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THE PALLI CHIKITSAK PROGRAM OF BANGLADESH
AN ADDENDUM TO THE MAIN REPORT:
TECHNICAL ASSESSMENT OF CONSTRUCTION COMPONENT

NOVEMBER 1980

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SCOPE OF PROJECT

The Government of Bangladesh through the Ministry of Health is requesting assistance in the construction of hostel facilities for Palli Chikitsak trainees during their training tenure at the Thana Health Complexes. This concern was expressed by representatives of the Ministry of Health to members of the HSI field team involved in the Palli Chikitsak project. The reasons given for requesting hostel facilities are twofold:

1. To create an atmosphere for learning within the Thana Health Complexes by addressing the Palli Chikitsak trainees' personal, cultural, and environmental needs during the training period.

2. To eliminate conditions of overcrowding and excessive demand upon the environmental resources within the Thana Health Complexes.

Since cost is a major consideration recognized both by representatives of the Government of Bangladesh as well as representatives of USAID, the purpose of this addendum to the report entitled "The Palli Chikitsak Program of Bangladesh: A New Approach to the Delivery of Rural Health Care" is to clarify the scope of the construction component of the overall project. This is to be accomplished through the following tasks:

- Identifying key issues related to residential construction in Bangladesh

- Highlighting factors influencing the design of the hostels as well as the selection of materials

- Proposing design options for the hostels
- Providing financial estimates for their construction and maintenance
- Proposing future activities necessary prior to implementation of the construction component of the Palli Chikitsak program

PROJECT JUSTIFICATION

In recent experience with the Palli Chikitsak program, the subjects of adequate accommodations for the trainees and the creation of an atmosphere for learning became recurrent concerns.

Presently, eating, sleeping and study activities often occur within the same space. In many cases, this space is part of the Thana Health Complex originally intended for the use of patients. The use of sleeping, kitchen, and latrine facilities by Palli Chikitsak trainees often hampers the operation of the health complexes and restricts the admission of patients. In the Trainer Survey, conducted by the HSI field team, Thana Health Administrators were asked to list any problems that they found with the present program and to suggest possible means of improvement. Approximately forty percent of the administrators stated that the use of facilities by the trainees hindered the daily activities of the health complexes by overloading the available resources. It was suggested that separate hostel facilities, located near the Thana Health Complex buildings, would improve the program by allowing for the admission of more patients for practical observation since the demand on the Thana facilities by the trainees would be greatly reduced. The administrators also concurred that living facilities away from the patients would enhance the learning process by providing a more

comfortable environment for the Palli Chikitsak trainees. This was also viewed as a boon for the recruitment and retention of the trainees.

The Ministry of Health, through statements by the Minister and the Deputy Director of the Palli Chikitsak Program, has revealed to HSI that while the overcrowding of the Thana facilities used for the training program is tolerable over a short period, it would not be considered acceptable over the long run of the project. That is, once the project reaches its maintenance phase during which a constant number of Palli Chikitsak graduates are to be trained annually to meet program needs due to attrition, hostel accommodations for the trainees will become an essential part of the program. Ministry of Health representatives firmly support this belief.

Enrollment in the Palli Chikitsak program is for a period of one year during which the trainees are expected to stay in residence at the Thana Health Complexes. Since these centers were designed as patient care facilities, the influx of numerous Palli Chikitsak trainees was not anticipated during their design and planning. Consequently, the issue of living conditions has become such a great concern to those involved in the operation of this project.

The need for trainees' living accommodations has been identified and can be qualified. Since the hostels are part of the project maintenance phase, their principal function will be to house the trainees needed each year due to attrition within the program. This need can be estimated as

follows:

- With an annual attrition factor of .04 and an overall objective of maintaining the total number of active Palli Chikitsaks at 65,000, there will be a need for 2,600 graduate trainees starting practice every year after the program has reached the maintenance phase

- With a dropout rate of .08 per class, there will need to be 2,850 trainees admitted every year in order to achieve the desired number of graduates

- With a capability of 50 students per training center, 57 training centers are required on the long term basis for maintenance of the program at the desired level of 65,000 practicing Palli Chikitsak graduates

- Consequently, at each one of these 57 training centers, hostel accommodations are required for approximately 50 trainees. It is quite possible that there may be variation in this number

- Also, it should be expected that approximately 20 percent of these (about 10 trainees per center) will be women as this is one of the objectives of the overall program

The construction of hostels is viewed by the Government of Bangladesh as a fundamental support for the Palli Chikitsak program. The anticipated benefits are seen as contributing directly to the success of the program. More space and resources will be available for patient care. The creation of a more comfortable environment for learning can be expected to improve trainee satisfaction with the program while reducing obstacles to the learning process. A more empirical expression of the benefits of the

hostels should be found in increased recruitment and reduced attrition during training.

