Wells experiment

Methods

The study began on January 25th, 2015 and was conducted in a total of ten villages. The ten villages were chosen at random from census data comprising a list of all known Pahari Korwa villages. We held one round of community meetings in the ten study villages during the month of February 2015 (from 2nd February to 27th February 2015). On arrival in each village we informed all village residents about the well building project and date and time of the community meetings via door-to-door visits to every household of the village. In these meetings, villages were informed in their local language (Sargujia) via a standardized script (refer to script) about the project. The script also contained a set of test questions that were asked at the end to the whole group to make sure people had understood all the information. During this first meeting we informed each village that Rs 100000 (at the time GBP 1000) was available to provide the village materials (including the costs of delivering the materials to the village) for the village to build up to 6 wells. Villagers would have to contribute voluntary labour. Villages were given 3 weeks to decide whether or not they would build the wells, how many wells they would build and where they would site the wells. We filmed all proceedings (informed consent was taken from all participants in the community meetings to film the proceedings and only two individuals chose not to be filmed and were excluded from the film) in the community meetings and recorded the names and unique ID's of all residents of the village who attended this first meeting. At the end of this first meeting, villages provided us their preliminary thoughts and decision on what they wished to do. We emphasized that all decisions would be taken entirely by the village and that we would not participate in this decision making process or advise them on what they should do. We also informed villages that we would be filming the well building process in the village and installing camera traps in order to document and record the building. We informed them that a team of two research assistants would be posted and would live in their village through the entire period of well building. Villages were informed that they had three months up to the arrival of the monsoons to build these wells as if the wells were not complete by then, their efforts would be wasted as the holes they would have dug would get filled in by the rain and mud. We then left the village and did not return for a period of at least three weeks during which time the village was free to have discussions about what they would do without any interference from us and without the presence of cameras.

After 3 weeks (in practice this ranged from 3 to 5 weeks due to logistical constraints on travel) we returned to each village and held a second community meeting in order to hear the final decision each village had taken. This second meeting was also filmed in each village and once again we recorded the names and unique IDs of the village residents who attended the

meetings. We then noted down what their final decisions were and informed them that the next stage would be for us to arrange the drops of the materials in the villages that had decided to build. 6 out of 10 villages decided to build 4 wells across them. Four villages decided not to build. For this second community meeting, we took along a 'mistri' (expert builder/engineer). The mistri accompanied villagers to the different sites where they decided to build wells and we recorded the GPS locations and the dimensions of the wells that they wished to build. The mistri then estimated the quantities of materials (brick, stone, cement, sand and small stones or gravel (bajri)) that each well would need based on the dimensions specified by the villagers. We then calculated what the total cost of building the wells would be based on the material estimates provided by the mistri in order to ensure that the wells the villages had decided to build were within the budget of Rs 100000 allocated to each villages, otherwise we would have had to advise the villages to alter the dimensions and/or number of wells they wished to build to fit within the budget. No changes were made to the number and dimensions of wells that the villages first decided to make as for all villages the first estimate of costs fell within their allocated budgets. The second meetings in each village were held between 5th March and 19th March 2015.

Through the month of March and April we arranged for building materials to be dropped in each village. All building materials were dropped at the site of the wells via tractors. As the materials were dropped, our teams of research assistants were posted in each village and the camera traps were installed. Camera traps were installed at 19 out of 24 wells being built as we could not always find a suitable and secure place to install the camera traps in the remaining wells or village residents using those well sites asked us not to install the cameras. We also did not install camera traps at any sites which were actively being used by people and where people did not want them installed. The camera traps were usually installed by tying and nailing them to a tree near the site of the well. One of the camera traps in one of the villages was stolen after which we did not replace it. We think this was stolen by migrating labour that worked in a nearby stone quarry. No other camera traps were stolen or damaged.

Each team of two research assistants lived in the villages for a period of 4 months during which time they made quantitative observations of the well building process. The sampling protocol is described in the next section.

The research teams were pulled out of the villages on June 30th 2015 so this was the final day until which observations were made in the year 2015 and for most villages. From mid-June onwards there was very little work going on at the well sites as the monsoons had arrived and heavy rains were preventing the villages from building as we had anticipated. The teams could also not work or make observations in heavy rain and video equipment could not be used so we withdrew the teams at this time. At this time 6 wells out of a total of 24 were complete.

Over the following year, once the monsoons were over some of the wells continued to be built. However, since we did not always know in advance when people were working on the wells and did not have teams posted in the villages during this time we were unable to record the building process. Our team visited the villages about once every month or two during this period to check on the status of the wells and if any further work had been carried out and recorded whether this was the case or not. In 2016, two villages informed us in advance that they would be working on some of the wells in their villages during the spring and summer of 2016. So we posted teams of two people each in each of these villages during the months of April, May and in one village half of June too, to record the well building process in these villages, until the wells were completed. One village built one well during this time and the second built two wells. In total between June 30th 2015 and June 2016 an additional 10 wells were completed but we were only able to record work in 3 out of these 10 wells during this period. The observations conducted during April, May and June 2016 in the two villages were conducted in the same way as conducted in 2015 and as described in detail in the next section. Therefore in total, 16 out of 24 wells were completed across 6 villages as detailed in Table 1 below.

