[redacted]

CARE International

Report

of the

Evaluation of Pilot Project
Marawara Valley
Kunar Province

May - July 1991

Prepared by:
Brian J. Williams
September 5, 1991

Table of Contents

Preface

In late May, 1991, CARE assembled a preliminary team for an end-of-pilot-project evaluation in Marawara Valley of Kunar province. Over the course of the next two weeks, until June 10, Dr. Jarik Lette designed the research methods required for the evaluation. In the meantime, CARE contracted Brian Williams to act as Dr. Lette's research assistant in the early stages of the evaluation, and later, to carry out the research design as planned. Finally, Mr. Asif Ikram was seconded from USAID/REP to be the data-collector-supervisor and to be the adviser on cross-border monitoring.

By Thursday, June 6, this team was interviewing candidates for data-collectors, and on Wednesday, June 12, Dr. Lette and Mr. Ikram began training the seven chosen data-collectors with the aid of a video recorder. The training covered how to introduce yourself to the local people, how to interview, how to verify answers with observation, and the need for persistence in searching for particular respondents. After the training, a short, four-day field testing trip to the Sheegal valley of Kunar was arranged for five of the data-collectors who demonstrated competence during the initial training. During the field testing, the data-collectors experienced for the first time the arduous physical conditions of the work, and the frustrations involved in looking for people who live in villages which sprawl over half a mountain. This field-testing proved crucial to the success of the evaluation. Had the data-collectors not had this trip to prepare their expectations for the real ten-day trip, they would have had much greater difficulty overcoming the physical hardships of the work. In addition, of course, the field-testing exposed several weaknesses in the approach and formulation of the questions on the questionnaire. A final version of the questionnaire is given in Appendix 3.

Following the field testing and Eid, the changes to the questionnaire were made, the last bits of analysis and data-entry required for the formulation of the respondent lists were completed, and a refresher training day for the data-collectors was arranged. On Sunday, June 30, the expedition planned to leave but was delayed due to reports of renewed fighting between mujahideen factions in Kunar. On Monday, July 1, after receiving re-assurances that all was safe, the evaluation team traveled to the village of Marawara at the mouth of the Marawara Valley. The trip was comprised of the five data-collectors, Asif Ikram data-collector supervisor, two vehicles (a land-cruiser and a Suzuki jeep), two drivers, and myself acting as researcher in charge. The team began interviewing the next day, and worked through Thursday morning, July 11, with the exception of Friday. During this time the data-collectors completed over six hundred interviews.

The structure of this report will follow the research design, as

closely as possible, as designed by Dr. Jarik Lette. In some cases, conditions in the field required or suggested that the design be changed in some way. In these cases, this has been duly noted. A more subjective section follows the analysis of the research design questions, recording other notable observations made during the ten-day trip to Marawara Valley. The purposes and activities of CARE projects themselves are not discussed at great length, under the assumption that those who will be reading this report will already be familiar with CARE activities through regular reporting.

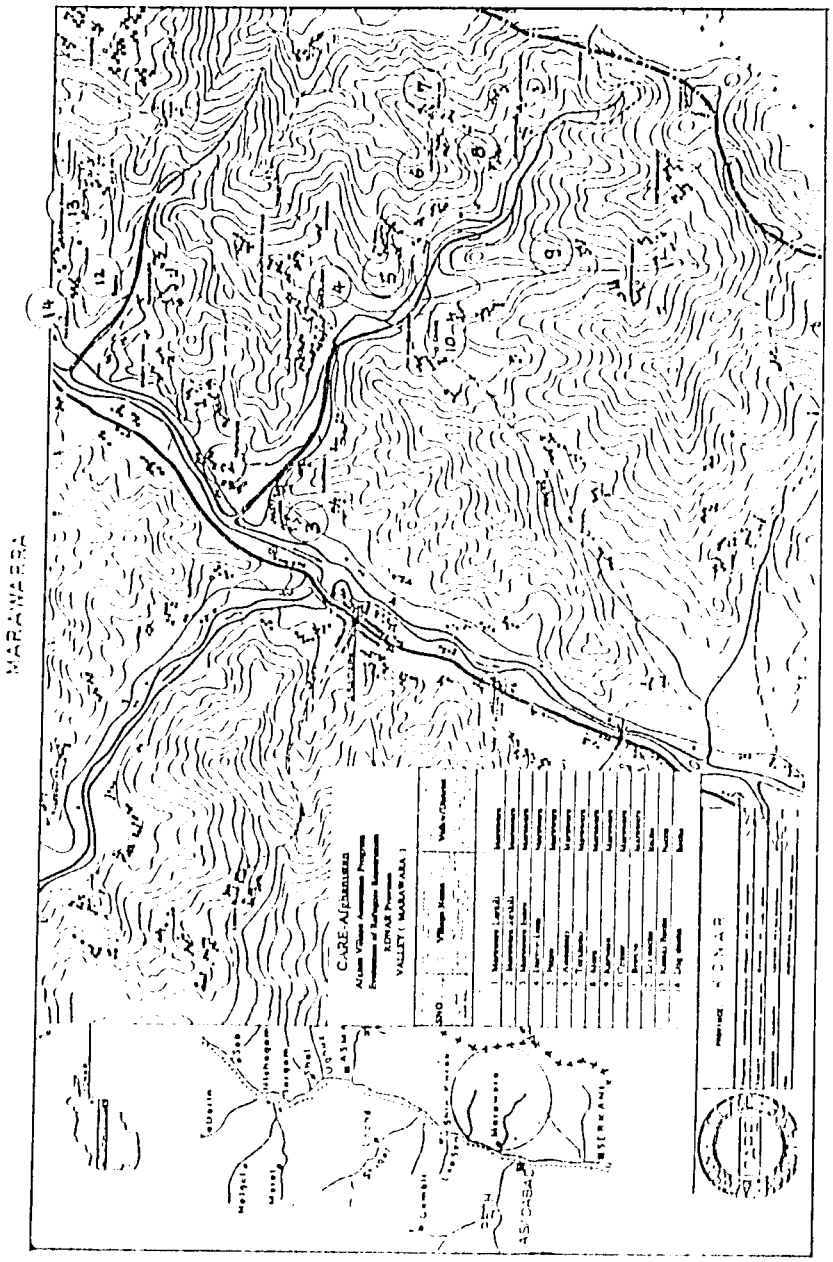
Brian J. Williams
July 30, 1991

A Note on the Time Frame of the "Pilot Project"

The Pilot Project for CARE's Afghan Village Assistance program began in the late fall of 1989 when the baseline survey was done of Marawara Valley. The village of Marawara, at the mouth of the Marawara Valley, was not included in this survey because the residents of Marawara Valley displayed no interest in becoming involved with CARE's work in the valley. Shortly after the survey was completed, however, they asked to become involved in the project, and were thereafter included. Due to this situation, those research questions which use information from the baseline survey do not include Marawara village or any projects in its vi inity. For other questions, however, because projects in Marawara village were completed during the time-frame of the Pilot Project, Marawara village was included.

Theoretically, the Pilot Project ended on December 31, 1990. In the field, however, this change meant little. Projects continued as before, the philosophies behind the project carried on, and new projects in Marawara Valley were planned. Thus, by the time the evaluation team arrived in Kunar to investigate questions such as the effect of the Pilot Project on repatriation, the evaluation was, in fact, measuring beyond the scope of the Pilot Project on paper. When possible, such as in research question 5.0 which addresses the reconstruction of community capital assets, this report documents the state of affairs both at the end of the Pilot Project period and as recently as possible.

Map of Marawara Valley in Kunar Province, Afghanistan



Pakistan-Afghanistan Border
Marawara Project Area (Marawara and Bachi Valleys)
Rivers

0.0 Executive Summary

This evaluation researched questions about the different CARE Afghan Village Assistance Programs as given below. Full explanations are written in correspondingly numbered sections of the report.

1. Food Security Program: What percentage of participating families have Re-established their Residences (RR)? What percentage of participating families are engaged in Subsistence Level Agricultural Production (SLAP)? Is there a difference in the above two categories (RR and SLAP) for those who were full participants and those who were partial participants in the Food Security Program?

- The survey indicated that 74% of the *fully* participating families are present in Marawara Valley. A more rigorous statistical calculation of the survey results, which utilized indicators such as the presence of women and children, a grain store, a fuel store, etc., indicated that 40% of the fully participating families have re-established their residences.[1]

- Two calculations were performed to determine the percentage of participants who were engaged in at least a subsistence level of agricultural production. The first calculation determined that 52% of the *full* participants are managing at least subsistence level agricultural production; the second, more realistic calculation puts the estimate at closer to 28%. In both cases, the opportunities for the introduction of error into the calculation makes these figures somewhat unreliable. This is a result of the vagaries encountered when trying to elicit information from farmers unfamiliar with a western emphasis on measurement. The opportunities for error were expanded even further because farmers appeared to sometimes try and guess at what answer was most likely to bring them aid.

- Difficulties in finding the *partial* participants in the Food Security Program caused the results to be inconclusive. Participants, registered by the head-of-household, chosen at random from office lists could not be found, and residents of the village in which they theoretically resided did not recognize their names. The possible explanations for this include: respondents had fabricated the names of heads-of-households so that they could receive more food aid or that respondents had given false names for fear that rations received in Pakistan for themselves or relatives might be sacrificed.

---

[1] The confidence levels of the statistics presented are explained in full in the main body of the report.

- It should be noted that the duplicity in the Food Security Program uncovered by the evaluation had been recognized by CARE in mid 1990. The program was subsequently suspended in late August, 1990.

2. **Cash/Food for Work:** What percentage of participants' families have re-established their Residences (RR)? What percentage of participants' families are engaged in Subsistence Level Agricultural Production (SLAP)? Is there a difference in the above two categories (RR and SLAP) between those participants who have worked on a CARE project for less than 10 weeks (short-term participants) and those who have worked on a CARE project for more than 10 weeks (long-term participants)?

- Long-term participants: at best, 65% of participants' families have re-established their residences. The more rigorous test indicates that 35% have re-established their residence. 38% are engaged in subsistence agricultural production by the more generous test, 20% by the more rigorous calculation.

- Short-term participants: as expected, the families of short-term participants have much lower rates of re-established residences and subsistence level agricultural production. One important contingency which partially explains this is that CARE had to import labor from anywhere it could enlist it for some of the early projects, as local labor did not exist.

3. **Total Area Under Cultivation:** How much land in Marawara Valley is under cultivation?

- The survey concluded that approximately 40-50% of the cultivatable land in Marawara Valley is being farmed. This estimation was based on observation only.

- As an adjunct note, the surveyors discovered a considerable amount of sharecropped farming.[2]

4. **Village Assistance Program and Area Under Cultivation:** Does the program cause an increase in the area under cultivation?

- The statistical calculations concluded that the area under cultivation in CARE project areas within Marawara Valley is no greater than the area under cultivation in other areas, also in Marawara Valley, which do not have CARE projects in them.

---

[2] Whether or not a farmer was sharecropping was not a formal research point of the survey, and was not on the questionnaire. Therefore, it is impossible to make any percentage calculations about sharecropping. The surveyors discovered it only when farmers volunteered the information. Approximately a third of the farmers interviewed commented that at least some of the land they farmed was sharecropped.

The validity of this result, however, is under question for several reasons. Doubt is cast primarily because the effects of the CARE road could not be isolated.

5. Afghan Village Assistance Program and Capital Assets: How many communities participating in the Afghan Village Assistance Program have reconstructed their priority capital assets?

- After CARE's initiating baseline study of Marawara Valley was completed in late 1989, each village shura congregated to decide which "community assets" required reconstruction. According to CARE files, shuras requested repairs for 31 separate irrigation channels, erosion barriers, karezes, springs or roads. By the end of the pilot project, CARE had completed 13 projects addressing these needs, was continuing work on another 11, and five more had been surveyed for construction. This accounts for 29 of 31 requests.

- In addition to the above, CARE has initiated five other projects in Marawara Valley.

6. Village Assistance Program and Repatriation: Does CARE's Afghan Village Assistance Program result in repatriation?

- The statistical calculation, designed to indicate causality, determined that the program does not lead to repatriation; the lack of suitable control communities for the experimental method used, however, makes this result less conclusive. The control communities used were communities within Marawara Valley which did not have a CARE project in their immediate village. The effect of the road, however, could not be removed for the control communities; it could be that the effects of repatriation are valley-wide rather than on packets of refugees returning to individual communities. Section 6.3 contains a full explanation.

- Despite the results of the test as per the design, figures incidental to the calculations indicate the return of refugees. For example, CARE's baseline study (late 1989) found 235 families living in all of Marawara Valley. During the evaluation this summer, 18 community surveys, which represents about one-half of Marawara Valley, found 353 families; this is more than the number of families which lived in *all* of Marawara Valley a year-and-a-half ago.

7. Program Weaknesses: This question was not formally researched due to lack of time and funds, but one notable weakness was uncovered during the course of the evaluation.

- As noted above in section 1.0, many cases of fallacious registration were uncovered in the Food Security Program. The

evaluation discovered these cases because people whose names were on the participant list simply could not be found.

8. **Program Strengths:** This research question was not addressed because the time and resources required to solve it as per the research design were not available.

9. **Negative side-effects:** This research question was not independently addressed because the time and resources required to solve it as per the research design were not available. Nevertheless, one negative side-effect stands out:

- During the course of the evaluation, trucks exporting timber from Afghanistan were noted nearly every day driving up the Marawara Valley road, which ends within a few kilometers of the Pakistan border.

10. **Wheat/Cash use in the Cash/Food for Work Program:** How has the wheat/cash ratio changed during the time the program was implemented?

- This evaluation makes no conclusions about the effect of wheat payments on the market in Kunar, but merely presents graphically the changing price of wheat in Kunar which was the catalyst for CARE's decision to switch from food payments to cash payments in November, 1990.

11. **Other Observations:** During the 11 days the evaluation team traveled through the villages of Marawara Valley, a number of other notable observations were made. In addition to those highlighted below and enumerated in section 11, a number of less formal observations made by the author have been given in the footnotes throughout the report.

- *Mines:* During the team's visit to Kunar, at least one mine was seen, and two deaths due to mines occurred. Marawara Valley has been de-mined. At the entrance to Bachi valley, also in the Marawara project site, it is dangerous to venture off the road to either side due to the presence of mines.

- *Community Re-establishment:* Other indicators not related to CARE projects indicated the re-establishment of communities. While the evaluation team worked in Kunar, most farmers were harvesting their wheat and using local water mills to make flour. According to the locals, most of the mills had been destroyed and subsequently repaired. Most mosques also looked as if they had been destroyed, but all have been partially repaired to the extent where they can be used by the resident population.

- *Other services:* There were no schools open in Marawara Valley

at the time of the visit. There was a sign for a Swedish Committee health clinic in the village of Marawara, but it was never open during the two weeks the team stayed in Marawara. There was a Pakistani-owned tractor for hire in Marawara Valley during the team's visit, and the tractor was observed to be plowing new fields that, from observation at least, had not been farmed in many years. At least one group of local farmers acclaimed the Marawara road as the reason that they could now hire a tractor to cultivate more land.

