

Approach to Measuring Farmers' Welfare

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Disparate agricultural development across regions and states has generated much interest among academicians and policy makers alike. Most studies measured inter-state variations in output, gross domestic product or gross value added and explained the differences in terms of differential input use, infrastructure, etc. The focus has been on production. With paradigm shift to farmer's income and then to welfare, this paper discusses farmers' welfare as a multi-dimensional construct and measures inter-state variation in the same.

Shift to Farmers' Welfare Paradigm

The avowed goal of doubling of farmers' income by 2022 as set by Govt. of India in 2015 shifted the focus from production to farmers' income. Further, Dalwai (2019) delineated, farmers' welfare as a multi-indicator construct going beyond income level. According to him, farmers' welfare is reflected through: absolute and relative average income; availability and accessibility to social security system – education, health, etc.; and, facilitating the farmer in moving up Maslow's need hierarchy beyond social security. Taking cue from there, we have developed farmers' welfare as a multi-dimensional paradigm (Satyasai et al, 2021a, b). In our framework, we define farmers' welfare across states through 35 indicators under 6 dimensions: (i) production (ii) post-production (iii) infrastructure (iv) social development (v) ecological aspects, and (vi) policy & fiscal environment. Production and post-production factors that can enhance or diminish welfare of farmers can range from input availability, costs and quality, labour availability and wage rates, output prices, market access, post-harvest facilities, etc. These backward and forward linkages will be more effective if the physical and financial infrastructure facilities such as connectivity, irrigation, power, banking network and penetration, among others are made available to farmers' households. Social infrastructure such as education and health facilities, network of community organisations, degree of social capital built up, and so on further add up to the farmers' welfare. Superimposed on these 4

dimensions are policy environment and ecological factors that would impact the level of farmers' welfare.

We combined the selected indicators into dimension indices *a la* HDI methodology² and then worked out a state-wise composite farmers' welfare index (FaWI). All these indicators are defined such that higher the value, higher would be the farmers' welfare. We caution that the index worked out is not a direct measure of welfare. The score only reflects the likelihood of a state ensuring farmers' welfare relative to other states. An elaborate version of this article has been presented and published in Agricultural Economics Research Review (AERR), 2021, 34 (Conference Number). Based on the feedback received, we have improvised the methodology by refining the indicators. While we have earlier used a few composite indices developed by EPWRF³ taking the total number of indicators to 90, in this article we have taken 34 relevant individual indicators besides NAFINDEX⁴ which is a composite index. Thus, we have combined 52 indicators.

FaWI estimates with and without these refinements are highly correlated with coefficient of correlation of 0.91. Storage capacity, cold storage capacity and rural non-farm employment have been added to post-production dimension, which were not part of paper published in AERR. This has brought about changes in the states' ranking in post-production dimension. Similarly, we have added two more indicators in Fiscal dimension, namely, public expenditure per capita (₹'000) and percentage of capital expenditure by state governments on agriculture to total expenditure on agriculture. This has changed the

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² All indicators are normalized using $D_n = (A_n - m) / (M - m)$; wherein, for n^{th} state, D_n is the normalized value of the indicator ($0 \leq D_n \leq 1$). A_n is the actual value, M is maximum value, and, m is the minimum value. Individual dimension indices (DI) and FaWI are computed using $DI_n = (\sum Wi \cdot Di)$ & $FAWI_n = \sum (DI_i)$.

³ <https://www.nabard.org/auth/writereaddata/tender/1007211141NRS-13-%20Construction%20of%20State-wise%20RII%20&%20Scheme%20of%20RIDF%20Allocation.pdf>

⁴ <https://www.nabard.org/auth/writereaddata/tender/2106212528Rural%20Pulse%20Issue%20XXXIII.pdf>

value of states' fiscal dimension in this article bringing about change in overall ranking of the states. We present here the estimates based on individual indicators listed in Table 1.

The data on various indicators are collected from various published sources which are all in public domain.

