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## Numeracy and Financial Literacy of Forest Dependent Communities Evidence from Andhra Pradesh

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## Numeracy and Financial Literacy of Forest – dependent Communities Evidence from Andhra Pradesh

### Abstract

This study is an attempt to measure the numeracy and financial literacy of forest dependent communities (FDCs) in India using data from the two economically different forest communities in the state of Andhra Pradesh. In an attempt to rehabilitate degraded forests, the Government of India launched the joint forest management (JFM) program in 1990 with the involvement of FDCs. This has not only helped increase their income levels, but through interactions with and help of Government officials, have also given them a first-hand exposure to financial management at JFM. While there is some evidence on numeracy and financial literacy of urban and rural households and fishing communities in India, there is no evidence on numeracy and financial literacy of Indian FDCs. This study attempts to fill that gap by providing background on FDCs in two economically different regions of Andhra Pradesh (Rayalaseema and Coastal Andhra) and provides evidence on their numeracy and financial literacy. While the performance on both numeracy and financial literacy differs for the two regions, it is found that the participants scored better on numeracy skills than on financial literacy. It was found that while in general participants had difficulty in recognizing mathematical symbols for addition and multiplication and performing the corresponding operations, they were generally able to perform the same operations when orally instructed in their local language without difficulty. While the empirical evidence on financial literacy is less strong, roughly a third of the participants had some basic knowledge of economic concepts like simple interest and time value of money

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## 1. Introduction

Forest dependent communities (FDCs) in India are among the more disadvantaged sections of society with relatively poor access to economic opportunities, health care, nutrition and education (Kumar, 2002). Isolated from mainstream society socially, culturally and geographically, the FDCs dwell in and around forest fringes in small hamlets without the comforts and amenities of modern life and depend on forest produce for their livelihood. Perhaps due to these reasons, it is often presumed that forest dwellers would have poor numeracy and financial literacy skills.

In one of the earlier studies that investigate numeracy of forest dwellers, Deshpande (1981) reported a lack of counting and calculating ability among Warli forest tribes of Maharashtra. Dearth of further research from the field has served to strengthen the notion that forest dwellers lack numeracy and financial literacy skills.

Meanwhile, policy changes at the National level and connected financial aid during the past twenty years have enabled forest dwellers to participate more actively in forest management and undertake community projects involving investment decisions. This has increased the interactions between FDCs and the Government officials and provided the FDCs with a first-hand exposure to financial management. FDCs have also been often required to assess, as a community, the relative costs and benefits in the short, medium and long run of undertaking specific forestry investments and evaluate connected trade-offs.

The fact that Indian FDCs are now involved to a certain extent in decision making on investments involving tradeoffs between present and future costs and benefits means their numeracy and financial literacy levels assume significance. However, research in this area has been lacking. This paper addresses the above gap and attempts to study numeracy and financial literacy levels of FDCs using data from the forest communities of Andhra Pradesh in India.

The plan of the paper is as follows. The next section provides an overview of the FDCs in the Indian context and describes their linkages with the Government. Section 3 briefly reviews the literature and discusses the motivation for the research. Section 4 provides

details on the research design and Section 5 describes the methodology. Section 6 discusses the results and finally section 7 concludes with implications for policy and scope for further research.

## **2. Context: Forest Dependent Communities in India**

A forest dweller is a person who resides in, and depends on the forests for her livelihood. In 2006, the Government of India enacted the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 which not only defines forest dwellers but also distinguishes between “forest dwelling scheduled tribes” and “other forest dwellers” for purposes of assigning ownership rights over forest lands to FDCs.

According to this Act, forest dwelling scheduled tribes are people belonging to the scheduled tribes category who reside in and depend on forests for their livelihood activities. The “other forest dwellers” are people who have resided in forests for at least three generations (a generation comprises 25 years) prior to 13/12/2005 and who depend on forests for their livelihood activities (Ministry of Law and Justice, Government of India, 2007).

Approximately 200 million of the Indian population consists of forest dwellers and forest dwelling scheduled tribes (both categories are referred to as forest dependent communities in this study) who are dependent on forest resources for their livelihood. Fifty four million of these forest dwellers belong to the tribal communities which have ethnic origins (Ministry of Environment and Forests, Government of India, 2011).

Since the FDCs reside and earn their livelihood in forests that are Government-controlled, their welfare is vested with the State Forest Department. Beginning with an attitude of hostility and indifference towards the FDCs in the nineteenth century, Governments gradually viewed them as partners in the management of forests and enlisted their active participation through Joint Forest Management since 1990. The Government of India Circular on Joint Forest Management (JFM) in 1990 envisaged higher involvement of FDCs, with emphasis on the participation of women, customary title holders and forest dwellers with ethnic origin in rehabilitating degraded forest areas.

Essentially, JFM sought to establish a cooperative partnership between the FDCs and the State forest departments for rehabilitating degraded forest areas. The partnership takes the form of a standard JFM agreement where the FDC agrees to protect the forests they inhabit from fire, grazing and illicit timber removals in return for which the community receives some rights over forest produce (like fuel, fodder, timber, and other forest products) and a share of penalty levied on forest offences.<sup>1</sup>

Going further, the Government has also accorded individual and community titles over forest lands to FDCs since 2006.

### ***2.1 Structure and Financial Management at JFM***<sup>2</sup>

A FDC residing in a village or hamlet would be constituted into a JFM Committee by the State Forest Department. A typical JFM Committee would comprise of all the adult members of each of the households belonging to the FDC with a minimum compulsory representation for women. The JFM Committee in turn, selects a smaller group called the Managing Committee consisting of 15 members (of which 8 members are women, as in Andhra Pradesh) headed by a Chairperson and Vice-Chairperson, one of whom shall be a woman. The managing committee is empowered to take and implement decisions relating to forest management on behalf of the JFM Committee.

The JFM Committee holds a joint account in the local public sector bank with the Chairperson, Vice-Chairperson and the District Forest Officer or her nominee as joint signatories through which financial aid from donor and the Government will be channeled

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<sup>1</sup> Retrieved from <http://www.aponline.gov.in/apportal/departments/departments.asp?dep=06&org=60&category=about> on 29/01/13

<sup>2</sup> Records from Office of Divisional Forest Office, Rajampet Wildlife Division, Government of Andhra Pradesh accessed on 19/01/2013.

through<sup>3</sup>. The forestry projects envisioned by the Government and donor agencies are executed by the JFM Committee with technical assistance from the District Forest Office (DFO).

The DFO draws a seasonal or annual schedule of forestry works and their financial requirements in consultation with the JFM Committee, prepares a “Micro plan” and implements the plan utilizing funds from the Government and donors. The Chairperson and the Vice-Chairperson records the details of the forestry works in standard measurement books with assistance from the DFO.

The DFO also monitors the forestry works implemented by the JFM Committee through check-measurement and test-check of works. The Chairperson and Vice-Chairperson, with assistance from the DFO, render accounts for the funds utilized to the Government and donor. A District Forest Officer typically would exercise such monitoring over an average of 150-350 JFM Committee in the various States of India.<sup>4</sup> The managing committee and the JFM committee are also required to meet regularly and monitor the micro plan activities.

As of 2007, about 106,479 JFM committees involving 21.99 million forest dependent population are actively functioning and managing 22.02 million ha of forests (Ministry of Environment and Forests, Government of India, 2011). Aid agencies, notably the World Bank Group, provided significant financial aid to India for the strengthening of JFM institution, forest rejuvenation and building local capacities. Table 1 provides details of some of the important JFM projects funded by the World Bank Group in India during the period 1992-2010.<sup>5</sup> As of 2010, the World Bank has funded ~ \$ 546 million or Rs. 20202 million (valued at US\$ 1 = Rs. 37) for the protection and development of forests through JFM.

