RICE FOR NUTRITION: A TEMPORAL PERSPECTIVE OF THE MAJOR SAARC COUNTRIES

Subrato Kumar Kuri, MS

Lecturer, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh, Bangladesh

Md. Jamal Hossain, MS

Lecturer, Department of Agricultural Statistics, Bangladesh Agricultural University, Mymensingh, Bangladesh

Upama Mondal, MS

Lecturer, Department of Genetics and Plant Breeding, Bangladesh Agricultural University, Mymensingh, Bangladesh

Abstract

Rice is the major source of nutrition in most of the South Asian countries. This paper examined the rice contribution status on nutrition supply viz. calorie, protein and fat from 1975 to 2009 among the major SAARC (South Asian Association for Regional Cooperation) countries. Among the major SAARC countries the people of Bangladesh highly relied on rice for calorie (72%), protein (62%) and fat supplies (17%) to meet their nutritional needs although it has not achieved yet rice yield sufficiency. It was found that India is the highest rice producer among the SAARC countries but they consume very littile amount of rice for their nutritional needs. It indicated that Bangladesh has been practicing rice monoculture widely and their food habit is rice based due to lack of variety of crop species. So it is needed to produce different crops like wheat, maize, potato and other fruits and vegetables for consumption. As well, poultry and livestock sectors have to be developed for more protein and fat supply from other sources along with rice in Bangladesh.

Keywords: Nutrition supply from rice, temporal perspective, SAARC countries

Introduction:

Food is the only element in this universe even cosmic world for life surviving. All living being needs foods for their physical existence. Despite of all other animals, human being is the prime consumer of foods from different sources. Generally all the food materials from different edible sources are important for nutrition and ultimately for life existence. Among these food stuffs, rice is the most important cereal crops for food consumption in the world as well the second largest single use of the land for food production (Mondal et al., 2013). Almost one-fifth of the world's land area is used for rice cultivation. It is the major source of food for more than 2.7 billion people on a daily basis (Nagaraju *et al.*, 2002).

World's most densely populated region is South Asia with largest portion of undernourished people. Despite a period of marked economic growth averaging 6% a year over the past 20 years, it remains the world's second poorest region with more than 500 million people living on less than US$1.25 per day (Bishwajit *et al*, 2013). According to The Asia Foundation, 2010, in case of Asia, food security has traditionally been defined as maintaining stable prices for rice in the major urban markets of a country where it is the staple food of more than 50% of the population. Accoring to FAOSTAT, for South Asia the figure is around 70% which is highest in the world, and hence food security is essentially a reflection of rice security in this region. The total production of rice has become static over the years with the gradual decrease of crop-growing areas. Green revolution helped to solve the world's demand for food, but is not enough to meet the 21st century's exploding population. The pressure has pushed rice cultivation to less productive lands, including coastal areas (Mondal *et al*, 2013).

In Bangladesh, rice grows in all the crop-growing seasons and occupies 77% of the total cropped area of 13.9 million hectares. Rice provides 75% of the calories and 55% of the protein in the average daily diet of the people of Bangladesh (Bhuiyan *et al.*, 2002). Not only Bangladesh other South Asian countries i.e. major SAARC (South Asian Association for Regional Cooperation) are processing more or less the similar scenario. Because, these countries having significant similarities in terms of livelihood, diet, culture, lifestyle and socio-economic status and are characterized by widespread poverty, under nutrition and low literacy rate. The vast majority of this area is completely depending on rice for their daily food consumption due to agrarian social structures. But the climatic inconsistency affect the rice production which causing substantial economic loss for the local farmers (Jamal et. al., 2014). So, it is important to explore the status of nutritional uptake from rice by the population of these countries. So the study was designed and conducted to meet the following objectives:

- To explore the historical background of rice production of the major SAARC Countries.
- To discover the status of different nutrients consumptions from rice by the mass population of the of the major SAARC countries for thirty five years from 1975 to 2009.

Methodology:

The study area was the major SAARC countries namely Bangladesh, India, Pakistan, Nepal, Bhutan, Sri Lanka and Maldives (except Afghanistan). The data was collected by systematic study of the available records method. It is a conventional method of data collection used for collecting data from different secondary sources. The data were retrieved from the official website of International Rice Research Institute (IRRI) at 14th March 2013. The data was found as yearly raw format in a Microsoft Office Excel Spread Sheet from the year of 1975 to 2009.

