Globalization and Obesity: Asian Experiences of 'Globesity'

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. **Abstract**

This paper explores the 'globesity' hypothesis that is, it examines, the effect of globalization in its social and economic dimensions on the obesity of the nations. The study utilized a panel set of Asian countries dividing it into two groups based on the income classification. The annual time period of data series runs from 1985 to 2015. For the low and low middle income countries economic and social globalization positively affects obesity, implying the benefits of globalization leads to adverse impact on health. This is due to life style changes, availability of processed food and lack of public awareness. However, for the richer Asian nations globalization, particularly in its social dimension has negative impact on obesity. The study employs the Westerlund cointegrating techniques to investigate upon the long run causal association between obesity and globalization.

Key Words: Obesity; Health; KOF index; Social globalization; Economic globalization; Asia, Granger Causality.

JEL code: C50; I10; F69; P46; O53.

Introduction

Globalization is the relentless exploration and dissemination of technology, R&D, knowledge, trade, capital movements and culture transcending all boundaries. Globalization has mitigated poverty, hunger, expanded human capital formation, but at the same time has transported the epidemic of obesity worldwide. The prevalence of obesity is higher in the wealthier nations, however, what is alarming is the growth rate of occurrence of obesity is rising in the low and middle income countries. Two out of every five adults is overweight in the Asian Pacific region. . WHO (2017) defines obesity as an abnormal or excessive fat accretion in the body that may damage a person's health and escalate the risk of certain diseases. The BMI or the body mass index is utilized to measure an overweight or obese person. It is ascertained by dividing the weight in kilograms by the square of height in meters. WHO (2017) classifies adult BMI between 18.5 kg/m² and 24.9 kg/m² as normal. An adult BMI of above 30 kg/square meters and above is regarded as obese. The Table (1) reports the percentage of change in the occurrence of obesity in the Asian and Pacific region over 1990 and 2013. Based on the findings of the Table (1) among the South Asian region the growth rate of the incidence of obesity is highest in Bangladesh over the period 1990 to 2013, (111.3 percent). There has been higher growth rates in the occurrence of obesity in the countries of Sri Lanka and Nepal. The South East Asian region witnessed a rise in obesity from 1990 to 2013 to about 40 percent. Vietnam has the highest growth rate in obese population over the same period, Table (1). So globalization has not only increased the wealth of the nations' particularly in the countries of Asia, but it has also increased the waistlines of the population. Studies show that in China public health care expenditure for diabetes owing to obesity rose from 1.96 percent in 1983 to 18.2 percent

in 2007. According to Ramachandran et al (2012) the overweight and obesity rates are widely varied in the Asian region. Malnutrition during childhood is an important factor of becoming obese in adulthood owing to a sedentary lifestyle.

The countries of Asia are struggling with the dual problem of obesity and undernutrition. Due to rapid urbanization and with the availability of energy dense food, obesity is turning out to be a pressing problem in many countries of Asia. Modernization and wealth have brought in the nutrition transition which is indeed an obesity inducing. For an individual obesity causes imbalance in energy because calorie intake is not compensated with the adequate burning of calories. This is due to availability and choice of food in a globalized world. In Mumbai, India, for example a billboard advertisement shows that McDonald's meal is available at 25 rupees. As the poor economies are prospering the people belonging to the low income rung have access to processed food which make them obese, but they lack the proper knowledge about health care to maintain their health.

Table (1): Prevalence of Overweight and Obesity in the Selected Countries, the Asian and Pacific Region

Countries	1990	2013	Percentage of Change
China	13.2	27.9	111.4
Republic of Korea	25.2	32.3	28.2
Japan	20.2	23.3	15.3
Mongolia	41.3	49.4	19.6
Afghanistan	43.3	45.9	6.0

Bangladesh	8.0	16.9	111.3
Bhutan	31.5	35.3	12.1
India	17.3	20.1	16.2
Maldives	33.4	40.3	20.7
Nepal	9.1	13.0	42.9
Pakistan	27.1	33.1	22.1
Sri Lanka	19.3	26.2	35.8
Brunei	17.5	20.6	17.7
Cambodia	10.1	15.5	53.5
Indonesia	14.8	26.0	75.7
Lao PDR	19.3	24.6	27.5
Malaysia	38.3	46.3	20.9
Myanmar	14.7	18.2	23.8
Philippines	17.8	24.5	37.6 Contd Table (1)
Singapore	30.7	38.2	24.4
Thailand	20.8	36.0	73.1
Vietnam	5.8	13.1	125.9
Fiji	44.2	51.2	15.8

Papua New Guinea	39.1	42.9	9.7
Solomon Islands	59.5	64.8	8.9
Timor-Leste	4.7	4.9	4.3
Palau	44.2	51.2	15.8
Marshall Islands	66.7	76.9	15.3
Micronesia	69.6	74.9	7.6
Samoa	80.3	84.0	4.6
Tonga	82.5	86.1	4.4
Kiribati	75.1	79.1	5.3
Vanuatu	45.3	50.6	11.7

Source: Helble M and K Francisco (2017).

Asian countries are rapidly urbanizing, in 2010 around 40 percent of the Asian population was urban (1.6 billion people), and by 2030 over half of the Asian population will be urban, Fast Facts, (2011), ADB. City living has created the easy availability of processed food, the diet is leaner in vitamins and minerals but rich in fats and carbohydrates. City living is also sedentary. However, in the low income urban areas, health care infrastructure is not accessible to curb obesity. A disquieting association has been found with obesity and numerous prolonged diseases like heart disorder, diabetes, the incidence of diabetes is alarmingly in teenagers and children who are obese. Across the globe in 2016 the children who are overweight (under the age of five) is over 41 million, half the overweight children live in Asia and about a quarter live in Africa. According to WHO (2017) obesity problem has tripled during 1975 and 2016.

Such incidence of chronic health disorder ultimately reduces productivity and lowers life expectancy. According to Finkelstein et al. (2005) obesity is an important subject matter of research in health economics because it involves economic costs in terms of expenditure to cure and control the health disorder (direct costs) and the indirect costs is reflected in lower productivity rates in the job markets. Rapid and growing incidences of obesity related health disorder in the Asian economies may entail the economic growth unsustainable. The Asian economies are facing a nutritional transition across geographical areas and the social economic ladder. On the average the BMI of the population is on the rise. In South East Asia around 300 000 die of overweight/obesity annually. In Bangladesh around 7.6 percent male adults are obese where as in Maldives 53 percent of female adults are obese. The epidemic of obesity is a cause of urgent public health policy action. The governments of majority of Asian countries are yet to develop formative budgetary allocation to prevent and control obesity.

