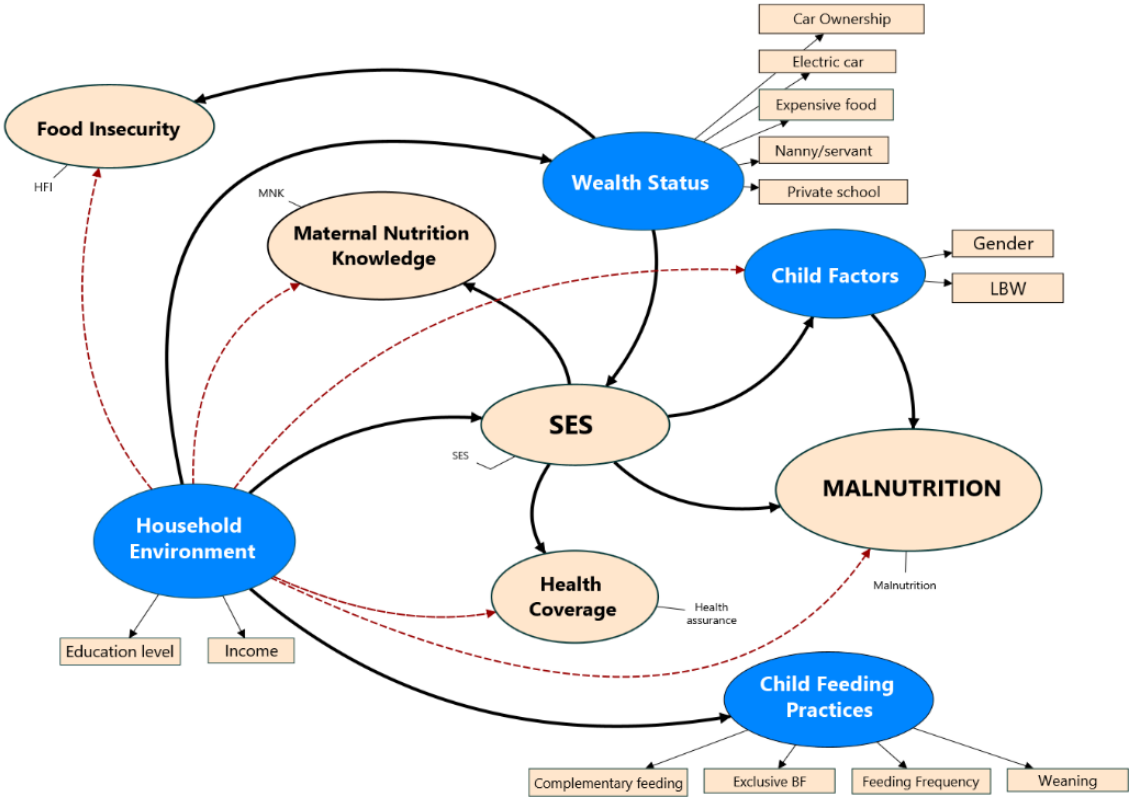

Figure 9 Model Path Diagram of Socioeconomic Disparities on Nutrition Inequalities in Indonesia *(n=535; Source: Primary Data Survey, PLS-SEM test)*

Direct-indirect effects of the modified SEM and path diagram of its output paths. In SEM, circles represent latent exogenous and endogenous variables, and rectangles indicate observed or measured exogenous and endogenous variables. Arrows linking circles and rectangles take their path type or link type from their coefficients. Black arrows indicate direct effects, and red arrows indicate indirect effects.

4.3.5 Measurement Invariance of Composite Models (MICOM) and Multi-Group Analysis (MGA)

Group comparisons using PLS-SEM will be misleading without establishing the invariance of researchers' measures. The MICOM procedure outlines a three-step approach to assess measurement invariance before conducting multigroup analyses in PLS-SEM (130). Before comparing across countries, Henseler et al. (2016) used the MICOM three-step procedure to assess for measurement invariance. The MICOM analysis confirmed Compositional Invariance, since the original correlations for the composite scores were greater

than the 5% quantile. This allows them to interpret differences in path coefficients across the two groups. Path coefficients were compared within each country-specific model, with testing for measurement equivalence supporting the identification of differences in path coefficients.

a. Step 1 (Configural Invariance): It was confirmed by keeping the same indicators and data handling in both models.
b. Step 2 SmartPLS provides confidence intervals based on permutations, which allows us to determine whether a composite has a significant correlation of less than one in the Hungarian sample and the Indonesian sample. Otherwise, the composite does not differ much between the two aggregation groups, and compositional invariance is established. The correlation between the composite scores was not statistically different from being equal to 1. This happens because the 'meaning' or 'recipe' of the SES construct is comparable across both groups, whereas the particular loading on an item (e.g., car ownership) is somewhat different in importance between the two locations. Table 20 shows MICOM results between the two study settings.

Table 20 The Results of MICOM Step 2 between Hungary and Indonesia *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Variables	**Original correlation**	**Correlation permutation mean**	**5.00%**	**Permutation p-value**	**Original correlation**	**Decision**
Child Eating Behaviour	1	1	1	0.387	1	Established
Food Insecurity	1	1	1	0.414	1	Established
Malnutrition	1	1	1	0.376	1	Established
Maternal Nutrition Knowledge	1	1	1	0.327	1	Established
SES	1	1	1	0.028	1	Not established

p-value < 0.05: not established

A permutation test was used to assess compositional invariance. The results showed that the correlations between composite scores were not significantly different from 1, as the value 1 fell within their corresponding confidence intervals.

c. Step 3 for the mean values and for those data sets' variances, permutation-based confidence intervals allow to check if the composite's mean value or its variance differs across groups. Table 21 shows the permutation value to evaluate whether the Hungarian Model and Indonesian Model had equal means and variances.

Table 21 Permutation Value in Hungary and Indonesia *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Variables	Original difference	Permutation mean difference	2.50%	97.50%	Permutation p-value	Decision
Child Eating Behaviour	-1.795	-0.009	-0.164	0.133	0.000	Not established
Food Insecurity	-1.664	-0.008	-0.169	0.127	0.000	Not established
Malnutrition	-0.882	-0.007	-0.08	0.035	0.000	Not established
Maternal Nutrition Knowledge	0.239	-0.013	-0.303	0.253	0.092	Established
SES	0.144	-0.015	-0.345	0.285	0.370	Established

p-value < 0.05: not established

Since configural invariance (Step 1) is established, and compositional invariance (Step 2) was shown, but equality of means and variances (Step 3) is only partially supported, the results provide confirmation of partial measurement invariance. Results of MICOM Step 3 suggested that both countries had significantly different means for malnutrition, food insecurity, and child eating behaviour ($p < 0.05$). Thus, Full Measurement Invariance was not achieved. Nevertheless, Partial Measurement Invariance was established (following Step 2: Compositional Invariance), allowing MGA to compare path coefficients and hypotheses (131).

Implication for Multi-Group Analysis (MGA)

Establishing partial measurement invariance implies that comparisons of structural paths between the Hungarian and Indonesian samples are significant. Hence, a MGA can be performed to compare path coefficients between groups. Based on the MGA test, this cross-country analysis between the two samples shows significant differences in SES with respect to food insecurity, malnutrition, and maternal nutrition knowledge.

Table 22 Results of Multi-Group Analysis between Hungary and Indonesia *(n=128, Hungary; n=535, Indonesia; Source: Primary Data Survey, PLS-SEM test)*

Path	Difference (Hungary-Indonesia)	p-value (Hungary - Indonesia)	Decision
Child Eating Behaviour -> Malnutrition	-0.029	0.768	Not significant difference
Food Insecurity -> Malnutrition	-0.178	0.120	Not significant difference
Maternal Nutrition Knowledge -> Malnutrition	-0.040	0.778	Not significant difference

SES -> Child Eating Behaviour	0.131	0.677	Not significant difference
SES -> Food Insecurity	**0.012**	**0.001**	**Significant difference**
SES -> Malnutrition	**0.100**	**0.001**	**Significant difference**
SES -> Maternal Nutrition Knowledge	**0.141**	**0.000**	**Significant difference**

p-value>0.05: significant

5. DISCUSSION

The structural equation models in this analysis offer a unique opportunity for a direct cross-national comparison of the pathways between SES differences and nutrition inequality among children in Budapest (Hungary) and Surabaya (Indonesia). Based on the path analytic model, findings suggested both converging hierarchical patterns and unique context-specific contrasts manifesting a complex relationship among economic development, strategic social policy contexts, and nutrition outcomes. The results for both countries are in line with the broader UNICEF framework (24,132) that argues that child malnutrition, an important manifestation of nutritional inequality, is driven by more distal socioeconomic variables, which act primarily through proximal mediators. These disparities reflect the context of Hungary as a relatively high-income European state with extensive health care and social protection systems, around 95%, although people with low incomes are more likely to have unmet health treatment or medical needs due to the costs, distance accessibility, or waiting time to get treatment from health care providers (133), versus that of Indonesia as a LMICs characterised by long-term structural inequities in terms of equitable distribution of education, healthcare, and economic opportunities across regions (134). Based on the mediation models, we emphasise the importance of socioeconomic inequalities as underlying determinants of nutritional inequalities across these divergent areas. The present study highlights that socioeconomic inequalities are fundamental determinants of child nutrition, aligning with global syntheses indicating that poor socioeconomic standing is a common underlying factor in differential nutritional outcomes worldwide (135).

5.1 Discussion of Indonesian results for the entire sample

The evidence of the study in the Indonesian context across the full sample (n = 657) supports hypothesis 4, which asserts that the relationship between child biological factors (namely, prematurity and low birth weight) mediates the association between childhood SES and nutrition inequality. Maternal education was revealed to significantly associate with preterm birth, with being in the lowest quartile having a factor 3.23 (AOR = 3.23) higher risk for preterm delivery; household wealth indicators, namely house ownership and income, were significant predictors for birth outcomes (106). These results suggest that, in the Indonesian case, SES-malnutrition was driven by an overarching structural vulnerability that predicts future individual/family characteristics even prior to birth. In contrast to the hypothesised Hungarian model (Hypothesis 2), in which universal health coverage was thought to moderate the relationship between SES and neonatal biological risks (non-significant mediating effect of

birth weight among European).

Moving beyond the role of household food security, the strong association with poor birth outcomes in the Indonesian sample suggested that structural factors in predicting Indonesia's nutritional health (Hypothesis 6, Hypothesis 7) overrule behavioural influences. In contrast to the Hungarian model, which suggests that child feeding practices are driven by maternal knowledge and child eating behaviour. Current data illustrate that in Indonesian households, these behaviours may be secondary to resource availability. The mother's educational and employment status is inherently connected to food security, which shapes a child's nutritional status (106). This supports Hypothesis 5, suggesting that child feeding practices in Indonesia are less influenced by behavioural factors than structural factors such as SES and food security.

The significant predictors of child undernutrition (wasting and stunting) identified in the Surabaya study included maternal education and SES, while Maternal Nutrition Knowledge was surprisingly rejected as a main driver for wasting using Boruta algorithm analysis (87). This supports the dissertation that, in the Indonesian sample, structural factors such as household resource availability and financial stability have a more immediate and significant association with nutritional outcomes than practising behavioural variables alone. In the Hungarian sample, malnutrition is more likely to arise from child's eating behaviour and feeding practices in detail, whereas for Indonesia, it appears that even when mothers are informed of how to improve their child's nutrition "inhibited mediation path" described in Hypothesis 3 happen because food insecurity does not feed them knowledge (but part is limited financial resources blocking practice flow) into better well-being. Moreover, the findings on health insurance in the Indonesian Model provide a more nuanced perspective on Hypotheses 2. However, this study argues that health insurance is the most common mediator in Indonesia. However, another study of urban children did not find health insurance to be a significant predictor of wasting in that sample (87) and suggested that closer services or better-quality services may have outweighed simple coverage.

5.2 Hypotheses

5.2.1 Predictive Relationship of Socioeconomic Factors on Child Malnutrition

Hypothesis 1 argued that the underlying mechanisms of SES differed fundamentally between Hungary and Indonesia. It was previously hypothesised that in the Hungarian sample, the relationship between SES and malnutrition would be fully mediated by concurrent variables, particularly child feeding practices, child eating behaviour, household food insecurity, and maternal nutritional knowledge. At the same time, the Indonesian study demonstrated

substantially more direct and no mediated effects of SES on child nutritional outcomes. The PLS-SEM analysis in this study strongly rejected this hypothesis, with the structural dynamic closely aligning with the predicted model.

The structural model showed that, in the Hungarian context, SES has a direct effect on child malnutrition, with no significant mediating effect. The finding challenges the idea that there are any behavioural or knowledge associated with socioeconomic disadvantage in high-income or developed countries. Conversely, the evidence highlights a crucial gap that is consistent with an earlier study, which shows that total material constraints directly dictate nutritional outcomes, thereby overruling any maternal feeding preferences and or behaviour practices (136). In the Hungarian welfare state, where severe poverty is less visible than in LMICs, there is nevertheless a persistent dimension of material deprivation that will, directly, prevent a household from affording enough nutritious food.

Previous studies have identified specific contexts; however, the relationship between SES and child nutrition tends to have immediate or direct effects. Evidence from sub-Saharan Africa indicates that when basic services, such as clean water, primary health care, and affordable, nutritious foods, are not universally available, these socioeconomic differences become more directly associated with malnutrition through mechanisms that avoid the usual intervening pathways (137). In such environments, without the buffer of well-designed structures, poor households will be directly exposed to inappropriate diets, repeated illness, and growth-limiting settings. This finding is also consistent with previous studies that found significant differences in how child growth varies across SES because of caregiving environments (138,139), dietary diversity (140), sanitation (141), and health care utilisation all vary by SES. Furthermore, a finding argues that socioeconomic disadvantage leads to a chain of limited life-space choices that ultimately result in poor nutrition (135).

