

Chapter 2

Coverage, Sampling Design, and Methodology

The main focus of the present study is the estimation of marketed and marketable surplus of major food grains and response of marketed surplus to price and other exogenous variables. In this chapter, the conceptual and theoretical model of the marketed surplus of farm households and procedure for the selection of crops, states, and sample households are discussed. This study is based on both primary and secondary data pertaining to major foodgrains, namely rice, wheat, maize, bajra, gram, and tur, grown in the country. In order to examine the trends in production and to yield performance of the major food grains, secondary data on crop area, production, and productivity were collected from different published sources. In order to estimate marketed surplus and farm retention pattern and to identify major factors influencing marketed surplus, primary data from the households growing selected crops were collected. The data on the socioeconomic profile, operational holding, cropping pattern, crop production, farm retention, marketing, access to inputs and services, etc. were collected from farmers in the selected states.

Coverage and Sampling Design

Multistage stratified sampling method was used with major states producing the selected crops as strata and districts, blocks, villages, and households as primary, secondary, tertiary, and the ultimate units of sample, respectively. Table 2.1 presents the share of major producing states in total production of selected crops, namely rice, wheat, maize, bajra, maize, gram, and tur during the TE2014–15. Given the constraints in data collection due to limited time and resources, the study was restricted to major producers of the crop as given in Table 2.2. In the first stage, states were selected based on their share in total production and importance of the crop in the state economy. Based on these criteria, West Bengal, Andhra Pradesh, Uttar Pradesh, Punjab, and Haryana were selected for rice, and Uttar Pradesh, Punjab, Haryana, and Madhya Pradesh were selected for wheat. Andhra Pradesh,

Table 2.1 Major producers (% share in total production) of selected foodgrains in India, TE2014–15

Crop	Major producers
Rice	West Bengal (14.2%), Uttar Pradesh (12.9%), Andhra Pradesh (11.3%), Punjab (10.6%), Odisha (7.3%), Bihar (6.1%), Chhattisgarh (6.1%), Assam (4.8%), Tamil Nadu (4.7%), Haryana (3.7%), Karnataka (3.3%), Jharkhand (2.9%), Madhya Pradesh (2.9%), Maharashtra (2.8%)
Wheat	Uttar Pradesh (29.9%), Punjab (17.9%), Madhya Pradesh (15.6%), Haryana (12.1%), Rajasthan (10.1%), Bihar (5.1%), Gujarat (3.9%)
Bajra	Rajasthan (44.0%), Uttar Pradesh (20.0%), Gujarat (11.1%), Haryana (8.4%), Maharashtra (6.7%), Madhya Pradesh (4.1%), Karnataka (3.2%)
Maize	Andhra Pradesh (19.7%), Karnataka (16.5%), Bihar (9.8%), Maharashtra (9.5%), Madhya Pradesh (7.3%), Tamil Nadu (6.8%), Rajasthan (6.8%), Uttar Pradesh (5.4%), Gujarat (2.9%), Himachal Pradesh (2.6%), West Bengal (2.2%), Jharkhand (2.0%), Punjab (2.0%), Jammu & Kashmir (1.9%)
Gram	Madhya Pradesh (39.2%), Rajasthan (14.9%), Maharashtra (13.8%), Karnataka (7.83%), Andhra Pradesh (8.1%), Uttar Pradesh (5.9%), Chhattisgarh (3.0%), Gujarat (2.6%), Jharkhand (2.0%)
Tur	Maharashtra (30.2%), Karnataka (15.8%), Madhya Pradesh (13.2%), Uttar Pradesh (8.5%), Gujarat (7.9%), Andhra Pradesh (7.5%), Jharkhand (6.7%), Odisha (4.1%)

Source Computed from GoI (2016)

Karnataka, Maharashtra, and Rajasthan were selected for bajra crop, and Madhya Pradesh, Rajasthan, Maharashtra, and Karnataka for gram. For tur, Maharashtra, Karnataka, Uttar Pradesh, and Madhya Pradesh were selected.

The individual state studies were conducted by the respective Agro-Economic Research Centres/Units (as given in Table 2.3), and the coordinated study was undertaken by the Centre for Management in Agriculture, Indian Institute of Management, Ahmedabad. Since Agro-Economic Research Centre, Waltaire, did not complete the study on time, Andhra Pradesh report was not included in the coordinated report.

