

An aerial, hand-drawn sketch of a rural settlement. The drawing shows a central path or road that branches out into several smaller paths. Along these paths, there are various types of buildings, including simple houses, larger structures that could be schools or community centers, and what appear to be small shops or stalls. There are also some trees and open areas scattered throughout the settlement. The style is a light, sketchy drawing, possibly done with charcoal or pencil, giving it a sense of a conceptual or preliminary plan.

## PART II

### Research Project Reports

**A**fter the first workshop, participants returned home and, in consultation with their organisations, reworked their research designs. They then set about conducting the research and writing up their research reports, which they presented at the second workshop. In Part II, you will get to read reports of six research studies that were submitted. The studies, rich in detail, document a number of interesting local literacy and numeracy practices. They also examine the larger contexts and power relations within which these practices are embedded. The studies threw up several questions, which were debated and discussed at the workshop. A brief description of some of these are described in the concluding section.

## MAPPING THE LITERACY ENVIRONMENT IN TWO VILLAGES IN UTTAR PRADESH

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### ORGANISATION

Nirantar  
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### RESEARCH AND TEXT

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### INPUTS

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This study by Nirantar tries to map the literacy environment in two villages in Lalitpur district of Uttar Pradesh, India. Nirantar members from Delhi and local facilitators were involved in the study. Walks through the villages, visual documentation and then individual interviews were employed to ascertain the different types of ‘texts’ available in the villages — both in the external environment (public spaces like walls, buildings, shops), and within Dalit homes. Further, the contexts of these texts — who reads and writes them, and what relations of power they reiterate — are explored.

### INTRODUCING THE STUDY

Nirantar, a resource centre for gender and education, located in New Delhi, initiated a community-based literacy, education and empowerment programme for women and adolescent girls, in 20 villages in Lalitpur district (one of the 200 poorest districts in India) in the North Indian state of Uttar Pradesh (UP) in 2002. The programme is called Sahjani Shiksha Kendra (which roughly translates as ‘Women’s Education Centre’). The programme works with nearly 500 women and girls through different activities such as village-level literacy camps and discussion sessions, residential literacy camps, village-level centres and production of local material. The programme focuses on the Dalit community, which is invariably the most economically and socially deprived community in the Indian rural context. The literacy and educational process is holistic, rooted in the lived realities of the women participants, and enables them to develop analytic and leadership skills. The local team comprises 15 facilitators who are from the area and two local coordinators, most of whom have limited years of formal schooling.

### Research Questions

Through this research study we wanted to map the literacy environment in two villages with a view to exploring how the findings of the research can feed into developing literacy material locally. As the topic was fairly broad, after considerable discussion we

narrowed the scope of the study and formulated the following research questions:

- What written 'literacy texts' are available in the external environment of two villages in UP? In what larger contexts are these texts embedded? Who reads them? Who writes them? What value is associated with them? We use the term 'texts' very broadly to include written material of different kinds. The external environment refers to public spaces like walls, buildings, shops, etc.
- What texts are available within Dalit homes? In what larger contexts are these texts embedded? Who reads them? Who writes them? What value is associated with them?

#### Research Methods and Process

The study was conducted in two villages, Gauna and Korwas, where Nirantar runs education centres.

The research methods we employed for this study were a village walk and individual interviews. The village walk covered both the Dalit and upper-caste *bastis* (neighbourhoods). On the village walk we spoke to various people about the texts and later also made enquiries about specific texts. For the home environment we focussed on the Dalit community and identified texts found in three households in each village.

We decided to make this process both a research and collaborative learning process and thus included some of our local facilitators in the research. As they had not participated in the training, Nirantar members conducted a short orientation for them. Two teams, one for each village, comprising a member of Nirantar (Delhi), the facilitator of that centre and one local coordinator, did the initial fieldwork. Before beginning the fieldwork the teams met and discussed the objectives of the study and methodologies that they would adopt. A broad checklist of texts and documents to look out for was also drawn up to serve as a guide. However, we did worry about whether we had intervened too much as a result of using the checklist. Team members took detailed field notes, which were processed collectively in workshop mode. After this first round different members went back to the villages to gather further information where gaps were perceived. All the material was finally sifted and analysed at a workshop.

"When interviewing, we used a checklist of ideas for written materials. Though we tried to use it as little as possible, we probably ended up prompting people with questions such as, 'Do you have a calendar in your house? Do you have a marriage record book?' It was hard for people to generate their own list of things. But was this the right way to do things? We felt we got a lot more information this way, and we did not have much time, but are not sure if that was too much intervention."

#### The Study Setting

Both the study villages, Gauna and Korwas, are large villages. Gauna has a population of 1,400 of many different castes. By way of facilities, it has a Primary Health Centre, two schools (primary and middle), a public telephone booth and several small grocery stores. The village has a *pucca* (tarred) road and good access to road transport. Both the upper-caste and Dalit *bastis* have electricity and the houses, even in the Dalit *basti*, are made of brick.

Korwas is a mixed-caste village with a population of 1,621, but is not as well endowed as Gauna. It has a primary school, a few small grocery shops (mainly in the upper-caste *bastis*) and a ration shop (a public grain-distribution shop). There is no *pucca* road to the village. The main road is 8 km away from the Dalit *basti* and 4 km from the upper-caste *basti*. Korwas is difficult to access in the rains. There is no regular public transport to the village. Only some houses in the upper-caste *bastis* have electricity.

The settlements of both villages are broadly divided into three sections on the basis of caste groupings — Dalits or 'lower castes', the 'middle castes' and the 'upper castes'. There is mobility between the middle- and upper-caste *bastis*, but not between the Dalits and other caste groups. Dalits rarely enter the other caste neighbourhoods unless they have to pass through or need to visit them for some specific purpose. It is equally rare for other castes to visit the Dalit *basti*. In both villages the Dalit *basti* is a little removed from the main village.

#### RESEARCH DATA AND ANALYSIS

##### Written Texts in the External Environment

During our walk through the village we found that several walls had writing on them and that the range of texts was quite vast — from government information and slogans, election signs, religious writing, good wishes, wedding announcements to even love messages. The writing style and language also varied considerably, as we shall see from the examples below.

##### Government Information

We found that a significant amount of the wall-writing concerned government information and messages. A lot of this information was in the form of slogans — messages on the importance of hygiene or the value of education. These slogans were generally written on walls which were located more centrally in the villages or on public buildings, like the walls of schools, public health centres etc. For example, the slogans on the school walls read 'Ghar Ghar Vidya ka Deep Jaalao' (Light the lamp of knowledge in every home) and 'Padho, Padhao... Desh ko Aage Badhao' (Study, teach... Take the nation forward).

Another set of wall-writings communicated information about government schemes. For example, in the upper-caste *basti* in Korwas, there was a board carrying information on the construction of a small dam in the village. The information was factual, with details of coverage area of the dam, time frames for completion, etc. The information had clearly been written by a professional painter, was in very small type and had a lot of information crammed in. All of this had been put up as a mandatory requirement of the government to provide information regarding public schemes.

But who reads this information? When we were looking at the board there were a number of men from the upper-caste *bastis* sitting around and we started talking to them. They could all read the information but hadn't actually read it before (though they knew what it was about). We later found out that the men of the Dalit *basti* could not read the information as it required higher levels of literacy. But they too were aware of the content of the messages. Women, on the other hand, had neither read the information nor did they have any idea of what it said. The women we spoke to said their mobility was limited and restricted, they are mostly in purdah, and stopping to read a signboard would not be culturally acceptable. So even literate women would never stop to read a public sign.

“All the government-related information was in formal language. One could surmise that the ‘target audience’ for such information and messages would be upper-caste men. It was clear that factors like education levels, exposure and mobility are very gendered, and that men have an upper hand in these.”

### Election Slogans

Election slogans and symbols visible on most of the walls in the villages had been written during the Panchayat elections that had been held earlier that year. These slogans utilised texts as well as symbols, stating the names of candidates along with their party symbols. The writing was large and very legible. In some places abbreviations had been used for names of political parties. Most of the women we spoke to did not understand the abbreviations even if they could read them. By and large, most women and men recognised the candidate and political party from the symbols. People also commented that they had read the messages at the time of the elections, and that they were now just decorative elements.



Clockwise from top left: A notice outside a health centre; the gates of a school; names on a wall written by a newly literate woman; information on a children's environment scheme and good luck messages outside a home; a Panchayat election symbol; a slogan on education



### Wall-writing in the Dalit *basti*

We entered the village through the Dalit *basti*. There was so much written on the walls — none of it uniform or neat. We reached Siyarani's house in the Dalit *basti*. On the wall of her house there were interesting illustrations and texts. We asked her to read what was written. She read 'Shubh Laabh' (good luck), 'Deepawali' (festival of lights), 'Mor' (peacock) and 'Kalicharan'. Kalicharan, we learnt, was her son's name and he had done all the writing. We also noticed a heart with an arrow with 'I Love You' written in Hindi. We asked Siyarani to read what was written inside the heart. She was able to read it but did not know what it meant. She said, "My son wrote something that makes no sense." The writing and the drawings had been made with blue paint and *geru* (red-coloured paint). The writing was neat but it did not look like the work of a professional artist. On the walls of Siyarani's kitchen, we found that she had written her name and the name of the village, 'Korwas'. We asked her if there was anything else that she had written. She told us that she writes her name and her husband's name on the sacks of wheat that are taken to the *mandi*. She also writes the names of various grains and vegetables on the sacks that come to her house.

Research Notes



This page: Wall writings on Siyarani's house. Right: a bank passbook and an envelope for a wedding invitation

### Wall-writing on Houses

Walls of individual houses also had a number of things written on them. These included polio immunisation messages, religious texts, names of family members, names of newly-wed couples, poetry, some drawings like flowers, earthen lamps etc. Almost every house in the village had polio immunisation messages on their façades,

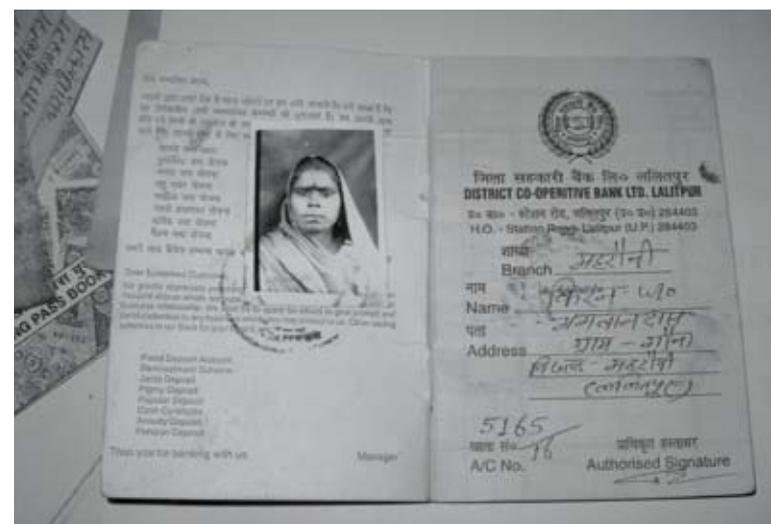
near the front door. Everyone knew that the health worker had written it after giving the children in that house polio drops. No one, including us, could decipher what had been written, except the date. Clearly, this was not general information but code, and was valuable only to the health worker when she came around the next time. Most houses had religious symbols and messages painted on the walls. A common message was 'Shubh Laabh, Lakshmi Sada Sahay Kare' (May Goddess Lakshmi always bless this home). Lakshmi is the goddess of wealth and many Hindu homes have this as a good luck message. These texts had been written by family members. Also a number of houses where marriages had taken place had messages blessing the newly-weds written on the walls.