12. **Conclusions:** Two ideas emerge as constants throughout the research carried out for this evaluation. The first is that the difficulties inherent to carrying out complicated, quantitative-based development research given the current conditions in Afghanistan tend to overshadow and throw into doubt the results of the evaluation. The second is that despite the equivocal results of the quantitative research, a number of qualitative indicators seem to suggest that repatriation is occurring.

1.0 Food Security Program

1.1 Food Security Program Outline

The Food Security Program is designed to provide 60% of food needs for a year for returning refugees, in order that they can concentrate resources on constructing assets such as their home, irrigation canals, etc. when they first return. In addition to periodic shipments of food, a one-time distribution of hand-tools assisted a family's efforts to reconstruct their homes and farms. When CARE began its project in Marawara Valley, it enrolled any family who had already returned from Pakistan. As everyone had left Marawara Valley at the height of the war, anyone who was present was eligible to enroll (in other project areas, those who had never left Kunar were not eligible to enroll - local shuras provided information on who had returned from Pakistan). After CARE had begun its activities, it enrolled additional families who returned. As discussed below, the Food Security Program was suspended in late August of 1990, in Marawara and all other project areas as well.

1.2 Research Questions

How many participating families have Re-established their Residences (RR)? How many participating families have established Subsistence Level Agricultural Production (SLAP)? The questions were researched twice, once for full participants of the program, considered to be those who received food and hand-tools, and once for partial participants, considered to be those who received food but not hand-tools.

1.3 Calculation of Re-established Residence (RR)

Two separate methods were used to calculate whether a farmer and his family had re-established their residence. The first quite simply counts the presence of the participant and his family as an indication that they have re-established their residence. This qualifies them for RR1. This method begs the question about whether the family has really re-established their residence, or whether they have returned only to cultivate lands or to escape the summer heat of Bajaur agency. The Marawara Valley in Kunar climbs from the Kunar river valley up to the Pakistani border, and the ease of transport across the border to Pakistan leads to significant transiency between Marawara and Bajaur. A more complicated measure for re-established residency, RR2, was therefore designed. This measure took as the most important indicators physical presence of the entire family (women and children), the commencement of home repair, and the cultivation of farmland In addition, whether the family had started a hay-stack if they had animals, and whether the family had started to store grain if they had farmed sufficient amount of land were also considered. Calculations based on this scale obviously yielded lower results. These same tests were used for the Food Security Program and the Cash/Food for Work programs. See Appendix 1 for a more detailed explanation and a sample

calculation of RR2.

1.4 Calculation of Subsistence Level Agricultural Production (SLAP)

The calculation of the kilo-calories produced in a year by a household is quite complex. Two methods were devised to measure the re-establishment of Subsistence Level Agricultural Production (SLAP), called SLAP1 and SLAP2. The first method is calculated as per the original research design, and bases the yields for wheat, maize and barley on the reported yields of farmers in the baseline study. After discussions with agricultural experts in Peshawar indicated that these figures were unreasonably high, and upon the advice of Dr. Lette, average yields from Kunar in 1987 as per the Swedish Committee's Agricultural Survey for Afghanistan were used instead. The differences are significant, further highlighting the danger of laying too much faith on calculations based upon farmer's responses. Both sets of data will be presented.

The full method of calculation with an example is given in Appendix 2, but the methodology is outlined here. First, to determine the amount of land which a farmer cultivated, the questionnaire required that the data-collectors ask how much seed was sown by the farmer. This is the same as was done in the baseline study and attempts to circumvent farmers' unfamiliarity with a Western emphasis on measurement. Any difference in the amount of seed needed to sow the farmer's own land and the amount of seed that he sowed in the past season is assumed to be sharecropped land. This assumption is supported by a number of farmers who commented that this was the case. Farmers also indicated that the standard payment for sharecropped land was 50% of the yield. Therefore, all calculations were based on the fact that only 50% of the yield of surplus (sharecropped) land was to remain with the farmer himself. See Appendix 3 for the questionnaire itself.

Next, depending upon whether SLAP1 or SLAP2 was being calculated, yield rates from either the baseline study or the Swedish Committee report were used to calculate the farmers' yields. Wheat and maize could be directly converted into kilo-calories, but barley had to be exchanged into wheat as per the barley/wheat price ratio given in the baseline study. This was done because the barley cultivated in Kunar is generally used for animals and not people. This ignores the fact that farmers may use some of the barley for their own animals. This calculation may overestimate the productive capacity of the farmer in that some of the barley might have to be used to feed animals rather than be exchanged for wheat, which the farmer and his family could consume. The seed/area ratio used for the calculation was

25 kgs/jerib.[3] In this way, too, the calculation was generous to the farmer as at least one agriculturalist in Peshawar has put the average at closer to 30 kgs/jerib.

After calculating the kilo-calories produced directly from agriculture, animals were considered. For each goat or sheep owned, the amount of wheat that could be bought in exchange for an average number of kilograms of goat or sheep meat per animal was calculated. The number of kilo-calories from this much wheat was added to the total.[4]

This total was then compared to the number of kilo-calories required by the family based on 2,000 kcal/day/person.[5]

Note that this calculation is very rough, and depends upon the integrity and knowledge of the farmer in his responses. This method does not account for fertilizer used, if any, differing soil types, or the method of cultivation.

1.5 Calculation of Full and Partial Participants

Some participants in the Food Security Program did not receive hand-tools but only food. These people are considered *partial* participants, whereas all others are considered *full* participants.

1.6 Results: Food Security Full Participants

The numeric results for full participants of the food security program can be seen in the box on the next page.

---

[3] 5 jeribs = 1 hectare. See Appendix 2 for a detailed calculation.

[4] A concern has been expressed that to translate the number of animals that a farmer owns into an equivalent amount of wheat (and then to calories), may overestimate the caloric production possible by the farmer. Tentative research into the productivity of herds, however, indicated that there was not enough information available about the presence of disease in Kunar and the availability of fodder etc., to make accurate assessments about the productivity of herds, replacement needs, etc. Such information would be necessary to make a more accurate calculation of the caloric impact of animal husbandry. In addition, in general, the contribution of animal husbandry to the total number of calories produced by the farmer is an order of magnitude smaller than the contribution of wheat. Thus, an overestimation of the caloric contribution of animals is most likely negligible anyway. The example calculation in Appendix 2 illustrates the small impact of animals on the total number of calories produced.

[5] As stated in Appendix "D" of CARE's working Pilot Project document (see Appendix 5: References): "According to WFP, as quoted in an UNHCR manual, a long term subsistence diet (averaging all ages/sexes) is 2,000 kcal per day."

FOOD SECURITY PROGRAM: FULL PARTICIPANTS

Re-established Residence (RR)
RR1: Presence Only

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
43	58	74%	561	416 ± 54

RR2: Presence and Other Indicators

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
23	58	40%	561	222 ± 29

Subsistence Level Agricultural Production (SLAP)
SLAP1

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
30	58	52%	561	290 ± 38

SLAP2

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
16	58	28%	561	155 ± 20

* Confidence level of 95.44% ± 13.13%

Stated in words, 74% of the respondents found[6] were living in Marawara; 40% of the respondents met the more rigorous test for RR. These percentages extrapolate to the following: with the presence-only test, there is a 95.44% likelihood that 416 ± 54 families out of 561 families registered as full participants in the Food Security Program had re-established their residences; by the more rigorous test, there is again a 95.44% likelihood that 222 ± 29 families out of 561 families had re-established their residences. The results for subsistence level agricultural production should be read the same way. That is, with the same confidence level, 290 ± 38 families out of 561 families met the test for SLAP1, and 155 ± 20 met the test for SLAP2. It must be remembered that this program was discontinued part-way through the year, so that in a sense all the participants were "partial" participants. Although immeasurable, this must have had some effect on the participants.

---

[6] "Found" means that sufficient information was gathered from a respondent or about a respondent to calculate RR and SLAP, e.g. either the respondent was found and interviewed, or it was reported that the respondent lived in Bajaur agency with his family and did not farm land in Marawara this year. In this latter case, the fact that his family (women and children) were not in Marawara, and the fact that he had not farmed his land, is sufficient information to determine that he does not meet any of the RR and SLAP criteria.

1.7 Results: Food Security Partial Participants

Some explanation is required before stating the results of this research question. Partial participants of the Food Security program are considered to be those who received food from CARE but not hand-tools. This only happened in two distributions, one to residents of Brow Low and one to residents of Chinar. Out of a sample of 75 such partial participants, 51 were registered from Brow Low, and 24 from Chinar. As Brow Low is a four-hour walk from the road, two data-collectors and the data-collector-supervisor went to Brow Low to do all aspects of the research design (e.g. Food Security Full Participants, Food Security Partial Participants, Cash/Food for Work, etc.) at one time. They planned to spend the night.

Once in Brow Low, they encountered major difficulties in finding the respondents whose names had been chosen at random from the various Food Security registry lists. In some cases the villagers did not recognize the names of people who were supposed to live in their villages; in other cases supposed heads-of-households were children; and, finally, a disproportionate number of heads-of-households for families who had theoretically "returned home" were "away" that day. The data-collectors, CARE staff, and the data-collector-supervisor suggested the following reasons for this behavior. First, in some cases the people had lied, exaggerating the size of their families and registering every male member of the family as a head of household. This was done in order to receive as much food as possible. This behavior suggests that the recipients do not view the food as being clearly given in exchange for work on their home, but more as a hand-out which they can get more of if they lie. Second, as many of these families still live partially in Bajaur agency, they are concerned about losing their ration cards in Pakistan. They are very hesitant, therefore, to use their real fathers' names.

These problems resulted in a situation where village elders did not recognize or declared as "unknown" many of the respondents for which our data-collectors searched. This should not have been the case at all, as participants in the Food Security Program were supposed to be families which had returned permanently. In the case of the Cash/Food for Work Program, for example, it may be understandable that the local people do not recognize the names of some participants who may have returned just for a few months to work on a particular project. Not recognizing names in the Food Security Program, however, is less understandable. This situation, in which the village people responded that they did not know some of the respondents, quickly led to less than friendly relations, to the point where one of the data-collectors remarked that he was "happy we had a muj guard with us." An administrative error on the part of the evaluation team exacerbated the poor relations. One of the village names on the Food Security list was mistranslated so that some of the respondents for whom the data-collectors searched in

Brow Low actually lived in different village. Not knowing this at the time, this added to the data-collectors frustrations when the villagers indicated that they did not know the names of some of the respondents.

For the Food Security Partial list, the poisoned relations between the data-collectors and the village elders resulted in the discovery of only 27 out of 50 partial participants in the Food Security Program who were on the list. This effectively nullifies this research question.

As mentioned previously, there were only two cases in the Food Security Program where tools were not distributed (e.g. where people participated only *partially* in the program): one was in Brow Low and the other was in Chinar. As discussed, the situation in Brow Low was such that the survey was ineffective. Of the Chinar partial participants, however, the data-collectors found 18 out of 24 respondents. The total number of partial participants in Chinar was only 34 to begin with, so the data-collectors have interviewed more than half of this group. It is felt, therefore, that the results of just this group are worth presenting. They are given in the box below.

FOOD SECURITY PROGRAM: PARTIAL PARTICIPANTS: CHINAR VILLAGE ONLY

Re-established Residence (RR)
RR1: Presence Only

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
17	18	94%	34	32*

RR2: Presence and Other Indicators

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
15	18	83%	34	28

Subsistence Level Agricultural Production (SLAP)
SLAP1

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
14	18	77%	34	26

SLAP2

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
5	18	28%	34	10

* As the total population size is so small in this case, e.g. 34, a different formula for determining the confidence level of the sample size is necessary than used for the other research questions. This formula was not available in Peshawar.

1.8 Conclusions about Food Security Program

The original research question about the Food Security Program was split up into two parts to address concerns that those who had participated only partially were less likely to have re-established their residences or subsistence level agricultural production than the full participants. Although the results of the Partial Participants research question are incomplete, there seems to be no evidence that partial participants are any less likely to re-establish either their residence or subsistence level agricultural production.

Perhaps of greater concern, however, are the difficulties which the data-collectors encountered when trying to find the participants in the Food Security Program. In some cases, our respondent, who for the Food Security Program should be a head-of-household, was a six or eight-year-old child. This happened at least three times out of the sample of 68 partial participants in the Food Security Program. In addition, local villagers claimed that 15 more (out of the 68) respondents were in Bajaur or other villages in Marawara Valley, although their families were in the local village. This is a higher percentage of "people whose families are here but who are unavailable today for one reason or another" than we found elsewhere in Marawara Valley, and it was the impression of the data-collectors at the time that the people were merely covering for previous falsehoods. In many cases it was only when pressed that the locals responded that the respondent was in Bajaur, often at first indicating that they did not know this person at all. The original response may have been nearer the truth - the local villagers simply did not recognize fictitious names.

Here is another similar example. The data-collectors were searching for a participant (according to the CARE records) named Shamsur Rahman. After asking after him using both his and his father's name, the local people first said that this person was completely unknown. Later, they singled out an eight-year-old boy, and said that this was Shamsur Rahman. At this point, about 15 people had gathered around the group on some charpoys underneath a tree. They brought the boy into the group, who sat on the ground surrounded by many of the male members of the community. When the data-collector finally managed to have everyone be silent except the boy, and asked the boy if his name was Shamsur Rahman, the boy said no. He was visibly shaken. After this, the men in the village all said that Shamsur Rahman was actually in Bajaur.[1]

---

[1] Through the trip, the data-collectors incessantly explained that this evaluation team was not going to bring benefits to those who were chosen for interview. Nevertheless, the impression I received (partly from observation and partly from the data-collectors' comments) was that the local people refused to believe or understand this. Instead, they appeared to feel

This evaluation cannot say with any accuracy the extent to which people may be taking advantage of the food security program. Rather, that some respondents are completely unknown, that in other cases children have been registered as a head-of-household, that these things have happened at all indicates that the program is not strictly following its original intention, which is providing food for one family while that family expends other resources in the reconstruction of their home. It should be noted that CARE had internally recognized some of these problems and suspended the Food Security Program in late August, 1990.

2.0 Cash/Food for Work

2.1 Cash/Food for Work Program Outline

The Cash/Food for Work Program aims to reconstruct community assets in preparation for returning refugees while, at the same time, providing labor and a source of income for those who have ventured to return. The program was designed to use local labor as much as possible. If skilled labor was to be imported, then a local person was to be trained at the same time. The single biggest project of this kind was the road in Marawara Valley, but other projects ranged from refurbishing dirt canals to constructing concrete aqueducts and retaining walls. Most of the first year's wages were paid in wheat, but as the price of wheat plummeted in late 1989, CARE switched to paying in cash (see section 10.0). From the beginning of the project through to April, 1991, approximately 7,000 two-week food or cash payments were made to workers on projects. There were approximately 3,100 individual workers who worked on the projects.