According to studies in high-income countries, socially disadvantaged groups face significant obstacles to healthy dietary intake, which contributes to widening disparities in diet quality (136,142). People living in lower SES, food deserts, low finances, and adverse living and working conditions are always having a bad diet. SES, occupation, and place of residence have been social determinants of health that influence these dietary patterns. It has a negative or positive influence on health development. People living in more disadvantaged groups usually have poorer diets, often including less fruit, vegetables, whole grains, and other protein-rich foods, and more sugar-sweetened drinks, fried foods, fast food, and processed meat (143). This shows that health inequality in dietary habits persists over the years.

Furthermore, the SES associated with child malnutrition in Hungary, being a direct one, not mediated through food insecurity or maternal knowledge, signals a 'Structural Persistence' that welfare policies have yet to overcome. This study suggests three unreported mechanisms for this:

a. Relative Deprivation and Psychosocial Stress: In an advanced society, low SES corresponds with parental chronic stress (distributions of cortisol). Research suggests that this stress can affect child growth and biological development independently of caloric intake (144).
b. Environmental Housing Quality: In Hungary, low SES is often linked to living in a slum area or poor housing (exposure to dampness, deficient heating, or environmental pollutants). In young children, these combined factors can lead to recurrent respiratory infections or chronic inflammation, both of which directly affect nutritional absorption and growth (145,146).
c. Time Poverty: As a rule in the welfare state, low-income parents work low-wage jobs, or multiple jobs that afford them long commutes. This 'time poverty' can create dependence on ultra-processed, energy-dense but nutrition-poor diets that do not show up on traditional 'food insecurity' scales, but translate directly into malnutrition.

In contrast, in Indonesia, lower SES is associated with a greater likelihood of poor biological conditions early in life. This indirect pathway means that SES factors contribute to the strong evidence of low birth weight and directly predict malnutrition. In line with earlier investigations, which found that SES is a critical predictor of accessibility to maternal health and prenatal care, both of which correlate with the risk of experiencing birth complications (147,148). This is a consequence that low birth weight, whose initial health status is partly determined by their socioeconomic background, is at greater risk of suffering from malnutrition. Importantly, in the Indonesian sample, biological child factors (low birth weight) have a considerable direct effect on child malnutrition, independent of other mediating pathways. This direct effect is quite revealing: it shows that health and nutrition interventions for neonatal and maternity care may not have fully enhanced child growth and development in the early stages of life, especially for children and mothers living in disadvantaged socioeconomic circumstances. Corroborating previous studies, this study indicates that early biological risks, such as low birth weight, can continue to directly predict malnutrition (149–151), and once established, create a sustained, harmful trajectory in a child's growth and development. In addition, a finding revealed that poor WASH may be a stronger predictor of undernutrition and

low birth weight (149). Children born with low birth weight experience challenges in gaining a balanced nutritional status due to difficulty achieving the target enteral intake. Children may suffer complications, which may be associated with the severity of such illnesses as respiratory distress, necrotising enterocolitis with or without short gut syndrome, cardiac, sepsis, and other causes of malnutrition (152,153).

Overall, these results from Hungary and Indonesia provide additional support for this evidence and add greater complexity to it. The general model that characterised the way socioeconomic conditions affect nutrition in the household environment and behavioural terms was evident for both countries. It is consistent with previous findings that maternal education and maternal care-seeking behaviours were significantly associated with child nutrition. Household economic status had an overall strong positive effect that increased during the crisis, but had no effect on children aged under 6 months. A favourable household environment, including water, sanitation, and community conditions, significantly reduces child malnutrition (118–121). Furthermore, a previous study found that higher education and income, and employment, were associated with higher diet quality, whereas unemployment was associated with poorer diets. Having positive attitudes and behaviours towards healthy eating increased diet quality, whereas having negative attitudes and behaviours towards healthy eating decreased diet quality. Certain effects of SES (education, income, and single-parent household) on the quality of diet operate indirectly through specific behaviours or attitudes, such as trusting food advertisements, reading food labels, valuing organic foods, and eating ready-to-eat meals (154).

In Indonesia, SES continued to have a significant direct effect on child malnutrition, so the partial mediation that socioeconomic disadvantage repeatedly resulted in health inequalities in middle-income countries, even after covariate adjustment, where social networks may provide further unmeasured disadvantages, such as health status, nutritional adequacy, cognitive development, and future achievement, that directly influence food security, nutritional status, and health resilience. Children's networks start out as part of their mother's network, but they develop and maintain relations with similar others, other children, and with geographically close or recurrent contacts (155). Other unmeasured disadvantages (power, discrimination, conflict, and environmental degradation) further underscore the need for deeper investigations into cultural and structural factors that sustain reliance on remittances despite economic growth. It is consistent with prior research that discrimination in health services continues to perpetuate health services inequity in LMICs (156).

Wealth Status was the most significant exogenous latent construct in studies in Hungary

and Indonesia. It also captures possession of consumer durables and lifestyle assets (for instance, electric cars, expensive foods), nannies or servant(s), private schooling, a trip abroad, and a wired internet connection that together stand as proxy indicators for economic sustainability and prosperity growth. It is considered an important predictor of nutritional inequalities by improving access to resources and reducing the risk of malnutrition. In Hungary, wealth status was mediated by SES and food insecurity in child malnutrition, while in Indonesia, it was mediated by SES, maternal nutrition knowledge, food insecurity, and child factors. This finding of full mediation aligns with work in high-income settings where wealth status does not independently predict later child growth faltering after adjusting for child factors, prenatal factors (157), education, occupation (137), and behavioural factors (158).

The lack of a direct effect of wealth status on child malnutrition in Hungary and Indonesia, however, wealth status mediates child malnutrition through SES and food insecurity. Transitional economies display stronger connections that reflect ongoing market-induced food system inequalities, intensifying nutrition inequities. Corresponding to a prior study that global food systems are leading to health/environmental degradation, challenges to redevelop them to be more sustainable are progressively emerging across the world, and should involve the science-policy-society (consumers) and the improvement of the transition from nutrition and sustainable healthy diets to food systems change (159).

5.2.2 Health Coverage Role in Child Malnutrition

The focus of hypothesis 2 was the systemic intervention of the state, and posited that for the Hungarian sample, health coverage would not have significant direct or mediating effects as it would be neutralised by constant. In Hungary, health coverage is more homogeneous, and access to services is roughly similar across socioeconomic groups. Healthcare is provided to almost the entire population in Hungary by the National Health Insurance Fund, administered by the National Institute of Health Insurance Fund Management (NEAK), but spending on healthcare is much lower than in the EU (6.4% of GDP compared to 9.9% in 2019) (160). The GPs are funded on a capitation basis, with some practice-location and performance criteria. County hospitals are under the supervision of the National Directorate-General for Hospitals. The great majority of inpatient care expenditure is tax-funded, whereas out-of-pocket contributions (as co-payments) are surprisingly high in the outpatient care sector (outdoor clinics, dental care), as well as pharmaceuticals and medical equipment financing (160,161). Since all Hungarians had to be covered by the NEAK health insurance regulation, there was no variance. Hence, the measure was constant at the macro-level because every child gets health

coverage. This means that health insurance cannot play any role in this stratifier at the individual level or as a mediator of nutritional inequalities.

Contrary to the Indonesian Model, health coverage does not have a statistically significant direct or indirect mediating effect on child malnutrition. Possessing this insurance did not statistically protect children from low-SES, nor did it mediate pathways to malnutrition. Although health coverage exists in Indonesia, how much mothers and children use it, the quality of services received, and the services made available through health programmes may not be sufficient to mitigate the effects of socioeconomic disadvantage or household food insecurity on nutrition. Despite extensive efforts to improve healthcare access, such as the health coverage and the integrated healthcare system (Posyandu). However, along with these health programmes, health coverage may not be sufficient to explain the effectiveness of the Posyandu and other programmes that target the prevention of child malnutrition, or due to the strong influence of socioeconomic predictors on malnutrition in Indonesia.

The JKN, health coverage programme in Indonesia, has achieved rapid increases in insurance coverage since 2014, but substantial gaps persist in the quality of care and access, particularly between urban and rural populations (162). Due to this continued inequity, families with high SES are more likely to receive timely and quality care, which leads to unequal nutrition outcomes for children. Nevertheless, the progress of JKN in Indonesia faced a lot of obstacles from informal sector workers in the payment of premiums, regional differences in access to services and distribution of health workforce are among the weaknesses (163). Other programme, such as Program Keluarga Harapan (PKH), is a conditional cash transfer scheme targeted at low-income households with pregnant women and children up to 2 years old, which provides financial aid in exchange for fulfilling health and education conditions (164).; and, The BPNT (Bantuan Pangan Non Tunai) is a cash-based targeted food assistance programme that offers monthly electronic vouchers to poor families in order for them to acquire basic nutritious foods such as rice, eggs, and other staples through pre-identified retailers (165). This programme allows poor households to improve their children's nutritional status.

In addition, the PLS-SEM analysis finds that the direct effect of SES on health insurance ownership is a crucial finding in the Indonesian context. It means that a direct relationship exists: higher SES is sufficient, so families can obtain and maintain all sorts of health insurance. Families that have high income, are educated, and are employed are more likely to pay the premiums, get through the enrolment, and maintain coverage over timeThis direct pathway indicates that the economic and social inequalities manifest as unequal access to health

resources, which may lead to nutritional inequalities. In line with a previous study that revealed the SES factor was more likely to become JKN participants than the poorest families in Indonesia (166).

5.2.3 The Efficacy of Maternal Nutrition Knowledge on Malnutrition

In the Hungarian context, maternal nutrition knowledge has no direct or indirect effect on malnutrition, which also contradicts the common assumption that in developed countries, the health status of the child is determined by the education and health literacy of the mother (167,168). The fact that maternal nutritional knowledge does not translate into improved child nutritional status through feeding practices suggests a disconnect between "what the mother knows to do" and "what she can actually do". In contemporary European societies, mothers face an overwhelming amount of nutritional information, from recommendations issued by Paediatricians to public health campaigns urging exclusive breastfeeding and complementary feeding. Previous research in Hungary highlighted that mothers' health literacy is predicted by SES, age, and partnership status. The findings imply the need to enhance caregivers' health literacy through a range of health promotion activities, especially among mothers from low-SES backgrounds. In this context, the difficulties faced by adolescent and single mothers must also be taken into consideration (168).

The path model in Hungary indicates that perhaps 'no more' nutrition knowledge may be gained from traditional knowledge-based exposures, since it is already virtually universally possessed, and it was at ceiling. Within this high-awareness environment, further education has decreasing returns. Policy focus should therefore refocus on newer behavioural drivers of nutrition inequality, such as screen time, exposure to digital marketing, and intake of processed foods, which are more likely to dominate in high-income contexts. This argument is supported by a scoping review of digital nutrition interventions in high-income countries, which reports the limited influence of basic education programmes (169). Together, these trends imply the necessity of shifting approaches to advanced behaviour and environmental mechanisms in technology exposure, high-knowledge systems, for example, applying digital intervention to improve nutrition behaviours (170,171).

In Hungary, school meal contributes on children's total energy and nutrient intake. The country has a well-organised structure for the school meal programme. Public catering offers a diet, which is controlled by dieticians and regulated by ordinance, that is most suited to the nutritional needs of different sections of the population. Depending on what the family can afford, the student will either receive meals at no charge, at a reduced rate, or pay full price for

them. Over 50% of school-age children eat regularly within the framework of school catering. Essentially, the figure has remained the same for the past 70 years. Although school meals have been, and still are, part of the day-to-day lives of many youngsters, the image is still rather poor (172). However, children from a disadvantaged family can improve their nutritional status through this programme. The provision of school meals plays a critical role in mitigating hunger, poverty, and malnutrition. Beyond immediate nutritional benefits, these programs support long-term preschoolers' health, which subsequently contributes to improved attendance, higher graduation rates, and better academic focus (173).

PLS-SEM results in Indonesia indicate that financial hardship would inhibit maternal nutritional knowledge through the feeding practice pathway. In many developing countries, maternal education is part of public health programs, often employ community health workers (Kader) to provide maternal education at integrated health (Posyandu). Positive influences include increased uptake of antenatal care, improved rates of exclusive breastfeeding, increased vaccination coverage, and decreased incidence of stunting (174). However, statistical evidence in this study indicates that such knowledge-based initiatives are ineffective when not preceded by structural initiatives. In line with previous findings. Depending on household wealth, mothers' employment status, and other factors were associated with dietary diversity and continued breastfeeding (175). Furthermore, SES was significantly associated with child feeding practices, rather than with maternal nutrition knowledge itself (177).

Maternal nutrition knowledge in this study significantly predicted better feeding practices in Hungary but not in Indonesia. Its differences indicate that knowledge, especially about mothers, does not translate into practice most readily where households have the economic means and access to diverse foods. In LMICs, knowledge interventions are frequently constrained by the affordability, accessibility, and availability of healthy foods; thus, the knowledge alone yields limited behavioural changes (176). This indicates that in Hungary, shared information, training or education, and counselling programmes related to health and nutrition can be a high-leverage, cost-effective strategy, whereas in Indonesia, they must be coupled with measures that remove material barriers (cash transfers, subsidised supplementary foods, market access). This interpretation is consistent with implementation research in nutrition, which emphasises combined “knowledge + enabling” interventions.

Nutrition knowledge among mothers matters more in Indonesia, which is also consistent with the idea that interventions focusing on knowledge pay off better where the knowledge baseline is low. When situated in these contexts, focused counselling may lead to rapid

improvements in feeding practices and child indicators that diminish nutrition inequalities related to SES. In Indonesia, unequal access to education exacerbates this situation. The most recent syntheses continue to provide additional evidence supporting the linkage of maternal nutrition interventions in low-awareness LMIC settings (177–180).

