

CLINICAL RESEARCH

Exploring Association between Food Law and Double Burden of Malnutrition: A Case Study of Afghanistan

Abdullah Zubair

Pakistan Institute of Development Economics, Pakistan

Correspondence should be addressed to Abdullah Zubair, Pakistan Institute of Development Economics, Pakistan

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ABSTRACT

THEORETICAL FRAMEWORK

For all forms of malnutrition with their related diseases a unique term of double burden of malnutrition is used (DBM). DBM is the greatest risk for all globe which has both social and economic costs.

OBJECTIVE

To investigate impacts of food law on DBM in Afghanistan.

MODEL/METHODOLOGY

We introduce new model under PLS-SEM in which we employ Smart PLS 3.2.9 software package for statistical analysis.

DATA

Through, purposive sampling we have online interviews with 400 residents of Afghanistan.

FINDINGS

Our study findings indicate that all forms of food law have significant impact to protect population form DBM. Similarly, balanced diet has significant role to control DBM.

POLICY IMPLICATIONS

Our investigations suggest that government should adopt objective food law to control all harms from supply/production side of food.

PRACTICAL IMPLICATIONS

This research will help government to reshape their food law and will encourage people to have balanced diet regime.

KEYWORDS

Food law; DBM; BDR; PLS-SEM

INTRODUCTION

The term malnutrition refers to bad nutrition which covers two broad aspects of over and under-nutrition. In 1992 a unique term of double burden of malnutrition (DBM) emerges at the ICN held by the FAO and the WHO instead for both forms of malnutrition and their related diseases [1].

In fact, mostly DBM and their related diseases raise due to neither incidences nor nature. But rather DBM raise due to demand/consumption and supply/production poor regulations. Since, DBM and their related diseases are main predictor of mortality [2-6]. Similarly, they have both economic and social burden at individual and state level [3-5,7]. Therefore, in fact, we need to reshape our food system to combat with DBM and diet related diseases [8]. In fact, in order to regulate all food chain process there is need to food security, food safety, and food control [9-11]. Indeed, supplying healthy nutritional outcome is more essential than food consumption. These protections cannot be guaranteed by subjective economic growth or hunger elevation. Rather, for every nation it is essential to regulate all food chain process through objective food law [12-14].

In fact, implementation of objective food law is real development. Though, in high level standard countries many forms of under-nutrition vanished. However, other forms of malnutrition like over-nutrition, nutrients deficiency (hidden hunger) and their related diseases increase [15-17]. Therefore, these is much need for adoption of objectives food law. A responsive state should consider third pillar (community) welfare and advancements. A state should not rarely consider on capitalists and industries benefits. Recently, many proofs show that mostly mortality and severe diet related diseases increase due to high consumption of industrial food [18-21].

Since recently, in Afghanistan the DBM is regarded as the greatest factor of mortality. Because every year thousands of Afghans are getting ill due to either under or over- nutrition. Which make them to bear high social and economic costs. In fact, weak food regulatory institutions and bad diet grow the challenges of DBM. For instance, absence of standards, legislations, lack of implementation of food policies, nutrition habit, food insecurity [22,23]. In this research, we want to explore association of food supply/demand (food law and BDR) and DBM in Afghanistan.

LITERATURE REVIEW

In this part, we summarize previous studies on three issues. Double burden of malnutrition classification of food and food law and regulations.

Table 1: Double burden of malnutrition.

S. No	Author (s)/Source	Year	Findings
1	Amaral et al. [2]	2007	DRM (Diseases Related Malnutrition) increase about 20% of patients' hospitalization costs.
2	Lin Lim et al. [3]	2012	Malnourished patients have longer hospital stays days and these patients are more likely to be re admitted.
3	Freijer et al. [4]	2013	In EU countries almost 20 million patients have diseases associated malnutrition which cost € 120 billion EU governments annually.
4	Goates et al. [7]	2016	Overall annual cost of 8 diseases (S, COPD, CHF, BC, D, MD, DEP, and CC [1]) which are associated to malnutrition is over \$15.5 billion in USA.

5	GNR [5]	2016	The report shows that from 57 countries about 2 billion people suffer from micronutrient malnutrition (under-malnutrition) and nearly 2 billion people are obese (over-nutrition).
6	WHO [6]	2017	In 2014 approximately 462 million adults worldwide were under-weight which come in category of under-nutrition. However, around 1.9 billion were either overweight or obese which come under over-nutrition).
7	Htenas et al. [19]	2017	Globally, overweight and obesity (over-nutrition) cost an estimated US\$2 trillion per year. They are responsible for 68 percent of overall mortality which are caused by NCDs [2]. Most of them are diet related diseases (namely cardiovascular diseases, cancers, and diabetes)
8	Anik et al. [16]	2019	In south Asian countries (Bangladesh, Nepal, Pakistan, and Myanmar) prevalence of DBMHL [3] is high in urban areas than in rural areas.
9	Little et al. [24]	2020	Prevalence of co-morbid anemia and overweight is 23.1% among women and 13.1% among men while prevalence of co-morbid anemia and diabetes is 6.2% among women and 6.3% among men.

