Reconstruction Assistance in Rural Nepal after the 2015 Gorkha Earthquake through Aarma Parmah Approach

Devraj Gautam¹, Gustavo Cortés ²

Abstract

Background: In the aftermath of the tragic 2015 Gorkha earthquake, the Government of Nepal invited International non-governmental organizations (INGOs) to support with highly needed humanitarian aid. Medair, a Swiss based INGO, arrived soon after, providing emergency relief and staying to aid in the reconstruction of private houses owned by vulnerable people in Ramechhap. Medair covered 1,300 households in this region, providing technical assistance, quality assurance, and supporting the community in other ways required to accomplish the project.

Research objectives: Completing the reconstruction of 1,300 households in a remote community which relied on NPR 3,00,000 (3000 USD) provided by the GoN, in just a two-year time frame, while meeting all the quality standards and the Nepal Building Code was very challenging. The main objective of this paper is to describe how Aarma Parmah, and old method of labour exchange, was successfully employed in reconstruction and how it was one of the main factors for finalizing the works on time and with a high quality.

Methodology: Medair, in association with local partner Community Development Society (CDS), designed and implemented the project using Aarma Parmah clusters at the centre. A series of surveys were conducted during the project implementation and one additional survey a year following completion assessed the perception and satisfaction of the community regarding Aarma Parmah. The surveys were conducted using KOBO software to register the answer of the interviewees. The most relevant results obtained from the analysis are hereby presented.

Key results: The project was successfully completed, mainly due to the ‘Aarma Parmah’ approach which led to improved acceptance by beneficiaries, to overcoming financial obstacles and to reaching all families, effectively leaving no one behind. The knowledge of construction and build back better methodologies will be used to cope with future disasters and will be transferred to future generations.

Keywords: Reconstruction; Earthquake Resilience; Build Back Safer, Owner Driven Reconstruction, Aarma Parmah

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1. Introduction

On 25 April 2015, a 7.6 magnitude earthquake struck Nepal, followed by another severe 7.3 magnitude earthquake on 12 May. In the following weeks persistent and at times significant aftershocks and landslides continued to destroy buildings, infrastructure, and livelihoods, affecting millions of people. According to the Post Disaster Needs Assessment (PDNA) [1] there were over 8,790 casualties and 22,300 injuries. It was estimated that the lives of eight million people, almost one-third of the population of Nepal, were impacted by these earthquakes. Of the country’s 77 districts, 31 were affected. Of those, 14 were declared as ‘crisis-hit’ for the purpose of prioritizing rescue and relief operations. An additional 17 neighbouring districts were declared as partially affected.

In the 31 affected districts, it was reported that 498,852 private houses were fully destroyed and 256,697 private houses were partially damaged [1]. The total value of disaster effects (damages and losses) caused by the earthquakes was estimated at NPR 706 billion (7 billion USD).

In view of such a large scale of devastation, the Government of Nepal undertook various immediate initiatives for rescue, relief and reconstruction works. At the same time the Central Natural Disaster Relief Committee (CNDRC) made an appeal to the international community for effective search, rescue, and relief activities [2].

Medair, a Swiss based non-governmental organization (NGO), deployed its emergency response team to Nepal on 27 April 2015 within 48 hours of the disaster, and started relief distributing activities at eight Village Development Committees (VDC) of Sidhupalchowk district (Gati, Piskar, Listikot, Phulpingkatti, Sindhukot, Haibung and Bhotechaur). Medair worked in close coordination with the Nepal team of Danish INGO Mission East as well as local partners in relevant districts. Emergency shelter and water, sanitation and hygiene (WASH) support was provided to more than 40,000 affected individuals. Households requiring support for demolition were provided with tools, technical support and employed in cash-for-work activities. Household located at higher altitudes were provided cash transfers to support their preparations for winter.

From January 2016 to June 2016, Medair provided Disaster Risk Reduction (DRR) training to communities with the aim of increasing their preparedness during disasters, and to explain basic ways for building earthquake resistant houses. Medair followed IFRC’s Participatory Approach to Safe Shelter Awareness (PASSA) module [3], DUDBC’s [4] and NSET’s [5] mason training curriculum and a house design catalogue published by DUDBC [6]. During that period, 218 individuals of four VDCs at Sindhupalchowk district (Gati, Piskar, Listikot and Phulpingkatti), 243 individuals of five VDCs at Okhaldhunga district (Raniban, Yesham, Narnadeshowr, Gamnangtar and Singhadevi) and 150 individuals of three VDCs of Ramechhap district (Bijulikot, Sanghutar and Himganga) were trained on PASSA [3]. Similarly, 94 Masons at Ramechhap and 89 Masons at Okhaldhunga were trained following DUDBC’s curriculum. Furthermore, two demonstration model houses were built for masons
and community members to learn about different earthquake resistant features following DUDBC design catalogue [6] at Okhaldhunga and Ramechhap district respectively.