Regional Variation in FAWI

Farmers' Welfare Index (FaWI) as a composite index has coefficient of variation (CV) of 25% with Goa at the top with a value of 0.57 and Rajasthan at the lower end with a value of 0.24. Among the dimensions, variation in fiscal dimension was maximum with a CV of 94% (Table 2).

Table 1: Indicators used for constructing FaWI

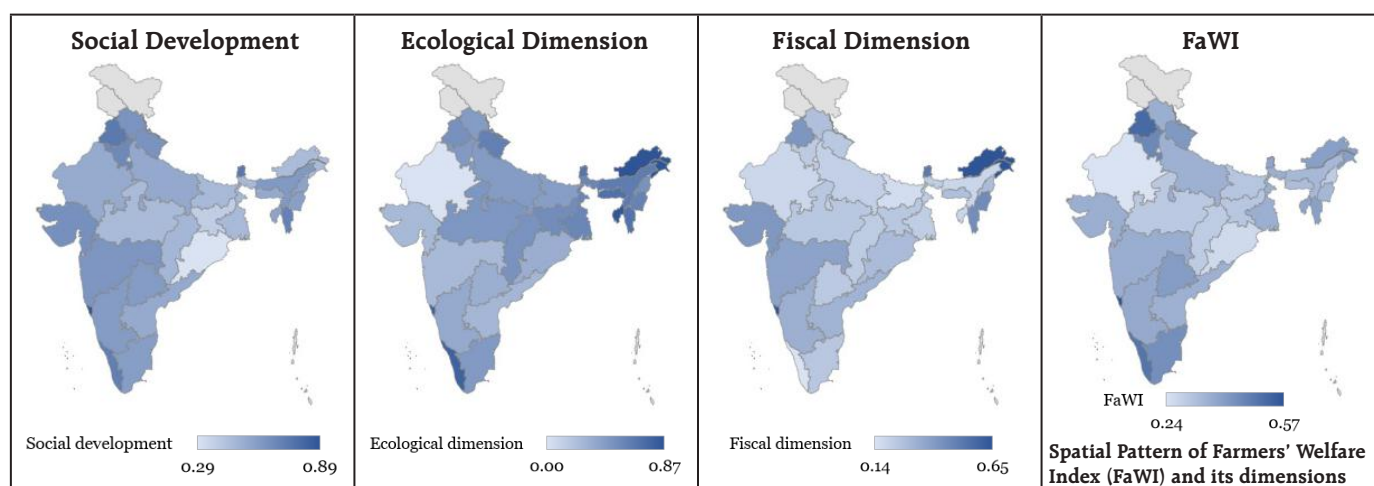
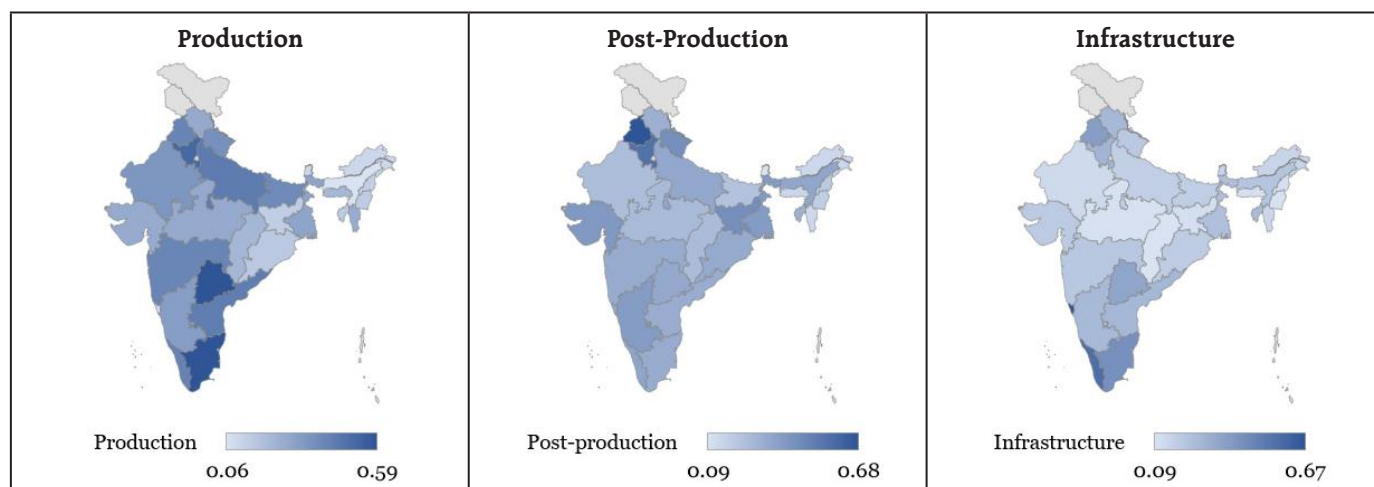
Dimension	Indicator	Symbol	Weight
Production	Net Irrigated Area (NIA) as % of Net Sown Area (NSA)	P1	0.20
	PM Krishi Sinchayee Yojana (Integrated Watershed Management Programme) as % of NIA	P2	0.20
	GSVA of Livestock as % of GSVA of Agriculture and Allied Activities	P3	0.20
	Number of Soil Health Cards per ha. of NSA	P4	0.20
	Pumpsets/Tubewells Energised (in Number) as % of NIA in 2015-16	P5	0.20
Post-Production	Farmers Income per Household	O1	0.143
	Ratio of Agri to non-Agri income	O2	0.143
	Number of registered/unincorporated processing units per ₹ million value of production	O3	0.143
	Storage Capacity in Metric Tonnes per 100 Tonnes of foodgrain production in 2017-18	O4	0.143
	Capacity of Cold Storage in Metric Tonnes per 100 Tonnes of Horticulture Production in 2017-18	O5	0.143
	Regulated markets per thousand ha. of Net Sown Area	O6	0.143
	Rural Non-Farm Employment as Percentage to Total Rural Employment in 2017-18	O7	0.143
Infrastructure	Electricity consumption per ha of Net Sown Area	I1	0.143
	Rural Road per sq km	I2	0.143