### General Observations

Our observations and discussions clearly showed that it is the men in the community who are generally engaged in writing and reading information in the public places. This was because public spaces are largely out of bounds for women. In contrast, women who had at least been to the literacy centre had written and drawn on walls within the home.

We also noticed a significant difference in the amount of wall-writings in the Dalit and upper-caste *bastis*. The walls of the upper-caste *bastis* looked freshly painted and did not have as much written on them. On enquiring we were told that the houses in the upper-caste *basti* had been recently painted because of *Makar Sankranti*, celebrated a few days before our visit. All castes celebrate the harvest festival, but clearly it is celebrated more grandly by the upper castes. In the upper-caste *basti* the slogans were generally seen on walls of schools and public health centres, and not on the walls of the houses. There were several instances during the village walk when we came across people who knew the content of the message even though they could not read it. Wall-writing seemed to form an important part of the 'background', something that was there but did not really have to be read.

### Texts within Dalit Homes



The interviews revealed a wide range of written texts within the homes — wedding invitation cards, school textbooks, account books, visiting cards, land documents, condolence cards, and ration cards. Below are our observations around some of these texts.

### Calendars

Calendars — ‘English’ and the *Panchaang* — were available in a number of homes. *Panchaang* is a type of calendar used by Hindus and has lunar days marked as well. People said that since the *Panchaang* has a lot of details and is difficult to read, most people preferred to consult the *pandit* or religious head in the village for this information. We found that a number of houses had ‘English’ calendars but reading them did not seem to be an everyday practice. A few said these calendars were used to mark or read dates of important ‘official’ events — court dates, bank loan repayment dates, etc. Again, this was a male domain. School-going children referred to calendars to find out when school holidays were and so on. Some women who attend the Sahajani Shiksha Kendra educational centre have also started reading calendars. They said that they did so to remember dates of meetings or trainings. A number of the women we spoke to could read the numbers but could not read the days of the week or month.

We found calendars of previous years still hanging on the walls of many homes. Calendars are colourful, have pictures of gods and goddesses and, not surprisingly, are used for decorative rather than functional purposes. Calendars, especially the *Panchaang*, are expensive. Many people wait to get a free calendar, which they could get from a business partner or a shop that they regularly frequent. At election time calendars were distributed with the names of the candidates printed. People rarely seem to buy a calendar.

### Financial Records

We found a variety of documents that recorded financial transactions. For example, we found that most households kept a notebook where they recorded different things, in no particular order.

Excerpts from notebook in Siyarani’s house The notebook in Siyarani’s house had details of various transactions and detailed accounts:

- Money spent on a pilgrimage to Mathura, the distance covered, the amount given as a donation at temple, money spent on *prasad* (temple offering).
- Records of money spent to hire an irrigation machine, the duration for which hired (since the machine is hired out on an hourly rate) and the amount spent on diesel.
- Details of presents and cash received at a family wedding.
- Receipts from Siyarani’s son’s school.



Clockwise from left: a *Panchaang* (Hindu calendar); a calendar distributed free by political parties; a page from a notebook

Siyarani and her husband said it was important to keep these accounts in joint families, where finances were commonly managed, as they should be able to “answer anyone at any time”. Her son and husband had maintained the notebook. Siyarani could not read these texts. She told us that she could read clear handwriting or type but not cursive handwriting.

Every household also maintained a ‘marriage gift notebook’. These notebooks have a record of the names of the guests who attended the wedding and the gifts they had given. The records are used to give gifts of the same value in return. Written records are mostly kept as proof to avoid any cheating or for future verification.

“Accounts are kept not for planning or financial management. People’s memories are very good so written accounts are for accountability and for proof. If we need to write things down to remember them, then we might assume that that’s why people write things down, whereas that may not be why at all. This shows how our perspective can colour our interpretation.”

We found small scraps of paper with numbers written on them in many homes. Non-literate women and men ask for these receipts from shopkeepers when they go to the market to sell small amounts of grain or ghee. They do so to ensure that they are not cheated. They usually get the receipts read by other literate people in the bazaar itself and also bring them home to be checked by their husbands or sons. It is difficult to decipher what is written on these papers, and women kept referring to it as ‘Urdu’ to emphasise

that it was in an unknown language (when in fact they were written in Hindi).

In all the households, documents, papers and other records are used, read and managed by the male members in the family. This seemed to follow from the fact that men are in charge of the finances. Women handle small amounts of money and make small purchases but men take decisions regarding larger purchases and sales. But even in situations where women handled money, as in cases where they managed small home-based shops, it was the men of the family who maintained the written accounts.

#### Women's Access to Written Documents

When we reached Ramsakhi's house we found her sitting at the doorstep. She invited us in. Ramsakhi runs a shop from her home. That is why she wants to learn to read and write. When we told her why we had come, she looked worried. She thought we had come to test her. She kept saying there was nothing in her house, only the children's schoolbooks. It was only after her husband came home that she began to bring out the notebooks (largely because he was instructing her to). When we asked about papers related to the family land, Ramsakhi looked clueless. Her husband got up and brought out the papers. It felt strange that Ramsakhi and I should be in the same situation — we were seeing the papers of her family land for the first time together! We pored over the papers. Ramsakhi turned the pages, her fingers quivering with excitement. After all, it is not every day that a village woman gets to hold and see land papers. As we left her home, she told us that she would probably never see them again.

Research Notes

#### CONCLUDING OBSERVATIONS

Probably the most important observation emerging from the study is that literacy texts are embedded in relations of power. In this study we saw this in terms of gender and caste relations. What is written, who writes it and who reads it are determined by these relationships. The study shows that access is not neutral. There is written material available but women do not have the opportunities and are, in fact, not permitted to read it. Thus programmes trying to enrich the literate environment or working to get marginalised communities to enter the world of letters must also understand these dynamics.

Following from this is the need to recognise that simply including local texts in teaching-learning material is not enough, unless we also equip learners to engage with these in real-life contexts. For instance, if our programme decides to include reading wall-writing as one of the activities, this would mean negotiating a variety of power relationships, such as dealing with issues of women's mobility in the public domain, even before we could get to the actual act of coding and decoding what is written.

As practitioners we often say that there is hardly any literacy material available in rural contexts. By using a broad definition of what constitutes a text we actually found a rich variety of material available. While it is true that we did not come across many books or newspapers, things were being written and read in the rural context. Moreover, what most literacy programmes, including ours, consider as texts is not what is found in the real world. We found that there was hardly any written material that did not have both numbers and letters. Yet most programmes have separate literacy and numeracy material. At a practical level, we realised that if we are to get women to negotiate locally available material we would also have to help them engage with handwriting and not typed material alone.

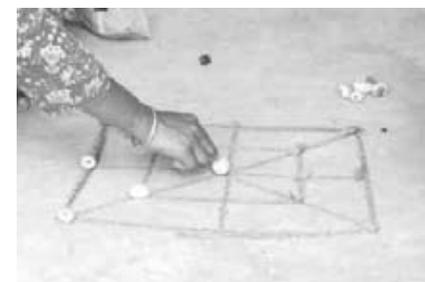
The research study was a learning experience for all of us including the 'local' team members who, despite being local, realised that they did not have a nuanced and detailed understanding of locally available texts and the literacy and numeracy practices around these texts. Using an ethnographic perspective to map the literate environment enabled us to understand in greater depth the nature and range of available literacy texts and the larger literacy, numeracy and communicative practices in which they are used and are embedded. Our future efforts in developing curriculum and the teaching-learning process would be enriched if informed by this understanding.

"I enjoyed just walking around the village and looking at the written texts that were available, noticing things I had not noticed before. We asked them what they have to read and they said, 'Nothing'. Then we collected so many things — betting cards, ID cards, postcards, ration cards, wedding cards ..."

#### FOLLOW-UP SUGGESTIONS

- Explore in greater detail practices around some specific texts that Nirantar feels can be included in the teaching curriculum.
- See if there is a difference in the texts available in the homes of different castes.
- Map what other kinds of textual materials are available, which may not necessarily be 'functional'.

## DOCUMENTING INDIGENOUS GAMES IN RURAL BANGLADESH



In Bangladesh, the indigenous knowledge and practices of rural communities receive barely any attention from academia or the educational sector. Educated sections of society have yet to recognise and appreciate the rich experiential knowledge of the socially and economically backward people. One such neglected area is the numerous everyday numeracy practices of rural non-literate communities. This study, which documents numeracy practices around games played by rural Bangladeshi adults and children, is a small step towards filling this gap.

### INTRODUCING THE STUDY

The study was conducted in northern Bangladesh, which is the least economically developed area of the country. The area has the lowest per capita income in the country. The region is primarily rural and traditional agriculture is the most significant activity here. Forty-seven per cent of the population in these parts is landless and ekes out a living as agricultural labour.

In the *Monga* period, an agriculturally lean period which covers August, September and October, most men migrate to other parts of the country to earn wages. Women and children remain behind in the villages. As there are few employment opportunities, people have spare time on their hands. They often fill this by playing a variety of indigenous games. There are some games which are very popular among children and some among the adults. Along with games, adults also spend their time in *addah*. Riddles and puzzles are common features of these *addahs*. These riddles and puzzles, usually in rhyme, often deal with mathematical concepts. This is an age-old mathematical tradition among poor, non-literate people.

### Objectives

The specific objectives of the study were:

- To identify the recreational activities of the people of the targeted communities.

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ORGANISATION  
Plan Bangladesh

RESEARCH AND TEXT  
S.M.M. Kabir

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Probak Karim (Learning Specialist)

- To understand the role of numeracy in the games played by the women and children of these communities.
- To discover insiders' perspectives of numeracy and its significance in recreational activities practised as part of their daily life.

### Methodology

The study was fundamentally exploratory and provides an in-depth documentation of a few indigenous games. As the study adopted an ethnographic approach, the researcher steered clear of making any value judgements. Instead the researcher tried to understand and learn from the practices through observation and informal discussion. Interestingly, these understandings later raised more questions and indicated the need for further investigation, which is mentioned in the later part of this paper.

This was a qualitative study using multiple methods. Informal and semi-structured interviews played a significant role throughout the study. Observation was another important method that helped the researcher understand the people and their practices, and audio-visual documentation of the selected events was used. Filming and interviews were done with the permission of the participants.

The study was conducted in part of Plan Bangladesh's operational area in northern Bangladesh. The study covered two villages. Due to the longstanding goodwill that Plan Bangladesh had generated in these communities, the researcher was welcomed. The recreational games vary from season to season; thus the study only covers those games that were being played at the time of the field visits and is therefore not a documentation of all recreational games.

## RESEARCH DATA AND ANALYSIS

### Research Data about Three Popular Recreational Games

#### Game 1: Dang Guli

**Number of participants** Two to eight, sometimes 10

**Material** One stick about 6 inches long and another stick 24 inches long

**Rules** First, a small shallow hole is made in the ground. To decide who will begin, the children put a coin inside the palms of two team leaders in handshake position, and they then jointly throw the coin in the air. The child who wins the toss goes first. The small stick is placed in the hole and the big stick is used to flip the small stick up and hit it as far as possible. If anyone catches the small stick in the air, the player is out.

