ASSESSMENT OF AGRICULTURAL MAN-POWER IN THE GANGA-JAMUNA DOAB

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ABSTRACT

Present paper incorporates the facts and factors of demographic constraints that influence the man-power index. Considering three improtant demographic determinants-age, sex, and mental health of agricultural workers, and converting total agricultural workers population into an index of man-power by assigning their weights, a composite index and total man-power units of each of the tehsil of Ganga-Jamuna doab have been calculated. The areal patterns of man-power units engaged in agricultural activities are highly influenced by the intensity and quality of education and socio-economic development, and, therefore, the areas of the Upper Ganga-Jamuna doab have higher intensity of man-power units than the lower parts.

INTRODUCTION

Enumeration of total persons engaged in agricultural activities is crude index of agricultural worker's force measurement. Man-power varies according to the demographic structure and mental health capacity. Therefore, demographic constraints, namely, age and sex composition and education for the skilful development of the workers can be the fundamental determinants for proper assessment of man-power index. Thus present study attempts to assess the real units of man-power engaged in agricultural activities in the Ganga-Jamuna *doab* and to highlight the causes of its areal features and general patterns. In general, the Ganga-Jamuna *doab* - and important part of Upper Ganga basin situated between foot-hills of Himalyas in the North, and Deccan plateau in the South (25°6'-30°24'N. and 77°O'-81°55' E.), which covers an area of about 588 hundred sq Km., (20% of Uttar Pradesh) incorporating 59 tehsils of 15 districts of Western parts of the State of Uttar Pradesh, is physiogrsphically uniform (gentle seaward slope formed by alluvial sedimentation, fertile soils with high moisture capacity), climatically suitable for intensive agricultural activities (annual mean temperature from 8°C to 22°C with the annual rainfall of 85 cms.) and economically advanced part of India where labour intensive agricultural economy is dominated. There seems various infra-structural changes in the rural economy being rapid adoption of agricultural technology. However, a comprehensive part of occupational structure (63.2% of the total workers) is employed in agricultural activities. The total population of the *doab* is 30.24 million (27.3% of the State's population as against 7.3% higher than the percentage of areal extent). Thus, population density is higher (514 persons per sq. km.) than that of Uttar Pradesh (377 persons per sq.km.).

The concerned data of demographic structure as well as rural literates and density of agricultural workers have been collected and compiled from up-to-date Census publi-

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cations (1981) of Uttar Pradesh series while non-available Census data are officially drawn out from the Office of the Census operation U. P., Lucknow.

NUMERICAL EVALUATION OF DETERMINANTS

Three important determinants of man-power age structure, sex composition of agricultural labourers, and rural mental health (educationol aspects) have been identified numerically by giving their weights to agricultural population. Such weightages should be assigned by calculating their relative strength with the help of convertings related data. Before analysing the numerical evaluation of the determinants, we must discuss the related techniques and tools for data conversion. For finding the relative picture whether in ratios or in coefficients of the related phenomena, various data conversion techniques, viz, percentiles, quotients, fractional conversions, etc. have been utilised in geographical researches (Chakravarti 1970). All such tools are associated with the 'Total Unit Technique'. On the other hand, 'Mean-Unit Technique' by which mean of the data series is considered as unity and total items of the series are converted accordingly, has adopted for better conversion. 'Mean-Unit' procedure is followed for identifying the relative weights of the determinant for the Ganga-Jamuna *doab* area.

(a) *Demographic Coefficient and their Weighted Agricultural Population :* Body-energy which has been measured in the form of caloric intake and its daily requirements (FAO/ WHO 1973) that vary according to age and sex due to differences occurred in energy capacity to the body and harmonic change according to its biological needs, is the focal point of calculating demographic coefficients. For Indian active workers, advisory Committee of Indian Council of Medical Research (ICMR 1981) has recommeded daily dietary intake requirements of 2800 Keal for moderately active man of ideal weight and 2200 Keal for ideal active woman. On the basis of such recommendations, the energy coefficients according to age and sex composition have been calculated and then they have been weighted to the proportional shares of each category of agricultural population of the entire Ganga-Jamuna *doab* for the consideration of regional averages (Table. 1) and of each and every areal unit for analysing its areal patterns.

(b) *Relative Performance of Rural Mental Health* : Most of the masses of agricultural population reside in rural areas and therefore, rural mental health can be gauged to consider the skilful development of agricultural workers. Two components of mental capacity-proportionate share of educated persons as well as literates among rural masses- are important for understanding and assessing relative performance of rural mental health. Note that the educated persons are the few even negligible in rural areas* and, therefore, level of literacy can sloely be considered for the purpose. It's relative performance for each with unit as the index of mental health (Imh) has been calculated to get ratio between the % of educated persons and literates to total rural population (re) and its regional average (Re) as : Imhi = (rei/Re) ..... (1).

