FINANCIAL AIDS AND SUPPLY PURCHASING FOR WIDER FEEDING MODALITIES IN SCHOOL MEAL PROGRAMS: A CASE STUDY OF USDA FUNDING

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Abstract

Background: The feeding modalities applied in countries with school meal programs are varied because these are shaped not only by the national commitments to alleviate food insecurity among children but also by resource availability from national and international agencies. In terms of financial resources, the USA plays a consistent role in providing donations, grants, loans, and loan guarantee programs to support global school feeding. The U.S. Department of Agriculture (USDA) oversees these funding sources for international school meal programs.

Aim: This study aims to examine the moderating effect of USDA funding on the relationship between supply purchasing methods and feeding modalities among countries implementing school meal programs.

Methods: The Bayesian Mindsponge Framework, combining the reasoning strengths of Mindsponge Theory and inference advantages of Bayesian analysis, was employed on a dataset of 126 government representatives who manage large-scale school meal programs in 126 different countries.

Results: The findings indicated that USDA funding has the potential to positively moderate the relationship between foreign supply purchases and the feeding modalities of school meal programs. However, the direct association between foreign purchases and feeding modalities was unclear. Conversely, while USDA funding was found to have a negative

moderation effect on the relationship between domestic supply purchases and feeding modalities, it is these domestic purchases that show potential for positively influencing the feeding modalities.

Conclusions: Findings underscore the importance of supporting the World Bank and World Food Programme's recommendation to rely more on local resources and capacities for developing long-term and sustainable school meal programs. Further exploration of the impact of foreign supply purchases on feeding modalities is needed. Formulating strategic plans to better leverage USDA funding for enhancing domestic supply purchases is highly recommended.

Keywords: domestic purchase; foreign purchase; USDA funding; supply purchasing; school meal programs.

> "Not to mention these people buy new food every week, discarding old stuff.
>
> What is there to worry about feeding the Sparrows!?"
>
> —In "Food"; *Wild Wise Weird* (2024).

1. INTRODUCTION

School meal programmes continue to occupy a crucial role in various country-specific development goals, where they meet not only food security objectives (Soares et al. 2017) but also educational (Wang & Fawzi, 2020), socio-economic, and nutritional (Mostert, 2021) objectives. Jomaa et al. (2011), Kristjansson et al. (2022), Wang et al. (2021), and Destaw et al. (2022) highlighted that school feeding programmes can positively impact energy intake, micronutrient status, school enrolment, and attendance.

Observed significant cross-sectoral benefits of school meal programmes have been the mitigation of gender imbalances in access to education, especially for school-going girls (Gelli et al. 2007), enhanced local economic growth (Verguet et al. 2020) as well as contribution to social safety initiatives (African Union 2021). The importance of school meal programmes is further illustrated in the post-COVID school context, where the total number of children benefiting from the school feeding programme as of 2022 stood at 418 million, exceeding the number of pre-COVID student beneficiaries by 30 million (Bundy et al. 2024).

Globally, countries are acknowledging the multi-sectoral benefits of school meal programmes, which has informed multi-sectoral policy objectives within their school meal programs (Bundy et al. 2024), with the principal objectives being nutrition, education, and social protection (Wang et al., 2021; Kristjansson et al. 2015; Bundy et al. 2024). In lower and middle-income countries, other than the aforementioned objectives, a number of these programmes also feature the intended objective of stimulating local

and rural agribusiness through the emphasis on local procurement (GCNF, 2022a). Consequently, this brings into question the role of funding and procurement for these programmes, with a specific focus on lower- and middle-income countries. While food procurement within most school meal programme contexts has an element of local sourcing, the literature points to a noticeable component of supplementary foreign sourcing towards these programmes in lower- and middle-income countries (GCNF, 2022a). Similar observations are made concerning the actual financing of these programmes, with foreign contributions, on average, taking up more than half the total investment into these programmes (Bundy et al. 2024). In addition, Buttenheim et al. (2011), Raveenthiranathan, et al (2020), Wang et al. (2021), and Yussif (2022) found that despite using different feeding modalities, there was limited evidence of school meal programs in improving nutritional status or increasing students' enrolment.

Literature on school meal programmes indicates the dynamism of funding for the school meal programme, especially in the context of shrunken post-pandemic economic contexts. Literature indicates that low-income countries have still managed to raise their domestic funding for school meals, with the World Food Programme approximating a positive deviation from 30 percent in 2020 to 45 percent in 2022 (World Food Programme, 2022; Plakida et al., 2023). However, this has been accompanied by a decline in international support, down from US$267 million in 2020 to US$214 million in 2022 (World Food Programme, 2022). Further clarification is offered by Wineman et al. (2022), who identify domestic food purchase as the most common avenue for food procurement for school meal programs in Africa, with 83% of programs accessing at least some food through this avenue. This was followed by receipt of in-kind donations from within the country (domestic in-kind) at 50% and in-kind donations from other countries at 47% (foreign in-kind), with the foreign purchase being the least common procurement approach, involving 29% of all programmes (Wineman et al., 2022).

This, therefore, provides evidence and justification for country-owned procurement processes in the management of school meal programmes, which has a considerable impact on the sustainability of these initiatives (Bundy et al. 2009). In this regard, sustainability is consequently linked to ensuring adequate allocations from their respective budgets, planned frameworks for transition from donor assistance and external funding (Schultz et al., 2024; Bundy et al., 2009) as well as legislation to improve local agricultural production (Cohen et al. 2023). Furthermore, Wineman et al. (2022) provide evidence that a reliance on foreign procurement is correlated with sub-optimal outputs, such as less diverse menus. Other identified benefits of local procurement are greater certainty on quality, affordability, and origins of products (Nymand-Grarup et al., 2015) and reduced food wastage (Treagar et al., 2022).

Against the provided backdrop, this study purposed to examine the moderating effect of United States Department of Agriculture (USDA) funding on the relationship between supply purchasing methods and feeding modalities in countries implementing school meal programs. The USDA, through the McGovern-Dole International Food for Education and Child Nutrition Program, managed by the Foreign Agricultural Service, supports

school meal programmes in low-income, food-deficit countries with the objectives of supporting education, child health development, and food security (USDA, 2016). Underpinned by the school meals theory of change, the programme is guided by the premise that health and nutrition interventions targeted at school-going children have significant impacts on the children's educational outcomes, namely school performance, school participation, as well as cognitive development (USDA, 2016). With this motivation, the USDA undertakes pre-implementation initiatives for McGovern-Dole projects, which include awarding funds, selecting commodities, and purchasing and shipping U.S.-produced commodities for direct feeding (USDA, 2016).

Recent USDA-McGovern-Dole reports indicate that these initiative projects provided daily meals to more than 2.7 million children in the year 2022, with more than 1.5 million children and community members also benefiting from take-home rations (USDA, 2023). Additionally, in collaboration with host governments across the globe, the programmes worked to boost household access to food in the short term, especially during the global COVID-19 pandemic (USDA, 2023). Notwithstanding the immediate benefits of these programmes in school meal programmes in lower- and middle-income countries, there remains a gap in the understanding of their actual impact on the relationship between various methods of supply purchasing and feeding modalities. This study, therefore, proposed a case study on the USDA funding moderation effect to investigate this phenomenon.

2. METHOD

2.1. Theoretical Foundation

This study is grounded in Mindsponge Theory (MT), an information-processing framework that guides model construction and interpretation of results (Vuong, 2023). MT was initially developed by Vuong & Napier (2015) to explore how individuals process and adapt to new cultural values, particularly in the context of acculturation and the global mindset. The core concept, the "mindsponge mechanism," uses the metaphor of a sponge to describe how the mind selectively absorbs information aligned with core values while discarding incompatible values (Vuong & Napier, 2015). Over time, MT has evolved into a more comprehensive framework known as granular interaction thinking theory (Vuong & Nguyen, 2024a, 2024b). This enhanced version incorporates elements from quantum physics (Rovelli, 2018; Keppens, 2018; Rovelli et al., 2017) and Shannon's information theory (Shannon, 1948). The current MT views information as possible alternatives, which is consistent with Shannon's definition. The updated MT introduces an entropy-based value system to capture better the complexities of human behavior (Nguyen, 2024; Vuong & Nguyen, 2024a, 2024b, 2024c). The focal point of this revised framework is the granular interaction thinking mechanism, which describes how information units within the mind interact with one another and with external information to generate values.

In MT, the mind operates as an information processor within its broader environment, referred to as the "infosphere." The framework, as outlined by Vuong (2023), includes key processes such as dynamic self-balancing, cost-benefit assessment, goal alignment, energy conservation, and ensuring existence through survival, growth, and reproduction. Within the mind, the mindset functions as a repository of deeply ingrained information, known as core values, which influence subsequent cognitive processes and behavioral responses. These core values serve as reference points in a multi-layered filtering process, guiding the evaluation of incoming information. During this evaluation, the mind assesses whether the potential benefits of accepting new information outweigh the costs. Information that passes this cost-benefit analysis becomes integrated as new core values, thereby shaping future cognitive processes and responses. This dynamic allows the theory to explain how individuals continuously adapt their beliefs and behaviors based on their evolving understanding of the world.

MT has been utilized in various socio-psychological studies to explore cognitive processes shaping behaviors, including areas such as environmental and conservation psychology (Alzahrani et al., 2023; Huang et al., 2023; Nguyen & Jones, 2022). In this study, MT serves as a guiding framework to understand the dynamics between different purchasing strategies and feeding modalities in the context of school meal programs. MT emphasizes that individuals process and evaluate information based on a perceived cost-benefit optimization.