With the aim of rapidly reconstructing buildings which sustained physical damages, the government of Nepal established the National Reconstruction Authority (NRA) on the 25th of December 2015, a government body responsible for the post-earthquake reconstruction. In April 2016, the NRA endorsed NGO mobilisation guidelines [7] that paved the way for NGOs to execute various post-earthquake reconstruction and rehabilitation works. Based on the guidelines, Medair proposed a project to support the reconstruction of 310 houses in two of the wards in Bijulikot, Ramechhap. Under a tri-party agreement between the NRA, CLPIU and Medair, work began in July 2016. Medair partnered with local NGO, Community Development Society (CDS), who helped in the implementation of the project.

During the initial project, affected families as well as local and district stakeholders requested that the project be extended. Based on the needs in the community, Medair agreed to the extension on 19 December 2017 to cover all remaining wards in Bijulikot, supporting an additional 953 households. A map of Bijulikot and its wards is shown in Figure 1.

Figure 1. Map of Bijulikot identifying the sub-divisions or wards and the number of beneficiaries in each ward.
On September 2018 Medair’s first project of 310 houses was successfully handed over to the local government, followed by the second project of 1,002 houses which were handed over in April 2019, marking the end of Medair’s work in Nepal.

From the beginning of the project, Medair understood that people were accustomed to share labour when working in agriculture. In this labour exchange system, known as Aarma Parmah, families living nearby organise themselves to help each other finish a similar set of tasks. In rural Nepal, the practice of labour sharing for agricultural purposes is ancient and widespread. Aarma Parmah involves people trading their work in the field so that without monetary exchange, individuals can help one another in the process of sowing, ploughing, cultivation and harvesting. When a farmer needs help, he or she will receive at least one person from each household within the agreed Aarma Parmah group, so that activities can be accomplished. The farmer will then reciprocate the help received by sending one able member of his/her household to each of the households that provided help, when help is requested. This way of working not only helps in completing the tasks on time, but also helps in increasing the social harmony [8] among the people of the community.

NRA’s CEO, Sushil Gyewali, explained during an interview on April 2016 [9] that it would be possible for a family to construct their house with the funding provided by the government if people demolished their old vulnerable houses and reused materials that were undamaged, and if people made use of the traditional Aarma Parmah system. In our experience, and as explained in the discussions section, both were key in reducing construction costs.

Medair introduced the traditional system of Aarma Parmah in the reconstruction sector through significant community awareness campaigns. The whole Bijulikot VDC was divided into small clusters consisting of six to fifteen households based upon the number of houses within that community. For each cluster one person from each house participated in the group. The role of the cluster was to exchange labour within the group, assisting each other with the demolition of damaged houses and construction of new ones. Medair distributed tool kits to each cluster and provided training on their use. These tool kits enabled safe and efficient demolition of damaged homes, allowing salvaged materials to be used in new house construction as well.

The formed group of people started with activities that required less skill under the direct supervision of Medair and CDS technical personnel. Such activities included demolition, transportation of materials and reconstruction of the houses to the plinth phase. Houses which consisted of elderly people or people who couldn’t do physical work did not participate in the working team but could volunteer in preparing lunch or serving water to the workforce. The work force constructed the house of every people in the cluster, including that of those members being physically unable to work. This cluster system also helped in formulating the owner driven approach, giving authority and plenty of discussion time to determine whose houses to build first and which house model from the pre-approved government catalogue had been chosen. Houses in this catalogue had been designed considering local materials and using engineering features to increase the seismic safety.
This paper shows how the Aarma Parmah approach was followed in the reconstruction of the 1,312 houses in Bijulikot VDC, and explores the results of a series of surveys aimed at better understanding how people perceived and benefitted from the approach. The methodology is first explained, followed by the results, discussions and conclusions.

