

# Village and Household Economies in India's Semi-arid Tropics

---

Thomas S. Walker and  
James G. Ryan

The Johns Hopkins University Press  
Baltimore and London

# Contents

---

*List of Tables and Figures* ix

*Preface* xvii

**1. Introduction** 1

India's SAT and the Study Regions 1 / Focus 3 / Organization of the Book 4

**Part One: Methods and Profiles**

**2. The Approach: Longitudinal Village Studies** 9

Genesis 9 / Selecting the Villages and the Household Panel 11 / Data Collection and the Resident Investigator 12 / Extrapolation across Space and Representativeness over Time 17 / Appendix 2.1. The ICRISAT Village Studies and Rural Social Science Research in India 18 / Appendix 2.2. Lessons Learned in the Conduct of Longitudinal Village Studies and Implications for Agricultural Research with a Farming Systems Perspective 21

**3. The Regions and the Villages** 25

Historical, Social, and Economic Background 25 / The Agricultural Setting 32 / Other Agricultural Enterprises 56 / Region and Village Profiles 57

**Part Two: Welfare and Factor Markets**

**4. Income, Consumption, and Wealth** 61

Setting the Stage 61 / Data, Definitions, Procedures, and the Length of Time Series 66 / Aspects of Income, Consumption, and Wealth 68 / Trends 76 / Fluctuations 83 / Mobility 98 / Conclusions 103

**5. Labor** 107

Structure of the Village Labor Market 108 / Farm Labor Use 114 / Labor Market Parameters and Their Seasonality 121 / Dynamics of Wages and Unemployment 126 / Labor Supply Responses 136 / Conclusions 147

**6. Land** 151

The Shaping of the Land Market 152 / Farm Size 164 / Tenancy 171 / Fragmentation and Consolidation 180 / Conclusions 193

7. Village Financial Markets 196  
General Features and Regional Variation 198 / The Informal Sector 201 /  
The Formal Sector 207 / The Recent Evolution of the Village Financial  
Markets 209 / Borrowing and Overdues 209 / Conclusions 215

### Part Three: Risk, Nutrition, and Technical Change

8. Risk 221  
Risk Perceptions and Sources of Production Risk 222 / Risk Attitudes 233 /  
Household Risk Management 239 / Public Policy Responses 248 /  
Conclusions 262
9. Nutritional Status 265  
General Features 266 / Sources of Variation 277 / Determinants of Energy  
and Nutrient Intakes 279 / Intrahousehold Intake of Nutrients and  
Energy 293 / Changes since the Late 1970s 296 / Implications for Nutrition  
and Health Policy 297
10. Assessment of Technology 301  
Efficiency and Land Improvements 301 / Equity 306 / Nutrition 324 / Food  
Security 334 / Conclusions 341

### Part Four: Synthesis

11. India's SAT: Particularity and Prospects 347  
Particularity 347 / Prospects 351 / Closing Thoughts 357

*References* 359

*Index* 385

# Tables and Figures

---

## Tables

- |     |   |    |
|-----|---|----|
| 1.1 | Soil, rainfall, and crop characteristics of the study regions   | 4  |
| 1.2 | Classification of districts by growth in total cereal production by region and state, from 1958/59–1960/61 to 1981/82–1983/84       | 5  |
| 2.1 | Household population, sampling fractions, and relative farm sizes, by study village   | 13 |
| 2.2 | An inventory of biological investigations in the study villages since 1975, by phase of farming systems research                    | 14 |
| 2.3 | Special-purpose surveys conducted in the study villages from 1975 to 1985 by topic and coverage                                     | 15 |
| 3.1 | Salient features of common village cropping systems   | 47 |
| 3.2 | Input use, yields, and net returns in the common village cropping systems   | 48 |
| 3.3 | Diffusion of modern hybrids and varieties in the study villages   | 51 |
| 3.4 | Key descriptive phrases distinguishing the study regions and villages   | 57 |
| 4.1 | Correlation coefficients between cropping year income shares (%) by source and per capita income from 1975/76 to 1983/84 by village | 71 |
| 4.2 | Linear trends in real household income per person (in Rs in 1975 prices), by village and income quartile from 1975/76 to 1983/84    | 78 |
| 4.3 | Linear trends in real net wealth per person (in Rs in 1983 prices), by village and asset quartile from 1975/76 to 1983/84           | 81 |
| 4.4 | Incidence of income shortfalls (in number of households), by village from 1975/76 to 1983/84  | 86 |
| 4.5 | Median interhousehold correlations of household per person income, by village and farm-size class from 1975/76 to 1983/84           | 92 |