In the context of school meal programs, key factors like domestic and foreign purchases, as well as the presence of USDA funding as the potential moderator, play a crucial role in shaping the program's capacity to offer a variety of feeding modalities to the students. According to MT, the decisions made by school administrators regarding food sourcing are driven by their perceptions of the benefits and costs associated with each purchasing strategy. When administrators perceive greater benefits from domestic purchasing—such as lower costs, increased food quality, or supporting local agricultural markets—they are more inclined to prioritize this option, which can potentially enhance the variety and quality of meals provided to students.

Research supports this approach, showing that effective resource allocation and institutional backing are vital for program success. For instance, a study by Hotz et al. (2015) found that school meal programs with ample funding and practical resources were more likely to offer a diverse range of feeding options. This finding aligns with MT, which posits that when the perceived benefits of a specific strategy (e.g., domestic purchasing) outweigh its associated costs, administrators are more likely to engage with that strategy, leading to more positive outcomes.

Consequently, if USDA funding is effectively leveraged, we anticipate a positive relationship between the presence of USDA funding and the number of feeding modalities offered. Conversely, when adequate funding is lacking, or if foreign purchases are viewed as less beneficial, the variety of feeding options may be restricted. Additionally, the relationship between funding and feeding diversity may not be entirely direct; USDA

funding could indirectly promote more diverse feeding modalities by enabling greater domestic purchasing. This potential mediation effect highlights the interconnected nature of funding, purchasing decisions, and program outcomes in enhancing the effectiveness of school meal programs.

2.2. Model construction

2.2.1. Variable selection and rationale

This study utilized data from a global survey conducted across 126 countries in 2021, collecting responses from government representatives responsible for managing large-scale school meal programs. The dataset, publicly available in the Global Child Nutrition Foundation (GCNF) Global Survey of School Meal Programs database (GCNF, 2022), was analyzed using Bayesian Mindsponge Framework (BMF) analytics. The final dataset includes 126 valid responses and provides insights into how school meal programs are influenced by different purchasing methods and funding structures, with a particular focus on the moderating role of USDA funding.

The survey targeted officers in charge of procurement and program implementation, providing a diverse range of perspectives on national school feeding strategies. A pilot survey with a small group of respondents was conducted to refine the questionnaire, improving its clarity and ensuring relevance to the study objectives. The final dataset includes key variables related to procurement methods, USDA funding, and feeding modalities, facilitating an analysis of how these factors interact to shape school meal program outcomes.

For the purpose of this research, the following variables were selected (see Table 1). These variables capture the key components of the study, with one outcome variable, two predictor variables, and one moderating variable. *FeedingModalities* is defined as the structure and approach of meal distribution in school meal programs (e.g., breakfast, lunch, dinner, snacks, and take-home rations), as the outcome variable. *ForeignPurchase* and *DomesticPurchase* predict this outcome variable. *ForeignPurchase* is defined as the procurement of food supplies via purchasing from neighboring or distant countries. *DomesticPurchase* is the procurement of food supplies via purchasing from local, regional, elsewhere within the country, from national food reserves. *USDAfunding* is defined as the financial support provided by the USDA's McGovern-Dole International Food for Education and Child Nutrition Program, aimed at enhancing the effectiveness of school meal programs. This structured selection of variables reflects the study's objective of examining the moderating effect of USDA funding on the relationship between purchasing methods and feeding modalities of school meal programs among implementing countries. It ensures a comprehensive understanding of the interaction between the nation's food procurement methods for school meal programs and external funding assistance. Descriptions of these variables are shown in Table 1 below.

Table 1. Variable description

Variable's Name	Description	Data Type	Value
DomesticPurchase	The confirmation on obtaining food supplies via purchasing from local, regional, elsewhere within the country, from national food reserves.	Binary	0 = No 1 = Yes
ForeignPurchase	The confirmation on obtaining food supplies via purchasing from neighboring or distant countries.	Binary	
FeedingModalities	The confirmation on employing breakfast, lunch, dinner, snacks, or take home rations as the feeding modalities in school meal programs.	Binary	
USDAfunding	The confirmation of funding receiptment from the USDA for the shool meal programs.	Binary	

2.2.2. Statistical model

To test the moderating effect of *USDAfunding* on the relationship between *DomesticPurchase* and *ForeignPurchase* with *FeedingModalities*, we formulated Model 1 with the following structure:

$$FeedingModalities \sim \text{normal}\left(\log\left(\frac{\mu_i}{1-\mu_i}\right), \sigma\right) \quad (2.1)$$

$$\log\left(\frac{\mu_i}{1-\mu_i}\right) = \beta_0 + \beta_1 * DomesticPurchase_i + \beta_2 * ForeignPurchase_i + \beta_3 * USDAfunding * DomesticPurchase_i + \beta_4 * USDAfunding * ForeignPurchase_i \quad (2.2)$$

$$\beta \sim \text{normal}(M, S) \quad (2.3)$$

The probability around the mean $\log\left(\frac{\mu_i}{1-\mu_i}\right)$ is determined by the shape of the normal distribution, where the width of the distribution is specified by the standard deviation σ. μ_i indicates the probability that varied feeding modalities are included in the school meal programs reported by the government representative from the country i. $DomesticPurchase_i$ indicates the respondent i's confirmation of obtaining food supplies via purchasing from local, regional, elsewhere within the country, or from national food reserves; $ForeignPurchase_i$ indicates the respondent's confirmation of obtaining food supplies via purchasing from neighboring or distant countries. Model 1 has six

parameters, such as the intercept, β_0, the coefficients, $\beta_1 - \beta_4$, and the standard deviation of the "noise", σ. The coefficients of the predictor variables are distributed as a normal distribution around the mean denoted M with the standard deviation denoted S. The logical network of Model 1 is shown in Figure 1 below.

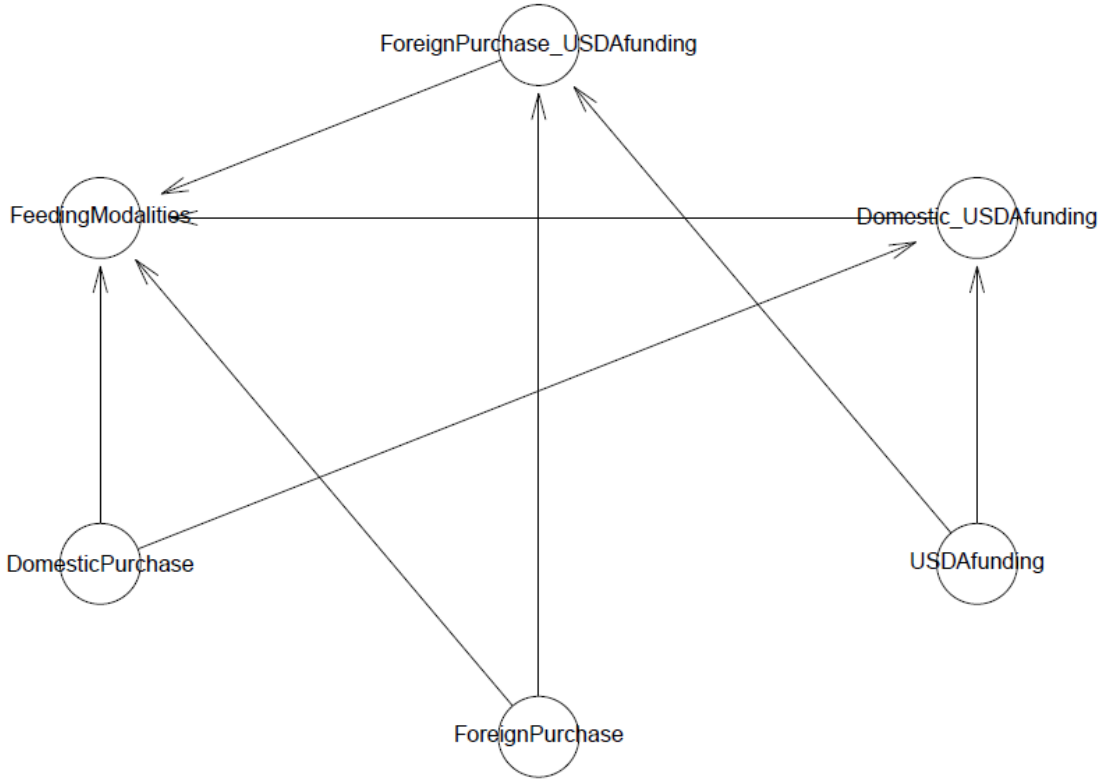

Figure 1. Model 1's logical network

2.3. Analysis and validation

This study utilized the Bayesian Mindsponge Framework (BMF) analytics for several key reasons (Nguyen et al., 2022; Vuong et al., 2022). The BMF approach combines the logical reasoning of Mindsponge Theory with the inferential strengths of Bayesian analysis, making it an effective analytical framework for our study.

Bayesian inference treats all parameters probabilistically, enabling the reliable prediction of parsimonious models (Csilléry et al., 2010; Gill, 2014). This offers several advantages over traditional frequentist approaches, such as the use of credible intervals for result interpretation instead of relying solely on p-values (Halsey et al., 2015; Wagenmakers et al., 2018). Additionally, Bayesian analysis with informative priors can address multicollinearity problems and weak data issues (Adepoju & Ojo, 2018; Jaya et al., 2019; Leamer, 1973).