RESIDENTIAL CONSTRUCTION IN BANGLADESH

The typical housing available to most Bangladeshis affords neither adequate protection from the severe weather characteristic of the region nor from the unsanitary conditions which contribute to poor health. The most prevalent form of construction throughout the country is "kutcha", composed of bamboo, straw, or reed walls and roof with a mud or mat floor. While most common, kutcha is also the least durable form of construction in Bangladesh. Due to natural deterioration of materials, kutcha structures seldom endure longer than five years. This may be somewhat extended by extensive annual maintenance which includes replacement of those portions of the structure which have become damaged or deteriorated. However, over a five year period, maintenance often becomes as costly as replacement. It is not uncommon for kutcha structures to be completely destroyed or rendered uninhabitable during severe storms. During a single year, floods have destroyed as many as 500,000 houses and damaged 1.2 million others. Most of the units which were destroyed were of kutcha construction. Some regions such as the Bangladesh Delta Costal Strip, are prone to severe cyclones and the expectations for Kutcha construction are limited at best. Thus, it is important that kutcha construction be viewed in terms of temporary structures. Over a long term project, funding must be allocated regularly for their maintenance and replacement.

The principal advantage to kutcha construction is that the materials

involved are universally available throughout Bangladesh. Since construction materials can be found on or near virtually any site, availability and transportation are not problems as often they are with more sophisticated forms of construction. Also, many Bangladeshis are well acquainted with kutcha construction. Consequently, it is not difficult to find construction labor in most villages. Kutcha structures may also be constructed quickly without the need for specialized materials or skills. Even though they lack durability, kutcha structures possess a certain resilience in that they can always be repaired or replaced quickly.

Another form of construction in Bangladesh, though not nearly as common as kutcha, is "pucca". Pucca construction is comprised of stone, concrete, or baked brick. There are varying grades of pucca construction. Pure pucca construction consists of an entire structure of stone, brick, or concrete. Semi-pucca structures are those which mix pucca with other construction materials such as corrugated iron roofing. Pucca is more likely to be found in urban areas and is usually the chosen form of construction for most development programs.

In general the spectrum of construction costs range from kutcha as the lowest to pure pucca as the most expensive with a variety of mixed combinations of materials in between. It must be mentioned that there are a variety of other factors such as plumbing and electricity which greatly affect construction costs beyond the cost of the basic structure. Table I summarizes the relative proportions of construction as surveyed in Bangladesh in 1973.

TABLE I

SUMMARY OF RELATIVE PROPORTIONS OF CONSTRUCTION MATERIALS IN BANGLADESH (1973)

	PUCCA	KUTCHA	MIXED	OTHER	TOTAL
URBAN	22%	43%	29%	6%	100%
RURAL	2%	81%	16%	1%	100%
TOTAL	4%	77%	18%	1%	100%

The predominance of kutcha construction as illustrated by Table I is a powerful indicator of such factors as the availability, cultural acceptability, economic necessity, and the general familiarity with this method of construction.

Traditionally, housing has been the responsibility of the villagers themselves. Aside from some housing for its employees, government contributions were limited to the distribution of construction materials in the event of natural calamities such as floods or cyclones. International development agencies also tend to direct activities toward replacing damaged housing and developing more durable housing.

Because of the subsistence nature of the economy, most housing can be described in terms of the absolute minimum in shelter with less than adequate protection from severe weather. Sanitation is poor. Water and electricity are unavailable. Most houses have no immediate access to roads. Maintenance is a constant problem.

According to a 1960 census, more than one-half of the families live in a single room with an average of 3.2 individuals per room throughout the entire country. Thirty-one percent of the people lived five or more to a room; and 13 percent, 4 or more to a room.