Table 2: Classification of food.

S. No	Author (s)/Source	Year	Findings
1	Fardet and Boirie [25]	2014	Processed food and higher processed food and from beverage groups wine tend to high the risk of diet related chronic diseases
2	Moubarac et al. [26]	2014	Dietary patterns of Canadian between period 1938 and 2011 is replaced by UPFs [1] which suggest nutritional research and regulation should be adopted to control the new dietary pattern.
3	Schnabel et al. [27]	2019	Consumption of UPFs (Ultra-processed food) is associated with higher risk of all-cause mortality.
4	Popkin [28]	2020	UPFs and various types of beverages increase significantly the risks of obesity, and other NCDs.
5	Baker et al. [29]	2020	As countries grow richer, more and wider variety of UPFs are consumed. UPFs sales volumes are highest in Australia, North America, Europe and Latin America, however UPFs are growing most rapidly in Asia, the Middle East and Africa. Further, these dietary changes particularly in highly-populated middle-income countries, raises serious diet related health risk (malnutrition).

Table 3: Food law and regulations.

S. No	Author (s)/Source	Year	Findings
1	Acton and Hammond [12]	2018	As prices of sugary drink increase, consumers are significantly less likely to select sugary drinks with high calories.
2	Demmler et al. [13]	2018	Consumers shopping in supermarkets significantly increases BMI (Body mass index). Which suggest government intervention to discourage consumption of high processed food.

DATA AND METHODOLOGY

In this research we explore the association between food law and double burden of malnutrition (DBM) in Afghanistan through analysis of public perceptions. Therefore, based on Bartlett et al (2001) at $\alpha = 0.05$ we consider the sample of 400 residents of Afghanistan. Through purposive sampling method from May 2019 to February 2021 we complete our survey via hybrid interviews. During interview the research structured questionnaire is filled by elected enumerators. This way is a type of schedule method which is easy to collect the data and get accurate information from respondents who have capability to respond well and analysis the issues. However, in our survey about 50 interviewers' data is not included for further analysis because their data file is corrupted. Thus, we only consider 350 interviews which equate to 87.5% of total. All respondents are adult over 18 years old. We use PLS-SEM for statistical analysis of responses from interviews. We use the Smart PLS 3.2.9 software package. In our study our dependent variable is ordered in nature, we use 5 for strongly agree; 4 for agree; 3 for neutral; 2 for disagree and 1 for strongly disagree. By the same way, the independent variables are measured on 5-point Likert scale.

Model

We formulate following model to present the association of food law and DBM.

$$PDBM = f(FL, BDR)$$

$$PDBM = f(SFL, MEFL, EFL, EVFL, BDR)$$

$$PDBM = \beta_1 + \beta_2 SFL + \beta_3 MEFL + \beta_4 EFL + \beta_5 EVFL + \beta_6 BDR + \mu$$

Conceptual Framework

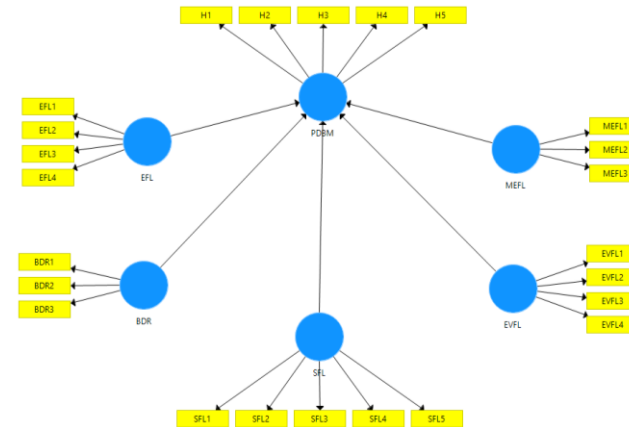


Figure 1: Author’s work.

Description of Variables

In our research model, we use the protection/safety from DBM as dependent variable. While, we take all four forms of food law; General/Social Food Law (SFL), Market related Economic Food Law (MEFL), Economy Food Law (EFL), Environmental Food Law (EVFL) and balanced dietary regime (BDR) as independent variables in the study. As we actually investigate about the quality of food law based on prior studies [30-45] controlled variables are not included for this study.

Preliminary List of Factors

In the following list we present those factors that explain the latent variables of the model.

Table 4: Preliminary list of factors.