This paper makes an attempt in a time series framework to empirically obtain the causality association between globalization and obesity in the Asian economies. So the paper makes a contribution in the literature to utilize the time series approach to identify the link across globalization and obesity, such studies in the literature are a few. The study has classified the major countries of south and south East Asia into two groups based on their income levels. This classification is analogous to the World Bank classification of the countries in accordance with income levels. The first group is a panel of eleven countries belonging to the upper middle and the high income group of Asia, the second panel is a list of seventeen countries of Asia belonging to the low and the lower middle income group. Such classification is crucial because it will help us to verify whether with a rise in the income above a certain threshold the concern for

obesity also rises. It is expected that globalization will augment per capita availability of income in the low and low middle income countries and this will bring changes in life style leading to obesity. However, for the high income countries, globalization will bring rise in wealth, but not at the cost of health damage because concern for health care and controlling for obesity will be affordable in the individual budgetary allocation.

The remainder of the paper is designed as follows the Section II discusses the findings in the literature related to obesity and its impact on the economy, the objectives of the study, methodology and data sets utilized thereof is explained in the Section III. Section IV discusses the important empirical results, the paper is finally concluded in the Section V.

Review of Literature

According to Bhattacharya and Sood (2011) obesity is a multifaceted social economic problem, it involves factors like health care research; policy on prices of food, the importance of sports and exercises. The survey of Rosin (2008) shows the economic causes associated with obesity. The findings of Brunello et al. (2008) show the extent of the negative impact of obesity in work productivity due to disability and absenteeism. Cawley and Meyerhoefer (2012), Finkelstein et al. (2009) and Thorpe et al. (2004) have tried to make estimation of the economic burden associated with obesity. Colagiuri et al. (2010) concluded that the overweight and the obese population will increasingly face a larger medical bill in comparison to the other sections of the population.

Again, Phillipson (2001) observes that rapid advancement in technology has generated options for reducing muscle energy expenditure per hour in the workplace and in the household, as a result the population is becoming increasingly obese.

Finkelstein and Strombotne (2010) observes that easy and cheap availability of high energy dense, tasty food accompanied by sedentary work habits has made today's global population obese. Sobal and Stunkard (1989) makes a comprehensive review on 144 studies on the relationship between obesity and the socioeconomic status of the population in the developed and the developing countries. It is crucial to note, as Sobal and Stunkard (1989) observe that there is an inverse relationship between incidence of obesity and income growth in particular among the female population. McLaren (2007); Monteiro et al. (2004) and Reynolds et al. (2007) discuss as countries move from the low and middle income to the high income group the growth of obesity is higher in the lower income quintiles. Kulkarni et al. (2017), Ackerson et al. (2008) and Gaiha et al. (2011) conclude that in the developing countries the occurrence of obesity rises with a rise in incomes. Popkin (1994) and Popkin et al. (2012) explain that human body adapts to resource scarce environment, but become susceptible to obesity when there is an abundance of resources in the environment. The public health professionals define such phenomenon as "famine and feast hypothesis" Other related, country specific (empirical) studies based on household and cross section surveys include the works of Loureiro and Nayga (2004) for 32 OECD countries; Chou et al. (2004) for the USA; Huffman and Rizov (2007) for Russia; Brown and Siahpush (2007) for Australia; Andreyeva et al.(2007) for 11 European countries; Pieroni and Salmasi (2010) for the UK; Bleich et al. (2008) for 7 OECD countries and Maennig et al. (2008) for Germany. Siddiqui and Donato (2016), based on the household surveys in Asia conclude that among highly educated women there is a decline in the incidence of obesity. Thus the achievement of education after a certain threshold leads to weight control behaviour. Schmidhuber and Shetty (2005) and Popkin et al. (2012) summarizes that the current decade has experienced rapid economic growth which has seen changes in sectoral

composition of the occupation of the people (a shift away from labour intensive primary occupation). Further, there has been high rates of urbanization which has transformed the life styles of the population. The eating patterns have altered massively which health professionals describe as “global nutrition transition”.

Helble and Sato (2018) discuss that what is worrying is the fast growth of occurrence of overweight and obesity among people in the lower income quintiles of the Asian and the Pacific region. The incidence of chronic ailments due to obesity is burdensome for the lower income quintile population because in many cases the cost of medical expenses is privately borne by the households. The situation that perplexes the governments of the low income countries is what combination of polices will reduce the occurrence of obesity among the adult population and at the same time lessen malnutrition. It is extremely difficult to treat the problem associated with overweight, Ng et al. (2014). Helble and Sato (2018) shares serious concern on the occurrence of dual household burden in some families of Asia, particularly India, where some child members are malnourished while the adults are obese. Jehn and Brewis (2009) explore the occurrence of obesity across a set of 19 lower and middle income countries, the paper concludes that obesity is less prevalent in low income group countries.

The studies in the existing literature have explored expansively on the aspects of intercountry experiences of income inequality and health hazards relating to obesity, particularly based on cross section household surveys. However an exploration with time series and panel data sets is scant. Recently, Font and Mas (2016), examines the ‘globesity’ (globalization and obesity hypothesis) hypothesis. The paper observes that there is a strong association between globalization and obesity and calorie intake. Font

and Mas (2016) conclude that one standard deviation increase in globalization is leading to an increase of 23.8 percent of the obese population. Based on data analysis from Asia, Africa and Latin America Garrett and Ruel (2005) observe that the influence of rising incomes on the incidence of obesity hold true up to certain rise in income levels beyond which the association does not hold. This paper makes an attempt to verify that whether the globalizing impact on obesity declines in middle and high income countries over a time series set of observations. Such studies have not been conducted in the area of obesity along with its causal association. Though the problem of obesity has been identified in almost all the countries of Asia, no specific policy guidelines have been formulated over the past three decades, owing to lack of adequate quantification of the documentation of globalization and obesity. The present research makes an attempt to quantify in a time series framework, the documentation on obesity and globalization.

Objectives, Data Sets and Methodology

Objectives

This study primarily attempts to explore the impact of globalization on obesity in the major countries of Asia, classified on the basis of their incomes. The main objective of this paper is to examine the causal relationship between globalization and obesity and to assess the effect of globalization for the Asian countries in a time series framework. The time frame of analysis runs from 1985-2015.Specifically the study attempts to explore the short run dynamics and the long run equilibrium relation across the variables, based on Granger causality tests.