If the stick is not caught, any of the participants can throw the small stick towards the long stick, trying to touch it or get it within the reach of one hand (measured from the elbow to the middle finger). If thrown successfully, the player who hit the small stick earlier is out. If he is not out, he strikes the small stick with the big one to make it jump

in the air and hits it with the bigger stick and tries to hit it as far as possible. This is done thrice and the distance covered is measured with the larger stick by turning the stick end over end. If the player can strike the smaller one two to three times in the air, the measurement will be double or tripled.



Children playing Dang Guli

**Analysis** This is one of the most popular games played in rural Bangladesh. There are many numeracy tasks hidden in this game. At the beginning of the game, when the player hits the small stick, the player has to estimate the distance to the opposite player as well as determine the angle with which to hit the stick to avoid getting out. Even when the player from the opposing team throws the stick back to hit the larger stick or to reach within one hand of the hole, he also needs to estimate the distance before throwing. Winning is dependent on the best combination of distance estimation, targeting the points and throwing.

The system of keeping score helps develop two basic maths skills. The players try to set a score on an approximate mental measurement of the distance through negotiation; otherwise they have to measure the distance with the stick. Sometimes the score is doubled or even tripled if one can hit the small stick twice or thrice at a time in the air. In this situation the players have also to multiply the score by 2 or 3 or have to count in multiples like '2, 4, 6, 8' or '3, 6, 9, 12'.

A point of social significance in this game is its tossing system. Throwing coins by holding each other's hand is a unique example of neutrality. All over the world, a third person is hired for a toss to keep up the neutrality. But here the participating two parties are doing the same without the involvement of a third person.

### Game 2: Bagh-Bondhi

Number of Participants Two

Materials Two sets of two types of seeds to be used as playing counters. Each set contains 12 counters.

Rules The figure shown in the photograph is drawn on the ground; usually each side is around 30 cm. The players take turns to put out their counters, which they must place on the joints of the squares. Each player tries to get three counters in a row. If this happens, that player takes one of his/her opponent's counters already placed on the board. Thus each of them tries to take the other's pieces. When all the counters of a participant have been taken, the game is over. The difference between the numbers of counters taken by both of them determines the degree of win.



Women playing Bagh Bondhi

Analysis The winning of the game is completely dependent on the most appropriate selection of points where his/her pieces will be placed. Proper selection and placement is based on the complex skill of strategising. Players also need to anticipate each other's moves and plan moves in advance.

### Game 3: Tash

Number of participants Two or more

Materials Empty packet of cigarettes, leaves and broken pieces of pottery

Rules A rectangular box is drawn on the ground. A player stands in this box and throws a broken piece of pottery (roughly round in shape) in any direction. This player bets a specific number of cards or leaves, or a combination of both. Now any of the remaining players tries to throw his piece of pottery onto that piece or as close as possible to it. If he succeeds in doing so, he will get all those cards from the first participant for the amount bet. Otherwise, he has to give those cards, or cards and leaves, of equal value

to the first player. He is allowed to pay the amount with any suitable combination cards and leaves.

“Why is mathematics thought to be mainly about calculating and counting? An analysis of the games shows that they range from pure luck to those that are pure strategy. Numeracy should include strategising or sequencing or generalising — in other words, processes. There are also aspects of competitiveness, social skills like turn-taking, and the mode (no writing, purely verbal/oral) in games. When analysing, we must think, ‘What kind of mathematics am I looking for? Processes? Calculations? Cooperative skills?’”



Children engaged in a game of Tash

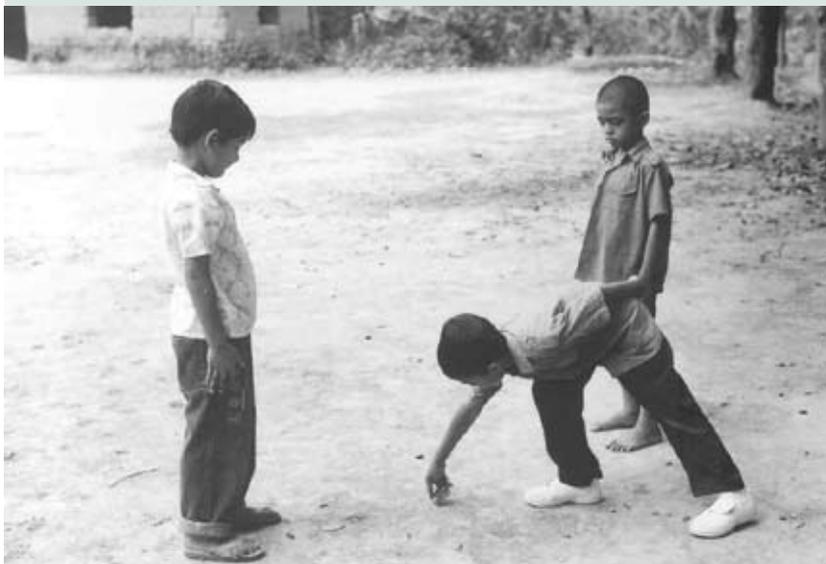
Analysis This is another very attractive indigenous game in rural northern Bangladesh played particularly by boys. Adults do also play the game but they do so with money instead of leaves and cigarette packets. Parents do not encourage children to play this game as it is seen as a form of gambling. However, it has many mathematical implications. In particular, the counting of points becomes complex when the leaves are used as payment instead of cigarette packets, because the value of the leaves and the cigarette packets is not same, and even the value of different types of cigarette packets is not the same. At the beginning of the game, players set the value of a leaf and each type of cigarette packet as 1, 2, 4, etc. To play with materials that have unequal value requires complex conversion skills. Children are acquiring the skill of calculating in a complex yet natural way through this indigenous game.

### NUMERACY GOES BEYOND CALCULATING

Kut-Kut and Unish-Bish are two other indigenous games played in northern Bangladesh.

Kut-Kut is played by girls. Estimation of time and space and counting are the mathematical skills involved.

Unish-Bish is played by both boys and girls. Here the mathematical skills are ranking, spatial estimation and counting.



Top: Kut-Kut, a game popular with girls. Left: Boys playing Unish-Bish

### CONCLUDING OBSERVATIONS

Some of the significant insights that emerged from the study:

- Almost all the games required numerical skills. However, it was interesting to discover that, when asked, the participants of those sports events did not recognise these numeric activities as 'valuable' or as being 'authentic' mathematical knowledge.
- The perception of being numerically literate was found to be absent in the community.
- Most of the numeracy skills required for these games were verbal and not written.
- The key numeracy skills required in the day-to-day recreational activities ranged from simple mathematical concepts and skills like counting, addition, subtraction, multiplication, division and measurement to highly complex concepts and skills such as proportion, estimation, ranking, strategic decision-making, applying logic in a situated context, identifying geometric shapes, angles, and stratifying objectives.
- The numeric skills as practised in the daily lives of these people is normally not recognised by the literate parts of the society as 'official knowledge or skills'. The rural people, in turn, learned to internalise these values and they too refuse to recognise this as official or formal knowledge.

*"Using ethnographic research methods was completely new for me and it gave me a completely different way to look at data. I discovered people doing a different kind of complex calculation, but I don't know how they were calculating it!"*

### FOLLOW-UP SUGGESTIONS

- A subsequent research study could be to see how the numeracy skills involved in the games compare with those included in the formal school curriculum of the classes that the boys were studying in and explore how this knowledge can be included in formal school education.
- Explore social issues around games in terms of gender and social class: Who plays these games? Where? Do girls play outdoor games? Do girls and women have as much time to play games? In addition to the rules documented, narratives of children's experiences around these games should be included.
- The conversations with the children on the rules of the game could also be taped, because people usually have different interpretations of rules and change rules, which is also interesting. The researcher should incorporate the prior knowledge he had about the games into the write-up.

## UNDERSTANDING NUMERACY PRACTICES IN A SKILLS-TRAINING PROGRAMME IN NEPAL



This report describes an attempt to apply an ethnographic lens to gain an understanding of the numeracy-related practices and experiences of girls who have participated in two of World Education's non-formal education programmes for adolescent girls. The study observes two groups of girls during a vegetable-farming training with a general focus on their numeracy experiences and practices. This documents the difficulties the girls had in switching between traditional and standard practices. It also records the ways in which girls do mental maths calculations.

### INTRODUCING THE STUDY

Many girls in Nepal, especially in rural areas, do not have the opportunity to attend school for various socio-cultural, economic and political reasons. Since 1998, World Education and its local implementing partners have been providing educational opportunities to out-of-school adolescent girls in Nepal through the Girls' Access to Education (GATE) Programme. This nine-month-long, non-formal education programme aims to provide girls who have been left out of formal education – either never having had the chance to enrol or having had to drop out early – with a strong foundation for learning. This not only focuses on their literacy and numeracy skills but also on building their life skills and ability to lead a healthy life.

World Education and its implementing partners first piloted the Self-Employment Education Program (SEEP) in 2003. This is a 12-month programme, of which the first six months are spent on basic economic education and the next six months on a group discovery-learning exercise on how to run a business. Participants also choose an area in which they would like to build a business after the programme, for which they receive practical skills training. The SEEP classes target 14- to 18-year-old adolescents (to date, most have been girls) who have completed a non-formal education programme such as GATE or have dropped out of school.

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### ORGANISATION

World Education, Nepal  
Kathmandu, Nepal

### RESEARCH AND TEXT

Juna Maya Koirala Pandey, Deeva Yonzan Lama

## Research Methods

We observed two SEEP groups. Both groups were located just west of Kathmandu city, in Goldhunga and Gangabu localities. We selected these classes as they had large numbers of GATE graduates. Change Nepal was the local implementing partner. Rather than have pre-determined questions guide our research, we decided to observe the vegetable-farming training and take notes with a general focus on their numeracy experiences and practices. The observations would then guide us into broad questions or themes to further explore in conversations with participants. We observed the training in commercial vegetable farming over three days, and then held a focus-group discussion with four participants. With the consent of the girls, we used a tape recorder to record the discussion, which we later transcribed.

In order to understand the girls' numeracy experiences and practices, we set out to study:

- Numeracy practices in a SEEP class: The methods used were observation and visual documentation of the class.
- Comparison between the numeracy curricula of GATE and SEEP: The methods employed were focus group discussions and a study of curricular materials of both programmes.
- Numeracy experiences of GATE graduates now enrolled in SEEP: The methods used were informal interviews and focus-group discussions with GATE graduates participating in SEEP and with the facilitator.

## RESEARCH DATA AND ANALYSIS

### Numeracy Practices in Commercial Vegetable-Farming Training

Over three days, we observed the commercial vegetable-farming training. On the first day we stayed for a couple hours listening to the theoretical lecture. On the second and third days, we observed the practical aspects of the training, where the trainees and their facilitator (plus guest facilitators who had run other SEEP classes for Change Nepal, the implementing organisation) worked on a plot of land they had prepared near their class site. Following instructions from the trainer and observing the trainer's modelling, the girls prepared a seed-bed, added fertiliser to the soil, planted vegetable saplings, and watered the plants. We attended the training as observers and made a note of any examples or mention of numeracy-related practices we encountered. In this process we found examples of different uses and concepts of measurement units, particularly measurement units of size and volume.