2. Methodology

In a baseline survey conducted during the project planning phase, people were asked if they were interested in working in a cluster system. Out of 813 respondents, 71% of beneficiaries mentioned that they were willing to work in a cluster system based on Aarma Parmah principles. Given that the majority of the people preferred to work in clusters, Medair employed the system. Later on, having seen the progress made by households in the cluster system, all remaining households decided to join, totalling 118 clusters with an average of 10 to 11 households. During project implementation it was seen that about 85% of the total participants were actively engaged.

Frequent surveys were conducted during the project implementation period to measure the effectiveness and impact of the intervention, and to monitor the outputs and outcomes of the project. Surveys were also conducted to learn areas of improvement and to incorporate the necessary adjustments as needed.

This paper investigated whether Aarma Parmah was indeed one of the main reasons why most of the families in Bijulikot VDC were able to finalize reconstruction of their houses with the provided grants of NPR 3,00,000 (3,000 USD), and aligning with the government timeline. In order to answer this question, surveys conducted during project implementation (with nearly 90% participation) were analysed, and an additional survey was conducted to further investigate the approach one year after project completion.

The initial surveys were conducted during project implementation by a number of enumerators which went to each household and asked a series of questions about the different aspects of the project, namely reconstruction, demolition, social mobilization, technical support, cash grants, beneficiary feedback mechanisms and the cluster system (ie, Aarma Parmah). The surveys were conducted using KOBO software [10] programmed into tablets. Third party enumerators were trained on how to use the software as well as briefed on the questionnaire. Collected data were uploaded from the tablets to a server and downloaded for further analysis.

Two of the surveys conducted during the project period included questions regarding Aarma Parmah. These questions were mainly formulated to learn about beneficiaries' involvement in clusters, their feeling while they were associated with clusters to finalise their reconstruction, how often they were having meetings to discuss progress made, challenges needed and way forward to build their houses in their clusters. Questions also investigated if the cluster system helped them in reducing the cost of reconstruction, the effects in communal harmony while working in clusters and whether or not they were interested in performing future communal tasks through the cluster system.
The most recent survey was conducted with the aim of evaluating the Aarma Parmah process, how it had helped the reconstruction process in Bijulikot VDC, and whether there were other benefits to the approach. These questionnaires asked people about their location, phone number, their house reconstruction status, whether Aarma Parmah was in practise before the reconstruction project and if it was used for the reconstruction. Another question investigated if the Aarma Parmah approach introduced for reconstruction was similar to what they practised before for agriculture. Interviewees were also asked if they were engaged in the Aarma Parmah clusters formed by Medair; those who were involved were further asked demographic information about the cluster, the activities conducted through the formed cluster, how the cluster was useful for them in finalizing their reconstruction, and if they were able to save money by working in clusters. Finally, social aspects were also investigated, including how the cluster helped in improving communal harmony, how the clusters helped the vulnerable people of their communities in completing the reconstruction and their rating of the cluster system.

Because of the ongoing lockdown in Nepal due to COVID-19 at the time of the study, it was decided to conduct the third survey through phone interviews. Out of the 1,312 beneficiaries, phone records were available for 511 families, representing all wards of Bijulikot VDC. A random sampling selection was used to choose a sample of four families from each of the 9 wards, totalling 36 surveys. The random sampling was carried out using the Microsoft Excel random function. Note that the sampling process ordered all the people in each ward with a phone number, allowing the random selection of additional members when one of the top four members is a given ward was not reached.

As previous surveys, questions were programmed in KOBO software [10]. A total of 36 beneficiaries participated in the survey, four from each of the nine existing wards (18 from Ward 3 and 18 from Ward 4 in the new ward structure).

Section 3, presented below, provides the results obtained from the surveys.

3. Results

Several surveys were conducted during the project implementation (2016 to 2019), covering most beneficiaries with the aim of obtaining feedback to further improve the ongoing project, and to understand the satisfaction of the beneficiaries and the effectiveness of the process followed, including the Aarma Parmah approach.

In a survey conducted in July 2017, it was found that out of 299 respondents surveyed at wards 3 and 6 of Bijulikot VDC (out of 310 targeted), 99% said that they were familiar with the Aarma Parmah cluster system that Medair implemented for the construction works, and only 12% of those did not participate in a cluster meeting. 82% felt that working in clusters reduced the overall costs of demolition and reconstruction, 96% said that it improved the harmony within the community and 95% mentioned that they would like to continue to use the cluster system in the future.
In another survey conducted in February 2018, out of 824 respondents surveyed at wards 1, 2, 4, 5, 7, 8 and 9 of Bijulikot VDC (out of 1002 targeted), 99.6% said that they were familiar with the Aarma Parmah cluster system that Medair implemented for the construction works and only 2.7% of those did not participate in a cluster meeting. 60% felt that the cluster reduced the overall costs of demolition and reconstruction, 62% said it had improved the harmony within the community, and 87% mentioned that they would like to continue to use the cluster system in the future as well.

