



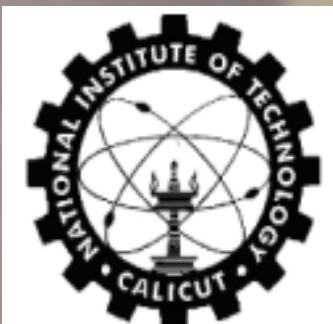
# DEVELOPING APPROPRIATE HOUSE DESIGNS FOR TRIBAL COMMUNITIES IN WAYANAD, KERALA

Department of Architecture and Planning ,  
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**Project Team:**

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# Introduction

- **Post flood damages on the housing and associated infrastructure in Kerala has called for disaster resilient eco-friendly housing reconstruction approaches.**
- Govt follows conventional designs by Life mission for rebuilding efforts.
- Vulnerable sections like tribes lack technical knowledge to customize the design based on their cultural or socio economic characteristics.
- **Geographically Wayanad, is one of the highly vulnerable districts in Kerala. Moreover, the districts also has the highest share in the adivasi population (about 38%).**
- In the wake of the post flood damages in Wayanad, it has been realised that the **future shelter redevelopment in the district , especially the housing for tribal community need to be given due consideration through evolving appropriate design solutions meeting their socio economic conditions as well as physical vulnerability.**
- In this background, the **current research project attempts to evolve disaster resilient sustainable housing design options customized for tribal communities, through a comprehensive participation of the community during various stages of the design process.**
- **The participatory design process customized for evolving appropriate housing solutions specifically for the tribal community would help to ensure community inclusion in planning and implementing housing styles appropriate to the community context.**
- By executing this bottom-up approach for planning and designing housing options the tribal community would be able to acquire necessary knowledge and skills to perform the shelter construction on their own.

## AIM

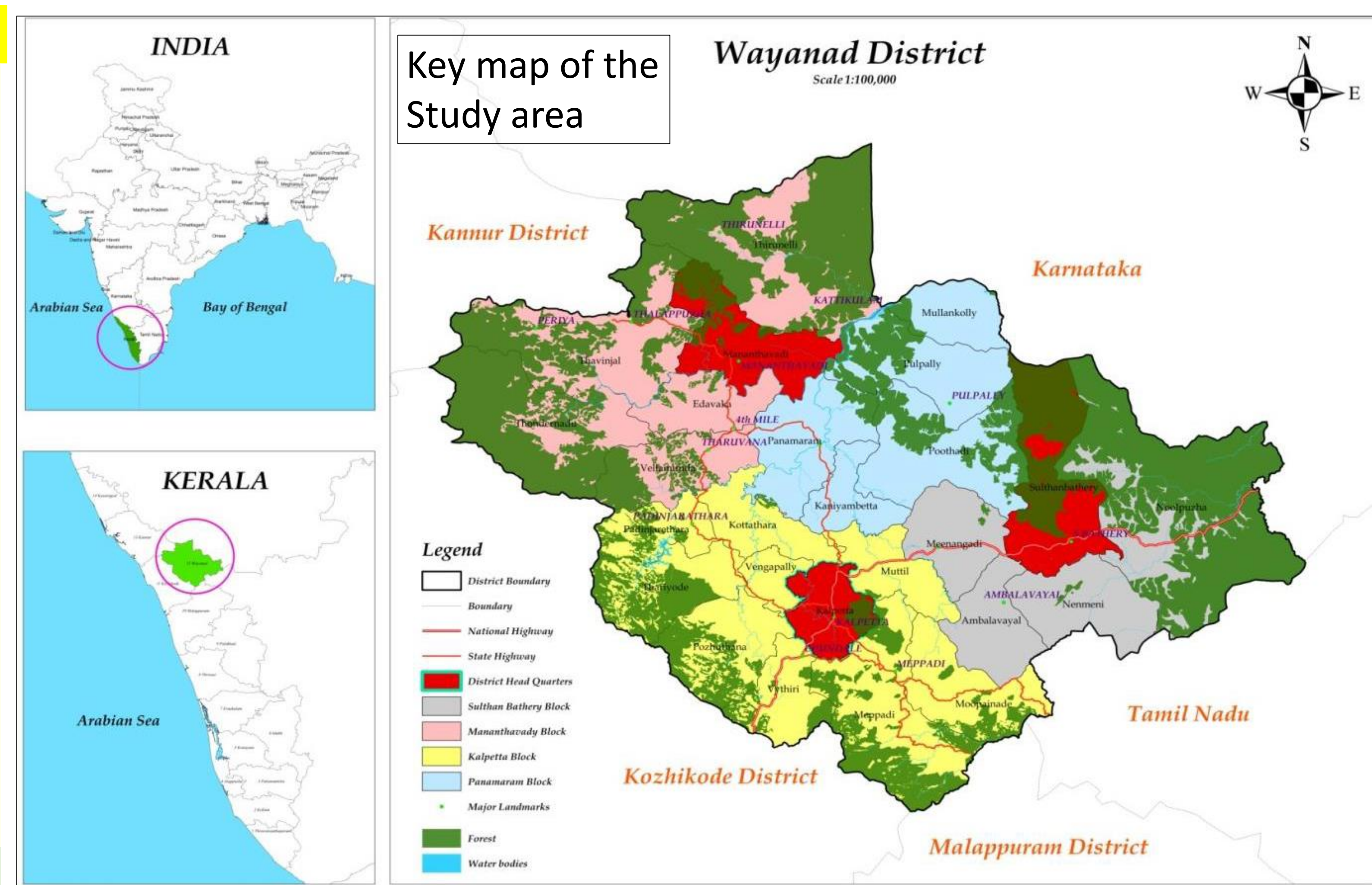
This research is aimed to develop a participatory design process as a standardized approach for shelter planning and design for tribal community and to develop appropriate housing options following participatory approach specifically for the tribal communities of Wayanad District

## OBJECTIVES

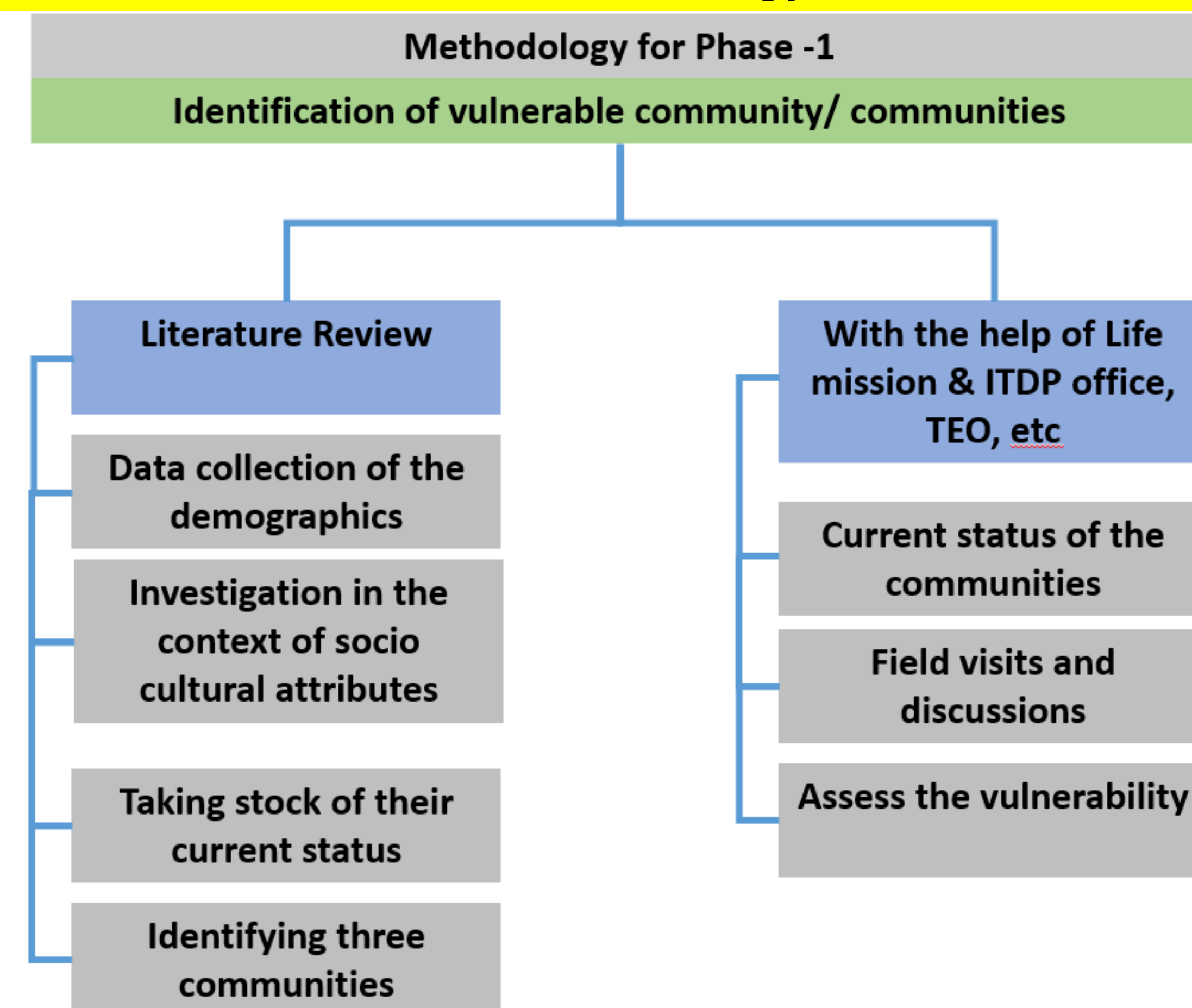
1. To identify the critical issues and concerns of Tribal community in providing sustainable housing solutions
2. To evolve and implement a participatory planning and design process as a universal approach for shelter development in tribal areas
3. To develop disaster resilient sustainable housing solutions for the tribal community
4. To develop guidelines for cluster planning of housing units in tribal settlements.

## PHASING OF THE PROJECT

- **Phase 1-** Identification of vulnerable community in need of appropriate housing solutions
- **Phase 2-** Documentation of indigenous housing styles of the tribal community
- **Phase 3-** Developing participatory design approach
- **Phase 4-** Executing the participatory design process to understand the socio economic status and cultural identity as well as the housing need of the community
- **Phase 5-** Documentation of existing housing typologies for the targeted communities
- **Phase 6:** Presenting the initial housing solutions satisfying the community characteristics and housing requirements
- **Phase 7-** Developing the final housing solutions appropriate to the community contexts minimizing the physical vulnerability



## Methodology



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# Methodology

## Methodology for Phase -2

### Documentation of indigenous housing styles of tribal community

#### Study of the existing scenario of tribal housing

Visiting the existing houses of the communities

Study and document the typology and architecture plans

Understand the lifestyle, and the other user behavior with respect to spaces

Document the construction style and building materials

Evaluate the disaster resilience of the structures

#### Documentation

Documentation of the architectural plan of the existing

## Methodology for Phase -5

### Documentation of existing housing typologies for the targeted communities

#### Study of the existing housing facilities

Visiting the existing houses of the communities

Study and document the typology and architecture plans

Understand the lifestyle, and the other user behavior with respect to spaces

Document the construction style and building materials

Evaluate the disaster resilience of the structures

#### Collecting user experience/inputs from users

Collecting data through questionnaires and interviews

Making a list of requirements from the user perspective

Comparative analysis of indigenous houses vs Govt. Houses

## Methodology for Phase -3

### Developing the participatory design Approach

#### Stages

Key informant consultation

Consultation with households

Community consultation and appraisal

## Methodology for Phase -4

### Executing the participatory design process

#### Participatory interaction - 1

To understand the socio economic status and cultural identity

To understand the housing need of the community

#### Design – First stage

Preliminary design

Discussions with officials and representatives of the communities

## Methodology for Phase -6

### Preparing initial housing solutions satisfying the community characteristics and housing requirements

#### Architectural work

Preparation of floor plans and other detailed drawings

Selection of materials

Inputs from structural consultancy

Material palette and check for disaster resilience & nbsp;

#### On-Site verification

Field visits to verify the adaptability of designs

Revisions if needed

## Methodology for Phase -7

### Developing the final housing solutions appropriate to the community context minimising the physical vulnerability

#### Final drawings and report

Preparation of the final drawings with specifications

Documentation of cost estimation

Submission of the report

Act  
Go to



# Phase I: Identification of vulnerable community/communities

## Criteria 1: Community characteristics

### Adiya Community

- Believed to be slaves to the local landlords and had bonded labour to their families.
- They lived in groups called “kunt” and their household units were known as “kulu”.
- Most of the members worked as agricultural laborers.
- Adiyas used to live in thatched and mud walled houses with a single hall and few provisions for kitchen and living.
- There were no signs of any bathrooms or toilet usage.
- Currently the community lives in brick (or) laterite walled thatched, Brick or laterite walled tiled, and small concrete houses.

### Paniya Community

- The original inhabitants of wayanad and numerically the largest tribal community in the district (46% of the total tribal population).
- originally labourers, and were sold as bonded labour along with plantations.
- Their huts were constructed with thatched roofs and mud plastered walls.

## Criteria 2: Population distribution of tribal community

- The Major Tribes in the District are Paniyan, Kurichachan/Kurichian, Kurumans/ Mullu Kuruman/ Mulla Kuruman/Mala Kuruman, Kattunayakan and Adiyans.
- Kattunaika, Adiya and Paniya tribes have the highest number of settlements in the district.

### Block wise SC / ST Colonies and number of families

Sl. No	Name of Block	No of ST colonies	No of families	ST Population
1	Vythiri	425	6846	29217
2	<b>Mananthavady</b>	<b>614</b>	<b>10289</b>	<b>45122</b>
3	<b>Panamaram</b>	<b>550</b>	<b>8730</b>	<b>37158</b>
4	<b>Sulthanbathery</b>	<b>535</b>	<b>9543</b>	<b>38434</b>
5	Kalpetta	43	727	2959
	District Total	2167	36135	152890

Source: District Census Handbook, 2011

### Villages according to the proportion of ST population to the total population range

#### Name of Taluk: Mananthavady

Range of ST population	Location code number	Name of village
21 – 30	627295	Payyampilly
21 – 30	627298	Periya
21 – 30	627299	Thondernad
21 – 30	627303	Cherukottur
21 – 30	627304	Panamaram
21 – 30	627305	Anchukunnu
31 – 40	627294	Thissilery
51 - 75	627293	Thirunelly

Source: District Census Handbook, 2011

### Population details of Scheduled Tribes

State/ District / Taluk	% of ST Population
Kerala State	1.5
Wayanad District	18.5
Mananthavady Taluk	21.6
Sulthanbathery Taluk	19.3
Vythiri Taluk	14.6

Source: Census data 2011

### Facts identified :

- 1 Poothadi panchayat in Sulthanbathery Taluk & Thirunelli Panchayat in Mananthavady Taluk have highest number of tribal settlements belonging to Kattunaika community. (77 settlements in Poothadi and 71 in Thirunelli)
- 2 Panamaram village in Mananthavady Taluk has the highest number (126 settlements) of Paniya community colonies followed by Noolppuzha village (112 settlements) in Sulthanbathery Taluk
- 3 Thirunelli and Mananthavady village panchayaths as well as Padinjarethara in Vythiri Taluk is found to be having higher number of Adiya Tribal colonies when compared to other villages in various taluks. (75,55 and 60 settlements respectively)

## Criteria 3 :Impact due the flooding and landslide 2018

- Study conducted by IIA → houses with area under 500 sq. ft was most affected , mostly owned by the tribal people.
- 50% of the flood affected houses were recently built ones.
- Panamaram and Mananthavady-highest number of Kachcha houses, mostly in flood plain which makes them highly prone to floods.
- Panamaram village → highest number of flood affected residential as well as institutional and public buildings.
- most of the affected buildings are within the flood plain zone.