Rural to the urban migration of educated and skilled labour is one of the important factor which reduces the percentage of rural educated persons.

Table 1. Weighted agricultural population of the Doab according to age and sex (1981).
(Daily energy allowances in Kcal)

Age groups (1)	Body energy averages (2)	coefficients (3)	Agricultural population (4)	% (5)	Weighted Age Relatives* (6)
1. *Infants* : 0-1 year	1,120	0.542577			
2. *Children* : 1-10 years	1,663	0.805630	2,24,269	4.140	3.47168
3. *Young children* 10-14	2,410	1.167510			
4. *Adults* :					
(a) 15-19	2,510	1.215954	4,01,807	7.417	9.01871
(b) 20-39	2,500	1.211100	24,37,220	44.991	54.48860
(c) 40-49	2,375	1.150554	9,72,112	17.945	20.64662
(d) 50-59	2,250	1.089999	7,22,480	13.337	14.53720
5 *Olds* : (60-69)	2,000	0.968888	6,59,265	12.170	11.05437
6. *Too olds* : (70 and above)	1,750	0.847778			
Total	18,578	—	54,17,153	100.000	113.21720
Average	2,064	1.000000	—		1.13217**
Sex composition					
(A) Male :	2,800 (7.65)****	1.169600***	51,99,101	95.975	112.25236
(B) Female :	2,200	.830400***	2,18,052	4.025	3.34236
Total					115.59472

N.B. : *Weighted Relatives are the multiplicat ons of column (3) and (5). **Total is divided by 100 to get average. ***These are the averages of the coefficients calculated on the basis of daily caloric requirements and wage rates. ****Figures in brackets denote per head daily wages of agricultural labourers in Rupees.

Source : Recommended Dietary Intakes for Indians, 1981, ICMR-New-Delhi, Tables 2.1, 2.4, 2.5 & 2.6.

(c) *Composite Index of Determinants :* Multiplying all three weighted indices of determinants components, a composite picture, i. e. called Determinants Weight (DW), can be shown in the following form. DWi = (Wari. Wsri. Imhi), ...(II) where War = Weighted Age Relatives and Wsr = weighted Sex Relatives as given in Table 1, and Imh is as equation (1). Further, for finding total magnitudes as well as intensity of man-power notated as TMPUa and MPUa, it has been calculated to assign the determinants weights (DW) to the total magnitudes as well as its intensity of agricultural workers for each ith areal Units notated as TAW and AW, as TMPUai = Dwi. TAwi,...(III) MPUai = Dwi. Awi. ...(IV) Here, in this paper only the intensity index of agricultural man-power units has been calculated and analysed by utilising equation IV.