Choosing appropriate priors is crucial during model building (van de Schoot et al., 2021). As our study is exploratory, we initially employed uninformative priors to minimize subjectivity. We then conducted a sensitivity analysis using a prior-tweaking method by re-running the analysis with informative priors designed to reflect a neutral belief in associations. These informative priors were specified using a normal distribution with a

mean of 0 and a standard deviation of 0.5. If the estimated outcomes were consistent across both sets of priors, the results were deemed robust. Following the model fitting process, we employed Pareto-smoothed importance sampling leave-one-out (PSIS-LOO) diagnostics to assess the goodness-of-fit of the model (Vehtari & Gabry, 2019; Vehtari et al., 2017). The LOO computation procedure is outlined as follows:

$$LOO = -2LPPD_{loo} = -2\sum_{i=1}^{n} \log \int p(y_i|\theta) p_{post(-i)}(\theta) d\theta$$

The posterior distribution $p_{post(-i)}(\theta)$ denotes the posterior distribution computed after excluding observation i. In the PSIS method, k-Pareto values are used to identify influential observations. Values below 0.5 indicate that the model fits well, while values above 0.7 suggest the presence of influential data points affecting the LOO estimate.

For models demonstrating a good fit, we proceeded with convergence diagnostics and result interpretation. We used both statistical measures and visual illustrations to validate convergence. Statistically, the effective sample size (*n_eff*) and the Gelman–Rubin shrink factor (*Rhat*) were employed. The *n_eff* value larger than 1000 indicates a sufficient number of effective samples for reliable inference (McElreath, 2018). The *Rhat* value, the value should be close to 1 for convergence, with values exceeding 1.1 indicating non-convergence (Brooks & Gelman, 1998). Visually, convergence was assessed using trace plots of the Markov chains.

The Bayesian analysis was conducted in R using the open-access **bayesvl** package, which offers robust visualization capabilities (La & Vuong, 2019). To ensure data transparency and facilitate reproducibility, all data and code snippets from this study have been deposited on a preprint server for public access and reuse (Vuong, 2018). The dataset and code can be accessed at: https://zenodo.org/records/13354411

3. RESULTS

Before interpreting the results of BMF analytics, it is necessary to evaluate how well Model 1 fits the data. As can be seen in Figure 2, we found no value exceeding the 0.3 threshold; the recommended value is below the 0.7 threshold. This indicates a good fit signal between the model and the data.

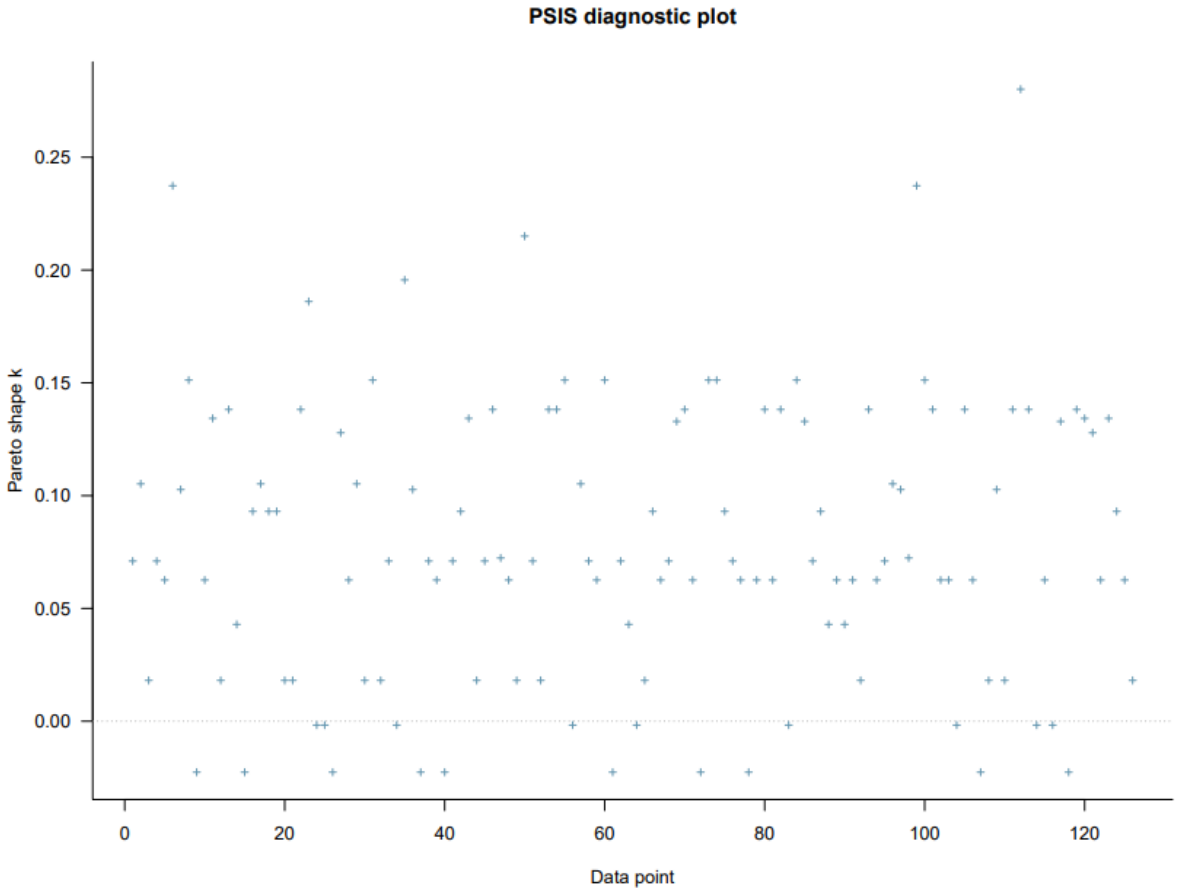

Figure 2. Model 1's PSIS-LOO diagnosis

The posterior distribution statistics of Model 1 are shown in Table 2. All *n_eff* values are greater than 1000, and *Rhat* values are equal to 1, so it can be assumed that Model 1's Markov chains are well-convergent. Table 2 below explains the posterior distribution statistics of Model 1, as illustrated in Figure 1.

Table 2. Estimated results of Model 1

Parameters	Mean	SD	n_eff	Rhat
a_FeedingModalities	0.38	0.07	5333	1
b_DomesticPurchase_FeedingModalities	0.07	0.07	5290	1
b_ForeignPurchase_FeedingModalities	0.01	0.04	7652	1
b_Domestic_USDAfunding_FeedingModalities	-0.08	0.06	6806	1
b_ForeignPurchase_USDAfunding_FeedingModalities	0.08	0.10	6413	1

The convergence of Markov chains is also reflected in the trace plots of Figure 3. In particular, after the 2000th iteration, all chains' values fluctuate around the central equilibrium.

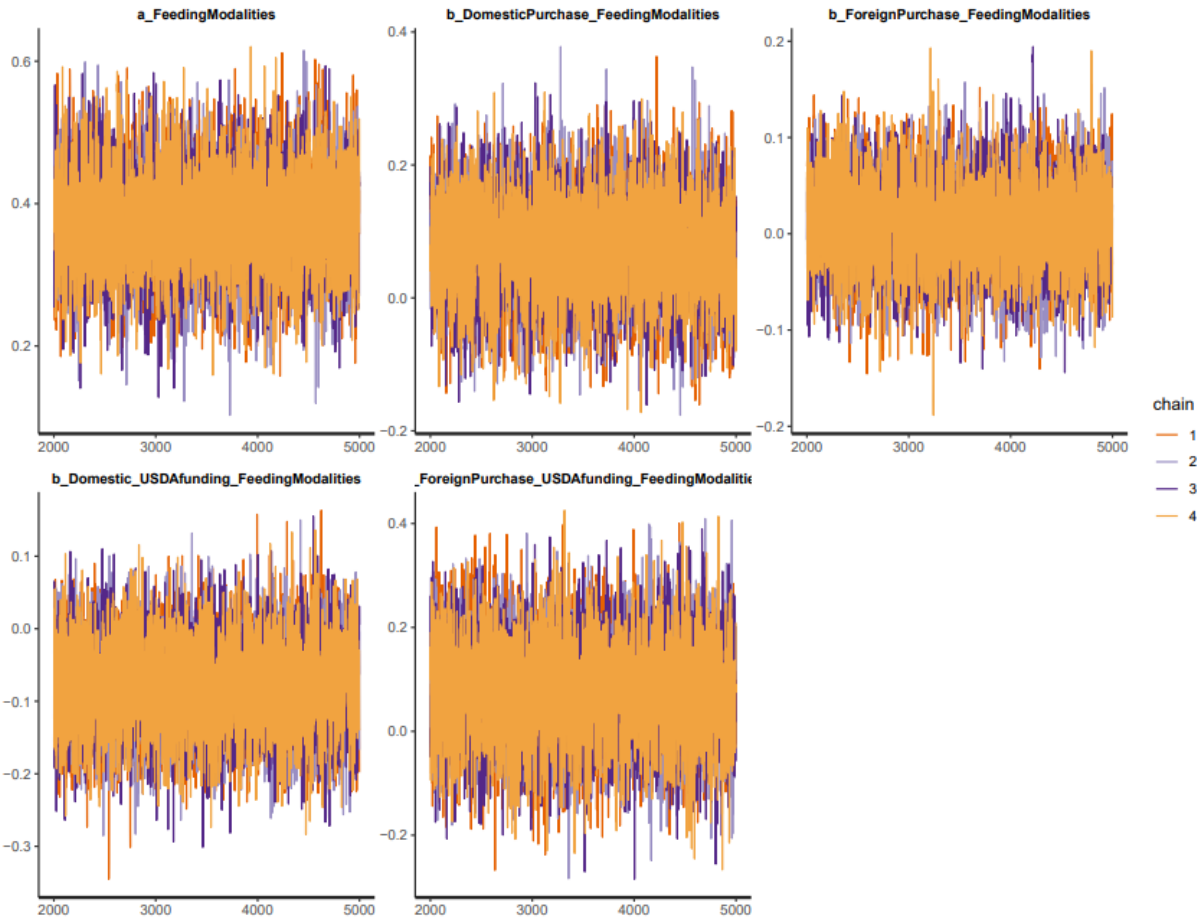

Figure 3. Model 1's trace plots

The Gelman-Rubin-Brooks plots and autocorrelation plots also show that the Markov chains have good convergence. Gelman-Rubin-Brooks plots are used to evaluate the ratio between the variance between Markov chains and the variance within chains. The *y*-axis demonstrates the shrinkage factor (or Gelman-Rubin factor), while the *x*-axis illustrates the iteration order of the simulation. In Figure 4, the shrinkage factors of all parameters rapidly decrease to 1 before the 2000th iteration (during warm-up). This manifestation indicates that there are no divergences between Markov chains.