### No of affected buildings in various Panchayaths

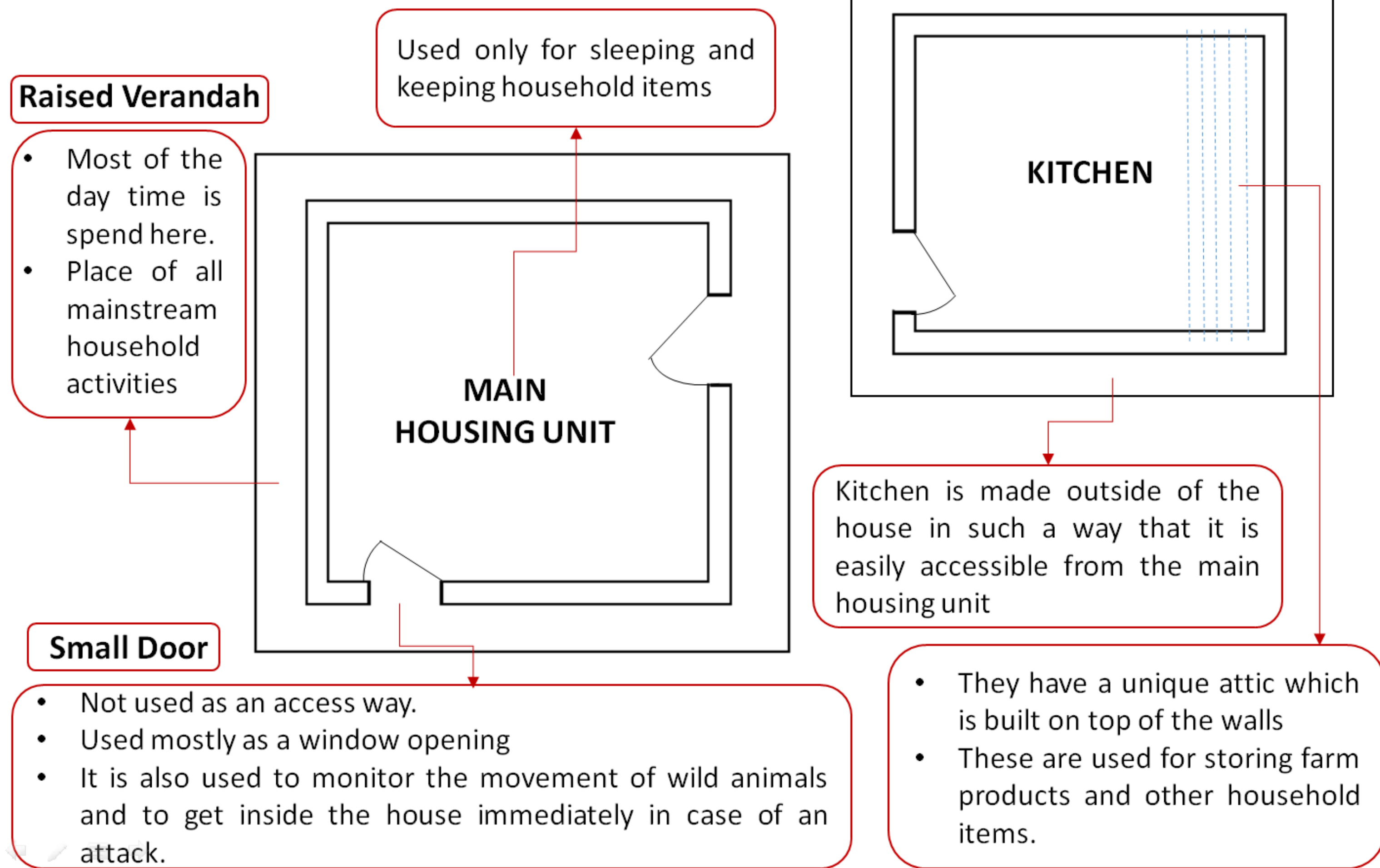
LSGD	Commercial	Institutional	Public	Residential
Ambalavayal				68
Edavaka	18	2	4	408
Kalpetta	4	3	3	524
Kaniyambetta			2	29
Kottathara	41	4	11	380
<b>Mananthavady</b>	<b>39</b>	<b>5</b>	<b>16</b>	<b>799</b>
Meenangadi	1			124
Meppadi	2			91
Mullankolli	1			51
Muttill		1		178
Nenmeni				8
Noolpuzha				49
Padinjarethara	8	2	6	343
<b>Panamaram</b>	<b>25</b>	<b>10</b>	<b>16</b>	<b>1000</b>
Poothadi				47
Pozhuthana	1		5	201
Pulpally	2			34
Sulthanbathery				23
Thariyod	2	1	3	232
Thavinjal	4	1	4	296
Thirunelli	2			126
Thodernadu	1			99
Vellamunda	5	2	5	158
Vengappalli	8	2	7	170
Vythiri	6	3		211
<b>Total</b>	<b>170</b>	<b>36</b>	<b>82</b>	<b>5672</b>

Source: Rebuild wayanad report, IIA

**Communities identified - Paniya Community in Mananthavady or Sulthanbathery Taluk, Adiya Community in Mananthavady Taluk ,Vythiri Taluk & Kattunaika Community Sulthanbathery / Mananthavady**



## General Layout



## Materials and methods of construction

### Materials

- Locally available materials like blackwood, bamboo, soil, valavari grass, wild twigs, rice straw, reeds, etc. are used for the construction.
- A special type of bamboo known locally as "kallanmula" is used for walls and roof frames. This bamboo is larger in diameter and is denser.
- They are cut in the right time ("pakkam"), and then soaked in water for a month for seasoning.
- Naturally available colors from soil, leaves, firewood, clay, etc were used for coloring



Locally made Bricks



Bamboo Ridge and rafters



Wall constructed in two stages



Sloping Roof

### Methods

#### Bricks

- Bricks are locally made from clay using wooden moulds
- The walls are usually 20- 25 cm thick, which helps in load bearing.
- The walls are left to dry before roof construction.
- The walls are then plastered, which is very important as it protects the mud walls from direct exposures to atmospheric changes.
- The walls are also naturally colored and decorated using hand patterns.

#### Roof

- roof is constructed using bamboo.
- The ridges, rafters and purlins all are made from bamboo.
- The roof is then thatched using rice straw, mountain grass, coconut leaves, ragi husk, etc. according to the availability.
- These days the roof structure is covered using tarpaulin.

#### Foundation

- Foundation is created above Earth surface in two layers to avoid erosion.
- The lower layer is 20 – 30cm high and is beaten up thoroughly and compacted.
- Upper layer is also made similarly by beating mud for a height of 60 cm.
- Walls are built load bearing using sun dried bricks, mud mortar as well as a cob.

#### Floor

- floors are also plastered using cow dung, rice husk ash and sand in 3 to 4 layers
- Doors are made by weaving split bamboo pieces across frames made of bamboo.





# Phase II: Documentation of indigenous housing styles of the tribal community



Hand drawn wall decoration pattern

Wall plastered with natural color

Roofing Materials

## Swaminathan foundation housing project

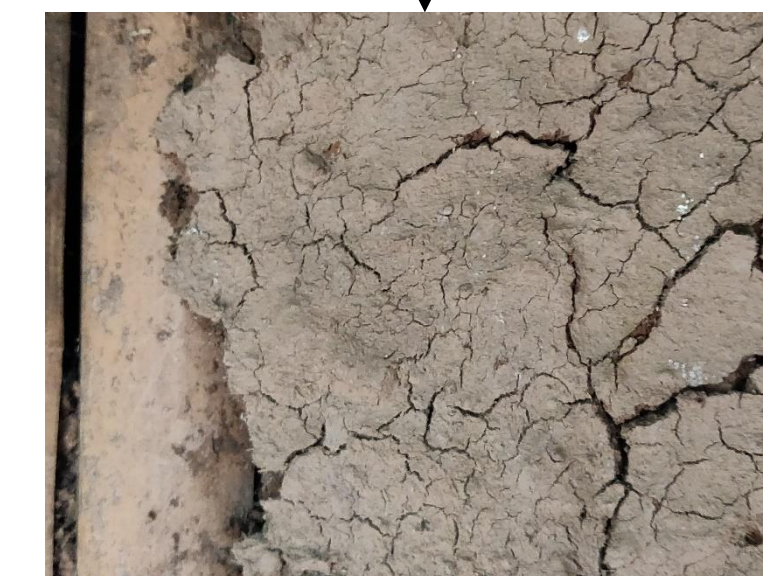
- The M.S. Swaminathan Research Foundation has built some houses post flood in the year 2007, in the **Kairali tribal colony of muppainad panchayath.**
- The houses, each of **357 sq ft area**, were constructed at a cost of Rs.4.24 lakh.
- Locally available mud was the major material used in the construction.
- These houses were built based on **sustainable housing concept.**
- Rammed earth construction** technology was used for the basement and foundation and cob construction for the walls.
- Hard wood** was used for the construction of **windows and doors.**
- Matured coconut palms were used as raptors.
- The houses were plastered with different colour mud available in the area
- Its roofing frame was done using wood** and was covered using **manglore tiles.**
- Local people were trained for the same** and was involved in the construction of these houses.

### Issues

- These houses are an example that proves that mud housing is not a sustainable solution for housing.
- This is mainly due to the fact that **mud gets easily disintegrated when exposed to continuous rain and other atmospheric changes.**
- Also **the knowledge transfer of these type of housing is very difficult** and is almost impossible since the new generation prefers to educate themselves and get more secure jobs.
- Maintaining these houses is also a tedious task**, which is not possible because of lesser time available to the working age people in the house.
- The houses are already deteriorating with sagging roofs, disintegrating plaster, cracks, etc.**



Cracks on mud walls



Tilted wall



Cracks at the top of wall



Damages on the foundation

## Sustainability aspects of traditional tribal housing

- Use of locally available materials and local skills** for the construction of traditional houses makes it sustainable.
- This **eliminates the need of external assistance** for maintenance and repair of the housing unit.
- Limited use of main housing unit** (i.e only for sleeping and storage), results in very low usage of energy.
- The thick mud walls of these houses **regulates the temperature within the house** and always keeps it in a moderate level.
- Thick walls and lesser openings** also protects the interior walls from direct exposure to atmospheric conditions.
- The roof is also made in such an angle that rain is kept away from the walls.

## Critical concerns of traditional Tribal housing

- Raw materials used( soil and clay) becomes **highly vulnerable when exposed to water.**
- Mud has low tensile strength** and develops cracks easily.
- Compressive strength of the wall reduces with time** thus affecting strength and stability of the super structure.
- Roof materials also becomes highly vulnerable after exposure to rain.**
- Walls are damp** due to soaking of water.
- There are molds on the walls** due to moisture which affects the health of the dwellers and also the aesthetic beauty of the house.
- Moreover these houses **require regular up-keeping and maintenance.**
- Lesser number of openings** result in inadequate air circulation and lighting.
- In short it is realised during the study that the tribal community generally aspire to live in housing units made of modern building materials mainly due to disadvantages as highlighted.



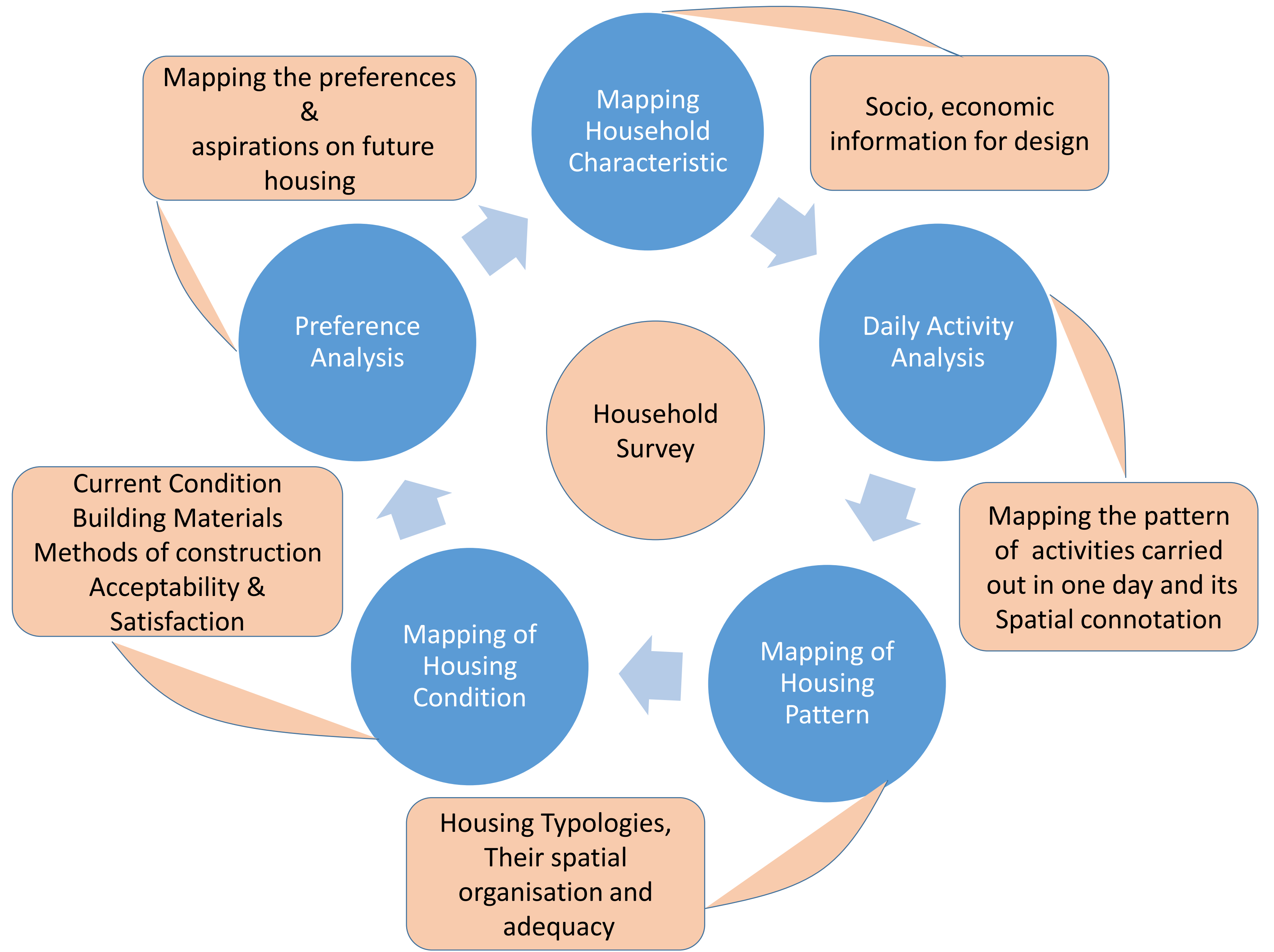
# Phase III: Developing participatory design approach

**Definition**  
 “process by which people are enabled to become actively and genuinely involved in defining the issues of concern to them, in making decisions about factors that affect their lives, in formulating and implementing policies, in planning, developing and delivering services and in taking action to achieve change’ (WHO, 2002)”