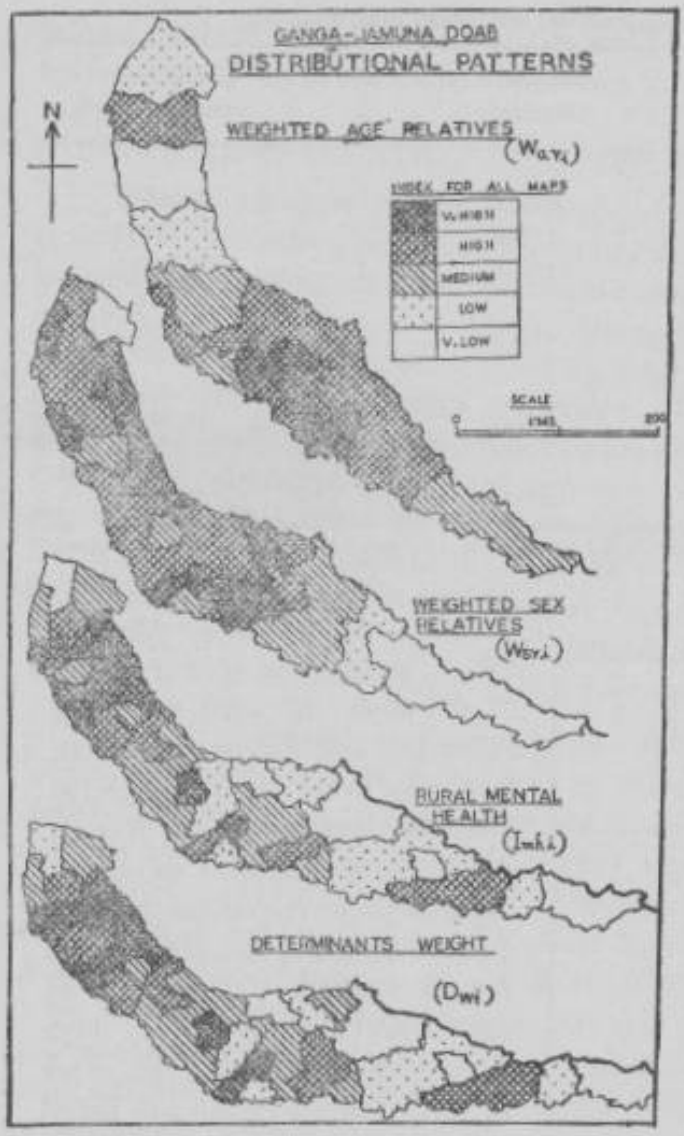

Fig. 1. Map of Ganga-Jamuna Doab showing distributional patterns—weighted age relatives etc.

(d) *Areal Variations of the Components :* Numerical calculations of each of the man-power component, their composite index and intensity of agricultural man-power units as given in the Appendix evolve regional patterns and their areal variations that require geographical causes and their justifications Table 2. which highlights overall degree of variability denotes that composite index of Determinants Weights (DW) has highest degree of variation (27.16%) as against the degree of its components variability.

Index of weighted age relatives (War) which has least variations (1.01%) is distributed most uniformly over the *doab* area. It is on account of lower variations in the regional characters of agricultural workers calculated according to various age groups. However, there seems a significant variation of the index of 'War' among various age groups. According to Table 1, 45% of the total workers acompany within the age group of 20 to 40 years, while its 'War' value is higher (54.5%) owing, no doubt, to marginally greater body energy strength. The average value of the composite index of Dw that is 1 31 (see Table 2), indicates the well-known fact about agricultural workers efficiency. Overall working capacity of agricultural workers of the *doab* is 31% higher than the ideal conditions of the health.

For analysing distributional characteristics of the components. first of all, the areal units have been classified into five categories on the basis of 'semi-interval method' of regionalisation (Table 3) and then areal variability for each index has been depicted by preparing distribution maps. On account of the higher concentration of adults (20–40 years age groups that account for 47% of total agricultural population) and Male persons (more than 99%) in the constitution of agricultural worker's force particularly in central parts of the Ganga-Jamuna *doab*, the index values of 'War' and 'Wsr' components seem higher (above 1 144 for 'War') in these parts, particularly in Mainpuri district

Table 2. Distributional characteristics of agricultural manpower determinants.

Manpower Determinants	Mean	Standard Deviation	Coefficient of variation (in %)
(A) *Manpower Determinants*			
1. Wari	1.13217	.01157	1.01558
2. Wsri	1.15595	.15149	13.11032
3. Imhi	1.00000	.25831	25.82912
(B) *Composite Index*			
4. Dwi	1.30873	.35516	27.16194
(C) *Density of Agricultural Workers*			
5. Awi	1.31905	.24141	18.30172
(D) *Manpower Intensity*			
6. MPUai	1.72628	.43861	25.48402

N.B.: The indices of Awi and MPUai have been calculated on the basis of per hactare of Net Cultivated Area (NCA).