Left: A trainer measuring a seed-bed with a measuring tape.  
Right: Trainees using a stick to measure

## Use of Measurement Units

### A. Measuring the size of a seed/vegetable bed

**Observation** During the theoretical session of the training on commercial vegetable farming, the trainer repeatedly explained that an ideal size of a seed/vegetable bed for growing vegetables is 'one metre' wide. He explained that if the beds were of this width, it is convenient for people to work without stepping on the vegetables.

During the practical session of the training, the trainer used a measuring tape to measure a stick to make sure it was approximately one metre long. He then had the girls use this stick to measure the size of the seed/vegetable beds.

**Participants' knowledge & views** In the focus-group discussion, we asked the participants what the ideal size of a bed should be, why it should be that size and how they could measure it. It was amazing to discover that the participants thought that the bed they made was nine inches. The phrase 'nine inches' was never mentioned during the training, either at the theoretical or practical session. In spite of the phrase 'one metre' being repeated several times during the training, none of the four participants remembered it. When we asked them how they used to measure beds earlier, they said, "Our parents do it. They don't measure like Sir did. But, the beds they make and the ones we made now are of the same size. They know it by practice."

Later, we explained to the participants that the ideal width of a vegetable bed should be one metre. We also asked them how they could measure one metre, to which they promptly replied, "*Ek haat ra ek bitta*". This means the length of your hand from your elbow to the middle finger plus the length of your palm.

**Reflection** This example gives us a general idea on traditional versus formally learned agricultural numeracy practices. Here we can see how people who do not have formal knowledge of making 'correct' sizes of beds have been making beds that are approximately one metre. They just know it by practice. When they said that the bed would need to be nine inches wide, it was a random number. It appears that the width the trainer had mentioned was a purely abstract concept to them, which had no association with the actual size of the bed they knew they needed (from practice).

It was interesting that the trainer, after measuring a stick with the measuring tape, asked the girls to use the stick for their practical application of what they had learned. The girls were not themselves asked to measure one metre. Once the stick showed the girls the approximate length necessary, they did not have to, thereafter, worry about measuring an exact metre. The formal measurement was done by the trainer, and the girls used the informal way to measure by using the length of a stick.

*"What is being taught in class is not being learned by the girls and they resort to what they have learned at home or on their own, and this is what we must understand and then incorporate into our programmes."*

#### **B. Measuring the volume and proportions of seeds and fertiliser**

**Observation I** We had noted during the theoretical session that while talking about different kinds of seeds, the trainer had said that only 50 per cent of the seeds of bitter gourd actually germinate.



The trainees understood that 'per cent' means 'out of hundred' but could not apply it to real-life contexts

**Participants' knowledge and views** We asked the girls if they had understood this, especially what he meant by '50 per cent'. After thinking for quite a while, the girls said that 50 per cent meant '50 out of 100'. We then asked them what 20 per cent meant. They said it was 20 out of 100. Assuming they were clear about the concept of percentages, we asked them what it meant when the trainer said, "Only 50 per cent of the seeds germinate." Surprisingly, none of the girls could give us the answer.

**Reflection** Though the girls understood that 50 per cent of 100 was 50, they could not figure out what we meant by '50 per cent out of 100 seeds germinate'. In other words, they were completely unaware that 50 per cent simply means 'half'. It seems that they understood the concept that percentage means 'something out of 100' but could not convert, apply or transfer it to other amounts or real-life contexts.

**Observation II** Another numeracy-related concept that came up in the training related to the different labels found on the packets of fertilisers. The trainer had said that consumption of 600 gm of fertilisers that were labelled green was harmful.

**Participants' knowledge and views** When we asked the participants what they understood by what the trainer said regarding the consumption of 600 gm of green-labelled fertilisers, none of the four participants remembered hearing this. This led us to ask them if they knew what a gram was. All of them said, "100 gm is one *pau*." We then asked them which was larger, 1 kg or 500 gm, or whether they were equal. Three of them said 1 kg was not larger while one said "yes" (they are equal).

**Reflection** *Pau* is a very common unit used to weigh vegetables and other food items. In some parts of Nepal, 250 gm is considered equal to one *pau* whereas in other places, 200 gm is considered equal to one *pau*. Although the SEEP numeracy curriculum included a lesson on grams and kilograms, the girls did not seem familiar with it or did not seem to remember. It did not appear that they had internalised the meaning of these measurement units or that they were familiar with using them.

#### **C. Conceptualisation and understanding of measurement units**

**Observation I** As mentioned earlier, the trainer had used a measuring tape to measure one metre for a vegetable bed. In the field, we did not see any girls actually using the tape themselves to measure beds. So we wanted to know if they were familiar with using the tape.

**Participants' knowledge & views** The girls said that the measuring tape used by the trainer to measure beds was called a 'Centi Tape'. They also knew that there were numbers written on the tape but had no idea what those numbers represented. We explained to them that a measuring tape had inches on one side and centimetres on

the other. They were completely unaware about these measurement units (centimetre and inch). However, they knew that metre measured clothes and kilometre measured distances. According to them, they knew this based on what they had heard in their day-to-day lives.

**Reflection** Though the SEEP curriculum includes lessons on measurement units, our participants had not heard of some of these measurement units. They were not aware of units like centimetres and inches which are not as frequently used in everyday life as units like metres and kilometres. Here we can see the difference between formal and applied learning. They did not seem to retain as much of what they had learned formally in class as they did of what was applied in their lives.

**Observation II** In several instances, the trainer used traditional concepts of measurement units in his instructions to the girls. For example, he said that in winter a one-metre-wide seed-bed would need to be covered with plastic. The plastic would need to be held over the bed with thin pieces of bamboo or otherwise pliable sticks that are *paanch haath* or 'five hands' long (one *haath* is from the elbow to the tip of the middle finger).

In another example, the trainer said that for each plant they were planting (eggplant saplings), they would need to add one teaspoon of urea to the soil before planting. Although he said one teaspoon, he asked the girls to estimate how much that would be with their hands and used his own hands to demonstrate. They then used their hands to measure the amount.

**Reflection** In the training, and interview about the training, we found a constant verbal switching between formal and traditional agricultural measurement units. Even the trainer several times explained measurements in traditional measurement units.

#### Formal versus Informal Numeracy Practices

In the focus-group discussion, the participants had mentioned that they were confident of themselves when shopping on their own. So we asked them how they did the actual calculation in shops. They said that they did it in their minds. This led us to probe their informal numeracy practices further by giving them maths exercises to solve. Some interesting results we found were as follows:

The girls were given numeracy exercises, some to be solved mentally and some on the board. We observed that they were much more accurate and quicker to compute the answer in their minds than when working it out on the board. For example, the following exercise was given to them to solve on the board:

"Meena has Rs 68. She spends Rs 25 buying meat, Rs 12 buying noodles and Rs 5 on tea. How much does she have left?"



A trainee take her time doing written calculations

The girls could not solve this problem on the board even after taking a lot of time. But all of them said that it would surely not have been so difficult if they were asked to calculate this mentally.

"With measurement, in formal maths we see that we have to have formal answers:  $143 \text{ cm} + 62 \text{ cm} = ?$  There is an exact answer. An 'inexact' answer is counted incorrect. But in real measurement practices such as in gardening, we don't need exact answers! And so in formal maths, suddenly they have a wrong answer, whereas in life, their answer is not wrong; it is an answer that varies depending on the flower-bed or garden or whatever. And so we need to say that in the classroom we are playing a game (formal maths practices) and acknowledge that game."



An 'inexact' answer on the board

We asked the girls how much money they would have with them if they spent Rs 15 out of Rs 50. The answer '35' was very prompt and accurate. They said that they were quite familiar with these numbers and just knew it. There was no need to even calculate.

Counting on fingers is one of the most common methods of calculating numbers. People either bend their fingers to count or count the lines on their fingers to add or subtract numbers. And we saw them do this very quickly.

We also asked the girls how they would deduct one number from another mentally (eg: 50 minus 21). One of the girls explained that she would first split the number into two halves (50 into 25/25), deduct 21 from one half ( $25 - 21 = 4$ ), then add that number to the other half ( $4 + 25 = 29$ ). She got the correct answer this way.

Similarly, another girl said she split the number (50) into 20 and 30, deducted 21 from the number 30 ( $30 - 21 = 9$ ) and added 9 to the other half 20 ( $20 + 9 = 29$ ). Hence, she also got the correct answer.

**Reflection** The girls found formal numeracy more difficult compared to informal numeracy. The sums that could be easily solved informally could not be solved using formal methods. Each individual has his or her own way of practising numeracy.

An informal interview was done with the two SEEP facilitators who were present at the focus-group discussion. One of them had solely GATE graduates in her class, while the other had school dropouts who were not from GATE. The facilitator who had GATE graduates said that it was very difficult for her participants to cope with the maths lessons of the SEEP class. According to her, the maths lessons in SEEP are much more complex compared to the GATE maths lessons. The other facilitator did not find it so difficult to cope with the maths content with her participants.

#### CONCLUDING OBSERVATIONS

During the vegetable-farming training, both the trainer and the participants switched between traditional units of measurement and formal metric units. The girls seemed to have a very superficial understanding of the metric units. They had heard of metres, kilometres, grams and kilograms. However, they seemed uneasy and unsure when they had to apply the concepts. They had been introduced to these concepts: that was also clear once we reviewed the content of the numeracy curriculum of SEEP. However, the SEEP curriculum does not mention the traditional measurement units (for example, a '*pathi*') at all, and as a result, does not provide a relation or comparison between the two systems. In the girls' village, the traditional units are still commonly in use, as they continue to be elsewhere in Nepal. If they are not used exclusively, then

they are used alongside or parallel to the metric system. Perhaps for the girls to be able to internalise and practically apply the newly learned formal measurement units, they need to be able to see a clear relation between the two measurement systems. For example, approximately how many kilograms of rice grain fit into a *pathi*? How many *haath*, as a measurement of size, make a metre? Such comparisons and conversions might help them understand the different units more clearly.

No matter what formal methods were taught in GATE, SEEP, as well as in the vegetable production training, the girls resorted to the traditional and/or informal ways of doing numeracy activities that they were used to — whether it was in their daily activities such as shopping or the farming activities they had observed and helped their parents and other community members with.

After the trainer used the measuring tape to measure one metre on a stick, the girls used the stick to measure the vegetable beds thereafter. None of them showed interest in using the measuring tape. It was as if the formal measuring with centimetres was appropriate for the trainer, who was in a position of respect and power (especially with all the theoretical knowledge he had lectured them with), but not necessary for the practical use of the girls.

This leads us to the question: What use is there really for the formally-taught measurement system in the girls' lives, as they seem to have a system of their own that works for them? Yet, the reality is that they do encounter the formally-taught metric system. We can argue that it is meaningful to include the metric measurement units in a curriculum like SEEP, but *how* we do this is the question. How can we help them feel comfortable and confident with both systems — the formally-taught and the traditional, informally-learned systems of measuring? We believe that if the girls were able to have a sense of how the different measurement units in the two systems compare and relate with one another, they might be more comfortable switching between the two.

*"Doing the research was interesting but analysing it was not! Making links between different observations was difficult."*

#### FOLLOW-UP SUGGESTIONS

- Explore how findings can feed into modifying the numeracy curriculum of the non-formal education programme and the micro-enterprise development programme.
- Further research the maths background, experiences and teaching methods of the facilitators, as that will impact the learners, although perhaps not as directly as might be thought.