The most recent survey carried out as part of this research, as described in the Methodology section, was conducted on April 2020, one year after the end of the project completion. The intention was to understand the perception of the community on Aarma Parmah, as used for reconstruction, and how it has impacted to the lives of community members. The results of the survey are illustrated in detail below.

Out of the total surveyed population, 75% were female and 25% male, while 69.4% were general beneficiaries, 22.2% were trained masons, 5.6% were PASSA members and 2.8% were elected ward representatives (see Figure 2).

![Figure 2](Image)

**Figure 2.** Affiliation of respondents.

People were also asked if they practised Aarma Parmah in the community before Medair’s intervention. 50% of the respondents answered affirmative, 33.3% of beneficiaries mentioned that their community practised it occasionally and 16.7% mentioned that they had not practised Aarma Parmah in their communities. This is summarized in Figure 3.

![Figure 3](Image)

**Figure 3.** Practice of Aarma Parmah in the community.
Respondents who answered that Aarma Parmah was used in their communities were further asked about its purpose. 93.3% mentioned that they used Aarma Parmah for agricultural purposes, whereas 3.3% mentioned for community development and another 3.3% for reconstruction works, as shown in Figure 4. When asked how the cluster system introduced by Medair compared to the Aarma Parmah approach in use before, 5.6% mentioned that it was similar, however 41.7% of the respondents mentioned that it was different. This was expected as reconstruction dynamics were different and activities included soft-side components and training.

![Figure 4. Purpose of Aarma Parmah in the community.](image)

94.4% of the respondents replied that they had participated in the cluster system formed by Medair (the previous two surveys had shown a 99% and 99.6% participation rate, respectively). Of the 5.6% of the respondents that were not involved in the cluster, the main reason given for not been involved was that the respondent’s grant claim was finalised later on and almost all the houses of their area had been completed. Thus, they had no other option but to hire labour to complete their house. Some respondents explained that they were staying in Kathmandu for work, so they contracted their house to a local contractor.

The cluster composition was also investigated. It was found that the cluster with the highest number of members had fifteen members, while the one with the least number had six members. The group with the highest number of male members had twelve members while the one with the least number had three. For female members, the group with the highest number had six, while one group had none. The average cluster size was 10.1 members, with 7.4 male members and 2.7 female members on average (see Table 1). It should be noted that each member represented his/her household.

Table 1. Cluster group composition

<table>
<thead>
<tr>
<th>Cluster Member</th>
<th>Lowest no. of members</th>
<th>Highest no. of members</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3</td>
<td>12</td>
<td>7.4</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>15</td>
<td>10.1</td>
</tr>
</tbody>
</table>
When asked about what activities were conducted through the cluster, 63.9% of respondents mentioned that they were involved in transporting materials. More specifically, transporting construction materials such as cement, sand, rebar, CGI sheets and stone, for example, usually transported from the nearest road to houses under construction. Some of the beneficiaries needed to carry those materials for more than 2.5 hours. 55.6% of beneficiaries mentioned that they were actively involved in construction activities, usually as non-skilled labours, 41.7% of respondents mentioned that they demolished their vulnerable house with the help of cluster members. Finally, 19.4% of respondents explained that although they were part of a cluster they did not participate in reconstruction activities within the cluster and instead constructed using a local contractor to build their house. In total 80.6% of beneficiaries were actively engaged in the cluster, supporting each other for reconstruction activities. A summary is shown in Figure 5.

Figure 5. Activities conducted through cluster (Aarma Parmah).

As shown in Figure 6, respondents who worked in the cluster system were also asked to mention its benefits. 63.9% of beneficiaries mentioned that they were able to save money through labour sharing. 61.1% of respondents mentioned that they benefitted from transportation of materials and 13.9% respondents mentioned that they benefitted in other ways such as the masons’ training that was organized for clusters and the motivation to finalize constructions that came from the cluster.

Figure 6. Benefits of cluster system.