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<sup>3</sup> Retrieved from

<http://www.aponline.gov.in/aportal/departments/departments.asp?dep=06&org=60&category=about> on 28/01/2013

<sup>4</sup> Records from Office of Divisional Forest Office, Chittoor (East) Division, Government of Andhra Pradesh accessed on 19/01/2013

<sup>5</sup> Retrieved from

[http://www.worldbank.org/projects/search?lang=en&searchTerm=&countryshortname\\_exact=India](http://www.worldbank.org/projects/search?lang=en&searchTerm=&countryshortname_exact=India) on 28/01/13

### 3. Literature Review

This section briefly discusses the literature on numeracy and financial literacy separately.

#### 3.1 Numeracy

Numeracy, defined as the ability to understand and process basic notions of numbers and chance events, aids decision-making in the real world over a wide range of health, financial and social issues (Peters et al., 2012). This implies that innumerate people may not be good decision makers. Paulos (1988) adds that innumeracy afflicts both the educated and uneducated people. Paulos goes on to show, through careful real world examples, that the inability to logically reason out chance events may lead to irrational decisions and chaotic public policies (as cited in Grey, 1991, pp. 68-69).

Hunt and Wittman (2008) highlights the importance of numeracy by observing that skills in mathematics have contributed to the economic prosperity of the developed economies (as cited in Cokely et al., 2012, p. 25). There is substantial evidence, however, that a majority of people, including the educated, are innumerate. For example, Schwartz, Woloshin, Black and Welch (1997) report that only 16% of a sample of women veterans from the New England Army Registry could correctly answer all the 3-item general numeracy questions that aimed to test simple notions of chance events and proportions. Similarly, Lipkus, Samska and Rimer (2001) find that only 18% of a sample of white, educated people in USA answered all the questions correctly in the 3-item general numeracy questionnaire. Kirsch, Jungeblut, Jenkins and Kolstad (2002) find that close to 50% of Americans lack minimal numeracy skills that are necessary to interpret numerical data in printed material. Peters et al. (2012) also provide further evidence on the conclusions of Kirsch et al. study.

With overwhelming evidence indicating toward innumeracy in developed countries, it is hard to expect higher levels of numeracy in the developing economies given their high levels of poverty and under-development. However, Gaurav and Singh (2012) find evidence

that rural farmers from Gujarat in India displayed a high level of numeracy skills based on their responses to simple questions in mathematics and probability.

Studies have also documented the association of wealth, income levels and numeracy. Lusardi and Mitchell (2011b) show that persons who cannot perform interest rate calculations are less likely to calculate how much to save from their incomes and tend to be unsuccessful financial planners. They conclude that innumerate people are less likely to be wealthy in the long run (as cited in Lusardi, 2012, p. 9). Lusardi and Tufano (2009) report that people who are less numerate are more likely to pay higher costs for their borrowings which may adversely impact their income flows. The above findings suggest that incomes of individuals are positively associated with their numeracy levels.

### ***3.2 Financial Literacy***

Research on financial literacy has burgeoned in recent years due to the spread of financial liberalization in many developed and developing economies stimulating the supply of a wide array of financial products. While participation in financial markets may have increased, there has been some concern on peoples' capabilities to understand financial information and make value maximizing decisions.

Hastings, Madrian and Skimmyhorn (2012) link up numeracy and financial literacy by defining financial literacy as a set of numeracy skills necessary to make effective financial decisions. The causation from numeracy to financial literacy is implicit in this definition.

Hastings, Madrian and Skimmyhorn (2012) also observe that the academic literature has provided different meanings to the notion of financial literacy. In their review, while in some studies, financial literacy implied knowledge of financial products like stock, bond and mortgages, in other studies, financial literacy meant an understanding of basic financial concepts like interest rates, inflation and time value of money.



For example, Gaurav and Singh (2012) defined financial literacy as the ability of a person to understand and interpret financial information and make informed decisions on her personal financial matters like investments, loans and retirement planning .

Bernheim (1995) was one of the early researchers who reported that most households in USA lacked basic financial knowledge and often struggled with simple numerical calculations. Further studies corroborated the above conclusions. For example, financial illiteracy is preponderant in countries with well-developed markets like Germany, United States, the Netherlands, Sweden, Italy, Japan and New Zealand (Lusardi & Mitchell, 2011a). Van Rooij, Lusardi and Alessie (2011) find evidence from a sample in Netherlands that people with low financial literacy do not invest in stock markets. Lusardi and Mitchell (2008) conclude from a study of 758 American women that older women have lower financial literacy levels as compared to younger women, the majority of women have not made retirement plans and women with higher financial literacy were more likely to plan for their retirement. The evidence thus suggests widespread financial illiteracy in the developed world.

As with numeracy, *prima facie* one would expect financial literacy levels to be even lower and more serious in developing countries like India, given the dearth of basic financial services like banking, insurance services and credit markets (Gaurav & Singh, 2012). Pal and Pal (2012) find evidence that financial exclusion among households is severe across all income groups in India.

Gaurav and Singh (2012) conclude that the rural farmers in India performed poorly in financial aptitude and debt literacy tests which imply low financial literacy levels. On the other hand, Agarwal et al. (2010) show from a study of Indian investors who are clients of a financial advisory services firm that the investors are financially literate. But care has to be taken to generalize from the above results as clients of financial investment services have higher financial knowledge than the general population.

Agarwalla et al. (2012) find that financial knowledge among Indians is not widespread and is low by international standards. While nearly 33% of respondents from South Africa scored six and above (high level of financial knowledge) and more than 50% of

respondents across 13 Organization for Economic Cooperation and Development (OECD) countries scored six and above in the OECD-prescribed financial literacy test, the researchers found that only 22% of the employed and 23% of the retired Indians scored 6 and above in the standard test. The findings together imply low levels of financial literacy among educated Indians.

### 3.2.1 Determinants of Financial Literacy

Friedman (1953) argued that people need not be financial experts to make optimal value-maximizing financial decisions as much of the learning can happen through trial and error and by observing the financial behaviors of other people (as cited in Hastings, Madrian, & Skimmyhorn, 2012, p. 8). Agarwalla et al. (2012) find evidence that Indian students from villages performed marginally better than their urban counterparts in OECD-prescribed standard financial tests which is a surprising result as one expects urban people to be more financially literate than their rural counterparts.

Taken together, the above studies indicate that numeracy and financial literacy are driven not only by socio-economic factors like wealth, education and rural or urban status, but also by factors like innate ability, patience and learning effects. Financial literacy differs across gender, age, countries and socio-economic characteristics. As mentioned earlier, financial illiteracy is preponderant in countries with well-developed markets (Germany, United States, the Netherlands, Sweden, Italy, Japan and New Zealand) and developing market economies like Russia (Lusardi & Mitchell, 2011a).

Women are less financially literate than men, educated persons are more financially literate than the non-educated, older people overestimate their financial literacy, urban people are more financially literate than their rural counter-parts and minorities like Afro-Americans and Hispanics are less financially literate than the whites (Lusardi, 2012).

It is of interest to know whether financial education increases financial literacy. Mandell (2008) suggests that there is little correlation between financial education and performance scores of high school students in financial literacy tests. Carpena et al. (2008)

find evidence from a study of 1200 households in Ahmadabad from the Indian state of Gujarat that financial education does not aid financial investment decisions which require mathematical calculations. Thus, the research evidence suggests that financial education does not increase financial literacy.