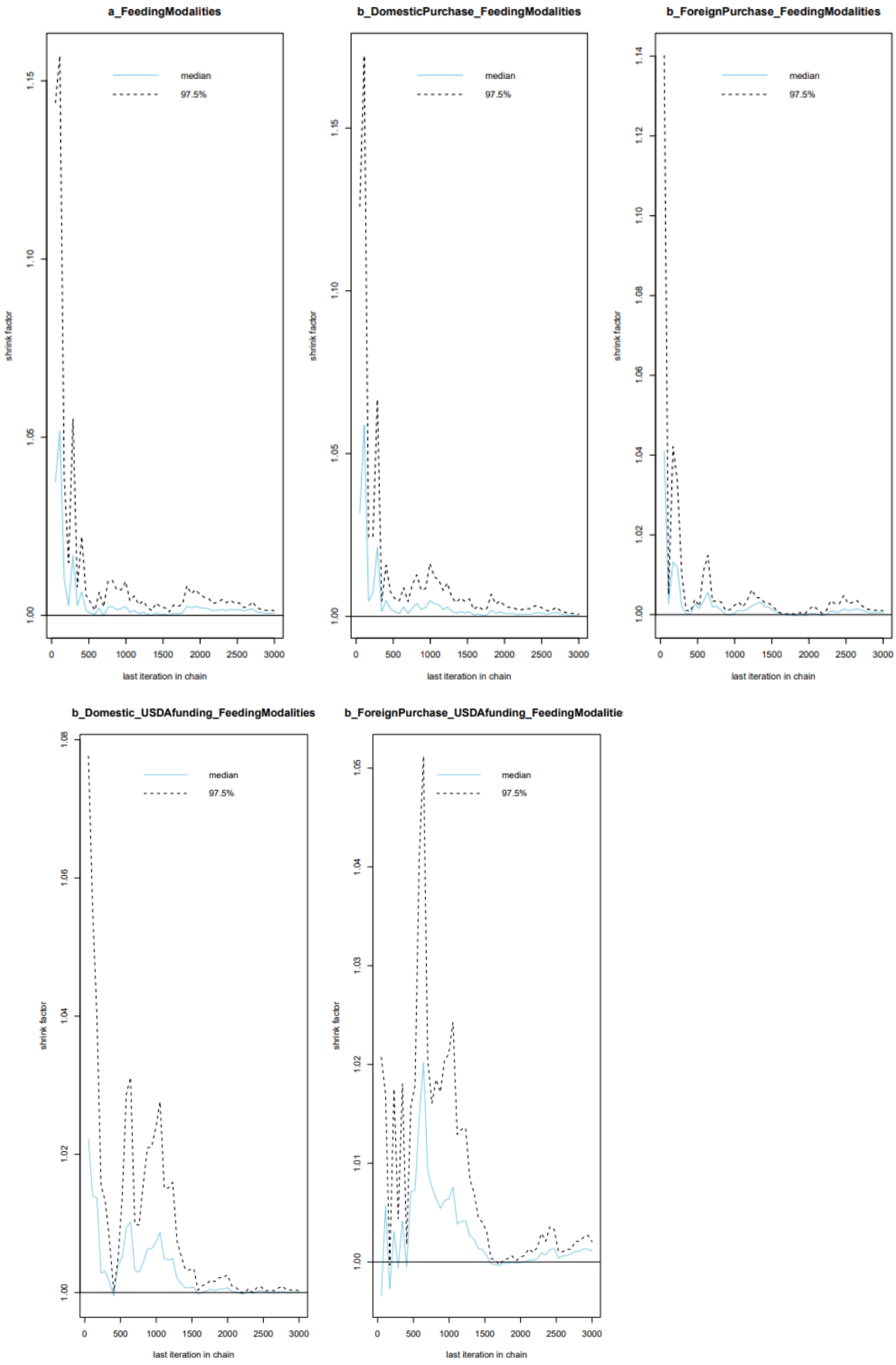

Figure 4. Model 1's Gelman-Rubin-Brooks plots

The Markov property refers to the memory-less property of a stochastic process. In other words, iteration values are not auto-correlated with the past iteration values. Autocorrelation plots are used to evaluate the level of autocorrelation between iteration values. The plots in Figure 5 show the average autocorrelation of each Markov chain along the y-axis and the delay of these chains along the *x*-axis. Visually, after several delays (before 5), the autocorrelation levels of all Markov chains swiftly drop to 0, indicating that the Markov properties are preserved and the Markov chains converge well.

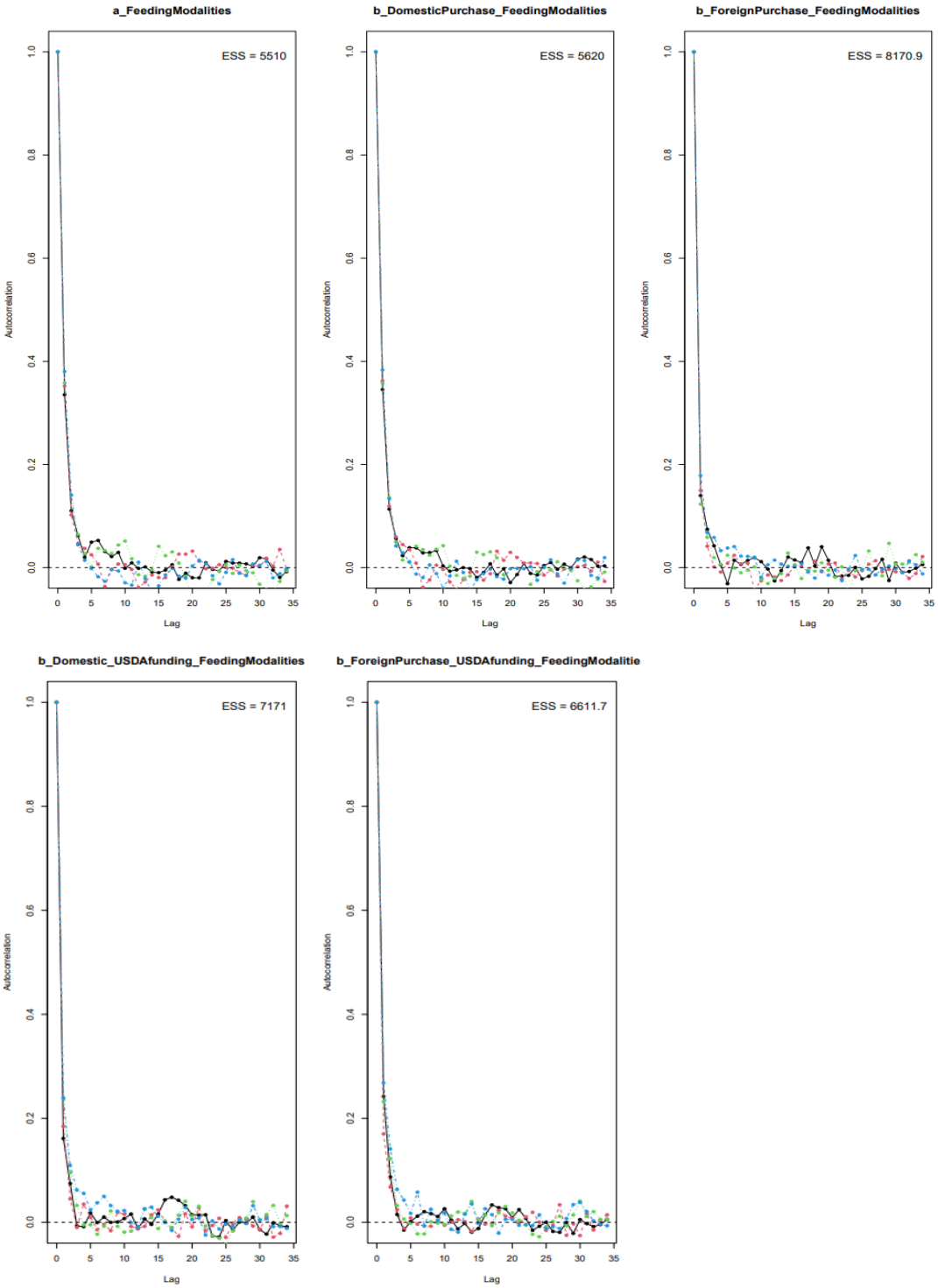

Figure 5. Model 1's autocorrelation plots

Since all the diagnostics confirm the convergence of Markov chains, the simulated results are eligible for interpretation. Figure 6 illustrates the estimated outcomes based on estimated coefficients by using Mean values for computation because they have the highest probability of occurrence. A proportion of the distributions of *b_DomesticPurchase_FeedingModalities* and *b_ForeignPurchase_USDAfunding_FeedingModalities* are located on the positive side of the *x*-axis, while the distribution of *b_Domestic_USDAfunding_FeedingModalities* is fully situated on the negative side. These distributions signify the moderately reliable positive effect of *DomesticPurchase* on *FeedingModalities,* and the positive moderation effect of *USDAfunding* on the relationship between *ForeignPurchase* and *FeedingModalities*. In addition, the distribution of *b_ForeignPurchase_FeedingModalities* is situated in the neutral zone, indicating its unclear effect on the *a_FeedingModalities*.