	Rural Bank Branches per sq km	I3	0.143
	Wireline Tele-density	I4	0.143
	Wireless Tele-density	I5	0.143
	Nafindex	I6	0.143
	Agriculture Credit/ha (₹ lakh)	I7	0.143
Social Development	Number of Doctors per Functioning PHC in Rural Areas in 2019	S1	0.09
	Number of Rural Health Centres Per thousand rural population in 2019	S2	0.09
	Percentage of Community Health Centres with at Least 30 Beds in 2019	S3	0.09
	Number of Beds in Rural Hospitals Per Thousand Rural Population in 2018	S4	0.09
	Rural Literacy Rate in 2017-18	S5	0.09
	Percentage of Elementary Schools Approachable by All-Weather Road in Rural Area in 2016-17	S6	0.09
	Percentage of Elementary Schools with Building in 2016-17	S7	0.09
	Percentage of Rural Households Having Access to Improved Source of Drinking Water Located in the Premises and Water Sufficiently Available Throughout the Year in 2018	S8	0.09
	Percentage of Rural Households having Both Bathroom and Latrine within the Household Premises in 2018	S9	0.09
	Percentage of Rural Households having Drainage System in 2018	S10	0.09
	Percentage of Households Living in Pucca Houses	S11	0.09
Risks & Ecological aspects	Forest and Tree cover as % of Geographical Area	E1	0.50
	Percentage of non-degraded land over total land area	E2	0.50
Policy & Fiscal environment	Public expenditure per capita (₹000)	F1	0.3334
	Public expenditure in Agri per Operational Holding (₹000)	F2	0.3334
	Percentage of capital expenditure by state governments on agriculture to total expenditure on agriculture	F3	0.3334

