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**Regional Analysis of Household Consumption of Pearl  
Millet in Major Pearl Millet-Producing and -Consuming  
States in India**

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# 1. Introduction

Pearl millet (*Pennisetum glaucum*) is an important coarse cereal crop that is grown and consumed largely in northwestern parts of India, mainly in the states of Rajasthan, Gujarat and Haryana, and to a lesser extent, in parts of Maharashtra, Karnataka and Uttar Pradesh.

The climatic conditions in the northwestern parts of India are extreme with very high temperatures during summer, which are in the range of 40-45°C and around 1-5°C in winter. The western regions of Gujarat and Rajasthan are mainly dry belts with poor soils and low rainfall, because of which cereal crops such as pearl millet and sorghum that produce both grain and fodder (dual purpose) are cultivated. The grains from these crops form the staple food commodity in the regions where they are grown.

Another reason why pearl millet grain is an essential component of the food basket of these regions is because of its ability to keep body temperature warm during the cold months. The grain is consumed in the form of *rotis* (bread) during winter in urban areas and throughout the year in rural areas. Along with wheat, it accounts for the major chunk of cereal consumption in daily dietary requirements. The stover of pearl millet is an important source of fodder for livestock that can be stored for the dry season, which further augments the importance of pearl millet in these regions (Kelley et al. 1993).

Over the past decade, research studies that have analyzed household consumption data collected by the National Sample Survey Office (NSSO) have reported a historical, long-term trend of decline in per capita consumption of all cereals, and particularly, of coarse cereals at an all-India level. The consumption of pearl millet and sorghum declined by 66% and 68% respectively in urban areas and by 59% and 72% in rural areas of India during the period 1972-73 to 2004-05. This decline is partially attributed to a shift in dietary pattern of consumption from coarse cereals to fine cereals and high value commodities such as milk, meat, fruits and vegetables – a shift driven by income growth and urbanization (Chand 2007; Parthasarathy Rao et al. 2006).

Decline in the consumption of pearl millet as seen at the all-India level are also seen for the important pearl millet-producing and -consuming states of Rajasthan, Gujarat and Haryana (Basavaraj et al. 2010). We, however, hypothesize that the household level consumption at a more disaggregated regional level in the main producing states mentioned has not shown a similar decline in consumption and that pearl millet is still an important staple in these regions along with wheat. Keeping this hypothesis in view and also to get a true picture of consumption of coarse cereals specifically of pearl millet, household consumption data are disaggregated at the regional level from all-India data, as very few studies have made an attempt to analyze household consumption data at the regional level. Regional averages of household consumption data would provide better insights on the following aspects:

1. The importance of pearl millet in the consumption basket in producing regions in Rajasthan, Gujarat and Haryana.
2. Differences in the consumption of pearl millet between different income groups in the regions.
3. Better insights into the gap between demand and supply of pearl millet in these regions.
4. Inter-state and intra-regional trade in pearl millet.

## 2. Data source and methodology

The main data source for this study is the National Sample Survey Organisation (NSSO), which collects state and country level averages data on household consumer expenditure for rural and urban consumers in India every five years. The averages from the 61<sup>st</sup> round (2004-2005) was disaggregated at regional levels for the states of Rajasthan, Gujarat and Haryana. These three states accounted for 64% of all-India production in 2006-07. Since the study is restricted to northwestern states of India, Maharashtra and Karnataka (which also produce some quantities of pearl millet) have not been included in this analysis.

### 2.1 Sample design of NSSO

In their surveys, NSSO adopted a multi-stage stratified sampling design. The first stage units were villages for the rural sector and Urban Frame Survey (UFS) blocks for the urban sector. The second stage units were households. There was an intermediary stage for larger sample villages or blocks. During the 61<sup>st</sup> round, the total number of villages from rural areas and blocks from urban areas, number of sample households and number of sample persons surveyed for Rajasthan, Gujarat and Haryana are presented in Table 1.

The survey provides information on consumption both in quantity and value terms for food and non-food items. Consumption expenditure of food items on per capita are provided using two reference periods: 7-day and 30-day recall on the day preceding the survey. The survey is carried out in sub-rounds covering four seasons. The results presented in this study are based on the 30-day reference period and average for the four seasons. The NSSO regions in the states of Gujarat, Rajasthan and Haryana along with the composition of districts for each region are shown in Table 2. Per capita monthly consumption of pearl millet is analyzed for all the regions in the selected states and across regions within a selected state.

Data on area, production and yield of pearl millet at the district level is obtained from publications of the Directorate of Economics and Statistics, Government of India, which provides such data for principal crops in India. A three-year average of area and production of pearl millet is considered to even out any sharp year-to-year fluctuations due to external factors. Pearl millet production obtained for the districts of Rajasthan, Gujarat and Haryana are aggregated for different NSSO regions for the three states. The data thus obtained for these regions is then compared with region-wise consumption to arrive at an estimate of region-wise demand–supply gap and inter-regional difference in consumption pattern.

**Table 1. Sample size and distribution of households during 61<sup>st</sup> round of the survey**

State	Number of villages (rural area)	Number of blocks (urban area)	Number of sample households		Number of sample persons	
			Rural	Urban	Rural	Urban
Rajasthan	232	164	3541	1630	20155	8125
Gujarat	168	200	2320	1955	11592	9085
Haryana	356	104	1680	1040	9293	4979