It is expected that financially literate individuals would make better financial decisions resulting in value-maximizing economic outcomes. Bernheim, Garrett and Maki (2001) conclude that students exposed to financial education in their high school were more likely to accumulate greater wealth after reaching adulthood. Skimmyhorn (2012) reviews the contributions and savings plan of American soldiers and found evidence that soldiers who were administered financial education courses participated more in thrift saving plans with almost double contributions in comparison to those soldiers not enrolled in the course.

However, Gartner and Todd (2005) conclude from a study of online credit card education program for college students that financial literacy has no association with responsible credit card usage like maintaining credit balances and timeliness of payments. Thus, one finds mixed evidence that financial literacy improves economic outcomes of people.

To specify the link between financial literacy and income levels, Jappeli and Padula (2011) develop a model which predicted that the optimal stock of financial literacy of a person increases with her income levels and certain other factors like patience levels and the returns to financial literacy. The researchers recognize that acquiring any level of financial literacy by a person requires time and monetary resources and hence involves some costs. Therefore, persons with higher incomes may employ their resources to acquire financial literacy education. Mandell (2008) finds evidence that students from wealthier families in USA are substantially more financially literate than those from less wealthier families. Mandell ascribes this result due to the higher level of awareness on the importance of financial literacy by the wealthier families. This suggests that income levels of individuals are positively associated with their financial literacy levels.

### ***3.3 Motivation for Research***

As Friedman (1953) argued, just as pool players need not be physicists, people need not be financial experts to make optimal financial decisions. Financial knowledge can be imbibed by learning from other people's experiences and through trial and error. Applying these arguments in the context of Indian FDCs, it is expected that the JFM activities and assignment of property rights over forest lands would provide some exposure to the FDCs in project implementation, financial management, banking and interpreting land records which may influence their numeracy and financial literacy levels.

While there is some evidence on numeracy and financial literacy of urban (Agarwalla et al., 2012) and rural households (Rao, 2001) and fishing communities (Hapke, 2001) in India, there is no evidence on numeracy and financial literacy of Indian FDCs. This study attempts to fill that gap and provides some evidence on numeracy and financial literacy levels of the Indian FDCs. In addition, the study also provides some evidence on the linkages between numeracy and financial literacy levels.

## **4. Research Design**

### ***4.1 Study Area***

This study looks at the FDCs of the Indian state of Andhra Pradesh. A brief description of forests and JFM in Andhra Pradesh follows.

The forests of Andhra Pradesh, covering roughly 23% of the state's geographic area, is spread over 6.38 million ha and accounts for approximately 9% of India's total forest cover. Rich in biodiversity, the forests harbor tribes like the Gonds, Chenchus, Savara and the Yanadi.

The Government of Andhra Pradesh adopted JFM as a tool to rejuvenate the degraded forests in 1994. Since its adoption, 7718 JFM committees, called Vana Samrakshana Samithis (VSS), involving approximately 1.539 million people are functional in the State

managing 1.52 million ha (23.8% of total forest area in the State) of forest area.<sup>6</sup> In 2002, the State re-christened JFM as community forest management (CFM) indicating its commitment to encourage deeper community participation in the management of forests (Andhra Pradesh Forest Department, 2011).

The VSS hamlets were situated on the forest fringes which necessitated travelling and trekking in forests. Since unauthorized entry in forests areas is a punishable offence under the Andhra Pradesh Forest Act, 1967, permission was obtained from the Principal Chief Conservator of Forests of Andhra Pradesh for visiting forest areas and engaging with the VSSs in Rayalaseema and coastal regions of Andhra Pradesh for conducting the interviews and tests. The Forest department of the Government of Andhra Pradesh (APFD) provided transport, infrastructure and facilities for conducting these tests in the VSS hamlets and their regional offices.

The study draws samples from members of VSS situated in two regions in Andhra Pradesh: the Rayalaseema and the coastal regions. With the assistance of the APFD, two districts (Chittoor and Kadapa) in Rayalaseema region and one district (Nellore) in the coastal region of Andhra Pradesh were identified. From the records maintained by APFD at the district / division forest offices, four VSSs from Chittoor district, one VSS from Kadapa district and four VSSs from Nellore district were selected as the study VSSs. From each VSS, members were selected for the study from a sampling frame consisting of all the individuals who belong to the VSS.

#### ***4.2 Sample Description***

The study sample was spread over four VSSs (Sri Venkateshwarapuram, Mangapuram, Goplalpuram and Gadanki) in Chittoor district, one VSS (Indiranagar) in Kadapa district (both districts from the Rayalaseema region) and four VSSs (Chedimala, Peddavaram, Apparaothota and Kasumuru) in Nellore district from the coastal region of Andhra Pradesh. The nine VSSs were thus geographically dispersed across the districts of Kadapa, Chittoor and Nellore over an area span of approximately 175 sq. kms. The field

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<sup>6</sup> In Andhra Pradesh, the FDC is thus referred to as Vana Samrakshana Samithi in the regional Telugu language.

work for data collection was done during the months of May and June 2013. 149 members of VSS participated in the study. 75 members of VSS were from the Rayalaseema region while 74 members of VSS were from the coastal region of Andhra Pradesh.

In general, the forests allotted to the VSSs from the Rayalaseema region were degraded to a large extent and hence, community forest plantations were not fully successful. The revenue accrued in the joint bank account of these VSSs from community forestry projects under the JFM / CFM program is perhaps an indicator of the economic status of the members of the VSS. The last column of Table 4 reports the details of the revenues accrued to these VSSs from the assigned forests under the JFM / CFM program and deposited in the joint bank account as on 31/05/2013. The five VSSs from Rayalaseema region selected for the study have less than Rs. 10,000 each as revenues from community forestry works in their joint bank account. S. V. Puram and Mangapuram VSSs are situated 6 and 13 kms. from Tirupati town in Chittoor district. Gopalapuram VSS, situated 29 kms. from Tirupati, is running an eco-tourism unit since 2010. Gadanki VSS is situated 47 kms. away from Tirupati. Indiranagar VSS is situated 16 kms. away from Kodur town in Kadapa district.

The forests assigned to the VSSs from the coastal region in Nellore district, in general, contained fertile soil which was amenable for raising community plantations. As depicted in Table 4, all the four VSSs from the coastal region selected for the study have, on an average, more than Rs. 8,00,000 as revenues from community forestry works in their joint bank account from the JFM / CFM program as on 31/05/2013<sup>7</sup>. Besides forestry works under public programs, the members of these VSS have also benefitted from jobs available in the nearby towns like Nellore (20 kms. from Chedimala VSS and 29 kms. from Kasumuru VSS) and Kavali (15 kms. from Apparaothota VSS and 23 kms. from Peddavaram VSS).

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<sup>7</sup> The regional forest officers informed one of the authors that the amounts have not been disbursed to the members of concerned VSSs due to certain procedural issues. The members of VSS, who were invited to participate in this study in the division / range offices submitted representations to the forest officers requesting the release of the above amounts to the concerned VSSs.

## 5. Methodology

### 5.1 Numeracy

Gaurav and Singh (2012) used a simple questionnaire for estimating the numeracy levels of small scale rural farmers in Gujarat. This method is found suitable to elicit numeracy levels of people with low educational attainment and hence relevant to the study.

This study uses the questionnaire developed by Gaurav and Singh (2012) to test basic numeracy in vernacular Telugu to suit the study context. Please see Table 2. The ten questions described seek to assess basic notions of addition, subtraction, multiplication, proportions and test basic ideas about chance events.