5.2.4 Influence of Child Factors on Malnutrition

Hypothesis 4 focused on developmental biology and parenting afterwards. The Hungarian study predicted that early child biological risks, particularly low birth weight and prematurity, would significantly influence behavioural variables (feeding practices, eating behaviour) so as to offset predicted growth delays. On the contrary, it suggested that in the Indonesian sample, these child factors would act as partial mediators for malnutrition due to persisting biological deficits in early life. The empirical data shows interesting findings: child factors were completely non-significant in Hungary but were a strong direct predictor of malnutrition without mediation in Indonesia.

In the Hungarian sample, the child factors (low birth weight and prematurity) have no direct, indirect, or total effect, which is a strong testimony to the effectiveness of early-stage medical intervention in developed countries. The Barker Hypothesis (the Developmental Origins of Health and Disease) suggests that a child can be heavily programmed by early life stressors such as low birth weight, for future metabolic disorders and growth impairment (97). The evidence from Hungary shows that a strong, universal healthcare system can interrupt this biological trajectory. When a child is born preterm or low birth weight in Hungary, they are immediately placed in a specialised neonatal intensive care facility and subsequently receive constant and exclusive state-sponsored outpatient paediatric surveillance and nutritional supplementation.

Evidence abounds in the documentation of the “First 1,000 Days” initiative in LMICs. Previous studies have illustrated that, in resource-poor settings, low birth weight is one of the most intractable predictors for permanent childhood undernutrition (149,181,182). Despite the growth of the Indonesian healthcare system, it lacks the sophistication to provide neonatal follow-up care to highly vulnerable infants for their catch-up growth. In rural areas of Indonesia, a premature newborn who survives birth returns to a household with no clean water and an undernourished mother. Such a biological recovery is unlikely. This biological disadvantage at the time of birth overrides any behavioural or caregiving interventions and leads to malnutrition, as evidenced by our statistical model.

In the Hungarian sample, child factors that are relevant include only low birth weight

and prematurity, with their effect predominantly indirect through the ability of the health system to detect, follow up, and manage early-life risk. The fact that early biological disadvantage does not necessarily translate into measurable nutritional deficits in early life is also due to the availability of comprehensive maternal and child health services, routine neonatal screening, and universal follow-up. The lack of direct association between child factor and malnutrition in Hungary study can be attributed to the health care system's effectiveness in counterbalancing and/or compensating for some of those early biological threats, similar to previous findings child factor which strength findings on our previous study by multivariate logistic regression analysis, child in food-insecure household has 1.5 higher risk to preterm birth than living in food secure, nevertheless less likely to occur in food-insecure for low birth weight. Furthermore, prematurity was strongly associated with maternal education, with mothers with higher education being three times less likely to deliver prematurely than the least-educated mothers (106).

Hungary's health visitors play a role in prenatal care. Prenatal care is provided in a coordinated system by district health visitors, the gynaecologist or midwife (depending on the risk of pregnancy), and general practitioners. When pregnancy is confirmed, the mother and the health visitor will plan pregnancy care. Prenatal Care Education is very important during the prenatal period. Women are taught about the normal aspects of pregnancy, both physical and emotional, along with preparation for labour. These consultations also provide an opportunity to discuss serious issues like the pain relief options in labour and decisions about breastfeeding. Health visitors conduct regular screenings, counselling and home visits to support the health of both the mother and baby during pregnancy (183).

In Indonesia, associations between child factors (low birth weight and gender) and malnutrition are a direct pathway. It means that child factors influence growth failure. This finding is consistent with prior findings, particularly the high prevalence of the adverse perinatal outcomes and the limitations of neonatal care in mitigating their long-term nutritional impacts (106,184) (likely due to suboptimal early detection, medical treatment, and postnatal treatment) (185). It indicates that the government needs to improve prenatal care and risk screening. Consistent with prior findings, neonatal and postnatal service quality, in order to mitigate the direct biological mechanisms leading to child malnutrition in Indonesia.

Maternal and newborn care programmes in Indonesia are slightly different from those in Hungary. This is because in Indonesia, it is strongly influenced by local traditional beliefs, which is one of the cultures, particularly that pregnancy and birth outcomes are a matter of

fate or God's will, resulting in many communities realising that to prevent maternal or infant death. Thus, traditional birth attendants are still used. Consequently, Indonesia has built a robust community-based health system at the village level based on posyandu, public health centres (puskesmas), health visitors (Bidan Desa), and community volunteers (kader), to bring professional care closer to families. Posyandu is distributed throughout the urban-rural areas of the country. Village midwives and birth centres are established to improve accessibility to antenatal, delivery, and postnatal care services, whereas community volunteers facilitate the identification of pregnant women, promote antenatal care attendance, and refer particularly high-risk pregnancies. Despite this, under-trained volunteers, inadequately health-stocked facilities, uneven access to midwives, and the continued preference for traditional birth attendants are appreciated for their cultural, spiritual, and practical roles, and their contributions are significant in the maternal and newborn programme. Collaboration between midwives and traditional birth attendants (who were trained) is increasingly recognised as a strategy to share cultural assumptions in order to ensure safer childbirth (186,187).

5.2.5 The Predictors of Child Feeding Practices

PLS-SEM analyses in this study reveal that maternal nutrition knowledge is significantly associated with exclusive breastfeeding, early initiation of breastfeeding, weaning practices, and complementary feeding in children under five years in Hungary. Mothers with more knowledge of nutrition adhere to exclusive breastfeeding from birth more strongly. This knowledge also includes the timing and the complementary foods selected during this stage, so that mothers introduce a wide variety of nutritious foods. This knowledge directly affects practice, which explains why maternal knowledge is a strong predictor in Hungary to influence child feeding practices.

In addition, the study found that the direct effects of eating behaviour also affect feeding practice in Hungary. As such, a child's cues can result in their feeding alongside the caregiver's knowledge, thus supporting one another. As the hypothesis states, maternal knowledge and child behaviour resulted in mother and child outcomes, but household environment and SES would be expected not only to influence each other; they should also have an indirect impact on child outcomes. The level of education of a mother, often correlated with SES, is known to influence maternal nutrition knowledge. Studies across European countries demonstrate that maternal knowledge can have a direct influence on feeding, but SES and household environment (which reflect income and educational attainment) may play the role of mediating factors to enhance the feeding practices (188,189).

A study in Hungary revealed that SES was a significant independent predictor both for breastfeeding and for the use of hydrolysed infant formulae among supplementary nutrient users, indicating that SES has a significant influence on improving appropriate child feeding practices. Key finding in the research is that the low-SES group needs to promote encouraging breastfeeding, and continuous education of experts (GP-s, paediatricians, nurses, home health visitors) is essential (190). Furthermore, the school meal programme for preschool children in Hungary can help low-SES families to improve child feeding practices. School meals in Hungary are relatively low-priced for this social aspect, after all, so that a low (or lower) income is not an obstacle for children to access (healthy) daily meals. Although the total number of children is decreasing slightly, there has been a small increase in both the number and percentage of children who eat school meals. The younger the children and the poorer the region, the greater the demand for the service. For a fee, school meals are provided by local authorities, while also considering social policy aspects (e.g., low (or lower) income is no obstacle to children having access to (healthy) meals in educational institutions). Under certain social conditions, the service is provided with a voucher discount or even free of charge (191).

In Indonesia, the most direct predictors of child feeding practices, such as exclusive breastfeeding, timely breastfeeding initiation, and complementary feeding, are influenced by maternal education and income. As the availability and accessibility of sufficient food are fundamental requirements for child feeding practices, in this study, income and education mediated the relationship between wealth status and household food insecurity. Even though no direct effect between food insecurity and child feeding practices, prior findings revealed that mothers who live in more food-secure households are much better able to adhere to recommended feeding practices, such as exclusive breastfeeding and incorporating a variety of complementary foods into their diets, irrespective of mothers' knowledge (39,192,193).

Several studies from Indonesia and other settings show that IYCF practices are primarily determined by SES (194). As a result, maternal awareness of these practices might help them understand their importance. However, it is not directly predictive of exclusive breastfeeding, early initiation, or complementary feeding in Indonesia. And it is usually eclipsed by economic and food access realities. Hence, this variable empirically validates the thesis that structural factors are more pronounced.

5.2.6 Divergent Influence of Biological, Structural, and Behavioural Factors on Malnutrition

Hypothesis 6 predicted that in Indonesia, structural predictors (such as SES and household food security), as significant determinants, would drive the influences of behavioural predictors on malnutrition. In Hungary, however, malnutrition would be mainly driven by the behavioural factors (feeding practices and child eating behaviour). The mediation analysis presented in the structural models bolsters and sharpens these hypotheses.

In the Hungarian model, the mediation analysis of malnutrition indicates a different pattern from that initially hypothesised. Although child eating behaviour and child feeding practices were hypothesised as the direct drivers of malnutrition, results showed no statistically significant direct or indirect impact using either model. SES and household food insecurity are significant direct predictors of malnutrition in Hungary, with no mediation. This indicates that malnutrition in the Hungarian sample is predominantly driven by structural, rather than behavioural factors. Based on the importance analysis in our prior study, SES was identified as an important factor in undernutrition and maternal nutrition knowledge. Furthermore, child feeding practices, such as weaning practices and exclusive breastfeeding, were found to be important factors in malnutrition (87).

When economic crises, inflation, or an abrupt job loss hit a Hungarian household, the accompanying structural deprivation immediately undermines the child's diet. The nuances of feeding behaviour are indeed rendered irrelevant by the more recent European public health reports, which have begun to identify widespread food insecurity in vulnerable groups as an imminent threat to child health across the European Union (195,196), with almost one quarter reporting that they cannot afford a meal containing meat or vegetarian equivalents every other day at least, and reliance on food banks is ever increasing (197).

Furthermore, the household environment transforms significantly in ways that indirectly influence malnutrition in the Hungarian context, suggesting that the household environment does influence the undesired health outcome, but not through feeding practices. Wealth Status also has a significant direct and indirect effect, suggesting mediation by pathways other than those involving child feeding practices or eating behaviour as the main drivers of malnutrition. The absence of direct or indirect effects on child eating behaviour and child feeding practices contradicts the hypothesis that these behavioural risk factors would drive malnutrition in Hungary directly. The linkage of behavioural causes on malnutrition is largely driven by structural factors. There was no direct or indirect association of child eating behaviour and child

feeding practices with malnutrition, whereas SES and household environment had direct and indirect effects on malnutrition, the effect being significant for total effects as well as for partial mediation for SES. It is consistent with previous findings that the socioeconomic context and the household environment are key predictors of malnutrition (198,199).

Child factors in the Indonesian sample, including low birthweight and gender, had a substantial direct and thus total effect on child malnutrition, emphasising early life biological risks. The hypothesis argued that structural factors, rather than individual behavioural factors, would drive these effects. In this particular model, the significant predictive relationship remains SES and household environment, with indirect influence through the predictive relationship through which behavioural factors could operate, establishing that there are no statistically significant direct relationships between behavioural factors and malnutrition. In line with the finding that low birth weight and prematurity in middle-income countries may lead to child health problems and undernutrition due to structural factors and environmental conditions that are limited, worsening the critical age of life (149,181).

In addition, in Indonesia, SES likely has a direct effect because of differential exposure to environmental risks or structural barriers that are not fully captured by food security and health coverage indicators. In line with previous studies suggesting that higher SES households can obtain stable access to diverse diets (200), better quality water supplies (201), and environments (202), and health information disseminated via multiple pathways other than formal education (203,204). Lower-SES households, in contrast, endure continued exposures, including inadequate sanitation (141) and increased exposure to infectious diseases (205,206), limited mobility (78), and the lack of bargaining power (207), all of which threaten children's nutritional status. These structural inequalities, which are inextricably linked to geography, occupation, and social order, may produce potent direct effects independent of intermediaries.

5.2.7 Analysis of Predictive Relevance in Hungary and Indonesia

Hypothesis 7 aimed to assess the general predictive validity of the structural models. In other words, it indicates less predictive relevance of the structural model in a Hungarian sample. This is because, on the one hand, the predictive relevance of the carrier model would be lower than in Indonesia and Hungary. It was theoretically assumed that child malnutrition in a developing LMIC country like Indonesia is highly deterministic and predictable from systemic factors, SES, household food insecurity, maternal knowledge, child factors, and feeding practices. In other words, one might expect malnutrition to occur in a poorly developed welfare state like Hungary due to idiosyncratic reasons, rather than systemic variance at the population

level (e.g., at the aggregate level, between populations) that is not expected. Hypothesis received support from empirical evidence, as measured by Stone-Geisser's Q^2 coefficient, indicating a statistically significant difference in how malnutrition manifests in both contexts.

An analysis of the values in the Hungarian sample presents a telling sign of malnutrition in a developed welfare state. According to the PLS-SEM approach, however, a value less than zero implies lower predictive relevance of the endogenous construct. Child malnutrition has a negative influence on Hungary's model. The implication is that the full structural model, even when including variables household food insecurity and SES, which have strong in-sample explanatory paths, fails to provide accurate out-of-sample prediction of malnutrition incidence. Moreover, child eating behaviour was shown to be another behaviour-related variable without predictive power. This means that, in Hungary, neither broader structural variables nor very specific child eating habits predict which children in the general population will end up being clinically malnourished.

Nevertheless, it shows exactly the compensating buffer of European welfare influences. In Hungary, for instance, a family might be classified as low SES, or under the household food insecurity, but there are state-sponsored interventions, daycare is subsidised, a near-universal family allowance, and free paediatric healthcare (to ensure that illness does not progress), which means that this child does not experience biological influence at the level of stunting or wasting. The direct correlation between poverty and physical malnutrition is broken. The Hungarian model possesses high predictive power for SES and wealth status. But it can not reliably link those economic indicators to child malnutrition. They will land on the extreme unpredictable edge of society, dragged there by an immeasurable disaster in the human family unit, acute emotional disorder, or surreptitious conditions rather than by normal providence.