Table 2: Farmers' Welfare Index and its Dimensions

State	Production	Post-Production	Infrastructure	Social Development	Ecological Dimension	Fiscal Dimension	FaWI
Andhra Pradesh	0.44	0.32	0.26	0.53	0.27	0.31	0.36
Arunachal Pradesh	0.10	0.14	0.15	0.46	0.87	0.65	0.39
Assam	0.06	0.34	0.21	0.60	0.63	0.18	0.34
Bihar	0.39	0.23	0.18	0.47	0.42	0.16	0.31
Chhattisgarh	0.23	0.26	0.09	0.48	0.49	0.22	0.29
Goa	0.09	0.33	0.67	0.89	0.79	0.65	0.57

Table 2: Farmers' Welfare Index and its Dimensions (Continued)

State	Production	Post-Production	Infrastructure	Social Development	Ecological Dimension	Fiscal Dimension	FaWI
Gujarat	0.27	0.40	0.19	0.64	0.25	0.41	0.36
Haryana	0.52	0.56	0.28	0.67	0.44	0.23	0.45
Himachal Pradesh	0.27	0.30	0.26	0.63	0.43	0.26	0.36
Jharkhand	0.14	0.44	0.10	0.38	0.52	0.24	0.30
Karnataka	0.32	0.39	0.26	0.59	0.35	0.32	0.37
Kerala	0.42	0.35	0.56	0.71	0.78	0.14	0.49
Madhya Pradesh	0.27	0.26	0.10	0.46	0.47	0.24	0.30
Maharashtra	0.41	0.32	0.20	0.62	0.25	0.37	0.36
Manipur	0.15	0.18	0.09	0.57	0.58	0.45	0.34
Meghalaya	0.22	0.14	0.10	0.53	0.69	0.26	0.33
Mizoram	0.26	0.14	0.13	0.70	0.68	0.45	0.39
Nagaland	0.13	0.20	0.10	0.56	0.49	0.27	0.29
Odisha	0.16	0.33	0.18	0.29	0.32	0.28	0.26
Punjab	0.41	0.68	0.37	0.74	0.50	0.41	0.52
Rajasthan	0.35	0.25	0.13	0.53	0.00	0.18	0.24
Sikkim	0.10	0.09	0.14	0.75	0.67	0.52	0.38
Tamil Nadu	0.59	0.32	0.42	0.58	0.45	0.24	0.43
Telangana	0.59	0.34	0.34	0.59	0.32	0.23	0.40
Tripura	0.15	0.30	0.24	0.56	0.86	0.18	0.38
Uttar Pradesh	0.44	0.34	0.17	0.54	0.44	0.21	0.36
Uttarakhand	0.37	0.44	0.19	0.63	0.60	0.23	0.41
West Bengal	0.29	0.39	0.23	0.46	0.56	0.21	0.36



Conclusions

A little below 70% of the Indians are living in rural areas and are mostly dependent on agriculture and allied activities for their livelihood. Though the share of agriculture sector in total gross domestic product (GDP) has been declining, the performance of the economy, the standard of living of a large section of population and poverty reduction strategy depends considerably on growth in the agricultural sector. India today is not only self-sufficient in respect of demand for food, but is also a net exporter of agri-products occupying ninth position globally. However, our farmers are still caught in the vortex of low returns and this points towards the need to change the agriculture strategy from production centric to farmers' welfare centric approach. While developing such a new approach, we must also bear in mind that the level of agricultural development varies from region to region and within region also. Except for states of Punjab, Haryana and Western Uttar Pradesh, where green revolution resulted in higher output mainly for wheat and paddy due to the adoption of technologies, HYV seeds and assured irrigation, most of the other states are associated with low levels of agricultural productivity and per capita output. This paper has adopted farmers' welfare framework and attempted to capture the inter-state variation in agricultural development discussed in the foregoing paragraph from a different paradigm. We constructed a Farmers' Welfare Index (FaWI) as a composite index of indicators representing six dimensions. The results revealed that Goa at the top with a value of 0.57 and Rajasthan at the lower end with

a value of 0.24. This study is expected to spur further debate and encourage more researchers to undertake studies for improvising on the methodology and scope as we move forward.

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