### 5.2 Financial Literacy

Van Rooij, Lusardi and Alessie (2011) used a set of five questions to test basic financial literacy. The questions measure the ability to perform interest calculations (question 1), compound interest (question 2), inflation (question 3), time value of money (question 4) and money illusion (question 5). This questionnaire, rephrased in the regional language Telugu, is used to assess the financial literacy of the FDCs in the study and shown in Table 3.

Basu, Foster and Subramanian (2000) emphasized the intra-household positive externality effects of literacy of an individual on the rest of the household. The positive externality through proximity to literates may also apply to the VSS in an inter-household framework.

For each participant in the study, data on demographic and economic variables like land owned, age, sex, married status, children, whether household head or not, family size, years of education, whether managing committee member or not and monthly income were also collected and in a forthcoming study provides some econometric evidence on determinants of both numeracy and financial literacy.

## 6. Results and Discussion

Before describing the results, given the nature of the study it is useful to take a look at some descriptive statistics.

### 6.1 Summary Statistics for the Study Sample

Table 4 reports the descriptive statistics of the study sample. The members of VSS who participated in the study were primarily middle-aged individuals with almost equal participation from both the sexes. On average, the members of VSS participating in the study were 35 years old. Approximately, 52% of the study sample was women, though this varied between VSSs significantly.

The participants were from households with an average size of four members. The average household income was Rs. 4168 per month. On average, the individual members of VSS in the study had a monthly income of Rs. 2793. These income measures vary between the VSSs in the study sample.

Educational attainment of the members of VSS in the study sample was low. The members of VSS, on average, had just about 4 years of education. Approximately 43% of the sample in the study did not attend school and had zero years of schooling.

Also, 34% of the sample had attained some level of primary education (between one and seven years of schooling) and 14% had completed primary education. Of the 23% of the study sample who reported that they have obtained some high school education, only 9% completed high school education (passed the tenth standard) and are attending a pre-university college and about 6% completed the pre-university education (passed the twelfth standard). No member of VSS in the study sample had education beyond the pre-university level (twelfth standard) nor attended a degree college.

The members of VSS are reliant on forestry works under the state-funded JFM / CFM program for their livelihood. Overall, approximately 83% of the study sample depended on



the jobs under the JFM / CFM program though there was considerable variation amongst the VSSs ranging from 45% (Gadanki VSS) to 100% (Peddavaram, Kasumuru and Indiranagar VSSs). The remaining 17% of the sample comprised of wives who were home makers, the aged and infirm who could not undertake jobs in the forests and those dependent on poultry and livestock activities. The members of VSSs from the coastal region, on average, were more dependent on forestry jobs under the JFM / CFM program than the members of VSSs from the Rayalaseema region.

The members of VSS who participated in the study also owned small patches of land in the fringes of forests which was used for building semi-permanent or thatched homes, rearing poultry and livestock and raising vegetables, fruits and tubers. The average land-holding size was 0.33 acres per VSS household. Land is an important household asset class for the VSS household along with bovines, livestock and poultry. The average value of these assets per VSS household is Rs. 26,972 in the study sample which varies considerably between VSSs as there is significant variation in values of land depending on their fertility and proximity to *pucca* roads.

## ***6.2 Results: Numeracy and Financial Literacy***

### **6.2.1 Results by Percentage Correctly Answered**

Table 5 provides the details of the questions of the numeracy test that was administered and the percentage of correct responses to each question.

A correct answer to each question in the numeracy test was awarded one point. In addition, each member of the VSS was also requested to measure the dimensions of an empty rectangular cardboard crate and compute its volume (*Gana pramanam* in Telugu). A member of the VSS who correctly measured the dimensions of the carton and calculated the volume was awarded two points. Wrong answers were awarded a zero. The maximum possible score in the numeracy test is twelve points.

Similarly, a correct answer to each question in the financial literacy test was awarded one point. Wrong answers were awarded a zero. The maximum possible score in the financial literacy test is five points.

### *Numeracy*

From Table 5, it can be observed that members of VSS had less difficulty in computing when the mathematical questions were framed in the form of sentences which embedded contexts and situations from their daily lives as in questions 1-4. There were trivial variations in the performance of VSS members from the Rayalaseema and coastal regions of Andhra Pradesh for these questions.

However, the VSS members from both the regions faced difficulty in recognizing mathematical symbols and performing simple computations in addition, subtraction, multiplication and division as in questions 5-8. For example, only 33.56% of the overall sample was able to recognize the symbol for addition and correctly answer question 5 while 85.23% of the overall sample could perform addition and correctly answer question 1 which was in a sentence form.

An interesting pattern evident in Table 5 is that members of VSS from Rayalaseema region showed competency in recognizing mathematical symbols and hence scored higher in questions 5-8 than their counterparts from coastal Andhra Pradesh.

Questions 9 and 10 which sought to assess skills in probability and chance events were adapted from Gaurav and Singh (2012) who reported that 84.92% and 80.74% of the sample of rural farmers from Gujarat correctly answered these questions. From Table 5, it is seen that only 30.87% of the sample in the study could correctly answer questions 9 and 10 on probability and chance events. Further, only 6.71% of the overall sample was able to measure the dimensions of an empty rectangular carton box and correctly compute its volume.

Only 4% of the sample could answer all the 12 questions correctly. Overall, the results indicate that the sample of VSS members in the study possess poor numeracy skills as measured through the customized questionnaire.

### *Financial Literacy*

Table 6 provides the details of the questions of the financial literacy test that was administered and the percentage of correct responses to each question. The five questions described in Table 6 were adapted from Van Rooij, Alessie and Lusardi (2011) which had investigated financial literacy in the Netherlands. Only 2% of the sample in the present study correctly answered all the five questions while Van Rooij, Alessie and Lusardi reported that 40.2% of their sample from the Netherlands correctly answered all the five questions.

It can be observed that, on the whole, the VSS members of the sample had a hard time in processing financial information. Only 30.87% of the sample was able to correctly answer question 1 on simple interest. Van Rooij, Alessie and Lusardi (2011) reported that 90.8% of a sample of the Dutch population correctly answered this question.

Similarly, only 18.79% of the sample in the present study was able to correctly answer question 2 on price rise and inflation. Gaurav and Singh (2012) reported that 26.80% of the sample of rural farmers from Gujarat correctly answered this question. These results are roughly comparable.

Close to 50% of the sample of members of VSS in the study had no idea of the time value of money while Gaurav and Singh (2012) reported that 90% of the sample of rural farmers from Gujarat were ignorant of the time value of money.

Only 5.37% of the sample in the present study could correctly answer question 5 as the members of VSS found it difficult to comprehend the idea and power of interest compounding. Lusardi (2012) reported that 35% of the sample in Sweden correctly answered a similar question on interest compounding while Van Rooij, Alessie and Lusardi (2011)

reported that 76.2% of the sample from Netherlands correctly answered the question on interest compounding.

It was also observed during the administration of tests that several members of the VSS in the sample guessed the answer to question 4 on money illusion with no attempt being made to logically reason out the solution.

Overall, the findings indicate a low level of financial literacy amongst the members of the VSS.

### 6.2.2 Results by Scores Achieved in the Numeracy and Financial Literacy Tests

We further discuss the results from numeracy and financial literacy tests classified by sex, age, income and region. We discuss them separately below. Please see Table 7.