Data Sets

Following Dreher, (2006), the KOF index of globalization is used in this study to

measure the impact of globalization on obesity. The KOF Index of Globalization ranks countries, according to being more global based on the economic, political, and social globalization According to (Dreher, 2006), globalization index is an aggregation of three subcomponents namely, i) economic, ii) social and iii) political. In this study, we examine primarily the economic and social components of globalization and its causal association with obesity. Economic globalization is an aggregation of the following variables: trade as a percentage of Gross Domestic product; Foreign Direct Investment as a percentage of Gross Domestic Product; portfolio investment as a percentage of Gross Domestic product, import barriers, and taxes on international trade as a percentage of total revenue earned. Social globalization is based on the following variables: telephone transfers in percentage to Gross Domestic product; international inbound tourists as a percentage of the total population; internet, newspaper circulation, and television use among per thousand people and availability of McDonald's restaurants. The political aspects of globalization are constructed to assess the degree of a country's involvement in the realm of international politics. By untangling the effects of globalization (into economic and social aspects) the paper attempts to specifically explore which of the two components are more relevant for the overweight and obesity issues. The economic aspect of globalization has made the Asian countries more interdependent. The social aspects of globalization are equally important because it refers to social interaction and life style changes. Information flows through social and personal contacts are crucial in shaping a person's life style. Increasing female participation in the labour market has an important social impact as far as the dietary patterns of the households are concerned. Women were traditional homemakers who cooked fresh meals for the households, now this activity is being increasingly substituted by packaged energy dense food. The data for globalization index is obtained

from the KOF Globalization Index, (databasehttps://www.kof.ethz.ch).

Data on adult obesity is obtained from the Global Health Observatory data repository, WHO Global Database on Body Mass Index (BMI) (https://knoema.com/WHOGDOBMIMay/who-global-database-on-body-mass-index-bmi). The percentage share of the adult population of a given country who is obese is chosen as the relevant variable. According to the WHO classification a person is considered obese if his/her BMI is over 30.

The time series data has been converted into the logarithmic form. This shifting into the natural logarithmic forms may reduce the difficulty arising out of heteroscedasticity as transformation in log lessens the scale in which the variables are measured, (Gujarati, 2009). The variable economic globalization is denoted by G1 and the logarithmic transformation by LG1, the variable social globalization is denoted by G2 and the logarithmic transformation by LG2. The variable obesity is denoted by O and its logarithmic transformation by LO.

Owing to the unavailability of data sets for a time period spanning through 1985 to 2015 , the choice set of the countries become restricted, so the study faces a tradeoff between the choice of countries and the choice of period, it is thus a longer time period with lesser number of countries. Following the classification of the World Bank Development Indicators, the countries chosen from the Central Asia, South Asia and East Asian region has been classified into low and middle income countries and upper middle and high income countries. So the study explores the causal association between globalization and obesity across two panel sets of countries. The first panel includes a group of seventeen countries in the Central Asian, South Asian and East Asian regions belonging to the low and middle income category. The second panel consists of a group of eleven countries belonging to the upper middle and high income category. Such twin

classification of the Asian countries is warranted because the study attempts to explore how far the results are in conformity with the hypothesis, globalization raises the income levels in developing countries which in turn is increasing the incidence of obesity at a higher rate than the developed world. Further the study will also explore whether there is an inverse relationship with globalization, particularly social, and obesity in the richer nations.

Methodology

To examine the specification of interest the relationship underlined in the equation (1a) explains the association between obesity and globalization in its economic and social dimensions.

$$LO_{it} = f(LG1_{it}, LG2_{it}) \quad 1(a)$$

Where LO denotes the obesity indicator (in logarithmic transformation); LG1 denotes the economic globalization indicator in logarithmic terms and LG2 indicates the social globalization in its logarithmic transformation. The country is indicated by i and the time dimension in t.

Econometric Estimation

The purpose of the present exercise is to examine the association between economic globalization (represented by LG1) and obesity prevalence (represented by LO), further it also attempts to examine the relationship between social globalization (represented by LG2) and obesity (LO) prevalence using a panel set of seventeen low and middle income countries and a panel set of eleven upper middle and high income countries. The set of countries chosen is a highly assimilated set, so there may be intercountry impact of shocks due to economic fluctuations. The results from the model specification may be biased if homogeneity restrictions on the parameters is not imposed. So the paper

applies cross-sectional independence and slope homogeneity tests to avoid model misspecification. It is necessary to control for possible cross sectional dependence across the observations in the panel. Panel data sets are likely to show cross sectional dependence owing to the presence of common shocks, this is the reflection of strong interdependencies.

Cross-sectional Dependence Test

The study utilizes three tests to verify the hypothesis of cross sectional dependence, they are Breusch and Pagan (1980), Langrage multiplier (LM) cross-sectional dependence test, the Pesaran (2004) test for cross sectional dependence and the Pesaran et al.(2008) adjusted Langrage multiplier (LM) cross-sectional dependence test. Pesaran et al. (2008) observes that the cross sectional dependence test miscalculates its clarification if the correlation over the pair approaches zero. To overcome the inadequacies Pesaran et al. (2008) developed the adjusted Langrage multiplier (LM) cross-sectional dependence test. The study applies the Pesaran and Yamagata (2008) slope homogeneity test to verify the country based heterogeneity postulation.

Panel Unit Root Test

The paper applies the Pesaran (2007) panel unit root test to test the stationary nature of the set of time series of observations. The Pesaran (2007) panel unit root test is acquired by supplementing the standard Augmented Dickey Fuller (ADF) test with the cross section (average) of lagged levels and the individual series with the first differences. The Pesaran (2007) model is specified in the [Equation (1)], there are N cross

sectional units and T observations of the time series.

$$\Delta x_{i,t} = \alpha_i + \rho_i x_{i,t-1} + c_i \bar{x}_{t-1} + d_i \Delta \bar{x} + \varepsilon_{i,t} \quad (1)$$

Where $\bar{x}_{t-1} = (1/N)\sum_{i=1}^{N} x_{i.t-1}$ and $\Delta x_t = (1/N)\sum_{i=1}^{N} x_{i.t}$

The first difference estimates is obtained through the factor shares. Pesaran (2007) has altered the IPS (panel unit root test) formulated by Im et al.(2003), grounded on the average of individual cross sectional ADF (CADF) which is defined as CIPS (cross sectional augmented IPS), the Equation (2).

$$CIPS = 1/N \sum_{i=1}^{N} CADF_i \quad (2)$$

$CADF_i$ Shows the cross sectional ADF statistic for the i[th] cross sectional unit obtained by the t-ratio of ρ_i when CADF regression is used in the Equation (1). When the distribution of N is large, CIPS statistic is non-standard.