This brief overview of the state of residential construction in Bangladesh serves to highlight some of the considerations involved in planning the hostel accommodations for the Palli Chikitsak trainees both

in terms of design expectations as well as the options for construction materials. By establishing the context for the hostels in terms of overall Bangladeshi construction, it becomes possible to delineate better the anticipated requirements for the hostels.

DESIGN ISSUES

In projects involving numerous similar functions at many sites, implementation can be facilitated greatly through the use of a prototypical design with standardized materials which may be replicated at all sites. This would serve both to control costs and to ensure uniform environmental standards. Considering that this report represents the first attempt to describe the Palli Chikitsak hostels in terms of physical space it is necessary first to discuss the expectations and constraints which will impact upon the design, the selection of materials, and project logistics. In essence, these are the design issues which will be pervasive throughout the entire construction component of the Palli Chikitsak program. Since the hostels are structures of relatively simple function, these issues can be discussed in detail in this report.

Although Thana Health Complexes have generally been established in rural areas, this alone serves as no guarantee that land will be readily available on the health center sites for construction of the hostels. Even when land is available it is likely to be of varying configurations or perhaps even broken into small parcels scattered throughout the health center site. Such site constraints may hinder the construction of one

single structure which would house all Palli Chikitsak trainees at an individual site. An alternative approach would be to inspect each site and produce a unique design for the facilities which meets the requirements of the particular site. The difficulty with this approach is that control is lost over the design process and cost accountability is greatly reduced. Thus, the most efficient approach would be a single design, though not a single structure, that would be universally applicable to all Thana Health Complex sites.

Given this assumption, some form of modular construction is worthy of consideration. That is, instead of a single large structure at each training site, the hostel function may be divided into smaller discrete modules, each housing a lesser number of trainees and together housing the total number of trainees on the health center site.

Aside from the more efficient use of land, many other arguments support the consideration of the modular approach to hostel construction. While pure shelter will acomplish the purpose of alleviating the conditions of overcrowding in the Thana Health Complexes, it will not necessarily create the atmosphere for learning that is desired to facilitate the Palli Chikitsak program in terms of ongoing operations and recruitment of new trainees. Aside from shelter, efforts must be made to address the trainees' personal, cultural and environmental needs during the training period.

Palli Chikitsak trainees have numerous personal, cultural, and

environmental needs. These can be expressed in terms of privacy, cultural requirements, space for activities, environmental safety and sanitation.

An important goal for the Palli Chikitsak program is to achieve an enrollment which is comprised approximately 20 percent by women. Cultural considerations mandate separate quarters for men and women. Aside from mere dormitory accommodations this cultural mandate extends to latrine and kitchen facilities. Within each hostel unit, some degree of personal amenity in terms of privacy and noise control should be provided. One way to accomplish this is to reduce the scale of the individual hostel structures. This can be done through a modular approach. While a great premium is placed on private personal space in Bangladesh, the personal environment for the trainee can be greatly enhanced by providing more hostels on a single site which accomodates 10 to 20 individuals rather than a single hostel for all 50 trainees. The smaller groupings of trainees would be better able to address cultural considerations while eliminating excessive distractions and creating a more intimate environment for education. Other design considerations which support a modular design are presented as follows:

Assuming that the hostels are likely to be of kutcha construction, safety factors are of paramount importance. Since fire is an ever present hazard with this form of construction, groupings of individuals should be sufficiently small so as to enable quick evacuation from the structure without panic in the event of an emergency.

Sanitation may be enhanced and the spread of infectious diseases may

be reduced through smaller groupings of trainees. Considering the climate of the region, ventilation is essential. Since the hostels are unlikely to have electricity, adequate natural lighting must be available.

Although current estimates call for approximately 50 Palli Chikitsak trainees at each of the designated Thana Health Centers, in practice, this number may be subject to variation. This may be due to an under or over demand for a particular center or a change in the overall program attrition and dropout rates which were used to estimate the need for the hostels. The hostel facilities should possess the flexibility to be added or subtracted in reasonable increments so as to reflect changes in program demand over time.

Since the hostels will be subject to a continuing replacement program, the design of facilities should permit a phased approach toward replacement. That is, accommodations for all Palli Chikitsak trainees on a given site should not be replaced at the same time. Individual units may be replaced routinely on a staggered basis leaving an adequate amount of housing at any given time.