**Table 2. NSSO regions and composition of districts in Haryana, Gujarat and Rajasthan.**

Region	Composition of districts in the region <sup>*</sup>
Eastern Haryana (EHA)	Panchkula, Ambala, Yamunanagar, Kurukshetra, Kaithal, Karnal, Panipat, Sonapat, Rohtak, Jhajjar, Gurgaon, Faridabad
Western Haryana (WHA)	Jind, Fatehabad, Sirsa, Hisar, Bhiwani, Mahendragarh, Rewari
Eastern Gujarat (EG)	Sabarkantha, Khedbarhma, Vijaynagar, Bhiloda, Meghraj, Panchmahal, Kadana, Santrampur, Dohad, Vadodara, Jetpur Pavi, Chhota Udaipur, Kavant, Navsari, Narmada, Bharuch, Jhagadia, Anklesvar, Valia, Surat, Mangrol, Umarpada, Nizar, Uchchhal, Songadh, Mandvi, Pal
Plains Northern Gujarat (PNG)	Patan, Vagdod, Siddhpur, Mahesana, Sabarkantha, Vadali, Idar, Himatnagar, Prantij, Talod, Modasa, Dhansura, Malpur, Bayad, Gandhinagar, Ahmedabad, Anand, Kheda
Plains Southern Gujarat (SPG)	Panchmahal, Khanpur, Lunawada, Sehera, Morwa (Hadaf), Godhra, Kalol, Ghoghamba, Halol, Jambughoda, Vadodara, Savli, Vadodara, Vaghodia, Sankheda, Dabhoi, Padra, Karjan, Sinor, Bharuch, Jambusar, Amod, Vagra, Bharuch, Hansot, Surat, Olpad, Kamrej, Surat City, Chor
Dry Areas Gujarat (DAG)	Kutch, Bans Kantha, Patan, Santalpur, Radhanpur, Harij, Sami, Chanasma, Surendranagar
Saurashtra (SARG)	Rajkot, Jamnagar, Porbandar, Junagadh, Amreli, Bhavnagar
Western Rajasthan (WRA)	Ganganagar, Hanumangarh, Bikaner, Churu, Nagaur, Jodhpur, Jaisalmer, Barmer, Jalor, Sirohi, Pali
Northeastern Rajasthan (NERA)	Jhunjhunun, Alwar, Bharatpur, Dhaulpur, Karauli, Sawai Madhopur, Dausa, Jaipur, Sikar, Ajmer, Tonk, Bhilwara
Southern Rajasthan (SRA)	Rajsamand, Udaipur, Dungarpur, Banswara
Southeastern Rajasthan (SERA)	Bundi, Chittaurgarh, Kota, Baran, Jhalawar

\*. In some regions, there is overlap of districts due to part of the district falling in two different regions.

To analyze the difference in consumption pattern across income groups in the regions of Rajasthan, Gujarat and Haryana, the sample was divided into three broad groups of low, middle and high income based on the distribution of sample households across different expenditure classes<sup>1</sup>.

## **3. Results and discussion**

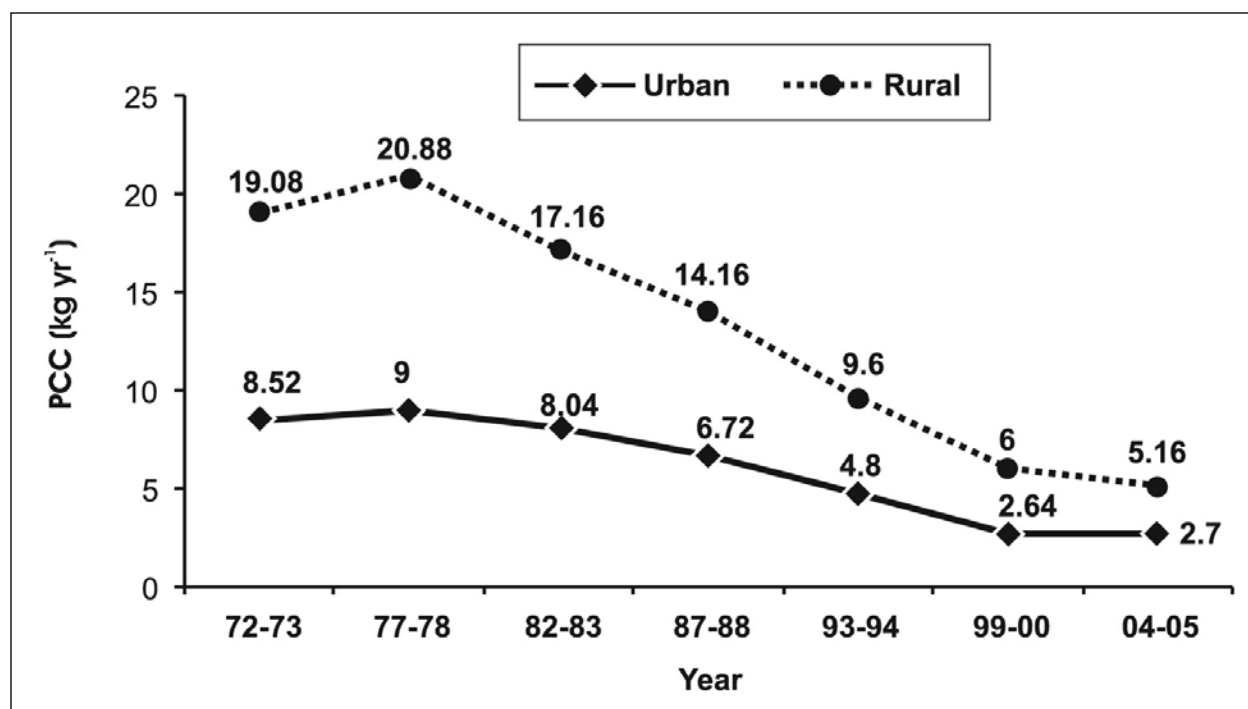
### **3.1 Annual consumption trends of pearl millet**

#### **3.1.1 All-India and state level (rural and urban)**

Between 1972-73 and 2004-05, the annual per capita consumption of pearl millet at the all-India level declined sharply by 67% (4.1 to 1.4 kg) in urban areas and by 59% (11.4 to 4.7 kg) in rural areas of India (Figure 1).

A closer examination of the data reveals that a steep decline in consumption started in 1982-83 and reached a low in 1999-2000 and has plateaued during the latest NSSO round of 2004-05. A number of factors have contributed to the declining trend in consumption of pearl millet. Availability of rice and wheat through the Public Distribution System (PDS), the shorter preparation periods needed

1 The classification of households into low, middle and high income groups is based on distribution of households in the NSSO expenditure classes. For urban areas, household expenditure (in Rs.) < 580 = low; between 580 and 1880 = middle and >1880 = high. For rural areas, households belonging to expenditure group <432 = low, between 432 and 632 = middle and >632 = high.