Then those were processed and analyzed for further study. Total five parameters were considered for this study. Those were- Annual total rice yield (FAO), Rice calorie supply per capita (Cal/day) , Rice calorie supply as % of total calorie supply (%) , Rice protein supply as % of total protein supply (%) and Rice fat supply as % of total fat supply (%) . Different types of descriptive statistics were applied in this study to fulfill the objectives of the study. These were mean, standard deviation (SD), coefficient of variation (CV), minimum value and maximum value and range of the data series. Mean was calculated to know the average status of data set for gross interpretation. However, standard deviation was calculated to measure the average distance of individual observations from their mean value. The coefficient of variation (CV) is defined as the ratio of the standard deviation to the mean. It shows the extent of variability in relation to mean of the population. The coefficient of variation is useful because the standard deviation of data must always be understood in the context of the mean of the data. In contrast, the actual value of the CV is independent of the unit in which the measurement has been taken, so it is a dimensionless number. For comparison between data sets with different units or widely different means, one should use the coefficient of variation instead of the standard deviation (Wikipedia,2014).

Findings

Status of annual rice yield among the major SAARC countries

From Table 1, it was found that, according to Food and Agriculture organization (FAO), average annual rice yield of respective SAARC countries during 1975 to 2009 had ranged from about 1084.33 (‘00000’ ton) in India to about 0.56 (‘00000’ ton) in Bhutan. Whereas other SAARC

countries like Bangladesh, Pakistan, Nepal and Sri Lanka had been annually producing on average, 287.18, 60.19, 32.89 and 25.08 '00000' tons rice respectively from 1975 to 2009 (Table 1).

Table 1. Descriptive Statistics of annual total rice yield - FAO ('00000' tons) from 1975-2009

Descriptive Statistics	Bangladesh	India	Pakistan	Nepal	Bhutan	Sri Lanka	Maldives
Mean	287.18	**1084.33**	60.19	32.89	0.56	25.08	DNF
Standard Deviation	85.71	250.53	16.70	7.74	0.09	5.83	DNF
Coefficient of Variation	29.85	23.10	27.75	23.53	16.07	23.25	DNF
Minimum	176.28	630.52	39.26	18.33	0.37	11.54	DNF
Maximum	481.44	1480.36	104.28	45.24	0.77	38.75	DNF
Range	305.16	849.84	65.02	26.91	0.4	27.21	DNF

Source: Author's Analysis, * DNF= Data Not Found

The data of Maldives were absent in the secondary data source, because it can't produce rice due to its island topography. The coefficient of variation (CV) of annual total rice yield was minimum in Bhutan (16.07%) and maximum in Bangladesh (29.85%). Incase of Pakistan, the CV was also higher around 27.75%. The annual production of rice has increased over the years from 1975 to 2009 in India, Bangladesh and Pakistan. Among of these countries India had possessed the dramatic increment over the study period [Figure 1 (a)].

Status of rice calorie supply per capita (cal/day) among the major SAARC countries

Rice is the major source of calorie supply in many countries of the world. Its average contribution to calorie supply per capita (Cal/day) of respective SAARC countries during 1975 to 2009 had ranged from about 178 in Pakistan to about 1587 in Bangladesh (Table 2). Whereas, for other SAARC countries like India, Nepal Sri Lanka and Maldives were 699.60, 797.71, 917.54 and 507.29 respectively (Table. 3). The data of Bhutan were absent in the data set.

Table 2. Descriptive statistics of rice calorie supply per capita (Cal/day) from 1975-2009

Descriptive Statistics	Bangladesh	India	Pakistan	Nepal	Bhutan	Sri Lanka	Maldives
Mean	**72.40**	31.70	7.76	38.30	DNF	40.24	21.65
Standard Deviation	2.00	1.51	1.95	4.12	DNF	2.37	4.07
Coefficient of Variation	2.76	4.77	25.17	10.76	DNF	5.90	18.80
Minimum	68.29	35.24	5.03	31.04	DNF	36.31	13.03
Maximum	76.40	1109.52	12.31	44.10	DNF	47.33	31.03
Range	8.11	1074.28	7.28	13.06	DNF	11.02	18

Source: Author's Analysis, * DNF= Data Not Found

The coefficient of variation (CV) for this data set was minimum in Sri Lanka (5.84%) and maximum in Pakistan was (23.06%). The contribution of rice to calorie supply per capita (Cal/day) has increased over the years from 1975 to 2009 in Bangladesh, India and Sri Lanka while in Nepal has declined [Figure 1 (b)].