In the second stage, appropriate number of districts were purposively selected from each state (depending upon the number of districts in the selected state) keeping in view the representative nature of the district and on the basis of importance of the crop in terms of production. The list of selected districts and participating Agro-Economic research Centres/Units for each selected crop is given in Table 2.3.

In the next stage, appropriate numbers of blocks/talukas/villages from each district were selected purposively based on the production of the crop. Finally, from each selected village, an appropriate number of farmers keeping in view the representative nature of different farm categories (marginal 0–1 ha, small 1–2 ha, medium 2–10 ha; large > 10 ha) were selected randomly with the condition that a sufficient number of households in each category were obtained in each selected district. The final sample consisted of 42 districts and 3963 households (918 rice producers, 1193 wheat growers, 358 maize farmers, 500 bajra growers, 553 g producers, and 441 tur farmers) spread over eight states. Table 2.4 presents the

Table 2.2 List of selected crops and states (% share in total production) for the study

Crop	Selected states
Rice	West Bengal (15.2%), Andhra Pradesh (14.4%), Uttar Pradesh (13.2%), Punjab (11.1%), and Haryana (3.8%)
Wheat	Uttar Pradesh (35.4%), Punjab (19.5%), Haryana (13.4%) and Madhya Pradesh (8.1%) Rajasthan (9%)
Maize	Andhra Pradesh (21%), Karnataka (15.4%), Maharashtra (7.9%), Rajasthan (9.3%)
Bajra	Rajasthan (48.2%), Uttar Pradesh (14.7%), and Haryana (12.1%)
Gram	Madhya Pradesh (39.5%), Rajasthan (13.9%), Maharashtra (11%), and Karnataka (2.8%)
Tur	Maharashtra (26.7%), Karnataka (13.9%), Uttar Pradesh (12.7%), and Madhya Pradesh (11.4%)

Source Computed from GoI (2011)

Table 2.3 List of selected districts and participating agro-economic centres/units

Crop	selected state	Selected districts	Participating AER centre/unit
Rice	Haryana	Karnal	Delhi
	Punjab	Gurdaspur, Sangrur, and Ferozpur	Ludhiana
	U.P.	Shahjahanpur and Barabanki	Allahabad
	West Bengal	Burdwan, Birbhum, and Murshidabad	Visva-Bharati, Santiniketan
Wheat	Rajasthan	Alwar, Chittorgarh, Churu, Hanumangarh, and Udaipur	Vallabh Vidyanagar, Anand
	M.P.	Hosangabad	Jabalpur
	U.P.	Shahjahanpur, Barabanki, Agra, and Budaun	Allahabad
	Haryana	Karnal and Bhiwani	Delhi
	Punjab	Gurdaspur, Sangrur, and Ferozpur	Ludhiana
Maize	Karnataka	Devanagere and Belgaum	ISEC, Bangalore
	Maharashtra	Nashik and Aurangabad	Pune
	Rajasthan	Alwar, Chittorgarh, and Udaipur	Vallabh Vidyanagar, Anand
Bajra	Haryana	Bhiwani	Delhi
	Rajasthan	Alwar, Churu, Hanumangarh, and Udaipur	Vallabh Vidyanagar, Anand
	U.P.	Agra and Budaun	Allahabad
Gram	Rajasthan	Alwar, Churu, Hanumangarh, and Udaipur	Vallabh Vidyanagar, Anand
	Maharashtra	Amravati and Latur	Pune
	Karnataka	Bijapur and Gulbarga	ISEC, Bangalore
	M.P.	Vidisha	Jabalpur
Tur	U.P.	Fatehpur and Hamirpur	Allahabad
	M.P.	Narshingpur	Jabalpur
	Maharashtra	Amravati and Latur	Pune
	Karnataka	Bijapur and Gulbarga	ISEC, Bangalore