Consistent with current findings, Hungary's model showed relatively direct pathways from SES to malnutrition. This pattern is consistent with empirical evidence from other European welfare states in which universal or near-universal coverage of health, education, and social benefits attenuates direct SES gradients in child health outcomes (208,209). Researchers have argued that social protection and universal services "lift the floor" of access, converting what would otherwise be direct material disadvantages into mediated or attenuated effects. Overall, the Hungarian Minimum Income Schemes (MIS) represent one of the least protective and enabling social assistance programmes in Europe, as well as a case of substantial programme retrenchment in the last decade (210). In the context of Indonesia, the structural model meets this criterion for predictive relevance, so Hypothesis 7 is confirmed. In contrast,

the value for child malnutrition in Hungary cannot be positive, even if suggested in absolute statistical terms, a negligible quantity of predictive relevance, but crossing the threshold is a vital distinction. This means that out-of-sample in Indonesia, structural inequalities, household environment factors, and early biological child factors (i.e., low birth weight) have predictive ability. Moreover, the predictive relevance of both SES and wealth status structural constructs underlying the Indonesian model leaves an unbroken chain of prediction tracking from macro poverty to child biological condition.

Based on Hypothesis 7, the Indonesian model is predicted to be more consistent but generally modest in its predictive relevance across a broader range of predictors, particularly for malnutrition. Even though the SES predictor in Hungary is notably strong, the overall model's ability to predict key outcomes of malnutrition is more pronounced in Indonesia, which is consistent with the hypothesis. With more than 20 million children under the age of five in a country such as Indonesia, therefore, a model that explains even 1.6% of the variance in malnutrition is equivalent to identifying or explaining the risk for hundreds of thousands of children. For a policymaker, even a 1.6% gain in targeting high-risk households by SES and feeding behaviour represents a significant increase in the efficiency of public health. The 1.6% of out-of-sample variance explained by this model denotes the 'structural footprint' of inequality that is invariant across biological individuals.

5.3 Policy Implications

In light of the structural patterns found in Hungary, where SES affects child malnutrition mainly through indirect pathways such as food insecurity and maternal knowledge, the actual Hungarian policy landscape corresponds to a few of the intervention points. One such policy is the national Child Guarantee Action Plan developed with the purpose of carrying forward the European Child Guarantee, and focuses on issues about access to healthy meals for children, including school meals and during holiday periods (211), which directly reflects our study finding that food insecurity serves as an important intermediary for nutritional inequality even in a population with universal welfare systems.

In addition, Hungary's regulated school nutrition programmes and the School Fruit and Vegetable initiative are designed to increase dietary quality as well as influence healthy eating behaviour among children (212), which corresponds with findings from research that fostering caregiver knowledge and preparing a healthy feeding environment could help attenuate the indirect effect of socioeconomic disadvantage. Focused food subsidies for social deprived students provide a further operationalisation of the outcome that financial aid for nutritionally

adequate eating can diminish entrenched inequities in food availability. Furthermore, more comprehensive family support measures in terms of tax breaks and child subsidies enhance household economic resources that serve to buffer social protection (213). The SEM findings indicate that the direct effect of SES on malnutrition is moderated.

Ongoing focus on food safety is maintained by the National Food Chain Safety Office, which ensures that the food reaching families meets quality standards (214), which is consistent with what this study implies, that improving proximate conditions, such as food quality and food safety offered to a child, as well as availability) can help break pathways from socioeconomic disadvantage to malnutrition. Together, these programmes suggest that Hungary's policy framework is focusing on intermediaries identified in research, and further adjustment of targeting and outreach may be necessary to reduce remaining disparities among the most vulnerable subpopulations.

Hungary has implemented several measures to support children's nutritional status through school meal programmes and social assistance; however, programme gaps identified by this study remain. The pervasive mediating effect of food insecurity firstly indicates the necessity of a nationwide early-childhood food security screening programme being incorporated into all elected paediatric consultations and district health services. Unlike most of the Western world's welfare states, in Hungary they cannot systematically monitor the food security of families with children under five years old; developing adequate screening tools and direct referrals for food assistance or emergency services could bridge this feeding inequality. Second, the indirect effect of maternal nutrition knowledge proposes a potential new community-based parent nutrition education programme focused on the first 1,000 days of life and delivered through health visitors, family physicians, and local community centres. At present, nutrition education is incorporated in general counselling (without specified curricula or materials, sensitised staff) and not directed toward specific populations at risk, such as Roma or low-income households. Third, due to the existing regional and social disparities in the model, Hungary could expand its mobile outreach nutrition services into underprivileged, segregated urban areas that offer home visit-based support, growth surveillance, breastfeeding counselling, and feeding demonstrations. Fourth, the SEM findings indicate that even for households with indirect socioeconomic disadvantage, there are still barriers to accessing healthy diets and therefore introducing a nutrition voucher (or "healthy basket subsidy") system targeted towards families with young children, which can be redeemed at local food vendors for fresh fruits, vegetables and protein-rich foods, could

also address specific gaps not already covered by current school-based feeding programmes. Taken together, these proposed interventions would serve as an adjunct to those population-level programmes already in place by directly targeting the mediating pathways, food insecurity, knowledge gaps, and social marginalisation, identified in the study outcomes.

In Indonesia, regular and routinised Posyandu child growth monitoring is a supported programme for reducing maternal and child mortality, established since 1986 (215). The services include maternal and child health, family planning, nutrition, immunisation, and disease prevention. However, SES disparities and health service inequalities persisted, suggesting that providing maternal and child nutrition in Indonesia's health coverage, at no cost to low-income families, could improve the accessibility of health care. An unconditional cash transfer program for early childhood, specifically earmarked for high-protein foods (especially protein animal sources), fruits and vegetables, and food fortification, could reduce economic hardship, household food insecurity, and malnutrition. Findings in Indonesia that maternal nutrition knowledge does not lead to improved child feeding practices underscore the need for integrated "knowledge and enabling" interventions that combine nutrition education with material or practical support (such as cash transfers).

These might involve health practices programmes integrated with food vouchers, community cooking workshops, and peer support groups for adolescent mothers. Additionally, child biological factors (such as low birth weight and prematurity) were important risk factors for malnutrition in Indonesia, suggesting the importance of scaling up prenatal and neonatal care services, including home visits for high-risk pregnancies, and improved implementation of Kangaroo Mother Care (216) and transport vouchers for facility-based deliveries. These recommended programmes are in line with the primary pathways identified by SEM analysis: structural inequality, food insecurity, poor translation of knowledge into action, biological vulnerability, and unequal access to healthcare, and would add value to current national programmes while addressing specific weaknesses that persistently reinforce nutrition inequalities in Indonesia.

5.4 Strengths and Limitations

This study has several important strengths that may contribute to a better understanding of socioeconomic inequalities as predictors of nutritional inequities among children under the age of five in Hungary and Indonesia, as follows:

a. This study is a cross-country comparison within a single conceptual framework, a rare occurrence in this literature and provides an opportunity to examine in detail how

economic development modifies the paths from socioeconomic to malnutrition.

b. Using SEM with invariant latent constructs and mediation analysis, the study also provides strong empirical support for context-specific differences where direct to mediated effects are evident across high-income and lower-middle-income contexts.
c. The incorporation of detailed indicators, such as wealth assets and child feeding practices, guarantees a comprehensive examination that provides excellent policy-relevant information to support decision-making aligned with SDGs.
d. Conceptual framework in two countries with quite different developmental, economic, and welfare characteristics, it offers a scarce form of direct cross-national comparison and contributes significantly to global child nutrition inequalities.
e. Its focus on urban metropolitan areas in two countries with different national-level economies, which facilitated a controlled cross-country comparison and minimised rural-urban confounding, making the results more relevant to rapidly urbanising.

However, the present study is subject to some limitations as follows:

a. The small size of the sample, which may not be fully generalisable to all urban families in Hungary and Indonesia. Accordingly, these findings should be interpreted with caution and cannot be generalised to the entire national population or to rural and suburban areas.
b. This study confesses that the Hungarian model is underpowered for small effect sizes. Findings from Hungary should only be regarded as exploratory and have tempered the strength of the conclusion that can be made based on this subsample.
c. This study clarifies that although the sample is sufficiently large to identify big effects, it may be underpowered to reliably detect subtle indirect effects, particularly in the Hungarian context.
d. The cross-sectional study design prohibits drawing causal inferences due to reverse causality.
e. Recall and social desirability biases may have occurred in self-reported questionnaires, especially those on food insecurity, child feeding practices and behaviour, and maternal nutrition knowledge, which may have led to underestimations of actual discrepancies. But the lack of significant results with respect to the maternal nutrition knowledge to child outcomes path can be attributed to its nonspecific nature in terms of domains. Whereas the GNKQ-R assesses 'declarative' nutrition-related knowledge (for example, types of nutrients and calorie density), it does not assess child feeding knowledge.
f. The operationalisation of SES is recognised as an acknowledgement that transforming

some indicators into categorical variables can be arbitrary and lead to information loss. Moreover, although PLS-SEM estimates indicator weights for formative constructs, the relative importance and potential dominance of specific SES dimensions may be influenced by their empirical weights, thereby overshadowing more refined socioeconomic factors.

g. This study focuses on undernutrition and did not take into account evidence on the double burden of malnutrition (for instance, the presence of overweight/obesity), limiting its relevance in settings where increasing wealth was accompanied by persistent undernutrition. Future research needs to build on these findings to address the identified gaps and strengthen the evidence base.

5.5 Recommendation

Recommendations for future research, among others: **1) Longitudinal study design**: The PLS-SEM analysis from this study gives a more predictive relationship, yet, as it is cross-sectional data, it limits strict causal inference. Longitudinal cohort studies are needed to investigate the influence of SES, food security, and maternal knowledge on child growth. **2) Exploring untested constructs in higher-income populations**: Lower structural model predictive relevance for the Hungarian sample suggests nefarious predictors of malnutrition or diet-related outcomes. Parental time pressure, screen-time practices, ultra-processed foods environments, and maternal mental health should be included in future studies in Hungary. **3) Extending the comparative study** to confirm the observed dichotomy of structural factors (developing contexts) and behavioural factors (developed context), future studies should extend to a broader range of countries. Testing this model in additional lower-middle- and high-income countries would help establish a more generalised global framework for child nutritional inequities. **4) Future studies should employ moderated mediation models** to determine the socioeconomic thresholds below which maternal nutritional knowledge would have a significant influence on malnutrition, paired with corresponding contextually and culturally adapted tools for measuring functional health literacy among disadvantaged populations.

6. CONCLUSION

This thesis offers an integrative model for socioeconomic disparities as a predictor of nutrition inequality among children, with the conclusion:

1. The key predictor of child malnutrition is SES in both settings. The significant differences in mediating pathways between Hungary and Indonesia are important for understanding persistent child malnutrition. Low birth weight in Indonesia, low-SES, and poor household environment will lead to malnutrition through biological vulnerability. However, this does not apply to Hungary.
2. SES in Indonesia may adversely affect malnutrition due to limited access to health coverage; conversely, the health coverage in Hungary supports equitable access, indicating welfare policies have successfully extended health coverage for children.
3. In Hungary and Indonesia, maternal nutrition knowledge did not demonstrate a direct or indirect effect on child malnutrition. Furthermore, in Hungary, maternal nutrition knowledge has a direct effect on child feeding practices. Whereas, in Indonesia, lower income and parental education have a direct effect on maternal nutrition knowledge.
4. In Hungary, child factors do not correlate with malnutrition, indicating protective influences. In contrast, in Indonesia, child factors can directly affect malnutrition.
5. In Hungary, child feeding practices have a direct effect on maternal nutrition knowledge and are mediated by SES and household environment. In Indonesia, it has a direct effect only on the household environment, indicating that higher income and maternal education lead to better child feeding practices.
6. Path analysis reveals that structural factors were identified as predictors of malnutrition in both settings, but in different pathways. The Hungarian model shows that structural factors such as SES, household environment, wealth status, and food insecurity shaped nutritional outcomes, whereas in Indonesia, when SES is included, these factors were mediated only by household environment. Furthermore, child factors were found to have a direct effect on malnutrition, and no behavioural factors were identified in the Indonesian Model.
7. The Indonesian Model is significantly higher predictive of child malnutrition than the Hungarian Model. The lower predictive relevance of malnutrition in the Hungarian model suggests that welfare policies can serve as a protective buffer against socioeconomic disadvantage for families.

SUMMARY

This dissertation explores how SES, household food insecurity, maternal nutrition knowledge, child feeding practices, child eating behaviour, household environment, wealth, and child factors could be related to child malnutrition in urban areas in Hungary and Indonesia. A cross-sectional analysis, focusing on 36 to 59 months, was conducted. SEM PLS was employed in separate analyses for each country to predict direct and indirect pathways linking SES to malnutrition and to investigate the mediating role of other predictors. **First,** our results highlighted that SES is a key predictor of child nutrition. Families with higher incomes, more educated, and stable employment will be in a better financial situation overall and able to meet basic needs such as food, health care, and expenses for their children. **Second,** limited access to health coverage in Indonesia reveals socioeconomic disparities, policy, and health system inequalities between Hungary and Indonesia. **Third,** limited financial resources and lower formal parental education have a strong direct effect on maternal nutritional knowledge. **Fourth**, child feeding practices do not have a statistically significant direct or indirect effect on malnutrition. Nonetheless, feeding practices in Hungary are strongly influenced by maternal nutritional knowledge, suggesting it shapes what and how children are fed. In Indonesia, child feeding practices are more clearly shaped by the household environment (income and educational attainment). **Fifth**, the child factor (low birth weight) was a key predictor of malnutrition, suggesting that health interventions do not protect children at the early stage of life. **Sixth**, Path analysis reveals the dominance of structural factors (SES, food insecurity, wealth status, household environment) in both countries. Likewise, a child's biological factors were found to directly affect malnutrition. **Seventh**, the Indonesian Path Model was more predictive of malnutrition than the Hungarian. The implication of this study is that each of these major causal factors is potentially modifiable, and there are considerable factors overall that changes in national-level variables lead to improvements in child health. Moreover, the best interventions and programmes will be implemented in different subnations according to current conditions, not only SES but also other factors, which are significantly suggested for change in child nutrition and health status (217). Specific research is required to help governments prioritise the most effective factors for change.