Those respondents who were engaged in different kinds of reconstruction activities through clusters were asked how much money they were able to save through conducting those
activities through the Aarma Parmah approach. For demolition activities, the lowest saving was NRs. 10,000 (100 USD), the highest saving mentioned was NRs. 50,000 (500 USD), and the average saving per house was calculated as NRs. 26,666 (266 USD). It should be noted that the salvaged materials after demolition of their previous unsafe houses were also utilized for the construction of their new house and the value of that saving has not been considered here.

Similarly, the lowest saving for reconstruction of houses was NRs. 25,000 (250 USD), the highest saving mentioned was NRs. 1,20,000 (1,200 USD), and the average saving was calculated as NRs. 53,250 (532 USD). For materials transportation, the lowest saving was NRs. 5,000 (50 USD), the highest saving was NRs. 30,000 (300 USD) and average saving was calculated as NRs. 9,696 (97 USD). For those houses reconstructed using the Aarma Parmah approach, an average of NRs. 89,612 (896 USD) was saved per family. Table 2 shows a summary of the savings for the different phases and the total savings.

<table>
<thead>
<tr>
<th>Task</th>
<th>Respondents</th>
<th>Lowest Saving</th>
<th>Highest Saving</th>
<th>Average Saving Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition</td>
<td>41.6%</td>
<td>NRs 10,000 (USD 100)</td>
<td>NRs 50,000 (USD 500)</td>
<td>NRs 26,666 (USD 266.66)</td>
</tr>
<tr>
<td>Reconstruction</td>
<td>55.5%</td>
<td>NRs 25,000 (USD 250)</td>
<td>NRs 1,20,000 (USD 1,200)</td>
<td>NRs 53,250 (USD 532.5)</td>
</tr>
<tr>
<td>Materials transportation</td>
<td>63.8%</td>
<td>NRs 5,000 (USD 50)</td>
<td>NRs 30,000 (USD 300)</td>
<td>NRs 9,696 (USD 96.96)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>NRs 40,000 (USD 400)</td>
<td>NRs 2,00,000 (USD 2,000)</td>
<td>NRs 89,612 (USD 896.12)</td>
</tr>
</tbody>
</table>

Similarly, 19.4% of respondents mentioned that there were vulnerable families within their clusters and that all families with vulnerable individuals had been supported and empowered to finalize their shelters. Dr. Shrestha, member of the Nepal Social Welfare Council and final project evaluation team lead, explained in his final report [11] that most vulnerable people (the elderly and those with disabilities) were also able to reconstruct their houses due to Aarma Parmah which helped ensure nobody was left behind at Bijulikot VDC. When asked in which ways vulnerable families were supported, 71.4% percent of respondents mentioned that their cluster helped in transportation of the construction materials of vulnerable families from the main road to the houses. 57.1% of respondents mentioned that they provided labour from the cluster to support the reconstruction of the houses, 28.6% mentioned that they were able to provide skilled masons from the cluster to help finalize the reconstruction of those vulnerable families and 42.9% of respondents mentioned that vulnerable families were supported by other means such as finding a local contractor for those families to complete the
house reconstruction within the provided grants and supervising the construction of the house. These results are summarized in Figure 7.

Figure 7. Means of support to vulnerable households.

The effects of Aarma Parmah on the social cohesion of the community were also investigated. 33.3% of respondents mentioned that their relation with neighbours was improved significantly due to cluster activities. 27.8% mentioned that their relation with neighbours improved slightly, whereas 38.9% of respondents mentioned that the relation with neighbours was unchanged (see Figure 8). Respondents mentioned that misunderstandings between cluster members were directly resolved between the involved members and the cluster team leader, preventing any escalation and further negative effects.

Figure 8. Relation with neighbours within clusters.

It was interesting to see that 91.7% of respondents mentioned that communal harmony was maintained inside their communities as a result of the Aarma Parmah approach. In places where mixed castes resided, it could be seen that all the people from different castes were equally participating in their reconstruction works. Also, when respondents were asked to evaluate the social and cultural bonding among the people of their locality as a direct effect of the cluster, 22.2% catalogued the bond as very high, 66.7% catalogued it as high, and 11.1% mentioned it was low (see Figure 9).
33.3% of beneficiaries mentioned that they were able to conduct some of the activities through their cluster in joint efforts after Medair left from the community, whereas 66.6% mentioned that they did not conduct any further activities through the formed clusters. Respondents who mentioned that they have continued some tasks are mainly in agricultural works, but also in community development works like road improvement, clearance and water supply maintenance. Furthermore, 25% of respondents mentioned that they are still continuing cluster meetings that were formed by Medair and 75% of respondents mentioned that they have not conducted any cluster meetings after Medair finalized its reconstruction work.