2.2 Research Questions

How many participating individuals have re-established their residence (RR)? How many participating individuals have established subsistence level agricultural production (SLAP)?

2.3 Calculation of RR and SLAP

This is the same as for the Food Security Program. Please see the descriptions under section 1.1 and 1.2.

2.4 Calculation of Short and Long-Term Participants

Participants in the Cash/Food for Work research question were divided into two categories: those who had worked a longer period of time and those who had worked a shorter period of time. This was done to determine if those who had worked for a longer period of time were more likely to have re-established their residence or subsistence farming. In order to create these lists, a translator/data-entry person had to be hired. He proceeded to

---

that if they only had the "right" answer, they would receive some benefits from us. Thus, rather than answering the questions as honestly as possible, they attempted to try and guess what the "right" answer was.

translate approximately 7,000 names, also recording when they worked, and on what project. The CARE records for the Cash/Food for Work program correspond to requisitions of either food or cash for payment, so by counting the number of times a person's name appeared on the list of 7,000, it was possible to determine the number of times this person was paid. The cut-off was five payments, which corresponded to approximately 10 weeks of work. Any participant who had been paid five or more times was thus considered a long-term participant, and anyone else short-term.

2.4 Results: Cash/Food for Work, Short-term Participants
The results for short-term participants in the Cash/Food for work program are given in the box below.

CASH/FOOD FOR WORK PROGRAM: SHORT-TERM PARTICIPANTS

Re-established Residence (RR)
RR1: Presence Only

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
23	65	35%	2587	915 ± 114

RR2: Presence and Other Indicators

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
12	65	18%	2587	477 ± 59

Subsistence Level Agricultural Production (SLAP)
SLAP1

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
11	65	17%	2587	438 ± 54

SLAP2

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
8	65	12%	2587	318 ± 39

* Confidence of 95.44%, ± 12.4%

When reading the results in the box, realize that the last number should be read as "the number of participants whose *families* have either re-established their residences or subsistence level agricultural production." This does NOT mean that this number of families have re-established their residences in Marawara Valley, as often one family supplies more than one worker.

2.5 Results: Cash/Food for Work, Long-term Participants
The results for the long-term participants in the Cash/Food for Work Program are given in the box on the next page.

CASH/FOOD FOR WORK PROGRAM: LONG-TERM PARTICIPANTS

Re-established Residence (RR)
RR1: Presence Only

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
44	68	65%	501	324 ± 32

RR2: Presence and Other Indicators

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
24	68	35%	501	177 ± 18

Subsistence Level Agricultural Production (SLAP)
SLAP1

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
26	68	38%	501	192 ± 19

SLAP2

No. Meeting Criteria	Sample Size	Percent	Total Pop.	Total Estimated Meeting Criteria
14	68	20%	501	103 ± 10

* Confidence of 90%, ±10%

2.6 Conclusions about Cash/Food for Work Program

As expected, the numbers indicate that those who have worked for a longer period of time are more likely to have established their residences and subsistence level agricultural production. One reason that the short-term participants had such low repatriation rates may be that CARE had to import labor for some of its projects, particularly early on. On the Bachi Road, for example, since almost no one lived in the nearby villages, labor had to be recruited in Pakistan. CARE anticipated that as people returned to the valley more and more local labor could/would be used. While this survey has not measured this trend, those who came only to work on one project are more likely to have fallen into the short-term category, and those who continued to work on projects would have fallen into the long-term category.

While in Marawara Valley the evaluation team remained under the protection of a local commander. Relating to this issue of importation of labor, this commander requested that when CARE needs skilled labor that it use local labor instead of importing it from Pakistan or elsewhere. This is expanded upon in sections 11.4 and 11.5.

3.0 Total Area Under Cultivation

3.1 Research Question

How much land in Marawara Valley is under cultivation?

3.2 Results

As per the research design, it was decided to make only a very rough estimate based on observation of the amount of land under cultivation. Any more detailed measure would be questionable in its reliability (had the data-collectors simply asked every farmer they could find) or over-burdening in the resources required. It was estimated from observation that 40-50% of the land in Marawara is under cultivation. By and large, farmers have begun by cultivating those lands which are most productive, easiest to reach, and least damaged. Farming has begun on the valley floor, nearest to the river where terraces are the widest. As one looks up the sides of the valley, one can see terracing, which has not been maintained throughout the war, reverting to the natural contours of the land.

While in Marawara Valley, the data-collectors discovered a large amount of share-cropped farming. One reason for this was that farmers returned to Marawara only to discover that their lands (or what were their lands) were not cultivatable because of neglect or damage. Their only choice then, was to farm as a share-cropper. The standard payment for farming another's land is 50%.

4.0 Village Assistance Program and Area Under Cultivation

4.1 Research Question

Does the program result in an increase in the area under cultivation?

4.2 Calculation

The methodology used to research this question has been changed from the original. The new methodology will compare the total area farmed by farmers who live in nine pairs of matched communities. The change was made so as not to exclude the effect of newly repatriated farmers on the total area under cultivation. The matched communities are the same as chosen for research question 6. For each community, a simple calculation on the baseline study produced a total hectare figure for land under cultivation for late 1989. For the 18 communities in question, community surveys by the data-collectors this year yielded another set of totals. The percentage increase for each community was then calculated. The matched pair test was performed on the nine pairs of numbers. See Annex 3 of the Research Design for a discussion of the statistical permutation test for matched pairs.

4.3 Results of the Permutation Test for Matched Pairs

The permutation test for matched pairs investigates the likelihood of one particular hypothesis. In this case, the hypothesis is that CARE projects in communities lead to a general increase of the land under cultivation. The permutation test, carried out by a simple program written in IBM Basic language,

concluded that this was not the case.

There are reasons, however, to doubt the validity of this result. Both the reliability and the validity of figures for land under cultivation rest on the honesty, accuracy, and reliability of the data-collectors for the baseline study, the data-collectors for the evaluation, and the farmers in both cases. For the baseline study, some farmers were found in Bajaur and asked how much land they farmed that year. When in Bajaur, there are no incentives for the farmer not to lie (in Marawara, surveyors could at least make farmers point out their lands, their animals, etc.). As the data-collectors witnessed in Marawara, the over-riding perception of any farmer in Afghanistan being surveyed is that if he gives the "right" answer, he will receive aid. For example, the baseline study indicated that last year, before CARE projects had begun, farmers in Loy Kallay of Peetow village farmed 76 hectares (Loy Kallay of Peetow village is a particularly devastated village). The baseline study also indicated that only 6 families lived there. The evaluation survey this year indicated that 29 families were present in Loy Kallay of Peetow, and that 14.18 hectares are under cultivation. Remember, too, that hectares are calculated by a rather circumlocutory method, which starts by asking how many dalis (equivalent to between four and five kilograms) of seed the farmer needed to sow his land. With discrepancies like this arising out of the figures from interview-based databases, it is difficult to put too much stock in their answers.

In addition to the doubt thrown onto this research question because of uncertainties about the accuracy and reliability of the farmer-based data, problems also arise from the choice of control communities. The control communities used were also in Marawara Valley, where the single most important CARE project, the road, affected every community more or less equally. It may be that the road is the primary factor in affecting people's decision about returning to cultivate land. Although a similar valley to CARE's with appropriate baseline information was searched for at the beginning of the evaluation, a suitable one was not found.

5.0 Afghan Village Assistance Program and Capital Assets

5.1 Research Question

How many communities participating in the Afghan Village Assistance Program have reconstructed their priority capital assets?

5.2 Methodology

The methodology for this question has also undergone some changes. The research question indicated that the data-collector-supervisor was to observe community assets to see if they had been reconstructed. Community assets, however, was

vaguely defined. According to the baseline study, people most often listed community assets as the Marawara road and irrigation systems. As it can take half a day just to walk from one end of a village to the other, it would put too much of a burden on resources to observe if all the irrigation canals in Marawara Valley had been repaired yet.

After the baseline study in 1989-90, a shura was assembled in each village and was asked to submit a concrete list of village assets which required repair. These lists were used as the base for designing CARE projects. Given this information, the research methodology has been changed. As these village shura lists exist only in Persian in the project office in Kunar, they first had to be collected and translated. Secondly, these lists were compared to the list of completed or nearly completed CARE projects.

5.3 Results: Reconstruction of Primary Community Assets

The box on the next page lists all the requests for reconstruction aid as given in writing by the shuras from each village.

According to the CARE files, shuras requested repairs for 31 separate irrigation channels, erosion barriers, karezes, springs or roads. By the official end of the pilot project (December 31, 1990), CARE had completed 13 projects which corresponded to the shura requests. If the requests of the shuras are taken to be the scope of "community assets" within which CARE aims to have an impact, then CARE has helped to complete 41% of the community assets in Marawara. Another 11 projects, or 35%, were under construction, and five more, or 16%, had been surveyed for repair. By June 30, 1991, those figures had changed to the following: 19 projects (61%) had been completed, two were on-going (6%), five more were pending (16%), and three (9%) had been stopped. In aggregate, it can be said that CARE had at least begun to plan for 93% of the primary community assets of Marawara Valley by June 30, 1991.

As usual, there are some caveats about these figures. It may be that the two cases where shuras had requested aid, but where seemingly CARE has not responded with projects, are a result of a shura body requesting aid for the same channel twice. In this case, CARE may have repaired even greater than 93% of the community assets. On the other hand, it must also be assumed that CARE engineers had some contact with shuras before there requests. Resulting information exchange between CARE engineers and shura members could have consciously or unconsciously affected what the shuras requested. On the whole, however, CARE's efforts within Marawara Valley are considerable; one is rarely out of sight of at least one of the 24 reconstruction projects to which CARE has contributed.

CARE Projects
According to Shura Requests

No.	Village	Project Requested By Shura	CARE Project ID Num	Status 12/30/90	Status 6/30/91
1	Ajab Shahgai	Irr. Channel	K-01-IC-010	PENDING	PENDING
2	Ajab Shahgai	Irr. Channel	K-01-IC-011	PENDING	PENDING
3	Bachi	Erosion Barr.	K-01-RD-002	Complete	Complete
4	Bachi	Irr. Channel	K-01-IC-004	Complete	Complete
5	Bachi	Irr. Channel			
6	Bachi	Road	K-01-RD-002	Complete	Complete
7	Brow Low	Irr. Channel	K-01-IC-017	ON-GOING	--STOPPED
8	Brow Low	Irr. Channel	K-01-IC-018	ON-GOING	--STOPPED
9	Chinar	Irr. Channel	K-01-IC-003	Complete	Complete
10	Chinar	Irr. Channel	K-01-IC-005	Complete	Complete
11	Dara-i-Dam	Irr. Channel	K-01-IC-019	Complete	Complete
12	Dara-i-Dam	Irr. Channel	K-01-IC-014	Complete	Complete
13	Dara-i-Dam (Naroby)	Spring	K-01-SP-031	Complete	Complete
14	Karwalo	Irr. Channel	K-01-IC-015	PENDING	PENDING
15	Karwalo	Irr. Channel	K-01-IC-016	PENDING	PENDING
16	Marawara	Irr. Channel	K-01-IC-020	Complete	Complete
17	Marawara	Irr. Channel	K-01-IC-021	Complete	Complete
18	Marawara	Irr. Channel	K-01-IC-024	ON-GOING	ON-GOING
19	Marawara	Irr. Channel			
20	Marawara	Karez: Ali Khel	K-01-KZ-025	ON-GOING	Complete
21	Marawara	Karez: Dadl Khel	K-01-KZ-030	ON-GOING	Complete
22	Marawara	Karez: Ensri	K-01-KZ-029	ON-GOING	Complete
23	Marawara	Karez: Khalozyano Khel	K-01-KZ-028	ON-GOING	Complete
24	Marawara	Karez: Qatlan Khel	K-01-KZ-026	ON-GOING	Complete
25	Marawara	Karez: Sulaiman Khel	K-01-KZ-027	ON-GOING	Complete
26	Marawara	Reservoir	K-01-IC-023	ON-GOING	ON-GOING
27	Marawara	Road	K-01-RD-001	Complete	Complete
28	Mora	Irr. Channel	K-01-IC-008	ON-GOING	--STOPPED
29	Mora	Irr. Channel	K-01-IC-009	PENDING	PENDING
30	Turkhobo	Irr. Channel	K-01-IC-006	Complete	Complete
31	Turkhobo	Irr. Channel	K-01-IC-007	Complete	Complete

Out of the projects listed above, CARE management has had to stop construction, or not start construction (those projects marked "STOPPED" or, in some cases, "PENDING"), on some projects due to proprietary problems with villagers. Usually this is a result of land-owners not wanting to give up more land for the expanded size of CARE projects[8].

In addition to the projects which arose out of a direct response to shura requests, CARE has initiated five other projects in the Marawara project area. These are listed in the box on the following page.

Two of these projects, the warehouses, are a result of CARE project needs in the area, e.g. a place to store wheat and equipment. As long as the buildings are functional, they can be

[8] This may support the concern mentioned by some CARE managers that CARE projects in Kunar are over-constructed. I, too, made this observation after my first trip to Kunar for the field-testing.

CARE Projects Not Listed in Shura Request Files

No.	Village	Project	CARE Project ID Num	Status 12/30/90	Status 6/30/91
1	Dara-i-Dam	Warehouse	K-01-WH-13	ON-GOING	Complete
2	Bachi	Warehouse	K-01-WH-12	ON-GOING	Complete
3	Khangoshah	Spring	K-01-SP-32	ON-GOING	Complete
4*	Chinar (Miniagal)	Irr. Channel	K-01-IC-034	PENDING	PENDING
5*	Turkhobo	Irr. Channel	K-01-IC-033	PENDING	PENDING

** These two projects were not surveyed until spring of 1991, after the end of the pilot project*

considered a new community asset. In addition to the two warehouses, there are three other routine projects for which requests were not found.

6.0 Village Assistance Program and Repatriation

6.1 Research Question

Does the Afghan Village Assistance Program result in repatriation?

6.2 Methodology

For this research question, nine pairs of communities were to be measured for the return of refugees (both presence and RR), a percentage increase from last year was to be calculated, and the permutation test for matched pairs was to be performed. The hypothesis was that areas where CARE projects existed encouraged refugee repatriation.

6.3 Results

The result of the permutation test for matched pairs indicated that, within Marawara Valley, refugees from areas where CARE projects had been completed or nearly completed were no more likely to repatriate than if they were from other parts of the valley. Note that the control communities were in Marawara Valley, and therefore although all the communities did not have CARE projects occurring in them, all 18 communities were affected more or less equally by the road. In addition, the road was the first CARE project, the biggest CARE project, and the community project most asked for by villagers. Therefore, this particular test should not be viewed to say that CARE has NOT made any difference with regards to repatriation.[9]

[9] I would like to add the remark that which village refugees return to, *within Marawara valley*, is more likely a function of the state of their homes than of whether CARE has repaired an irrigation canal in their home village.