Status of rice calorie supply as % of total calorie supply (%) among the major SAARC countries

Table 3 shows people in Bangladesh most reliant on rice for energy. The people in different countries rely on rice of their calories like- Bangladesh (72.40%), India (31.70%), Pakistan (7.76%), Nepal (38.30%), Sri Lanka (40.24%) and Maldives (21.65%). Therefore, its average calorie supply as % of total calorie supply (%) during 1975 to 2009 had ranged from about 8% in Pakistan to about 72% in Bangladesh. Therefore, among the SAARC countries the people of Bangladesh is the largest user of rice nearly 72% to meet their energy needs. The coefficient of variation of this data set is minimum for Bangladesh (2.76%) and maximum for Pakistan (25.17%). Maldives has possessed also a higher CV of 18.80%. From the Figure 1 (c)

it was found that the trend of Nepal for choosing the amount of rice as percent of total calorie supply was decline over the study period but other countries had shown the more or less similarities but fluctuation in nature. The data of Bhutan was not found in the data sources.

Table 3. Descriptive statistics of rice calorie supply as % of total calorie supply (%) from 1975-2009

Descriptive Statistics	Bangladesh	India	Pakistan	Nepal	Bhutan	Sri Lanka	Maldives
Mean	**62.32**	1.17	5.88	29.47	DNF	35.30	11.99
Standard Deviation	2.51	24.39	1.55	2.75	DNF	3.79	2.88
Coefficient of Variation	4.03	2084.62	26.36	9.33	DNF	10.74	24.02
Minimum	56.06	22.12	3.78	24.42	DNF	30.82	7.04
Maximum	66.02	27.36	9.20	33.45	DNF	45.79	18.78
Range	9.96	5.24	5.42	9.03	DNF	14.97	11.74

Source: Author's Analysis, * DNF= Data Not Found

Status of rice protein supply as % of total protein supply (%)

Table 4 shows people in Bangladesh most reliant on rice for protein. The obtained scenario for Bangladesh- 62.32%, India-24.39%, Pakistan-5.88%, Nepal-29.47%, Sri Lanka-35.30% and Maldives-11.99%. Therefore, its average protein supply as % of total protein supply (%) during 1975 to 2009 was lowest in Pakistan (5.88%) and maximum in Bangladesh (63.32%). Srilanka and Nepal had also higher average of 35.30 % and 29.47% respectively. Therefore, among the SAARC countries the people of Bangladesh is the largest user of rice nearly 62% to meet their protein needs. The coefficient of variation of this data set is minimum for Bangladesh (4.03%) and maximum for Pakistan (26.36%). The CV for data set of Maldives was also higher 24.02%. From the Figure 1 (d) it was found that, the trend of dependency on protein for protein supply among the SAARC countries was minimally fluctuated over the entire period.

Table 4. Descriptive statistics of rice protein supply as % of total protein supply (%) from 1975-2009

Descriptive Statistics	Bangladesh	India	Pakistan	Nepal	Bhutan	Sri Lanka	Maldives
Mean	**62.32**	1.17	5.88	29.47	DNF	35.30	11.99
Standard Deviation	2.51	24.39	1.55	2.75	DNF	3.79	2.88
Coefficient of Variation	4.03	2084.62	26.36	9.33	DNF	10.74	24.02
Minimum	56.06	22.12	3.78	24.42	DNF	30.82	7.04
Maximum	66.02	27.36	9.20	33.45	DNF	45.79	18.78
Range	9.96	5.24	5.42	9.03	DNF	14.97	11.74

Source: Author's Analysis, * DNF= Data Not Found

Status of rice fat supply as % of total fat supply (%) among the major SAARC countries

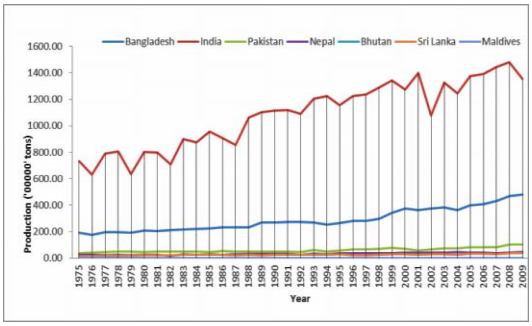
Table 5. Descriptive statistics of rice fat supply as % of total fat supply (%) from 1975-2009 among the major SAARC countries