Respondents were asked about what system of work they preferred. 75% answered that the Aarma Parmah approach, 16.7% replied paid labour and 8.3% mentioned that both of them would be effective, as summarized in Figure 10. Similarly, 33.3% of respondents rated this approach as very high, 55.6% as high, and 11.1% of respondents gave it a low rating. Meanwhile, 86.1% of respondents mentioned that they are willing to continue practicing Aarma Parmah in the future. The remaining 13.9% of beneficiaries did not show any willingness to continue Aarma Parmah for other types of work in their communities.
4. Discussion

The analysis of the results from the surveys has helped understand how people that participated in the cluster system benefited from it and how the system was perceived. This section expands some of the key areas revealed by the surveys, namely the financial savings that enabled people to finish their construction with the limited amount of funding provided by the government and the social harmony within the clusters and the community.

One of the key benefits from working in clusters was the financial savings which enabled most people to finalize their house construction without the need of borrowing money. People from these remote locations struggled to feed their families throughout the year from farming, so it would have been very difficult to construct the new house if they had to finance a significant part. Thus, working together was a necessity to save the money and construct the houses within the provided grant.

The given grant of NRs 3,00,000 (3,000 USD) was seen insufficient to build a house if the family was to hire the labour to construct it. Labour costs for a typical two room stone masonry house with attic floor (shown in Figure 11) would cost an average of NRs. 1,75,000 (1,750 USD) when built by a contractor. As shown in Table 3, labour costs added to the cost of construction materials and transportation would have been NRs. 5,75,000 (5,750 USD) which is more than families were capable of financing and would have slowed down or even stopped the project. Figure 12 and Figure 13 show the main steps undertaken for reconstruction.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost, NRs. (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition of old house</td>
<td>50,000 (500)</td>
</tr>
<tr>
<td>Materials</td>
<td>3,00,000 (3,000)</td>
</tr>
<tr>
<td>Transport</td>
<td>50,000 (500)</td>
</tr>
<tr>
<td>Labour</td>
<td>1,75,000 (1,750)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,75,000 (5,750)</strong></td>
</tr>
</tbody>
</table>

In the recent survey, discussed in the results section above, people were asked how much they saved for each of these activities by working in clusters. The results revealed that people were able to save an average of NRs. 89,612 (896 USD) per household. This amount is shown in Table 4 (rounded to NRs. 90,000 [900 USD]), along with other sources of income such as the grants provided by the government, savings from the reuse of salvaged materials, and additional funding provided by Medair (NRs. 35,000 [350 USD]) for transport of materials.

Comparing these two tables it can be seen that there was an average deficit of NRs 50,000 (500 USD) when building a typical two room house (see Figure 11), which was selected by more than 80% of beneficiaries. This deficit was usually absorbed by the family, using their own savings. It should be also noted that in the recent survey respondents mentioned that their saving from Aarma Parmah ranged from 40,000 (400 USD) to NRs 2,00,000 (2,000 USD), averaging NRs. 89,612 (896 USD) per household. This fluctuation of saving
corresponds to the fact that some of the clusters fully adopted Aarma Parmah until the completion of their houses whereas some of the clusters completed their plinth or sill band through the Aarma Parmah approach and used hired masons afterwards.

Table 4. Financial management breakdown.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost, NRs (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant provided</td>
<td>3,00,000 (3,000)</td>
</tr>
<tr>
<td>Salvaged materials (eg, stone, timber)</td>
<td>1,00,000 (1,000)</td>
</tr>
<tr>
<td>Savings from Aarma Parmah</td>
<td>90,000 (900)</td>
</tr>
<tr>
<td>Medair support for transportation from Manthali to the nearest road head</td>
<td>35,000 (350)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,25,000 (5,250)</strong></td>
</tr>
</tbody>
</table>

Figure 11. Plan view and cross-section of typical two room stone masonry house.