## UNDERSTANDING HOW MUSLIM WOMEN IN JAIPUR SLUMS DEAL WITH LITERACY AND NUMERACY



This ethnographic study was undertaken in two slums of Jaipur by Bharat Gyan Vigyan Samiti (BGVS). The study attempts to explore the literacy and numeracy practices of Muslim women living in these slums, as they went about their daily interaction with shopkeepers, or in their calculation of wages for work. The study also documents their engagement with the literate environment in which they live.

### INTRODUCING THE STUDY

Bharat Gyan Vigyan Samiti (BGVS), Rajasthan has been working in slums of Jaipur since 1999, providing educational programmes and support for socially vulnerable and disadvantaged women and children among the Muslims and Hindu Dalits. Schools were built and Bal Manchs (Children's Forums) were created.

In addition, women were organised into Samata Committees (BGVS' Women's Front) and self-help groups (SHGs): 12 such groups were formed. These groups have been operating for the last three years, and one group has accumulated as much as Rs 100,000 in savings. Such programmes are important in today's context as the urban population of the state is increasing and there are hardly any programmes that address the needs of the urban poor. Most of the development programmes address the rural masses.

### Research Design and Methodology

The slums studied were Rajiv Nagar and Banda Basti, located in the Vidyadhar Nagar zone of Jaipur. Detailed field notes were taken, as also some audio recordings. The tools used were observation, focus-group discussions and individual interviews. Photographs were taken.

The women we interviewed were 25 to 55 years old. Some were members of SHGs mobilised by BGVS. Most of the women were illiterate but were involved in an

### ORGANISATION

Bharat Gyan Vigyan Samiti (BGVS)  
Jaipur, Rajasthan, India

### RESEARCH AND TEXT

Komal Srivastava

economic activity such as embroidering saris or doing *bandhej* (tie-and-dye work) to make a living. Some of them run small shops. All these activities involve dealing with numbers. Initially a long list of research questions was formulated. This was later narrowed down to two questions:

- How do the women deal with the literacy around them?
- How many numbers do they know and what are the methods of calculations that they use?



A view of the basti

#### Description of the Study Setting

The population in these *bastis* (neighbourhoods) comprises Muslims and Hindus. The Hindu community belong mainly to the Scheduled Castes. Hindus and Muslims live in harmony. Riots have never taken place in these *bastis*, though tensions flare every time there is a communal problem in Jaipur. The residents are migrants from various parts of rural Rajasthan, Bihar and Uttar Pradesh who have come to the city over the past 25 years. These *bastis* are slums that lack basic facilities such as healthcare, reliable water supply, sanitation, etc and the living conditions for families are very difficult. Women lead difficult lives. Domestic violence is prevalent in this area. There are a number of women who are separated or divorced and who have to raise their children single-handedly. They are under constant stress to meet their livelihood needs.

#### Livelihood

The men here are mainly daily wage-earners: construction labourers, rickshaw pullers, mechanics, workers in gemstone factories. On average, they manage to get 15 to 18 days of work in a month and earn about Rs 2,000 a month. Women are also daily wage-earners and take up employment within the *basti*. They may also work from home, making bangles, doing *bandhej* or embroidery on saris, or gem polishing. They earn Rs 700-800 per month. There is immense exploitation of women in *bandhej* work, since they only receive Rs 4-10 per sari or cloth depending on the amount of tying they have to do, but the work is very time-consuming and hard on the eyes. For embroidery

on saris they get Rs 17-25 per sari; if they buy the thread themselves, they earn Rs 2-3 extra. On average, it takes them six to seven hours to complete one sari. Payment is made once every week or two.



Girl embroidering a sari

#### Education and Health

The level of education is very low among the women. Most are illiterate, though the women have now started sending their daughters to the *Janshala* schools located in the *bastis*. Most girls go to the *madrassa*, where they are taught the Quran orally. Women and girls are inducted into religious education called *Kalam Pak*.

Women involved in *bandhej* work have to tie the cloth very precisely; it requires a lot of concentration and puts a lot of strain on the eyes. It weakens the women's eyesight and can gradually lead to blindness. Women involved in gem polishing inhale a lot of dust which is released while polishing the stone. This dust can be very harmful and can lead to silicosis.



Women outside a local school

## RESEARCH DATA AND ANALYSIS

### Aspects of the Literacy Environment of the Women

There are a number of wall writings and posters in the *basti*. The women did not read the posters or writings, although they comprehended the pictures. Some women felt that the written content on the wall or posters was meant only for rich people, and therefore it was irrelevant whether they understood the messages or not.

For example, a frequently seen poster is from the government dairy corporation Saras, which shows a small girl drinking a glass of milk with an official requesting everyone to drink a glass of Saras milk. The women understood that girls should be given milk. They all recognised the brand, as it is the most popular dairy, but they can't buy it as it is expensive.

They all have a calendar in their houses. They don't recognise the written words but they can recognise the pictures. Some women knew the script of numbers but generally couldn't recognise individual numbers like 1, 2, 3, 4, 5 when randomly asked. However, they recognised the pattern in which numbers were written on the calendar. They use calendars to keep records.



Profuse writing across the walls of the *basti*

Very few women were interested in reading newspapers, but one was very interested in the news. She said she would pick up the newspaper and hold it as though she could read it, but she only looked at the pictures. She would usually ask her husband or children to read the news aloud to her.

When asked how they managed to board the right bus or get off at the correct station, the women said they were unable to read bus numbers or signs, so they asked the conductor to announce the stop where they had to get off. They remain very alert and at times even ask their fellow passengers. There were incidences when some of them had lost their way by getting off at the wrong bus stop.

## Numeracy Practices of the Women

The women engage with numbers while purchasing goods, and in the work they do such as embroidery, *bandhej* or running a shop and so on. Most of the women we spoke could count up to 30 and thereafter could count in tens: 30, 40, 50 etc.

### How Women Deal with Calculations Involved in Purchasing Goods

Below are some examples of how women calculate:



Two women manage a shop

Case 1: Bismillah, of Vijay Nagar

Question: If you have to buy 4 kg of sugar, and 1 kg costs Rs 22, then how much do you have to pay?

She immediately replied, "80 and 8". We asked her how she made the calculation. She said she split 22 into 20 + 2, then 20 in four places (times) is equal to 80, and then Rs 2 in four places (times) is 8, so it is 80 and 8. Then she would make the payment.

Question: 1 kg of milk costs Rs 15. How much will 250 gm cost?

Bismillah replied that half a kilo would cost Rs 7.50, then half of half would be 3.

But this is wrong.

When asked how she calculated, she said she did it mentally.

*Bismillah's methods: Decomposing numbers and approximation*

Case 2: Afea, of Banda Basti

Question: If you were going to buy four items from a shopkeeper and one cost Rs 10, another cost Rs 27, a third cost Rs 34, and the last cost Rs 30, how much will you have to pay? How would you make the payment?

Afea said that she couldn't get a total but that she would make separate payments for each thing, paying 10, 27, 34 then 30. If the shopkeeper then gave her some change she would try to total or ask the shopkeeper to do it. She always takes a slip with the goods bought and then gets her husband to cross-check the calculation.

*Afea's methods: Paying separately and asking for written receipts*

Case 3: Jebun, of Rajiv Nagar

*Question: If bhindi costs Rs 20 per kg, then how much will 250 gm of bhindi cost?*

Jebun replied Rs 3. When we asked how she calculated, she said that normally vegetables cost Rs 3 or 4 for 250 gm so it should be Rs 3.

*Jebun's method: Using experiential knowledge*

From the above examples it is very evident that women do calculations mentally but encounter limitations when doing big calculations, as they don't know large numbers. In most cases they make educated guesses, which means that they do lose out on small amounts. When buying goods, many women ask the shopkeeper to make receipts for the goods bought so that they could have it cross-checked it at home. Some felt that if they were educated they would not have to be dependent on another person.

How Women Deal with Calculation of Payments Due for Piecework Completed



Women discuss their calculation methods

Case 1: Jannat, of Banda Basti

For doing embroidery on one sari she gets Rs 17. Payment is not made every day; it is made upon completion of sets of four, five or seven saris.

*Question 1: How do you keep track of how many saris you have completed?*

Jannat replied that she draws lines on the wall, one for each sari completed: | | | |

*Question 2: How would you calculate the payment for four saris?*

Jannat calculated like this: For one sari, she gets Rs 17.

For two saris,  $Rs\ 17 + 17 = Rs\ 34$

For three saris,  $34 + 17 = 50 + 1$

For four saris, split 17 into 7+10. So add the 10 to the 50 (above) and add the 7 to the 1 (above). This becomes 70 minus 2.

*Jannat's method: Adding and splitting large numbers.*



Interviewees tell their stories

Case 2: Kallo, of Rajiv Nagar

Kallo does *bandhej* work on cloth. For this work, she is paid Rs 4 to 10. The amount depends on the kind of tying to be done on the cloth. She doesn't get work every day, maybe 15 days a month. Payment is made once every 15 days but it can also take up to three months.

Question: If you have tied 15 cloth pieces of different rates: seven pieces of Rs 4 each and then three pieces of Rs 5 each, and five pieces of Rs 7, how much should you get paid?

Kallo calculated in this way:

First we will calculate of five pieces of Rs 7

One piece is Rs 7

Then for two pieces,  $7 + 7 = 14$

For four pieces  $14 + 14 = 30 - 2$  which is 2 - 30

For the fifth now add 7 to make it 39.

She realised it was wrong so she did the calculation again:

Two pieces is  $7 + 7 = 14$

Four pieces is  $14 + 14 = 30 - 2$

For the fifth now add 7 by splitting 7 into 2 + 5

Then add 2 to the  $(30 - 2)$  so it becomes 30, then  $30 + 5 = 35$ .

For this calculation she used her fingers, counting four on one finger.

Other questions we asked were also calculated in a similar manner, and after some time she didn't want to calculate any more. She said that in spite of calculating like this nobody could cheat her because her daughter-in-law kept the record in a diary and always cross-checks.

#### CONCLUDING OBSERVATIONS

When asked explicitly, the women said they felt confident in dealing with the literacy and numeracy around them. But we have seen that in many cases the women made errors while making their calculations. They were unaware of how much they were losing in their interactions with shopkeepers and contractors. So while at one level it was heartening to see that they do not see their 'illiteracy' as a huge barrier, we also realised that there clearly were areas where they were at a disadvantage, which they had learnt to live with.

Women see the written word everywhere and can 'read' posters and wall-writing and calendars through visuals or other markers and have learnt to negotiate various texts without actually being able to read them. They recognise photos and make their own interpretations. They also feel that the things written on posters or hoardings are not meant for them as they are very expensive. The women were in the habit of keeping records either in a diary provided by the business owner (written by someone else) or by making lines on the wall or ticking on the calendar. Their practices were thus a mixture of the traditional and standard.

Their calculations are limited largely to addition and subtraction. They can do small calculations but not big ones, as they get very confused with many figures. They

don't know the names of numbers beyond 30. After that they only know the names of multiples of 10s — if a number is 38, then they will express it as '2 less than 40'.

"Documenting the way women calculate was really challenging as after they tell you the answer it is difficult for them to retrace the steps. They get frustrated. But I was also surprised at how confidently they sometimes gave me the wrong answer."