Some qualitative observations, in fact, provide some proof that repatriation has occurred. First, according to the baseline study, 235 families were resident in Marawara Valley at the beginning of 1990. During the 1991 evaluation, 18 community (sub-village) surveys were completed which represents about one-half of Marawara Valley, and the survey discovered 353 families; this is more than the number of families which lived in *all* of Marawara Valley a year-and-a-half ago. Second, while eating lunch under a tree in Naroby Kallay of Dara-i-Dam village, a family was observed returning to their home. Some questions were asked of the head-of-household, who replied that they were planning on surviving the coming winter (they had missed the wheat season) by gaining employment with CARE if possible. It must be remembered, however, that as indicated previously in the report, the locals seemed to have an aptitude for guessing what it was that the data-collectors wanted to hear. Third, while visiting Marawara village itself (not included in the baseline study), a private Pakistani tractor was observed plowing fields for the locals at the rate of Rs. 100/hour. The locals explained that one of the most important uses for the Marawara road is the access it provides for a tractor. On a different day the same tractor was observed plowing a field which had obviously been lying in disuse for several years. These observations indicate the re-development of an agricultural economy.

7.0 Weaknesses

This research question was not addressed because the time and resources required to solve it as per the research design were not available. See the conclusion sections of the Food Security Program and the Cash/Food for Work programs for some weaknesses noticed in these programs.

8.0 Strengths

This research question was not addressed because the time and resources required to solve it as per the research design were not available.

CARE's influence is more likely to be valley-wide. The availability of labor and of food may influence a refugee to return to Marawara valley but which village he will return to will depend upon where he can find decent shelter. As clearly concluded from the baseline study, a returning refugee's paramount personal concern is his home. The data-collectors found many cases of a farmer living in a brother's or cousin's home in a neighboring village rather than in his old home. Chinar is a good example. Loy Kallay of Chinar is decimated, and very few, if any, people live there. But in the survey of Miniagal, a sub-village of Chinar which covers an entire side valley, many people said that though their old home was in Loy Kallay of Chinar, they were living in Miniagal because their old home was destroyed.

9.0 Negative side-effects

This research question was not independently addressed because the time and resources required to solve it as per the research design were not available.

Nevertheless, one potential negative side-effect was noted every day the evaluation team was in Marawara. This was the export of timber into Pakistan by truck up the Marawara road. Every day trucks were observed traveling up the Marawara road fully loaded with timber, returning the next morning empty. The road up Marawara Valley does not go all the way to the Pakistani border, and although the locals had requested that it be built all the way to the border, CARE had refused to do so. The Welfare Relief Committee, however, has undertaken the construction of the road to the Pakistani border. Even without the road going all the way to the Pakistani border, the timber is being exported with the help of the road; after the road is completed all the way, the use of the road for this purpose may increase further.[10]

10.0 Wheat/Cash Used in the Cash/Food for Work Program

10.1 Research Question

How has the wheat/cash ratio changed during the time the program was implemented?

10.2 Results: Wheat/Cash Ratio

From the beginning of the Food/Cash for Work program in March, 1990 until November 1990, all the workers on CARE's projects in the Marawara project area were paid only in wheat. In November of 1990, the wheat/cash ratio was about 44%; that is, 44% of those who received payments for working on CARE projects in November were paid in wheat, the rest in cash. Since then, all payments have been made in cash. The decision to switch the payment from wheat to cash was based upon the drop of wheat prices in Kunar and the resultant flow of wheat back to Pakistan for sale.

---

[10] As an indication of the vital role the road plays in this operation, consider the following example. One afternoon the valley received a two-hour rain and hail storm, which proceeded to cause the Marawara rive. to flood. The flood washed out the road's access ramps where the road dips down to the river-bed in order to ford the river. The storm lasted from about 2:00pm to 4:00pm, and by approximately 6:00pm, people were already working on its repair. The people working on the road were certainly not CARE laborers and they did not appear to be organized from the local community either. It is my opinion that they were the truck drivers who had an immediate interest in repairing the road as quickly as possible. By 10:00am the road had been repaired enough for trucks to cross.

Figure 1 below shows a graph of wheat prices in CARE projects in Kunar over the last year-and-a-half. It is important to note that this graph does *not* depict the impact of CARE policy on wheat prices, nor does this evaluation make any assessment of that impact. This is merely a graphical representation of the information upon which CARE made its decision to switch from wheat payments to cash payments.

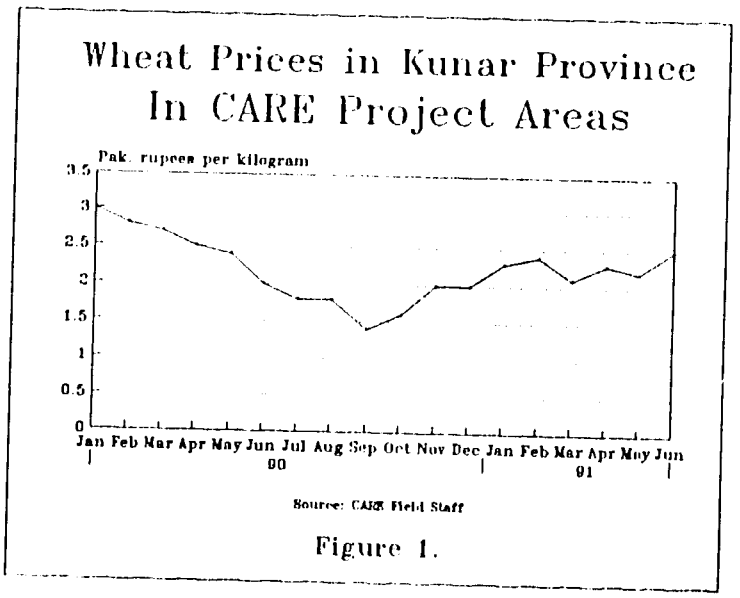


Figure 1.

11.0 Other Observations Made During the Trip

11.1 Mines

As expressed in the baseline study, the presence of mines was one of the salient concerns of refugees in Pakistan and of those in Afghanistan. Their presence was noted in the following ways during the evaluation team's visit to Marawara. First, one of our respondents had been killed by a mine about a month preceding our visit. He lived in Miniagal of Chinar village in Marawara Valley, which is considered to be a mine-free area of Kunar. Second, also in Chinar village, a mine was shown to me as we walked home at the end of the day. It was sitting in a chink in a retaining wall for a terrace. Whether it had been set there or moved to that location was not clear. Third, one day during our trip a boy was killed by a mine. Again, this occurred in Marawara Valley. Finally, the mouth of the Bachi valley is still

heavily mined. Fields which have not been farmed in years are covered with ATC mine warning cairns. In Bachi, farmers expressed the need for the mines to be cleared before the re-establishment of agricultural production.

11.2 Repatriation and Community Re-establishment
Although section 6.0 deals with the impact of CARE projects upon repatriation, it seems justifiable to discuss the issue further.

One indication of the re-establishment of normal agricultural life is the existence of working flour mills. Several working flour mills were discovered during the evaluation, but only one abandoned flour mill was observed. In the case of each working mill, locals indicated that it had been destroyed but that it had been repaired. While CARE had not undertaken to assist in the reconstruction of flour mills, the fact that they exist and are working indicates the re-establishment of agricultural production, to which CARE may have contributed in other ways.

Similarly, the repair of mosques indicates that enough people intend to live their long enough to utilize the mosque. Most mosques were both damaged and partially repaired. As with flour mills, CARE had nothing to do with the repair of mosques but it does give an indication about the extent to which the community has re-established itself.[11]

11.3 Other Services in the Valley
In the village of Marawara itself, right next to the road, there is a sign for a Swedish Committee medical clinic. During the 11 days which the evaluation team spent in Marawara, the clinic was not open once. When asked, the local commander responded that it had not opened yet.

The evaluation team saw or heard no evidence of a school in Marawara Valley.

Outside of the non-functioning Swedish Committee clinic and the road-work of the Welfare Relief Committee, the evaluation team saw no evidence of other organizations' efforts which may have

---

[11] Overall, I had the distinct impression that farmers, particularly in the more remote and intact villages, were re-establishing their homes. In one high village (upper Miniagal), for example, I noticed a sewing machine in a farmer's newly painted, well-maintained house. This might be taken to indicate that the refugees intended to stay at least long enough for their clothes to need repairing! It is also quite a heavy item to carry home just for the summer. Also, in these more isolated villages, retaining walls for their terraces were in good condition, and irrigation canals flowed with cultivating water.

affected the agricultural capacity of farmers in Marawara Valley.[12]

11.4 Imported Labor

It was discovered that in a few cases, workers for some of the CARE projects were Pakistanis. After having expressed surprise at this, one of the data-collectors overheard one of the locals say that they should not tell the evaluation team that a person was a Pakistani anymore. After having investigated further, it would appear that there was not enough local labor to complete the CARE projects, particularly early on. This was especially true for Bachi road, because not many people had returned yet to Bachi. It is not surprising, with Bajaur agency being so close, that if CARE had to recruit labor in the camps in Bajaur that a few Pakistani relatives ended up making the trip to Marawara for work. There was no indication of mass migrant labor.

11.5 Commander's Request

On the last day of the visit, the local commander who had been providing security for the evaluation team made a special visit to make three requests. The first was that the standard wage paid on projects should be raised from Rs. 40. The second was that he would prefer to have the wage paid in wheat. He explained that it was difficult for the local people to travel to a market where they can buy wheat. They had to travel to Bajaur agency to buy it. Third, he requested that the local labor be used for masons and other skilled labor positions. Although his claims were not investigated (and cannot, therefore, be taken as truth), he suggested that CARE had brought in people who were only partially skilled or unskilled, and trained them to become skilled labor. If people were to be trained, he argued, they should be local people.

Note that according to one CARE official, the commander *may* have been interested in receiving payments in wheat because it is possible for him to take a cut of the payments using the following scheme: depending upon the price for wheat, out of the shipment of wheat which he receives from CARE, he is able to pay the workers the amount of wheat which corresponds to a certain wage *at the current price of wheat*. If the price of wheat is such that the allotted amount of wheat per worker is greater than the amount of wheat that a normal day's wage would buy, the commander can keep the surplus amount and sell it. Note that

---

[12] Other organizations, however, have operations in other parts of Kunar which might affect farmers in Marawara valley. For example, DACAAR has a concrete beam project near the Nawa bridge, and Madera has a veterinary clinic in Asadabad. Although operations like these, and presumably there are others as well, may affect farmers in Marawara, the evaluation team saw or heard no evidence of this.

this was not investigated, nor was there any evidence of this discovered; it was merely relayed as one possible explanation for events.

Finally, it should be noted that the commander, as the shura representative for projects in Marawara Valley, receives a salary from CARE equivalent to 1.5 times the daily wage of unskilled labor (Rs 40 per day) or Rs 60 per day.

12.0 Conclusion

Two recurrent themes permeate all the research questions in this report. The most obvious, and the most pessimistic, highlights the difficulties of carrying out complicated, quantitative-based development research with the current conditions in Afghanistan; this is evident even in a relatively stable and accessible province such as Kunar. The second is that despite the difficulties there is evidence, much of it qualitative rather than quantitative, of permanent repatriation in Marawara Valley. Although it is impossible to say with substantial reliability, as a result of vigorous statistical testing, that CARE's presence in Kunar has caused this return, it is also difficult to doubt that the extensive projects which CARE has undertaken in Marawara Valley have had no effect. It is unfortunate that measuring the extent of CARE's impact is as difficult as it is, but it is just one of many difficulties fathered by war in Afghanistan.

Appendices

Appendix 1: Details on Calculation of Re-established Residence

The more complicated formula for calculating Re-established Residence (RR2) was as follows:

1) The base score was three (3) points. One point for presence of women, one point for presence of children, and one point for having farmed land last season.

2) If the respondent had four (4) or more animals, of which at least one (1) was a big animal (mule, ox, or cow), then an additional point was added to the TOTAL POSSIBLE. If this person had started a hay-stack (for the animals), then an additional point was given TO THEIR SCORE.

3) If the respondent had had their house damaged, then an additional point was added to the TOTAL POSSIBLE. If this person had started to repair their home or another place to live, then additional point was given TO THEIR SCORE.

4) If the respondent had sowed at least 3 dalis (15 kgs) of seed this past season, then an additional point was added to the TOTAL POSSIBLE. If the respondent had started to store grain, then an additional point was given to THEIR SCORE. Note that this minimum, 15 kgs of seed, was chosen because it was the smallest amount of seed that someone had sowed and answered "yes" to the "Have you started a grain store?" question.

At the end, each respondent ended up with a total possible of between 3 and 6. If the total possible was 3, then the respondent needed a score of 3 to be considered as having re-established a residence. The rest of the totals possible and requisite scores are given below.

TOTAL POSSIBLE	SCORE INDICATING RR2
3	3
4	3
5	4
6	5

This formula is based on the formula which was in the research design, but has been altered slightly after field-testing.

Example:
Consider Fazal Rahman, son of Gul Rahman, a long-term participant in the Cash/Food for Work program. There are 12 members in Fazal's family, including five men and four kids. This leads to the conclusion that there are three women. In addition, he had one donkey, four goats, four cows and two oxen. His house had been damaged, and he had begun to repair it. He had started a

haystack, but he had not started to store grain. He sowed 40 dalis of seed this past season.

His case will be scored as follows:

1) Out of the necessary three points, he scores three: one for the presence of women, one for the presence of children, and one for farming land last season. So far then, he has scores three out of three, or 3/3.

2) Next, he has more than four animals, and at least one is a large animal, so add one to the total possible to get four. He has started a haystack, so add one to his score: 4/4.

3) Next, his house was damaged, so add one to the total possible, and add one to his score because he had started to repair it: 5/5.

4) Finally, he did farm more than 3 dalis of seed last season, so add one to the total possible. He had not started a grain store, however, so do NOT add one to his score: 5/6.

5) The final score is five out of six (5/6), which is enough to signify RR2.

Appendix 2: Details on Calculation of Subsistence Level Agricultural Production (SLAP)

As with Re-established Residences (RR), there evolved two methods of calculation for the re-establishment of Subsistence Level Agricultural Production (SLAP). The first method calculates calories produced by using average yield figures obtained from the baseline study. The baseline study simply asked farmers what their yields were. Using these figures, SLAP1 was calculated.

After having discussions with agricultural experts in Peshawar, however, it was discovered that these yields were unbelievably high. Therefore, a second method of calculation was developed. This method used Swedish Committee's Agricultural Survey of Afghanistan's average yields for 1987 specific to Kunar province. Even these figures appear high (57 seers/jerib or 1,995 kgs/hectare for irrigated wheat), but they are far more believable than the figures from the baseline study which are close to 5,000 kgs/hectare. In the west, with highly controlled cultivation with appropriate amounts of fertilizers and improved seed, a yield of 4,000 kgs/hectare is considered average.[13] Therefore, the yields from the baseline study seem implausibly high. Details about and an example of each calculation are given below.