The estimated results of Model 1 revealed that USDA funding has the potential to positively moderate the relationship between foreign supply purchases and the feeding modalities of school meal programs. However, the direct association between foreign purchases and feeding modalities was unclear. Conversely, while USDA funding was found to have a negative moderation effect on the relationship between domestic supply purchases and feeding modalities, it is these domestic purchases that show potential for positively influencing the feeding modalities (see Figure 6).

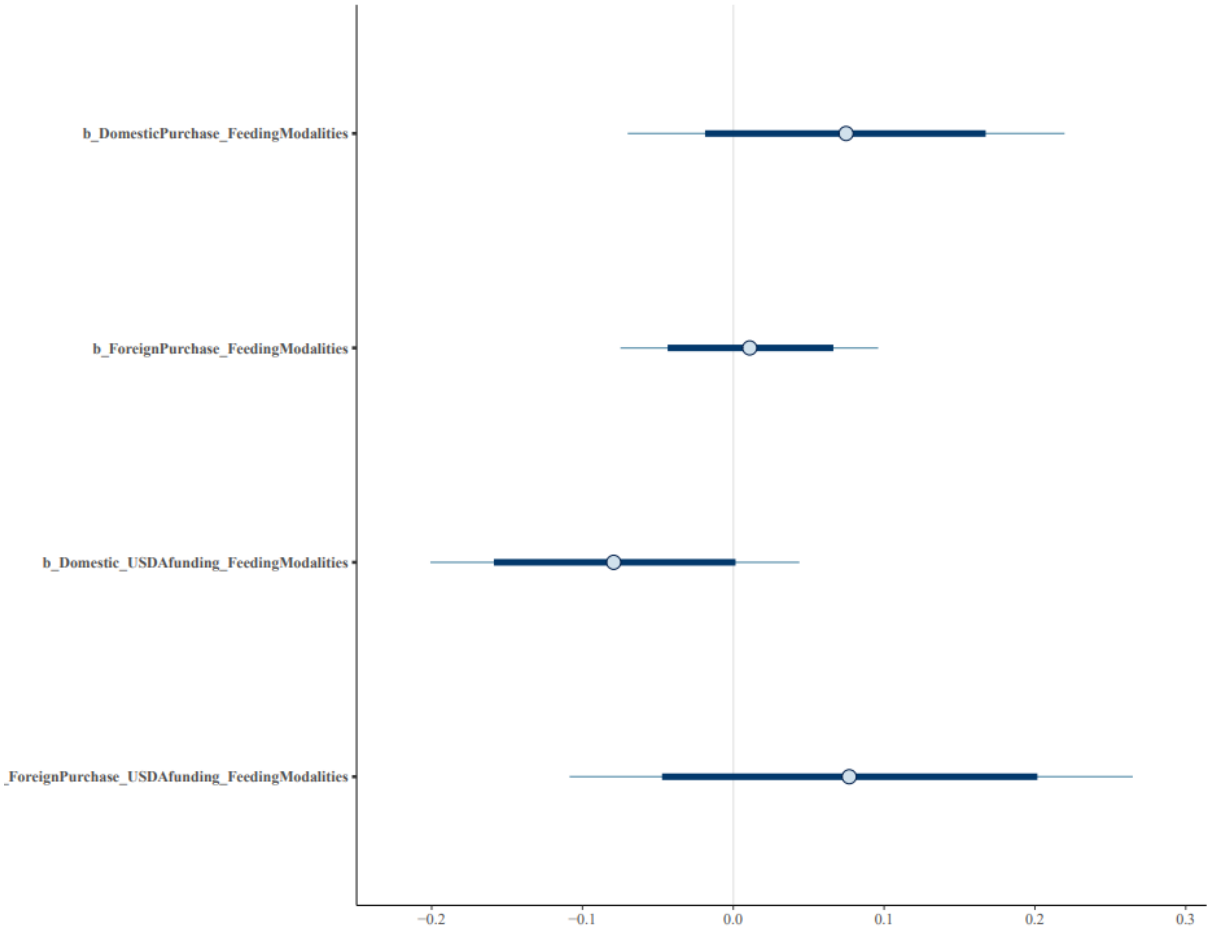

Figure 6. Estimated coefficients

Figure 7 shows the posterior distribution with Highest Posterior Density Intervals (HPDIs) at 89%. A small proportion of the found effects are still located on the opposite side, suggesting that the results are moderately reliable.

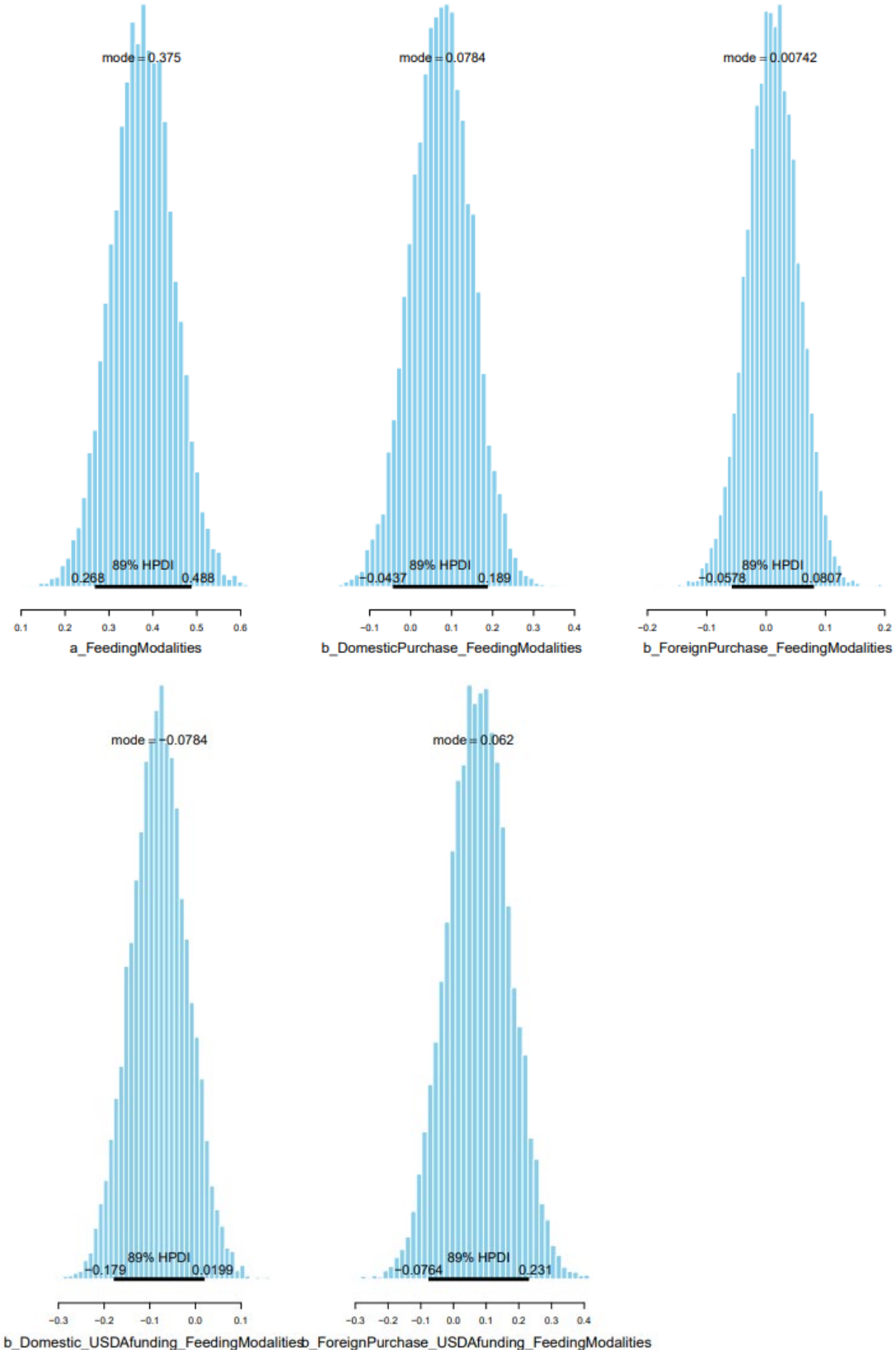

Figure 7. Distributions of posterior coefficients with HPDI at 89%

4. DISCUSSION

This study employed BMF to examine the moderating effect of USDA funding on the relationship between supply purchasing methods and feeding modalities in countries implementing school meal programs.

Findings indicated that USDA funding has moderate reliability to positively moderate the relationship between foreign purchases of supplies and the feeding modalities of school meal programs. This could be ascribed to USDA funding's influence on enhancing children's nutrition and education, global economies, and international school feeding programs. Botkins & Roe (2015), Krasnoff et al. (2023), and Spill et al. (2024) found that funding bodies had expanded dramatically to support food sourcing and educational initiatives. USDA funding contributes as a market stimulus, encouraging the procurement of food and the establishment of well-designed school meals and feeding modalities among implementing countries (Bundy et al., 2024). Foreign purchases are also a way of public purchasing. Soares et al. (2021) postulated that children and the local economy can benefit from public purchasing through school feeding programs, which can open a market for regional suppliers. There is a need to formulate strategies to leverage the foreign purchases of school meal supplies for the improvement of local economies and regional markets for the sake of local communities engaged in school meal programs.