**Figure 1. Trends in the annual per capita consumption of pearl millet in rural and urban India, 1972-73 to 2004-05**

for fine cereals like rice and wheat in comparison to pearl millet, and the availability of diversified ready-to-eat foods with longer shelf lives are some of the factors that have caused the decline in consumption of pearl millet. However, further disaggregation of data at the state level shows that among cereals in rural Rajasthan and Gujarat, pearl millet is still an important commodity in the food consumption basket despite the decline in its share to total cereal consumption (Table 2).

In urban Rajasthan and Gujarat, however, pearl millet has been replaced with wheat to a large extent.

### **3.1.1 Regional level**

As mentioned earlier, trends at the All-India and state level mask the trends at a more disaggregate regional level and hence the household consumption data is further disaggregated at regional level both in rural and urban areas for the states of Rajasthan, Gujarat and Haryana for the NSSO regions presented in Table 3.

Western Rajasthan (WRA), dry areas in Gujarat (DAG), northern plains in Gujarat (NPG), Saurashtra in Gujarat (SARG), southern plains in Gujarat (SPG) are the top five pearl millet consuming regions in the states of Rajasthan and Gujarat (Table 4). These five regions almost account for the entire consumption of pearl millet in the three states. Geographically, the top five regions consuming pearl millet in the states of Rajasthan and Gujarat are located in close proximity to each other and the rainfall distribution pattern, temperature, soil types etc, also exhibit similar patterns along with predominance of livestock population. These factors, to a large extent,



**Table 3. Commodity share among total cereals in urban and rural Rajasthan and Gujarat between 1972-73 and 2004-05.**

Commodity	Rural				Urban			
	Rajasthan		Gujarat		Rajasthan		Gujarat	
	1972-73	2004-05	1972-73	2004-05	1972-73	2004-05	1972-73	2004-05
Pearl millet	27	21	30	23	NA	5	21	7
Rice	1	2	12	20	4	5	16	25
Wheat	30	67	28	36	76	89	56	65

**Table 4. Annual consumption of pearl millet (kg per person) across regions of Rajasthan, Gujarat and Haryana in rural and urban areas, 2004-05.**

NSSO Regions	Rural consumption	Urban consumption
Western Rajasthan (WRA)	69	19
Dry Areas Gujarat (DAG)	59	24
Plains Northern Gujarat (PNG)	33	7
Saurashtra (SARG)	32	14
Plains Southern Gujarat (PSG)	20	3
Northeastern Rajasthan (NERA)	17	4
Western Haryana (WHA)	10	0.4
Eastern Gujarat (EG)	5	2
Eastern Haryana (EHA)	1	0.4
Southeastern Rajasthan (SERA)	1	0.1
Southern Rajasthan (SRA)	1	3

influence farmers' decisions in the matters of cultivation of crops and cropping patterns, which in turn determines the consumption habits of these regions.

The comparison of consumption between rural and urban areas reveals that pearl millet consumed in rural areas is higher by 3-5 times in almost all the regions examined. Some of the factors responsible for lower consumption in urban areas discussed earlier at the all-India level analysis holds good for the regions as well.

Western Rajasthan (WRA) – which comprises the districts of Ganganagar, Hanumangarh, Bikaner, Churu, Nagaur, Jodhpur, Jaisalmer, Barmer, Jalor, Sirohi and Pali – is a traditional pearl millet-consuming belt of Rajasthan and has the highest annual consumption of pearl millet at 69 kg per person in rural areas. Similarly in the dry areas in Gujarat (DAG), which comprises the districts of Kutch, Banskantha, Patan, Santalpur, Radhanpur, Harijsami, Chanasma and Surendranagar, the per capita annual consumption of pearl millet is highest in urban areas at 24 kg. The annual rural consumption in this region is also high at 59 kg per person.

Consumption of pearl millet is highly dependent on good harvests of pearl millet in the region of western Rajasthan, which is prone to frequent droughts. Apart from human consumption, grain is fed to cattle as concentrate feed in rural areas.

Every alternate year, there is drought or poor rainfall in western Rajasthan (Kelly et al. 1996) and so the demand for pearl millet is met through imports from neighboring states Gujarat and Uttar Pradesh, or from eastern parts of the Rajasthan where the drought tends to be less severe due to higher average rainfall. The regions with lowest pearl millet consumption are eastern Haryana (EHA), southeastern Rajasthan (SERA) and southern Rajasthan (SRA). In urban areas of eastern and western Haryana (EHA and WHA) and southeastern Rajasthan (SERA), pearl millet consumption is negligible and therefore not reported. The western and eastern regions of Haryana and south and southeastern parts of Rajasthan (EHA, WHA, SRA and SERA) are better endowed with resources such as irrigation facilities, fertile soils and favorable climatic conditions and so wheat and rice are preferred crops for cultivation as they yield better returns compared to other crops. The cultivation practices in turn determine the consumption habits of these regions to a large extent.