#### FOLLOW-UP SUGGESTIONS

- Explore how this understanding can feed into developing teaching-learning material for the programme.
- Do a more detailed analysis of the women's record-keeping practices and all their different practices around their *bandhej* work.

# DOCUMENTING OCCUPATION-RELATED NUMERACY PRACTICES OF RURAL ADULTS IN ANDHRA PRADESH

## ORGANISATION

Andhra Pradesh Mahila Samatha (MS) Society  
(A Mahila Samakhya Project of the Government of India)  
Andhra Pradesh, India

## RESEARCH AND TEXT

Sandhya Rani G., Samantha V.



This study, conducted in a village in the Telengana region of Andhra Pradesh, attempts to document the numeracy practices of adults, from various caste, gender and occupational backgrounds. Through visits to the field, focus-group sessions and interviews, a documentation of the local numeracy practices and their interface with 'standard' systems and practices was presented.

## INTRODUCING THE STUDY

There is a gap between formal numeracy methods and everyday numeracy practices that rural people follow in their daily lives. Often, adults find the formal mathematical methods — usually taught in adult education programmes — complex and irrelevant to their daily needs. Most programmes, including the Mahila Samakhya (MS) programme, do not build on the existing numeracy practices that people use in their daily lives. We believe that by understanding such practices we will be able to develop sustainable literacy and numeracy programmes.

### Objectives of the Research

- To understand and validate everyday numeracy practices and mathematical skills of people in the study area.
- To critically examine and explore the possibility of applying these practices in adult-learning processes, particularly numeracy programmes.

### Methodology and the Study Setting

We conducted the study in one village in the Telengana region of Andhra Pradesh where the MS programme is operational. During initial visits to the study village we realised that people's numeracy practices have a definite relationship with their occupation, which in turn is determined by caste and gender. Based on this realisation, we decided to understand and document numeracy practices of adults of different occupational and caste groups. We talked to men and women from 12 caste groups.

The study was exploratory and what we have is a documentation of practices and observations. Further work is required to generate generalisations.

“The methods we used in our research were: regular field visits, observations and interviews, collecting local puzzles and games, case studies, photo documentation and focus-group discussions, all held in mixed villages. We worked with homogeneous groups when questions were related to occupations, and with mixed groups when discussing games and puzzles. As needed, we returned to the village for more research.”



Researchers engaged in a group discussion

The selected village, Baswapur, is a typical Telangana village. For administrative reasons, the state of Andhra Pradesh is divided into three regions: Telangana, Rayalaseema and Coastal Andhra. Every region maintains its uniqueness in terms of cultural, social, geographical and other economic conditions. The Telangana region was ruled by Muslim rulers (the Nizams) for several years. The language and culture of this region reflects this. The study village is situated in Pulkal Mandal of Medak district, 5 km from the *mandal* headquarter and 35 km from the district headquarters. A *mandal*, known as a ‘block’ in other parts of India, is an administrative unit. States are divided into districts, and districts are further divided into blocks or *mandals*. Based on educational indicators, some *mandals* are designated ‘Educationally Backward’. Though geographically close to the capital Hyderabad, Pulkal Mandal is considered an Educationally Backward block.

The village comprises 250 households with a total population of 2,000. The main occupation in the village is agriculture. The village is segregated on caste lines and

a majority of the people still depend on caste-based occupations. Baswapur is a multi-caste village and people’s numeracy practices revolve around their occupations and related transactions and, as occupations are determined by caste, we find that numeracy practices of different castes vary. Thus, it is very important to know the caste structure and occupations to understand people’s numeracy practices.

#### RESEARCH DATA AND ANALYSIS

We talked with people individually and in groups in order to learn about their numeracy practices. We looked particularly at two areas: traditional methods of measurement and local methods of calculating. Below we present a documentation of these.

##### Local Units of Measurement: A Documentation

We observed that people have traditional ways of measuring different things. With the introduction of the metric system, they have to negotiate between these two systems of measurement. The system is elaborate and there are local terms for all the different units of measurements. Below are examples of local units of measurement and in some cases a rough and ready conversion chart between the two systems — often referred to locally as the ‘old’ and ‘new’ systems. The standard system has a base of multiples of six and people still use that system within the village economy. The metric and the decimal system uses a base of 100: people are often confused between the two base systems.

**In agriculture** When enumerating amounts of agricultural, horticultural and other products, many measurement units, which have local terms, use references related to the hand:

For volume A pinch = *chitikedu*; a fistful = *guppedu/pidikedu*; a handful = *charedu*  
For lengths Four fingers’ length = *bethedu*; an elbow’s length = *mooradu*

There are specific containers to measure grains and pulses. These volume measures are rough approximations and vary with the kind of grain being measured.

1 *sola* = 750 gm; 1 *thavva* = 1.5 kg; 1 *manedu* = 3 kg; 1 *adda* = 6 kg; 16/17 *addas* = *thumudu*;  
1 *mudumanikalu* = 9 kg; 1 *kuchedu* = 12 kg; 1 *kuchedu manedu* = 15 kg

**Measurement of Metals** There are traditional terms for measuring metals. And different metals may have different unit measures. For gold and silver it is: 1 *maasam* = 6 gm; 1 *thulam* (old system) = 12 gm; 1 *thulam* (new system) = 10 gm  
For iron 1 *seru* = 1.5 kg; 1 *madama* = 12 kg; 1 *quintal* (old system) = 120 kg



Left: Interviewing toddy producers. Right: A mason uses a rope to measure

Even toddy (locally-made, cheap liquor) producers have their own system: 1 *burra* = a container of 12 bottles; 2 *burrras* = 1 *pette* = 24 bottles

Even though the metric system has been introduced these measures are still used within the village economy.

### *Gajam*, the King of all Tools

Masons and carpenters have an elaborate system of local measures. These measures relate to metric measures and they 'switch' between the two systems.

*Angulam* = 1 inch; *adugu* = 1 foot; *gajam* = 3 feet

*"The gajam is the king of all tools. Though I use a tape measure now, nothing can beat the gajam."*

The *gajam* is a 36-inch stick which is divided into 24 equal parts and each part is called a *thassu*. So, 1 *thassu* equals 1.5 inches. There are different symbols for a quarter *gajam* (*paavu*), half *gajam* (*artha*), three-quarter *gajam* (*muppavu*).

There are implements for other tasks as well. For example, a *kaivaram* is a compass (and there are compasses of different sizes) and a *metna* is used to draw straight lines and to check angles.

### Are Measures Standard?

When we were exploring how people 'measure' milk, we realised that their perceptions of quantity were closely linked to their selling practices. We found that while they measure in 'standard' units (litre), when posed the question, "How do you measure



milk?" there was an immediate counter question, "What kind of milk? Pure or diluted?" The question was answered by an explanation of the process of acquiring and selling the milk. Below is a brief account of this explanation:

First they collect milk from the people who have cattle, for Rs 8. They mix 1/4 litre of water with 1 litre of milk. They sell this diluted milk to restaurants in town for Rs 10.

When they sell to the local teashops, they mix equal ratios of water and milk and sell it at a price of Rs 8.

Sometimes they sell milk to sweet shops to make a particular kind of sweet called *kalaakhand*. That sweet is measured in *thulams* (1 *thulam* = 10 gm). For one *thulam* of sweet, the sweetshop pays the milk vendor 60 paise. To see how much he has to pay, the owner of shop takes one litre

of milk and makes the sweet in front of the vendor. He pays the amount due based on the weight of sweet produced.

### Understanding Methods of Calculation

In order to understand people's methods of counting and calculations we gave some exercises to men and women (separately) from different caste groups. We first explained the purpose of the exercise so that people were at ease and did not think that we were testing them. For counting, we gave them some seeds and asked people to count them.

The following are some sample calculations based on questions we asked:

*Question 1: If the daily wage is Rs 25 per day and you worked for a week, then how much pay should you receive?*

The most common method used for this calculation was:

Step 1: 25 is split into 20 and 5

Step 2: Then they worked with 20 x 7 days. For this they dropped the 0 from the 20 and work with 2

Step 3: They calculate that 2 x 7 = 14. They then 'return' the 0 to the 14 to make it 140 (20 x 7)

Step 4: They then took the 5 and multiplied it into 7: 5 x 7 = 35

Step 5: Then they return to the 140 and split 140 into 40 and 100

Step 6: They added 35 to the 40:  $40 + 35 = 75$

Step 7: Then added 75 to the 100 that remained:  $100 + 75 = 175$ , the final answer

Described this way the process sounds very long. However, these calculations were done very quickly and without any pen and paper. A similar process of 'decomposing' numbers into smaller more manageable units and then 'recomposing' the numbers was followed in other questions that were put to people. Understanding the different steps was both interesting and difficult as our questions were often met with puzzled looks. A typical response was, "We have never thought about how we get these answers."

Despite asking several times, we were not clear about how they arrived at the answers to the multiplication steps so quickly. For example:  $2 \times 7 = 14$ . But they always got it right. We surmised that though they had not formally learnt multiplication tables, the fact that they had probably done this several times over they had come to 'learn' multiplication tables. We also found that people were very comfortable and quick with adding successively (i.e.  $2 + 2 + 2 + \dots$ ). They knew the process but did not have a name for it.

"We asked some people how they got the answer to the questions we asked them. They said the answer came from God, or from their stomach or it's in their head. They didn't know it is called multiplication, but they do it very quickly in their head."

#### What Determines Abilities to Calculate?

We found that comfort and familiarity with numbers and the speed with which people calculated depended on the extent to which people encountered numbers and were required to calculate in their everyday lives. This again was determined by social hierarchies of gender, caste and community.



Left: A group discussion with Dalit women.



Right: A researcher observes a man and a woman counting seeds

Consider the following observations: In the Dalit communities, women counted seeds in ones, twos and fives, but men counted in fives. Women in these communities did not handle large sums of money. We found that in general, for Dalit communities which survive on daily wage employment, their calculation limit seemed to be up to Rs 1,000. This was true for both men and women. For the other castes, which are financially better off, we found that most men were comfortable counting up to Rs 10,000. However, women did not seem to go beyond Rs 1,000. When asked at what points they handled money, the women said that they handed wages to agricultural wage-workers in the absence of their husband or sons and this hardly ever exceeded Rs 1,000. But as 'upper-caste' women have less mobility and are not engaged in wage work they seemed less confident and slower than women from other caste groups.

In a Muslim household we were surprised when the husband took much more time to count than the wife. When we asked them how many seeds there were in their hands, the husband said 420, but the wife said, "I don't know, I just counted the seeds in 20s because I only know numbers up to 20. But she had made sets of 20 seeds." Once again women did not seem to know large numbers. In the Muslim community, older women are not able to count as fast as the younger ones who are involved in agriculture as daily wage workers.

In the Kammari caste — who are traditionally blacksmiths, make all farming appliances and are engaged in agricultural work — both men and women are able to count fast.

#### Strategising in Everyday Life

For certain jobs, such as transplanting of paddy saplings, sugarcane cutting, weeding, etc, workers are paid a daily rate. In this area, men and women get a daily wage of Rs 40 and Rs 25, respectively. An additional amount of Rs 6 per day is paid towards the toddy. Generally, landowners pay the amount meant for toddy daily, and pay the wages weekly.