Code	Factors
PDBM	Protection from Double Burden of Malnutrition
H1	Symptoms of DBM
H2	Adverse effects from not/eating specific nutrient
H3	Adverse effects from Symptoms of Double Burden of Malnutrition
H4	Visiting Physician
H5	Usage of Medicine
SFL	General/Social Food Law
SFL1	Labeling (Food)
SFL2	Education (Balanced Diet)
SFL3	Packaging (Food)
SFL4	Regulation of Advertising (Diet Supplements)
SFL5	Drugs regulations
DRR	Drugs Regulations
MEFL	Market related Economic Food Law
MEFL1	Regulation of Harmful Competition (Food Suppliers)
MEFL2	Legislation (Necessary Food Items)
MEFL3	Prices of Supplied Food
EFL	Economy Food Law
EFL1	Taxation (Un Healthy Food)

EFL2	Trade Policy (Food)
EFL3	Government Expenditure (Food)
EFL4	Registration of Shops/Establishments
EVFL	Environmental Food Law
EVFL1	Environmental Regulations
EVFL2	Sanitation (Water)
EVFL3	Served Food Regulation
EVFL4	Agricultural Regulation
BDR	Balanced Dietary Regime
BDR1	Types of Food
BDR2	Quality of Food
BDR3	Use Amount/Quantity of Food

RESULTS

Our study statistical analysis is employed by PLS-SEM. As PLS-SEM has two sub parts first the measurement/outer model and second the structural/inner model. First, we begin analyzing the measurement/outer model through reliability, internal construct consistency, and validity tests. Later on, we analyze the later model in order to, test the hypothesis through bootstrapping process and similarly, path coefficients of latent variables, collinearity assessment, R-square value and predictive relevance of the Model.

Statistical Analysis of Model

Evaluation of reflective measurement model

The outer/measurement model reveals the relationship of overserved/manifest and unobserved/latent variables [46]. In order to, find the outer/measurement model in PLS analysis reliability and validity criteria are used [47]. Simply, we employ the individual item reliability, construct internal consistency, and construct validity.

Assessment of reliability

An indicator reliability describes the variance of an individual manifest/observed comparatively to latent/unobserved variable by assessing the standardized outer loadings of the manifest/observed variables [48]. Generally, manifest/observed variables with an outer loading of 0.7 or higher are believed to be completely acceptable [49]. However, we can keep the outer loading with a value less than 0.7 in case of case of reflective model [50]. In our study all indicators are reasonable based on justification of Hulland [50] and Hair et al. [51].



Figure 2: Representation of the study model.

Construct internal consistency

It is used to describe the joint measurement of each construct. According to Hair et al. [46] Cronbach Alpha and composite reliability (CR) are two common measures of construct's reliability. The minimum range for CR is score between 0.6 and 0.7 [52]. For our study we use CR mostly used in PLS-SEM models. Our estimation findings denote that all values of CR are above than 0.7 so that scales are fine.

Table 5: Composite reliability.

	Composite Reliability
BDR	0.807
EFL	0.875
EVFL	0.915
MEFL	0.850
PDBM	0.866
SFL	0.941

Assessment of construct validity

Construct validity reveals the robustness of the accuracy of a measure. We employ average variance extracted (AVE) [53]. Generally, the rule of thumb is that an AVE value higher or equal to 0.50 is acceptable [53,54].

Table 6: Average variance extracted.

	Average Variance Extracted (AVE)
BDR	0.582
EFL	0.637
EVFL	0.729
MEFL	0.654
PDBM	0.564
SFL	0.762

Evaluation of the Inner Structural Model

The inner/structural model and its unobserved/latent variables theoretically and conceptually establish a contextual relation among observed data on both input and output sides. In order to, evaluate significance of all path coefficients we use bootstrapping.

Path coefficient

The Path coefficient describe the response of the dependent variable to a unit change in an independent variable keeping all other variables constant [55]. The path coefficients of an inner/structural model are similar to regression coefficients [56]. However, Smart PLS employ standardized form so it should be interpreted in standardized form accordingly.

Table 7: Path coefficient.

	PDBM
BDR	0.111
EFL	0.100
EVFL	0.104
MEFL	0.271
SFL	0.402

Bootstrapping process for testing hypothesis

Bootstrapping is a non-parametric re-sampling mechanism that incorporates repeated random sampling with replacement from the original sample [57]. Bootstrapping is the only procedure for testing the significance of path coefficients [58]. In our study as in following Table 7 we find that three forms of food law which are General/Social Food Law (SFL), Economic Food Law (EFL), and Market related Economic Food Law (MEFL) are significant. Similarly, Balanced Diet Regime (BDR) is significant in our study. Which predict that these four variables have significant impact on Safety/Protection from DBM. However, for our study Environmental Food Law (EVFL) is statistically insignificant. In nutshell, we can conclude that there is close association between food law and DBM. Means that regulations of supply/production side of food have significant impact to combat with DBM. Similarly, our findings denote that BDR has close relation with DBM. Means that duties of care of an individual about his food consumption/demand has essential impact on DBM too.