Panel Cointegration Test

The present study has applied the cointegration test formulated by Westerlund, (2007). The null hypothesis of no cointegration is tested through the error correction term in a conditional model which is equal to zero, in the Westerlund, (2007) specification of cointegration. The equation (3) specifies the Westerlund (2007) error correction model.

$$\Delta z_{it} = \delta_i' d_i + \theta_i(z_{i(t-1)} - \beta_i' y_{i(t-1)}) + \sum_{j=1}^{m} \theta_{ij} \Delta z_{i(t-j)} + \sum_{j=0}^{m} \emptyset_{ij} \Delta y_{i(t-j)} + \omega_{it} \quad (3)$$

Here d_t= (1-t) $'$, is the deterministic components. δ_i' =(δ_{1i} δ_{2i}) $'$ shows the corresponding vector of the parameters. By least square estimation the error correction term θ_i is found as, [Equation (4)].

$$\Delta z_{it}= \delta_i' d_i +\theta_i(z_{i(t-1)} - \pi_i' y_{i(t-1)}) +\sum_{j=1}^{m} \theta_{ij}\Delta z_{i(t-j)}+\sum_{j=0}^{m} \emptyset_{ij}\Delta y_{i(t-j)} +\omega_{it} \qquad (4)$$

Where θ_i denotes the adjustment parameter it indicates the speed through which the system goes back to the equilibrium state.

Based on the least square estimation ofθ_i, Westerlund (2007) framed four tests. The first two explains the group mean statistics, the next two shows the panel test statistics.

The group mean statistics are expressed correspondingly in the equations (5) and (6),

$$G_\tau=\frac{1}{N}\sum_{i=1}^{N}\frac{\theta_i}{S.E.\hat{\theta_i}} \qquad (5)$$

$$G_\alpha=\frac{1}{N}\sum_{i=1}^{N}\frac{T\theta_i}{\theta_i'(1)} \qquad (6)$$

G_τ and G_α test the null hypothesis $H_0: \theta_i=0$ for all i versus the alternative hypothesis $H_1^g: \theta_i < 0\ for\ some\ i$. If the null hypothesis is rejected then it means a cointegrating relationship exists for at least one cross section unit.

The Equations (7) and (8) shows the panel test statistics;

$$P_\tau= \frac{\theta_i}{S.E.\hat{\theta_i}} \qquad (7)$$

$$P_\alpha= T\hat{\theta} \qquad (8)$$

P_τ and P_α test statistic for the null hypothesis P_τ $H_0: \theta_i=0$ for all i against the alternative hypothesis of $H_1^p: \theta_i = \theta < 0\ for\ all\ i$.

Here the rejection of the null hypothesis means the rejection of the hypothesis of no cointegration for the entire panel. After discussing about the stationarity properties and the cointegrating relation, subsequently the paper examines the long run elasticities of the variables in each panel set of the observations.

Here, Pesaran's (2006) Common Correlated Effects Mean Group (CCEMG) estimator, and the Augmented Mean Group (AMG) of Eberhardt and Teal (2010) is applied to test the long run elasticities of the concerned variables. The Pesaran (2006) CCEMG estimation considers the cross sectional dependence and heterogeneity of parameters. The CCEMG [Pesaran(2006)] are independent and is distributed randomly. This method monitors each definite regressor with cross section aggregation when N tends to infinity. Eberhardt (2012) opines that the CCEMG has a crucial drawback, the projected parameters of the slope are not easy to interpret. The AMG method as postulated by Eberhardt and Teal (2010) in divergence to CCEMG do not reflect the undetected common factors as noise elements rather it chooses the factors as a common dynamic process which has to be estimated.

Panel causality tests

The present study follows the Dumitrescu and Hurlin (2012) panel causality methods to obtain the direction of causality between obesity and globalization. This approach tests for causality utilizing the stationary VAR model where the coefficients are fixed. The null hypothesis states the Homogeneous Non Causality (HNC) where there is no causal association for all the observations in the panel. The alternative hypothesis implies Heterogeneous Non Causality (HENC). The hypothesis test statistic is the arithmetic mean of individual Wald Statistic Equation (9),

$W_{N,T}^{H_{nc}}$=1/n$\sum_{i=1}^{N} W_{i.t}$ (9)

$where\ W_{i.t}$ shows the Wald test statistic for country i to examine the causation

Dumitrescu and Hurlin (2012) measured a stable statistic for W^{HNC} by putting the estimated values of mean and variance of the distribution due to no convergence to the similar chi square of respective individual Wald Statistics for the sample T. The equation (10) expresses the Dumitrescu and Hurlin (2012) statistic;

$$. Z_{N,T}^{HNC} = \frac{\sqrt{N}\left[W_{N.T}^{HNC} - N^{-1}\sum_{i=1}^{N} E(W_{i.t})\right]}{\sqrt{N^{-1}\sum_{i=1}^{N} Var(W_{it})}} \qquad (10)$$

Results and Discussion

Table (2): Descriptive Statistics: (Summary Output of)

Low and low middle income countries

Measures	LO	LG1	LG2
Mean	24.92	42.27	35.12
Maximum	76.2	76.40	62.18
Minimum	6.4	14.01	8.64
Standard Deviation	17.30	16.56	14.61
Skewness	1.24	0.33	0.005
Kurtosis	3.65	2.00	1.91

Source: KOF Globalization index tables for G1 and G2 and WHO statistical tables for O
Compilation: Author

Table (3): Descriptive Statistics: (Summary Output of)

Upper middle and high income countries

Measures	OB	G1	G2
Mean	32.4	55.9	57.8
Maximum	78.5	93.72	84.4
Minimum	10.6	18.9	12.39
Standard Deviation	16.5	16.4	15.4
Skewness	1.13	0.32	-0.57
Kurtosis	3.36	2.98	3.12

Source: KOF Globalization index tables for G1 and G2 and WHO statistical tables for O
Compilation: Author