## **3.2 Consumption pattern across income groups**

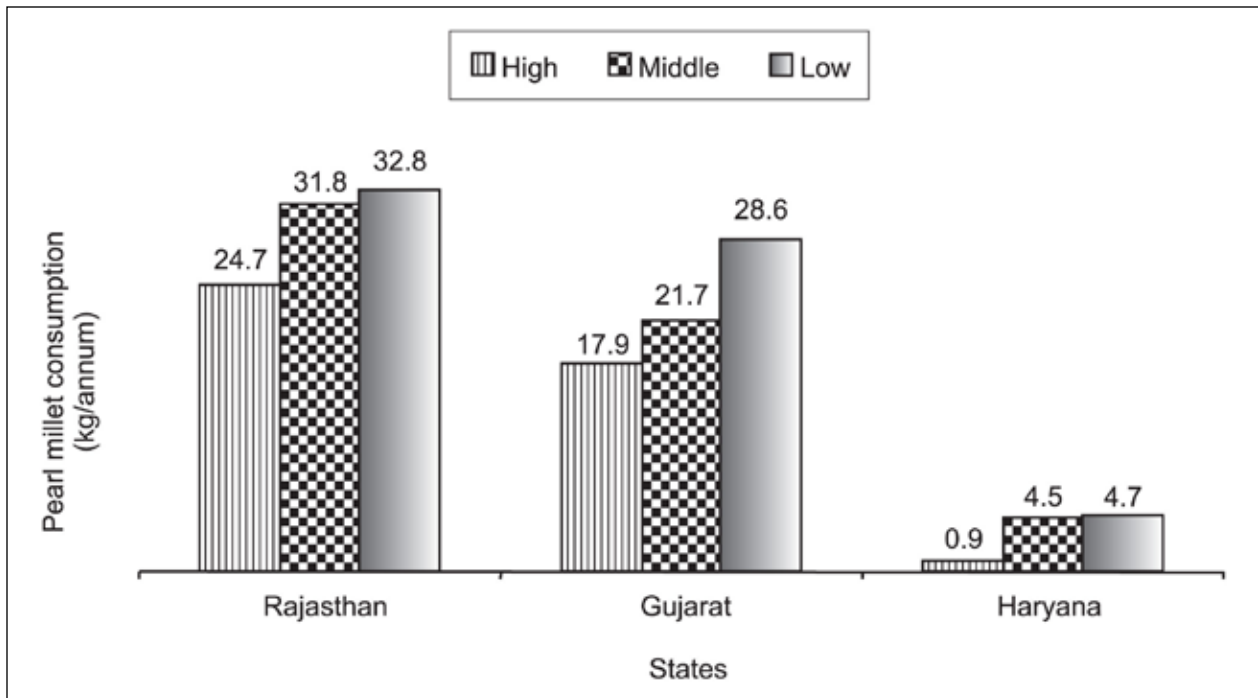
### **3.2.1 State level**

Consumption patterns of food commodities vary with household income, and this is even more the case for coarse cereals. To analyze the changes in consumption patterns according to income in these states, expenditure groups classified by NSSO are grouped into high, medium and low income groups as indicated in the methodology section.

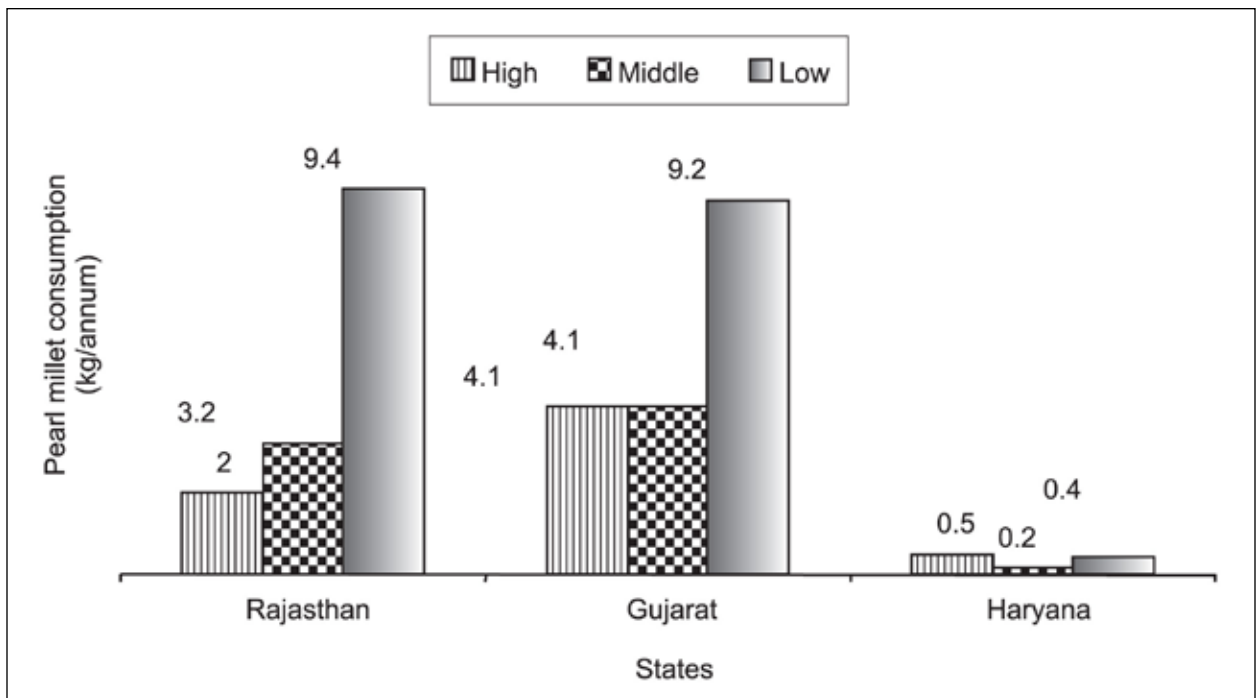
Per capita consumption of pearl millet across income groups both in rural and urban areas show inverse relationship with income in all the three states. But the inverse relationship is less sharp than that found for sorghum particularly in rural areas (Parthasarathy Rao et al. 2010). For instance, there is not much variation in consumption of pearl millet between middle and low income groups in Rajasthan and Haryana, and to some extent also in Gujarat (Figure 2). Results thus indicate that in rural areas, higher income groups also continue to consume pearl millet, perhaps because of the climatic conditions that include cold winters as consuming pearl millet is perceived to keep the body warm.

Lower income groups in rural areas of Rajasthan consume the highest pearl millet at 32.8 kg per capita annually followed by Gujarat at 28.6 kg per capita per annum. In rural areas, consumers in the lower income bracket involved in farming consume more of pearl millet compared to other cereals as pearl millet provides energy for longer hours compared to cereals like wheat and rice, particularly in the winter months.

The results of study for urban areas show that there is a significant difference in the consumption of pearl millet across income groups compared to their peers in rural areas. Thus, unlike in rural areas, there is a sharp decline in consumption as we move from low to high income groups (except for Haryana, where consumption is in any case very low). The lower income groups in urban areas of Rajasthan and Gujarat consume 9.4 and 9.2 kg per person per annum respectively (Figure 3). In Haryana, pearl millet consumption even among low income groups is low at 0.4 kg per annum. The reasons for low consumption of pearl millet in urban areas are because more time and special skills are required in preparation of pearl millet *rotis* (bread) and also due to the fact that complements like milk and milk products (*ghee*) are not so affordable (survey findings). The low keeping quality of pearl millet flour demands frequent pounding and milling as and when required, and this is a major constraint for urban consumers.