Descriptive Statistics	Bangladesh	India	Pakistan	Nepal	Bhutan	Sri Lanka	Maldives
Mean	**17.01**	3.88	0.62	6.27	DNF	2.91	2.94
Standard Deviation	3.29	0.48	0.25	1.20	DNF	0.42	1.10
Coefficient of Variation	19.34	12.37	40.32	19.14	DNF	14.43	37.41
Minimum	11.04	3.01	0.29	4.13	DNF	2.41	1.73
Maximum	23.57	4.73	1.18	8.40	DNF	4.09	5.64
Range	12.53	1.72	0.89	4.27	DNF	1.68	3.91

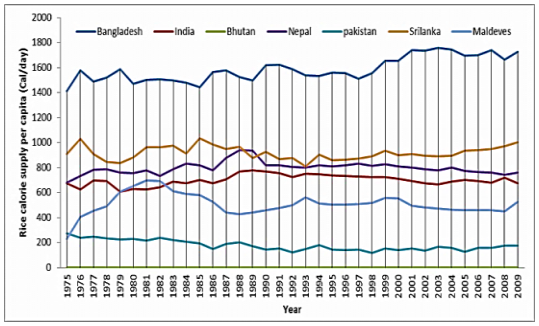
Source: Author's Analysis, * DNF= Data Not Found

From Table 5, it was found that, average contribution of rice to fat supply as % of total fat supply of respective countries during 1975 to 2009 had ranged from about 0.62 % in Pakistan to about 17.01 % in Bangladesh. Whereas, for other SAARC countries like India, Nepal Sri Lanka and Maldives were 3.88%, 6.27%, 2.91 % and 2.94 respectively (Table. 5). The data of Bhutan

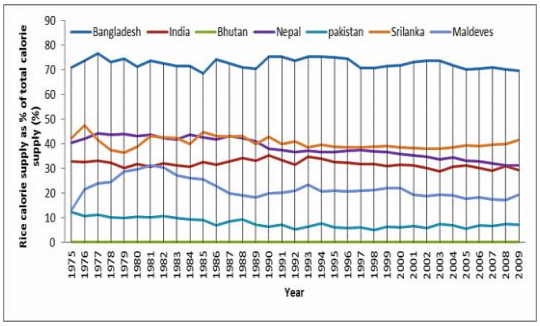
were absent in the secondary data source. The coefficient of variation (CV) for this data set was minimum in India (12.37%) and maximum in Pakistan (40.32%). Incase the data set of Maldives the CV was also high around 37.4%. The contribution of rice to fat supply as % of total fat supply has decreased over the years from 1975 to 2009 in Bangladesh, Nepal and Pakistan while in Sri Lanka and Nepal had increased trend over the year [Figure 1 (e)].



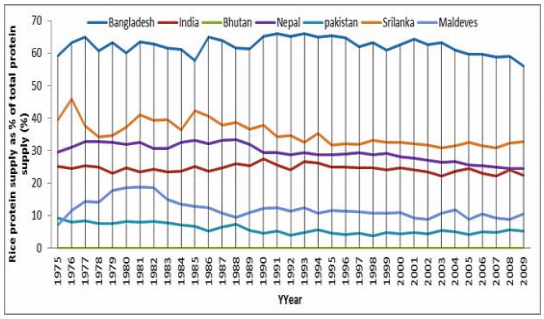
a



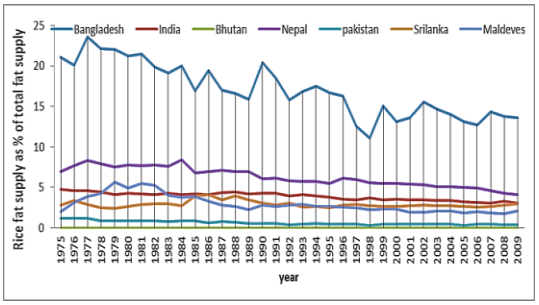
b



c



d



e

a=Annual production ('00000' thousand ton)

b= Rice caloric supply per capita (cal/day)

c= Rice caloric supply % of total caloric supply (%)

d= Rice protein supply % of total protein supply (%)

e= Rice fat supply % of total fat supply (%)

Figure 1. Graphical presentation of rice yeld and its contribution on nutrition supply among the SAARC Countries from 1975-2009

Our present study completely matches with Bishwajit et al. (2013). In their study they found that rice provides around 60% to 70% of calories and 50% to 55% of protein intake in the South Asian population. According to