4.6	The correlates of stochastic and endemic poverty across the three study villages, from 1975/76 to 1983/84	96
4.7	Relative variability of food expenditure shares by village, from 1976/77–1981/82	97
4.8	Variable description in analyzing the importance of inherited endowments on household income, by region	102
4.9	Regression estimates of the influence of inherited endowments on household income, by region	103
5.1	Monthly salary arrangements for regular farm servants (RFSs) compared to wage labor incomes	113
5.2	Simple regressions and correlations between crop labor use per hectare and farm size, from 1975 to 1983 by village	117
5.3	Estimated labor use intensity elasticities of household resource endowments, by village	118
5.4	Annual trends in crop labor use in three villages, from 1975 to 1983	120
5.5	Rural unemployment rates from other studies using person-day criteria	123
5.6	Linear trend in real wages, by sex and village from 1975/76 to 1983/84	128
5.7	Description of variables in the Mincer offer wage equation, the probit analysis of probability of participation, and the analysis of the extent of labor supply and their statistics	137
5.8	Wage functions for adults in the six study villages, 1975 to 1978	139
5.9	Determinants of the probability of participation by adults in the daily hired labor market in six villages, 1975 to 1978, using a probit function	143
5.10	Determinants of labor supply in six villages	145
5.11	Scenario analysis of effect of increased labor demand on labor market participation, wages, labor, and household incomes for a representative household	147
6.1	Changes in the composition of landownership and landlessness from 1950 to 1982, for the sample households in six study villages	154
6.2	Land market transactions from 1950 to 1982 according to the relative size of holding in 1950	158
6.3	Median size of owned holding in dryland equivalent acres in 1950 and 1982, by village	160

- 6.4 Means and standard deviations of the variables in the regression analysis of land productivity from 1975/76 to 1983/84 by region 166
- 6.5 Correlates of land productivity from 1975/76 to 1983/84, by region 167
- 6.6 Paired comparison for significant differences in means of household resource stability indices, subjective land prices, and land revenue rates, by farm-size class and village 170
- 6.7 Incidence of tenancy in the study villages 172
- 6.8 Risk implications of tenancy arrangements in the Sholapur villages, 1975 to 1978 175
- 6.9 Partitioning differences in factor intensity and productivity between owned and sharecropped land to irrigation, soil quality, and tenancy 178
- 6.10 Land fragmentation in India in 1961/62, by region and state 183
- 6.11 Land fragmentation in 1982/83, by study village 184
- 6.12 Division of land after respondent became head of the household, until 1982/83, in number of households and plots by region 186
- 6.13 Farmers' perceptions of the benefits and costs associated with land fragmentation, by village in 1985 189
- 7.1 Institutional credit infrastructure in the study villages 198
- 7.2 Credit market transactions in number of loans taken by the sample households, by sector, source, and village from 1976/77 to 1984/85 199
- 8.1 Descriptive statistics on yield and net return distributions of post-rainy season sorghum, by soil types in Shirapur and Kalman from 1975/76 to 1979/80 232
- 8.2 Structure of the Rs .50 experimental game to measure risk attitudes 235
- 8.3 Frequency of choices by game size in percent of total observations 236
- 8.4 Determinants of the interhousehold variation in intercropping within three agroclimatic regions of India's SAT 247
- 8.5 Descriptive information on the common crops sown in the study villages, from 1975/76 to 1983/84 253
- 8.6 Simulated risk benefits from participating in alternative crop insurance designs 254

- 8.7 Elasticities from a Tobit analysis of effect of wealth on days of participation in the MEGS in Maharashtra villages, 1979 to 1983    261
- 9.1 Availability of food grains and demand for labor in six villages    274
- 9.2 Means and standard deviations of the dependent and independent variables in the regression analysis of the determinants of nutrient intake    280
- 9.3 Determinants of individual nutrient intakes for 1–12-year-old children    281
- 9.4 Determinants of individual nutrient intakes for adults    282
- 9.5 Elasticities of individual nutrient consumption with respect to per capita consumption expenditure and family size    287
- 9.6 Effects of equalizing RDAs within the household on shortfalls in %RDA by nutrient    295
- 10.1 Land/labor resource endowment and use ratios by village for small and large farm households, from 1975/76 to 1983/84    308
- 10.2 Capital/labor endowment and use ratios by village for small and large farm households, from 1975/76 to 1983/84    309
- 10.3 Operations contributing more than 5 percent of the wage bill over three years, from 1982/83 to 1984/85, by village and sex    316
- 10.4 The ratios of the cost of herbicide treatments to the cost of controlling weeds with farmers' traditional practices in the study regions in 1975 and 1985 prices, by cropping system    319
- 10.5 Percentage effect of a 10 percent increase in equilibrium supply of various commodities on final demand for nutrients in India    329
- 10.6 Simulated risk benefits from perfect crop yield stabilization    340