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BIBLIOGRAPHY OF THE CANDIDATE'S PUBLICATIONS

9.1. Publications related to the topic of the dissertation

The cumulated impact factor of the indicated journals (based on the latest data currently known): **19.8**

1. **Alristina, A.D**.; Mahrouseh, N.; Irawan, A.S.; Laili, R.D.; Zimonyi-Bakó, A.V.; Feith, H.J. Prematurity and Low Birth Weight Among Food-Secure and Food-Insecure Households: A Comparative Study in Surabaya, Indonesia. Nutrients 2025, 17, 2479. https://doi.org/10.3390/nu17152479
2. **Alristina, A.D.**; Laili, R.D.; Nagy, É.; Feith, H.J. The Importance of Socioeconomic Factors Associated with Maternal Nutrition Knowledge and Undernutrition Among Children Under Five. Nutrients 2025, 17, 3355. https://doi.org/10.3390/nu17213355
3. **Alristina, A.D.**; Kovács, É.; Arini, D.; Feith, H.J. Structural Equation Modelling of Socioeconomic Status on Malnutrition Among Urban Preschoolers: Multi-Group Analysis of Hungary and Indonesia. *Int. J. Environ. Res. Public Health* 2026, *23*, 858. https://doi.org/10.3390/ijerph23070858

9.2. Publications unrelated to the topic of the dissertation

The cumulated impact factor of the indicated journals (based on the latest data currently known): **3.8**

1. S. Juwita, N. B. Argaheni, and **A. D. Alristina**, "SCOPING REVIEW: APPLICATION OF TACTILE/KINESTHETIC STIMULATION IN PRETERM INFANTS," *Placentum: Jurnal Ilmiah Kesehatan dan Aplikasinya*, vol. 11, no. 1, pp. 65–74, Feb. 2023, doi: 10.20961/PLACENTUM.V11I1.66530.
2. A. S. Irawan, **A. D. Alristina**., "Beyond the interface: benchmarking pediatric mobile health applications for monitoring child growth using the Mobile App Rating Scale," Front Digit Health, vol. 7, p. 1621293, Jun. 2025, doi: 10.3389/FDGTH.2025.1621293/BIBTEX.

ACKNOWLEDGEMENTS

I must first acknowledge to my supervisor, **Prof. Dr. Feith Helga Judit PH.D., Habil** at Semmelweis University, Budapest, Hungary for her significant contributions and guidance. I am profoundly grateful for her unwavering support, not only as a supervisor but as a true mentor who guided me through every challenge of this journey. Her kindness and expertise made this experience both inspiring and fulfilling. Regardless of the question or difficulty, she was always willing to help and consistently treated me with respect and genuine care.

I am also specifically grateful to **Dr. Éva Nagy** and **Dr. Bodor Zsanett** for their support, which made a huge difference in my work, and I truly appreciate their kindness and expertise. I would also like to thank the undergraduate students at Semmelweis University, namely Kata Pálfalvi, Zsófi Kőszegi, and Anita Kerekes, who cooperated and worked on time for the Hungarian research.

My sincere thanks to **Stipendium Hungaricum Scholarship Programme** for the invaluable opportunity, through financial support, to learn and engage in my doctoral studies in Hungary. This scholarship has made my academic journey possible, and I sincerely appreciate the trust and support extended to me.

I would also like to thank my institution, the **Institute of Health Sciences Hang Tuah Surabaya**, which gave me permission to study abroad. My deepest thanks also to my colleague at the **Department of Nutrition Programme, Institute of Health Sciences Hang Tuah Surabaya, Rizky Dzariyani Laili**, for always giving me the dedicated time for research when needed. I sincerely appreciate the efforts of the undergraduate students in Indonesia who helped and joined as enumerators in this research.

Finally, I dedicate this thesis to **my family**, **Andri Ari Sanjaya** and **Atta Adli Sanjaya**, who have helped me throughout this decade-long journey. I am eternally grateful for his inspiration to study abroad and for his encouragement and belief in me. Thank you for trusting in my ability to complete this journey, for your confidence that I could do it, and for your very real ongoing help while I am doing it. It was your inspiration that carried me through every second of doubt. This success is yours as well as mine. To everyone who has helped me along the way, whether directly or indirectly, I genuinely appreciate your support.

LIST OF TABLES AND FIGURES

APPENDIX

TÁJÉKOZTATÁS

Kutatás címe: Társadalmi-gazdasági egyenlőtlenségek Magyarországon és Indonéziában az öt éven aluli óvodáskorú gyermekek táplálkozási egyenlőtlenségeinek vonatkozásában

Kutatás vezetője: Feith Helga Judit PhD, habil.

Önt egy tudományos felmérésben való részvételre kérjük fel, mely a Semmelweis Egyetemen valósul meg, **Arie Dwi Alristina PhD hallgató, valamint Pálfalvi Kata és Kerekes Anita dietetikus hallgatók kutatási projektjeként**.

Ez a beleegyező nyilatkozat tájékoztatja Önt a kutatásról, illetve a kutatással kapcsolatos kockázatokról és előnyökről.

Jelen dokumentum aláírásával Ön beleegyezését adja a kutatásban való önkéntes és anonim részvételhez.

Kérjük, olvassa el figyelmesen az alábbiakat.

Cél: A kutatás célja, hogy megvizsgálja a táplálkozási egyenlőtlenségek előrejelző tényezőit a 3 és 5 év közötti gyermekeket nevelő anyák körében Magyarországon és Indonéziában.

Kutatás eljárási rendje: 3 és 5 év közötti gyermekek édesanyáit kérjük fel a felmérésben való részvételre. A kutatásban résztvevők egy olyan kérdőív kérdéseire válaszolnak, amely az alapvető szociodemográfiai kérdéseken túl a gyermekek alapvető táplálkozási státuszára, szokásaira vonatkozó kérdéseket tartalmaz. A teljes felmérés körülbelül 30 percet vesz igénybe.

Előnyök: Ez a kutatás közvetlenül nem fog hasznot hozni Önnek, azonban az Ön részvétele értékes segítséget nyújt abban, hogy jobban megértsük a táplálkozási egyenlőtlenségeket meghatározó tényezőket Magyarországon.

Kockázat és kényelmetlenségek: Nincsenek előre látható kockázatok, amelyek túlmutatnának a mindennapi élet során tapasztaltakon.

Adatvédelem és titoktartás: Nem gyűjtünk a kérdezettről beazonosítható információkat. Az aláírt beleegyezési nyilatkozatot külön tároljuk a kutatási adatoktól, és a válaszokat nem kapcsoljuk össze Önnel. Csak a kutatásban résztvevők és kifejezetten tudományos célból kezelik a kutatás során szerzett adatokat, mindvégig anonim módon.

Önkéntes részvétel: A kutatásban való részvétel teljes mértékben az Ön döntése. Dönthet úgy, hogy nem vesz részt, vagy bármikor megszakíthatja a részvételét, anélkül, hogy büntetésben vagy hátrányban részesülne.

Ezen kutatás etikai engedély iránti kérelmét a Semmelweis Egyetem Regionális, Intézményi Tudományos és Kutatásetikai Bizottsága jóváhagyta (SE RKEB szám: 207/2024.).

Budapest, 2024. november …

…….. ……..

Pálfalvi Kata / Kerekes Anita szülő aláírása

A N Y A I K É R D Ő Í V M A G Y A R O R S Z Á G O N

Információk az Ön gyermekéről

Ha több 3 és 5 év közötti gyermeke jár az óvodába, kérjük, töltse ki a kérdőívet konzekvensen <u>mindig ugyanarra a gyermekére</u> vonatkozóan!

ÁLTALÁNOS INFORMÁCIÓK		
1.	Mi gyermeke születési dátuma?	**év hónap nap**
2.	Milyen nemű a gyermeke?	**Férfi** □ **Nő** □
3.	A gyermek magassága (jelenleg)	**..... cm**
4.	A gyermek súlya **(jelenleg)**	**..... kg .....gr**
5.	A gyermek **<u>születési</u>** súlya	**.....gr**
6.	A gyermek **<u>születési</u>** hossza	**..... cm**
7.	A **várandóság hányadik hetében született** a gyermek?	**..... hét**

SZOCIODEMOGRÁFIAI ÉS EGYÉB JELLEMZŐK *(anya)*

1.	Hány éves Ön?	**…… betöltött évek száma**
2.	a) Ön milyen magas? b) Mennyi az Ön súlya?	**..... cm** **..... kg**
3.	Mi az Ön <u>jelenlegi</u> családi állapota?	**Soha nem házasodott meg** **Házas, párkapcsolatban él** **Külön él a párjától** **Elvált** **Megözvegyült** **Egyéb, éspedig: ……**
4.	Mi a legmagasabb iskolai végzettsége?	**Nem fejezte be az általános iskolai tanulmányait** **Általános iskola** **Nem fejezte be a középiskolát** **Középiskola** **Diploma - BA/BSc** **Diploma - MA/MSc** **PhD fokozat** **Egyéb, éspedig:**
5.	Mi az Ön jelenlegi foglalkozása?	**Nincs foglalkozása** **Gazdálkodó, mezőgazdasági dolgozó** **Kereskedő/ vállalkozó** **Gyárban, üzemben dolgozó munkás** **Szellemi dolgozó (pl. tanár, alkalmazott, köztisztviselő, katona/rendőr)** **Egyéb, éspedig: .....**

INFORMÁCIÓK A HÁZTARTÁSRÓL

	KÉRDÉS	KÓDOLÁSI KATEGÓRIÁK
1.	Hányan élnek jelenleg az Ön háztartásában? (*saját magát is beleértve)*	**személy**
2.	Hány **öt év alatti** gyermek él jelenleg a háztartásukba?	**gyermek**
3.	Gyermekének (akire jelen kérdőív vonatkozik) ki a fő gondozója?	**Anya** **Apa** **Anya és apa** **Egyéb, éspedig: .....**
4	Mennyi az Ön(ök) havi **CSALÁDI jövedelme** (**összesen**)?	**230.000 HUF vagy kevesebb** **230.001 – 450.000 HUF** **450.001 – 570.000 HUF** **570.001 – 700.000 HUF** **700.001 – 1.000.000 HUF** **> 1.000.001 HUF**
5.	Hány autó van a háztartásukban?	**utó** **2 autó** **3 vagy több autó** **Nincs autónk.**
6.	Hány szobából, egyéb helyiségből áll a házuk/lakásuk, ahol jelenleg élnek?	**Hálószobák száma [……]** **Nappali száma [……]** **Étkező száma [……]** **Konyhák száma [……]** **Fürdőszobák száma [……]** **Sport, hobbi helyiségek száma [……]**
7.	Van saját házuk/lakásuk?	**Igen** **Nem**
8.	Önök **jellemzően** milyen vizet isznak? *(1-nél több opciót is választhat)*	**Vezetékes csapvizet** **Ásványvizet (üvegben/PETT palackban)** **Fúrt kút vizét** **Folyóból/patakból nyert vizet** **Ásványvizet (nem palackozott)** **Esővizet** **Egyebet, éspedig.....**

TOVÁBBI INFORMÁCIÓK A HÁZTARTÁSRÓL

1. Kérjük, hogy az alábbi állításokra 1-5 fokú skálán jelölje meg - figyelembe véve a jelenlegi vagyoni helyzetüket -, hogy mennyire tudnák megtenni az állításban foglaltakat! **(Ahol az 1=egyáltalán nem tudnák megtenni; 2=némi nehézséggel tudnák megtenni; 3=mérsékelt nehézséggel tudnák megtenni; 4=kis nehézséggel tudnák megtenni; 5=teljes mértékben, minden gond nélkül meg tudnák tenni)**

Állítás	**1**	**2**	**3**	**4**	**5**
Anyagilag meg tudjuk tenni, hogy bármilyen költségű külföldi utazáson részt vegyünk.					
Akár drága élelmiszert is meg tudunk venni rendszeresen, ez nem jelent problémát.					
Megtehetjük, hogy a gyermekünket egy költségesebb magániskolába járassuk.					
Meg tudjuk tenni anyagilag, hogy a háztartási feladatok ellátására fizetett segítőt vagy segítőket vonjunk be.					
Meg tudnánk venni egy új, felső kategóriás elektromos autót, ez nem jelentene problémát a családi költségvetésnek.					

2. Az alábbi eszközök közül **melyikkel rendelkezik az otthonában**? Ha több eszközzel is rendelkezik, kérjük mindegyiket húzza alá!

1) vezetékes internettel (pl. kábellel, WiFi-vel, routerrel, antennával)
2) légkondicionálóval
3) hőszivattyús fűtőberendezéssel
4) napelemmel (áramot termel)
5) napkollektorral, szolárfűtéssel (hőt termel)
6) egyikkel sem

3. Ön hová sorolná be magát vagyoni státuszukat tekintve?