**Figure 2. Annual per capita consumption of pearl millet (kg) across income groups in rural areas of Rajasthan, Gujarat and Haryana during 2004-05.**



**Figure 3. Annual consumption of pearl millet (kg) across income groups in the urban areas of Gujarat, Haryana and Rajasthan during 2004-05.**

### 3.2.2. Regional level

Across regions of Rajasthan and Gujarat, WRA, DAG, SARG, NPG and NERA are the major pearl millet consuming regions in rural areas. There is not much variation in consumption of pearl millet across income groups in these areas (Table 5). As discussed earlier, the cultivation of pearl millet here becomes the obvious choice both for consumption as well as for cattle feed and fodder for cattle because of agro-climatic and agro-ecological conditions. Thus, pearl millet in these parts is consumed irrespective of income groups as this is the staple and essential food commodity. The evidence also suggests that even with increase in income in rural areas, pearl millet as a food commodity is not going to be an inferior commodity for consumption in these regions in the medium term.

In urban areas, lower income groups in the regions of WRA, DAG and SARG consume more pearl millet compared to middle and high income groups as it forms the staple food commodity of the lower income strata. Lower income consumers in urban areas cannot afford to buy high priced cereals; besides, the strenuous nature of their work makes them favor pearl millet in their diet as it provides more energy compared to other cereals.

In some of the other regions, viz. SERA, WHA, EHA and NERA, the consumption of pearl millet is negligible (close to zero) across all income groups in urban areas. The regions of SRA and SERA are not major pearl millet producing regions. The cropping patterns for these regions are dominated by wheat, maize, barley, sorghum and paddy.

Rapid urbanization, easy availability of alternatives such as ready-to-eat processed food products and affordability of high calorie and high priced food products are some of the other factors that have contributed to reduced consumption of pearl millet across the higher income groups in urban areas.

In Haryana, though there is larger area under pearl millet in the eastern and western regions, the grain is mainly utilized as feed for poultry and by the potable alcohol industry (survey findings). The production from these regions is thus mainly for industrial users who prefer grains at lower prices.

**Table 5. Annual consumption of pearl millet (kg/person) across income groups in rural and urban regions of Rajasthan, Gujarat and Haryana, 2004-05.**

Region	Rural			Urban		
	High (>632)	Middle (432-632)	Low (432)	High (>1880)	Middle (580-1880)	Low (580)
WRA	46	69	69	8	8	21
NERA	13	15	18	0	1	4
SRA	0	0	1	0	3	3
SERA	1	3	1	0	0	0.1
EG	5	5	6	1	1	2
NPG	20	30	35	5	5	7
SPG	5	18	21	0	2	3
DAG	34	18	64	0	7	26
SARG	28	31	32	7	9	15
EHA	1	1	1	1	0.2	0.4
WHA	1	11	10	0	0.1	0.4

### 3.3. Production pattern of pearl millet

#### 3.3.1. State level

Among the major pearl millet producing states in India, Rajasthan with 50% share of the all-India pearl millet production is the highest followed by Gujarat with 12 percent and Haryana at 9% (Table 6). The three states together account for about 70% of the all-India area and production during 2004-05.

#### 3.3.2. Regional level

Across regions of the three states of Rajasthan, Gujarat and Haryana, WRA has the highest share in area (67%) and production (47%) to the states' total area and production under pearl millet. This is followed by NERA (33% and 53%) share in area and production respectively (Table 7). Within Rajasthan, SERA and SRA regions have negligible area under pearl millet. These regions are better endowed with resources and hence the cropping pattern over the years is dominated with cultivation of wheat, maize, sorghum, barley and paddy which are more remunerative compared to pearl millet. In Gujarat, DAG has the highest share of state area (52%) and production (46%). This is followed by NPG with 23 and 24% share in area and production respectively. The WHA

**Table 6. Pearl millet area and production in major pearl millet producing states ('000 tons), 2004-05.**

State	Area ('000 ha)	States share to all-India area (%)	Production ('000 t)	States share to all-India production (%)
Rajasthan	5,150	56	3,950	50
Gujarat	925	10	948	12
Haryana	569	6	737	9
All-India	9,233	100	7,931	100

**Table 7. Region-wise area and production of pearl millet in major producing states of India, 2004-05.**

Region	Area ('000 ha)	Share to state (%)	Production ('000 t)	Share to state (%)
WRA	3430	67	1848	47
NERA	1711	33	2093	53
SRA	1	0	1	0
SERA	8	0.2	7	0.2
EG	9	1	7	1
NPG	203	23	232	24
SPG	30	3	24	2
DAG	465	52	457	46
SARG	182	20	266	27
EHA	120	21	164	22
WHA	447	79	573	78