Calculation of SLAP1

This proved to be a rather convoluted calculation which began with the amount of seed the farmer sowed. This number, summed up for each of irrigated and non-irrigated wheat, barley, and maize was converted into hectares by the following:

5 dalis (25 kgs) of seed is used to sow 1 jerib of land
1 seer = 7 kilograms
5 jeribs = 1 hectare[14]

therefore,

x dalis * 1 jerib/5 dalis * 1 hectare/5 jeribs = y hectares

Then, from the baseline study an average was obtained for yield/hectare (see explanation, section 1.3). The amount of hectares in wheat, barley, and maize was then multiplied by this

[13] This was confirmed by an agriculturalist working for another NGO in Peshawar.

[14] These constants are estimates which may vary from region to region. Even within Marawara valley, some farmers stated that one dali was four kilograms while most said five. The numbers used in this calculation seem to be the most common.

yield. These average yields were, 4,972 kg/hectare, 5,108 kg/hectare, and 5,155 kg/hectare for wheat, barley and maize respectively.

From *The Management of Nutritional Emergencies in Large Populations*, (World Health Organization), the wheat and maize yields were directly turned into kilo-calories. Barley was converted into an equivalent amount of kilograms of wheat based on the barley/wheat price ratio as also obtained from the baseline study one year ago. These figures from the baseline study were as follows: wheat, Rs 10.64/kg; barley, Rs 8.35/kg. Then this figure, too, was multiplied by the kcal equivalent for wheat. Wheat provides 340 kcal/100 g, and maize 360 kcal/100 g.

Animals that could be eaten were also taken into consideration by calculating the kilo-calorie equivalent of the amount of wheat which could be bought from the sale of an average number of kilograms of meat for the animal involved. For a sheep this was 12 kg, for a goat 8 kg. As the price in Pakistan for goat's meat is close to the price for sheep's meat, the price for goat's meat as given by the DAI report was used for both. This price was Afs 1178.67.

All the kilo-calorie equivalents were added up, and if it was greater than 2000*number of people in the family, then they were considered to have re-established subsistence level agricultural production. Below is an example calculation. The real calculation was done by a program written in dbase.

Example:
Consider Fazal Rahman, son of Gul Rahman, a long-term participant in the Cash/Food for Work program. There are 12 members in his family, he has 4 goats, and he sowed 40 dalis of wheat seed on irrigated land last season, although he said that he only needed 10 dalis of wheat seed to cultivate all his *own* irrigated land.

The relevant constants are:
Yield Wheat Irr = 4,972 kgs/hect (as from baseline study)
Goat To Wheat = 8kgs/goat * 1178.67Afs/kg(goat) / 268.57Afs/kg(wheat) = 35.109 kgs(wheat)
Kcal(wheat) = 3400 kcal/kg

Total Calorie needs => 2000 kcal/pers * 12 pers * 365 = 8,760,000 kcal

Sharecropper Calculation:
Because the respondent used 40 kilograms of seed but only needed 10 kgs to farm his own land, we assume that 30 kgs of seed was used on sharecropped land, of which he only takes 50% of the yield. Therefore,

Land farmed = 30 * 50% + 10 = 25 dalis of seed used

The calories which the farmer has earned from wheat production can then be calculated as follows:

25 dalis * 1 jerib/5dalis * 1 hect/5 jeribs = 25/25 = 1 hectare irr. wheat
1 hectare * Yield Wh_Irr = 1 * 1972 = kgs/wheat produced
1972 kgs(wheat) * 3100 = 16,904,800 kcals

The calories which the farmer has earned from the goats can be calculated as follows:

1 goats * Goat_To_Wheat = 1 * 35.109 = equivalent of 140 kgs(wheat)
140 * 3100 = 477,482 kcals

The total the farmer has earned is then:

16,904,800 + 477,482 = 17,382,282.

Since this is more than the total needs, the farmer has re-established subsistence level agricultural production, meeting the requirements for SLAP1.

Calculation of SLAP 2

For the calculation of SLAP2, the yield figures from the Swedish Committee's Agricultural Survey for Afghanistan were used. The same case as above is used for the sample calculation of SLAP2, below.

Example:
Concider Fazal Rahman, son of Gul Rahman, a long-term participant in the Cash/Food for Work program. There are 12 members in his family, he has 4 goats, and he sowed 40 dalis of wheat seed on irrigated land last season, although he said that he only needed 10 dalis of wheat seed to cultivate all his *own* irrigated land.

The relevant constants are:

Yield Wheat Irr = 10 seers/jerib * 7 kgs/seer * 5jeribs/hectare = 1,995 kgs/heet
Goat_To_Wheat = 8kgs/goat * 1178.67Afs/kg(goat) / 268.57Afs/kg(wheat) = 35.109 kgs(wheat)
Kcal(wheat) = 3100 kcal/kg

Total Calorie needs => 2000 kcal/pers * 12 pers * 365 = 8,760,000 kcal

Sharecropper Calculation:
Because the respondent used 40 kilograms of seed but only needed 10 kgs to farm his own land, we assume that 30 kgs of seed was used on sharecropped land, of which he only takes 50% of the

yield. Therefore,

Land farmed = 30 * 50% + 10 = 25 dalis of seed used

The calories which the farmer has earned from wheat production can then be calculated as follows:

25 dalis * 1 jerib/5dalis * 1 hect/5 jeribs = 25/25 = 1 hectare irr. wheat
1 hectare * Yield_Wh_Irr = 1 * 1995 = 1995 kgs/wheat produced
1995 kgs(wheat) * 3400 = 6,783,000 kcals

The calories which the farmer has earned from the goats can be calculated as follows:

1 goats * Goat_To_Wheat = 1 * 35.109 = equivalent of 140 kgs(wheat)
140 * 3400 = 477,482 kcals

The total the farmer has earned is then:

6,783,000 + 477,482 = 7,260,482.

Since this is less than the total need, the farmer has not re-established subsistence level agricultural production, therefore not meeting the requirement for SLAP2.

Appendix 3: The Questionnaire

Name:
Fathers name:
Community:

Interviewed By:_____
Date of Interview:_____
Time of Interview:_____
Research Code:_____

1. Are you or is your family from Marawara Valley? [YES/NO]

2. A) How many families are in this house? ....

   B) How many people are HERE in your family? ....

3. How many men over 16 years of age are living here (in Marawara) in your family? ....

4. How many children, male and female, under 16 years of age are living here (in Marawara) in your family? ....

5. Has the house in which you are living been damaged? [YES / NO]

   If yes: Have you started to repair your home or repair/construct a place to live? [YES / NO]

6. Does your family have animals? [YES / NO]
   If yes: How many?

Kind	Number
donkey	...
goat	...
sheep	...
cow	...
oxen	...
mules	...
...	...
...	...

7. *If your family has animals (answered YES to Question #6):*
   Has your family started to make a hay stack for the coming winter? [YES / NO]

   If no: Will your family make a hay stack for the coming winter? [YES/ NO/ NOT SURE]

8. Has your family started to store grain for the coming winter? [YES / NO]

   If no: Will your family store grain for the coming winter? [YES / NO / NOT SURE]

9. Has your family started to store fuel (wood) for the coming winter? [YES / NO]

   If no: Will your family store fuel (wood) for the coming winter? [YES/ NO/ NOT SURE]

10. A) What preparations have you made in Marawara for the coming winter?

**** continued OVER ****

B) What preparations will you make for the coming winter?

_____

_____

_____

11. A) Does your family own land? [YES / NO]

If yes:

B) How much seed would be needed to sow all the irrigated land?

..... wheat ..... maize

C) How much seed would be needed to sow all the non-irrigated land?

..... wheat ..... maize

12. A) How much seed did your family sow last season on irrigated land?

..... wheat ..... maize

B) How much seed did your family sow last season on non-irrigated land?

..... wheat ..... maize

13. Does your family plan to stay in Marawara Valley for the coming winter? [YES / NO / NOT SURE]

If this person cannot be found: where is he?
Will he come back?

Appendix 5: References

The Agricultural Survey of Afghanistan: Third Report, Vol. 1, Crops and Yields, August 1989. Swedish Committee for Afghanistan. pp. 55 -59.

CARE International: Afghan Village Assistance Program, Phase One. With August 30th Revisions, 1989. CARE International. Appendix "D".

Commodity Price Report: April - June 1991. Agricultural Sector Support Project, Private Sector Agribusiness, Development Alternatives, In . (Unofficial, pre-publication figures given by telephone.)

The Management of Nutritional Emergencies in Large Populations. De Ville de Goyet, C., J. Seaman and U. Geijer. World Health Organization. pp. 88.

Research Design for an Evaluation of CARE's Project in Marawara Valley, Kunar Province, Afghanistan. Dr. Jarik Lette. (A copy is attached to this report)

Appendix 6: Computer Files

The three disks included in the report contain the following files:

Disk 1:

<MEMOS>	This directory contains all business-related memos written during the evaluation.
REPORT.DOC	This file contains this report.
CAPTION.DOC	This file contains the captions used in Appendix 4.
NEGATIVE.DOC	This file contains the negative numbers for all the pictures displayed in Appendix 4.
RESDESIG.DOC	This file contains the research design of Dr. Lette.
QUESTION.DOC	This file contains the questionnaire used in Mar-wara.
MATCH.WK1	This Lotus file contains the original nine pairs of matched communities for research question six (6).
MATCHAUC.WK1	This Lotus file contains the matched communities and differences as for the permutation test for research question 4, area under cultivation.
MATCHREP.WK1	This Lotus file contains the matched communities and differences as for the permutation test for research question 6, repatriation.

Disk 2:

CARETTL.DBF	This DBIII+ file contains the total database from the baseline survey which CARE carried out in the late fall of 1989 and winter of 1990.
VILLINDX.NDX	This is the DBIII+ index file which indexes on village name necessary for the FMLYCNT.PRG, HECTCNTB.PRG and FMLYTO.PRG programs.
FMLYCNT.PRG	This DBIII+ program counts the number of families originally stated as living in each sub-village. CARETTL.DBF must be indexed on VILLINDX.NDX for this program to work.
FMLYTO.PRG	This DBIII+ program counts the number of families who were present in each sub-village at the time of the baseline study (e.g. t0). This is needed for research question 6. CARETTL.DBF must be indexed on VILLINDX.NDX for this program to work.
HECTCNTB.PRG	This DBIII+ program counts the number of hectares under cultivation in each sub-village. This is needed for research question 4. CARETTL.DBF must be indexed on VILLINDX.NDX for this program to work.
YIELDAVG.PRG	This DBIII+ program finds the average yield for wheat, barley and maize from the baseline study. This is used for determining SLAP1.
PRICEAVG.PRG	This DBIII+ program finds the average price of barley and wheat for determining the ratio of kgs wheat = kgs barley for determining SLAP1 and SLAP2.

Disk 3:

CFFWTTL.DBF	This DBIII+ data file contains the names of ALL people ever paid in either cash or food in the CASH/FCOD for work program. If a person was paid more than once, his name appears more than once.
CFFWLONG.DBF	This DBIII+ data file contains all those whose names are listed in the CFFWTTL file and occur five times or more. This correlates to roughly ten weeks of work, at least.
CFFWSHRT.DBF	This DBIII+ data file contains all those whose names are listed in the CFFWTTL file and occur less than five times. This means they were considered as "short-term" participants.
CFFWLRES.DBF	This DBIII+ data file contains the results from the interviews for Cash/Food for Work Long term participants. Note the SUF_INFO field is recorded as .T. if there is enough information to use them in the analysis. Thus, a COUNT FOR SUF_INFO command in Dbase would yield the sample size as given in the results.
CFFWSRES.DBF	This DBIII+ data file is the same as the previous one but for short-term employees.
FSFRSLTS.DBF	This DBIII+ data file stands for "Food Security Full Results" and contains the information from those interviews.
FSPRSLTS.DBF	This is the same as the above but for Partial p rticipants in the Food Security Program.
CCSRSLTS.DBF	This DBIII+ data file stands for "Community Comparison Survey" and is the data file for all the heads-of-household surveyed for the matched communities, e.g. questions 4 and 6.
FMLYT1.PRG	This DBIII+ program counts the number of families in residence at time t1, e.g. now. It works on the CCSRSLTS.DBF file for research question 6.
REESTPRS.PRG	This DBIII+ program determines how many respondents with SUF_INFO = .T. are present in Marawara Valley, e.g. RR1. It was used for CFFWLRES, CFFWSRES, FSFRSLTS and FSPRSLTS.
REEST.PRG	This DBIII+ program determines how many respondents with SUF_INFO = .T. meet the criteria for RR2. It was used for CFFWLRES, CFFWSRES, FSFRSLTS and FSPRSLTS.
SLAP.PRG	This DBIII+ program determines how many respondents with SUF_INFO = .T. meet the criteria for SLAP1. It was used for CFFWLRES, CFFWSRES, FSFRSLTS and FSPRSLTS.
NEWSLAP.PRG	This DBIII+ program determines how many respondents with SUF_INFO = .T. meet the criteria for SLAP2. It was used for CFFWLRES, CFFWSRES, FSFRSLTS and FSPRSLTS.
MATCH.BAS	This IBM BASIC program uses the algorithm given in Annex 3 of the research design for performing the permutation test for matched pairs. It was used for research questions 4 and 6.

RESEARCH DESIGN
FOR
AN EVALUATION STUDY
OF THE CARE PROGRAM IN
MARAWARA VALLEY IN KUNAR

Dr. Jarik R. Lette
Peshawar, June 1991

CONTENTS

A.RESEARCH PROBLEMS

This section lists the research problems of the evaluation study in the order in which they first appeared in the CARE document 'SCOPE OF WORK' (SOW) May 1 1991. Some of the research problems which are not suitable for research in the short run can be found in annex 1.

food security (SOW, a.)
- How many participating families have reestablished their residences?
- How many participating families have established subsistence level agricultural production?

cash/food for work (SOW, a.)
- How many participating families have reestablished their residences?
- How many participating families have established subsistence level agricultural production?

Afghan village assistance program and capital assets (SOW, b.)
- How many participating communities have reconstructed their priority capital assets?

Village assistance program and area under cultivation (SOW, c)
- Does the program result in an increase in the area under cultivation?

(SOW, c)
- How much land in Marawara valley is under cultivation ?

Village assistance program and repatriation (SOW, d)
- Does the program result in repatriation?

Weaknesses
Shura participation (SOW, e.i)
- Do shuras participate in the program as expected?

Wheat/cash ratio (SOW, e.i)
- How has the wheat/cash ratio changed during the time the program was implemented?

Strengths
Political neutrality (SOW, e.i)
- Do the activities of CARE show a preference for a particular political party?

Negative side-effects (SOW, e.iii)
Dependency
- Does the program result in a culture/attitude of dependency?