Given these design considerations, a modular approach is recommended for consideration in the design of the hostels. Each module would provide at least minimum shelter requirements with the possibility of added environmental amenities which should be reviewed in preparation for the implementation phase of this project.

Since the intention of the Palli Chikitsak program is to train medical

practitioners who will return to their native villages upon completion of training, representatives of the Ministry of Health voiced concern to the HSI field team that the hostels should aesthetically reflect housing typically found in rural villages. This can be directly intepreted as a desire for kutcha construction.

As previously mentioned, kutcha is the most prevalent and least expensive form of construction in Bangladesh. Its major drawback is in its relatively short useful life and its lack of resistence to extreme weather conditions. Pucca is much more permanent and durable, however, it is also much more expensive.

The cost difference between pure kutcha and pure pucca construction is significant. Assuming costs for the basic structure (excluding furnishings, water, sanitary, and kitchen facilities) would reflect the scope of the construction component of the Palli Chikitsak project, this difference can be vast indeed. Basic kutcha construction costs approximately $2.80 per square foot whereas a totally pucca structure would cost about four times as much or $11.80 per square foot. Various forms of mixed construction will range in costs between these values. For instance, if a pucca structure uses a corrugated iron roof rather than one of concrete, the costs may be reduced by about 10 percent, whereas a kutcha building with a concrete floor instead of the typical mud or mat floor would increase in cost by as much as 75 percent.

In the preparation of this report many documents were reviewed and

many individuals employed by agencies and organizations involved in international development were consulted. There was some variation in the construction costs which were discussed as representative of the current situation in Bangladesh. For planning purposes, the values used in this report tend to be quite conservative. That is, they tend to reflect the higher construction costs as stated by various technical experts. These values also include materials, general as well as supervisory labor as required on site. Costs associated with general project administration are omitted from this report.

In making the selection of the appropriate construction material all of the characteristics of the materials must be taken under consideration as well as the issues related to procurement and logistics.

In a country such as Bangladesh with limited resources and transportation options, availability of materials must be carefully reviewed. Kutcha is readily available throughout the country. Pucca would require cement which must be imported and is usually subject to supply shortages. Even assuming an adequate supply of off site materials such as cement, construction activities are closely linked to the ability to transport the materials to the construction site. This can be a great obstacle to pucca construction in rural areas.

Another logistic issue is the availability of labor on the construction sites. For a building project of the scope of the Palli Chikitsak hostel facilities, a project manager/supervisor is required to oversee construction

activities at each site. Assuming kutcha construction, the availability of individuals skilled in this form of construction should prove to be no problem. In fact, such an individual would probably only require a manual on construction as technical support for construction. Since pucca construction requires a greater level of skill, difficulties may be encountered in finding enough skilled laborers at every site.

As a final comment on mixed construction. Most of the experts consulted in the preparation of this report concurred that there was little advantage to the mixing of kutcha and pucca construction. Many saw this combination merely as a grouping of the disadvantages of both construction modes. Specifically, they cited the poor durability characteristics of kutcha being combined with the logistical problems associated with pucca as the only outcome of mixing these two construction types. The only mixed type that seems practical would be a classic pucca building with some other material such as a metal roof.

So far, the hostels have been discussed exclusive of support facilities as well as procurement at the building site. Support functions in this case concern mainly kitchen and latrine facilities. It may be possible to use the existing kitchens at some of the Thana Health Complexes while constructing new kitchen outbuildings at others. This is a decision that will need to be made as specific sites are considered. It is assumed that sufficient latrines will need to be provided for all of the hostels. Assuming that each hostel complex for 50 persons requires two latrines for men and one for women, the cost of these may be estimated at roughly $500 for all three.

Typically, the latrine would be of corrugated iron construction with an expected useful life of up to five years.

Also, the availability of land is an issue which must be resolved during the planning of this project. While the construction values used in this report consider the cost of site preparation, presently there is no means by which to estimate the cost of site acquisition. If the Government of Bangladesh will donate the land, there will be no cost. If, however, land must be purchased, this cost may be profound.

PROPOSED DESIGN OPTIONS

Based upon the issues previously identified in this report, two conceptual designs are proposed for consideration. These make use of the modular concept and differ mainly in the configuration of the floor plan. Each conceptual plan may be expanded to house from 10 to 20 Palli Chikitsak trainees.