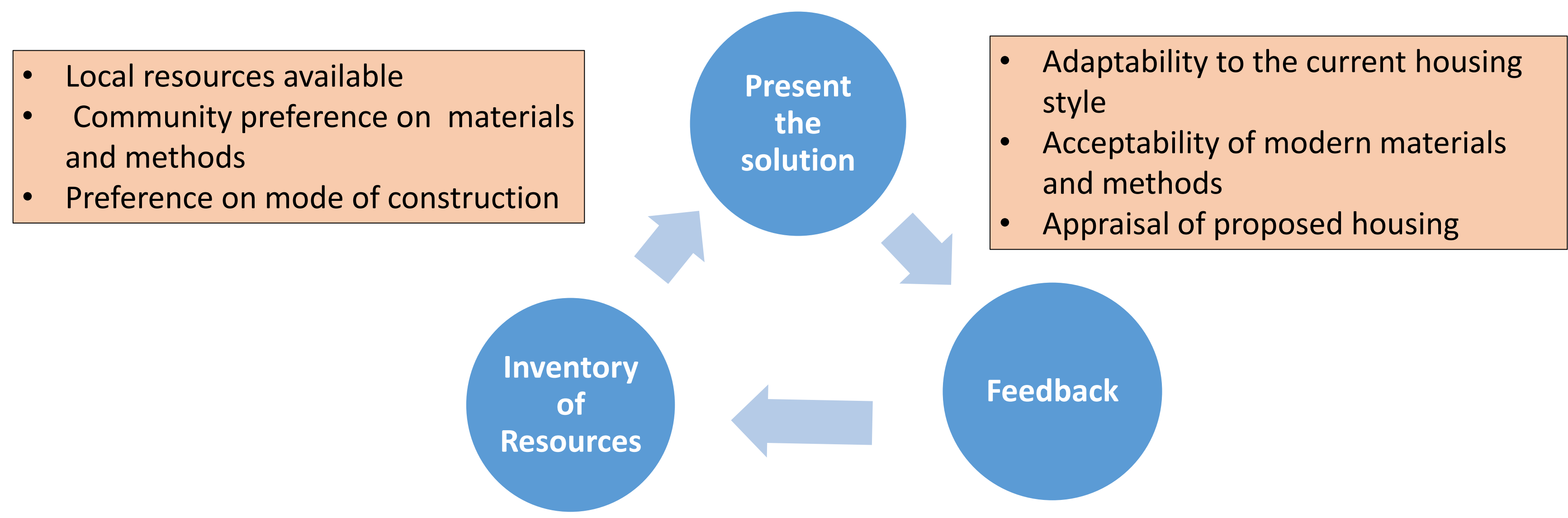
- Steps for implementing**
- assessment of current social, economical and environmental reality.
  - determination of community needs through close consultation.
  - audit of available resources, skills and capacities.
  - identifications issues and concerns

- Methodology**
- Semi structured interviews
  - Household survey using Structured questionnaire
  - Community Group Presentations
  - Consultation with Community liaison groups

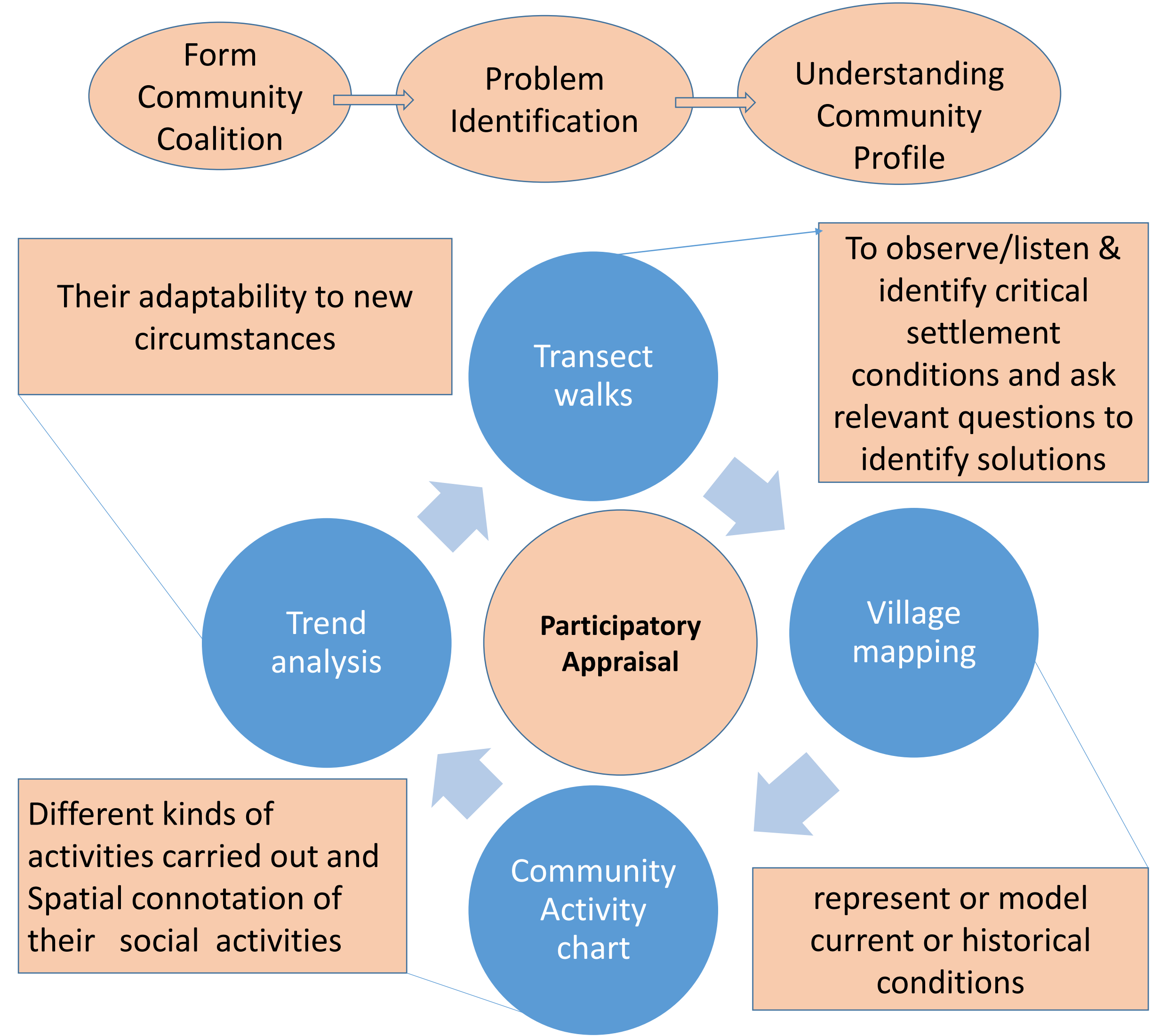
## Stage II: Consultation with Household through structured questionnaire survey



## Stage III: Consultation with Household through structured questionnaire survey



## Stage I: Key informant consultation





# Phase IV: Executing the participatory design process

## Initial site exploration

### Observations: Transect walk

Housing pattern | Extensions |  
Incomplete construction

→Housing pattern  
→Repairs & Maintenance  
→Kitchen spaces & Utility  
→Damages

Change in  
lifestyle



**Adiya Community (Chaligadha Tribal Settlement , Mananthavadi)**

**Stage 1: Key Informant consultation**

**PANIYA TRIBAL COMMUNITY - Basthipoyil Panamaram**

- Settlement falls under village Payyampally, near Mananthavadi Taluk, in wayanad district.
- The settlement is more than 80 years old and has a current population of 197 people in 52 families in 43 houses.
- average household size of the settlement is 5.
- Majority of the members are engaged in agricultural labour in nearby farms and fields.
- Majority of the houses in the settlement are semi- Pucca houses.
- nearest Anganwadi is 1.5km away, School is 2.5km away, and the nearest college is at Mananthavady which is 12km away.
- Nearest PHC is 2.5km away (Kurukkanmoola) and the nearest Taluk Hospital is 12 km away (Mananthavady).
- The community has two public wells which act as their source of drinking source.
- There are no community facilities such as community meeting place, playground available.
- Unlike most of the other tribal settlement, there is no temple or any religious buildings found in the settlements.
- The settlement is easily accessible from the Chaligadha – Kuruvadweep road.
- The location is highly vulnerable to flooding or low lying inundation.



**Housing Typology Trend**



**Infrastructure Availability**

- Payyampally Village, Mananthavadi Taluk
- More than 80 years of existence
- Water Supply – three community well  
Jalanidhi water supply connection available
- All houses are electrified
- No Playground/ play area within community
- Aganwadi – Kolathara settlement – 1 km away
- School – 1 to 4 – Alternative school @ kolathara  
5 to 8 – UP School 3 Km away (Gotrasaradhi available)  
High School – Panamaram 5 km away  
College – Mananthavady – 10km away

**Site plan of the settlement and general features**



**Change in lifestyle**

Agricultural labours → Farmers

Recognized the importance of education

Conscious about health – Regular vaccination & Hospital visits

Katcha House → Pucca House

No religious spaces within the community

Open to Change



- Payyampally Village Mananthavadi Taluk
- walking distance (800m) from Chalighadha – Kuruvadweep road.
- More than 80 years of existence



Stage 1: Key Informant consultation

Kattunaika Community (Vattapady Tribal Settlement , Sulthan Bathery)

Traditional Techniques



- Used for temporary solutions
- Additional living spaces
- Storage of wood or other goods
- Community prefer large open spaces which act as living space during day

- The community is located in a small village called Irulam , 3km from mananthavady town.
- There are sacred groves in the centre / origin of the community.
- The settlement is distributed in the radial pattern.
- There are 25 houses in the colony.
- They also have a community centre at the origin of the settlement.
- The approach to the settlement is by a narrow road that I approximately 2.2m wide which is paved using interlocking tiles.
- The inner roads are unpaved and unfinished .
- Individual units are approached by muddy footpaths varying in size.
- There are mainly three shrines, and two are situated deep with the forest.
- There is no well defined pattern of houses due to the terrain.
- Most of them does not have a patta to their land, but has a right to possess the land.
- Main cultivation of the community is coffee.
- For room partitions and openings temporary materials.

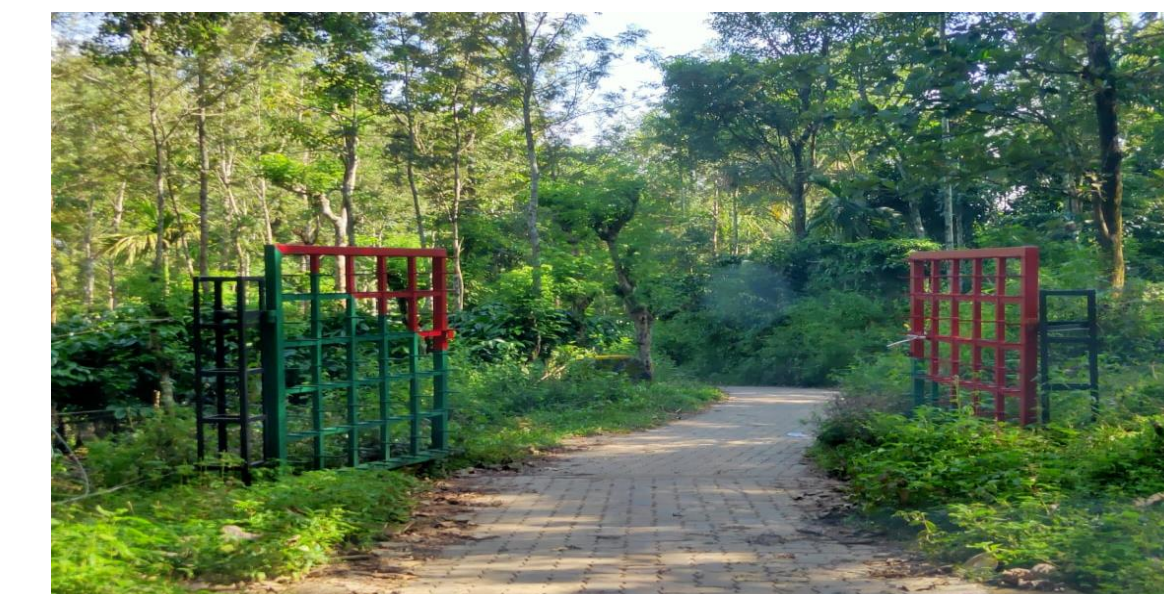
Common spaces



Community Centre

Seating in front of the community centre

Sacred grove



- The road to the settlement is paved with interlocking tiles.
- Inner roads are incomplete cement roads.
- The roads to the homes are muddy roads.