1) inkább jobb módú
2) átlagos
3) inkább rosszabb anyagi helyzetű

HOZZÁFÉRÉS AZ ÉLELMISZEREKHEZ
(FIES-SM)

Q1. Az elmúlt 12 hónap során **volt-e olyan alkalom, amikor Ön vagy a háztartásában élők aggódtak, hogy nem lesz elég élelmük, mert nem volt elég pénzük vagy más anyagi forrásuk?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva
Q2. Ha még mindig az elmúlt 12 hónapra gondol, **volt-e olyan időszak, amikor Ön vagy mások a háztartásában nem tudtak egészséges és tápláló ételeket fogyasztani pénzhiány vagy más egyéb forrás hiánya miatt?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva
Q3. Az elmúlt 12 hónap során **volt-e olyan időszak, amikor Ön vagy mások a háztartásában pénzhiány vagy más egyéb forrás hiánya miatt csak néhány fajta élelmiszert fogyasztottak?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva
Q4. Az elmúlt 12 hónap során **volt-e olyan alkalom, amikor Önnek vagy a háztartásában élőknek ki kellett hagyniuk egy étkezést, mert nem volt elég pénz vagy más egyéb forrás az élelmiszer beszerzésére?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva
Q5. Még mindig az elmúlt 12 hónapra gondolva, **volt-e olyan időszak, amikor Ön vagy mások a háztartásában kevesebbet ettek, mint amennyit gondoltak, mert nem volt elég pénzük vagy más egyéb forrásuk?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva
Q6. Az elmúlt 12 hónapban **volt-e olyan alkalom, amikor az Ön háztartása pénz- vagy egyéb forrás hiánya miatt kifogyott az élelmiszerekből?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva
Q7. Az elmúlt 12 hónapban **volt-e olyan alkalom, amikor Ön vagy mások a háztartásában éhes volt, de nem evett, mert nem volt pénzük vagy más forrásuk élelmiszerre?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva
Q8. Az elmúlt 12 hónap során **volt-e olyan alkalom, amikor Ön vagy a háztartásában élők pénz- vagy egyéb forráshiány miatt egész nap nem ettek?**	a	Nem	c	Nem tudom
	b	Igen	d	Elutasítva

QUALTRICS FELMÉRÉS
(GNKQ-R)

A következő néhány kérdés arra vonatkozik, hogy Ön szerint milyen tanácsokat adnának nekünk az egészségügyi szakemberek. Ha nem tudja a választ, inkább jelölje meg a "nem biztos/nem tudom" választ, minthogy találgasson.

1. **Az egészségügyi szakemberek azt javasolják, hogy az embereknek az alábbi élelmiszerekből többet, ugyanannyit vagy kevesebbet kellene enniük.** Jelölje be élelmiszerenként az Ön szerint helyes választ!

ÉTEL	Többet	Ugyanannyit	Kevesebbet	Nem biztos / nem tudja
Gyümölcs				
Hozzáadott cukrot tartalmazó élelmiszerek és italok				
Zöldségek				
Zsíros ételek				
Feldolgozott vörös hús				
Teljes kiőrlésű gabonák				
Sós ételek				
Víz				

2. Naponta **minimum hány adag gyümölcsöt és zöldséget javasolnak a szakemberek**? (Egy adag lehet például egy alma vagy egy marék apróra vágott sárgarépa) Karikázza be a helyes választ!
   a. 2
   b. 3
   c. 4
   d. 5 vagy több
   e. Nem biztos
3. **Melyik zsírfajta esetében javasolják a szakemberek, hogy az emberek kevesebbet fogyasszanak belőle?** Jelölje be élelmiszerenként a helyes választ!

ZSÍRFAJTÁK	**egyen kevesebbet**	**ne egyen kevesebbet**	**nem biztos a válaszban**
Telítetlen zsír			
Transzzsír			
Telített zsír			

4. **A szakemberek szerint milyen típusú tejtermékeket kellene fogyasztaniuk az embereknek?** Karikázza be a helyes választ!
   a. Teljes értékű tej
   b. Csökkentett zsírtartalmú (pl. fölözött és félig fölözött) tej
   c. Egyiket sem, a tejtermékeket kerülni kellene
   d. Nem tudom
5. **Hetente hányszor ajánlják a szakemberek, hogy az emberek halat egyenek?** Karikázza be a helyes választ!
   a. Hetente legalább 1-2 alkalommal
   b. Hetente legalább 3-4 alkalommal
   c. Minden nap

d. Nem tudom

6. **A szakemberek szerint hetente hányszor kellene reggelizni?** Karikázza be a helyes választ!
   a. Heti 3 alkalommal
   b. Hetente 4 alkalommal
   c. Minden nap
   d. Nem tudom
7. **Ha valaki naponta 300 ml gyümölcslevet iszik, hány adag gyümölcsnek és zöldségnek számít ez a napi gyümölcs-és zöldségadagjából?** Karikázza be a helyes választ!
   a. Egynek sem
   b. Egy adag
   c. Két adag
   d. Három adag
   e. Nem tudom

A szakemberek az élelmiszereket csoportokba sorolják. Arra vagyunk kíváncsiak, hogy Ön tisztában van-e az élelmiszercsoportokkal és a bennük található tápanyagokkal.

8. **Ön szerint az alábbi élelmiszerekben és italokban jellemzően magas vagy alacsony a hozzáadott cukortartalom?** Jelölje be élelmiszerenként a helyes választ!

ÉLELMISZER TÍPUS	**magas hozzáadott cukortartalmú**	**alacsony hozzáadott cukortartalmú**	**nem tudom**
Diétás kóla			
Natúr joghurt			
Fagylalt			
Ketchup			
Sárgadinnye			

9. **Ön szerint az alábbi élelmiszerek jellemzően magas vagy alacsony sótartalmúak?** Jelölje be élelmiszerenként a helyes választ!

ÉLELMISZER TÍPUSA	**magas sótartalmú**	**alacsony sótartalmú**	**nem tudom**
Reggeli gabonafélék			
Fagyasztott zöldségek			
Kenyér			
Sült bab			
Vörös húsok			
Konzervleves			

10. **Ön szerint ezek az élelmiszerek jellemzően magas vagy alacsony rosttartalmúak?** Jelölje be élelmiszerenként a helyes választ!

ÉLELMISZER TÍPUSA	**magas rosttartalmú**	**alacsony rosttartalmú**	**nem tudom**
Zab			
Banán			

Fehér rizs			
Tojás			
Burgonya héjával			
Tészta/tésztafélék			

11. Ön szerint ezek az élelmiszerek jó fehérjeforrások? Jelölje be élelmiszerenként a helyes választ!

ÉLELMISZER TÍPUSA	**jó fehérjeforrás**	**nem jó fehérjeforrás**	**nem tudom**
Baromfi			
Sajt			
Friss gyümölcs			
Sült bab			
Vaj			
Diófélék			
Szárított gyümölcs			

12. Az alábbi élelmiszerek közül melyek tartalmaznak keményítőt a szakemberek szerint? Jelöljön be élelmiszerenként egy-egy négyzetet!

ÉLELMISZER TÍPUSA	**van keményítő tartalma**	**nem keményítő tartalmú élelmiszer**	**nem tudom**
Sajt			
Tészta			
Burgonya			
Diófélék			
Banán			

13. Milyen fajta zsírt tartalmaznak az alábbi élelmiszerek? Élelmiszerenként egynél több négyzetet is bejelölhet!

ÉLELMISZER TÍPUSA	**többszörösen telítetlen zsír**	**egyszeresen telítetlen zsír**	**telített zsír**	**koleszterin**	**nem tudom**
Olívaolaj					
Vaj					
Napraforgóolaj					
Tojás					

14. Melyik élelmiszerben van a legtöbb transzzsír? Karikázza be a helyes választ!

a. Kekszek, sütemények, péksütemények
b. Halak

c. Növényi olaj
d. Tojás
e. Nem tudom

15. Egy pohár teljes tejben lévő kalcium mennyisége mennyi egy pohár sovány tejhez képest? Jelölje be a helyes választ!

a. Körülbelül ugyanannyi
b. Sokkal magasabb
c. Sokkal alacsonyabb
d. Nem tudom

16. A minimálisan feldolgozott élelmiszerekhez képest a feldolgozott élelmiszerek… Karikázza be a helyes választ!

a. … magasabb kalóriatartalmúak.
b. … magasabb rosttartalmúak.
c. … alacsonyabb sótartalmúak
d. Nem tudom

CSECSEMŐ- ÉS KISGYERMEKTÁPLÁLÁS

1. SZAKASZ: ANYATEJES TÁPLÁLÁS			
IF1	Szoptatta gyermekét?	1) Igen 2) Nem 3) Nem válaszol 4) Nem tudom	[ha nem/ nem válaszol/ nem tudom, ugorjon az IF4-re]
IF2	A gyermeke születése után <u>mennyi idővel tette először mellre a gyermekét</u>?	1) Kevesebb mint 1 óra 2) 1 és 23 óra között 3) Több mint 24 óra 4) Nem tudom	
IF3	Hány éves volt a gyermeke, amikor <u>teljesen abbahagyta a szoptatást</u>?	1) ..... (napok/hetek vagy hónapok száma, kiírva az időmennyiséget) 2) Még mindig szoptatja a gyermekét 3) Nem válaszol 4) Nem tudom	

2. SZAKASZ: KIEGÉSZÍTŐ TÁPLÁLÁS			
I IF4	Hány éves/hónapos korában vezette be gyermeke számára a kiegészítő (az anyatejen kívüli) táplálékot?		…..... hónapos korában
I IF5	A **szülést követő első két napban** kapott-e gyermeke az anyatejen kívül bármi mást enni vagy inni - például vizet, tápszert, banánt, zabkását, kekszet?		1) Igen 2) Nem 3) Nem tudom
IF6	Milyen folyékony táplálékot kapott gyermeke **6 hónapos kor alatt** az anyatejen kívül/mellett?	a) Nem kapott mást b) Teát c) Csecsemőtápszert d) Híg kását e) Levest f) Édesített, színezett italt g) Egyéb (részletezze):	
IF7	Naponta kb. hányszor eszik a gyermeke?	a) 2 alkalommal b) 2-3 alkalommal c) 3-4 alkalommal d) 5 alkalommal e) 6 vagy több alkalommal	

A GYERMEK ÉTKEZÉSI MAGATARTÁSÁRA VONATKOZÓ KÉRDŐÍV

Kérjük, olvassa el az alábbi állításokat, és jelölje be a gyermeke étkezési magatartására leginkább jellemző válaszokat.

	Soha	Ritkán	Néha	Gyakran	Mindig	
1. A gyermekem szereti az ételt	□	□	□	□	□	EF
2. A gyermekem többet eszik, ha aggódik	□	□	□	□	□	EOE
3. Gyermekemnek nagy az étvágya	□	□	□	□	□	SR*
4. Gyermekem gyorsan befejezi az étkezést	□	□	□	□	□	SE*
5. Gyermekem érdeklődik az étel iránt	□	□	□	□	□	EF
6. A gyermekem mindig kér inni	□	□	□	□	□	DD
7. Gyermekem először elutasítja az új ételeket	□	□	□	□	□	FF
8. A gyermekem lassan eszik	□	□	□	□	□	SE
9. A gyermekem kevesebbet eszik, ha dühös	□	□	□	□	□	EUE
10. Gyermekem szívesen kóstol új ételeket	□	□	□	□	□	FF*
11. Gyermekem kevesebbet eszik, ha fáradt	□	□	□	□	□	EUE
12. A gyermekem folyamatosan kér enni	□	□	□	□	□	FR
13. A gyermekem többet eszik, ha frusztrált	□	□	□	□	□	EOE
14. Ha hagynám, a gyerekem túl sokat enne	□	□	□	□	□	FR
15. A gyermekem többet eszik, ha szorong	□	□	□	□	□	EOE
16. Gyermekem az ételek széles választékát kedveli	□	□	□	□	□	FF*
17. Gyermekem az étkezés végén a tányérján hagyja az ételt	□	□	□	□	□	SR
18. Gyermekemnek több mint 30 percig tart befejezni egy étkezést	□	□	□	□	□	SE
19. Ha lenne erre lehetősége, a gyermekem az idő nagyobb hányadában enne	□	□	□	□	□	FR
20. Gyermekem alig várja az étkezéseket	□	□	□	□	□	EF
21. Gyermekem az étkezés befejezése előtt jóllakik	□	□	□	□	□	SR
22. Gyermekem szívesen eszik	□	□	□	□	□	EF
23. A gyermekem többet eszik, ha boldog	□	□	□	□	□	EUE
24. A gyermekemet nehéz kielégíteni megfelelő ételekkel	□	□	□	□	□	FF
25. A gyermekem kevesebbet eszik, amikor feldúlt	□	□	□	□	□	EUE
26. Gyermekem könnyen megtelik étellel	□	□	□	□	□	SR
27. A gyermekem többet eszik, ha nincs más dolga	□	□	□	□	□	EOE
28. Ha gyermekem jóllakott, akkor is talál helyet kedvenc ételének	□	□	□	□	□	FR
29. Ha lehetősége lenne rá, a gyermekem folyamatosan inna egész nap	□	□	□	□	□	DD
30. Gyermekem nem tud rendesen enni, ha közvetlenül előtte nassolt	□	□	□	□	□	SR
31. Ha lenne rá lehetőség, a gyerekem mindig inna egyet	□	□	□	□	□	DD
32. Gyermekem szívesen megkóstol olyan ételeket, amelyeket korábban még nem evett	□	□	□	□	□	FF*
33. Gyermekem akár kóstolás nélkül is úgy dönt, hogy nem ízlik neki egy étel	□	□	□	□	□	FF
34. Ha lenne rá lehetőség, a gyermekemnek mindig lenne étel a szájában	□	□	□	□	□	FR
35. Gyermekem egyre lassabban eszik az étkezés során	□	□	□	□	□	SE

Köszönjük szépen a kérdőív kitöltésében nyújtott segítségét, válaszai értékesek számunkra!

INFORMED CONSENT
Persetujuan untuk Berpartisipasi dalam Studi Penelitian

Judul Penelitian: Ketidaksetaraan Sosial-Ekonomi sebagai Prediktor Ketidaksetaraan Gizi pada Anak Usia 3 dan 5 Tahun di Indonesia

Ketua peneliti: Arie Dwi Alristina
Konsultan: Helga Judit Feith PhD, habil.