Village	Wells planned	Wells completed	
1	6	4	(67%)
2	5	2	(40%)
3	4	3	(75%)
4	4	2	(50%)
5	3	3	(100%)
6	2	2	(100%)
7	0	0	
8	0	0	
9	0	0	
10	0	0	
Total	**24**	**16**	**(67%)**

Table 1: Details of wells planned and completed

Method of sampling behaviour during well building

1. Each team in each village followed a timetable for making observations on the well building sites for 4 hours each day from the month of March to June.
2. These four hours for each day were randomly selected between 7:00 am to 5:00 pm. As this was the probable time between which people in the village could work, taking into

account their daily chores. For the latter half of May and through June, we excluded the hours from 12 to 4pm and no observations were recorded during these hours as it was very hot during this time and these were the peak hours of heat during the day. We did not want the research assistants to fall ill from heat exposure. Hence, during this time, the teams only made observations between 7am and 12 noon and then from 4pm to 6pm of each day.

3. Out of these 4 hours of observation, any two hours of observation (randomly selected) were done by recording observations on the video camera as well as observation sheets while the other two hours of observations were done by only recording the observations on the observation sheets i.e. without the video. Hence, for each day, the teams made two hours of observations with the video camera and two hours without. This allows us to test whether behaviour varies based on whether villagers were being recorded on video or not.
4. The Research Assistants situated in each village kept note of the well sites where building work was ongoing and randomly selected any one site for observation for each day, amongst the well sites where the work had started or was ongoing.
5. The Research Assistants also kept a daily record of the sites they took observations on and would make a note of the site number they visited each day on the timetable.
6. The observations were made 6 days a week. The Research assistants had a holiday once in a week which was randomly selected.
7. The Research Assistants also kept a Daily activity log where they noted if any work was going on or not at each of the well sites chosen by the villagers, if yes what work was going on at each of them. This helped us track activity at each well site on a daily basis even though behavioural observations were conducted at only one well site each day.

In this way, we randomized the well site where the team made observations each day, randomized the four hours of the day when they made observations and randomized the 2 hours in each day that they made video observations and non-video observations. We also randomized the day research assistants took holidays so that villagers could not guess when the team would be observing them and when not. In some villages, due to the research assistant's availability schedules, there were a few weeks when observations were not made.

Sample of the Timetable:

Hour without video

Date	Month	Day	Dhodhi No.	Hour 1	Hour 2	Hour 3	Hour 4
1/4/2015	April	Wednesday		10:00	11:00	04:00	05:00

At the start of each hour of video observations, the team made a record of the name of the village, date, time and well number at which they were working so that we knew which video related to which village, date, hour and well.

For each hour of observation (video and non-video), each team recorded the time of arrival and departure of villagers who came to work on the wells along with their names, unique IDs as well as identifiers (clothing, jewelry etc) for each person. This data was linked to the video data to quantify individual behaviour. Research assistants also kept free-hand notes on any interesting or important observations they made in the villages or anything they heard or conversations they had with villagers related to the well project on the observation sheets. The research assistants also kept free-hand notes about anything they heard or saw with reference to the well building every day. This information might help us to contextualize our findings later.

Camera trap data

The camera traps provide us a baseline measure of total activity that occurred at each well building site. We can use these data to estimate what percentage of total building time we captured in our observational sampling scheme in order to estimate whether we have a good sample of data (in terms of total number of hours of observation) and to estimate the power of our analyses. We can also use these data to estimate how much variation there is in total building and activity time across wells within a village as well as across villages and how this relates to the outcome of the study.

Pre-building water survey

Prior to introducing the project to the villages, we conducted a water survey in all villages. This survey was conducted in January and February 2015. During the survey we took a GPS reading of all the water sources at the time in the villages and conducted a door-to-door household survey and recorded which water source each household used, how often they collected water, how much water they collected each day, who in the household collected water, what the quality of their drinking water was like, how long it took them to walk to their water source one-way (self report) and how long it took the research assistant administering the survey to walk to the water source (measured by us) and other such questions (refer to survey sheet). This survey was conducted in order to obtain measured of need for new water sources both at the village level and at the household level. These data will be included in our analyses of the observational data as covariates and predictors.

We will also conduct follow up water surveys in future years to record whether these patterns of water use change as a consequence of the building of the wells and whether there are any free riders (people who did not build the wells but use the water from them).

Monthly survey after well building

Since all the wells were not complete by June 30th when our research teams withdrew from the study villages, we decided to conduct monthly surveys of each village to record whether any further building activity occurred and also to record whether the newly built wells were being used. As the building materials continued to remain at the well sites and people in some villages said they might continue to build after the monsoons, we made a monthly visit to record any activity although we did not make any quantitative observations.

Post-building water use observations

In 2017 we conducted an observational survey to record the use of the wells that had been completed. We posted teams of two people each in each village for one week during the month of May 2017 (16 to 22nd May in 3 villages and 23rd to 29th May in 3 villages). This time the observations were made entirely by the team members on paper and no video recordings were made as the use of the wells includes not only collecting water and washing but also bathing and we did not want to intrude on people's privacy. For each observation period the team would situate themselves at some distance to the well on the approach to the well and record who visited the well, for what duration of time, whether or not they collected water from the well and if so how much water. Each team was randomly assigned one of the wells that had been built in a village on a day and made observations between 5am and 10am in the morning and 5pm to 7pm in the evening which are usually the peak times of day when people use wells. These data will allow us to assess which households in the village are using the wells and compare it to which households contributed labour to the building process in order to obtain a measure of cooperation and free-riding.

Post-building water use survey

In 2017 we also repeated the same pre-building water sources and use survey that we had conducted in January and February 2015 during the months of January to March 2017 and October to November 2017 across all 10 villages. This provides another time point of data across all 10 villages of the distribution and use of water sources and will allow us to assess the extent to which the building of the new wells changed water access and use across the 6 villages where they were built and how this compares to the 4 villages who decided not to bild any wells.