Now that the financial benefits have been discussed, it should be reemphasized that beyond the savings, Aarma Parmah enabled people to build. Alternatives to Aarma Parmah included self-reconstruction or contracting works to a mason. However, both of these methods had very significant challenges. First, it would have been nearly impossible for the typical family to rebuild by themselves, as the stone-masonry system is fairly complex and requires special skills, and is fairly labour intensive. The other alternative, paying for labour, would have also been prohibitive for the majority of the families, as has been shown in the analysis above. Also, given that reconstruction of the houses was going on all over Ramechhap district, the demand for construction materials was more than the supply, resulting in scarcity of construction materials and construction delays. However, this could be managed through sharing of materials among cluster members until demand could be met with sufficient supply. Thus, Aarma Parmah was indeed a reason why families were able to rebuild, motivating each other, sharing labour, expertise and construction materials, and not spending
the significant amount that would have been required to rebuild using paid labour. This reality was well captured in the survey, with 75% of the people stating that they preferred Aarma Parmah to other methods of working.

![Image](image.png)

Figure 12. Cluster members involved in demolition activities and classifying the salvaged materials.

A UNESCO report [12] which looked at forms and patterns of social discrimination in Nepal concluded that discrimination is inherent in the denial of entry, services, access to common resources, social relationships and participation. Discrimination also results in forced labour, dominance, commitment of atrocities, social boycott and attitudinal untouchability. The survey showed that even after all the community engagement some cases of discrimination still existed (11.1%), but the majority of people set aside their social status (88.9%) and worked together for the good of their community, increasing social and cultural bonding leading to communal harmony. It was noted that many Dalit masons who were trained by Medair were freely working in upper caste family houses without any hesitation and vice versa.

People in Bijulikot VDC are of mixed castes. Data from National Planning Commission Central Bureau of Statistics [13] show that 53% of the population are Janjati, 32% are Chettris, 8% Dalits, 3.5% Brahmins and the rest 3.5% were others. Different castes do not work together normally, however, due to the enormous need to complete the reconstruction of the VDC within the timeline provided by the government, it was important to collaborate beyond their traditional ways. Thus, having social harmony within the communities was necessary to ensure collaboration among the people and a timely reconstruction.
a. Layout of the building
b. Foundation and stone soling
c. Cluster member working in plinth band
d. Sill band
e. Intermediate band
f. Lintel band
g. Roof band
h. Completed house

Figure 13. Activities undertaken for reconstruction
Questions were asked in the survey to evaluate how people perceived social harmony in their communities, whether the cluster system had improved relations with neighbours, whether it played a role in maintaining communal harmony and their ratings on social and cultural bonding as a direct effect of working in clusters. It is evident from the survey that people were satisfied with the Aarma Parmah approach and 92% affirmed that it helped them in maintaining social harmony of the communities. Social harmony was maintained since people were in need of working together for a common good. Also, whenever discrepancies arrived between members of a cluster, these were solved directly by the members and the team leader. This allowed for problems to be treated rapidly, without giving time for escalation. Furthermore, 61.1% of participants explained that the relationship with their neighbours had improved, of which 33.3% mentioned a significant improvement. The improvement was also observed by the first author who witnessed in one instance that some of the families who were not speaking with other neighbours for more than five years due to personal conflict were talking freely and helping each other in the reconstruction tasks.

Another very important benefit is that vulnerable families were also able to finalize the reconstruction of their houses even if they were unable to reciprocate the help that was demanded in the Aarma Parmah approach. The NRA provided a list of the extremely vulnerable families (65 households) in Bijulikot VDC. 86% of those beneficiaries were able to complete their house, whereas 9% of beneficiaries were found deceased and the remaining 5% had other reasons for not building. In the most recent survey people explained that vulnerable families were helped with the transportation of the construction materials to their houses, with labour support, including skilled masons and with supervision of the works.

In some instances, vulnerable people were also empowered from this approach. As an example, one blind man who helped to complete the reconstruction of his house within his clusters later on started working as a mason in his community. This meant that he was involved in income generation activities and that the community accepted him as a construction worker.

Now that the benefits have been discussed, it should be mentioned that significant efforts were made in order to introduce the Aarma Parmah approach to the community (see Figure 14). Although a large part of the community had already used the system for agriculture, the system was used in reconstruction which is very different. Plus members of Aarma Parmah groups, or clusters, were different from their agriculture peers. Thus, a great effort was made to engage communities, to train them, and to empower them to recognize the benefits and successfully complete the reconstruction. The next paragraphs further explain the process followed to introduce Aarma Parmah in the VDC.