- **By sex.** Men scored higher than women in the numeracy test. The  $t$  test<sup>8</sup> revealed no significant difference between the two scores at the 5% significance level. Similarly, men scored higher than women in the financial literacy test. The  $t$  test revealed no significant difference between the two scores at the 5% significance level.
- **By age.** The study sample was classified by age into young adults (less than 30 years of age), middle aged adults (between 30 and 60 years of age) and the aged (greater than 60 years of age) following Prakash (1999) and Lalwani et al. (2004). From Table 7, it can be noted that the young adults scored higher than the middle aged adults and the aged in both the numeracy test and the financial literacy test.

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<sup>8</sup> Though the sample size is not small ( $n_1, n_2 > 30$ ), the present study uses the  $t$  statistic to test hypotheses about the difference in the means of the two independent populations because population variances are unknown and only sample variances of the test scores are used in the hypotheses tests. An underlying assumption in applying the  $t$  test is that the numeracy and financial literacy test scores are normally distributed for the men and women members of VSS population (Black, 2006).

The numeracy and financial literacy test scores of the three age groups were examined with the analysis of variance (ANOVA). Note that the members of VSS recruited for the study are not strictly random samples. Often, the VSS Chairman, the managing committee and the forest staff have been consulted for selecting the members of the VSS as these functionaries are better informed about the availability of the members of VSS. The members of VSS have a tendency to migrate in search of jobs and brides.

Another important underlying assumption is that the scores of VSS members in the numeracy and financial literacy test scores are normally distributed in the VSS population group. The results of ANOVA tests in the study should be viewed with the above constraints in mind. The assumption of equal population variances is examined in every case using the Bartlett test and suitable corrections have been applied in such cases (Black, 2006).

*Variations in numeracy scores within age groups.* The Bartlett test for homogeneity of variances revealed that the variances of the numeracy scores were unequal at the 5% significance level. Applying the correction for homogeneity, the ANOVA test revealed that there were significant differences between the numeracy test scores among the three age groups at the 5% significance level.

*Variations in financial literacy scores within age groups.* The financial literacy scores of the three age groups were examined with ANOVA. The Bartlett test revealed homogeneity of variances in the scores of the financial literacy test across the three age categories at the 5% significance level. There was no need for the correction for homogeneity. The ANOVA test revealed that there were significant differences between the financial literacy test scores among the three age groups at the 5% significance level. Please see Table 8.

Tukey's Honestly Significant Difference (HSD) test revealed that there was a significant difference between the financial literacy test scores of the young adults and the middle aged adults at the 5% significance level. This test also indicated that there was no significant difference between the financial literacy test scores of the young

adults and the aged groups at the 5% significance level. Similarly, the test detected no significant difference between the middle aged adults and the aged groups at the 5% significance level.

Taken together, the results suggest that the young adult members of the VSS from both Rayalaseema and coastal regions of Andhra Pradesh were relatively more capable in processing financial information and had a better understanding of fundamental economic concepts than the middle aged group.

- **By income.** The members of the VSS in the study were divided into three income categories based on the average daily wage rate fixed by the District Collectors of Chittoor, Kadapa and Nellore (Rs. 137 per day).

It was ascertained through interview that the members of VSS, on the average, worked in forestry or non-forestry jobs for 15 – 20 days per month. . This average earning of a member of VSS for a minimum period of 15 days (Rs. 2000 approximately) is taken to be her income at the subsistence level. Viewed from this perspective, it may be tentatively surmised that the typical member of VSS would consider a full 30-day monthly income at the wage rate of Rs. 137 per day (approximately Rs. 4000) as sufficient and plenty.

Using this information, the members of VSS whose individual income was less than Rs. 2000 per month were classified as low income groups. Members of VSS whose individual incomes were between Rs. 2000 – Rs. 4000 per month were classified as middle income groups and those with individual incomes greater than Rs. 4000 were classified as high income groups.

The mean monthly income of an individual member of VSS in the present study is Rs. 2793( $sd = 2578.90$ ) while the median monthly income is Rs. 2000. The bottom 25% of the members of VSS in the study sample earn a monthly income of Rs. 1500 and less while 75% of the members of VSS in the sample earn a monthly income of Rs.

3000 and less. The minimum monthly income of the members of VSS in the sample is Rs.0 (some women who are homemakers) while the maximum is Rs. 20000.

Using this classification, it can be noted from Table 7 that on an average, the higher income group of VSS members scored higher than the other two income groups in both the numeracy test and financial literacy test.

*Variation in numeracy scores within income groups.* The numeracy scores of the three income groups were examined with ANOVA. The Bartlett test revealed homogeneity of variances in the scores of the numeracy test across the three income categories at the 5% significance level. There was no need for the correction for homogeneity. The ANOVA test revealed that there were no significant differences between the numeracy test scores among the three income groups at the 5% significance level. Please see Table 9.

*Variation in financial literacy scores within income groups.* The financial literacy scores of the three income groups were examined with ANOVA. The Bartlett test revealed homogeneity of variances in the scores of the financial literacy test across the three income categories at the 5% significance level. There was no need for the correction for homogeneity. The ANOVA test revealed that there were significant differences between the financial literacy test scores among the three income groups at the 5% significance level. Please see Table 10.

Tukey's Honestly Significant Difference (HSD) test revealed that there was a significant difference between the financial literacy test scores of the middle income and the higher income groups at the 5% significance level. This test also indicated that there was no significant difference between the financial literacy test scores of the lower income and the middle income groups at the 5% significance level. Similarly, the test detected no significant difference between the higher income and the lower income groups at the 5% significance level.

On the whole, the above results suggest that the members of the VSS belonging to the higher income group were relatively more capable in processing financial information and had a better understanding of fundamental economic concepts than the middle income group. No definite inference can be drawn on the differences in the scores of financial literacy test between the middle income and the poor income groups as the results are not statistically significant.

- **By region.** The mean score of the members of VSS from both Rayalaseema and coastal Andhra Pradesh regions in the numeracy test was 4.89 ( $sd = 3.25$ ) and 1.32 ( $sd = 1.37$ ) in the financial literacy test.

Split region-wise, Table 7 shows that the members of VSS from Rayalaseema scored higher in the numeracy test and the financial literacy test than their counterparts from the coastal region. The  $t$  test revealed no significant difference between the numeracy test scores of members of VSS from Rayalaseema and coastal region at the 5% significance level. Similarly, the  $t$  test revealed no significant difference between the financial literacy test scores of members of VSS from Rayalaseema and coastal region at the 5% significance level.

The main trends discussed above which referred to the whole sample in the study is generally reflected in the samples of VSS members from Rayalaseema and coastal regions. For example, Table 7 shows that the mean scores of male members of VSS from Rayalaseema in numeracy test is higher than the mean scores of female members. Similarly, young adults, on average, score higher than the middle aged adults and the aged members of VSS from both Rayalaseema and coastal regions in the two tests. These main trends support similar findings in Lusardi (2012).

A surprising result is that the mean scores of women members of VSS from the coastal region were higher than their male counterparts in both the numeracy and financial literacy tests. The mean score of women members in the numeracy test was higher than the mean score of men from the coastal region. The  $t$  test revealed no



significant difference between the numeracy test scores of women and men from VSS of the coastal region at the 5% significance level.

Similarly, the mean score of women members in the financial literacy test was higher than the mean score of men from the coastal region. The  $t$  test revealed no significant difference between the numeracy test scores of women and men from VSS of the coastal region at the 5% significance level.

To further analyze the effects of achievement scores of members of VSS in numeracy tests on their achievement scores in financial literacy test, an ordinal logistic model was fitted with the numeracy test score (*ordn5*) as a numeric (but not ordinal) predictor variable and an ordinal measure of the financial literacy test scores of the members of the VSS (*ordfl*) as the dependent variable following the strategy employed in Zeiffler (n.d). Please see Tables 11 and 12.