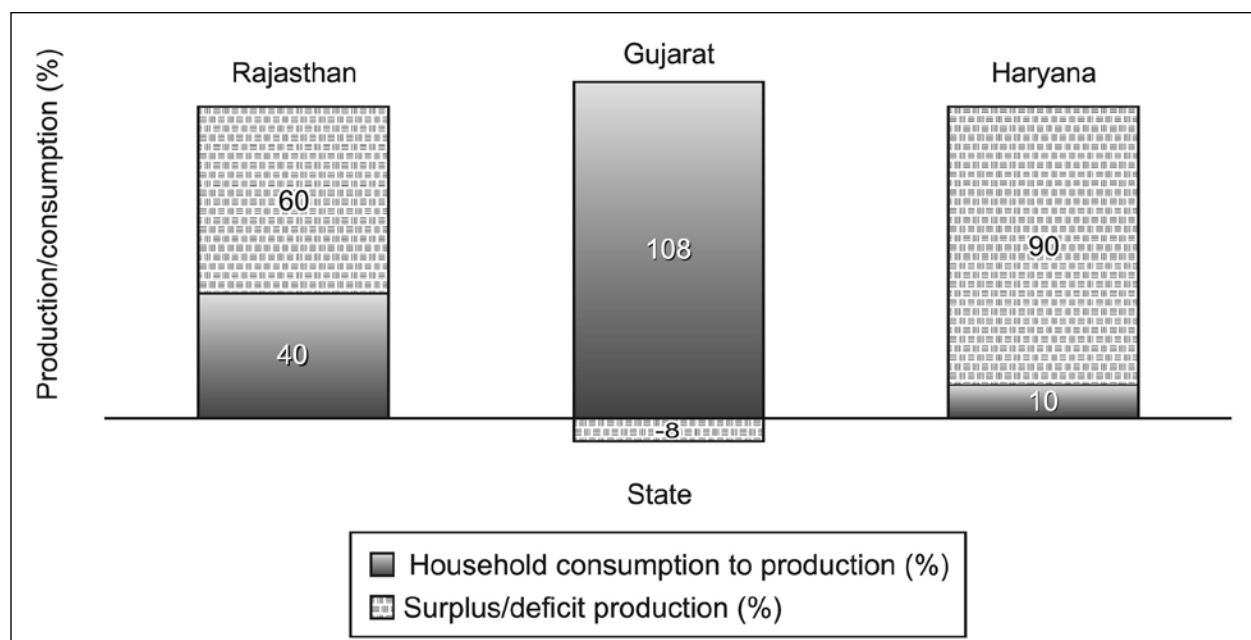
region in Haryana is the major pearl millet producing region in Haryana with 78% share in production followed by EHA region with 22% share. Thus within a state, pearl millet production is concentrated in few regions where the crop has found its niche.

### 3.4. Supply and demand of pearl millet

#### 3.4.1. State level

As indicated in the methodology section, data is analyzed to match pearl millet grain food consumption and production at the state and regional levels to get some estimates on the available surplus. Production of pearl millet in the states of Rajasthan and Haryana is higher than household consumption. After meeting household consumption, there is surplus pearl millet of around 60% in Rajasthan and 90% in Haryana. In Gujarat, there is a deficit in pearl millet production of 8%. The consumption to production share was 108% in Gujarat during 2004-05 (Figure 4).

To better understand the volume of surplus, a comparison was done with household consumption data for the period 1999-2000 reported by NSSO. The consumption to production ratio declined by 61% in Rajasthan from 1999-2000 to 2004-2005. It is found that in 1999-2000, Rajasthan too was a deficit state with production of pearl millet standing at 1,301 thousand tons, which was not sufficient to meet the consumption needs of 1,320 thousand tons. However, during 2004-05, the increased consumption demand of 1,561 thousand tons (18% up from 1999-2000) was met with good output of 3,950 thousand tons (200% higher than in 1999-2000). Rainfall data indicates that 1999-2000 was a low rainfall year compared to 2004-05. Rajasthan experiences frequent droughts and, during such years, the rain-deficit regions import pearl millet from Uttar Pradesh, Gujarat and the eastern parts of the Rajasthan if there is excess production there. Thus, consumption to production ratio can fluctuate from year to year depending on the climatic situation. Pearl millet in Rajasthan, apart from being used for human food consumption, is also used as feed for livestock.



**Figure 4. Production and consumption of pearl millet in major producing and consuming states in India, 2004-05.**

The surplus production over consumption of pearl millet by 60% during 2004-05 is presumed to be utilized for other uses such as feed for livestock in rural areas, as raw material in the manufacture of feed pellets and also, to large extent, towards the alcohol industry in the recent years.

The household consumption of pearl millet in Gujarat declined by 18% during 2004-05 from 1999-2000 despite a marginal increase in production by 15%. Though consumption to production ratio declined compared to 1999-2000, consumption still exceeds production marginally (Table 8).

In Haryana, the household requirement is considerably less than what is produced: in fact pearl millet production in the state exceeds consumption to the extent of 90%. It is observed that majority of the pearl millet produced here is utilized in the poultry feed industry and as raw material for the alcohol industry, both within and outside of the state.

It is estimated that at the all-India level during 1999-2000 about 54% of pearl millet production was used as food and the remaining 46% was utilized for other uses. By 2004-05, the utilization for other uses increased to 55% while food use declined to 44% (Basavaraj et al. 2010). Discussions with industry experts and market surveys conducted by the authors have revealed that the trends in utilization of pearl millet for other uses (alcohol and poultry feed) have increased in the recent years to about 70% of the production in eastern Rajasthan and Haryana.

### 3.4.2. Regional level

The region-wise production and consumption of pearl millet in three states for the period 2004-05 is presented in Table 9. There is surplus available in WRA and NERA after meeting the household consumption whereas in case of Gujarat, save for the DAG region, all the regions have deficit production vis-à-vis consumption. In Haryana, there is a surplus of pearl millet after meeting household consumption both in WHA and EHA regions.

The maximum surplus of pearl millet production is seen in the region of NERA. This region consists of the districts of Alwar, Bharatpur, Sawai Madhopur, Jaipur, Sikar, Ajmer, Tonk, Jhunjhunu and Bhilwara. Though the NERA region is not a traditional pearl millet consuming region, pearl millet is consumed at least for three months during winter, particularly in rural areas as it is considered to keep the body warm.