This study results show that the effectiveness of foreign supply purchasing is conditional on whether this supply-sourcing method involves USDA funding as financial aid. This could be because the USDA funding participation increases farm-level investments and makes supply chain connections easier (Wood et al., 2021). However, the destination country's exchange rate policies regarding compliance and regulations also affect how effective it is (Ortíz Soto & Orengo Serra, 2019). Among the factors that appear to influence the efficacy of these programs include program duration, initial nutritional status, and supplemental health initiatives (Reyes et al., 2021; Wang & Fawzi, 2020). The USDA's role in commodity standards and grading has changed from addressing traditional commodity markets to facilitating market segmentation and product differentiation to address market differentiation and product features (Wood et al., 2021; Delgado et al., 2021). Overall, this contributes to its effectiveness in school feeding programs.

MT views the positive moderating effect of USDA funding on the relationship between foreign purchases of supplies and the feeding modalities of school meal programs as an outcome of the nation's information processing system. The information on USDA funding, foreign purchasing of supplies, and feeding modalities of school meal programs are readily available and accessible by the country's administrators, including the ideal finances and resources needed to execute these programs effectively. The mind of each participating country collectively multi-filters all involved activities or information in the national school feeding, including methods of purchasing supplies from foreign suppliers, to enable the conformity between USDA funding, foreign purchases, and the feeding modalities of school meal programs. This information is deemed beneficial for the country, as evident by the applied feeding modalities. Therefore, the information on USDA funding is successfully stored in the mindset of the country's administrators and used to improve the feeding modalities through foreign supply purchases substantially.

The unclear association between foreign purchases and feeding modalities could be attributed to a lack of coherence in supply purchasing methods and feeding program mechanisms. Ferrero (2023) and Habyarimana et al. (2023) observed inconsistent results on the benefit of feeding modalities and foreign purchases to the success of school feeding programs in various settings. In addition, Wineman et al. (2022) also found that the diversity in the school menu tended to be greatest in feeding programs that sourced food supplies through domestic purchases rather than relying on foreign sources. Soares et al. (2017) and Bloom et al. (2022) highlighted that introducing new school meal procurement standards resulted in a rise in the domestic purchasing of nutritious foods, especially those from local farms. Therefore, further exploration of the direct impact of foreign supply purchases on feeding modalities in school meal programs is needed.

In the views of MT, the unclear association between foreign purchases and feeding modalities indicates that information on foreign purchases is deemed neutral after being multi-filtered collectively by the country, needing further benchmarking process. It also meant that this information was not in sync with the knowledge and information available on feeding modalities. Therefore, the information on foreign purchases is buffered, pending further assessments, evaluations, and ultimate multi-filtering processes to enable decision-making by a country on considering its linkage to the feeding modalities. Information on school feeding is fragmented and inconsistent across countries and school meal programs. The ultimate multi-filtering processes of information by the country need a comprehensive availability of related information and full access to it. This way, the subjective cost-benefit judgments of the nation's collective mind may be well-performed.

Findings also showed that the USDA funding has a negative moderation effect on the relationship between domestic supply purchases and feeding modalities of school meal programs. The important fact to note is that domestic purchases show the potential to influence feeding modalities positively; this fact is very intriguing. This study results show that USDA involvement by providing financial aid declines the effectiveness of domestic supply purchasing and this could be attributed to competition between USDA-subsidized meals and local produce, as well as efforts to meet USDA meal compositions and standards (Cohen et al., 2019). However, it is important to note that initiatives are underway to promote local food consumption and nutrition initiatives associated with USDA (Kenney et al., 2021).

There is also a possibility that these findings are attributed to the declined USDA funding with further impacts on decreased resources and expertise losses (Reynolds et al., 2008; Garrity et al., 2024). School meal programs have grappled with inadequate and unpredictable budgets and challenges related to supply chains and logistics—impediments that need to be addressed if these programs are to achieve their objectives (Wineman et al., 2022). Fox et al. (2004), Lin (2005), Fleischhacker (2020), and Katre and Raddatz (2023) indicated that these initiatives are designed to give children and families with low incomes access to healthy food. Therefore, school meal programs need to be supported with adequate budgeting to address the needs of households with low eating budgets. Fox et al. (2004), Huo & Peng (2023), and Fleischhacker (2020) highlighted that food assistance and nutrition programs supported by USDA are pivotal in promoting secure and reasonably priced food supplies and biomedical innovations that

have improved health and nutrition outcomes among children. There is a high possibility that if USDA funding and other financial resources are accumulated adequately for use in school meal programs, especially to enhance domestic supply purchases, the applied feeding modalities will be wider and even be able to cover the take-home rations for students.

The negative moderation effect of USDA funding on the relationship between domestic supply purchases and feeding modalities is regarded by MT as having different values. This could be attributed to a misjudgement of USDA funding-related information, which drives negative perceptions of domestic supply purchases and feeding modalities. It will be an inconvenience to the country and an indication of its dissatisfaction. This means a country may develop a mindset of disfavouring the association of domestic supply purchases and feeding modalities if moderated by USDA funding. This could be stemming from mistrust among the involved parties. On the other hand, MT attributes the positive association of domestic purchases with feeding modalities to the availability and accessibility of respective information on them by the country and the positive benchmarking results to the nation's core values. This indicates that the perceived information of domestic purchases allows a positive drive towards the availability of food for the various feeding modalities from the local resources to promote sustainable school meal programs.

These results highlight the importance of supporting the World Bank and World Food Programme's recommendation to rely more on local resources and capacities for developing long-term, sustainable school meal programs (Kretschmer et al., 2014). Additionally, the findings suggest a need to explore further the impact of foreign supply purchases on feeding modalities and to develop strategic plans for leveraging USDA funding to enhance domestic supply purchases.

5. STUDY LIMITATIONS

The study employed a dataset that cannot be evaluated over time, therefore restricting the availability of information that could be obtained over a wide spectrum. Another limitation of the study was the outbreak of the COVID-19 pandemic, which contributed to the closure of schools and affected possible timeous data collection. Future studies should consider a qualitative approach to obtaining information on USDA funding, purchasing methods, and feeding modalities used in various countries. Such studies should consider budget constraints in undertaking the interviews over time and fostering effective data collection. Future studies should also consider data from urban and rural areas for sound development and implementation of strategies surrounding feeding modalities and purchasing methods afforded by communities based on funding received from USDA.

6. CONCLUSION

USDA funding has the potential to positively moderate the relationship between foreign supply purchases and the feeding modalities of school meal programs. However, the direct association between foreign purchases and feeding modalities remains unclear. In contrast, USDA funding has a negative moderation effect on the relationship between domestic supply purchases and feeding modalities; it is these domestic purchases that show potential for positively influencing the feeding modalities. It is important to support the World Bank and World Food Programme's recommendation to rely more on local resources and capacities for developing long-term and sustainable school meal programs. Further exploration of the impact of foreign supply purchases on feeding modalities is needed. Formulating strategic plans to better leverage USDA funding for enhancing domestic supply purchases is highly recommended.

7. POLICY RECOMMENDATIONS

The study showed that USDA funding has the potential to positively moderate the relationship between foreign purchases of supplies and the feeding modalities of school meal programs, but the direct impact of foreign purchases on feeding modalities was ambiguous. On the contrary, the USDA funding has negatively impacted the relationship between domestic supply purchases and feeding modalities, but these domestic purchases show potential for positively influencing the feeding modalities. Therefore, local resources and domestic supply purchasing should be procured with the support of the World Bank and World Food Programme.

The extent to which school meal programs are supported with domestic resources reflects a dramatic shift in favor of national ownership and domestic food procurement. Policies governing school meal programs should encourage the procurement of local foods through domestic purchasing to boost the local economy and enhance the consumption of fresh fruits and vegetables from local farms, especially the nearby ones. More domestic funding should be made available to facilitate the improvement of the quality of national school meals. Policies supporting the improvement of after-school meal programs, or the take-home rations as a manifestation of wider feeding modalities, should be encouraged. Snacks provided to children should include healthy grains, dairy, fruits, and vegetables while restricting high-fat and high-sugar options. By offering wholesome meals and snacks after regular school hours, school meal programs supported by USDA funding will positively contribute to the wider feeding modalities to increase the total nutritional intake, supporting the positive health outcomes of children, particularly those from low-income households.

Recognizing the effective use of USDA funding for school meal programs will assist in acquiring domestic food supply, developing ideal feeding modalities, and promoting healthy eating choices and patterns for children. Advocation on awareness of other funding bodies within the country should be prioritized to allow domestic food supply purchasing to gain more knowledge on their dynamics and identify how they can be assisted and maximize finances anticipated and received to improve school nutrition.

Overall, national and school-specific policies should be formulated to enable viable funding and food acquisition to enhance healthy diets and sustainable feeding modalities for successful school meal programs.

REFERENCES

Adepoju, A. A., & Ojo, O. O. (2018). Bayesian method for solving the problem of multicollinearity in regression. *Afrika Statistika,* 13(3), 1823-1834.

African Union. (2021). *African Union Biennial Report on Home-Grown School Feeding (2019–2020)*. Addis Ababa: African Union.

Alzahrani, K., Ali, M., Azeem, M. I., & Alotaibi, B. A. (2023). Efficacy of public extension and advisory services for sustainable rice production. *Agriculture,* 13(5), 1062.

Bloom, D., Boys, K., Shisler, R. C., Dunning, R., Hundley, C., & Yates, D. (2022). Exploring models of local food procurement in farm to early care and education programs. Journal of Human Sciences and Extension, 10(1), 3. https://doi.org/10.54718/CONI3088

Botkins, E. R., & Roe, B. E. (2018). Understanding participation in farm to school programs: Results integrating school and supply-side factors. Food Policy, 74, 126–137. https://doi.org/10.1016/j.foodpol.2017.12.006

Brooks, S. P., & Gelman, A. (1998). General methods for monitoring convergence of iterative simulations. *Journal of computational and graphical statistics* ,7(4), 434-455.