Source Field survey

Table 2.4 List of selected crops, states, and farm category-wise sample size

States	Marginal <1 ha	Small 1–2 ha	Semi-medium 2–4 ha	Medium 4–10 ha	Large >10 ha	Total
<i>Rice</i>						
Haryana	58	79	34	23	6	200
Punjab	36	60	96	84	24	300
Uttar Pradesh	61	21	11	7	0	100
West Bengal	124	97	65	32	0	318
Total	279	257	206	146	30	918
<i>Wheat</i>						
Rajasthan	21	100	70	79	23	293
Madhya Pradesh	42	16	21	19	2	100
Uttar Pradesh	126	41	22	11	0	200
Haryana	86	110	59	36	9	300
Punjab	36	60	96	84	24	300
Total	311	327	268	229	58	1193
<i>Maize</i>						
Rajasthan	9	38	33	29	9	118
Maharashtra	37	37	20	6	0	100
Karnataka	40	43	39	14	4	140
Total	86	118	92	49	13	358
<i>Bajra</i>						
Haryana	21	31	27	18	3	100
Rajasthan	18	80	69	100	33	300
Uttar Pradesh	65	20	11	4	0	100
Total	104	131	107	122	36	500
<i>Gram</i>						
Rajasthan	11	28	46	95	32	212
Maharashtra	36	35	19	10	0	100
Karnataka	27	34	26	36	18	141
Madhya Pradesh	24	23	17	20	16	100
Total	98	120	108	161	66	553
<i>Tur</i>						
Uttar Pradesh	52	24	12	12	0	100
Madhya Pradesh	9	13	28	34	16	100
Maharashtra	33	42	20	5	–	100
Karnataka	19	39	33	36	14	141
Total	113	118	93	87	30	441
Grand total	991	1071	874	794	233	3963

Source Field survey

details of various categories of households selected from each state for the selected crop. This is one of the most comprehensive studies on marketed surplus estimation in the recent period.

Data Collection

Data used in this study come from the household survey conducted by participating Centres/Units, which was designed by the authors in collaboration with concerned Centres/Units in 2011–12. The survey covered a random sample of 3963 households spread over 42 districts and six states. The data relating to crop production, proportion of foodgrains production sold in the market, farm retention, and some of the major socioeconomic, institutional, technological, and other factors that might influence marketed surplus were collected from selected households. The household survey was conducted using a pre-tested questionnaire to interview the head of each household. The first part of the questionnaire included sociodemographic characteristics, land use, and cropping pattern, whereas the second part had questions on crop production, retention, marketed surplus, and access to markets, institutions, and infrastructure.

Conceptual Framework and Theoretical Model of the Study

Most farm households produce a significant portion of the food crops for self-consumption, and they also sell part of the produce in the market. There are well-known studies on the concepts of marketable and marketed surplus, and Dharm Narain's study (1961) may be considered as a pioneering study. While many studies do not make distinction between marketable and marketed surplus and the terms are used interchangeably, he made a clear distinction between these two terms. Several economists including Dandekar (1965), Krishna (1965), Bhalerao and Lal (1965), Bardhan and Bardhan (1969), Bardhan (1970), Behrman (1966, 1968), Haessel (1975), Bansil (1961), Shah and Pandey (1976), Patnaik (1975), Nadkarni (1980) have written extensively on the subject during the 1960s and 1970s. However, there are few studies in the recent past which have comprehensively analyzed marketable and marketed surplus issues.

The concept of marketed surplus has been used in a variety of ways, and it is necessary to clearly define each one of these. In some of the earlier studies on foodgrains marketing in the developing countries, three concepts of marketed surplus have been generally used: gross marketed surplus, net marketed surplus, and marketable surplus (Narain 1961; Krishna 1962; Krishnan 1965; Raquibuzzaman 1966; Sharma and Gupta 1970; Farruk 1970; Bhargava and Rustogi 1972; Nadkarni 1980, Rahman 1980; Harriss 1982; Hussein and Rajbanshi 1985) (Fig. 2.1).