The process of Aarma Parmah started with PASSA training sessions at ward level and project plans briefings and orientations which built trust within the local community, leading to the formation of ‘clusters’ of six to fifteen households depending upon the geographical location. For every cluster formed, a team leader for that cluster was selected by the cluster members themselves. The cluster was instructed clearly about their goals, approach of helping each other and especially helping vulnerable families of their clusters.
Figure 14. Community engagement and orientation.

Regular cluster meetings were held to discuss the need of each of the houses to be constructed, and to establish the construction order. First priorities were given to the families that were still staying at temporary shelters and to the vulnerable families. As clusters began to understand the owner-driven house reconstruction that they would be engaged in, they selected masons from their wards to participate in training provided by Medair. 152 masons were trained following a 7-day curriculum at Bijulikot VDC (see Figure 15), and thus, were ready to work in the reconstruction of houses in their respective clusters. Medair field engineers provided guidance and supervised the reconstruction works. Training of masons was an essential aspect that allowed the reconstruction works to be finalized on time and with a high quality. There were not enough masons in the community, thus, delays would have been inevitable. But even experienced masons were not accustomed to the number of earthquake resilient measures that were introduced by the government in order to build back to a higher earthquake safety standard. These trainings, combined with the fact that families worked together and shared labour and knowledge through Aarma Parmah, will undoubtedly result in knowledge on build back better methodologies that will be transferred to future generations.
5. Conclusions and Recommendations

In rural Nepal, the practice of labour sharing for agricultural purposes is ancient and widespread. Aarma Parmah involves people trading their work in the field so that, without monetary exchange, individuals can help one another in the process of sowing, ploughing, cultivation and harvesting. In this project the conventional concept was replicated for use in housing reconstruction through the creation of a cluster system. Cluster members were actively engaged in the demolition of old houses, transportation of materials and in construction of the new houses. Once the construction materials were delivered from Manthali to their nearest road, cluster members helped each other carrying those materials to their construction site. As the reconstruction of the houses was going on all over Ramechhap district, the demand for construction materials was more than the supply, resulting in scarcity of construction materials and construction delays. This was managed through sharing of materials among cluster members until demand could be met with sufficient supply. A recent survey showed that 94.4% of respondents were engaged in the clusters and 80.6% of respondents were actively engaged in supporting each other (demolition, materials transportation and reconstruction) through clusters. The survey also indicated that households were able to save an average of NRs. 90,000 (900 USD) through different activities conducted through clusters following Aarma Parmah.

The practice of sharing and learning from each other was increased. Working in clusters and supporting each other to construct houses helped people to learn new techniques for earthquake resistant construction. The cluster system also aided the most vulnerable families to complete their reconstruction. The most vulnerable people (i.e., the elderly and those with disabilities) were able to reconstruct their houses due to cluster approach, ensuring that no one was left behind. The recent survey also indicated that 100% of vulnerable families who were staying inside their communities were helped to complete their reconstruction.

Another significant factor achieved through the Aarma Parmah approach was that community harmony was improved. In the most recent survey 61.1% of respondents mentioned that their relation with neighbours was improved due to cluster activities. This improvement was also observed in the community, with members of different caste groups overcoming their differences and uniting together through the Aarma Parmah approach to complete reconstruction.

It has been seen that modernization is affecting Aarma Parmah. The old cultural system which could benefit communities in the future through collective approach is vanishing. In our field experiences we observed that people who had the financial resources or who were staying at cities preferred to construct their houses by hiring a local contractor rather than being engaged in a cluster. This trend is also observed in other countries. For example, a paper by Charles J Erasmus [14] in 1956 mentions that although exchange labour survives among poor families in most of the rural western south America, it was disappearing back then, with mainly older people remembering the practise. Arun Agrawal [15] also mentions
that Indigenous knowledge is disappearing over the world as a direct result of the pressure of modernization. He also suggests greater efforts must be made to save, document and apply indigenous strategies of survival.

Aarma Parmah is not only for agriculture or reconstruction; it proved very effective in sharing the knowledge and conducting community level activities that benefitted the entire community. In our project, apart from agricultural or reconstruction works, cluster teams cleared numerous landslides which were blocking the main road at Ward 3 of Bijulikot VDC. People were waiting for the VDC grant to clear that landslide for a period of three months before Medair’s team engaged them in the cluster approach. More than 100 people from 12 different clusters joined to clear the landslides in a three-hour period; it turned out to be a much easier task than people had imagined. The road clearance helped them transport construction materials to their houses. This is just one clear example of how helping each other with collective efforts can be utilised for development in many forms.

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