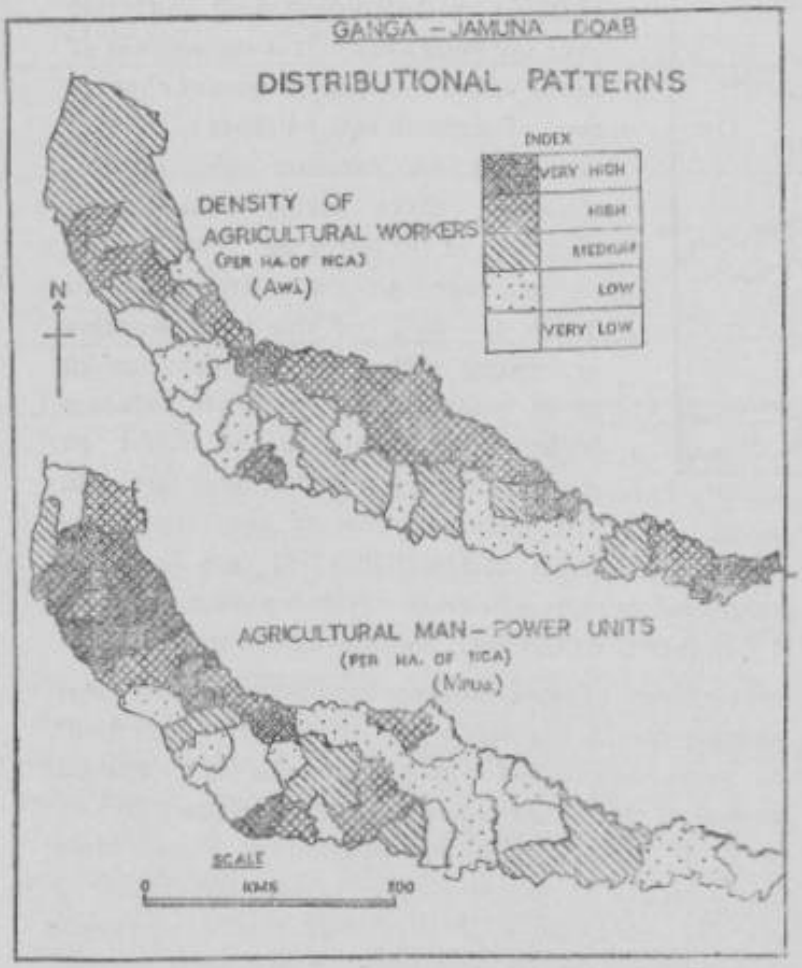

Fig. 2. Distributional patterns based on density of agricultural workers etc.

(Fig. 1 A and B). On the other hand, the lower parts of the *doab*, the *doab* tehsils of Allahabad and Fatehpur districts, have the lower index values for both the components. It is only due to the employment of higher percentages of the retired persons (above 60 years age group) and female workers (15 — 24%) in agricultural activities. Very high values (above 1.20) of the index of rural mental health are found in the areas of upper part of the *doab* particularly the tehsils of Muzaffarnagar & Meerut districts including the contiguous areas of Kanpur city. These areas are being influenced by the processes of industrialisation & urbanisation that increase the rate and intensity of literacy and educated persons. Therefore, remote areas of such activities of economic development, namely, the *doab* part of Allahabad district and most of Farrukhabad areas are weaker and

Table 3. Areal classes of the Agricultural Man-power Determinants

Determinants	Very high	High	Medium	Low	Very low
1. Wei hted Relatives (War)	Above-1.140 (9)	1.139-1.135 (20)	1.134-1.125 (14)	1.124-1.120 (9)	1.119 & below (7)
2. Weighted Sex Relatives (War)	Above-1.1670 (13)	1.1669-1.1590 (22)	1.1589-1.1510 (11)	1.1509-1.1460 (3)	1.1459 & below (10)
3. Index of Rural Mental Health (Imh)	Above-1.20 (10)	1.19 -1.050 (11)	1.049 - .900 (14)	.899 - .750 (13)	.749 & below (11)
4. Determinants Weight (Dw)	Above-1.55 (10)	1.54 -1.35 (12)	1.34 -1.15 (15)	1.14 - .95 (12)	.94 & below (10)
5. Agricultural Workers (Aw)	Above-1.60 (5)	1.59 -1.40 (15)	1.39 -1.20 (21)	1.19 -1.00 (11)	.99 & below (7)
6. Manpower units Per ha of NCA (MPUa)	Above-1.90 (11)	1.89 -1.70 (11)	1.69 -1.50 (10)	1.49 -1.30 (13)	1.29 & below (14)

N.B.: (1) No of *tehsils* into each areal class have been given under braketed figures.
(2) The distributional paterns of areal classes are shown by Figures 1 and 2.

have very low values (below. 749) of the index. The emerging patterns of the composite index is highly influenced by Imh index and, therefore, regional tendencies of Determinants Weights are similar to Imh except central parts of the *doab*, where regional trends distort due to the influence of 'War' and 'Wsr' indices. On the other hand, distribution of density of agricultural workers has different tendencies with the lower degree of areal variability (18.3%) and insignificant regional contiguity. The areas of Ganga low land have the high and very high density of agricultural workers (above 1.4 persons per ha. of N. C. A.) while the upper parts and contiguous areas of Jamuna rivers have the medium level of density of agricultural workers. The areas of higher values of Determinant Weights and higher density of agricultural workers accounts for the higher intensity of agricultural man-power units (MPUa) and vice versa. Therefore, entire upper parts of the *doab* including a few patches of central *doab*, viz, the central parts of Mainpuri district, the contiguous areas of Agra city, and Kaimganj tehsils of Farrukhabad district (Fig-2B) have the higher intensity of 'MPUa' while the mid, central and the entire lower parts of the *doab* include the low and very low values of MPUa. Thus, general trends of agricultural man-power intensity seem to decrease from upper *doab* towards its lower parts.

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