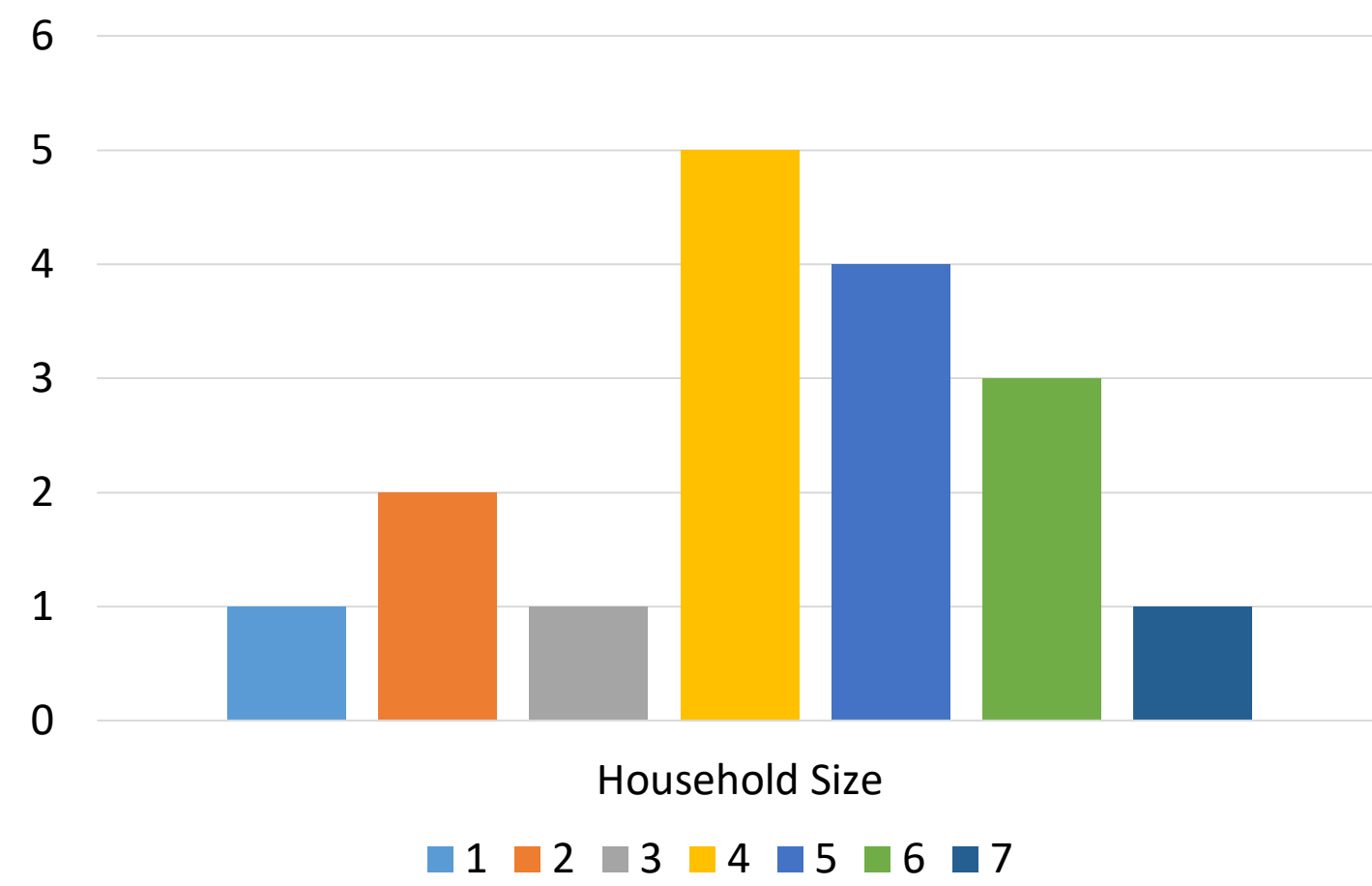


Adiya Community at Challigadha, Payyampalli Village

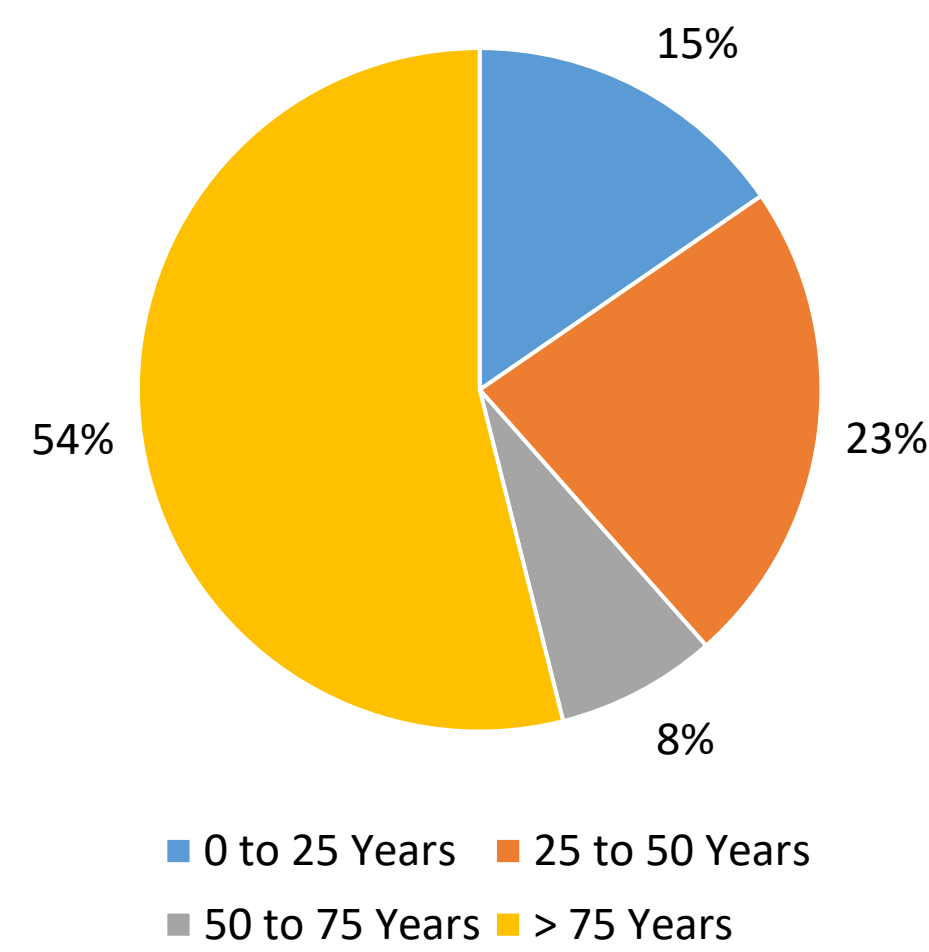
Housing Characteristics

Socio Economic Characteristics

Household size Distribution



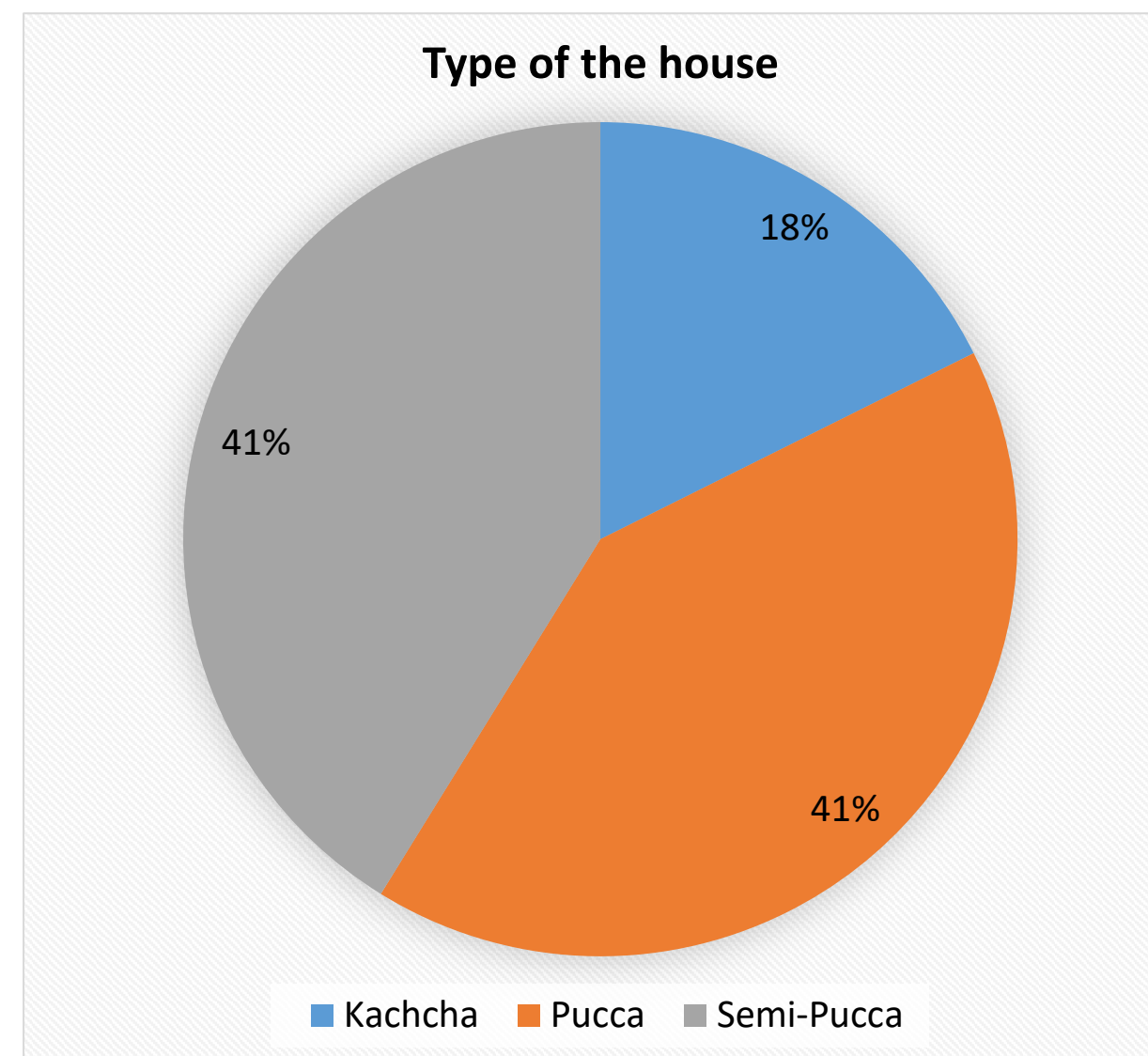
Length of Occupancy



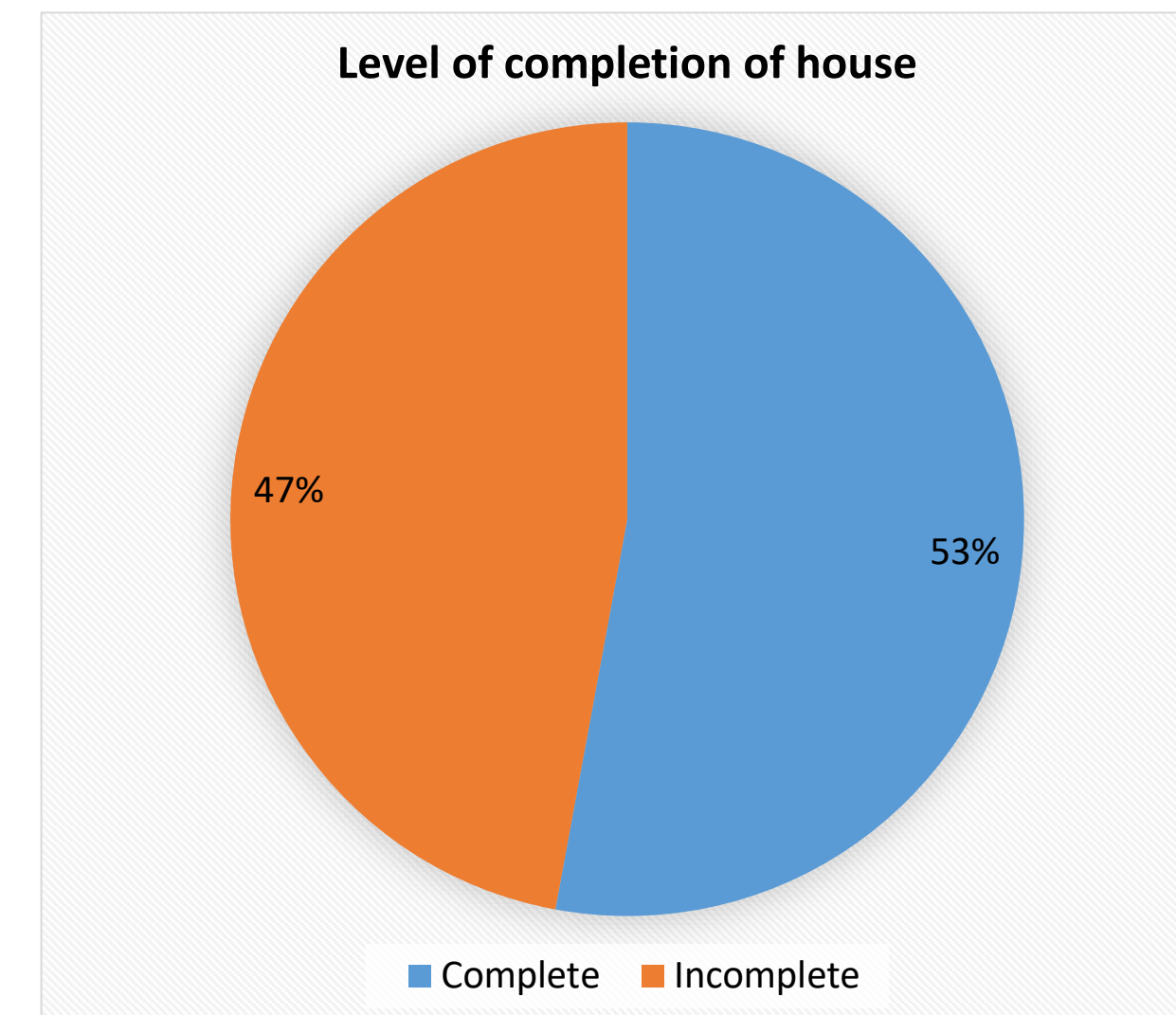
Family composition

Aged couple living alone (age > 55 years) /Couples beyond reproductive age	Couples with children in the age group of 0 to 6	Couples with School going children (age 7 - 15)	Couples with mature Children
3	1	5	8

Type of the house



Level of completion of house



HIGHLIGHTS

- 71 % of the community have a household size ranging from 4 to 6.
- Length of occupancy of more than 50% of the families is greater than 75 years.
- Average daily income per person in the community is Rs. 375
- Higher percentage of the family with growing or matured children