**Table 8. Annual production and consumption of pearl millet ('000 tons) in the states of Rajasthan, Gujarat and Haryana between 1999-00 to 2004-05.**

Supply / Demand	Rajasthan		Gujarat		Haryana	
	1999-00	2004-05	1999-00	2004-05	1999-00	2004-05
Production	1301	3950	851	984	582	737
Household consumption	1320	1561	1311	1068	57	77
Surplus/deficit over household consumption	-19	2389	-460	-84	525	660
Household consumption to production (%)	101	40	154	108	10	10
Surplus/deficit production (%)	-1	60	-54	-8	90	90

**Table 9. Region-wise consumption and production of pearl millet in major pearl millet producing states ('000 tons).**

Region	Production	Consumption	Surplus / Deficit (%)	Consumption to total production (%)
WRA	1848	1197	35	65
NERA	2093	355	83	17
SRA	1	5	-400	500
SERA	7	4	43	57
EG	7	35	-400	500
NPG	232	265	-14	114
SPG	24	97	-309	409
DAG	457	373	18	82
SARG	266	298	-12	112
EHA	164	14	91	9
WHA	573	62	89	11

The western region of Rajasthan, which consists of the districts of Jodhpur, Nagaur, Barmer, Jalor, Sirohi, Pali, Ganganagar and Hanumangarh, is the traditional pearl millet consuming area, and pearl millet forms the staple food commodity. During winter, temperatures in these districts are extremely low. Pearl millet is consumed throughout the year in the rural areas of this region and higher consumption of pearl millet is observed during winter season. Pearl millet is also utilized as feed for cattle in rural areas in WRA. Hence the surplus production of NERA region is traded to these regions where there is good demand both for human consumption and as well as for cattle-feed. This is particularly so in poor rainfall years where production drops drastically in WRA region. Similarly there is lot of intra regional trade of pearl millet happening between the regions of SRA and SERA (where consumption is more than production) from NERA.

In Gujarat, the DAG region has surplus production of 18% after meeting household consumption. Unlike Rajasthan, where the consumption is confined to western parts of the State, in Gujarat consumption of pearl millet is spread more or less equally across the regions of the state. Except for SPG and EG region, on average the consumption of pearl millet was about 300 thousand tons across each of these regions during 2004-05.

In Haryana, both the regions of EHA and WHA have surplus production over household consumption. Pearl millet in Haryana is consumed only in rural areas to a small extent during winter. Consumption of pearl millet over the years in the main growing districts of Haryana has been replaced by wheat. Thus, majority of the pearl millet cultivated in Haryana is utilized for industrial uses as discussed in the state level findings.

Higher incomes and rapid urbanization especially in the state of Haryana has significantly contributed to the decline in consumption of pearl millet apart from the factors described above in the state level analysis.



## 4. Conclusion

Regional level disaggregation of pearl millet consumption in important producing/consuming states has shown that pearl millet is still an important component in the consumption basket of households in the growing regions, particularly in north-western regions of the states of Gujarat and Rajasthan. The regions of western Rajasthan and all the regions of Gujarat (except SPG) have significant proportion of pearl millet consumption across cereals. Apart from human consumption, both pearl millet grain and fodder are utilized as feed for livestock. The importance of pearl millet grain as feed for livestock is due to the fact that livestock provides complementary products like milk and milk products which are essential complements for pearl millet consumption in rural areas besides generating additional income.

Consumption data disaggregated by income groups both at state and regional level has shown that pearl millet is predominately consumed by low and middle income groups and forms a staple food commodity for food security particularly in the rural areas of WRA, DAG and SARG regions. The cultivation of pearl millet becomes the obvious choice both for consumption as well as for fodder for livestock in these regions because of adverse climatic conditions. Hence, at least in rural areas, higher incomes will have little impact on consumption of pearl millet in the long run as it forms the staple food commodity here.

Consumption of pearl millet is more prominent in these regions during winter due to cultural preconception. Pearl millet is consumed during winter to keep the body warm and hence most households consume pearl millet at least once in a day for three months during the cold season. Due to extreme hot conditions in summer in these regions, agriculture and other labor activities become strenuous. Hence, the farming community and labor involved prefer to consume pearl millet as this is supposed to provide more energy compared to other cereals such as wheat, rice and sorghum.

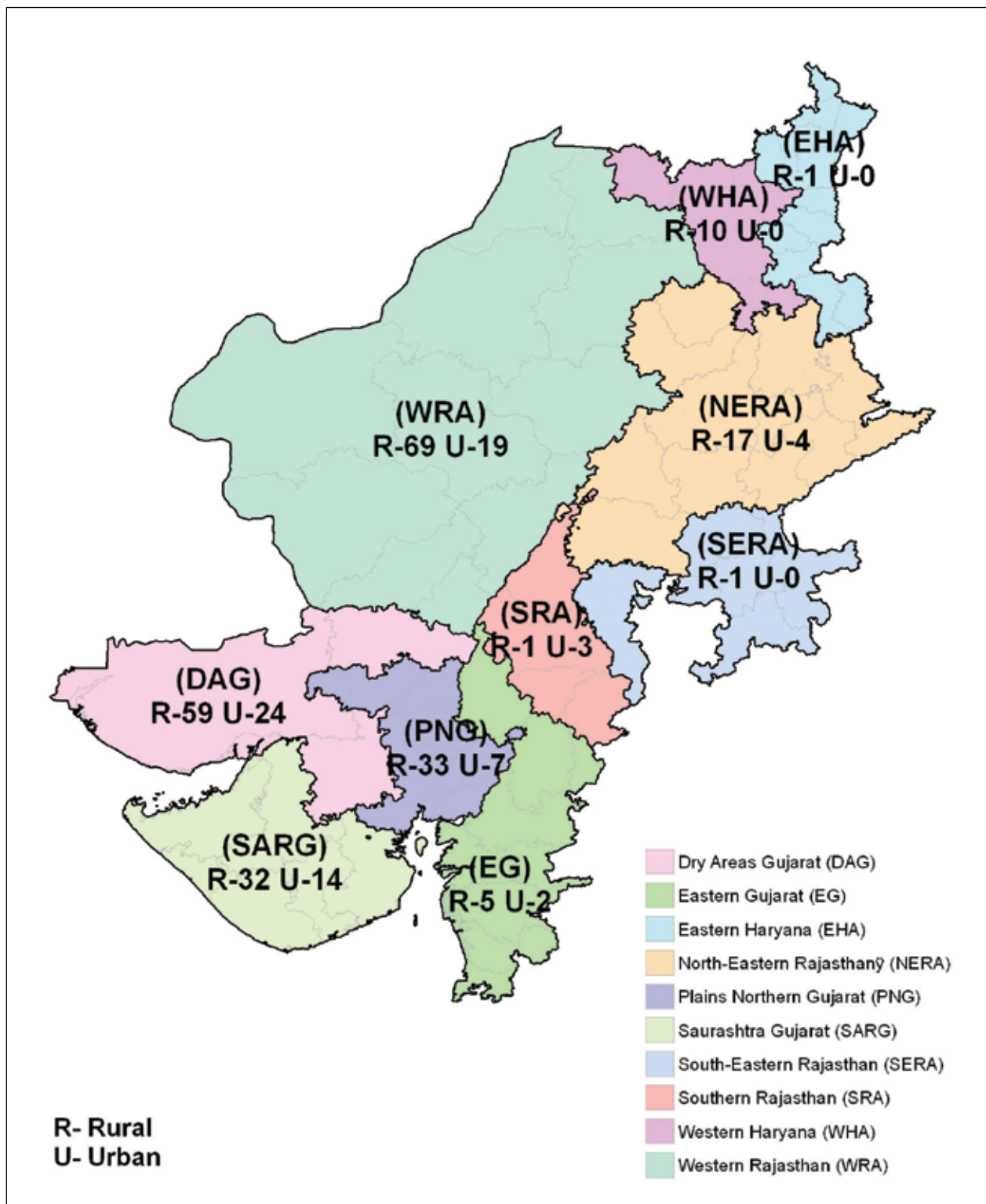
Regional level disaggregation has shown wide variations in production and consumption across regions. Variations to a large extent are influenced by external factors like drought especially in western parts of Rajasthan and Gujarat. People consuming pearl millet in these regions are highly vulnerable in terms of food security and have to depend on imports from other regions and states at higher prices. To address this, the government should consider introducing pearl millet as well as other nutritious cereals in the public distribution system (PDS).