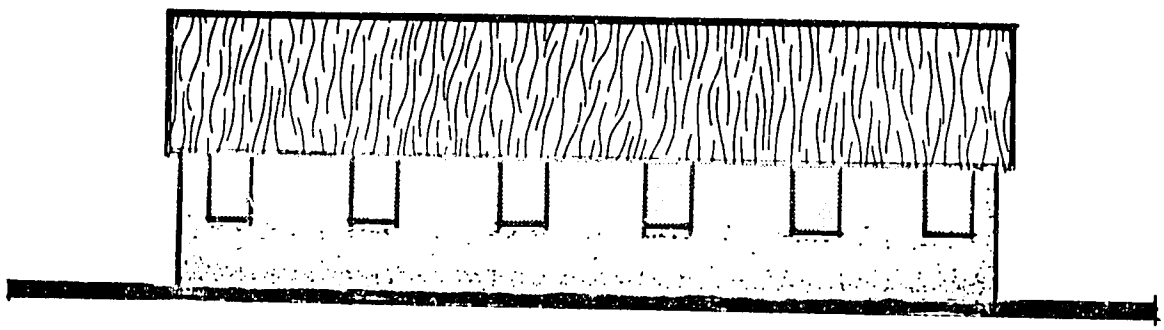
OPTION # 1

Option 1 provides the minimum in acceptable shelter. The only function planned for this structure would be sleeping. Some storage space is available between the beds. This option assumes that study facilities would be available elsewhere within the Thana Health Complexes. With this option approximately 54 square feet of floor area are required for each trainee. These structures can be modified to accommodate from 10 to 20 trainees by extending dimension "B" as indicated on the floor plan. For 10 trainees, this dimension is about 33 feet; for 20 trainees it becomes 63 feet.

OPTION # 2

Option 2 is a staggered rectangular unit which will accommodate either 10 beds with 2 study/dining spaces or 12 beds. Each bed has adjacent space for storage of personal belongings. Adjacent to each bed also is a window to provide adequate light and ventilation. Since it is highly unlikely

OPTION 1



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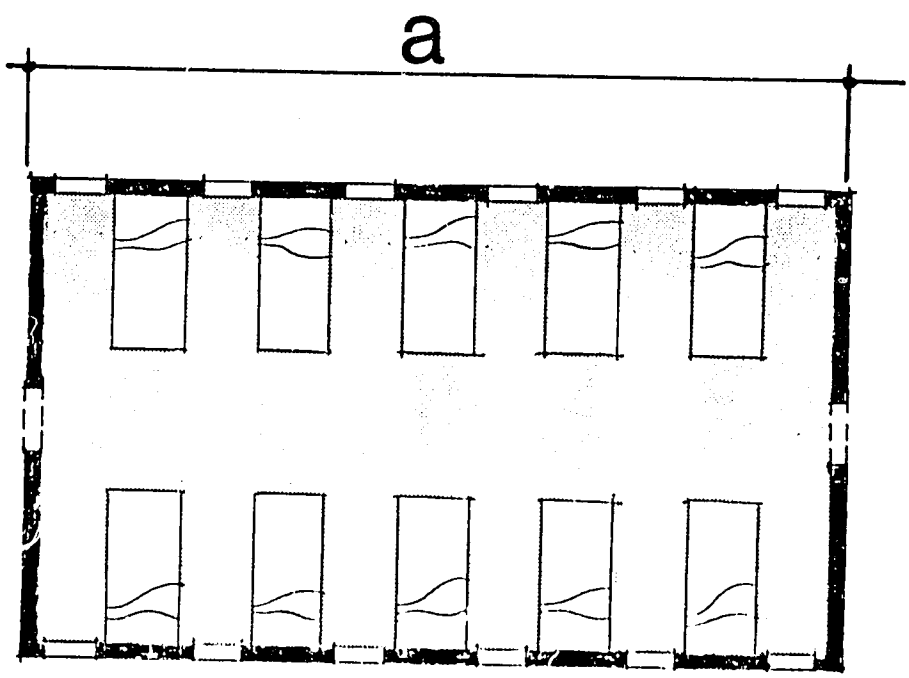