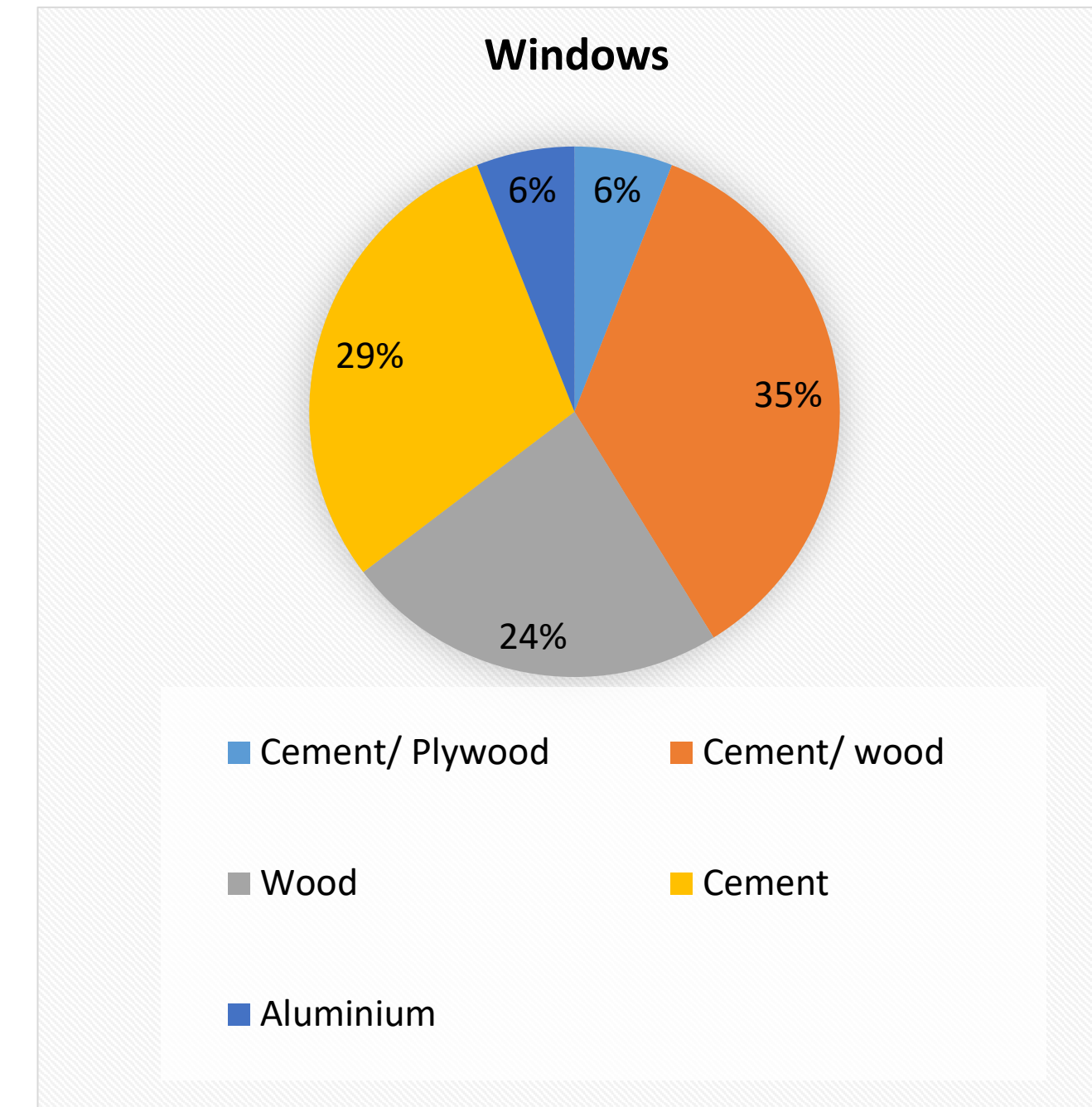
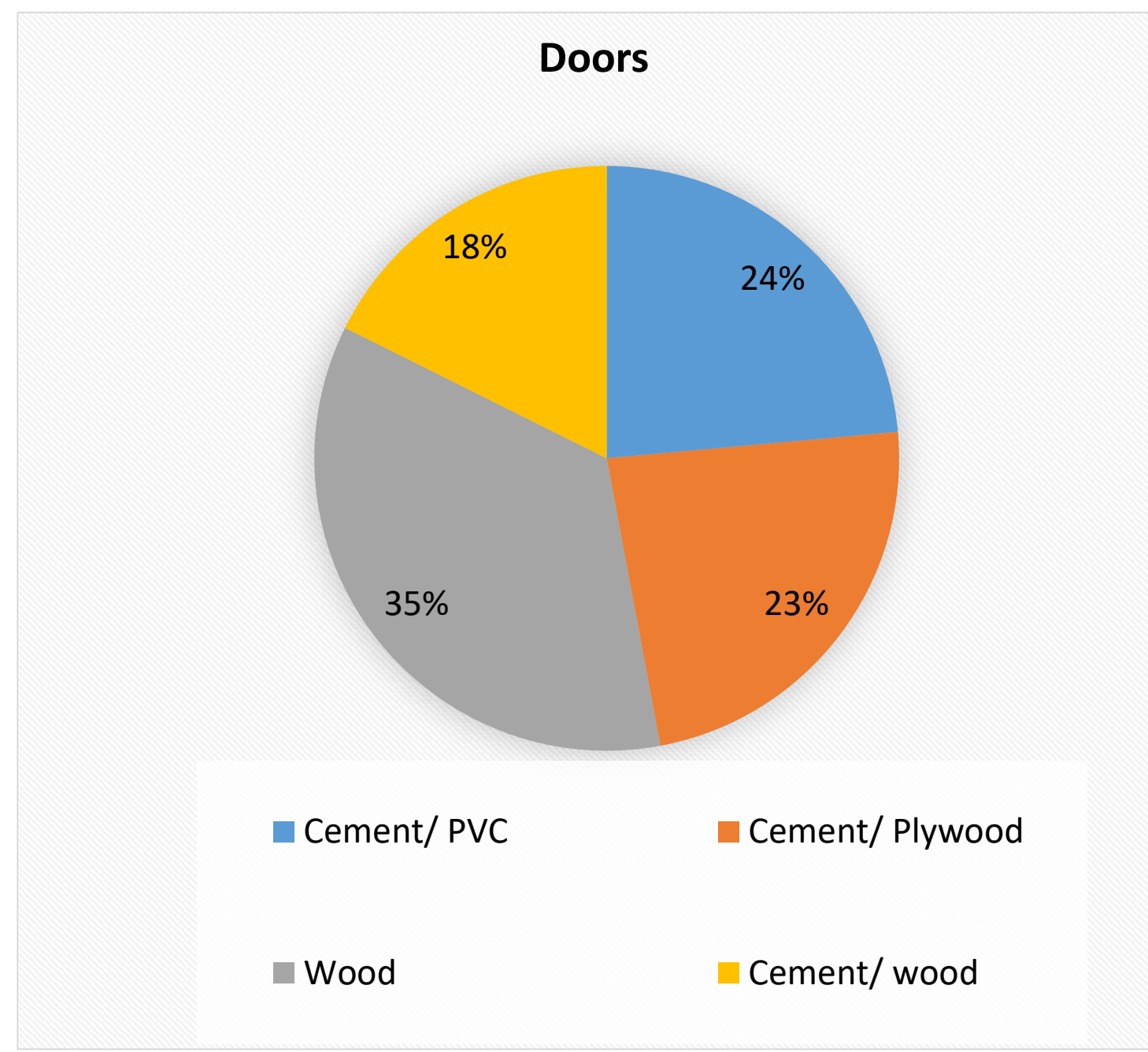
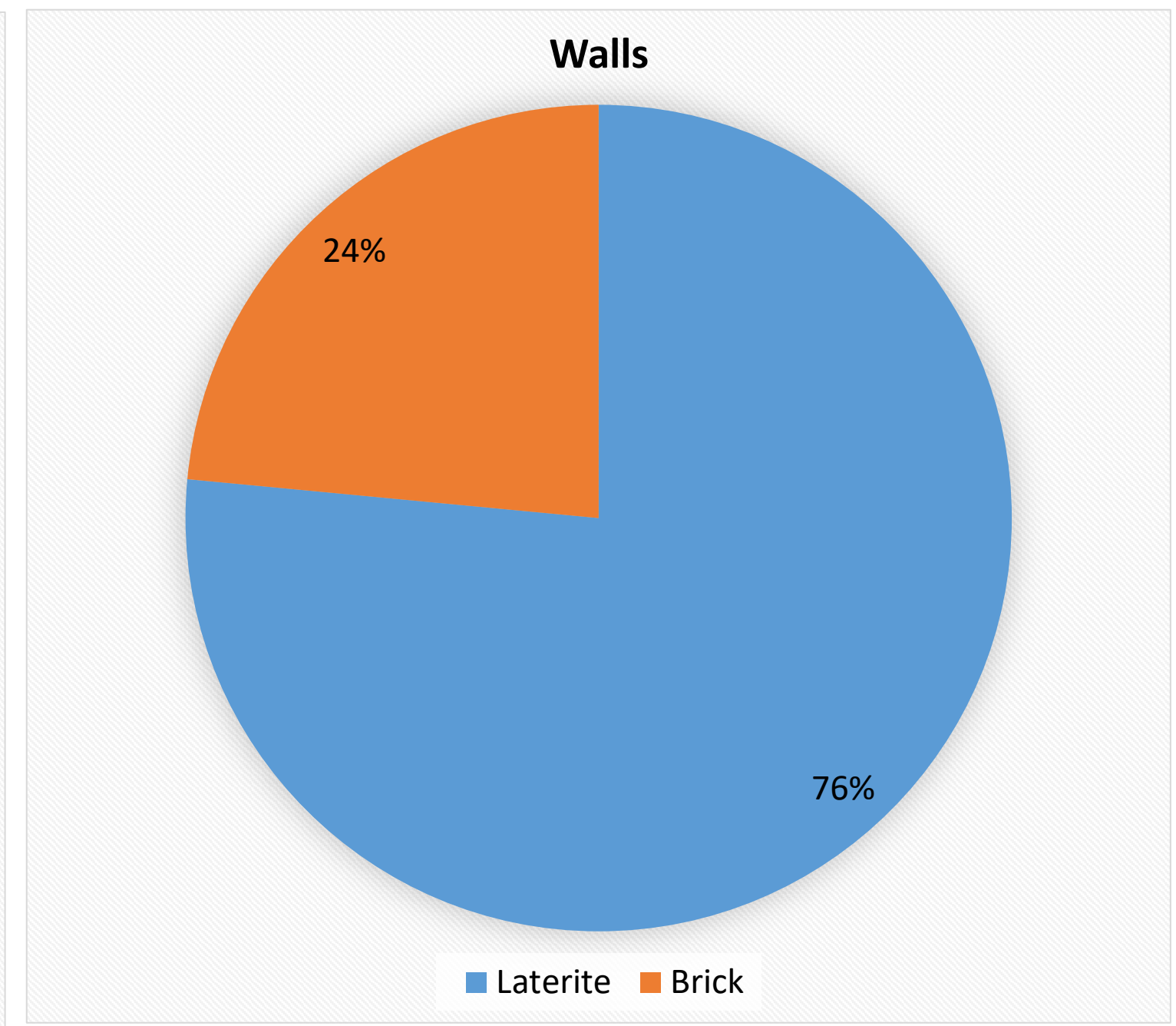
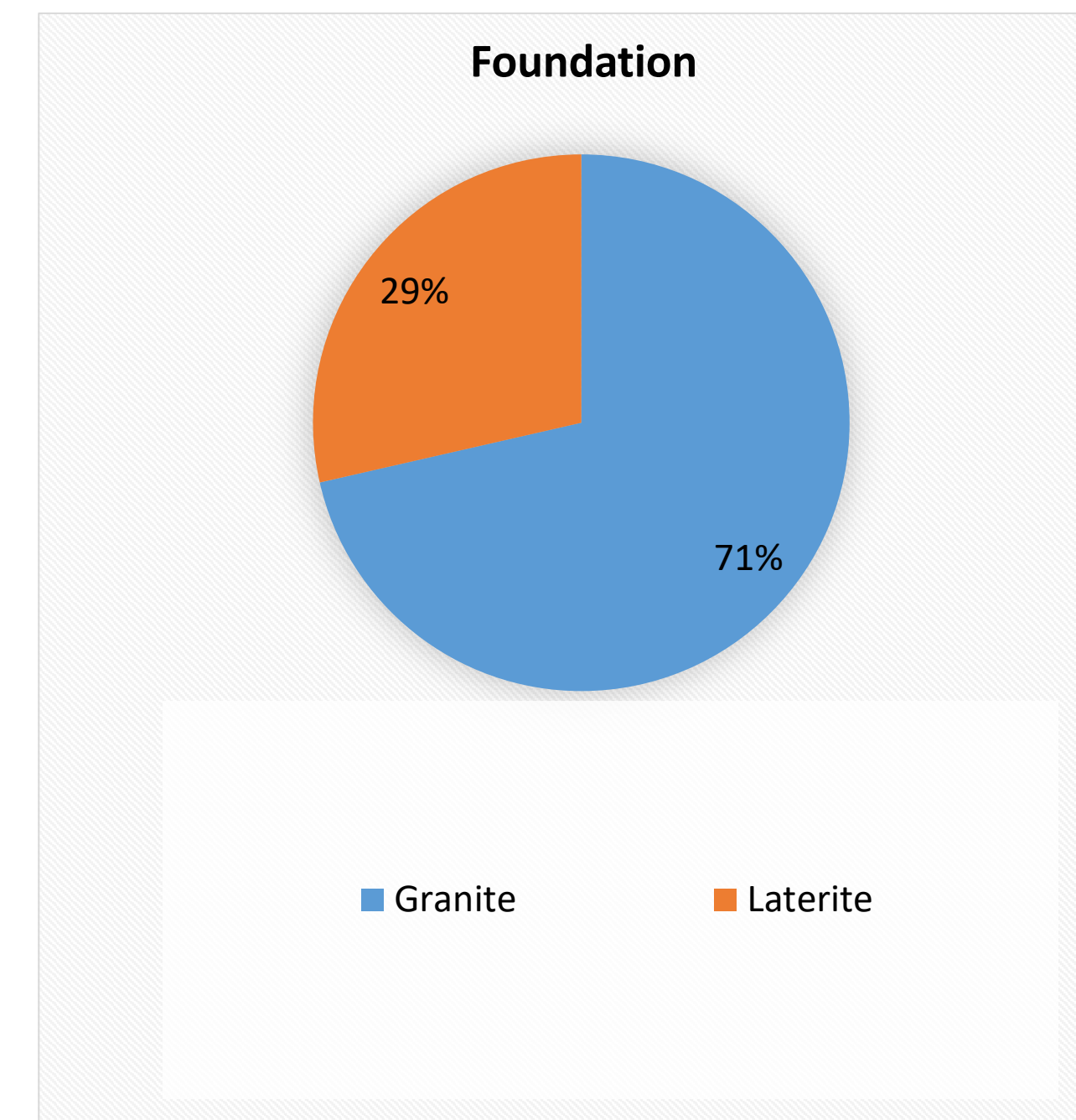
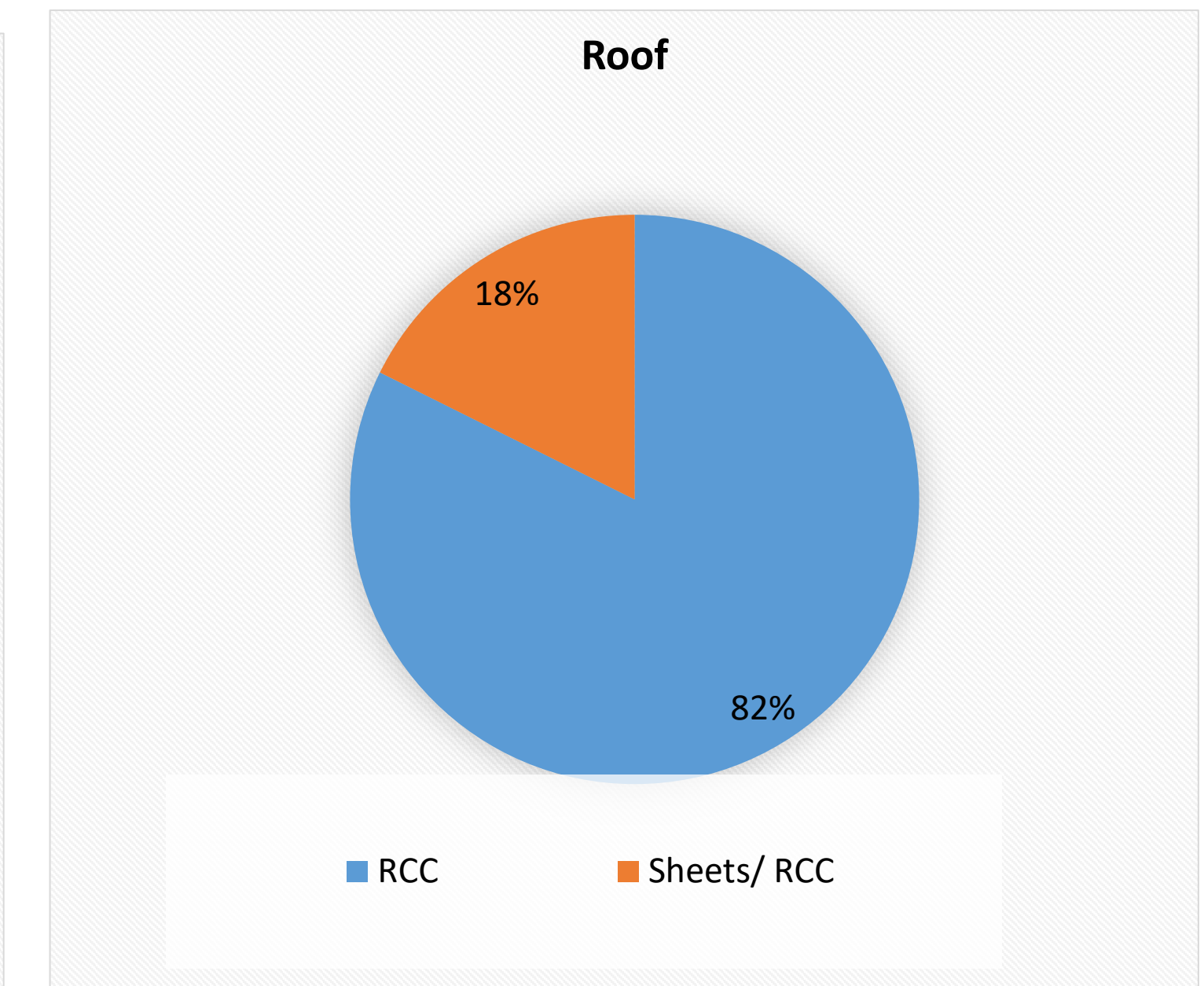
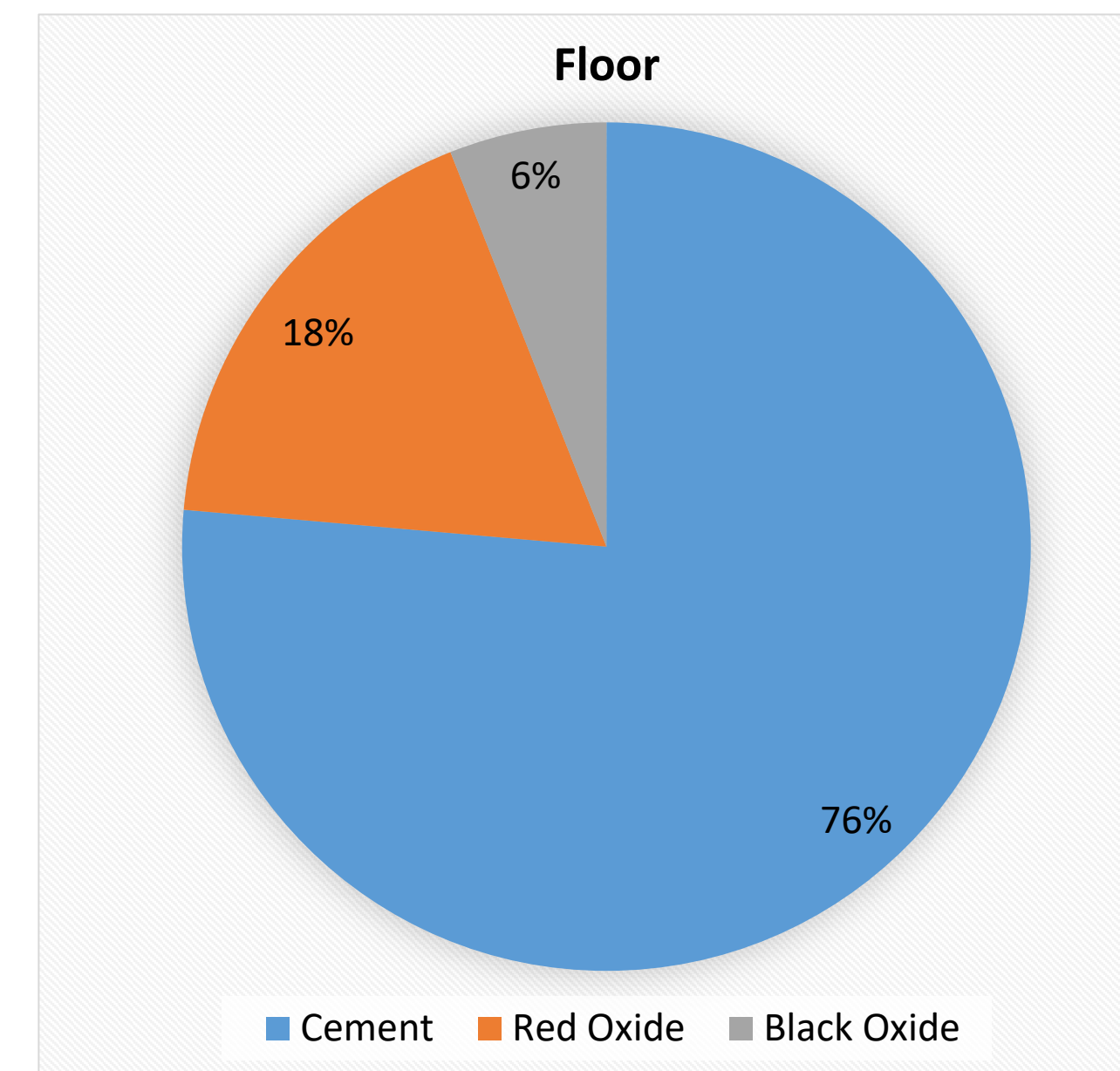