## Figures

- 1.1 Location of India's semi-arid tropics and the three study regions in 1975    3
- 3.1 Mean cumulative rainfall by week over ten years from 1976 to 1985 by village    35

- 3.2 Mean and standard deviations of planting date during the rainy season for Aurepalle and Kanzara from 1975/76 to 1984/85 37
- 3.3 Monthly crop labor use and rainfall in Aurepalle for selected years 38
- 4.1 Empirical distribution of real per capita household income by village from 1975/76 to 1983/84 69
- 4.2 Empirical distribution of mean household food shares from 1975/76 to 1983/84 by village 72
- 4.3 Lorenz curves showing the interpersonal distribution of real per person income and real per person net wealth by village from 1975/76 to 1983/84 73
- 4.4 Consumer prices by cereal and village from 1975/76 to 1983/84 79
- 4.5 Producer harvest prices by commodity and village from 1975/76 to 1983/84 80
- 4.6 Poverty and equity indices by village from 1975/76 to 1983/84 82
- 4.7 Empirical distribution of per capita income CVs from 1975/76 to 1983/84, by villages 85
- 4.8 Average within household mean and variance shares (%) by income source to total household income per capita from 1975/76 to 1983/84, by village and farm-size group 87
- 4.9 Household correlation coefficients between transfer and other household income from 1975/76 to 1983/84, by village 89
- 4.10 Mean real per capita income and years in poverty from 1975/76 to 1983/84 for the 104 continuous household samples in the three study villages 94
- 4.11 Mean real per capita income and years in poverty for each continuous household by village 95
- 4.12 Change in real income between 1975/76–1977/78 and 1981/82–1983/84 by household in Aurepalle 100
- 5.1 The features of the village labor markets 109
- 5.2 Hired labor share in total crop labor use from 1975/76 to 1984/85 120
- 5.3 Nominal wages by village and sex from 1975/76 to 1983/84 128
- 5.4 Involuntary market unemployment probabilities by village and sex from 1975/76 to 1983/84 135



- 6.1 The distribution of owned land by village in 1950 and in 1982  
155
- 6.2 Changes in land ownership between 1950 and 1982 (in acres log  
base 2) by village 157
- 6.3 The distributions of owned and operated area by village in 1983/  
84 161
- 7.1 Household borrowing (in Rs log base 2) from 1976/77 to  
1984/85 and inherited land (in acres log base 2)  
by village and sector 211
- 8.1 Alternative scenarios of risk perceptions between an improved  
technique (I) and a traditional practice (T) 224
- 8.2 Yield versus price risk in conditioning gross crop revenue  
variability in SAT districts in Andhra Pradesh, Karnataka,  
Maharashtra, and Tamil Nadu from 1956/57 to 1974/75 229
- 8.3 Price and yield perceptions of groundnut and paddy post-rainy  
season producers in Dokur from 1982/83 to 1985/86 231
- 8.4 Evaluation of the choice between two common cropping systems  
based on observed and assured normal net return distributions in  
Kanzara 234
- 8.5 Land transactions over time in Aurepalle, Shirapur, and  
Kanzara and in Char Gopalpur, a village in Bangladesh 242
- 9.1 Mean and standard deviations of energy and nutrient intake  
among individuals in the study villages from 1976 to 1978 268
- 9.2 Importance of cereals in energy and nutrient intake by village  
and nutrient 271
- 9.3 Frequency of differences between sex and seasons in the  
incidence of less than 50 percent RDA consumption of nutrients  
by age, sex, season and nutrient categories 273
- 9.4 Nutrient intake in the hot dry (HD), wet (W), and cold dry  
(CD) seasons by village from 1976 to 1978 275
- 9.5 Proportion of total variation in standardized nutrient and  
anthropometric measures contributed by intrahousehold,  
interhousehold, and intervillage differences for all individuals,  
adults (A) and children (C) 278
- 9.6 Estimated food and nutrient household expenditure elasticities in  
three ICRISAT study villages, 1976/77 and 1977/78 288
- 10.1 Mean input-output ratios for three study villages from 1975/76 to  
1983/84 by farm-size class 313

- 10.2 The seasonality of labor demand with improved watershed technology and existing farmers' cropping systems in two study villages and three verification trial sites 314
- 10.3 Average All India budget shares of total expenditure on commodity groups for rural and urban consumers 326
- 10.4 Alternative definitions of yield stability 337
- 10.5 Crossovers in yield of selected groundnut varieties in different production environments 339