floor plan

Thana Health Center Hostels
BANGLADESH

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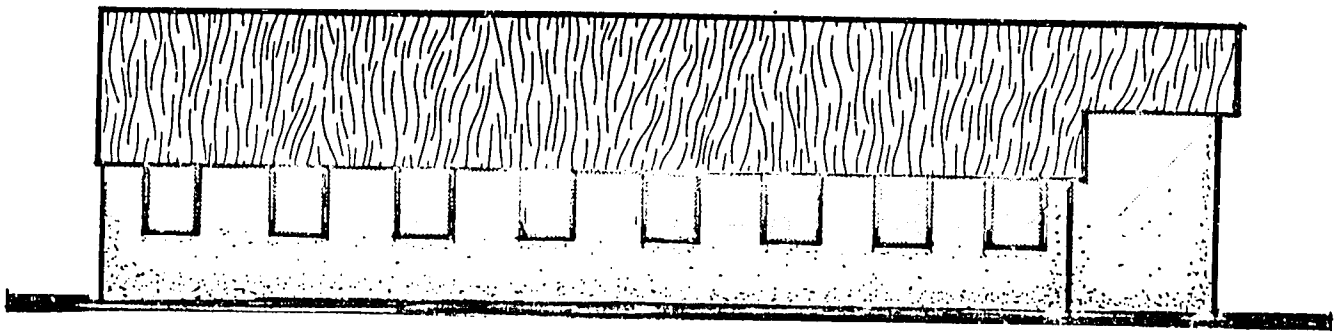
OPTION 2



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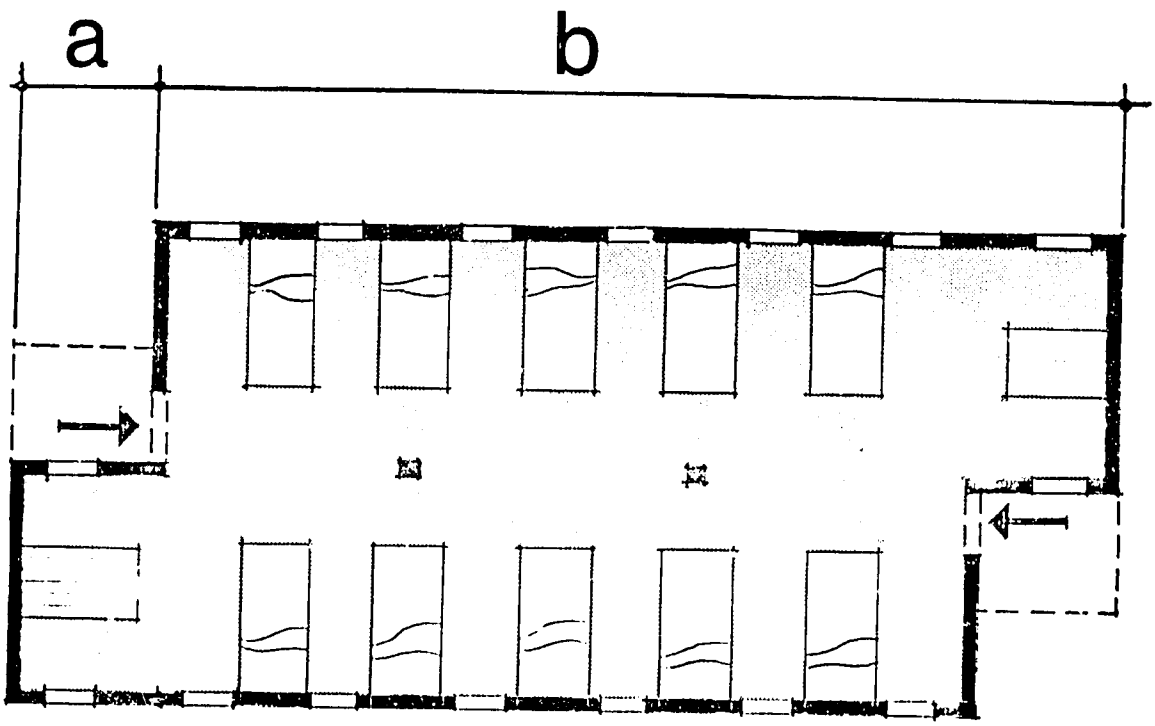

floor plan

Thana Health Center Hostels
BANGLADESH

that electricity will be available within the hostels, the study areas have windows opening on two sides to make the most use of available sunlight.