The Table (2) presents the summary descriptive statistics for the low and low middle income countries, as far as the OB (obesity) variable is concerned the standard deviation is 17.30, showing quite a degree of variability. The observations are positively skewed. As far as G1 (economic globalization) variable is concerned the mean set of the observations is 42.27, the degree of variability in the set of observations is not too high (Standard Deviation 16.56). For G2 (social globalization) variable the mean stands at 35.12. Here also the set of observations is positively skewed. The Table (3) shows the summary of the descriptive statistics of the time series of the observations for the panel set of the upper middle and the high income countries. The variability of the data sets is medium the standard deviation for obesity (O) is 16.5 and for economic (G1) and social (G2) globalization 16.4 and 15.4 respectively. Except for social globalization (G2) the observations for the other variables is positively skewed

Table (4): Cross-sectional Dependence and Slope Homogeneity Tests

Low and low middle income countries

Method	Test statistics	P value
Cross sectional dependence test		
CD_{BP}	488.64**	0.000
CD_P	186.61**	0.000
LM_{adj}	185.65**	0.000
Slope homogeneity test		
Δ^- test	25.21**	0.000
Δ^-_{adj} test	20.97**	0.000

Note: CD_{BP} test, CD_P test and LM_{adj} show cross-sectional dependence tests of Breusch and Pagan (1980), Pesaran (2004), and Pesaran et al. (2008), respectively. Δ^- test and Δ^-_{adj} test show the slope homogeneity test proposed by Pesaran and Yamagata (2008). ** shows significance level of 0.01 .

Table (5): Cross-sectional Dependence and Slope Homogeneity Tests

Upper Middle and High Income Countries

Method	Test statistics	P value
Cross sectional dependence test		
CD_{BP}	213.724**	0.000
CD_P	522**	0.000
LM_{adj}	28.325**	0.000
Slope homogeneity test		
Δ^- test	24.755**	0.000
Δ^-_{adj} test	21.032**	0.000

Note: CD_{BP} test , CD_P test and LM_{adj} show cross-sectional dependence tests of Breusch and Pagan (1980), Pesaran (2004), and Pesaran et al. (2008), respectively. Δ^- test and Δ^-_{adj} test show the slope homogeneity test proposed by Pesaran and Yamagata (2008). ** shows significance level of 0.01 .

It is crucial to test for the cross sectional dependence and slope heterogeneity in the panel set of observations belonging to the low and low middle income group and upper middle and high income group, respectively otherwise there may be bias in the results of econometric estimation. The Table (4) shows the cross sectional dependence test and the slope heterogeneity test for the panel set of seventeen low and low middle income countries. The Breusch and Pagan (1980) Lagrange Multiplier test, the Peasran (2004) and the Pesaran et al (2008) show the existence of cross sectional dependence for the panel set of seventeen low and low middle income countries. The second part of the Table (4) shows that the null hypothesis of slope homogeneity is rejected for both the sets of the tests. From the results of the Table (5) we can surmise that there is cross sectional dependence and slope heterogeneity amongst the panel of eleven upper middle income and high income countries of Asia.

The Tables (6) (of low and low middle income countries) and (7) (of Middle and high income countries) report respectively, the unit root test (Pesaran (2007)) of the time series of the observations. On the basis of the constant and the constant and trend specification, the time series of the observations for both the panel groups are integrated of the order I(1), for the concerned variables.

Table (6): Pesaran (2007): Panel Unit Root Test Analysis,

(Low and low middle income countries)

	Constant	Constant and Trend
Series at level		
LO	-1.32	-2.70
LG1	-2.21	-2.04
LG2	-2.41	-2.48
Series at first difference		
LO	-5.30**	-5.78**
LG1	-4.91**	-4.96**
LG2	-5.22**	-5.42**

Note: ** shows the rejection of the null hypothesis at the 1% level of significance, LO is the measure of obesity in logarithmic terms; LG1 is the measure of economic globalization in logarithmic terms and LG2 is the measure of social globalization in logarithmic terms. Compilation: Author

Table (7): Pesaran (2007): Panel Unit Root Test Analysis,

(Middle and high income countries)

	Constant	Constant and Trend
Series at level		
LO	-2.02	-1.23
LG1	-1.02	-2.07
LG2	-2.05	-2.08
Series at first difference		
LO	-2.54**	-4.10**
LG1	-5.29**	-5.43**
LG2	-4.89**	-4.95**

Note: ** shows the rejection of the null hypothesis at the 1% level of significance, LO is the measure of obesity in logarithmic terms; LG1 is the measure of economic globalization in logarithmic terms and LG2 is the measure of social globalization in logarithmic terms. Compilation Author

Table (8): Westerlund (2007) Cointegration Tests Analysis

(Low and low middle income countries)

Model: Economic Globalization	Value	z-value	Robust p-value
G_t	2.03*	0.04	0.002
G_α	-8.33*	-1.37	0.024
P_t	24.81*	5.86	0.00
P_α	8.40*	4.96	0.00
Model: Social Globalization			
G_t	3.64	2.12	0.023
G_α	12.33*	4.13	0.00
P_t	7.25*	3.01	0.001
P_α	5.08*	1.95	0.002

Note : * shows the values for rejection of the null hypothesis at 5 percent levels of significance. The AIC or the Akaike Information Criterion sets the optimal lag length, the number of bootstraps is set to 100.

Table (9): Westerlund (2007) Cointegration Tests Analysis,

(Upper Middle and high income countries)

Model: Economic Globalization	Value	z-value	Robust p-value
G_t	-3.20*	-3.51	0.00
G_α	-54.82*	-21.42	0.00
P_t	-15.33*	-9.70	0.00
P_α	-33.30*	-16.83	0.00

Model: Social Globalization			
G_t	-3.32*	-3.98	0.00
G_α	-47.40*	-17.70	0.00
P_t	-10.20*	-3.72	0.00
P_α	-41.56*	-18.10	0.00

Note * shows the values for rejection of the null hypothesis 5 percent levels of significance. The AIC or the Akaike Information Criterion sets the optimal lag length, the number of bootstraps is set to 100.

Since the variables are integrated of the order I(1), the Westerlund (2007) error – correction based panel cointegration method is applied to explore whether a long run relationship exist between obesity and globalization (both social and economic dimensions). The Tables (8) and (9) report the results of the panel cointegration test for the low and low middle income countries and the upper middle and high income countries respectively. For both the sets of the panel the null hypothesis of no cointegration is rejected. Thus, there exists a long run cointegrating relationship across obesity and globalization in economic and social dimensions.