# Phase IV: Executing the participatory design process

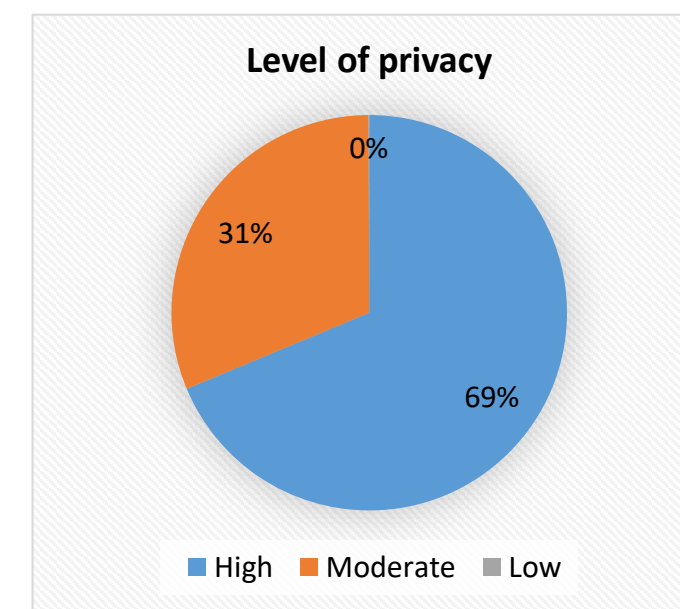
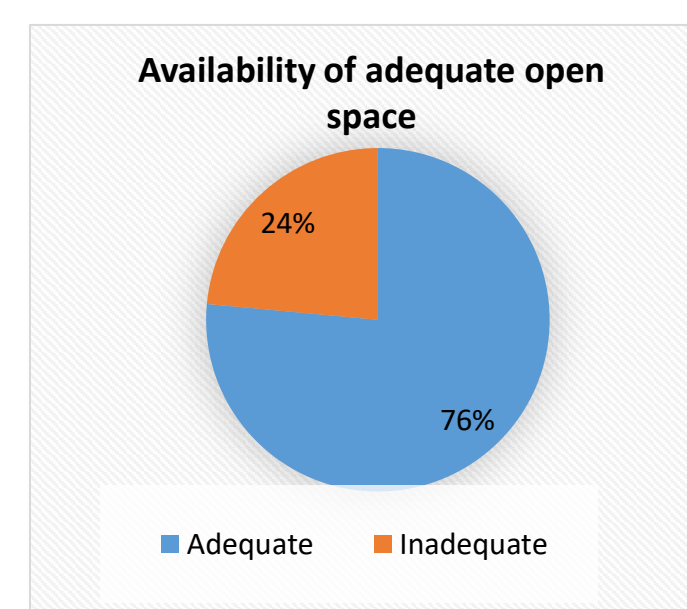
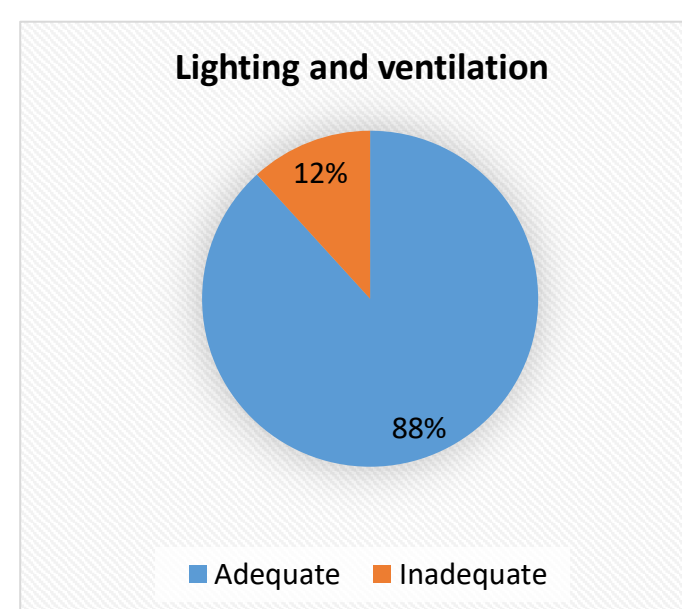
## Stage 2: Consultation with Household through structured questionnaire survey

- More than 70% of the houses have their walls, floor, roof and foundation made with modern construction materials like laterite, cement, RCC and Granite.
- The community has an open drainage facility
- The community as a whole faces shortage in water supply.
- Drinking water is available from a well which is more than 100m away.
- The community has adequate supply of electricity, and 88% reported adequate lighting and ventilation too.
- 76% of the dwellers reported that they have an adequate open space.
- There is no deity worshipping in any of the houses in this community.
- 94.2 % of the people surveyed does not own a vehicle.
- 31% of the people reported low privacy levels in their home

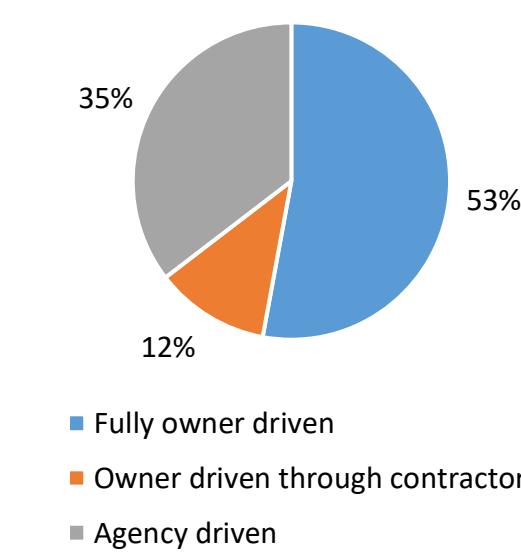
### Material used in construction



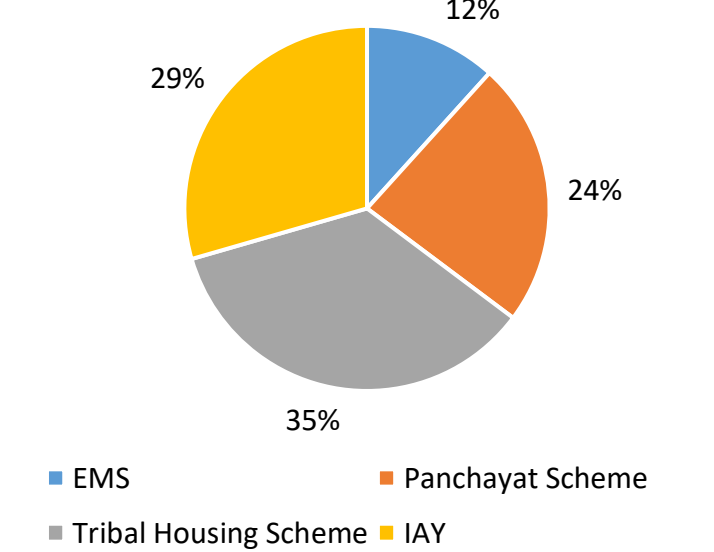
### Details of basic amenities



### Nature of Contract of construction



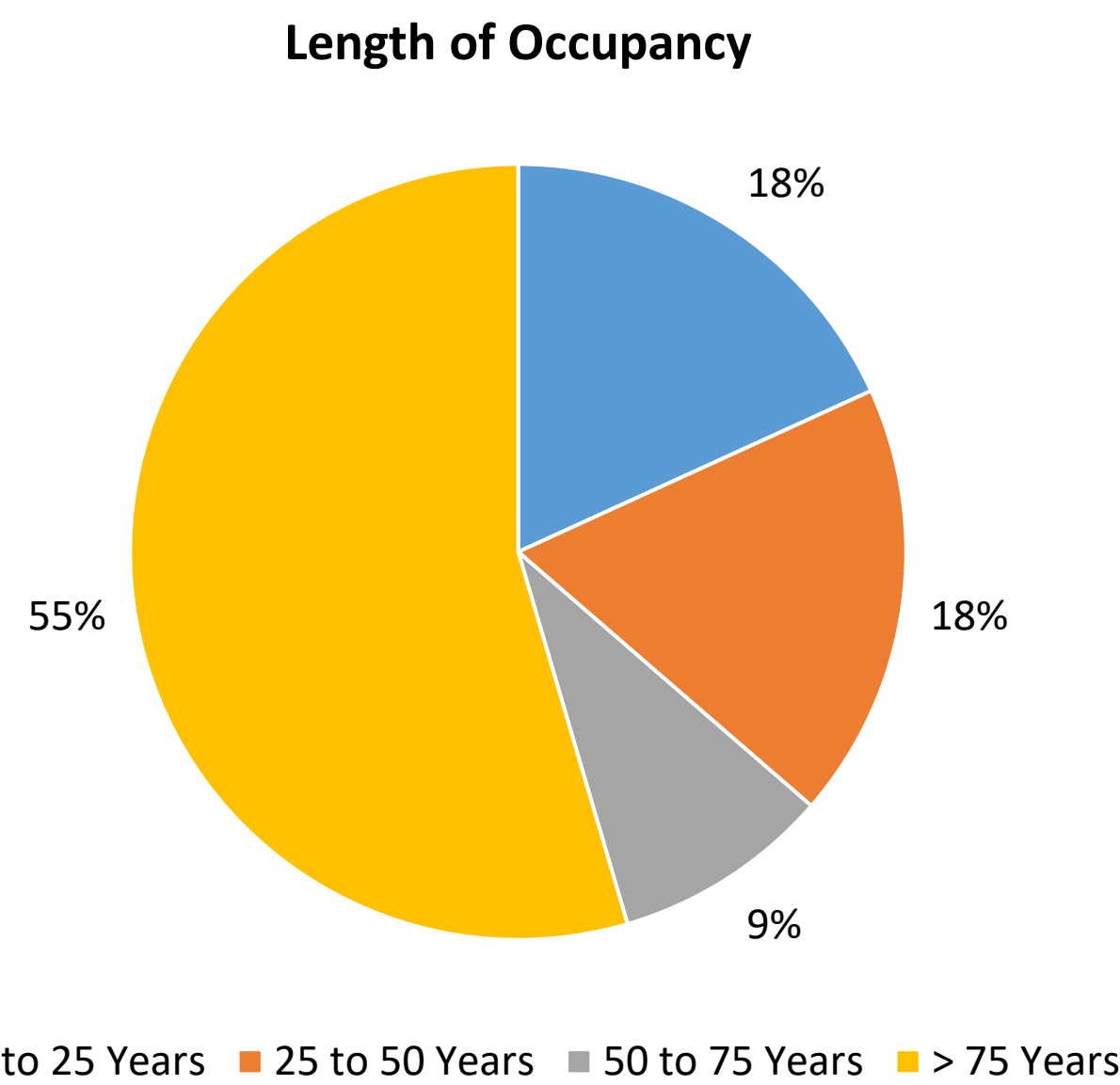
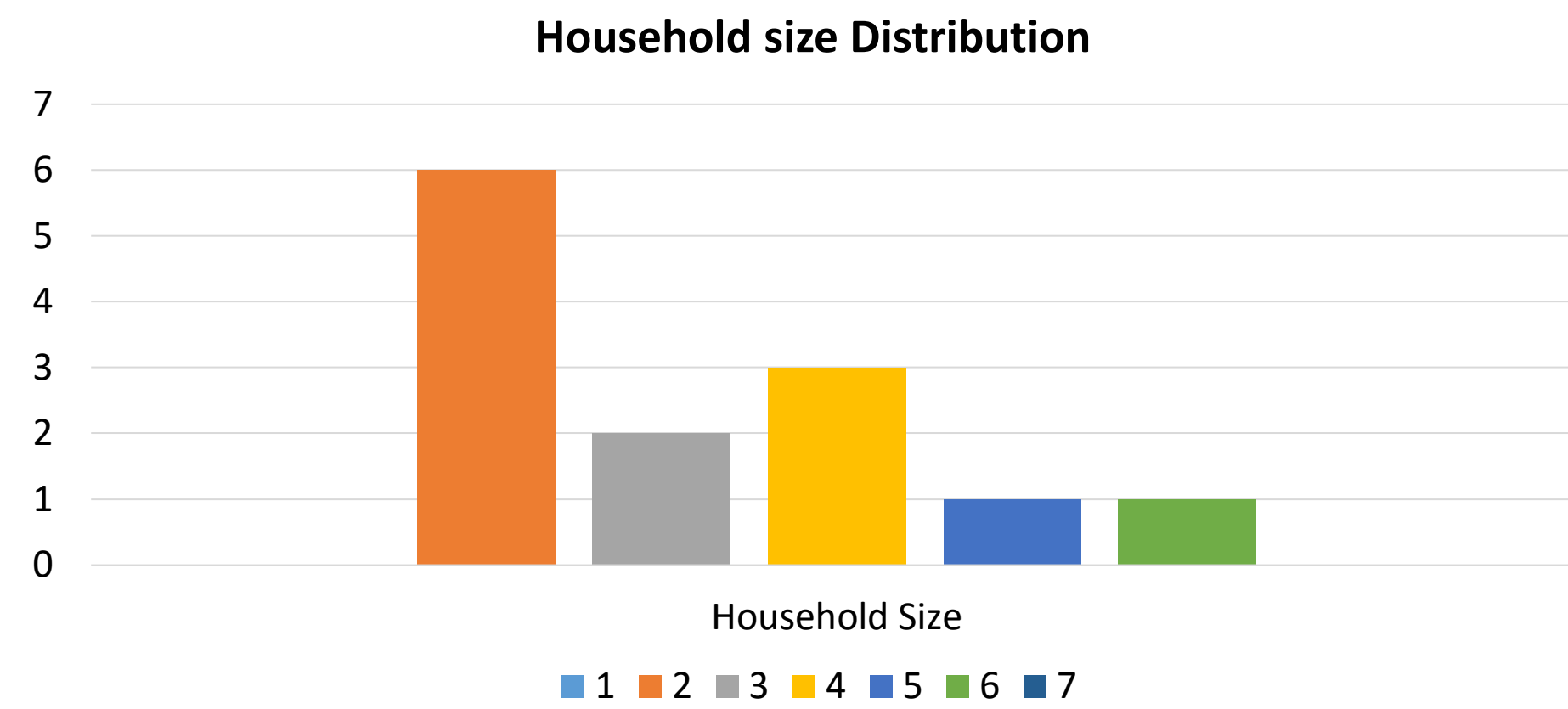
### Housing Schemes availed