Every research problem demands its own methodological strategy. For the purpose of data collecting some of these research problems can be grouped together. Selecting units of observation for the census, for the samples of the surveys and the matched pairs for the experiment will be done separately as should be data processing and data analysis.

DESCRIPTIVE SAMPLE SURVEY, UNITS FAMILIES

I food security problems:		(SOW, a.)
	-	How many participating families have reestablished their residences?
	-	How many participating families have established subsistence level agricultural production?
design:	descriptive, two sample surveys	
units:	-	families who fully participated in the food security program
	-	families who partially[1] participated in the food security program
populations:	-	all families in Marawara valley who fully participated in the food security program (n=553)
	-	all families in Marawara valley who partially participated in the food security program (n=120)
samples:	two simple random samples	
sample size:	Two small samples of 68 units from both populations corresponding with an accuracy of + or - 10% and a confidence level of 90% are suggested (see annex 2). Allowing for a non-response of 15% results in a sample size of 78.	
sampling frames:	Identical to the two populations. Lists can be found in the program files in CARE office	
variables:	-	reestablished residences (RR)
	-	established subsistence level agricultural production (SLAP)
data collection:	RR, interview	
	SLAP, interview	

[1] The families who participated partially did not receive handtools. The families who participated fully did receive handtools.

DESCRIPTIVE SAMPLE SURVEY, UNITS INDIVIDUALS

II cash/food for work (SOW, a.)

problems:
- How many participating individuals have reestablished their residences?
- How many participating individuals have established subsistence level agricultural production?

design: two descriptive, sample surveys

units:
- individuals who participated at least six months in the cash/food for work program (n=unknown, but possibly several thousand).
- individuals who participated less than six months in the cash/food for work program (n=unknown, but possibly several thousand).

populations:
- all individuals in Marawara who participate(d) in the cash/food for work program for at least six months.
- all individuals in Marawara who participate(d) in the cash/food for work program for less than six months.

samples: two simple random samples

sample size: A confidence level of 90% and an accuracy of + or - 10% requires a sample size of 68, (see annex 2). Allowing for a non-response of 15% results in sample sizes of 78.
We can draw the random sample from the list of participants found in the program files.

sampling frames:
- All individuals in Marawara who participate(d) in the cash/food for work program for at least six months.
- All individuals in Marawara who participate(d) in the cash/food for work program for less than six months.

Lists can be found in program files in CARE office in Kunar.

variables:
- reestablished residences (RR)
- established subsistence level agricultural production (SLAP)

data collection: RR, interview
SLAP, interview

DESCRIPTIVE CENSUS

III Village assistance program and area under cultivation (SOW, c)

Problem: How much land in Marawara valley is under cultivation ?

Secondary data can possibbly be obtained from FAO peshawar. Alternatively simple visual inspection might reveal the extent of cultivation. The latter measurement cannot be expected to be very accurate, but since we are dealing with a very substantial increase, there is no need for a high degree of accuracy.

EXPERIMENT, TESTING CAUSAL HYPOTHESES, UNITS FARMERS

IV Village assistance program and area under cultivation (SOW, c)

Problem:	Does the program result in an increase in the area under cultivation?
design:	experimental, precision matching
units:	farmers, i.e. families participating at least one full year (experimental) and not participating (control) The names and the communities of the participating families can be found in the program files; matching families can be found in the baseline study.
matching:	Farmers should be matched on worker/ dependent ratio, family size/land ratio and community.
variables:	more or less than 50% expanded area under cultivation. (AUC)
t0 measurement:	from baseline study
t1 measurement:	data to be collected, interview
statistical test:	the permutation test for matched pairs

DESCRIPTIVE CENSUS, UNITS COMMUNITIES

V Afghan village assistance program and capital assets (SOW,b.)

problem:	How many participating communities have reconstructed their priority capital assets?
design:	descriptive, census
units:	communities that participated in the Afghan Village Assistance Program
population:	All communities that participated in the Afghan Village Assistance Program
sample:	No sample, all units will be included in data collection and analysis
variables:	level of reconstruction of priority capital assets (LRPCA)
data collection:	observation, interview first establish what the stated priority capital assets of a community are, information in the village profiles or program files Observation will tell to what extent these have been rebuilt. Because of the small number of communities that have reconstructed their capital assets with assistance of CARE (no' more than 16), it is recommended that the supervisor of the data collectors will observe the extent of reconstruction. This will save time in training the data collectors.

EXPERIMENT, TESTING CAUSAL HYPOTHESES, UNITS COMMUNITIES

VI Village assistance program and repatriation (SOW, d)

problem:	Does the program result in repatriation?
design:	experimental, precision matching
units:	communities, participating (experimental) and not participating (control)
matching:	Communities are matched on landholding per family, the possibility to grow two crops per year or not and the distance to the road. **Brian Williams** has used the material of the baseline study and produced scores for the 35 communities in Marawara valley (see annex 4). Based on these scores it is possible to compile 9 matched pairs, which is certainly sufficient to make use of one of the most powerful statistical tests.
variables:	% increase (or decrease) at t1 of resident families nc compared to t0 (RF) Resident families are families that have reestablished residences.
t0 measurement:	from baseline study
t1 measurement:	data to be collected, interview
Statistical test:	the permutation test for matched pairs

INVESTIGATIVE/CASE STUDY
VII Weaknesses (SOW, e.i)
Shura participation

problem:
- Do shuras participate in the program as expected?
- Does the program result in the establishment of capable shuras?

design: investigative

data:
- program files
- interviews with the program managers at all levels
- interviews with members of the participating shuras
- interviews with participants of the program

output: organized inventory of the perceptions of shura effectiveness of the program managers, members of participating shuras and participants in the program

INVESTIGATIVE/CASE STUDY
VIII Strengths
Political neutrality (SOW, e.i)

problem: Do the activities of CARE show a preference for a particular political party?

design: investigative

data: program files
interviews with office bearers of the political parties, members of participating shuras, commanders and participants in the program
Compare the opinions about CARE with opinions about notorious partisan NGOs, with opinions about well known neutral agencies and some less known agencies in order to filter out respondents who will always accuse agencies of being partisan and respondents who consider all agencies to be neutral.

output: organized inventory of the perceptions of office bearers of political parties, members of participating shuras, commanders and participants in the program

INVESTIGATIVE/CASE STUDY
IX Negative side-effects (SOW, e.iii)
Dependency

problem: Does the program result in a culture/attitude of dependency?

A case study, for example the Dari Dam roof case, will illustrate some of the related phenomena.

DESCRIPTIVE CENSUS, DESK RESEARCH
X_Wheat/cash_ratio

problem:	How has the wheat/cash ratio changed during the time the program was implemented?
design:	descriptive, census
units:	All decisions regarding the wheat/cash ratio to be used
sample:	No sample, all units will be included in data collection and analysis
variables:	wheat/cash ratio as used (WCR)
data:	program files
output:	graph showing the different wheat/cash ratios over time

NOTE:
It is not difficult to draw a second graph in the same diagram showing the wheat price in Kunar during the same period. However, such a graph is easily misinterpreted.

B. LOGIC OF THE DESIGNS

The following research strategies are proposed:
- Descriptive, sample survey, census, collecting data in the field and desk research
- Experimental, precision matching
- Investigative research/case study

Descriptive research refers to a research method that is used when we are certain of what it is that we want to know, about which population and when we are not interested in causal relationships. We can collect data about every unit in the population (a census) or we can collect data about a sample that will allow us to estimate population parameters (a sample survey). In the descriptive part of the proposed evaluation study four sets of units will be used, families individuals, communities and decisions regarding the wheat/cash ratio in the food/cash for work program.

Experiments are used to test whether there exist causal relationships as expected. Briefly summarized an experiment consists of a number of units which are measured prior to the start of the experiment (t0 measurement). Half the units receive a particular treatment, after which all units are measured again (t1 measurement). A statistical analysis of the differences between the four measurements, if any, will show whether the treatment had the expected effect.

An experimental approach is the best one possible if we want to study the effect of interventions. Requirements are a baseline study held prior to the interventions and the existence of comparable control units not exposed to the treatment but included in the baseline study (t0 measurement) and the data collection after the treatment (t1 measurement).

There are three ways to allocate the units to the experimental group (receiving the treatment) and the control group (not receiving the treatment). The first method consists of allocating every unit at random to one of the groups. This is a good method if the number of units is fairly large, say about a hundred. In the case of the CARE evaluation study, in Kunar, the participating and non participating communities were not selected at random and we cannot use this method. The second method is called matching on frequency distribution. We make sure that the frequency distributions of all variables that we think might influence the causal relationship are identical for the experimental and the control group. This method might work for the CARE evaluation study in Kunar. The third method is precision matching. For every unit in the experimental group with certain characteristics a matching unit with the same characteristics is sought and placed in the control group. This method requires a sizable pool of units so that

matching pairs can be found, but the number of matched pairs does not have to be large. For the CARE evaluation study in Kunar this method has been chosen.

Investigative research is used if we are nor yet certain about what it is that we exactly want to know. The discovery of some facts may influence our research in an unanticipated way. In investigative research we cannot use the standard terminology of population, units, variables and values. We cannot record the data in a data matrix. Investigative research is similar to the "fieldwork" of anthropologists and the case study of some sociologist or journalists. Censuses, surveys and experiments are often called quantitative methodologies, whereas fieldwork, case studies and investigative research are often called qualitative methodologies.

C. UNITS AND VARIABLES

Units

Units for the various research problems are, farmers (families), individuals, communities and decisions regarding the wheat/cash ratio of the food/cash for work program.

Variables

reestablished residence (RR)
This variable intends to measure whether the family is actually living permanently in Marawara valley. As observation over a prolonged period of time is not practical, we will have to use the following indicators. It is assumed that these indicate permanent residence as opposed to seasonal residence.

- family living there, (RR1)
  (interview)
  The presence of woman and children is assumed to indicate permanent residence.
- kandu, grain store present, (RR2)
  (interview)
  Grain is too bulky to transport to Pakistan after the harvest. A family intending to go back to Pakistan for the winter can be expected to sell the grain they have harvested and does not need a grain store.
- hay stack (if animals are present), (RR3)
  (interview)
  Animal fodder is also to bulky to transport to Pakistan. If a supply of animal fodder is present or being prepared it indicates an intention to stay in Marawara valley during the winter.
- fuel supply (most likely animal dung), (RR4)
  (interview)
  The same is true for a fuel supply

If these indicators are valid indicators, they should show a high correlation. That is, most of the families that score positively on one of these indicators will also score positively on the other indicators. Whether this is the case or not can only be found out by field testing of the instrument for data collection. This must obviously take place inside Afghanistan, preferably in Kunar. Alternatively, the correlation of the indicators can be checked after the final data collection has taken place but short of discarding one or more of the indicators, there will nothing to be done about it.

established subsistence level agricultural production (SLAP)
How much land must be cultivated in order to meet the minimum energy requirements of the family? Distinguish between one or two crops per year. The baseline study will give the productivity of both types of land. May be it will prove necessary to compensate

for altitude. (double or single cropping)
Average or individual family composition combined with estimated physical activity will yield minimum energy needs of a family. Or, as a approximation for populations as a whole 2000 kcal per person per day can be used. (See, Caloric requirements per village and family, CARE 1989).
How many sheep/goat are necessary for a family to live on. What is the net productivity of a herd? Of any specific combination of cultivated land and animals can then be determined whether this can meet minimum subsistence requirements.
CHECK WITH DAI, JERRY OWENS, BOB HASKIL, DR. RICHARD SMITH

area under cultivation (AUC)
Preferably the same questions should be used to determine the AUC of a farmer as were used in the baseline study.

level of reconstruction of priority capital assets (LRPCA)
First, establish what the priority capital assets of a community are, see information in the village profiles.
Observation will tell to what extent these have been rebuilt.

% increase (or decrease) at t1 of resident families as compared to t0 (RF)t
Resident families are families that have reestablished residences.
t0 measurement: from baseline study
t1 measurement: RF can be calculated from the information in the baseline study and the measurement of reestablished residence (RR)

D. DATA COLLECTION TECHNIQUES

Observation
In order to produce reliable data, observation should be standardized as much as possible. Because only one variable will be observed and only in a small number of communities only one observer will be needed. The supervisor of the data collectors is an obvious choice.

Interview
There are many approaches as to what constitutes good interviewing. For census and the sample surveys reliability will rank foremost. However, complete standardization as is sometimes advocated to achieve a degree of reliability does not seem practical to me when interviewing Afghan peasants. Rather the ability to conduct a natural conversation will ensure that biased answers are minimized.
The research problems that will be addressed with investigative research designs require a proficiency in interviewing that cannot be learnt in a few days. Also the interviewer should have a full understanding of the research problems. An experienced Afghan researcher or an expat researcher fluent in Pashtu are the best choice.

Data taken in the baseline study
These have to be used as they have been collected, recorded and entered into the electronic files.

Data taken in the village profile study
These are not yet entered into electronic files.

Data from program files
All that has to be done is collect the relevant data and enter them into electronic files.

E. INSTRUMENTS FOR DATA COLLECTING

observing
The observer must have a clear understanding what he will observe and how his observation will have to be recorded. Some capital goods will be only partly completed and this must be recorded accordingly. The same applies to the quality of the capital goods.

specific questions for interviewing
Name: the name will already be filled in
Fathers name: same
'ommunity: same

area under cultivation (AUC):
The same questions as were used in the baseline study.
family living there, (RR1):
How many men are living in this house?
How many women are living in this house?
How many children are living in this house?

kandu, grain store present, (RR2)
Do you store grain for the winter?

hay stack (if animals are present), (RR3)
Do you have a animals?
(If yes), Do you have a hay stack for the winter?

fuel supply (most likely animal dung), (RR4)
Do you have a fuel supply for the winter?

The questions for RR2, RR3 and RR4 need only to be asked if women and children are living in the house.

established subsistence level agricultural production (SLAP)
Area under cultivation has been asked already.
Which animals do you have?
(per kind) How many of each kind?
In the questionnaire this questions should follow the first question of RR3.

% increase (or decrease) at t1 of resident families as compared to t0 (RF) No new questions are necessary

F. INSTRUCTIONS FOR TRAINING DATA COLLECTORS

Selection criteria:
Given the present condition in Afghanistan, political acceptability must rank foremost among the selection criteria. Other criteria are:

- Preferably indigenous to Kunar
- Fluent in the Pashtu as spoken in Marawara valley
- Acceptable behavior
- Literate
- Dedicated and honest
- Older rather than younger
- Used to and liking living among peasants, preferably peasant background

If the data collectors are to be trained and supervised by non- Pashtu speaking expats, they should also be fairly fluent in English. If the data collectors are able to record data in English it will facilitate entering the data into electronic files.

Selection
In Nigeria I had to select six interviewers out of sixty applicants. I only had time for an interview of a few minutes per applicant and I recorded my impressions during the interview. Immediately after the interview the applicant was asked to write a small essay about his fathers occupation. These essays ware judged later and fortunately my judgement of the essays indicated the same candidates as the interviews. This process resulted in six useful interviewers. The best of these continued to work for me as a very effective research assistant.