Since a long run cointegrating relationship exists across obesity and economic and social globalization in the panel set of observations belonging to the low and low middle income countries and middle and high income countries respectively, it is possible to examine the panel impact of globalization on obesity and the time series nature is also scrutinized.

The Table (10) shows the results of the country based heterogeneous panel elasticities on the basis of CCEMG estimates and the AMG estimation for the concerned set of the low and low middle income countries. The country specific time series observations on

the basis of the CCEMG model show that economic globalization (LG1) has a positive and significant impact in the countries, Afghanistan, Bangladesh, Cambodia, Mongolia, Nepal, Pakistan, Philippines. The overall panel statistic also shows a positive relationship, but it is not significant with respective to economic globalization for the CCEMG model. The country specific time series observations on the basis of the CCEMG model show that social globalization (LG2) has a positive and significant impact in the countries of Afghanistan, Bangladesh, India, Cambodia, Kiribati, Myanmar, Nepal, Pakistan and Vanuatu. The overall panel statistic also shows a positive relationship, and significant with respective to social globalization on obesity

The Table (11) reports the results of the country based heterogeneous panel elasticities on the basis of CCEMG estimates and the AMG estimation for the concerned set of the upper middle and high income countries. The country specific time series observations on the basis of the CCEMG model show that economic globalization (LG1) has a negative and significant impact in the countries of Azerbaijan, China, Republic of Korea, Thailand and Tonga. The overall panel statistic also shows a negative and significant relationship with respective economic globalization for the CCEMG model. The country specific time series observations on the basis of the CCEMG model show that social globalization (LG2) has a negative and significant impact in the countries of China, Japan, Malaysia, Maldives, Singapore, Thailand and Tonga. The overall panel statistic also shows a negative relationship, but insignificant with respective social globalization on obesity. Such findings share the observations of Helble and Sato (2018). Kulkarni et al. (2017), Ackerson et al. (2008) and Gaiha et al. (2011 who confirms (in cross section household surveys) that occurrence of obesity is

growing at a faster rate among the people of the low income countries of Asia and the Pacific.

The unobservable factors in the CCEMG estimation often lead to overestimation so the AMG model developed by Eberhardt and Teal (2010) is applied to distinguish across temporal and general dynamics. The Table (10) reports the results based on the AMG model [Eberhardt and Teal (2010)], the panel statistics show that economic globalization and social globalization has positive and significant impact on obesity in the low and low middle income countries. The Table (11) shows the results of the AMG model developed by Eberhardt and Teal (2010), for the upper middle and high income countries, the panel statistics show that economic globalization and social globalization have a negative and significant impact on obesity in the upper middle and high income countries.

The low and middle income countries of Asia have reaped high dividends with respect to economic growth, this is costly in terms of the health of the nations. Globalization both economic and social has a positive impact on obesity implying higher obesity in these nations. For the richer nations of Asia the benefits of globalization are reflected in a better health status (as reflected in the of the overall panel statistic), because globalization particularly social has an inverse relationship with globalization.

Table (10): Long-Run Heterogeneous Elasticities (Low and Low Middle Income Countries)

Country	CCEMG		AMG	
	Coefficient	. Z-statistics	Coefficient.	Z-statistics
Afghanistan	0.03*(LG1) 0.03*(LG2)	4.02(LG1) 4.30(LG2)	0.13*(LG1) 0.26*(LG2)	38.12(LG1) 13.57(LG2)
Bangladesh	0.87* (LG1) 0.15*(LG2)	69.47(LG1) 9.96(LG2)	0.12*(LG1) 0.03*(LG2)	23.12(LG1) 2.27(LG2)
Bhutan	0.09(LG1) -0.02(LG2)	0.28(LG1) -1.11(LG2)	-0.03*(LG1) -0.03*(LG2)	2.50(LG1) -6.59(LG2)

Cambodia	0.83*(LG1) 0.03*(LG2)	34.44(LG1) 5.35(LG2)	0.11*(LG1) 0.15*(LG2)	54.33(LG1) 7.68(LG2)
India	0.05(LG1) 0.08*(LG2)	0.87(LG1) 3.47(LG2)	0.03(LG1) 0.11*(LG2)	1.50(LG1) 19.26(LG2)
Indonesia	-0.01(LG1) -0.04*(LG2)	-0.92(LG1) -2.53(LG2)	0.18*(LG1) 0.31*(LG2)	26.19(LG1) 11.33(LG2)
Kiribati	0.11(LG1) 0.37*(LG2)	0.34(LG1) 3.85(LG2)	0.03*(LG1) 0.05*(LG2)	2.26(LG1) 2.549(LG2)
Lao PDR	0.23(LG1) -0.17*L(G2)	1.22(LG1) -4.77(LG2)	0.43(LG1) -0.43*(LG2)	1.56(G1) -57.89(G2)
Mongolia	0.02*(LG1) -0.08*(LG2)	2.75(LG1) -7.37(LG2)	0.03*(LG1) -0.06*(LG2)	4.38L(G1) 5.34(LG2)
Myanmar	-0.02(LG1) 0.13*(LG2)	-0.27(LG1) 7.69(LG2)	-0.02(LG1) 0.49*(LG2)	-1.33(LG1) 24.04(LG2)
Nepal	0.84*(LG1) 0.62*(LG2)	122.06(LG1) 28.54(LG2)	0.11*(LG1) 0.20*(LG2)	5.45(LG1) 9.68(LG2)
Pakistan	0.11*(LG1) 0.88*(LG2)	2.13(LG1) 38.41(LG2)	0.01*(LG1) 0.17*(LG2)	22.44(LG1) 21.58(LG2)
Papua New Guinea	-0.06*(LG1) -0.13*(LG2)	-4.60(LG1) -3.31(LG2)	-0.02*(LG1) -0.43*(LG2)	-7.22(LG1) -3.75(LG2)
Philippines	0.63* (LG1) 0.01(LG2)	4.41(LG1) 0.68(LG2)	0.63*(LG1) 0.50*(LG2)	6.84(LG1) 12.46(LG2)
Solomon Islands	-0.40*(LG1) -0.09*(LG2)	-5.5(LG1) -3.45(LG2)	-0.07*(LG1) -0.29*(LG2)	-2.04(LG1) -5.569(LG2)
Vanuatu	-0.90*(LG1) 0.17*(LG2)	-3.00(LG1) 3.85(LG2)	0.04(LG1) -0.01*(LG2)	1.92(LG1) -2.74(LG2)
Vietnam	0.89(LG1) 0.07(LG2)	27.61(LG1) 1.34(LG2)	0.02(LG1) 0.03(LG2)	1.43(LG1) 0.78(LG2)
Panel statistics	0.01(LG1) 0.78*(LG2)	1.91(LG1) 26.85(LG2)	0.11*(LG1) 0.139*(LG2)	3.07(LG1) 32.78(LG2)
Diagnostic Test (Panel)				
RMSE	0.19(LG1) 0.26(LG2)		0.08(LG1) 0.07(LG2)	