There are many possibilities for this option. Dimensions "A" and "B" as indicated on the floor plan may be doubled to increase the capacity from 10 to 20 trainees. For the 10 student plan dimension "A" measures 6 feet and dimension "B" measures 33 feet. For increased capacity these values may be increased while retaining the basic configuration. A structure for 10 students has a gross floor area of 700 square feet. This equals 70 feet per student. A discussion of each of these options in both pucca and kutcha construction follows.

FINANCIAL CONSIDERATIONS

By allocating 54 square feet per trainee, Option 1 requires a total of 2,700 gross square feet of floor area per training site. Since Option 2 allocates a greater amount of space to each trainee (70 gross square feet per trainee), the total floor area at a single training site becomes 3,500 square feet. Table II summarizes the expected construction cost per training site for both design options using either kutcha or pucca construction.

TABLE II

TOTAL CONSTRUCTION COSTS FOR OPTIONS 1 AND 2 FOR KUTCHA AND PUCCA CONSTRUCTIONS (IN 1981 US DOLLARS)

KUTCHA CONSTRUCTION

	Cost per Gross Square Foot	Gross Square Footage	Total Cost
Option 1	$2.80	2,700	$7,600
Option 2	$2.80	3,500	$9,800

PUCCA CONSTRUCTION

	Cost per Gross Square Foot	Gross Square Footage	Total Cost
Option 1	$11.20	2,700	$30,240
Option 2	$11.20	3,500	$39,200

Onto each of these options an additional cost of $500 should be added to cover the construction of three latrines at each site. While the values used in this estimate do consider site preparation, they do not include site acquisition. Other costs not included in this estimate are well facilities and furnishings.

For the 57 training sites, the costs for Option 1 range from $461,700 for kutcha construction to $1,752,180 for pucca. Similarly, Option 2 costs range from $587,100 to $2,262,900.

Since the hostels will become part of the maintenance phase of the Palli Chikitsak program, it is important to view these costs in terms of annual expenditures.

Kutcha construction has an expected life of 5 years. Also about 10 percent of the replacement cost should be allocated annually for routine maintenance and repair. After 5 years the structure should be replaced completely. The maintenance factor used in this report represents a best estimate based on data from previous projects conducted in Bangladesh.

Pucca construction has a much longer expected life. However, this can be subject to much variation depending upon the quality of the initial materials. Life estimates for a structure of pucca construction range from 10 to 20 years. For purposes of this report, the conservative value of 10 years has been selected. Additionally, pucca buildings require annual maintenance which equals about 3 percent of the replacement of the

structure.

Table III summarizes the expected annual costs for both options as constructed in either kutcha or pucca.

ACTIVITIES PRIOR TO IMPLEMENTATION

This report serves principally to identify the scope of the construction component of the Palli Chikitsak program in Bangladesh. Background information on the project has been provided, the project has been quantified, various design issues have been discussed, two design options have been proposed, and preliminary cost estimates have been made. The context has been established for the next series of activities prior to implementation. These activities are outlined as follows:

1. Evaluation of the material presented in this report by representatives of USAID and the Government of Bangladesh. Decisions must be made on the design for the hostels, the selection of materials, the acquisition of sites, and the provision of furnishings.

2. Development of a master plan for project implementation, identifying the specific sites for the hostel development.

3. Development of detailed construction plans and/or a construction manual for the hostel facilities.

4. Development of a logistics plan for staffing and procurement of materials. This should also include a project timetable.

5. Development of a finalized project budget.

TABLE III

ANNUAL RECURRENT COSTS FOR MAINTENANCE AND REPLACEMENT OF HOSTELS (IN 1981 US DOLLARS)

Construction Type	Construction Costs	Expected Life	Maintenance	Annual Cost*
KUTCHA				
Option 1	$461,700	5 years	$46,000	$132,340
Option 2	$587,100	5 years	$58,000	$175,400
PUCCA				
Option 1	$1,752,180	10 years	$50,000	$225,200
Option 2	$2,262,900	10 years	$65,000	$286,290

* Annual cost is computed as construction cost/expected life plus maintenance

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