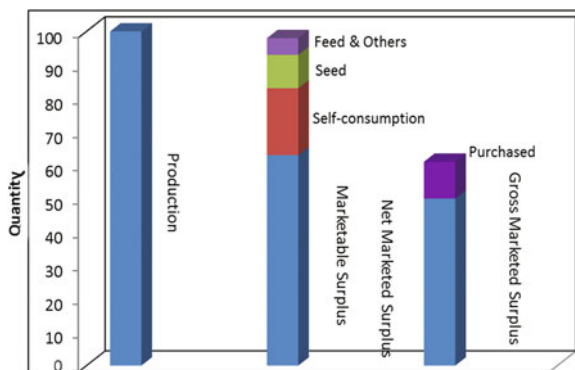


Fig. 2.1 Concepts of marketable and marketed surplus used in the study

For the purpose of this study, marketable surplus has been estimated by subtracting total retention from total production. The retention consists of quantity kept for self-consumption, for seed purpose, for feed, and payments in kind to laborers, gifts, and others. Gross marketed surplus is calculated by estimating the total quantity of produce sold in the market without considering whether there is any buy back by those sellers later on. Net marketed surplus, on the other hand, excludes the amount of produce which is bought back. There could be five different types of farmers: (i) exclusive sellers who only sell and do not buy back, (ii) exclusive buyers who buy and do not sell at all, (iii) net seller households whose sales are higher than purchases (i.e., they are involved in both sales and purchases), (iv) net buyer farmers whose purchases are higher than their sales, and (v) non-participant farmers who neither sell nor buy. The net marketed surplus will be available from category (i) and (iii) farms.

The estimates assume the following forms:

- **Marketable Surplus** = Total Production – Total retentions
- **Gross Marketed Surplus** = Quantity actually Sold/Actual Sales
- **Net Marketed Surplus** = Actual Sales – Net Purchases.

The entire amount of marketable surplus, which is available for sales, may not be actually sold in the market. Therefore, marketed surplus may be more, less, or equal to the marketable surplus, depending upon the socioeconomic conditions of the farmer, type of the crop, access to market, etc. Since marketed surplus represents actual sale by farmers, the difference between marketable and marketed surplus can reveal several patterns of sale, purchase, and stockholding by various categories of farmers. If marketable surplus is higher than marketed surplus, it indicates that stocks are held by farmers who have better retention capacity in anticipation of fetching higher prices in future period or sometimes during emergencies (Acharya and Agarwal 2004). On the other hand, if marketed surplus and marketable surplus are equal, it indicates that farmers are not in a position to hold back their stocks as they need cash for the next crop or other purposes. The marketed surplus is higher

than marketable surplus, when the farmer retains a smaller quantity of the crop than his actual requirement for family, farm, and other needs. It holds true especially for small and marginal farmers, who sell after harvest to meet immediate cash needs and buy back later mostly at higher prices. This situation of selling more than marketable surplus is termed as distressed or forced sale.

Determinants of Marketed Surplus

A major focus of the study is on the estimation of marketed surplus and the response of marketed surplus to prices and other exogenous variables. Therefore, it is important to define the concept and identify the important determinants of marketed surplus. In this section, a theoretical model of marketed surplus response function has been discussed. Many studies have observed that marketed surplus of a crop depends on various price and non-price factors. Empirical studies of marketed surplus have found that farmers respond positively to price changes, and this is consistent with economic theory. In addition to price, a number of other socio-economic, institutional, technological, and infrastructure factors influence marketed surplus. Among these are farm size and production, family size, wealth/income, risks, access to modern technology, markets, market information, etc.

A number of studies have reported that in most cases, there exists a strong linear, and in some cases a strong nonlinear, relationship between the quantity sold and variables such as farm size, quantity produced, family size, prices, and socio-economic and institutional variables for different categories of farmers. The linear relation may be written as:

$$MS = \alpha + \beta_i X_i$$

where MS denotes the marketed surplus, and X_i ($i = 1, 2, \dots, n$) represents the independent variables influencing marketed surplus. We can describe this function as the marketed surplus function. The dependent variable, marketed surplus, is defined as sales, which is a share of total output per household. The independent variables include farm size (ha), family size (numbers), awareness about MSP (yes/no), access to regulated market (yes/no), distance of farm from main market (km), per household production of the crop (in quintals), source of off-farm income, access to institutional credit, access to roads, awareness about price support programme, access to market and market information, and price received for the produce (Rs/qrtl). We hypothesize that with the increase in farm size and production, higher income and output price and better access to various institutional and technological factors, marketed surplus should increase. Family size, distance from market, and poor access to infrastructure, on the other hand, are expected to have negative effect on the marketed surplus. We used multiple linear regression analysis to examine the impact of various factors on marketed surplus of selected crops. The model is estimated first for each of the four major farm size categories and then for all farms combined.

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in India

Sharma, V.P.; Wardhan, H.

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