Sometimes wage-workers take the work on *guttha* — on a contract basis. If they take it on *guttha*, a group of people comes together to share the work and the wages. They try to complete the work in a much shorter period compared to daily-wage work so that they can save some money and time. Here they calculate the number of people required for the work, the time they will need and the amount that they can save. There is a certain logic in deciding on whether they should choose *guttha* or daily wage: If there have been good rains in the season they prefer daily-wage work. On those days they demand a high wage. At other times, as there will be competition for the jobs, they prefer *guttha*, so that they can reduce the amount of work and time and grab whatever job they can get.



Maths is usually associated with calculations. When applied to life these skills become an important tool for strategising.

“In our research we were trying to understand numeracy practices, but it was very difficult to understand their explanations. Till the end we could not figure out how they did multiplication! As far as research methods, is there any other way to try to capture this kind of information?”

#### FOLLOW-UP SUGGESTIONS

- Explore in greater depth gender-, age- and caste-related differences in numeracy practices.
- Observe people in their different occupations to observe the numeracy tasks being practised.

#### CONCLUDING OBSERVATIONS

- Many literate people think maths is difficult, but for non-literates, maths is a part of their normal life.
- The level of ability to calculate and count is related to people’s occupation and income, since that determines the range of values they need to be familiar with.
- In solving calculation problems, many were simplifying the problem and mostly using addition. People trained in formal maths use place values when calculating and reading numbers — i.e. they go from right to left. Here we found when calculating mentally most people read numbers from left to right. Many do multiplication rather quickly with a method that we could not discern, nor do they have a term for the process. In other words, they are unaware that they are doing multiplication.
- The majority of people depend on oral/mental calculations, whereas the upper-caste people who are literate depend less on oral calculations.
- Power relations were evident in that, irrespective of the ‘correctness’ of their answers, upper-caste people responded quickly to maths questions, whereas lower-caste people, even when they knew the correct answer, often held back when in the presence of upper-caste people.
- People have their traditional ways of counting and measuring different things. But because of the introduction of the metric and decimal system, they find negotiating between the systems difficult. This is causing them to lose their independence in calculating. For example, for measurements such as land, many are forced to depend on educated people for assistance. In this village, lower-caste or less-educated people depend on upper-caste, educated people.

## UNDERSTANDING NUMERACY PRACTICES AROUND WEIGHTS IN TWO NORTH INDIAN VILLAGES



Researchers and facilitators from Nirantar worked in two villages in Uttar Pradesh, India to ascertain the numeracy practices of women. Through observations and interviews, the traditional and standard weights and measures used by women in their daily interactions, and the complex power dynamics underlining the women's understanding, was documented and analysed.

### INTRODUCING THE STUDY

Nirantar, a resource centre for gender and education, has been working in 20 villages in Lalitpur district in Uttar Pradesh, North India, since April 2002. Our work here aims at empowering women and adolescent girls through literacy and education — an education that makes connections with their lived realities and helps them critically reflect on these. The programme, named Sahjani Shiksha Kendra (*Jani* in the local language means women, and *Sahjani*, one who helps women) works primarily with Dalit women and girls. The programme has adopted different literacy and educational strategies to enable them to act against discrimination and tackle local development problems.

Through this small research study we sought to document numeracy practices around measuring weights, both traditional and standard, with a view to using the study findings to rework Nirantar's existing numeracy curriculum and to develop new material.

### Research Questions

After several discussions we narrowed the research questions to the following:

- What are women's numeracy practices related to measuring weights? Do issues of gender, caste and class impact the nature of numeracy practices?
- What is the nature of the interface between 'standard' (metric) and 'traditional' measurement systems?

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### TEXT

Malini Ghose

### Study Setting

We selected two villages, Badhai ka Kuan and Manikpur. Badhani ka Kuan is a small village with a population of about 500 and is located about 6 km from Mehroni, the nearest small town. Several villagers have close ties with the town. The population is divided among three caste groups — Ahirwars (Dalits or Scheduled Castes), Badhai and Banjaras (these castes fall within 'Other Backward Castes' category). Dalits have the largest number of households, and agriculture is their main source of livelihood. Nirantar's literacy centre has been running in the Dalit *basti* (neighbourhood) for the past two years.

Manikpur is a large multi-caste village, with a population of 1,490. Manikpur, unlike Badhai ka Kuan is difficult to access, as it is both remote and the mud road leading to the village gets washed away every monsoon. The village has no electricity but it does have a school, childcare centre and several handpumps for drinking water. Nirantar began its educational centre here in 2001.

### Research Process and Methods

For Nirantar the research process itself was as critical as the research findings. One of our objectives for taking on this research was to involve the local facilitators in the research, both the fieldwork and the analysis. We thus set up a research team (divided into two groups, one for each village), comprising Nirantar members from both Delhi and Lalitpur. We organised an orientation workshop where we introduced the facilitators to some of the key concepts around ethnography, ethnographic research methods and the objectives of the study.

The research was designed as a simultaneous process of doing fieldwork and then collectively reflecting on it. The first three-day field visit aimed at understanding the traditional system of measuring weights and identifying the points of intersection between standard and traditional systems. During the fieldwork we conversed with a number of men and women, sometimes individually and at other times in small groups. We moved with the rhythm of our 'informants'. For example, when one of the women we were talking to said she had to go to the *chakki* (flour mill), we went with her. We looked at a variety of numeracy texts, such as account books and *parchis* (small receipts), and had discussions around these. Each day, after the fieldwork, both groups met and analysed their observations. Gaps in data and new questions were identified for the next day's visit.

The first round of observations yielded rich but slightly fragmented data. For the second round of fieldwork we changed our methodology slightly. We developed semi-structured questionnaires around specific themes such as 'shop literacies' and 'women's understanding of the metric system' around which we had more detailed

discussions. We held a final workshop with all the facilitators where we revisited the data and identified emerging patterns.

### RESEARCH DATA AND ANALYSIS

#### Understanding the traditional measurement system

"It is a complicated and nuanced system. It took us 'outsiders' time to unravel and we kept discovering new things. First we were told, "We measure in *pailis* and *barajjas*". These we learnt were names of containers — measuring containers, to be precise. We asked to see a *paili* and even took a photograph. We were told it measures 10 kg. We thought that this was a 'standard' traditional measure. Then someone else brought her *paili*, which looked different and was made of a different material! She said hers was an '11-kg *paili*'. We understood from the animated conversation that followed that everyone had their own *pailis*, and that *pailis* measured between 9 kg and 11 kg. Just when we thought we had understood the system, a woman said, with a grin on her face (enjoying our confusion): 'It's 10 kg for wheat, but will weigh more for urad!'"

Research Notes



Left: A woman holds a *barajja*.  
Above: Different kinds of *pailis*



After considerable discussion with the women we finally established the following:

- There is no 'standard' *paili*. Though *pailis* are containers (and hence measure volume) they are referred to in terms of weight. Smaller 1-kg measuring containers are called *barajjas*. The names of these measures varied across the region.
- The weight depends on what is being measured. Most *pailis* were 10-kg measures

but they could vary between 9 kg and 11 kg. How much a *paili* contains also depends on how it has been filled (i.e. smoothly up to the brim or heaped).

- The traditional system is a personalised system. Every family has its own *paili*. It could be made of brass, which is the most common, but we saw wooden and bamboo ones too. Borrowing and returning of grain must be done using the same container, since each woman 'knows' her *paili* (or *barajja*), its capacity and the way the *paili* was filled at the time of lending.

- *Pailis* and *barajjas* are used extensively in the village for barter exchanges. Sometimes women buy things from the local shop using grain measured with *pailis*. Women may borrow small amounts of grain within the village using *pailis*. Women use this system with confidence. They are familiar with the terms of exchange and they are unabashed about ensuring that they get the correct amount and are not cheated. As we shall see below this was in sharp contrast to their interactions with the standard system.



#### The Traditional System and Women's Economies

The traditional system of measurement seemed closely linked to women's lives and their economies. *Pailis* are used to measure small amounts predominantly within the village barter economy. Men usually do the large purchases and handle cash. During our discussions men hardly ever mentioned the barter economy. When they did there seemed to be a class bias at work as well. For example, Munnalal, from a well-off family of a 'higher' caste said, "Those who don't have money may be doing this, but we don't."



A granary inside a home from which women take small amounts of grain to buy items of their choice

The discussions around *pailis* led us to women's 'hidden' practices. Interestingly, Munnalal's wife later told us at great length about how she buys things in the market in exchange for small amounts of grain. We heard several accounts of women taking small quantities of grain from the household stock, usually without informing male family members, to buy things of their own choice. Some women said that men know about these practices and don't mind as it is not a large amount and women eventually end up buying things for the family anyway! Others said that very often they take the grain *chori chipke* ('*chori*' means theft and *chipke* means hidden or secretly) as they don't want male family members to know.

Whether women actually bought things for themselves or not was relatively unimportant. These discussions gave us insights into how women carve out tiny spaces in a world where they are certainly not spoiled for choice. Several women told us how they are given two *jodas* (one *joda* being a sari, petticoat and blouse) every year with which they have to manage. Women are not involved in the selection of saris. They are bought by male family members and given to them. What if they didn't like the sari that had been bought? Bhuvan's remark was a typical response, "There is no question of liking or disliking. We usually like everything. Men know what we like. If the sari tears, we stitch it and wait for the next year."

Of course, women knew about these practices but not everyone approved. Sribai from Manikpur said, "Some women steal grain from the house and sell it later in the market. Their husbands have no control over them. Women collect the money and over a period of time buy clothes and even manage to get jewellery made. Most often women use the money to buy things for themselves to eat. They are *chatori* (greedy)."

Discussions like these were centrally around issues of control, resistance and construction of gendered norms. The fact that we were able to analyse gender relations through a numeracy-research study was a novel experience for the research team.

#### The Market: Traditional/Standard (Metric) Interface

If women use the traditional system so extensively, did they have anything at all to do with the metric system?

All the women we spoke to do encounter the metric system, some more than others depending on their family situation, the work they were doing. Most women switched between traditional and standard measures when shopping — at the village shop, the local weekly village *haat* or the market at the nearest town.

Observations based on examples like the ones that follow enabled us to understand the nature of the interface between traditional and standard systems.

### Mithila at the *chakki* or flour mill

We went with Mithila to the *chakki*. On the way she told us, very confidently, that the sack she was carrying contained two *pailis* of wheat and on the scales that would weigh one *pao* (250 gm) more than 20 kg. On reaching the *chakki*, Mithila put the sack on the weighing scale and almost immediately removed it and put it by the side of the wall. All the while the flour-mill owner was at some distance from the scale. Mithila did not wait for him to come over and read the scale nor did she read it. From his position (leaning against the wall) he announced that the grain weighed less than 20 kg. He also deducted one *pao* as is his normal practice (for the amount of flour that gets wasted while grinding), and took the normal grinding charges.

Research Notes

### Observing an interaction at a trader's shop in Mehroni town

It was market day in Mehroni. The trader's shop was busy. During the half hour that we were at the shop we observed seven women and five men come and sell grain. It was striking that neither the women nor the men asked the trader how much the grain weighed. Nor did we observe them trying to read the scales. They only asked the prevailing buying price and how much they would get. (Here the assumption would be that they know the exact weight already and can therefore calculate how much they should get.) All the women demanded that the trader give them

a couple of rupees more than the amount he mentioned. Only one of the men did the same. The basis on which they were asking for more was not clear. The shopkeeper generally did not give a written *parchi* to the sellers, except to one woman who had brought a substantially large amount of grain to sell. While negotiating with the shopkeeper, this woman said she had brought the grain after weighing it using scales in the village. When we spoke to the woman after the transaction was over, we realised that she had not weighed the grain nor did she know how much the grain weighed. This was her strategy to ensure that she was not cheated. The *parchi* she had been given only had a money amount, not the weight.