Socio Economic Characteristics

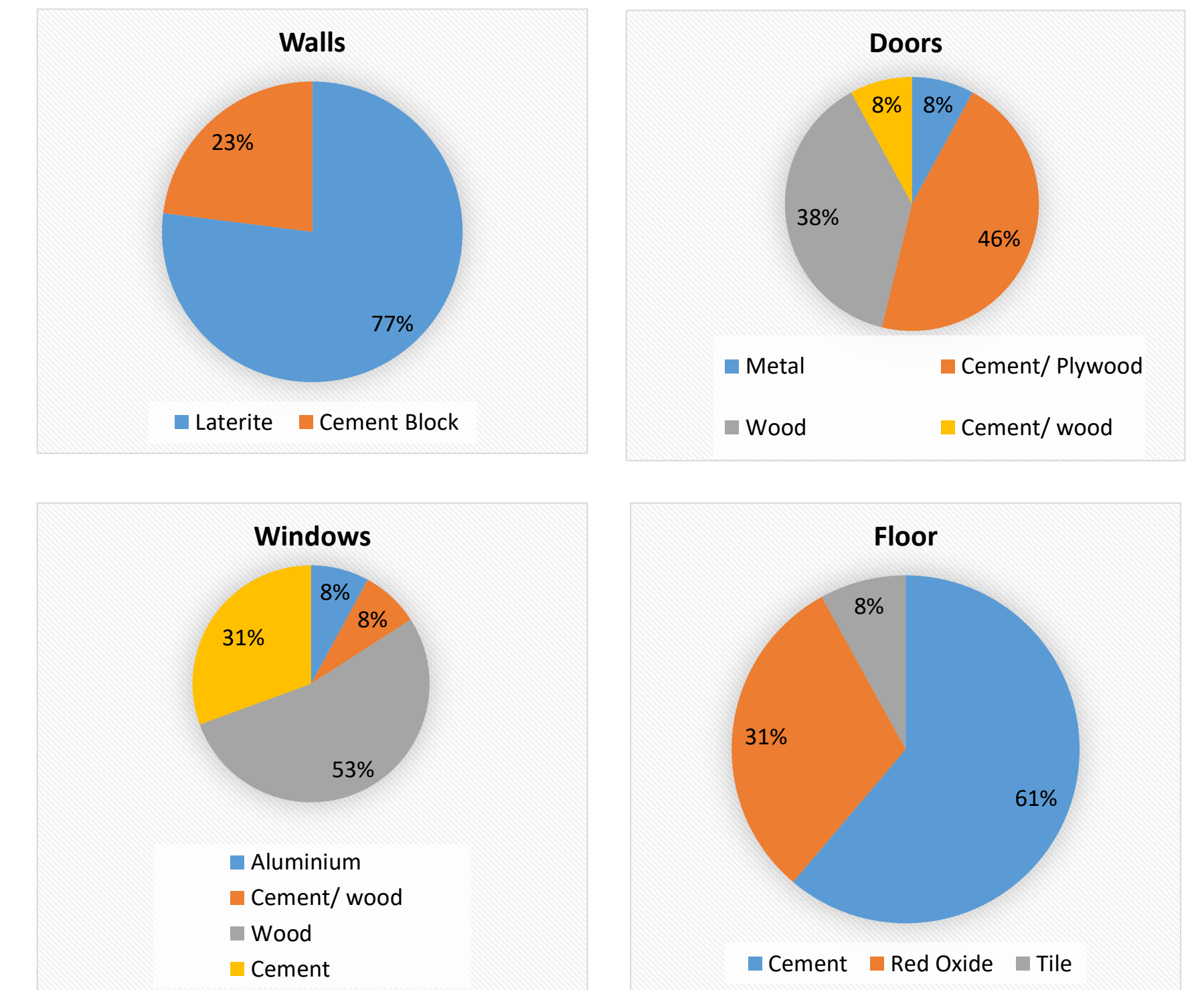
Kattunaikka Community, Vattappadi Settlement, Poothadi Village



Family composition

Aged couple living alone (age > 55 years) /Couples beyond reproductive age	Couples with children in the age group of 0 to 6	Couples with School going children (age 7 - 15)	Couples with mature Children
5	4	0	4

- 46 % of the community have a household size of 6.
- Length of occupancy of more than 50% of the families is greater than 75 years.
- Average daily income per person in the community is Rs. 400
- All the houses surveyed were pucca houses
- The houses were all completely constructed.
- Everyone surveyed owns the house they live
- Average no of rooms: 3.5
- Average size of housing unit: 640 sq. ft
- Average size of plot: 33.5 cents
- All the houses surveyed were having tap water facility, and 89% had drinking water available within the house.
- 97% of the interviewees reported a shortage in water supply.
- 67% of the people have toilet outside of their housing unit.
- The houses were all equipped with pour flush system in toilets.
- The community is having an open drainage system.
- All the houses were reported as having adequate lighting and ventilation.



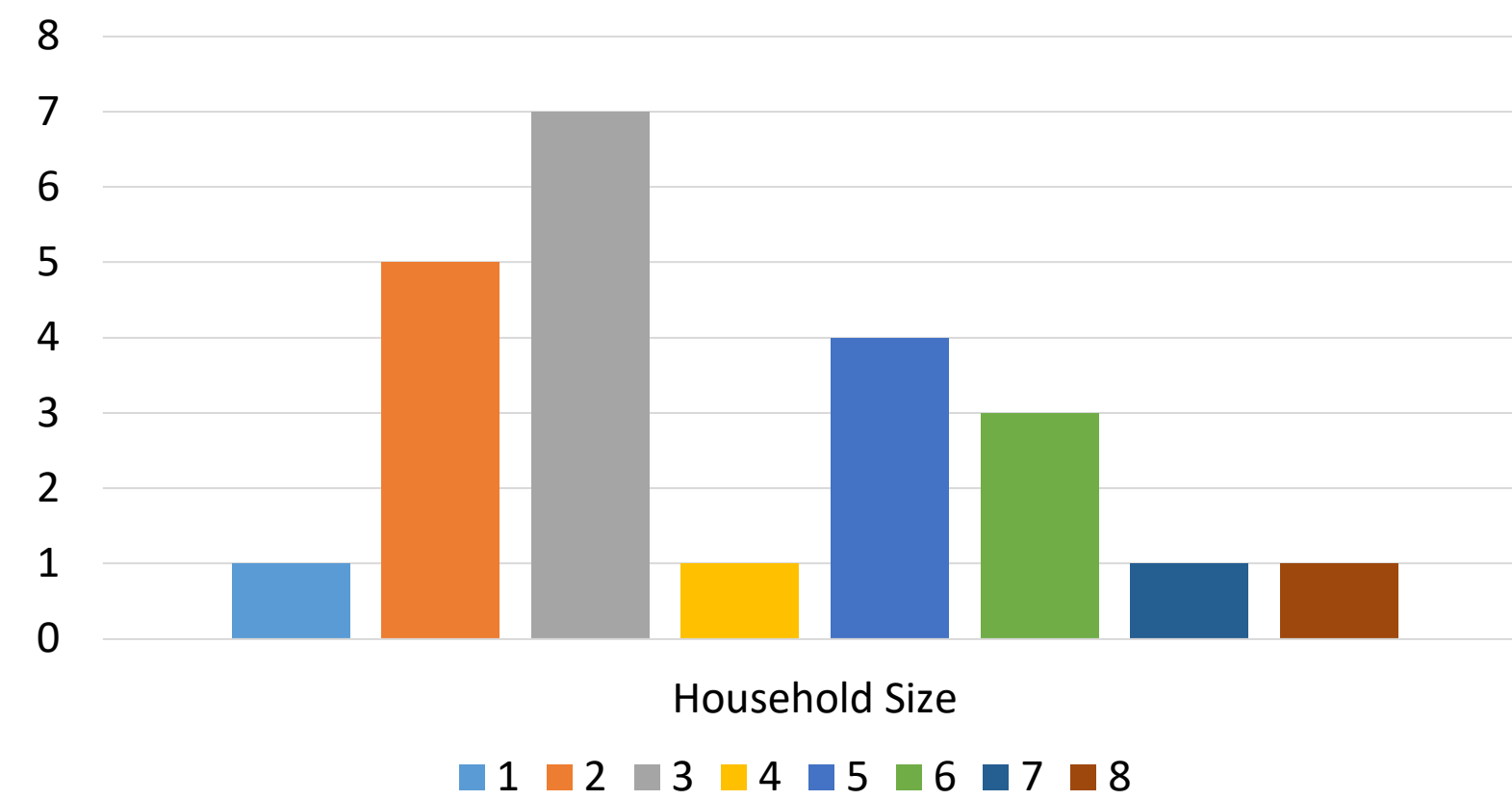
- All the houses surveyed were having an RCC roof.
- Flooring in the community is generally done using granite.
- Walls and floors of majority of the houses were of laterite and cement respectively.
- Doors were mainly with cement frames and plywood panels, whereas windows were mostly made of wood.
- 77% of the houses have a provision for expansion or alteration of their housing unit.
- The community has adequate amount of open space.
- There is no proper house level solid waste disposal system
- 93% of the households does not have deity worship within the house



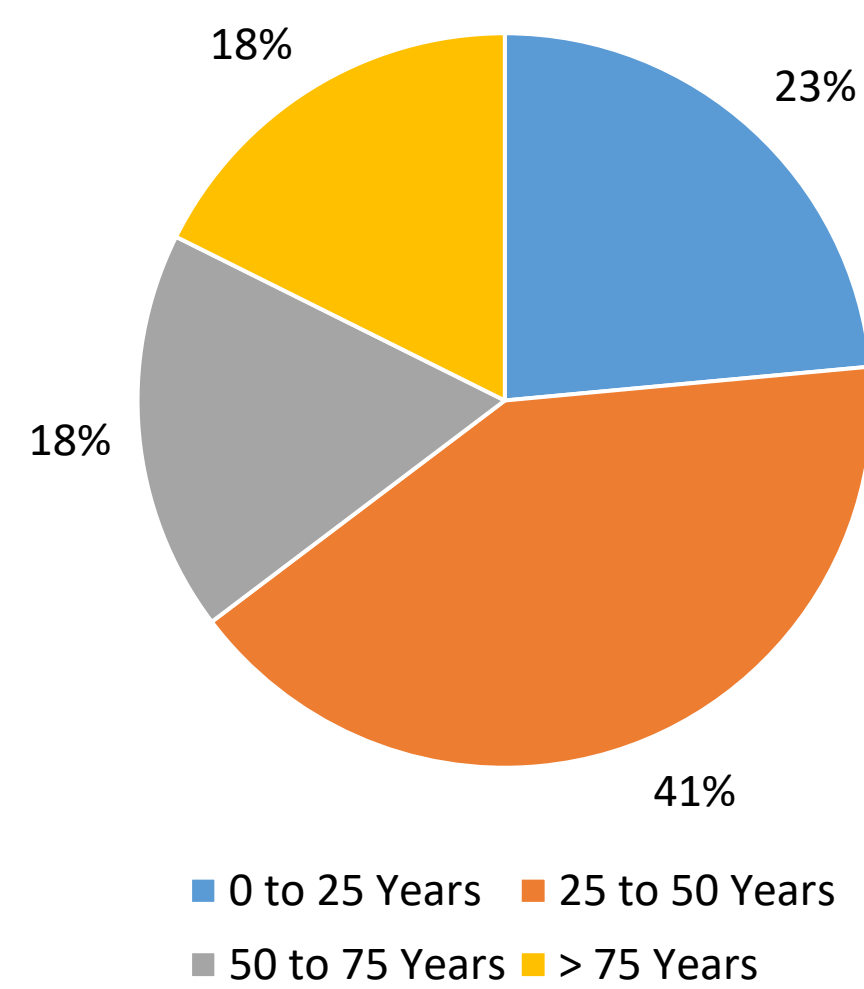
Paniya Community at Basthipoyil and Kolathara Settlement, Panamaram

Socio Economic Characteristics

Household size Distribution



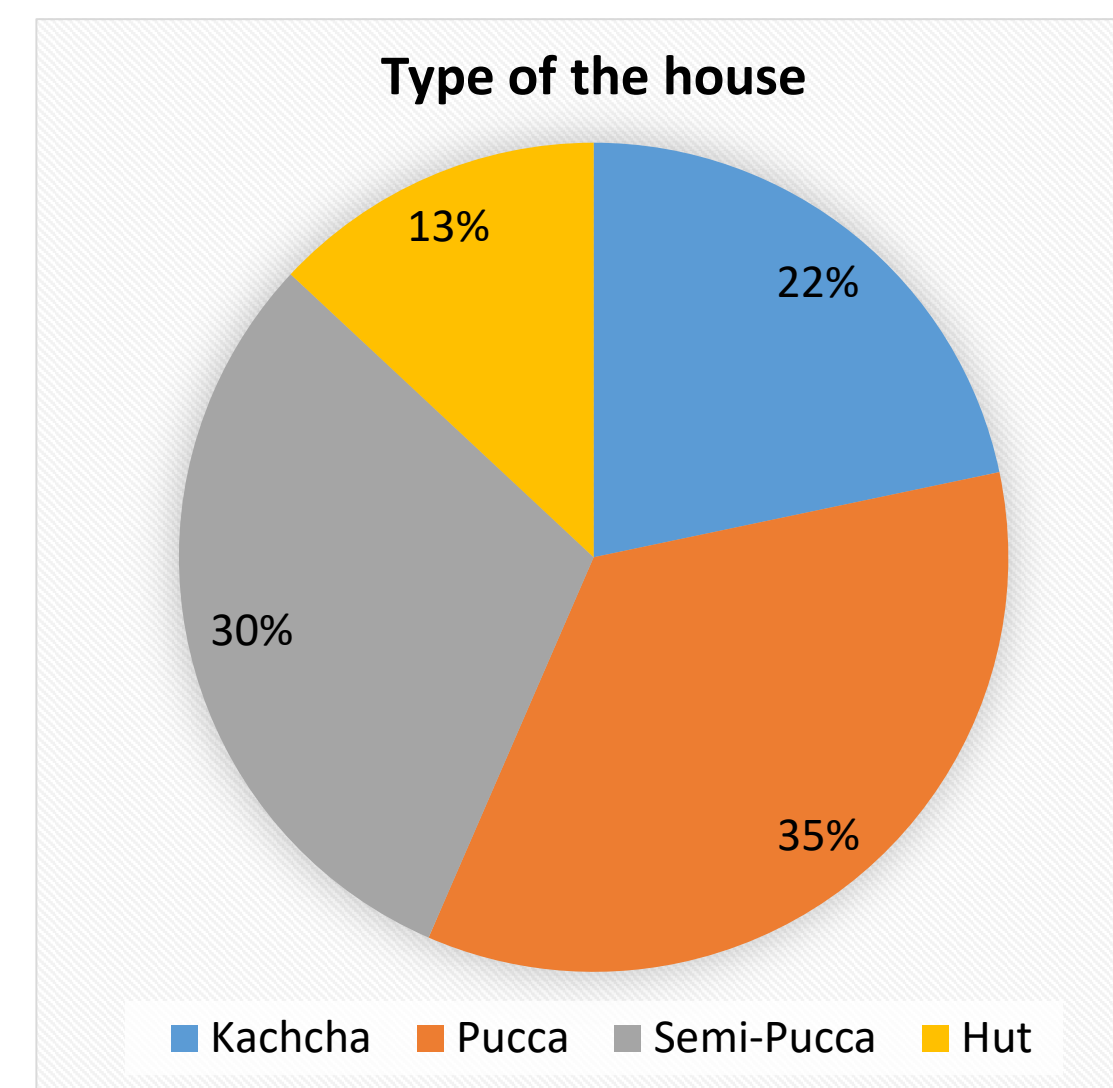
Length of Occupancy



Family composition

Aged couple living alone (age > 55 years) / Couples beyond reproductive age	Couples with children in the age group of 0 to 6	Couples with School going children (age 7 - 15)	Couples with mature Children
4	4	8	7

Housing Characteristics



HIGHLIGHTS

- 52 % of the community have a household size ranging from 2 to 3.
- 30.43 % of the community have a household size ranging from 5 to 6.
- Length of occupancy of 41% of the families is between 25 and 50 years.
- Average daily income per person in the community is Rs. 340
- 22% of the houses are still Kachcha and 13% of the families live in hut.
- More than half of the community own land, and 56% of the dwellers own their house (i.e, not along with the family).
- 66% of the land owners possess a patta to their property.
- Construction of more than half of the houses are still incomplete.