Table 11 shows the details of the construction of the ordinal variables from the scores achieved by the members of the VSS in the numeracy and financial literacy tests. The observed levels of achievement by the members of the VSS in the numeracy test are  $y_i = 1$  (very low),  $y_i = 2$  (low),  $y_i = 3$  (moderate),  $y_i = 4$  (high) and  $y_i = 5$  (very high). Similarly, the observed levels of achievement by the members of the VSS in the financial literacy test are  $y_i = 1$  (low),  $y_i = 2$  (moderate) and  $y_i = 3$  (high).

Table 12 reports that at the 1% significance level, an increase in one level of achievement score in numeracy test by a member of VSS increases the odds of her attaining any level of achievement score in the financial literacy test by 319.8%.

The above results thus show that members of VSS who are numerate are also predicted to be financially literate. In a forthcoming study we take a detailed look at determinants of both numeracy and financial literacy.

## 7. Conclusion

Most studies on numeracy and financial literacy have focused on the developed economies (Hastings, Madrian & Skimmyhorn, 2012). While a few studies on numeracy and financial literacy have been made in the context of developing countries like India (Agarwal et al., 2010; Agarwalla et al., 2012; Carpena et al., 2008) and Russia (Klapper, Lusardi & Panos, 2012), their focus has been on urban individuals and households. A few studies have been made on the financial literacy of rural farmers in India as in Gaurav and Singh (2012) among others. The present study on the numeracy and financial literacy of Indian FDCs is a contribution to the literature.

Viewed in isolation, the performance of the members of VSS in numeracy (customized) and financial literacy (standardized) tests reveal that this demographic group has moderate numeracy skills and poor knowledge in financial literacy. Members of VSS, in general, were found to have difficulty in recognizing mathematical symbols for addition, subtraction, multiplication and division and perform the corresponding operations. However, they were generally able to perform addition, subtraction, multiplication and division when orally instructed in their local language without difficulty.

It was also observed during personal interviews that roughly a third of the members of VSS in the study sample had some basic knowledge of economic concepts like simple interest and time value of money (as reflected in their responses to the corresponding questions on financial literacy) perhaps due to their exposure to public funded forestry projects since the inception of JFM in 1990.

The results of the present study are encouraging when viewed from a historical and social perspective. A considerable portion of the study sample have had limited exposure to schooling and face risks and dangers on an every day basis from weather, animals and insects in view of their dependence on forests. As mentioned earlier, these communities have been exposed to some knowledge in numeracy and financial literacy due to their involvement in JFM since 1990.

With such a limited exposure, it is encouraging to note that a third of the sample in the present study were able to answer the questions on difficult concepts like probability and simple interest correctly. At least half of the sample in the study had a clear idea on the time value of money. These small achievements may be viewed as positive externalities of publicly funded forestry projects.

Considering the importance of numeracy in everyday living and its linkages to financial decision making (Lusardi, 2012), it is imperative that modules in basic arithmetic, interest calculations, inflation, time value of money and calculation of volume of objects be imparted early to children and adults of FDCs in the literacy programs as these areas of mathematics have a relevance to their daily life.

This knowledge may be required to enable the FDCs to verify the volume of earth work done and receive correct payments in the case of community forestry jobs from work contractors and Government officials. Numerate and financially literate members of FDCs would better understand the financial features of community forestry projects. At the household level, numeracy and financial literacy may help the FDCs to avoid debt traps and facilitate their borrowing decisions.

Aged adults and adults without educational attainment should not be neglected in this regard. The modules described above are even more relevant to these individuals as they may have to make important household investment decisions.

Some difficulties were experienced in conducting the tests and interview in forest hamlets which were uncomfortable for congregation and discourse purposes. Hence, to the extent possible, the interview and tests were conducted in the regional forest offices where basic infrastructure like sitting chairs, tables, drinking water and stationary was available.

The questions designed in the study to assess numeracy are a subset of the group of questions generally used in the literature. For example, in the standard numeracy test designed in Lusardi (2012), the questions pertaining to purchase of furniture at discount is

excluded in the present study. To this extent, the results emanating from the present study may not be comparable to the results derived from standard numeracy tests in the literature.

FDCs in general may have developed certain numeracy skills from their interaction with nature and other experiences in the wild which are relevant to their livelihoods in the forests. From the first author's experience from his job as an Indian Forest Service officer, such "homegrown" knowledge may include estimating the height of a tree by its shadow, assessing the weight of a heap of grass by its space occupied on the ground and forecasting the approximate number of rainy days in a season from the presence of specific species of mushrooms. The present study does not purport to capture these homegrown skills of FDCs.

Hastings, Madrian and Skimmyhorn (2012) note that there is little evidence on whether the set of questions designed by Lusardi and Mitchell (2011a) and other researchers including Van Rooij, Lusardi and Alessie (2012) is the best approach to measure financial literacy of people. It is also fully not settled as to whether questionnaires are the best suited instruments to assess financial literacy skills. The issue of which questions are the most effective in capturing financial literacy skills is also open. In this context, Hung, Parker and Yoong (2009) reported that the measures of performance of subjects in financial literacy tests do not predict their actual financial behavior and decision making.

The Reserve Bank of India has launched a massive program to improve numeracy and financial literacy in rural India during 2012 to improve credit counseling and enable informed decision making among the rural population (Gaurav & Singh, 2012). This present focus by the apex body adds relevance to the present study.

The study provided some information on the numeracy and financial literacy of Indian FDCs in Andhra Pradesh who were exposed to two waves of the JFM program since 1990. Research may enquire into the numeracy and financial literacy levels of FDCs in other Indian states which had varying exposures to the JFM program.

Given their heterogeneous culture and lifestyle owing to their residence in and dependence on forests for their livelihoods, inter-disciplinary research may be required to

spell out ways to design educational curriculum to improve the numerical and financial literacy abilities of Indian FDCs.

Table 1

*Forestry Projects Funded by World Bank in India during the Period 1992-2010*

<b>Sl. No.</b>	<b>Name of the project</b>	<b>State / project duration</b>	<b>Total Project Cost (\$ million )</b>
1.	Maharashtra Forestry Project	Maharashtra / 1992-2000	12
2.	West Bengal Forestry Project	West Bengal / 1992-1997	39
3.	Andhra Pradesh Forestry Project	Andhra Pradesh / 1994-2000	89.1
4.	Madhya Pradesh Forestry Project	Madhya Pradesh / 1995-1999	58
5.	Uttar Pradesh Forestry Project	Uttar Pradesh / 1997-2003	65
6.	Kerala Forestry Project	Kerala / 1998-2003	45
7.	Andhra Pradesh Community Forest Management Project	Andhra Pradesh / 2002-2010	126.91
<b>Total</b>			<b>546.01</b>