Note: * denotes significance level at the 5% level.
CCEMG is Common Correlated Effects Mean Group estimator, Pesaran (2006); AMG is Augmented Mean Group estimator, Eberhardt and Teal (2010).
RMSE denotes the root mean square error. (LG1) denotes impact of economic globalization and (LG2) denotes the impact of social globalization

Table (11): Long-Run Heterogeneous Elasticities (Upper Middle and High Income Countries)

Country	CCEMG		AMG	
	Coefficient	. Z-statistics	Coefficient.	Z-statistics
Azerbaijan	-0.02*(LG1) 0.01*(LG2)	-4.13(LG1) 0.002(LG2)	-0.03*(LG1) 0.04(LG2)	-4.02(LG1) 0.58(LG2)
China	-0.06*(LG1) -0.07*(LG2)	-5.45(LG1) -2.60(LG2)	-0.03*(LG1) -0.04*(LG2)	-2.47(LG1) -2.64(LG2)

Brunei Darussalam	-0.03(LG1) -0.09(LG2)	-2.72(LG1) -0.70(LG2)	-007(LG1) -0.004(LG2)	-0.58(LG1) -0.27(LG2)
Fiji	-0.17(LG1) 0.20(LG2)	-1.25(LG1) 1.40(LG2)	-0.01*(LG1) 0.08(LG2)	-3.01(LG1) 0.99(LG2)
Japan	-0.02(LG1) -0.16*(LG2)	-0.64(LG1) -2.51(LG2)	-0.01(LG1) -0.07*(LG2)	-0.92(LG1) -3.31(LG2)
Korea Republic	-0.11*(LG1) 0.28*(LG2)	-2.26(LG1) 5.53(LG2)	-0.02*(LG1) -0.01(LG2)	-3.12(LG1) -0.40(LG2)
Malaysia	-0.06(LG1) -0.10*(LG2)	-1.15(LG1) -3.77(LG2)	-0.09(LG1) -0.01*(LG2)	-1.58(LG1) -2.32*(LG2)
Maldives	0.10*(LG1) -0.18*(LG2)	2.59(LG1) -4.33(LG2)	-0.13*(LG1) -0.05*(LG2)	-2.14(LG1) -2.38(LG2)
Singapore	0.01(LG1) 0.11*(LG2)	0.86(LG1) 2.49(LG2)	0.02(LG1) 0.04(LG2)	0.25(LG1) 0.38(LG2)
Thailand	-0.19*(LG1) -0.15*(LG2)	-9.24(LG1) -2.88(LG2)	-0.04*(LG1) -0.11*(LG2)	-2.12(LG1) -4.26(LG2)
Tonga	-0.06*(LG1) -0.16*(LG2)	-6.80(LG1) -5.46(LG2)	-0.05*(LG1) -0.04*(LG2)	-2.16(LG1) -2.64(LG2)
Panel statistics	-0.05*(LG1) 0.03(LG2)	-2.30(LG1) 0.69(LG2)	-0.01*(LG1) -0.02*(LG2)	-4.20(LG1) -2.18(LG2)
Diagnostic Test (Panel)				
RMSE	0.46 (LG1) 0.41(LG2)		0.33(LG1) 0.34(LG2)	

Note: * denotes significance level at the 5% level.
CCEMG is Common Correlated Effects Mean Group estimator, Pesaran (2006); AMG is Augmented Mean Group estimator, Eberhardt and Teal (2010).
RMSE denotes the root mean square error. (LG1) denotes impact of economic globalization and (LG2) denotes the impact of social globalization.

Table (12)**:** Dumitrescu and Hurlin (Granger Causality Analysis)

Low and Low Middle Income countries

Null Hypothesis	Economic Globalization does not Granger cause Obesity (Social Globalization does not Granger cause Obesity)		Obesity does not Granger cause Economic Globalization (Obesity does not Granger cause Social Globalization)	
Individual Country Statistics				
List Of Countries	W_i	p_i	W_i	p_i
Afghanistan	5.20* (0.08)	0.02 (0.92)	0.36 (5.26*)	0.54 (0.02)
Bangladesh	5.31* (0.81)	0.02 (0.67)	0.04 (6.42*)	0.83 (0.01)
Bhutan	7.26* (7.78*)	0.01 (0.0002)	7.83* (2.70)	0.003 (0.11)

Cambodia	7.58* (3.96*)	0.001 (0.04)	0.02 (6.99*)	0.88 (0.01)
India	0.87 (6.37*)	0.35 (0.03)	0.60 (7.58*)	0.44 (0.01)
Indonesia	7.85* (6.10*)	0.01 (0.003)	0.99 (8.48)	0.32 0.07
Kiribati	8.48* (0.18)	0.003 (0.66)	0.15 (0.64)	0.68 (0.43)
Lao PDR	0.64 (6.78*)	0.43 (0.014)	4.43* (1.31)	0.004 (0.26)
Mongolia	0.15 (1.30)	0.69 (0.30)	1.64 (1.14)	0.21 (0.29)
Myanmar	2.16 (0.001)	0.15 (0.99)	6.64* (3.52)	0.01 (0.07)
Nepal	10.55** (7.78*)	0.002 (0.0003)	1.05 (2.15)	0.31 (0.15)
Pakistan	14.83** (5.02*)	0.000 (0.001)	3.33 (5.96*)	0.07 (0.02)
Papua New Guinea	5.96* (0.43)	0.02 (0.54)	1.88 (0.01)	0.18 (0.90)
Philippines	17.71** (6.10*)	0.0001 (0.002)	0.64 (17.71**)	0.42 (0.002)
Solomon Islands	1.31 (0.18)	0.26 (0.66)	3.91* (0.06)	0.002 (0.79)
Vanuatu	17.71* (5.44*)	0.0002 (0.01)	0.55 (1.05)	0.46 (0.31)
Vietnam	0.06 (0.33)	0.79 (0.57)	0.49 (3.330)	0.48 (0.07)
Panel Statistics				
W^{Hnc}	3.70*(4.25*)		1.84 (11.58*)	
W_{NT}^{Hnc}	7.87*(7.87*)		2.45 (3.38)	
W_{N}^{Hnc}	6.65* (7.04*)		1.93(9.67*)	

Note * and ** show significance at the 5% &1% level of significance respectively.