Anda diundang untuk berpartisipasi dalam penelitian ini. Formulir persetujuan ini akan menjelaskan kepada Anda, apa yang perlu Anda lakukan, serta risiko dan manfaat yang terkait dengan penelitian kami. Partisipasi Anda bersifat sukarela. Mohon baca formulir persetujuan ini dengan seksama.

Tujuan: Tujuan dari penelitian ini adalah untuk melihat faktor-faktor apa saja yang menjadi prediktor ketidaksetaraan gizi pada anak usia 3-5 tahun di Indonesia

Prosedur: Ibu yang memiliki anak berusia 3-5 tahun akan diminta untuk berpartisipasi dalam survei ini. Kuesioner yang diberikan berisi tentang informasi sosiologis dasar tentang orang tua, anak, dan pertanyaan-pertanyaan seputar gizi. Keseluruhan survei akan membutuhkan waktu sekitar 30 menit untuk menyelesaikannya.

Manfaat: Penelitian ini tidak akan menguntungkan Anda secara langsung. Namun, partisipasi Anda dalam penelitian ini akan membantu kami untuk menentukan faktor prediktor yang mempengaruhi status gizi anak balita.

Risiko dan Ketidaknyamanan: Tidak ada risiko yang diantisipasi selain risiko yang dihadapi dalam kehidupan sehari-hari.

Privasi dan Kerahasiaan: Tidak ada informasi identitas yang akan dikumpulkan. Formulir persetujuan yang Anda tandatangani akan disimpan terpisah dari data studi Anda, dan tanggapan tidak akan dikaitkan dengan Anda.

Partisipasi Sukarela: Keikutsertaan Anda dalam studi penelitian ini sepenuhnya tergantung pada Anda. Anda dapat memilih untuk tidak berpartisipasi, atau Anda dapat menghentikan partisipasi Anda kapan saja tanpa penalti atau kehilangan manfaat. Anda akan diberitahu tentang informasi baru dan relevan yang dapat mempengaruhi kesehatan, kesejahteraan, atau kesediaan Anda untuk melanjutkan partisipasi dalam penelitian ini.

Kontak Informasi:
Jika Anda memiliki pertanyaan atau masalah mengenai penelitian ini, Anda dapat menghubungi Arie Dwi Alristina di (+62) 8133 658 4422. Proyek ini telah disetujui oleh komite etik Komisi Etik Kesehatan Badan Riset dan Inovasi Nasional (BRIN) Indonesia.

Pernyataan Persetujuan dan Tanda Tangan
Saya telah membaca formulir persetujuan ini dan memiliki kesempatan untuk mendapatkan jawaban yang memuaskan atas pertanyaan-pertanyaan saya. Saya secara sukarela setuju untuk berpartisipasi dalam penelitian ini. Saya memahami bahwa salinan persetujuan ini akan diberikan kepada saya untuk referensi di masa mendatang.

Tanda Tangan Responden	Tanggal

APPENDIX A-1
Informasi tentang Anak dan Keluarga

Bagian 1. Informasi Tentang Anak Anda
Jika Anda memiliki beberapa anak yang berusia antara 3 - 5 tahun, mohon lengkapi kuesioner tentang **salah satu** anak Anda.

DATA UMUM		
No.	PERTANYAAN	KODE KATEGORI
1.	Tanggal lahir anak	Tanggal Bulan Tahun
2.	Jenis kelamin anak	Laki-laki…..□ Perempuan.....□
3.	Tinggi badan anak (sekarang)	Cm
4.	Berat badan anak (sekarang)	kg gr
5.	Berat badan anak saat lahir	kg gr
6.	Panjang badan anak saat lahir	cm
7.	Berapa minggu Anda hamil (sebelum bayi/anak Anda tersebut lahir)?	Minggu
8.	Apakah anak Anda pergi ke sekolah setiap harinya?	a. Ya b. Tidak, (lanjut ke nomer 11)
9.	Apakah sekolah memberikan makanan untuk anak Anda?	a. Ya b. Tidak
10.	Kapan makanan diberikan di sekolah? (bisa pilih lebih dari 1 pilihan)	Sarapan Jajanan pagi Makan siang Jajanan siang Lainnya (sebutkan ……)
11.	Apakah anak Anda memiliki asuransi kesehatan?	Ya Tidak

Bagian 2:
Informasi Demografi Pengasuh (Ibu)

No.	PERTANYAAN	KODE KATEGORI
1.	Berapa usia Anda?	Tahun
2.	Berapa tinggi badan Anda?	cm
3.	Apa status pernikahan Anda saat ini?	Belum menikah Menikah Berpisah tidak tinggal serumah Bercerai Janda
4.	Apa gelar atau tingkat sekolah tertinggi yang Anda selesaikan?	Tidak ada Tidak lulus SD / SMP Lulus SD / SMP Tidak lulus SMA Lulus SMA Diploma BA/BSc/Sarjana S1 Master/S2 Gelar Doktor/S3 Lainnya, sebutkan:
5.	Apa pekerjaan Anda?	Tidak ada Petani/peternak Pedagang/pengusaha Buruh pabrik

		Profesional (guru, dosen, pegawai swasta, pegawai pemerintah, TNI/Polri) Lainnya (Sebutkan,)

Bagian 3:
Informasi tentang Rumah Tangga

No.	PERTANYAAN	KODE KATEGORI
1.	Berapa jumlah anggota keluarga yang tinggal di rumah Anda saat ini?	orang
2.	Berapa jumlah anak balita yang saat ini tinggal di rumah Anda?	orang
3.	Siapa pengasuh utama anak tersebut?	a. Ibu b. Ayah c. Ibu dan ayah d. Lainnya.....
4	Berapa pendapatan bulanan keluarga Anda (total)?	a. kurang dari Rp 2.300.000 perbulan b. > Rp 2.300.000 - Rp 4.500.000 perbulan c. > Rp 4.500.000 - Rp 5.700.000 perbulan d. > Rp 5.700.000 - Rp 7.000.000 perbulan e. > Rp 7.000.000 - Rp 10.000.000 perbulan f. > Rp 10.000.000
5.	Berapa banyak mobil yang Anda punya?	a. 1 mobil b. 2 mobil c. ≥ 3 mobil d. Tidak punya mobil
6.	Perkirakan berapa banyak ruangan (kamar tidur, ruang tamu, ruang makan ruang, dapur, kamar mandi, ruang hobi) yang ada di rumah Anda?	Kamar tidur […….] Ruang keluarga/Ruang Tamu [……..] Ruang makan […….] Dapur [……..] Kamar mandi […….] Ruang olahraga dan hobi […….]
7.	Apakah Anda memiliki rumah / vila?	Ya Tidak
8.	Dari mana Anda mendapatkan sumber utama AIR MINUM Anda?	a. Air keran b. Air mineral (dalam gelas/botol PET) c. Sumur bor e. Sungai/kali f. Mata air g. Air hujan h. Lainnya.....

Untuk setiap pernyataan berikut ini, mohon sebutkan dalam skala 1 sampai 5, dengan mempertimbangkan situasi keuangan Anda saat ini, seberapa besar kemampuan Anda untuk melakukannya.
1 = tidak dapat melakukan sama sekali;
5 = dapat melakukan sepenuhnya tanpa masalah

Pernyataan	**1**	**2**	**3**	**4**	**5**
Kita mampu melakukan perjalanan ke luar negeri dengan biaya berapa pun					
Kita mampu membeli makanan yang mahal secara teratur					
Kita bisa mampu memilih untuk mendaftarkan anak kita ke sekolah swasta yang lebih mahal					
Kita mampu membayar pembantu rumah tangga untuk melakukan tugas-tugas rumah tangga					
Kita mampu membeli mobil listrik terbaru yang canggih, dan tidak akan menjadi masalah dalam anggaran keluarga.					

1. Manakah dari berikut ini yang Anda miliki di rumah Anda? Jika Anda memiliki lebih dari satu, silahkan pilih sesuai yang Anda miliki.

1) Internet kabel (mis. kabel, WiFi, router, antena)
2) pendingin ruangan/AC
3) sistem pemanas dengan pompa panas
4) panel surya (menghasilkan listrik)
5) panel surya, pemanas tenaga surya (menghasilkan panas)
6) tidak ada

2. Di mana Anda akan mengklasifikasikan diri Anda dalam hal STATUS KESEJAHTERAAN?

1) lebih baik
2) rata-rata
3) lebih buruk

APPENDIX A-2
PANGAN

Kami ingin menanyakan beberapa pertanyaan tentang pangan. Selama SATU TAHUN TERAKHIR, apakah ada waktu ketika	
Q1. Selama 12 bulan terakhir, apakah ada saat ketika Anda atau orang lain di rumah tangga Anda khawatir tidak memiliki cukup makanan untuk dimakan karena kekurangan uang atau sumber daya lainnya?	a Tidak c Tidak tahu b Ya d Menolak Menjawab
Q2. Masih dalam 12 bulan terakhir, apakah ada saat ketika Anda atau orang lain di rumah tangga Anda tidak dapat makan makanan yang sehat dan bergizi karena kekurangan uang atau sumber daya lainnya?	a Tidak c Tidak tahu b Ya d Menolak Menjawab
Q3. Dalam 12 bulan terakhir, apakah ada saat ketika Anda atau orang lain di rumah tangga Anda hanya makan beberapa jenis makanan karena kekurangan uang atau sumber daya lainnya?	a Tidak c Tidak tahu b Ya d Menolak Menjawab
Q4. Selama 12 bulan terakhir, apakah ada saat ketika Anda atau orang lain di rumah tangga Anda harus melewatkan waktu makan karena tidak ada cukup uang atau sumber daya lain untuk membeli makanan?	a Tidak c Tidak tahu b Ya d Menolak Menjawab
Q5. Dalam 12 bulan terakhir, apakah ada saat ketika Anda atau orang lain di rumah tangga Anda makan lebih sedikit daripada yang seharusnya karena kekurangan uang atau sumber daya lainnya?	a Tidak c Tidak tahu b Ya d Menolak Menjawab
Q6. Dalam 12 bulan terakhir, apakah ada saat ketika rumah tangga Anda kehabisan makanan karena kekurangan uang atau sumber daya lainnya?	a Tidak c Tidak tahu b Ya d Menolak Menjawab
Q7. Dalam 12 bulan terakhir, apakah ada saat ketika Anda atau orang lain di rumah tangga Anda merasa lapar tetapi tidak makan karena kekurangan uang atau sumber daya lain untuk membeli makanan?	a Tidak c Tidak tahu b Ya d Menolak Menjawab
Q8. Dalam 12 bulan terakhir, apakah ada saat ketika Anda atau orang lain di rumah tangga Anda tidak makan sepanjang hari karena kekurangan uang atau sumber daya lainnya?	a Tidak c Tidak tahu b Ya d Menolak Menjawab

APPENDIX A-3
SURVEI QUALTRICS

Beberapa pertanyaan berikutnya adalah tentang saran apa yang menurut Anda diberikan oleh ahli kesehatan. Jika Anda tidak tahu jawabannya, tandai "tidak yakin" daripada menebak-nebak.

BAGIAN:1

1. Apakah para ahli kesehatan menganjurkan agar masyarakat memakan lebih banyak, sama banyak, atau lebih sedikit berdasarkan jenis makanan berikut ini? (tandai salah satu kotak untuk setiap makanan)

JENIS MAKANAN	LEBIH BANYAK KONSUMSI	SAMA BANYAK	LEBIH SEDIKIT KONSUMSI	TIDAK YAKIN
Konsumsi buah-buahan				
Konsumsi Makanan dan Minuman dengan tambahan gula				
Konsumsi Sayuran				
Konsumsi Makanan berlemak				
Konsumsi Daging Merah Olahan				
Konsumsi Biji-bijian				
Konsumsi Makanan Asin				
Konsumsi Air				

2. Berapa banyak porsi buah dan sayuran perhari yang disarankan para ahli untuk dikonsumsi oleh orang-orang? (Satu porsi bisa berupa, misalnya, sebuah apel atau segenggam wortel cincang) (lingkari salah satu)

a. 2
b. 3
c. 4
d. 5 atau lebih
e. Tidak yakin

3. Apa yang Ahli Kesehatan sarankan untuk mengurangi konsumsi jenis lemak berikut: (tandai salah satu kotak untuk setiap makanan)

JENIS LEMAK	SEDIKIT KONSUMSI	TIDAK SEDIKIT KONSUMSI	TIDAK YAKIN
Lemak tak jenuh			
Lemak trans			
Lemak jenuh			

4. Yang manakah produk susu di bawah ini yang seharusnya dikonsumsi?
   a. Susu murni / susu full cream
   b. Susu skim / susu rendah lemak
   c. Semua produk susu seharusnya dihindari
   d. Tidak yakin
5. Berapa kali dalam seminggu para ahli menyarankan agar orang makan ikan?(lingkari salah satu)
   a. 1-2 kali perminggu
   b. 3-4 kali perminggu
   c. Setiap hari
   d. Tidak yakin
6. Berapa kali dalam seminggu para ahli menyarankan orang untuk sarapan? (lingkari salah satu)
   a. 3 kali perminggu
   b. 4 kali perminggu
   c. Setiap hari

d. Tidak yakin

7. Jika seseorang mengonsumsi 10 ons jus buah dalam sehari, berapa banyak buah dan sayuran harian yang akan terhitung? (lingkari salah satu)

a. Tidak ada
b. Satu porsi
c. Dua porsi
d. Tiga porsi
e. Tidak yakin

BAGIAN:2

Para para ahli kesehatan/ahli gizi menggolongkan makanan ke dalam beberapa kelompok. Kami tertarik untuk mengetahui apakah Anda menyadari dari kelompok makanan dan nutrisi yang dikandungnya.