Table 2  
Questionnaire and Answer Choices to Test Numeracy

Question No.	Question	Answer Choices
1	If you have Rs. 10 and I give you Rs. 5, how much money do you have?	Rs. 20, <u>Rs. 15</u> , Rs. 10, Don't know, Refused
2	Suppose you want to buy sweets that cost Rs. 40. You only have one Rs. 100 note. How much change will you get?	Rs. 20, <u>Rs. 60</u> , Rs. 90, Don't know, Refused
3	If you have 4 friends and you would like to give each friend 2 laddus, how many laddus must you have to give away?	More than 8, <u>Exactly 8</u> , Less than 8, Don't know, Refused
4	What is one half of 600?	100, <u>300</u> , 500, Don't know, Refused
5	How much is $25 + 46 =$	61, <u>71</u> , 81, Don't know, Refused
6	How much is $450 - 125 =$	<u>325</u> , 350, 375, Don't know, Refused
7	How much is $5 \times 6 =$	<u>30</u> , 40, 40, Don't know, Refused
8	How much is $40 / 5 =$	6, 7, <u>8</u> , Don't know, Refused
9	<b>Bag I</b> has 2 black and 5 white stones. <b>Bag II</b> has 2 black and 50 white stones. If you shake the bags and take a stone from a bag without looking, from which bag are you <u>more likely to draw a black stone</u> ?	<u>Bag I</u> , Bag II, Don't know, Refused
10	If you take a stone from one of the above bags without looking, from which bag are you <u>more likely to draw a white stone</u> ?	Bag I, <u>Bag II</u> , Don't know, Refused

Table 3  
Questionnaire and Answer Choices to Test Financial Literacy

Question no.	Question	Answer choices
1	Suppose you had Rs.100 in a savings account and the interest rate was 2% per year. After 5 years, the money in your savings account is:	<u>More than Rs. 102</u> Exactly Rs. 102 Less than Rs. 102 Don't know Refused
2	Imagine you have Rs.100 in your savings account today. Also, the interest rate on your savings account is 1% per year and price rise is 2% per year. After 1 year, with the money in this account you would be able to buy:	More than today Exactly the same as today <u>Less than today</u> Don't know Refused
3	Assume that Mohan inherits Rs.10000 today (2013) and his sister inherits Rs. 10000 three years later in 2016. Due to this inheritance, the richer person is:	<u>Mohan</u> Mohan's sister They are equally rich Don't know Refused
4	Suppose that in the year 2013, your income has doubled and prices of all goods (like rice, dal, sugar and oil) have doubled too. In 2013, with this income you would be able to buy:	More than today <u>The same</u> Less than today Do not know Refusal.
5	Suppose you had Rs. 100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, in your account you would in total:	<u>More than Rs. 200</u> Exactly Rs. 200 Less than Rs. 200 Do not know Refusal.



Table 4  
Descriptive Statistics for the Study Sample, by VSS and Region

VSS	Age (Years)	Female (%)	Education (Years)	House hold size	Land (Acres)	Individual Monthly Inc. (Rs.)	Household Monthly Inc. (Rs.)	Household Assets (Rs.)	Occupation (%)	No. of Families / Population	VSS Revenue in Bank (Rs.) <sup>c</sup>
S. V. Puram <i>n</i> = 11	31.45 (12.57)	63.63	4.09 (4.85)	3.91 (1.38)	0.0 (0.0)	3236.36 (2173.14)	4872.73 (2322.97)	1627.27 (958.22)	72.72	26 / 172	1000
Mangapuram <i>n</i> = 13	31.31 (6.83)	46.15	7.31 (3.71)	6.23 (1.59)	0.0 (0.0)	4423.07 (5392.30)	6807.69 (4701.67)	3246.15 (3559.63)	76.92	32 / 187	1000
Gopalapuram <i>n</i> = 18	30.94 (10.38)	77.78	3.5 (3.79)	4.11 (0.9)	0.21 (0.54)	2250.0 (1833.11)	3583.33 (1751.05)	19100.0 (33405.95)	72.22	36 / 244	7300
Gadanki <i>n</i> = 22	34.00 (13.37)	59.09	8.86 (3.1)	4.86 (1.32)	0.27 (0.55)	1272.73 (1629.25)	2840.91 (1112.12)	26965.91 (29423.05)	45.45	52 / 306	2553
Indiranagar <i>n</i> = 11	39.91 (13.03)	36.36	1.09 (1.97)	5.00 (1.55)	1.05 (1.68)	3500.0 (2012.46)	3863.64 (1761.97)	48390.91 (75274.26)	100	40 / 209	1580
Rayalaseema <sup>a</sup> <i>n</i> <sub>1</sub> = 75	33.29 (11.69)	58.67	5.47 (4.48)	4.8 (3.78)	0.28 (0.81)	2668.0 (2956.22)	4154.67 (2776.17)	20392.67 (38777.58)	69.33	186 / 1118	-
Chedimala <i>n</i> = 14	48.57 (9.79)	0.0	0.86 (1.75)	3.71 (1.20)	0.11 (0.29)	2357.14 (1833.75)	3035.71 (1875.6)	71150.0 (188298.85)	92.85	72 / 498	14,57,433
Peddavaram <i>n</i> = 27	33.63 (13)	55.56	1.89 (2.76)	3.89 (1.58)	0.31 (0.87)	3074.07 (1650.78)	4314.81 (1856.11)	19370.37 (45102.61)	100	105 / 578	29,40,002
Apparaothota <i>n</i> = 21	33.86 (13.20)	57.14	3.14 (3.95)	3.76 (1.14)	0.83 (0.65)	2976.19 (2619.52)	3595.24 (2390.71)	45490.48 (32514.47)	95.23	77 / 512	8,10,055
Kasumuru <i>n</i> = 12	32.25 (14.89)	58.33	3.92 (3.94)	3.67 (1.07)	0.0 (0.0)	3125.0 (2659.5)	6250.0 (1768.15)	1250.0 (655.74)	100	63 / 257	18,57,888
Coastal Region <sup>b</sup>	36.30 (13.94)	45.95	2.38 (3.31)	3.78 (1.30)	0.37 (0.71)	2918.92 (2143.02)	4182.43 (2225.09)	33640.54 (88805.4)	97.30	317 / 1845	-

<i>n</i> <sub>2</sub> = 74											
<b>Full Sample</b> <b>N = 149</b>	<b>34.79</b> <b>(12.9)</b>	<b>52.35</b>	<b>3.93</b> <b>(4.22)</b>	<b>4.30</b> <b>(1.49)</b>	<b>0.33</b> <b>(0.76)</b>	<b>2792.62</b> <b>(2578.90)</b>	<b>4168.46</b> <b>(2509.15)</b>	<b>26972.15</b> <b>(68453.89)</b>	<b>83.22</b>	<b>503 / 2963</b>	<b>-</b>

*Note.* <sup>a</sup>*Rayalaseema* comprises S. V. Puram, Mangapuram, Gopalapuram, Gadanki and Indiranagar VSSs; <sup>b</sup> *Coastal Region* comprises Chedimala, Peddavaram, Apparaothota and Kasumuru VSSs; <sup>c</sup> This information was obtained from the District / Division Forest Offices Chittoor (East), Rajampet, Tirupati and Nellore; Standard deviations in parentheses.