Bundy, D. A., Gentilini, U., Schultz, L., Bedasso, B., Singh, S., Okamura, Y., Iyengar, H. T., & Blakstad, M. M. (2024). School Meals, Social Protection, and Human Development: Revisiting Trends, Evidence, and Practices in South Asia and Beyond. In Social Protection & Jobs (Issue 2401). https://doi.org/10.1596/41431

Bundy, D.A., Burbano, C., Grosh, M.E., Gelli, A., Jukes, M.C., & Drake, L. (2009). Rethinking School Feeding: Social Safety Nets, Child Development, and the Education Sector. The World Bank Group. https://econpapers.repec.org/bookchap/wbkwbpubs/2634.htm

Buttenheim, A.M., Alderman, H.G., & Friedman, J. (2011). Impact evaluation of school feeding programmes in Lao People's Democratic Republic. *Journal of Development Effectiveness, 3*, 520 - 542. https://doi.org/10.1080/19439342.2011.634511

Cohen, J. F. W., Richardson, S., & Rimm, E. B. (2019). Impact of the updated USDA school meal standards, chef-enhanced meals, and the removal of flavored milk on school meal selection and consumption. *Journal of the Academy of Nutrition and Dietetics*, *119*(9), 1511–1515. https://doi.org/10.1016/j.jand.2019.04.003

Cohen, J.F., Verguet, S., Giyose, B.B., & Bundy, D. (2023). Universal free school meals: the future of school meal programmes? *The Lancet, 402(10405), 831–833.* https://doi.org/10.1016/s0140-6736(23)01516-7

Csilléry, K., Blum, M. G., Gaggiotti, O. E., & François, O. (2010). Approximate Bayesian computation (ABC) in practice. *Trends in Ecology and Evolution*, *25*(7), 410-418. https://doi.org/10.1016/j.tree.2010.04.001

Delgado, L., Schuster, M. & Torero, M. (2021). Quantity and quality food losses across the value Chain: A Comparative analysis. Food Policy, 98, 101958, https://doi.org/10.1016/j.foodpol.2020.101958.

Destaw, Z., Wencheko, E., Kidane, S., Endale, M., Challa, Y., Tiruneh, M., Tamrat, M., Samson, H., Shaleka, D., & Ashenafi, M. (2022). Impact of school meals on educational outcomes in Addis Ababa, Ethiopia. *Public Health Nutrition*, *25*(9), 2614–2624. https://doi.org/10.1017/S1368980022000799

Ferrero, E.M., Wineman, A. & Mitchell, A. (2023). Changes in school feeding operations during the COVID-19 pandemic: evidence from 139 countries. *Food Security.* **15**, 1521–1537. https://doi.org/10.1007/s12571-023-01393-1

Fleischhacker, S. E., Woteki, C. E., Coates, P. M., Hubbard, V. S., Flaherty, G. E., Glickman, D. R., Harkin, T. R., Kessler, D., Li, W. W., Loscalzo, J., Parekh, A., Rowe, S., Stover, P. J., Tagtow, A., Yun, A. J., & Mozaffarian, D. (2020). Strengthening national nutrition research: Rationale and options for a new coordinated federal research effort and authority. The American Journal of Clinical Nutrition, 112(3), 721–769. https://doi.org/10.1093/ajcn/nqaa179

Fox, M.K., Hamilton, W.L., & Lin, B.H. (2004). Effects of food assistance and nutrition programs on nutrition and health: Volume 4, Executive summary of the literature review. Retrieved from: https://www.ers.usda.gov/webdocs/publications/46575/30216_fanrr19-4_002.pdf?v=41479

Garrity, K, Guera, K, & Hart, H (2024). Local Food System Approaches to Address Food and Nutrition Security among Low-Income Populations: A Systematic Review. Advances in Nutrition, 15(4), 100156. https://doi.org/10.1016/j.advnut.2023.100156

Gelli, A., Meir, U., & Espejo, F. (2007). Does provision of food in school increase girls' enrollment? Evidence from schools in sub-Saharan Africa. *Food Nutr Bull. 28:149–55.* https://doi.org/10.1177/156482650702800203

Gill, A., Williams, P., & Thompson, S. Perceived water conservation attitudes and behaviours in second-home island settings. Tourism and Hospitality Research 2010, 10, 141-151.

Global Child Nutrition Foundation (GCNF). (2022a). *School Meal Programs Around the World: Results from the 2021 Global Survey of School Meal Programs.* Retrieved from: https://gcnf.org/global-reports/

Halsey, L. G., Curran-Everett, D., Vowler, S. L., & Drummond, G. B. (2015). The fickle P value generates irreproducible results. *Nature methods*, *12*, 179-185. https://doi.org/10.1038/nmeth.3288

Hotz, C., Pelto, G., Armar-Klemesu, M., Ferguson, E. F., Chege, P., & Musinguzi, E. (2015). Constraints and opportunities for implementing nutrition-specific, agricultural and market-based approaches to improve nutrient intake adequacy among infants and young children in two regions of rural Kenya. Maternal & amp; Child Nutrition, 11(S3), 39–54. Portico. https://doi.org/10.1111/mcn.12245

Huang, Y., Hou, Y., Ren, J., Yang, J., & Wen, Y. (2023). How to Promote Sustainable Bamboo Forest Management: An Empirical Study from Small-Scale Farmers in China. Forests, 15(1), 12. https://doi.org/10.3390/f15010012

Jaya, I., Tantular, B., & Andriyana, Y. (2019). A Bayesian approach on multicollinearity problem with an Informative Prior. Paper read at Journal of Physics: Conference Series.

Jomaa, L.H., McDonnell, E. & Probart, C. (2011). School feeding programs in developing countries: impacts on children's health and educational outcomes. *Nutrition Reviews*, 69(2):83-98. https://doi.org/10.1111/j.1753-4887.2010.00369.x

Kenney, E. L., Dunn, C. G., Mozaffarian, R. S., Dai, J., Wilson, K., West, J., Shen, Y., Fleischhacker, S., & Bleich, S. N. (2021). Feeding children and maintaining food service operations during COVID-19: A mixed methods investigation of implementation and financial challenges. *Nutrients*, *13*(8), 2691. https://doi.org/10.3390/nu13082691

Keppens, A. (2018). What constitutes emergent quantum reality? A complex system exploration from entropic gravity and the universal constants. *Entropy,* 20(5), 335.

Krasnoff, S.M., Schmit, T.M. & Bilinski, C.B. (2023). Economic impact assessment of public incentives to support farm-to-school food purchases. *Food Policy*, 121,102545. https://doi.org/10.1016/j.foodpol.2023.102545

Kretschmer, A., Spinler, S. & Van Wassenhove, L.N. (2014). A school feeding supply chain framework: critical factors for sustainable program design. Production and Operations Management, 23(6), 990-1001. https://doi.org/10.1111/poms.12109

Kristjansson, E., Osman, M., Dignam, M., Labelle, P. R., Magwood, O., Galicia, A. H., Cooke-Hughes, P., Wells, G. A., Krasevec, J., Enns, A., Nepton, A., Janzen, L., Shea, B., Liberato, S. C., Garner, J. A., & Welch, V. (2022). School feeding programs for improving the physical and psychological health of school children experiencing socio-economic disadvantage. The Cochrane Database of Systematic Reviews, 2022(8). https://doi.org/10.1002/14651858.CD014794

Kristjansson, E.A., Gelli, A., Welch, V., Greenhalgh, T., Liberato, S., Francis, D. & Espejo, F. (2016). Costs, and cost-outcome of school feeding programmes and feeding programmes for young children. Evidence and recommendations. *International*

Journal of Educational Development, 48, 79–83. https://doi.org/10.1016/j.ijedudev.2015.11.011

La, V.-P., & Vuong, Q.-H. (2019). bayesvl: Visually learning the graphical structure of Bayesian networks and performing MCMC with'Stan'. *The Comprehensive R Archive Network (CRAN)*.

Leamer, E. E. (1973). Multicollinearity: a Bayesian interpretation. *The Review of Economics and Statistics,* 55(3), 371-380.

Lin, B.H. (2005). Effects of USDA's Food Assistance and Nutrition Programs on Nutrition and Health. *Amber Waves*, 1-1.

McElreath, R. (2018). *Statistical rethinking: A Bayesian course with examples in R and Stan*. Chapman and Hall/CRC Press.

Mostert, C. M. (2021). The impact of the school feeding programme on the education and health outcomes of South African children. *Children and Youth Services Review, 126, 106029.* https://doi.org/10.1016/j.childyouth.2021.106029

Nguyen, M.-H. (2024). Natural absurdity: How satirical fables can inform us of a vision for sustainability? https://philarchive.org/rec/NGUNAH

Nguyen, M.-H., & Jones, T. E. (2022). Building eco-surplus culture among urban residents as a novel strategy to improve finance for conservation in protected areas. *Humanities and Social Sciences Communications*, 9(1). https://doi.org/10.1057/s41599-022-01441-9

Nguyen, M.-H., La, V.-P., Le, T.-T., & Vuong, Q.-H. (2022). Introduction to Bayesian Mindsponge Framework analytics: an innovative method for social and psychological research. *MethodsX*, *9*, 101808. https://doi.org/10.1016/j.mex.2022.101808

Nymand-Grarup, A., Gradziuk, K., & Kristensen, N. H. (2015). Connecting local and global food for sustainable solutions in public food procurement. In *Second International Conference on Agriculture in an Urbanizing Society Reconnecting Agriculture and Food Chains to Societal Needs 1417 September 2015 Rome Italy: Proceedings of the Conference* (pp. 18-19). Retrieved from: http://agricultureinanurbanizingsociety-com.umbler.net/previous-editions/

Ortíz Soto, M., & Orengo Serra, K.L. (2019). Factors considered by food industry retailers and wholesalers in purchase intent for foreign products. *Journal of Food Products Marketing, 25*, 581 - 603.