Table 8: Bootstrap output.

	T Statistics (O/STDEV)	P Values	Conclusion
BDR -> PDBM	2.084	0.037	Statistically significant
EFL -> PDBM	2.012	0.044	Statistically significant
EVFL -> PDBM	1.693	0.091	Statistically insignificant
MEFL -> PDBM	5.789	0.000	Statistically significant
SFL-> PDBM	10.037	0.000	Statistically significant

Coefficient of determination (R-Squared value)

R-squared describe the amount of variance dependent variable that is explained by the model independent variables. In our study, the structural/inner model is 0.617. This denotes that five the independent constructs substantially explain 61.17% of the variance in the quality (Protection from DBM (PDBM)).

Table 9: Coefficient of determination (R²).

	R Square	R Square Adjusted
PDBM	0.617	0.611

Predictive relevance of the model (Q²)

Q²statistics is used to determine the quality of the PLS path model [59,60]. For our study construct cross-validated redundancy approach is used. In our study the Q²value is equal to 0.317. Following of Cohen (1988) Q²values of 0.02 are small effect size, 0.15 is medium effect size, and 0.35 is high effect size. Thus, our study model has a high degree of predictive relevance.

Table 10: Predictive Relevance of the Model (Q²).

	Q²
PDBM	0.317

Policy implications

Hence, we find in our investigations that food law and balance diet regime have significant impact on DBM. Therefore, we suggest that generally, each state should objectively improve all supply/production acts. As each state implements objective food law this will lead that we will have a healthy globe. In fact, real development not merely economic growth but rather is to have a healthy population. For instance, in order to avoid the health risks from industrial food such as UPFs a state should control harmful competition of food industries. In fact, the community called third pillar is the root of society should be not neglected. There are industries specifically, in developing countries use the competition trap. Which supply bad quality of food with low price in order increase their share in market through harmful competition. Mostly, community consider first the prices than quality

therefore, such competition trap increases DBM. Similarly, there is need to continuously like news propagandas educate and aware people about BDR and limit of usage of UPFs through advertisements, public campaigns and seminars. Moreover, there should be regulations on food supplements ads. Because many ads are shown in the way which encourage more consumption of specific food. For instance, ads of energy drinks, carbonated soft drinks, and other types of UPFs advertised by famous personalities i.e., actors, sports heroes and others. In fact, there should be a limit for their advertisement. Because, much ads of such food and drinks impact on consumer preferences specifically, make kids and young generation to be habit with them. Similarly, specifically in case of Afghanistan which is our study area food labelling act should be improved to control the supply/production of food. In fact, many products are sold in markets with poor labelling quality or even no labels. Similarly, there should be regulations on imported foods including beverages and medicine drugs. In fact, many shops sell poor quality of food items even medical stores sell substandard and counterfeit drugs. Actually, many imported foods are sold hugely due to low prices in market in spite poor quality which itself rise DBM even bad quality of medicine drugs. One of the ways to control counterfeit drugs is to register all drug stores and to check certificates of all physicians and drug sellers. Similarly, as in Afghanistan many poor people are affected by inflation due to not somehow domestic currency depreciation but rather traders' speculations the government should impose some legislations in some necessary food items. In nutshell, there is need to regulate the supply/production of the food in effective way. Finally, every individual need to care about his/her diet and the quality and quantity of food they take.

LIMITATION OF THE STUDY AND FUTURE DIRECTION

We only study impact of food law and balanced diet on DBM. However, in future researchers can improve this research by considering other variables i.e., genetic component of DBM, exercise, pollution, level of income, education and many other factors. Similarly, in future researchers can use our study list of factors to estimate the impact of each of them separately on DBM it will be further broader investigations.

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APPENDIX

Total: 350		
Indicator	Frequency	Percentile
Gender		
Male	220	62.85%
Female	130	37.14%
Age		
18-36	215	61.42%
36-54	105	30%
54 or older	30	8.57%
Social Status		
Single	122	34.85
Married	228	65.14
Family Income		
Below 15000	126	36%
15000-30000	104	29.71%
31000-45000	66	18.85%
Above 45000	54	15.42%
Level of Education		
Uneducated	81	23.14%
School-Madrassah	81	23.14%
Diploma-Undergraduate	185	52.85%
Post graduate	23	6.57%
Occupation		
Unemployed	33	9.42%
Student	65	18.57%
Self Employed	131	37.42%
Government Employee	121	34.57%
Living Area		
Urban	219	62.57%
Rural	131	37.42%