8. Menurut Anda, apakah makanan dan minuman ini tinggi atau rendah gula tambahan?(centang satu kotak untuk setiap makanan)

JENIS MAKANAN	TINGGI GULA	RENDAH GULA	TIDAK YAKIN
Minuman Diet soda			
Yogurt			
Es krim			
Saus tomat			
Melon			

9. Menurut Anda, apakah makanan berikut ini biasanya tinggi atau rendah garam? (centang salah satu kotak untuk setiap makanan)

JENIS MAKANAN	TINGGI GARAM	RENDAH GARAM	TIDAK YAKIN
Sereal			
Sayuran Beku/Frozen			
Roti			
Kacang panggang (almond, kacang mete, dll)			
Daging Merah			
Sup Kaleng			

10. Menurut Anda, apakah makanan berikut ini biasanya tinggi atau rendah serat? (centang salah satu kotak untuk setiap makanan)

JENIS MAKANAN	TINGGI SERAT	RENDAH SERAT	TIDAK YAKIN
Gandum			
Pisang			
Nasi Putih			
Telur			
Kentang dengan Kulit			

Mie atau pasta			

11. Menurut Anda apakah makanan berikut ini merupakan sumber protein yang baik? (centang salah satu kotak untuk setiap makanan)

JENIS MAKANAN	SUMBER PROTEIN YANG BAIK	BUKAN SUMBER PROTEIN YANG BAIK	TIDAK YAKIN
Daging ayam, burung, bebek			
Keju			
Buah-buahan segar			
Kacang polong panggang			
Mentega			
Kacang - kacangan			
Buah kering (kurma, kismis, dll)			

12. Manakah dari makanan berikut yang menurut para ahli kesehatan/ahli gizi termasuk makanan bertepung ? (centang salah satu kotak untuk setiap makanan)

JENIS MAKANAN	MAKANAN BERTEPUNG	BUKAN MAKANAN BERTEPUNG	TIDAK YAKIN
Keju			
Pasta			
Kentang			
Kacang			
Pisang			

13. Apa jenis lemak utama yang ada di setiap makanan ini?
(Anda bisa memilih lebih dari satu kotak untuk setiap makanan)

JENIS MAKANAN	POLI - LEMAK TAK JENUH	MONO-LEMAK TAK JENUH	LEMAK JENUH	KOLESTEROL	TIDAK YAKIN
Minyak Zaitun					
Mentega					
Minyak bunga matahari					
Telur					

14. Manakah dari makanan berikut yang paling banyak mengandung lemak trans? (pilihlah salah satu)
Biskuit, cake, kue kering

a. Ikan
b. Minyak Sayur
c. Telur
d. Tidak yakin

15. Jumlah kalsium dalam segelas susu murni / full cream disbanding segelas susu skim/susu rendah lemak: (pilihlah salah satu)

a. Hampir sama
b. Jauh lebih tinggi
c. Jauh lebih rendah

d. Tidak yakin

16. Jika dibandingkan dengan makanan yang diproses secara minimal (makanan segar), makanan olahan (seperti makanan kemasan. makanan siap saji, makanan instant, makanan kaleng) merupakan: (pilihlah salah satu)

a. Lebih tinggi kalori
b. Lebih tinggi serat
c. Lebih rendah garam
d. Tidak yakin

APPENDIX A-4
Survei tentang Menyusui

BAGIAN 1: MENYUSUI SECARA LANGSUNG DENGAN PAYUDARA			
Catatan	PERTANYAAN-PERTANYAAN INI PERLU DITANYAKAN KEPADA IBU ATAU PENGASUH UTAMA YANG BERTANGGUNG JAWAB MENYUSUI ANAK		
IF 1	Apakah anak Anda pernah minum ASI secara langsung?	Ya Tidak Menolak menjawab Tidak tahu	[jika Tidak, Menolak menjawab, Tidak tahu, lanjutkan ke IF4]
IF 2	Berapa lama setelah lahir pertama kali meletakkan anak Anda ke dada?	Kurang dari 1 jam Antara 1 hingga 23 jam Lebih dari 24 jam Tidak tahu	
IF 3	Berapa umur anak Anda ketika berhenti menyusu sama sekali?	…….. hari / minggu / bulan	
BAGIAN 2 : PEMBERIAN MAKANAN PELENGKAP ASI			
IF 4	Pada usia berapa Anda mengenalkan makanan pendamping ASI (selain susu) pada anak Anda?	bulan	
IF 5	Dalam dua hari pertama setelah melahirkan, apakah anak Anda diberikan makanan atau minuman selain ASI – seperti air putih, susu formula, pisang, bubur, biskuit?	Ya Tidak Tidak tahu	
IF 6	Makanan cair apa saja selain ASI yang dikonsumsi anak Anda di bawah usia 6 bulan?	a) Tidak ada b) air teh c) susu formula d) bubur/nasi tim e) sup f) minuman manis dan berwarna g) lainnya (sebutkan)	
IF 7	Berapa kali Anda memberi makan anak Anda dalam sehari?	a) 2 kali b) 2 – 3 kali c) 3 – 4 kali d) 5 kali e) 6 kali atau lebih	

LAMPIRAN A-5
KUESIONER PERILAKU MAKAN ANAK

Bacalah pernyataan-pernyataan berikut ini dan beri tanda **centang** pada kotak yang paling sesuai dengan perilaku makan anak Anda.

	Pernyataan	**Tidak pernah**	**Jarang**	**Kadang-kadang**	**Sering**	**Selalu**
1	Anak saya menyukai makanan	□	□	□	□	□
2	Anak saya makan lebih banyak saat merasa khawatir	□	□	□	□	□
3	Anak saya memiliki nafsu makan yang besar	□	□	□	□	□
4	Anak saya menghabiskan makanannya dengan cepat	□	□	□	□	□
5	Anak saya tertarik dengan makanan	□	□	□	□	□
6	Anak saya selalu minta minum	□	□	□	□	□
7	Pada awalnya, anak saya menolak makanan baru	□	□	□	□	□
8	Anak saya makan dengan lambat	□	□	□	□	□
9	Anak saya makan lebih sedikit ketika marah	□	□	□	□	□
10	Anak saya senang mencicipi makanan baru	□	□	□	□	□
11	Anak saya makan lebih sedikit ketika dia lelah	□	□	□	□	□
12	Anak saya selalu meminta makanan	□	□	□	□	□
13	Anak saya makan lebih banyak ketika merasa terganggu	□	□	□	□	□
14	Jika dibiarkan, anak saya akan makan terlalu banyak	□	□	□	□	□
15	Anak saya makan lebih banyak ketika cemas	□	□	□	□	□
16	Anak saya menyukai berbagai macam makanan	□	□	□	□	□
17	Anak saya menyisakan makanan di piringnya setelah selesai makan	□	□	□	□	□
18	Anak saya membutuhkan waktu lebih dari 30 menit untuk menghabiskan makanan	□	□	□	□	□
19	Jika diberi pilihan, anak saya akan makan hampir sepanjang waktu	□	□	□	□	□
20	Anak saya menantikan waktu makan	□	□	□	□	□
21	Anak saya merasa kenyang sebelum makanannya habis	□	□	□	□	□
22	Anak saya senang makan	□	□	□	□	□
23	Anak saya makan lebih banyak ketika dia senang	□	□	□	□	□
24	Anak saya sulit untuk diajak makan	□	□	□	□	□
25	Anak saya makan lebih sedikit ketika marah	□	□	□	□	□
26	Anak saya mudah kenyang	□	□	□	□	□
27	Anak saya makan lebih banyak ketika tidak ada kegiatan lain yang bisa dilakukan	□	□	□	□	□
28	Meskipun anak saya kenyang, ia masih bisa makan makanan kesukaannya	□	□	□	□	□
29	Jika diberi kesempatan, anak saya akan minum terus menerus sepanjang hari	□	□	□	□	□
30	Anak saya tidak mau makan jika ia baru saja makan camilan	□	□	□	□	□
31	Jika diberi kesempatan, anak saya akan selalu minum	□	□	□	□	□
32	Anak saya tertarik untuk mencicipi makanan yang belum pernah ia cicipi sebelumnya	□	□	□	□	□
33	Anak saya memutuskan bahwa ia tidak menyukai suatu makanan, bahkan tanpa mencicipinya	□	□	□	□	□
34	Jika diberi kesempatan, anak saya akan selalu memasukkan makanan ke dalam mulutnya	□	□	□	□	□
35	Anak saya makan lebih banyak dan lebih lambat selama makan	□	□	□	□	□

SEMMELWEIS EGYETEM
Szaknyelvi Intézet

DR. HABIL. FOGARASI KATALIN
igazgató, egyetemi docens

CERTIFICATE OF TRANSLATION ACCURACY

This document certifies that the manuscripts listed below have been translated applying appropriate English language usage, grammar, punctuation, and spelling by the professional English-language scientific editing staff at the Institute of Languages for Specific Purposes, Semmelweis University, Budapest. The translations truly reflect the content, meaning, and style of the original text and constitute in every respect a correct and true translation of the original document.

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Budapest, 18 October 2024

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ENDORSEMENT LETTER
001/PB-UMS/EL-Q/II/2024

This letter is to certify that the questionnaire below:

Tittle	:	1. Family Caregiver Assessment Interview 2. Access to Food Insecurity Experience Scale Survey Module (FIES-SM) 3. General Nutrition Knowledge Questionnaire-Revised (GNKQ-R) 4. Infant And Young Child Feeding Questionnaire 5. Food Frequency Questionnaire (Indonesia) 6. Questionnaire on Child Eating Behaviour
Name	:	Arie Dwi Alristina
DepartmenT	:	Doctoral School of Health Sciences Semmelweis University Hungary

has been endorsed by Pusat Bahasa *UMSurabaya.*

Surabaya, February 20, 2024
Chairperson,

Dr. Waode Hamsia, M.Pd.

SEMMELWEIS EGYETEM

Regionális, Intézményi Tudományos és Kutatásetikai Bizottság

Elnök: Prof. Dr. Sótonyi Péter

SE RKEB szám: 207/2024.
Protokoll: -

Dr. Feith Helga Judit
főiskolai tanár
Társadalomtudományi Tanszék

Budapest

Tárgy: „Társadalmi-gazdasági egyenlőtlenségek Magyarországon és Indonéziában az öt éven aluli óvodáskorú gyermekek táplálkozási egyenlőtlenségeinek vonatkozásában" című kutatás

Tisztelt Docens Asszony!

A Semmelweis Egyetem Regionális, Intézményi Tudományos és Kutatásetikai Bizottsága a 2024. szeptember 30-án megtartott ülésén az alábbi döntést hozta:

A bizottság a kutatási tervet szakmai és etikai szempontból megfelelőnek, valamint az intézmény tárgyi és személyi feltételeit a kutatás végzésére alkalmasnak találta.

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A bizottság fenti döntését az egészségügyről szóló 1997. évi CLIV. törvény és az emberen végzett orvostudományi kutatásokról szóló 23/2002. (V.9.) EüM rendelet alapján hozta.

Felhívjuk figyelmét az adatvédelemmel kapcsolatos jogszabályok szigorú betartására, az adatvédelmi felelős kijelölésére is. (1997. évi XLVII. törvény 21. §: az egészségügyi és a hozzájuk kapcsolódó személyes adatok kezeléséről és védelméről. 2011. évi CXII. törvény: az információs önrendelkezési jogról és az információszabadságról.)

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A vizsgálat befejezését követően kérjük a Bizottság részére a jelentés megküldését.

Budapest, 2024. október 29.

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BADAN RISET DAN INOVASI NASIONAL
HEALTH RESEARCH ETHICS COMMITTEE - NATIONAL RESEARCH AND INNOVATION AGENCY
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PERSETUJUAN ETIK PENELITIAN KESEHATAN
ETHICS APPROVAL ON HEALTH RESEARCH

No: 039/KE.03/SK/02/2024

Komisi Etik Bidang Kesehatan BRIN menerangkan bahwa,
Herewith, the Health Research Ethics Committee, National Research and Innovation Agency (NRIA) informs that,

Judul Penelitian *Research Title*	:	Socio-Economic Disparities as Predictors of Nutrition Inequalities among Children Under Five in Hungary and Indonesia
Nomor Usulan *Application Number*	:	2092023000007
Unit/Lembaga *Unit/Institution*	:	Semmelweis University
Peneliti Utama *Principal Investigator*	:	Arie Dwi Alristina

Telah ditelaah oleh Komisi Etik Bidang Kesehatan BRIN
has been reviewed by the Health Research Ethics Committee, National Research and Innovation Agency.

Berdasarkan hasil telaah tersebut dan revisi yang telah dilakukan sesuai rekomendasi penelaah, Komisi Etik Bidang Kesehatan BRIN memutuskan: Protokol Penelitian dengan judul di atas telah memenuhi Kaidah Etik dan diberikan persetujuan dengan jangka waktu riset dari tanggal 23 Februari 2024 sampai dengan tanggal 28 Februari 2025.
Based on the review, the Health Research Ethics Committee has decided: ***The research titled above has met the ethics principles and therefore is approved with a period of research from February 23, 2024 to Februari 28, 2025.***

Periset berkewajiban untuk:
Researchers are obligated to:

a. Mengajukan amandemen bila ada perubahan protocol penelitian;
Submit an amendment if there are any research protocol modifications;
b. Memberikan laporan apabila riset telah selesai;
Submit a report when the research has been completed;
c. Melaporkan kejadian serius yang tidak diinginkan (*Serious Adverse Event*); dan
Report any Serious Adverse Event; and
d. Mematuhi kaidah etik sesuai prinsip ICH-GCP.
Comply with the ICP-GCP principles.

Komisi Etik Bidang Kesehatan BRIN mempunyai hak untuk melakukan pemantauan selama riset berlangsung.
Health Research Ethics Committee reserves the rights to conduct monitoring and evaluation during the research.

Jakarta, 23 Februari 2024
Ketua Komisi Etik Bidang Kesehatan BRIN,
Chair of the Health Research Ethics Committee NRIA

TT ELEKTRONIK

Prof. Dr. Rustika, SKM., M.Si