Keeping in view the importance of pearl millet in the consumption basket of these regions, breeding efforts targeting drought resistant varieties, and hybrids and use of improved crop management technologies to increase production through higher productivity will help both farmers and consumers in the long run. This will particularly benefit those sections which are dependent on dry land cereals like pearl millet for food security. The increased production locally would also help both farmers and consumers to rely less on imports of pearl millet from other regions at higher prices.

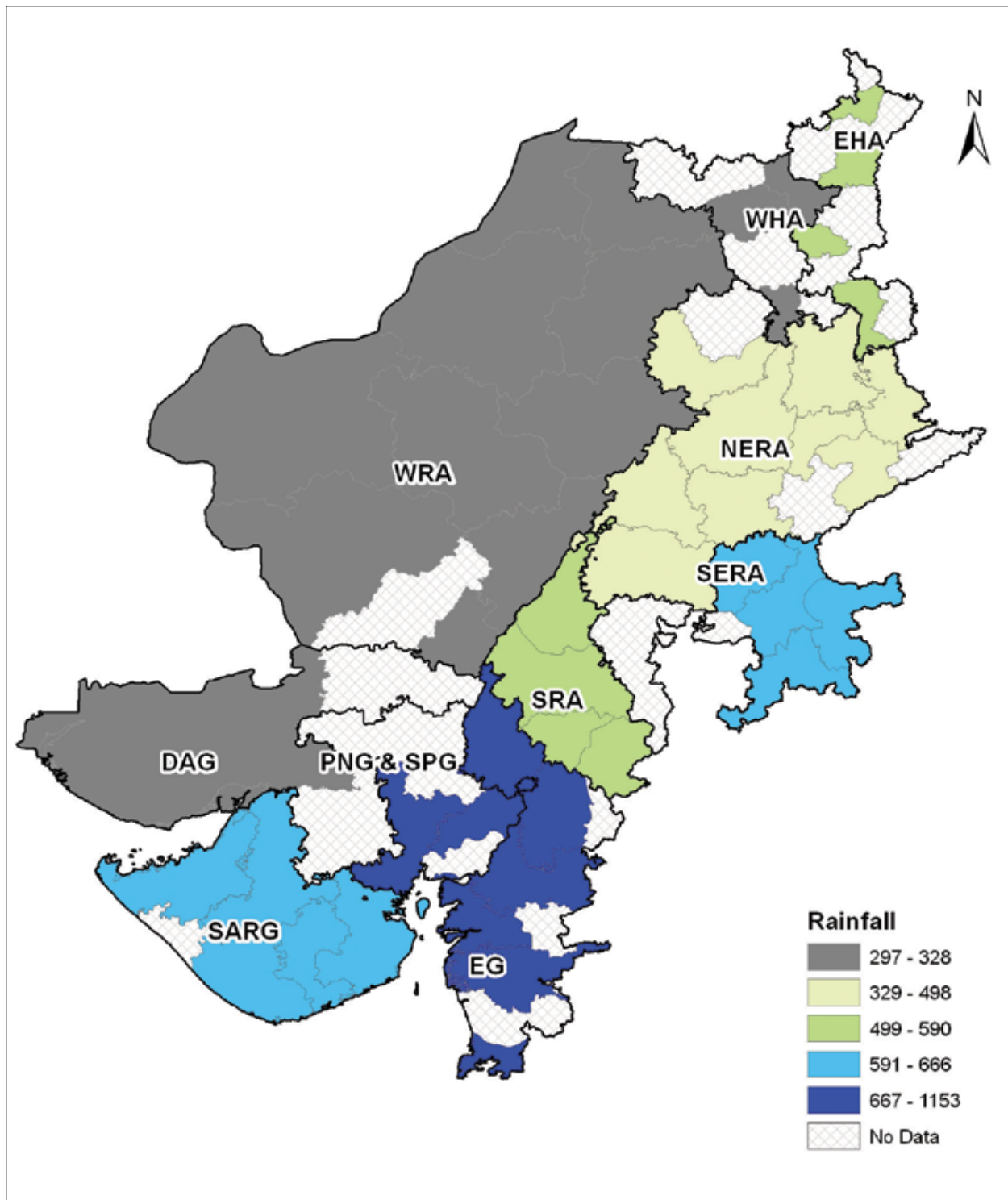
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**Appendix**



*Map 1. Pearl millet consumption across NSSO regions of Rajasthan, Gujarat and Haryana.*



**Map 2. Rainfall distribution across NSSO regions of Rajasthan, Gujarat and Haryana.**