The causal association is obtained by applying the Dumitrescu and Hurlin (2012) Granger Causality test, the Table(12) presents the panel Granger causality test as well as the Wald statistics at the individual country level for the seventeen low and low middle income countries of Asia. Economic Globalization Granger cause Obesity in Afghanistan, Bangladesh, Bhutan, Cambodia, Indonesia, Kiribati, Nepal, Pakistan, Papua New Guinea, Papua New Guinea, Philippines and Vanuatu. The panel statistic indicates that at the 5 percent level of significance, economic globalization and social globalization Granger cause obesity in the panel of low and low middle income countries of Asia. From the Table (12) it is found that there is a feedback effect between social globalization and obesity in Afghanistan, Bangladesh, Cambodia, India,

Pakistan, Philippines.

The Table (13) presents the panel Granger causality test [Dumitrescu and Hurlin (2012)] as well as the Wald statistics at the individual country level for the eleven upper middle and high income countries of Asia. Economic Globalization Granger cause Obesity in Brunei Darussalam, Japan, Republic of Korea and Maldives. The panel statistic indicates that at the 5 percent level of significance, economic globalization and social globalization Granger cause obesity in the panel of upper middle and high income countries of Asia. From the Table (13) it is found that there is a feedback effect between social globalization and obesity in Azerbaijan, Brunei Darussalam.

Table (13): Dumitrescu and Hurlin (Granger Causality Analysis)

Upper Middle and High Income Countries

Null Hypothesis	Economic Globalization does not Granger cause Obesity (Social Globalization does not Granger cause Obesity)		Obesity does not Granger cause Economic Globalization (Obesity does not Granger cause Social Globalization)	
Individual Country Statistics				
List Of Countries	Wi	pi	Wi	pi
Azerbaijan	1.55 (5.74*)	0.23 (0.02)	0.65 (4.73*)	0.43 (0.03)
China	3.14 (5.82*)	0.08 (0.02)	0.27 (0.20)	0.63 (0.65)
Brunei Darussalam	5.94* (1.93)	0.02 (0.17)	1.03 (5.38*)	0.31 (0.02)
Fiji	0.16 (0.07)	0.66 (0.79)	0.70 (3.01)	0.40 (0.09)
Japan	11.59* (6.02*)	0.02 (0.02)	4.59* (0.03)	0.04 (0.85)

Korea Republic	14.01* (1.25)	0.001 (0.27)	8.76* (3.62)	0.006 (0.67)
Malaysia	0.96 (26.72**)	0.33 (0.00002)	2.58 (0.01)	0.11 (0.91)
Maldives	12.05* (14.07**)	0.002 0.000	5.37* (0.67)	0.02 (0.41)
Singapore	0.28 (0.002)	0.54 (0.98)	3.79 (0.67)	0.06 (0.41)
Thailand	0.09 (1.79)	0.28 (0.39)	0.01 (0.02)	0.97 (0.98)
Tonga	1.95 (0.27)	0.17 (0.60)	0.46 (3.51)	0.49 (0.07)
Panel Statistics				
W^{Hnc}	2.44 (5.51*)		2.56 (1.98)	
W_{NT}^{Hnc}	3.39* (10.58*)		0.67(2.21)	
W_{N}^{Hnc}	2.79* (9.05*)		1.03 (1.86)	

Note: ** and * show significance at the 1% and 5% levels, respectively.

Thus the relationship of obesity and globalization is positive for the low income and middle income countries of Asia. An important picture that comes from the findings is the relationship between obesity and globalization, particularly the social dimension is negative and robust for the richer nations of Asia. Globalization by impacting the social life of the households in the richer countries of Asia has a crucial effect on the individuals' health and fitness.

Conclusion

The present study has explored the causal association between obesity and globalization along its economic and social dimensions for the period 1985 to 2015 in the panel set of the low and low middle income countries and upper middle and high income countries of Asia. The analysis shows that globalization has a positive impact

on obesity in the low and low middle countries of Asia, where as for the upper middle and high income countries of Asia the impact of globalization is negative. So the results are highly varied across the regions of Asia. Given the variation, there is a need for different approaches of intervention. The stress should be on diagnosis and management in the low income countries of Asia. The continuous preventive measures should be adopted for the middle and upper middle income countries of Asia. Further studies need to be undertaken to find out to what extent policies on food subsides in the low and low middle income countries of Asia will be successful in combating the dual burden of obesity and malnutrition. Though, this study did not address the issue on the intra household allocation of food intake, it is logical to conclude that reallocation of food intake may help to tackle the burden of obesity.

The problems associated with overweight and obesity has to be tackled by applying the double pronged policy objectives of raising nutritional standards of the population in the lower income quintiles along with generating the environment of increasing physical activity particularly among the school going children of Asia. The need for formulating a well-planned sports, school curricula is been increasingly felt. To increase the physical activity among the population of densely populated cities of low and middle income countries of Asia, there is an urgent need for better urban development which facilitates sidewalks and green areas. The policy implementation of raising the nutritional standard can be effectively met through market interventions in the form of government regulations (against junk and unhealthy food) and price controls. Strict regulations have to be framed to limit the marketing of junk and sweetener added food to children. Food labelling requirements, though a costly process has to be made stringent in the low and low middle income countries of Asia. Efficacy of price instruments to check upon the rising consumption of sugars, fat based

products and oils are often ineffective because they often turn out to be price inelastic, Meenakshi (2016). Last, the governments of low and low middle income countries of Asia in particular has to plan effectively on health budgeting through the public exchequer to control the menace of obesity and associated chronic ailments. Health management rather than curative health services is the need of the hour. More research on the cost effectiveness of the health management programmes is warranted in the developing countries because these countries are less equipped with such facilities. The policy recommendations to confront the problem of obesity should be comprehensively tackled. The course of action should give focus in childhood school nutrition. Neighbourhood interventions should focus on creating a healthy environment of fibre, mineral, vitamins and protein rich diets. Local producers should be given greater access to marketing facilities of fresh food supply.

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