Research Notes



## Analyses

### Power and Market Interaction

What instantly struck us was the contrast in confidence levels between the interactions where women used the traditional system and those where they had to switch between traditional and standard systems. The latter were clearly embedded in various power relations based on gender, caste, class and literacy.



Facing page and above: a researcher observing interaction at a trader's shop

Take the case of Mithila. In her village context she is considered to be a 'bold' woman, as she is outspoken and unconventional (having married out of choice and because she is mobile). Mithila is also familiar with urban life (and hence one assumes standard measures) as she migrates seasonally to the city to work. But Mithila did not question the *chakki* owner even though the amount of grain he said he had measured was less than what she had weighed at home using the traditional system. Perhaps she could not question him because, at the end of the day, Mithila is a non-literate, Dalit daily-wage labourer and the *chakki* owner is an 'upper-caste', literate and urban man. Similarly, most of the men and women in the trader's shop were rural and non-literate and belonged to castes that were 'lower' than that of the shopkeeper.

How aware were women about these power relationships and did they think it impacted the interaction? Mithila did not want to acknowledge that she might have been shortchanged. When we asked her why she hadn't questioned the mill owner she said, "Oh, it is a small amount!" But others acknowledged that, ultimately, the market is an upper-caste male space. During an interaction at the village, Ram Pyari had remarked, "Lower castes have no value in a *mandi*." And Har Dayal, her husband, had added, "Lower castes are cheated more by the buyers in the *mandi*. The grain of lower-caste farmers is auctioned at a lower price. The buyers claim that there is more



The mandi: a male space

*kuda karkat* in our grain (i.e. the grain is of poorer quality).” The relationship between Dalits and the traders is further complicated, as the latter are also moneylenders. The women’s families are invariably indebted to them and are also dependent on them for future loans. The fact that women repeatedly said that they ‘trust’ the shopkeeper must be read in this context.

### The Power of the Standard Measure

Initially observing the women bargain quite animatedly made us think that perhaps they were managing just fine. But after watching several interactions we realised that the interactions were set pieces. Women assume they’re going to be cheated (though they all say they have faith in the shopkeeper), and therefore always ask for a few more rupees. Women were never sure how much more they should ask for, as they never knew the exact weight of the grain. Bargaining for a ‘little more’ allowed them to believe that they have some power.

Women also bargain to mask the fact that they are, in fact, not sure of the metric measures. Though several women said they ‘knew’ the metric system, it was not clear how much they knew. We never saw anyone looking at or trying to read the scales in the market exchanges, nor did they enquire about the weight. The trader’s explanation for this was that women don’t need to ask because they can see the weight for themselves, which clearly they do not. But then he later admitted that very few women know the ‘smaller’ weights (less than 250 gm) or can calculate amounts that are more or less than the main markers (half, quarter and three-quarter kilograms). He also said that most men (approximately eight out of 10, he said) recognise the smaller weights or can calculate the ‘in between’ weights (for example, 350 or 700 gm). Our own enquiries during village interactions showed that generally women were familiar with the main markers but did not recognise the smaller weights or calculate prices

of these small amounts. However, it was these small amounts that they lost out on. The fact that women did not weigh the grain using standard measures before coming to the market reduced their confidence levels tremendously. The woman who had bluffed the trader and said she had weighed the grain before coming was clearly using her supposed knowledge of the standard to ensure that she was not cheated.

When did women insist on precision? When was rounding-off or approximation acceptable? Were we researchers, trained in formal maths, overly concerned about being ‘correct’ and ‘exact’? While it is difficult to come up with clear answers, we did observe that there were differences in the way in which interactions unfold in different contexts. There was a high degree of precision in the use of traditional measures. As ‘outsiders’, it was interesting that precision was linked to the traditional system (read imprecise), whereas when it came to the standard system (read precise) women ended up approximating.

“You won’t find a general pattern but you have seen that this kind of interaction is power-laden. The *paili* system works in their small-scale system. The *paili* is not a specific amount, it varies between *pailis* and between types of grains. Yet the women have a specific sense of how many kilograms that *paili* is when filled with a specific type of grain; she is precise about it. But when they go to the market, precision is required but as they cannot calculate and because of power they settle for ‘approximate’ amounts.”

### Of Women and Maths

It is natural that one’s ability to negotiate and calculate depends on confidence levels, and this again we found was influenced by gender. Throughout the study, in both the village and market contexts, we found that men — even non-literate men — calculated confidently. They hardly ever hesitated when asked a question. Women needed much more time as well as a conducive environment to be able to explain how they were making their calculations. Mithila, for all her bluster, was always nervous about explaining the method she used for her calculations. This was in sharp contrast to Har Dayal, Ram Pyari’s husband, who was happy to repeatedly explain his method of calculating interest to us. He and Ram Pyari looked very pleased when we played the tape back to them. Stereotypes about mathematical abilities were deeply entrenched. Men were believed to be good at mental calculations. “My husband can do calculations very well though he is not educated,” Uma had said. “The minds of husbands are sharper and work faster. I can’t do any calculations. I don’t know the weights,” claimed Ram Pyari.

### Rampyari can't calculate

Was this really the case? On our first day in Manikpur village, Ram Pyari told us that she helped run the small family shop. Though she spends most of the day managing the shop, she sees herself as a helper as she does not go out to buy the stock, which according to her involves big money and big calculations. Of course, we asked her if she recognised weights. What she said appeared to us like a pattern by now — she recognised only the 1 kg and 500 gm weights. Her lack of confidence made her reluctant to calculate: “I am scared. I have also never tried.” Her nervousness was exacerbated by her son's constant yelling (which was often, apparently) about her always making mistakes. How, then, did she manage at the shop? She did not sell *khhuli cheezen* — products that were sold ‘loose’, by weight, such as sugar — as this would require calculations. She said she sold ‘whole’ items like candies, *gutka*, bidi and matchboxes. On our second visit we again found Ram Pyari managing the shop, and to our surprise we saw her weighing and selling things! So we were left wondering whether Ram Pyari could measure things or not.

Research Notes

How do you assess whether someone knows something or not? Uma had said that she ‘knew’ the weight measures even though she could not read the numbers of the weights. Ram Pyari had told us that she did not know weights and could not calculate but was seen weighing and selling things when her son and husband were not around. The fact is that women know the traditional system and that this system has no recognition from the mainstream. Were we reinforcing hierarchies by enquiring how far women know the metric system? Yet we realised that ‘not knowing’ did lead to a lack of confidence and an inability to negotiate and play the system.

### ‘Good Women’ Don’t Go to Market

Our fieldwork led us to explore women's perceptions about the market as a space. We were surprised when several women categorically denied that they went to the market. We had, in fact, seen several women going to the market fairly regularly. Why the denial?

Women said that going to the market is not an activity that ‘good women’ engage in. Women who go to the market are ‘loose’ or out of control. And this reflects badly on the husband (who is obviously not man enough to control his wife) and the family. Several women said that women who do go, go out of *majboori* (out of compulsion) — either they were alone or their husbands were away. Women were uncomfortable when asked directly if they went to the bazaar, as the bazaar is a place where things are on sale. Women linked the word bazaar with being a *bazaaru aurat*: a prostitute.



Women in the marketplace

But we heard some different voices as well. For example, Sribai said that women do go to the market and even named some women. These women, Sitara the facilitator later told us, are ‘known’ in the village to ‘dominate’ their husbands. Ironically Sribai also has this reputation, but she has a positive self-image of herself — as someone who manages the household affairs, including selling grain at the market and even taking charge of loan-related transactions.

The women also said that their mobility threatened men's control over public space. “If women go to the market, it will lessen men's value and therefore it is correct that women do not go to the market,” declared Mithilesh. Possibly, women recognised how the gendered nature of power dynamics related to women and markets but did not want to explicitly challenge the gendered norm. Hence many women said they did not go to the market when in actual fact they did. Going or not going to the market is also a marker of caste and class status. Generally women from the so-called upper castes have much less mobility than Dalit women. We realised that many of the Dalit women who were speaking out against going to the market were financially better-off and were much keener to articulate and appropriate social practices of the upper castes.

### CONCLUDING OBSERVATIONS

The research study showed that the traditional system of measuring weights, using specific measuring containers, is used extensively within the village economy, especially by women. Women used this system confidently. They were particular and precise about their measurements when they used the traditional system and were rarely cheated or afraid of being cheated.

We also found that everyone engaged with both the traditional and standard systems.

It was difficult to generalise about the extent to which women were familiar with the standard system, but we did find that women were largely unfamiliar with weights other than the main markers like one, half, quarter and three-quarter kilograms. This, along with other power dynamics, made women under-confident when using the standard system and were often cheated as a result. With the standard system, women were constantly approximating, unlike when using the traditional system.

The research study showed that everyday numeracy practices, particularly around the interface between traditional and metric measurements, were embedded in power-laden social relationships. Gender, caste, class and literacy become important determinants of how the interactions are played out. As practitioners, this raised for us the question of the extent to which teaching just numeracy skills would enable women to challenge such relationships. An important breakthrough for the research team was the realisation that social and gender justice issues could be interrogated through numeracy. Our research, through unravelling women's hidden economies and practices and perceptions of the market, had enabled us to discuss issues of control, resistance and agency — all critical concerns in gender discourses. Nirantar, as a feminist organisation, has taken on board many of these issues in its education work but not through its work on numeracy.



Teachers as ethnographers

The research findings were revealing but the process of doing the fieldwork and analysis collectively was important in itself. The process of doing the research using ethnographic methods meant inverting power relations at different levels, which was quite liberating and exciting for the research team. As one team member said, “It felt

really good to learn from non-literate people about how they calculated. It was putting into practice the mantra of valuing local knowledge. There was a power inversion where ‘we’ were learning from ‘them’. We were forced to calculate mentally, in order to follow their methods of calculation, something that we were not comfortable with, given our dependence on written numeracy.” For the facilitators too, it opened new windows. They are always in a position where they are meant to know all the answers and this is quite a heavy load to carry. In this process they were learners and could learn together with others, some of whom were more educated than them. Initially, many of the facilitators were sceptical about whether they would learn anything new as they ‘knew’ the local context. But gradually they realised they did not know all the details, had not thought of these practices in ‘maths’ terms, nor had they thought of looking at numeracy as being located within social relations. “We were looking at something familiar through a different lens. Moreover we had not seen this as knowledge worth bringing into the classroom.”

“It was interesting to discover the extent to which literacy and numeracy are embedded in power relationships. It’s so determined by context. We looked at how literacy and numeracy are used or not by women in the market — one aspect is not being able to calculate but the other is the power relationships involved in doing it. Being able to speak up if you DO know something is wrong, once you have the knowledge and skills that enable you to know, would be powerful.”

#### Follow-up Suggestions

- Examine numeracy practices around specific areas like village shops, calendars, making and selling of ghee, etc in greater depth.
- Develop material using the information gathered and see how we can incorporate a social-practice approach to numeracy and literacy in our teacher training.