Plakida, O., Goroshkov, O., Vastyanov, R., Matyushenko, P., & Ostapchuk, K. (2023). International programs to provide school-age children with nutrition. *Inter Collegas, 10(2), 19-22.* https://doi.org/10.35339/ic.10.2.pgv

Raveenthiranathan L, Ramanarayanan V, & Thankappan K (2024). Impact of free school lunch program on nutritional status and academic outcomes among school

children in India: A systematic review. BMJ Open, 14(7), e080100. https://doi.org/10.1136/bmjopen-2023-080100

Reyes, L. I., Constantinides, S. V., Bhandari, S., Frongillo, E. A., Schreinemachers, P., Wertheim-Heck, S., Walls, H., Holdsworth, M., Laar, A., Nguyen, N., Turner, C., Wellard, K., & Blake, C. E. (2021). Actions in global nutrition initiatives to promote sustainable healthy diets. *Global Food Security*, 31, 100585, https://doi.org/10.1016/j.gfs.2021.100585.

Reynolds, L.P., Ireland, J.J., & Seidel, G. (2008). Editorial: "Brain drain" and loss of resources jeopardize the continued use of domestic animals for agricultural and biomedical research. *Journal of Animal Science, 86 10*, 2445-2446. https://doi.org/10.2527/jas.2008-1387

Rovelli, C. (2016). *Seven Brief Lessons on Physics*: Riverhead Books.

Rovelli, C., McMillan, R., Carnell, S., & Segre, E. (2017). *Reality is not what it seems: The journey to quantum gravity*: Penguin Audio.

Schultz L., Renaud A., Bundy D.A.P., Barry F.B.M., Benveniste, L., Burbano de Lara, C., Lo, M.M., Neitzel, J., O'Grady, N., & Drake, L. (2024). The SABER School Feeding policy tool: a 10-year analysis of its use by countries in developing policies for their national school meals programs. Frontiers in Public Health, 12. https://doi.org/10.3389/fpubh.2024.1337600

Shannon, C. E. (1948). A mathematical theory of communication. *The Bell System Technical Journal,* 27(3), 379-423.

Soares, P., Davó-Blanes, M.C., Martinelli, S.S., Melgarejo, L., & Cavalli, S.B. (2017). The effect of new purchase criteria on food procurement for the Brazilian school feeding program. *Appetite, 108, 288-294.* https://doi.org/10.1016/j.appet.2016.10.016

Soares, P., Suárez-Mercader, S., Comino, I., Martínez-Milán, M.A., Cavalli, S.B. & Davó-Blanes, M.C. (2021). Facilitating factors and opportunities for local food purchases in school meals in Spain. *International Journal of Environmental Research and Public Health*, 18(4): 2009. https://doi.org/10.3390/ijerph18042009

Spill, M. K., Trivedi, R., Thoerig, R. C., Balalian, A. A., Schwartz, M. B., Gundersen, C., Odoms-Young, A., Racine, E. F., Foster, M. J., Davis, J. S., & MacFarlane, A. J. (2024). Universal Free School Meals and School and Student Outcomes. JAMA Network Open, 7(8), e2424082. https://doi.org/10.1001/jamanetworkopen.2024.24082

Tregear, A., Aničić, A., Biasini, F., Bituh, B., Bojovic, M., Brecic, R., Brennan, R., Baric, M., Del Rio, I., Donati, D., Filipovic, M., Giopp, J., Ilić, F., Lanza, A., Mattas, G., Quarrie, K., Rosi, S., Sayed, A., & Tsakiridou, E. (2022). Routes to sustainability in public food procurement: An investigation of different models in primary school catering. *Journal of Cleaner Production. 338.* 130604. https://doi.org/10.1016/j.jclepro.2022.130604

United States Department of Agriculture (USDA). (2016). *McGovern-Dole Food for Education Program.* Retrieved from: https://fas.usda.gov/programs/mcgovern-dole-food-education-program

United States Department of Agriculture (USDA). (2023). *McGovern Dole Food for Education Program - FY 2022 Report to Congress.* Retrieved from: https://fas.usda.gov/newsroom/mcgovern-dole-food-education-program-fy-2022-report-congress

van de Schoot, R., Depaoli, S., King, R., Kramer, B., Märtens, K., Tadesse, M. G., Vannucci, M., Gelman, A., Veen, D., & Willemsen, J. (2021). Bayesian statistics and modelling. *Nature Reviews Methods Primers,* 1(1), 1.

Vehtari, A., & Gabry, J. (2019). *Bayesian Stacking and Pseudo-BMA weights using the loo package*. In (Version loo 2.2.0) https://mc-stan.org/loo/articles/loo2-weights.html

Vehtari, A., Gelman, A., & Gabry, J. (2017). Practical Bayesian model evaluation using leave-one-out cross-validation and WAIC. *Statistics and computing*, *27*(5), 1413-1432. https://doi.org/10.1007/s11222-016-9696-4

Verguet, S., Limasalle, P., Chakrabarti, A., Husain, A., Burbano, C., Drake, L., & Bundy, D. A. P. (2020). The Broader Economic Value of School Feeding Programs in Low- and Middle-Income Countries: Estimating the Multi-Sectoral Returns to Public Health, Human Capital, Social Protection, and the Local Economy. *Frontiers in public health, 8, 587046.* https://doi.org/10.3389/fpubh.2020.587046

Vuong, Q.-H. (2018). The (ir)rational consideration of the cost of science in transition economies. *Nature Human Behaviour*, *2*, 5. https://doi.org/10.1038/s41562-017-0281-4

Vuong, Q.-H. (2023). *Mindsponge Theory*. Walter de Gruyter GmbH. https://www.google.com/books/edition/Mindsponge_Theory/OSiGEAAAQBAJ

Vuong, Q.-H. (2024). *Wild Wise Weird: The Kingfisher Story Collection*. https://www.amazon.com/dp/B0BG2NNHY6

Vuong, Q.-H., & Napier, N. K. (2015). Acculturation and global mindsponge: An emerging market perspective. *International Journal of Intercultural Relations*, *49*, 354-367. https://doi.org/10.1016/j.ijintrel.2015.06.003

Vuong, Q.-H., & Nguyen, M.-H. (2024a). *Better economics for the Earth: A lesson from quantum and information theories*. AISDL. https://www.google.com/books/edition/Better_Economics_for_the_Earth_A_Lesson/I50TEQAAQBAJ

Vuong, Q.-H., & Nguyen, M.-H. (2024b). Further on informational quanta, interactions, and entropy under the granular view of value formation. https://philpapers.org/rec/VUOARN

Vuong, Q.-H., & Nguyen, M.-H. (2024c). Exploring the role of rejection in scholarly knowledge production: Insights from granular interaction thinking and information theory. *Learned Publishing*, 37(4), e1636. https://doi.org/10.1002/leap.1636

Vuong, Q.-H., Nguyen, M.-H., & La, V.-P. (2022). *The mindsponge and BMF analytics for innovative thinking in social sciences and humanities*. De Gruyter. https://books.google.com/books?id=EGeEEAAAQBAJ

Wagenmakers, E.-J., Marsman, M., Jamil, T., Ly, A., Verhagen, J., Love, J., . . . Epskamp, S. (2018). Bayesian inference for psychology. Part I: Theoretical advantages and practical ramifications. *Psychonomic bulletin review*, *25*(1), 35-57. https://doi.org/10.3758/s13423- 017-1343-3

Wang, D., & Fawzi, W. W. (2020). Impacts of school feeding on educational and health outcomes of school-age children and adolescents in low- and middle-income countries: protocol for a systematic review and meta-analysis. *Systematic Reviews,* 9, 55. https://doi.org/10.1186/s13643-020-01317-6

Wang, D., & Fawzi, W.W. (2020). Impacts of school feeding on educational and health outcomes of school-age children and adolescents in low- and middle-income countries: protocol for a systematic review and meta-analysis. *Syst. Rev., 9, 55.* https://doi.org/10.1186/s13643-020-01317-6

Wang, D., Shinde, S., Young, T., & Fawzi, W. W. (2021). Impacts of school feeding on educational and health outcomes of school-age children and adolescents in low- and middle-income countries: A systematic review and meta-analysis. *Journal of Global Health*, *11*, 04051. https://doi.org/10.7189/jogh.11.04051

Wineman, A., Ekwueme, M.C., Bigayimpunzi, L., Martin-Daihirou, A., de Gois, V. N., Rodrigues, E.L., Etuge, P., Warner, Y., Kessler, H. , & Mitchell, A. (2022). School Meal Programs in Africa: Regional Results From the 2019 Global Survey of School Meal Programs. *Front. Public Health, 10, 871866.* https://doi.org/10.3389/fpubh.2022.871866

Wood, B., Williams, O., Nagarajan, V., Sacks, G. (2021). Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. *Global Health* 17, 17. https://doi.org/10.1186/s12992-021-00667-7

Yussif, M.T., Adocta, V.A., Apprey, C., Annan, R.A., & Galseku., P. (2022). School Feeding Programmes and Physical Nutrition Outcomes of Primary School Children in Developing Countries. Journal of Food Science and Nutrition Research, 05(03), 642-650. https://doi.org/10.26502/jfsnr.2642-110000109