Training
observation
If possible the observer should make field visits with program managers and engineers to capital assets around Peshawar imilar to the ones expected in Marawara valley and discuss the ranking for state of completeness and quality.

Interview
Interview training will be much more efficient if video equipment can be used. The idea is to record a role play of an interview and discuss the recording with the trainees. The first fase of the training should aim at correcting common mistakes like deviating from the questionnaire, rephrasing the questions in a leading way, omissions, insensitivity etc. In the second fase the trainees will learn how to cope with difficult respondents. Every trainee should take his turn as interviewer until his performance is satisfactory. Interview training in this way is also very useful in discovering mistakes in the questionnaire and correcting these. Finally, it will give an indication as to which trainees are better not hired for the data collecting.

Field testing
The first objective of field testing is to try out whether there are any

difficulties in using the questionnaire. Corrections can still be made. Secondly, field testing will serve as the final exam for the data collectors. Thirdly, field testing will give an indication of the time required for an interview under field conditions. Every data collector should do about five interviews during the field testing.

Supervision

Finding the prescribed responded can be very time consuming and the temptation to substitute the prescribed responded with another or to fabricate answers is very real especially as the concepts of random sampling and matching are probably not fully understood by the data collectors. These temptations can be resisted a little easier if the data collector is aware that supervision is effective.

G. HOW TO ANALYZE THE DATA

The first task will be to enter the data in files of the chosen program. Each unit will be allocated a row or record and each variable will be allocated a column or field. It is strongly recommended that different electronic files are made for the different research problems, rather than giving every unit a code indicating to which research problem it belongs. Different files are easier to use and can be analyzed simultaneously but most importantly avoid a source a confusion.

Index construction
Some of the variables are operationalized with one indicator only. The results of the measurements can be used for the analysis straightaway. Some other variables are operationalized by means of several indicators and these will have to be combined to indexes first.

Reestablished residence
family living there, (RR1):
How many men are living in this house?
How many women are living in this house?
How many children are living in this house?

kandu, grain store present, (RR2)
Do you store grain for the winter?

hay stack (if animals are present), (RR3)
Do you have a animals?
(If yes), Do you have a hay stack for the winter?

fuel supply (most likely animal dung), (RR4)
Do you have a fuel supply for the winter?

Give one point if one or more women are present, give one point if one or more children are present, give one point if grain is stored, one point if hay stack is present and one point if fuel supply is present.

record NO if no women or children are present
record YES if total score is 4 or bigger and if animals are present or 3 or bigger if no animals are present
All other cases are scored as NO

established subsistence level agricultural production (SLAP)
1. number of people in the house * 2000 * 365
2. total area under cultivation, area used for double cropping counts double, * constant1 (total calories produced)
3. total number of animals * constant2 (equivalent of total calories produced)
4. 2 + 3 -1
5. if 4=0 or positive record yes

constant1 can be found from the baseline study: average yield per

hectare.
constant2 must be found by estimating the net productivity of a herd of sheep or goat expressed in the calories that would be supplied by purchasing wheat from the proceeds of the herd.

% increase (or decrease) at t1 of resident families as compared to t0 (RF) (number of resident families at t1/number of resident families at t0 -1) * 100

Statistical tests
The census and sample surveys do not test hypotheses, but measure or estimate population parameters. The experiments do test causal hypothesis and an appropriate statistical test is required. In our cases the choice of test is influenced by the fact that we are dealing with matched pairs and that the level of measurement is interval. This allows the "Permutation Test For Matched Pairs" to be used. This test is a little cumbersome to calculate, but is wholly appropriate for our conditions besides being a very powerful test.

> "The permutation test for matched pairs, because it uses all of the information in the sample, has power-efficiency of 100 percent. It is among the most powerful of all statistical tests."
> (Siegel and Castellan, p.100)

Software
The best software would be a program specifically designed to handle statistical data, like SPSS, BMDP or SAS. Today there exist versions of these programs that run on personal computers. If these programs are not available DBASE will be the next choice. DBase is a very powerful program that can handle large databases and is programmable. The disadvantage of DBase is that it requires some training before the uninitiated user can produce calculated fields, something that has to be done for our purposes. A spreadsheet program like Lotus/Symphony will certainly be adequate and is easier to use than DBase. I have handled relatively large databases with Symphony and there is no problem with calculating new fields. The disadvantage is that saving or copying large data bases is time consuming. This means that a fast computer with a large RAM will be required and in Peshawar UPS is highly desirable. Summarizing, If statistical programs are available they are the first choice, saving time since they do not have to be programmed; they already contain the necessary formulas. If an experienced DBase user is available this might well be the second choice. Lotus/Symphony will certainly be able to do the job and is easier to use than D ase.

Annex I OTHER RESEARCH PROBLEMS

The following research problems originate from the CARE document 'scope of work" and do need research from the point of view of the CARE program management, but it will be impractical to produce meaningful results in the short run.

Institution building

design:	experimental, precision matching
units:	As many communities that were participating in the program (experimental group) and the same number of communities that did not participate.
variables:	level of competence of the shura of a community (This seems difficult to measure)
data:	No data in the baseline study, impairing an experimental design

If it is felt that this is an important research problem, I recommend that an instrument for measuring shura competence will be developed and used to collect data in a baseline study in a new project area.

Dependency

problem:	Does the program result in a culture/attitude of dependency?
design:	experimental, precision matching
units:	As many communities that were participating in the program (experimental group) and the same number of communities that did not participate. or: As many individuals that were participating in the program (experimental group) and the same number of individuals that did not participate.
variables:	dependency as a culture trait or an attitude
data:	No data in the baseline study, impairing an experimental design

If it is felt that this is an important research problem, I recommend that an instrument for measuring dependency will be developed and used to collect data in a baseline study in a new project area.

VI.3 barriers/impediments
(SOW, e.ii)
These are the difficulties that face the program; they are considered to be external to the program and are not part of the evaluation study that seeks to determine the effectiveness of the program.

Annex 2 RANDOM SAMPLING

A sample is frequently studied in those cases when the population is too large to be studied. In order to make valid estimations of population parameters based on sample statistics, the sample must represent the population as close as possible. This is normally achieved by taking a random sample.

The size of the random sample can be calculated when the desired degree of accuracy and the chance that a false estimation is made are determined. Ideally the distribution of the parameter in the population should also be known to arrive at the smallest possible sample size. If, as is usually the case, this distribution is not known, we can allow for it, resulting in a larger sample size. A calculated sample size will ensure that estimations of population parameters have a known accuracy, a known chance to be accurate (90, 95 or 99%, this is known as the confidence level) and is not larger than is necessary, saving resources for other purposes. Put differently, a precise trade off between accuracy and cost can be made.

The table below shows calculated random sample sizes for different confidence levels and for different levels of accuracy.

Different random sample sizes

	confidence levels		
accuracy	90%	95%	99%
+ or - 1%	6765	9604	16577
+ or - 5%	271	385	664
+ or - 10%	68	97	166

1. These calculations are based on the assumption that the distribution of the population parameter to be estimated is not known. This results in a larger sample than would have been calculated otherwise. Or equally true, the above sample sizes will in reality be more accurate and at higher confidence levels.

2. The calculated sample sizes will only correspond with the levels of accuracy and confidence if the sample is not broken down. For example, if part of the sample is male and we want to estimate a parameter of the male population, the number of males in the sub-sample determines the level of accuracy and the level of confidence.

3. In reality we will not be able to locate all units selected in the sample or they might refuse to cooperate. This is known

as 'non-response'. We can make an educated guess as to the magnitude of the non-response and allow for it when the sample size is determined. Because it is unlikely that the non-response will be random, it will corrupt the nature of the random sample if it is too large. Therefore we cannot accept a non-response of more than 10-15% of the planned sample.
This puts large demands on the integrity of the data-collectors and the quality supervision.

Annex 3 THE PERMUTATION TEST FOR MATCHED PAIRS

The procedure for determining the significance of the observed value of T^+ depends on the size of N:

(a) If N is 15 or less, Appendix Table H gives probabilities associated with various values of T^+. If the probability associated with the observed value of T^+ is less than or equal to the chosen significance level, reject H_0.

(b) If N is larger than 15, compute the value of z by using Eq. (5.5) and, if there are tied ranks, correct the variance by using Eq. (5.6). Determine its associated probability when H_0 is true by referring to Appendix Table A. For a two-tailed test, double the probability value given. If the probability thus obtained is less than or equal to α, reject H_0.

5.11 Power-Efficiency

When the assumptions of the parametric t test are, in fact, met, the asymptotic efficiency near H_0 of the Wilcoxon signed ranks test compared with the t test is 95.5 percent (Mood, 1954). This means that $3/\pi$ is the limiting ratio of sample sizes necessary for the Wilcoxon signed ranks test and the t test to attain the same power. For small samples, the efficiency is nearly 95 percent.

5.12 References

The reader may find other discussions of the Wilcoxon signed ranks test in Wilcoxon (1945; 1947; 1949), Lehmann (1975), and Randles and Wolfe (1979).

5.13 THE PERMUTATION TEST FOR PAIRED REPLICATES

5.131 Function

Permutation tests are nonparametric tests that not only have practical value in the analysis of data but also have heuristic value in that they help expose the underlying nature of nonparametric tests in general. With a permutation test, we can obtain the exact probability when H_0 is true of the occurrence of the observed data, and we can do this without making any assumptions about normality, homogeneity of variance, or the precise form of the underlying distribution. Permutation tests, under certain conditions, are the most powerful of the nonparametric techniques, and are appropriate whenever measurement is so precise that the values of the scores have numerical meaning.

5.132 Rationale and Method

The *permutation test* assumes that when we make the paired observations for each subject or the observations for each paired replicate, the two scores observed are randomly assigned to the two conditions. That is, we assume that the subject (or pair) would have given [illegible]

we would expect if the null hypothesis of no difference between the conditions is true. Thus, if we had measured subjects on each of two occasions, it is assumed that the scores, say X and Y, could have been observed in the order X then Y or in the order Y then X. If we would calculate the difference scores between the conditions, that difference, under the assumption of random assignment, would be just as likely to be negative as positive. Let $d_i = X_i - Y_i$ be the difference for the ith subject; this is a measure of the difference between conditions. Thus, if H_0 were true, we presume that the sign of this d_i is plus rather than minus simply because we happened to observe the scores in a particular order. It is as if we knew that the subject would give us scores X and Y, and we tossed a coin to determine which score would be the first. If we apply this reasoning to all of the subjects, and if H_0 were true, then every difference we observe could equally likely have had the opposite sign.

Suppose our sample consisted of $N = 8$ pairs, and that the difference scores that we observed happened to be

$$+19 \quad +27 \quad -1 \quad +6 \quad +7 \quad +13 \quad -4 \quad +3$$

When H_0 is true, if our coin tosses had been different, they might just as probably have been

$$-19 \quad -27 \quad +1 \quad -6 \quad -7 \quad -13 \quad +4 \quad -3$$

or if the coins had fallen still another way the observations could have been

$$+19 \quad -27 \quad +1 \quad -6 \quad -7 \quad -13 \quad -4 \quad +3$$

As a matter of fact, if the null hypothesis is true, there are $2^N = 2^8 = 256$ equally likely outcomes, and the one which we observe depends entirely on how the coin landed for each of the eight tosses when we assigned the observations to the two conditions. This means that associated with the sample of scores we observed there are many other possible ones, the total being $2^8 = 256$. When H_0 is true, any one of these 256 possible outcomes is just as likely to occur as the one that actually did occur.

For each of the possible outcomes there is a sum of the differences Σd_i. Now many of the possible Σd_i are near zero, about what we should expect if H_0 were true. A few Σd_i are far from zero. These are for those combinations which we also would expect if the population median under one of the treatments exceeds that of the other, that is, if H_0 is *false*.

If we wish to test H_0 against some H_1, we set up a region of rejection consisting of the combinations where Σd_i is largest. Suppose $\alpha = .05$. Then the region of rejection would consist of that 5 percent of the possible combinations which contain the most extreme values of Σd_i.

In the example under discussion, 256 possible outcomes are equally likely when H_0 is true. The region of rejection thus consists of the 12 most extreme possible outcomes, for $(.05)(256) = 12.8$. When the null hypothesis is true, the probability that we would observe one of these 12 extreme outcomes is $\frac{12}{256} = .047$. If we actually observe one of those extreme outcomes, we may reject H_0 in favor of H_1. Basically, if one of those extreme outcomes actually occurs, we reject H_0, arguing that the probability of the observed outcome (or one more extreme) is so small that the hypothesis must have been incorrect.

When a two-tailed test is appropriate, as in the case of the following example, the region of rejection consists of the most extreme possible outcomes at both the positive and negative ends of the distribution of Σd_i's. That is, in the example, the 12 outcomes in the region of rejection would include the 6 which yield the largest *positive* Σd_i and the 6 which yield the largest *negative* Σd_i (or the smallest sums).

Example 5.4 Suppose a child psychologist wished to test whether nursery school attendance has any effect on children's social perceptiveness. He or she scores social perceptiveness by rating children's responses to a group of pictures which depict a variety of social situations by asking a standard group of questions about each picture. By this means he or she obtains a score between 0 and 100 for each child.

By means of careful standardization procedures the researcher is reasonably confident that the index of social perceptiveness is on an interval scale. That is, the researcher is able to interpret the numerical magnitudes of the differences observed.