Table 5  
Responses of VSS Members to the Numeracy Test

Question No.	Question Details	Percentage of members of VSS who answered correctly from		
		Rayalaseema	Coastal AP	Overall
1	If you have Rs. 10 and I give you Rs. 5, how much money do you have?	82.67	87.84	85.23
2	Suppose you want to buy sweets that cost Rs. 40. You only have one Rs. 100 note. How much change will you get?	84.00	83.78	83.89
3	If you have 4 friends and you would like to give each friend 2 laddus, how many laddus must you have to give away?	48.00	62.16	55.03
4	What is one half of 600?	58.67	54.05	56.38
5	How much is $25 + 46 =$	40.00	27.03	33.56
6	How much is $450 - 125 =$	34.67	22.98	28.86
7	How much is $5 \times 6 =$	38.67	29.73	34.23
8	How much is $40 / 5 =$	32	18.92	25.50
9	<b>Bag I</b> has 2 black and 5 white stones. <b>Bag II</b> has 2 black and 50 white stones. If you shake the bags and take a stone from a bag without looking, from which bag are you <u>more likely to draw a black stone</u> ?	32.00	29.73	30.87
10	If you take a stone from one of the above bags without looking, from which bag are you <u>more likely to draw a white stone</u> ?	32.00	29.73	30.87
11	Measuring the dimensions of an empty rectangular cardboard carton box using a measuring tape and computing its volume	10.67	2.70	6.71

Table 6  
Responses of VSS Members to the Financial Literacy Test

Question No.	Question Details	Percentage of members of VSS who answered correctly from		
		Rayalaseema	Coastal AP	Overall
1	Suppose you had Rs.100 in a savings account and the interest rate was 2% per year. After 5 years, the money in your savings account is:	38.67	22.97	30.87
2	Imagine you have Rs.100 in your savings account today. Also, the interest rate on your savings account is 1% per year and price rise is 2% per year. After 1 year, with the money in this account you would be able to buy:	22.67	14.86	18.79
3	Assume that Mohan inherits Rs.10000 today (2013) and his sister inherits Rs. 10000 three years later in 2016. Due to this inheritance, the richer person is:	60.00	43.24	51.68
4	Suppose that in the year 2013, your income has doubled and prices of all goods (like rice, dal, sugar and oil) have doubled too. In 2013, with this income you would be able to buy:	24.00	12.16	18.12
5	Suppose you had Rs. 100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, in your account you would in total:	4.00	6.76	5.37

Table 7

Mean Scores Achieved by Members of VSS in Numeracy and Financial Literacy Tests Classified by Region, Age, Sex and Income

Category	Classified into	Sample size	Mean Scores of members of VSS from Rayalaseema in		Sample size	Mean Scores of members of VSS from coastal region in		Sample size	Mean Scores of members of VSS from both regions in	
			Numeracy	FL		Numeracy	FL		Numeracy	FL
<b>Sex</b>	Men	31	5.67 (3.26)	1.74 (1.36)	40	4.45 (2.81)	1 (1.28)	71	4.98 (3.05)	1.32 (1.36)
	Women	44	4.54 (3.61)	1.32 (1.25)	34	5.15 (3.25)	1.29 (1.57)	78	4.81 (3.45)	1.31 (1.39)
<b>Age</b>	Young	40	5.48 (3.75)	1.45 (1.34)	33	6.21 (3.48)	1.81 (1.69)	73	5.81 (3.63)	1.62 (1.51)
	Middle	32	4.66 (3.18)	1.59 (1.32)	39	3.64 (1.99)	0.62 (0.85)	71	4.1 (2.62)	1.06 (1.18)
	Aged	3	2.67 (2.30)	1 (1)	2	3 (1.41)	0 (0)	5	2.8 (1.79)	0.6 (0.9)
<b>Income</b>	Low	16	3.75 (3.75)	1.31 (1.08)	16	4.75 (3.61)	1.19 (1.33)	32	4.25 (3.65)	1.25 (1.19)
	Middle	33	5.24 (3.26)	1.36 (1.41)	30	4.07 (2.68)	0.53 (0.97)	63	4.68 (3.03)	0.97 (1.28)
	High	26	5.5 (3.57)	1.77 (1.31)	28	5.54 (2.92)	1.75 (1.62)	54	5.52 (3.22)	1.76 (1.47)
<b>Overall</b>		<b>75</b>	<b>5.01(3.5)</b>	<b>1.49 (1.31)</b>	<b>74</b>	<b>4.77 (3.02)</b>	<b>1.14 (1.42)</b>	<b>149</b>	<b>4.89 (3.25)</b>	<b>1.32 (1.37)</b>

*Note.* FL = Financial Literacy; Members of VSS have been classified, by age, into young adults (“Young”), middle aged adults (“Middle”) and the aged. The study sample was classified by age into young adults (less than 30 years of age), middle aged adults (between 30 and 60 years of age) and the aged (greater than 60 years of age) following Prakash (1999) and Lalwani et al. (2004). Figures in brackets refer to the sample standard deviation.

Table 8  
ANOVA for *flscore* ~ *agecat*

Source	Sum of Squares	<i>Df</i>	Mean Squares	<i>F</i> value	<i>p</i>
<i>agecat</i>	13.94	2	6.97	3.851	0.0234
Residuals	246.23	146	1.81		

*Note.* *agecat* is a nominal variable denoting the age category to which the members of VSS belong. The study sample was classified by age into young adults (less than 30 years of age), middle aged adults (between 30 and 60 years of age) and the aged (greater than 60 years of age) following Prakash (1999) and Lalwani et al. (2004). *flscore* is the score of the member of VSS in the financial literacy test.

Table 9  
ANOVA for *nscore* ~ *inccat*

Source	Sum of Squares	<i>Df</i>	Mean Squares	<i>F</i> value	<i>p</i>
<i>inccat</i>	37.1	2	18.57	1.769	0.174
Residuals	1533.1	146	10.50		

*Note.* *inccat* is a nominal variable denoting the income category to which the members of VSS belong. Members of VSS whose individual income was less than Rs. 2000 per month are classified as low income groups. Members of VSS whose individual incomes were between Rs. 2000 – Rs. 4000 per month are classified as middle income groups and those with individual incomes greater than Rs. 4000 are classified as high income groups. *nscore* is the score of the member of VSS in the numeracy test.

Table 10  
ANOVA for *flscore* ~ *inccat*

Source	Sum of Squares	<i>Df</i>	Mean Squares	<i>F</i> value	<i>p</i>
<i>inccat</i>	18.37	2	9.184	5.161	0.0068
Residuals	259.81	146	1.779		

*Note.* *inccat* is the income category to which the members of VSS belong. Members of VSS whose individual income was less than Rs. 2000 per month are classified as low income groups. Members of VSS whose individual incomes were between Rs. 2000 – Rs. 4000 per month are classified as middle income groups and those with individual incomes greater than Rs. 4000 are classified as high income groups. *flscore* is the score of the member of VSS in the financial literacy test.



Table 11

*Details of Generation of Ordinal Level Variables (ordn5 and ordfl) from Scores of Members of VSS in Numeracy (nscore) and Financial Literacy (flscore) Tests.*

Numeracy Test		Financial Literacy Test	
<i>nscore</i>	<i>ordn5</i>	<i>flscore</i>	<i>ordfl</i>
0 - 2	1 (Very Low)	0 - 1	1 (Low)
3 - 5	2 (Low)	2 - 3	2 (Moderate)
6 - 8	3 (Moderate)	4 - 5	3 (High)
9 - 10	4 (High)		
11 - 12	5 (Very High)		

*Note.* *nscore* and *flscore* are the numerical variables which denotes the achievement scores of members of VSS in the numeracy and financial literacy tests. *ordn5* and *ordfl* are the corresponding ordinal level variables generated based on *nscore* and *flscore* as shown above.

Table 12  
*Ordinal Logit Estimation showing the Relation between Achievement Scores in Numeracy  
 and Financial Literacy Tests, Odds Ratios*

Dependent Variable : <i>ordfl</i>		
Independent Variables	$\beta$ (se)	<i>p</i> value
<i>ordn5.dupe</i> (integer)	4.198 <sup>***</sup> (0.213)	0.0
<i>N</i>	149	
Residual Deviance	186.837	
AIC	192.837	

*Note.* Standard errors are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . *ordfl* is the ordinal level variable generated based on the scores achieved by members of VSS in the financial literacy test. *ordn5.dupe* is an integer that is numerical in nature derived from the ordinal level variable *ordn5* generated based on the scores of members of VSS in the numeracy test. Please see Table 11.

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