United States Department of Agriculture (date not found), India is the major exporter of rice in South Asia selling about 98 million tons in 2012. Pakistan is the only other exporting country but the volume is much lower compared to India. Moreover they also stated that, Bangladesh is highly dependent on import from others countries and the biggest importer of rice in South Asia. India and Pakistan are the only two self-sufficient countries in rice in the region. Bishwajit et al., 2013 also found that the people of Bangladesh, India, Nepal, Pakistan and Sri Lanka consumed 152.67, 74.67, 95.67, 18.67 and 94.00 kg/person/year respectively. Our study supports this aforesaid statement. This has been happening because Bangladesh has been practicing rice based monoculture farming and maximum population of Bangladesh are completely depended on rice for their daily caloric supply. In case of other countries like India, Sri Lanka, Nepal and Maldives are also dependent on rice but not as severe as Bangladesh. Variation of cultivation and food habit was occurred also due to socio-economic similarities. For example, a vast majority people of Bangladesh has the same socio-cultural background and have limited alternatives for food consumption. Less awareness about farm ecosystem is another problem for shifting from monoculture to diversified crop cultivation in Bangladesh. Accoring to Kuri (2014), mass awerness should be generated among the farmers of Bangladesh for deversified crop cultivation. But in case of other countries, they belong to different socio-economic and cultural orientation due to their vast geographic dissimilarities. So, they cultivate different food crops like wheat, potato, brinjal, different fruits etc. for their daily needs. As well, their poultry and livestock sector are developed than that of Bangladesh.That is, they have better alternatives for protein and fat consumption. So, the nutient deficiency and rice dependency is higher in Bangladesh than other SAARC countries.

Conclusion

From the above discussion it was concluded that among all the SAARC Countries Bangladesh received the maximum amount of calorie, protein and fat from rice though their rice production is not so impressive compared to other SAARC countries. If this situation continues in future years, the total Bangladesh will face nutritional deficiency and will face huge pressure on their agricultural land i.e. land fertility will be reduced. Moreover, due to import of rice, Bangladesh requires extra huge amount of foreign currency in every year where foreign dependency remains as another problem for Bangladesh. So it may be recommended that different crop species cultivation and changing the food habit to reduce the pressure on rice may be practiced in the country. Other food items from wheat, maize, potato, brinjal and vegetables have to be produced for nutrition supply.

References:

Bhuiyan, M.A.R. 2005. Efficiency in evaluating salt tolerance in rice using phenotypic and marker assisted selection. M.Sc. dissertation, Department of Genetics and Plant Breeding, Bangladesh Agricultural University, Mymensingh, Bangladesh. pp: 96.

Bishwajit G., Sarker S., Ghosh S., Kpoghomou M.A.,Gao H., Jun L.,Daogen Y. (2013). Self-sufficiency in rice and food security: a South Asian perspective. Agriculture & Food Security 2013, 2:10.

Hossain M.J., Kuri S.K., Islam M.S. and Mondal U. (2014). Estimating the effect of climate change on rice Production: a study from Mymensingh district of Bangladesh using quantile regression method. *International Journal of Sustainable Crop Production (IJSCP).* ISSN-1991-3036 (Online). Volume 9 Issue 1 (20 February 2014). Website: *http://www.ggfjournals.com.*

http://en.wikipedia.org/wiki/Coefficient_of_variation#Definition. Date of retrived from the website: 13-1-2014.

International Rice Research Institute. (For secondary data source): http://ricestat.irri.org:8080/wrs2/entrypoint.htm. Date of retrived from the website: 16-4-2013.

Kuri S.K., Miah M.A.M., and Farouque M.G. (2014). Awareness of Char Land Small Farmers Regarding Effect of Climate Change on Farm Ecosystem In Bangladesh. *European Academic Research.* 1(11):3779-3791. ISSN:4412-4424. Romania, European Union. Website: www.euacademic.org.

Mondal U., Hassan L. and Begum S.N. (2013). Foreground Selection Through SSRs Markers for the Development of Salt Tolerant Rice variety. Journal of Bangladesh Agricultural University. 11(1):67-72.

Nagaraju, J., Kathirvel, M., Ramesh, K.R., Siddque, E.A. and Hasnain, S.E. 2002. Genetic analysis of traditional and evolved Basmati and non-Basmati rice varieties by using fluorescence-based ISSR-PCR and SSR markers. Proc. Natl. Acad. Sci. USA., 99: 583-584.

Rice Statistics. USA: United States department of agriculture (USDA). http:// www.indexmundi.com/agriculture/.