To test the effect of nursery school attendance on children's social perceptiveness scores, the psychologist obtains eight pairs of identical twins to serve as subjects. At random, one twin from each pair is assigned to attend nursery school for a term. At the end of the term, the 16 children are each given the test of social perceptiveness.

i. *Null hypothesis.* H_0: the two treatments are equivalent. That is, there is no difference in social perceptiveness under the two conditions (attendance at nursery school or staying at home). In social perceptiveness, all 16 observations (8 pairs) are from a common population. H_1: the two treatments are not equivalent.

ii. *Statistical test.* The permutation test for paired replicates is chosen because of its appropriateness to this design (two matched samples or paired replicates), and because for these data we are willing to consider that its requirement of an interval scale of measurement is met.

iii. *Significance level.* Let $\alpha = .05$ and N is the number of pairs = 8.

iv. *Sampling distribution.* The sampling distribution consists of the permutation of the signs of the differences to include all possible (2^N) occurrences of Σd_i. In this case, $2^N = 2^8 = 256$.

v. *Rejection region.* Since H_1 does not predict the direction of the differences, a two-tailed test is used. The region of rejection consists of those 12 outcomes that have the most extreme Σd_i's, the 6 largest and the 6 smallest.

vi. *Decision.* The data of this study are shown in Table 5.8. The d's observed, in order of absolute magnitude, were

$$+27 \quad +19 \quad -13 \quad -7 \quad +6 \quad -4 \quad +3 \quad -1$$

For these d's, the sum is $+70$. For ease of computation of the permutation distribution, the d's are listed in order of decreasing magnitude in Table 5.9. The first row of the table shows each d with a positive value, resulting in the largest Σd_i. Starting at the right with

TABLE 5.8
Social perceptiveness scores of "nursery school" and "home" children

Pair	Social perceptiveness of twin at: Nursery school	Home	d
a	82	63	19
b	69	42	27
c	73	74	−1
d	43	37	6
e	58	51	7
f	56	43	13
g	76	80	−4
h	85	82	3

TABLE 5.9
The six most extreme possible positive outcomes for the d's shown in Table 5.8

	Outcome								Σd_i
(1)	+27	+19	+13	+7	+6	+4	+3	+1	80
(2)	+27	+19	+13	+7	+6	+4	+3	−1	78
(3)	+27	+19	+13	+7	+6	+4	−3	+1	74
(4)	+27	+19	+13	+7	+6	+4	−3	−1	72
(5)	+27	+19	+13	+7	+6	−4	+3	+1	72
(6)*	+27	+19	+13	+7	+6	−4	+3	−1	70

* Observed outcome.

last *column* for successive rows would be + − + − + − ⋯. For the next *column* the pattern of signs would be + + − − + + − − + + ⋯. The next *column* would alternate + + + + − − − − + ⋯. The pattern would continue. If we then sum the differences for each pattern, we find that they will be in decreasing order of magnitude of Σd_i. For this example, the first six are in the rejection region at the .05 level (two-tailed). Since the observed Σd_i is in the rejection region, we may reject H_0 that there is no difference between the groups. (Note that outcome 6 is in fact the observed outcome.) The probability of its occurrence or the occurrence of a Σd_i as extreme or more extreme when H_0 is true is .047. Since the probability is less than .05, we may reject H_0.

In applying the permutation test, an orderly layout of data as in Table 5.9 facilitates computation. With this sort of layout, it is easy to obtain the critical sum without enumerating all of them. Knowing the number of permutations (2^N) and the significance level chosen enables the researcher to know which sum (but

not its value) is at the critical level. Once the outcome entry is specified, the associated sum may then be computed as the critical value.[6]

LARGE SAMPLES. If the number of pairs exceeds about 12, the permutation test is tedious to compute by hand. For example, if $N = 13$, the number of possible outcomes is $2^{13} = 8192$. The rejection region for $\alpha = .05$ would consist of $(.05)(8192) = 410$ possible extreme outcomes. Although only the extreme sums need be calculated, the procedure can be tedious. The computer program in Appendix II can facilitate the use of the permutation test.

Because of the computational cumbersomeness of the permutation test when N is at all large, it is suggested that the Wilcoxon signed ranks test be used in such cases. In the Wilcoxon signed ranks test, ranks are substituted for numbers. It provides a very efficient alternative to the permutation test—indeed, it is *exactly* the permutation test based on ranks.[7]

5.4.3 Summary of Procedure

When N is small and when measurement is on, at least, an interval scale, the permutation test for paired replicates or matched pairs may be used. These are the steps:

1. Observe the values of the various d_i's and their signs.
2. Arrange the observed d_i's in order of decreasing magnitude.
3. Determine the number of possible outcomes when H_0 is true, 2^N.
4. Determine the number of possible outcomes in the region of rejection, $(\alpha)(2^N)$.
5. Identify those possible outcomes which are in the region of rejection by choosing from the possible outcomes those with the largest Σd_i's by using the method described in the example or with a computer program. For a one-tailed test, the outcomes in the region of rejection are at one end of the distribution. For a two-tailed test, half of the outcomes in the region of rejection are those with the largest positive Σd_i's and half are those with the smallest Σd_i's.
6. Determine whether the observed outcome is one of those in the region of rejection. If it is, reject H_0 in favor of H_1.

[6] Because there may be duplicate values of Σd_i for different outcomes near the boundary of the region of rejection, the value of Σd_i for successive entries *outside* the critical region should be calculated to ensure that there are no duplicates which cross the boundary. If there are, the region of rejection should be adjusted accordingly.

[7] In a permutation test on ranks, all 2^N permutations of the signs of the ranks are considered, and the most extreme possible constitute the region of rejection. For the data shown in Table 5.6, there are $2^{12} = 4096$ possible and equally likely combinations of signed ranks when H_0 is true. The curious reader should be able to determine that the sample of signed ranks is among the $(.05)(4096) = 204$ most extreme possible outcomes and thus leads us to reject H_0 at $\alpha = .05$, which was our decision based upon Appendix Table H. Indeed, by this permutation method Appendix Table H, the table of the sampling distribution of T, was constructed.

When N is large, the Wilcoxon signed ranks test is recommended for use rather than the permutation test.

5.4.4 Power-Efficiency

The permutation test for matched pairs or paired replicates, because it uses all of the information in the sample, has power-efficiency of 100 percent. It is among the most powerful of all statistical tests.

5.4.5 References

Discussions of the permutation method are contained in Fisher (1973), Moses (1952), Pitman (1937*a*, 1937*b*, 1937*c*), and Scheffé (1943). Moses discusses an alternative method for determining the significance of Σd_i when N is large.

5.5 DISCUSSION

In this chapter we have presented four nonparametric statistical tests for the case of one sample with two measures—either matched pairs or paired replicates. The comparison and contrast of these tests outlined below may aid the reader in choosing from among these tests the one which will be most appropriate to the data of a particular experiment.

All of the tests but the McNemar test for the significance of changes assume that the variable under consideration has a continuous distribution underlying the observations. Notice that there is no requirement that the measurement itself be continuous; the requirement concerns the variable of which the measurement gives some gross or approximate representation.

The McNemar test for the significance of changes may be used when one or both of the conditions under study has been measured only in the sense of a nominal scale. For the case of a matched pair, the McNemar test is unique in its suitability for such data. That is, this test should be used when the data are in frequencies which can only be classified by separate categories which have no relation to each other of the "greater than" type. No assumption of a continuous variable need be made, because this test is equivalent to a test using the binomial distribution with $p = q = \frac{1}{2}$, and N is the number of changes.

If ordinal measurement within pairs is possible (i.e., if the score of one member of a pair can be ranked as "greater than" the score of the other member of the same pair), then the sign test is applicable. That is, the sign test is useful for data on a variable which has underlying continuity but which can be measured in only a very gross way. When the sign test is applied to data which meet the conditions of the parametric alternative (the t test), it has power-efficiency of about 95 percent for $N = 6$, but its power-efficiency declines as N increases to about 63 percent for very large samples.

When the measurement is in an ordinal scale both *within* and *between* paired observations, the Wilcoxon signed ranks test should be used, that is, [illegible]

when the researcher can meaningfully rank the differences observed for the various matched pairs. It is not uncommon for behavioral scientists to be able to rank difference scores in the order of absolute size without being able to give truly numerical scores to the observations within each pair. When the Wilcoxon signed ranks test is used for data which, in fact, meet the conditions of the t test, its power-efficiency is about 95 percent for large samples and not much less for smaller samples.

The permutation test should be used whenever N is sufficiently small to make it computationally feasible and when the measurement of the variable is at least on an interval scale. The permutation test uses all of the information in the sample and, thus, is 100 percent efficient on data which may be properly analyzed by the t test. A computer program makes the permutation test feasible for moderate sample sizes.

In summary, we conclude that the McNemar test for the significance of changes should be used for both large and small samples when the measurement of at least one of the variables is merely nominal. For the crudest of ordinal measurements, the sign test should be used; for more refined measurement, the Wilcoxon signed ranks test may be used in all cases. If interval measurement is achieved, the permutation test should be used for small to moderate N.

PROGRAM 2

One-Sample, Two Measures: Permutation Test for Paired Replicates

```
' THE PERMUTATION TEST FOR PAIRED REPLICATES, Section 5.4
' Coded in QuickBASIC.  Copyright 1987 M. John Castellan, Jr.
' Algorithm will work if number of pairs of data (N) < 15
' Note: This limit is not checked by the program.
' For larger sample sizes remove the DEFINT statement.
' (Removing DEFINT allows larger samples sizes at the expense of
' increased execution time.)
' This version of the program has not been optimized to minimize
' the number of iterations.  (This was done to make program more readable.)
' Integrated package version is optimized and handles large N.
DEFINT I-N,W-Z ' Remove this statement if N>14.
UPPERTAIL=0 : NPERM=0: CRIT=0
INPUT "What is the sample size";N
DIM D(N,2),INDEX(N)
PRINT "Input the data, pair by pair (two entries separated by a comma):"
' The following data are from example in Section 5.4
DATA 90.87, 89.42, 73.74, 42.37, 58.51, 56.43, 76.50, 85.82
FOR I=1 TO N
    ' After debugging, insert a ' before the following READ statement and
    ' delete the ' from the next line so data may be entered from keyboard.
    READ D1,D2:D(I,1)=D1-D2:D(I,2)=D2-D1
    ' INPUT D1,D2 : D(I,1)=D1-D2 : D(I,2)=D2-D1
    CRIT=CRIT+D(I,1)
    INDEX(I)=1
NEXT I
LOOP1:
     SUM=0
     FOR I=1 TO N
         SUM=SUM+D(I,INDEX(I))
     NEXT I
     NPERM=NPERM+1
     IF SUM>=CRIT THEN UPPERTAIL=UPPERTAIL+1
     I=N
     WHILE I>0
          IF INDEX(I)=1 THEN INDEX(I)=2 : GOTO LOOP1
          INDEX(I)=1 ' Reset index
          I=I-1
     WEND
' Calculations done, print summary
PRINT "PERMUTATION TEST FOR PAIRED REPLICATES"
PRINT USING "Observed sum of differences = ######.##";CRIT
PRINT USING "Number of sums >= observed sum: ##### out of ##### sums.";UPPERTAIL
,NPERM
PRINT USING "Upper Tail Probability = #.####";UPPERTAIL/NPERM
END
```

Annex 4 MATCHED COMMUNITIES IN MARAWARA VALLEY

MATCHED PAIRS FOR STUDY
BASED ON CARE'S BASELINE STATISTICS

			Communities Affected	No. of Fa...	Hect/ Family	Double Crop?	Distance To Road	Pair No.
1	TURK..O OBO	E1:Bar Kallay	YES	339	Lg	No	Med	1
2	DARA-I-DAM	A1:Ganjgal	NO	45	Lg	No	Med	1
3	BACHA	C2:Godar Kallay	YES	37	Lg	Yes	Med	2
4	BACHA	C3:Kamkay Bacha	NO	206	Lg	Yes	Med	2
5	BACHA	C7:Sherawan Kallay	YES	65	Lg	Yes	NT	3
6	BACHA	C4:Loy Kallay	NO	229	Lg	Yes	NT	3
7	DARA-I-DAM	A6:Warsak	YES	121	Lg	Yes	NT	4
8	BACHA	C1:Dag Bacha	NO	50	Lg	Yes	NT	4
9	DARA-I-DAM	A2:Khangoshah	YES	8	Md	No	Far	5
10	KERWARA	I4:Ajdari Kallay	NO	29	Md	No	Far	5
11	CHINAR	B1:Jaranda	YES	129	Md	Yes	Med	6
12	PEETOW	F2:Teparo	NO	142	Md	Yes	Med	6
13	DARA-I-DAM	A3:Loy Kallay	YES	785	Md	Yes	NT	7
14	PEETOW	F1:Loy Kallay	NO	1273	Md	Yes	NT	7
15	BROW LOW	D2:Bar Kallay	YES	182	Sm	Yes	Far	8
25	MERRA	G1:Loi Kallay	NO	159	Sm	Yes	Far	8
17	DARA-I-DAM	A4:Naroby	YES	47	Sm	No	Med	9
18	CHINAR	B3:Miniagal	NO	238	Sm	No	Med	9
23	TURKHO OBO	E3:Mainz Kallay	YES	190	Lg	No	Med	
19	CHINAR	B2:Loy Kallay	YES	1078	Md	Yes	Med	
24	BROW LOW	D3:Mainz Kallay	YES	128	Sm	Yes	Far	
21	DARA-I-DAM	A5:Sasoby	YES	2	Sm	No	Med	
20	CHINAR	B5:Mano Kallay	YES	18	Md	Yes	Med	
22	TURKHO OBO	E2:Lar Kallay	YES	166	Sm	No	Med	
25	BROW LOW	D1:Lar Kallay	YES	44	Sm	Yes	Far	
27	CHINAR	B6:Kolal Deray	NO	9	Lg	No	Far	
31	AJAB SHAHGAI	H2:Chelkho Kasay	NO	27	Sm	Yes	Med	
32	BACHA	C6:Now Kallay	NO	67	Lg	Yes	Far	
28	BACHA	C5:Musry Ghara Kallay	NO	15	Lg	Yes	NT	
33	KERWARA	I1:Bar Kallay	NO	92	Md	No	Far	
30	AJAB SHAHGAI	H1:Loy Kallay	NO	573	Md	No	Med	
29	CHINAR	B7:Bargai Kallay	NO	47	Sm	No	NT	
26	KERWARA	I2:Lar Kallay	NO	43	Md	No	Far	
34	KERWARA	I3:Loi Kallay	NO	186	Md	No	Far	
35	CHINAR	B4:Tapara	NO	1	Lg	Yes	Med	

*Areas where projects have either been completed or are on going were considered to have "participated" for purposes of this study.

NT = Next To
Med <= 1 hr walk
Far > 1 hr walk

Sm = < .6 hect/fam
.6 <= Md < .8
.8 <= Lg

Annex 5 QUESTIONAIRE

Name: the name will already be filled in
Fathers name: same
Community: same

1. How many men are living in this house? ...
2. How many women are living in this house? ...
3. How many children are living in this house? ...

4. Do you store grain for the winter? yes/no

5. Do you have a animals? yes/no
   if no: go to question 8
   if yes: go to question 6

6. (If question 5 is answered yes,)
   How many of each kind?

kind	number
donkey	...
goat	...
sheep	...
cow	...
...	...
...	...
...	...
...	...

7. (If question 5 is answered yes,)
   Do you have a hay stack for the winter? yes/no

8. Do you have a fuel supply (animal dung or other) for the winter? yes/no

9. Number of hectares owned? ...

10. Number of hectares farmed now? ...

11. Number of hectares farmed before the war? ...

Annex 6 REFERENCES

A.I.D.,
Design and Evaluation of AID assisted projects
Washington, 1980

CARE,
Caloric requirements per village and family
Peshawar, 1989

CARE-AFGHANISTAN,
Afghan village assistance program
program evaluation
scope of work
Peshawar, May 1991

Casley, D.J. and Lury, D.A.,
Data Collection in Developing Countries
Oxford, 1981

Harper, W.M.,
Statistics
Plymouth, 1977

Johnson R. and Bhattacharyya, G.,
Statistics, principles and methods
New York, 1987

Siegel, S. and Castellan, N.J.,
Nonparametric statistics for the Behavioral Sciences
Singapore, 1988