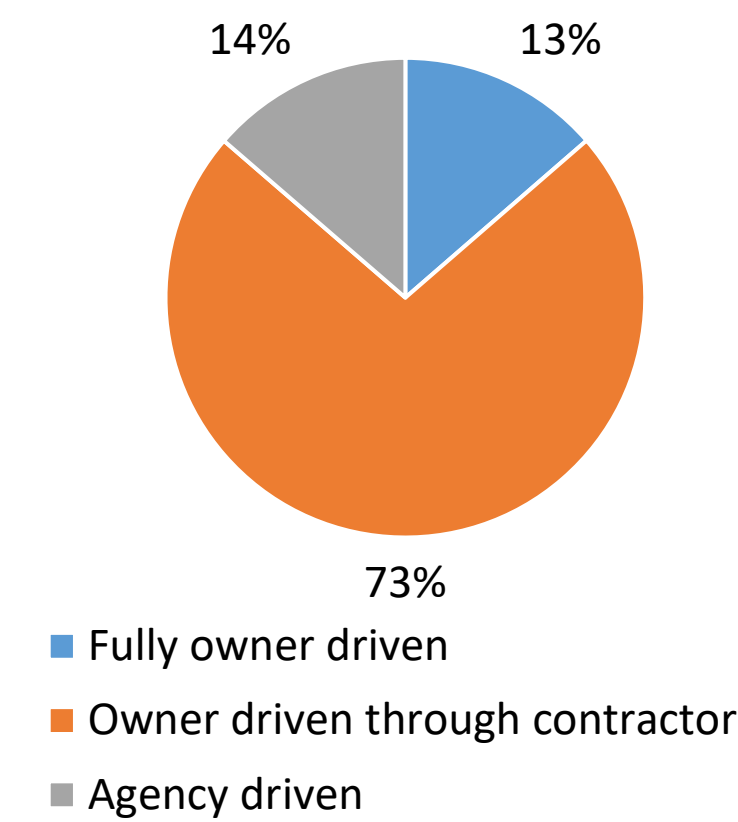


Paniya Community at Basthipoyil and Kolathara Settlement, Panamaram

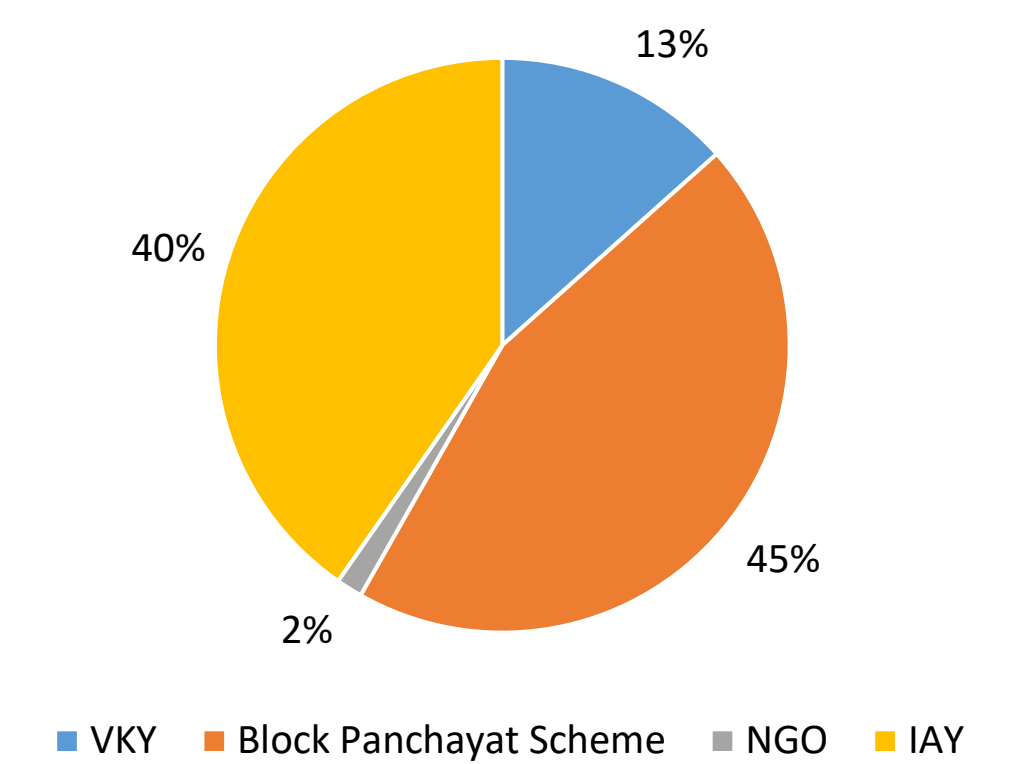
- The community has an open drainage facility
- Only 17% of the households have drinking water availability within house, while 48% of them have to travel more than 100m for drinking water.
- Most of the dwellers depend on well water and tap water and less than 10% of them use hand pump.
- 70 % of the households have toilet outside their house.
- 62% of them use pour flush system.
- More than half of the interviewees reported adequate lighting and ventilation.
- There is no proper solid waste management system
- 74% have adequate electric supply.
- 39% have complaints on privacy in their home.
- 70% of the houses have provisions for alterations or expansion of the current unit.
- 78% reported of not having a deity or divine place in their premise or house.
- In this community 20% of the houses are constructed using mud.
- 52% of the houses have mud flooring, while 26% of them have foundation made with mud.
- Even though majority of the houses have RCC or tiles for roofing, 14% are still thatched roofs.
- Majority houses have cement frames for doors and PVC panels, while majority houses have wooden windows.

Material used in construction

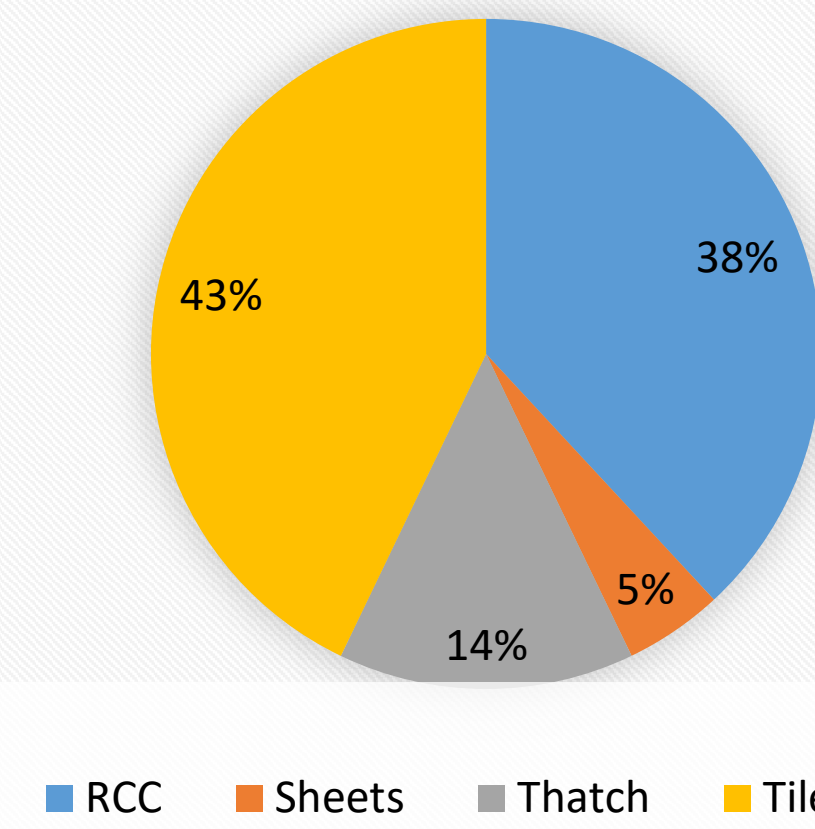
Mode of construction



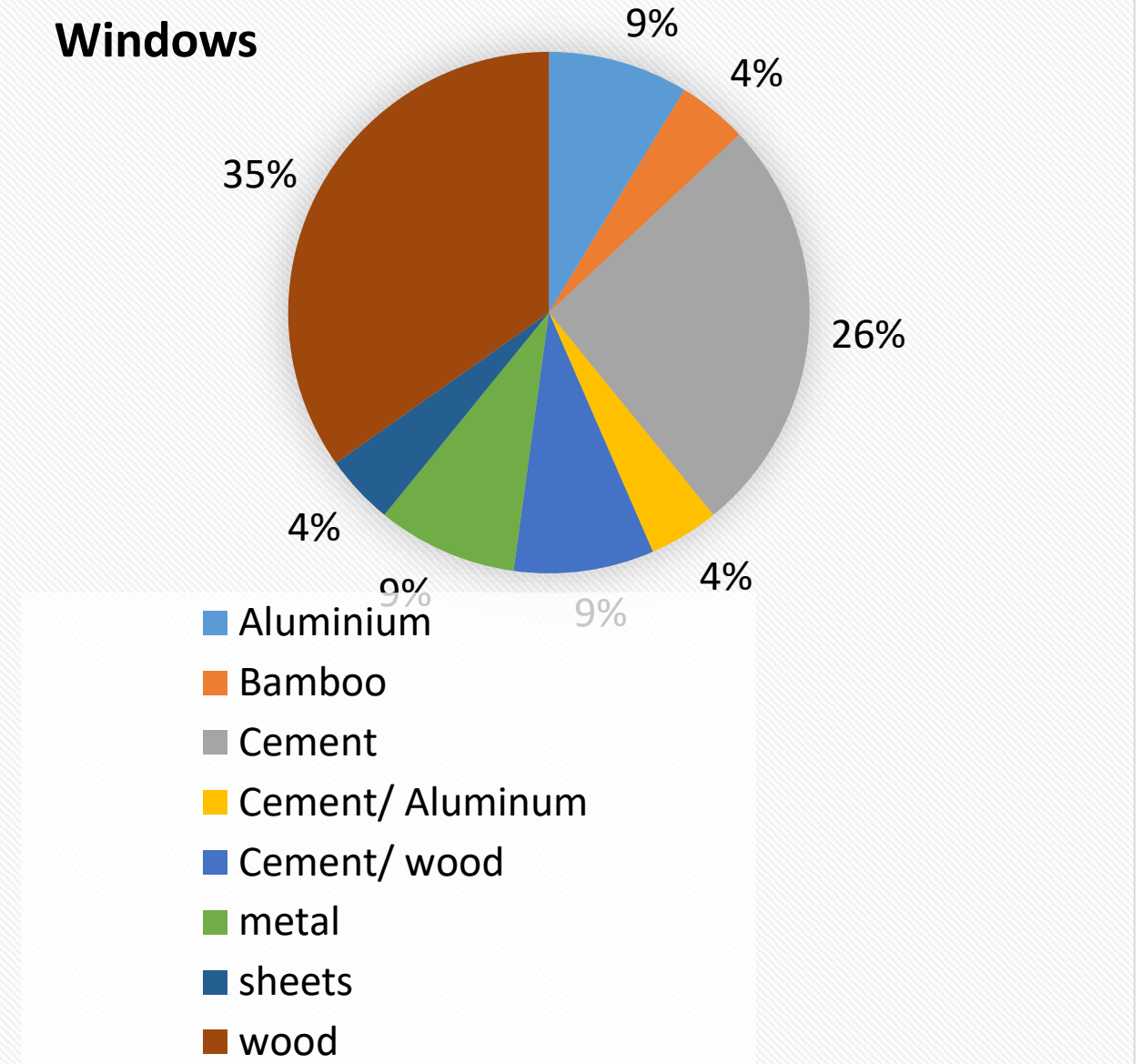
Housing Schemes availed



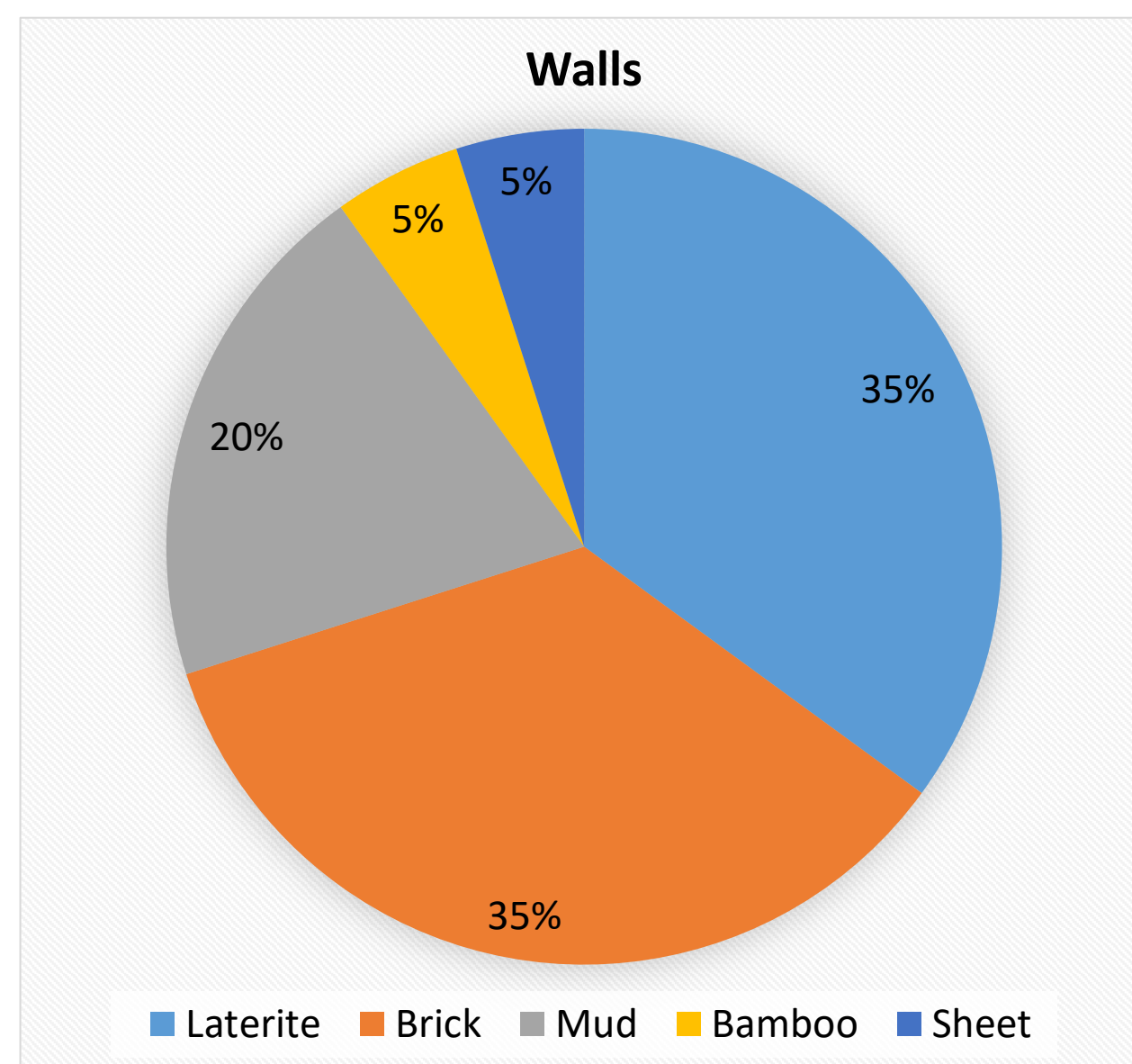
Roof



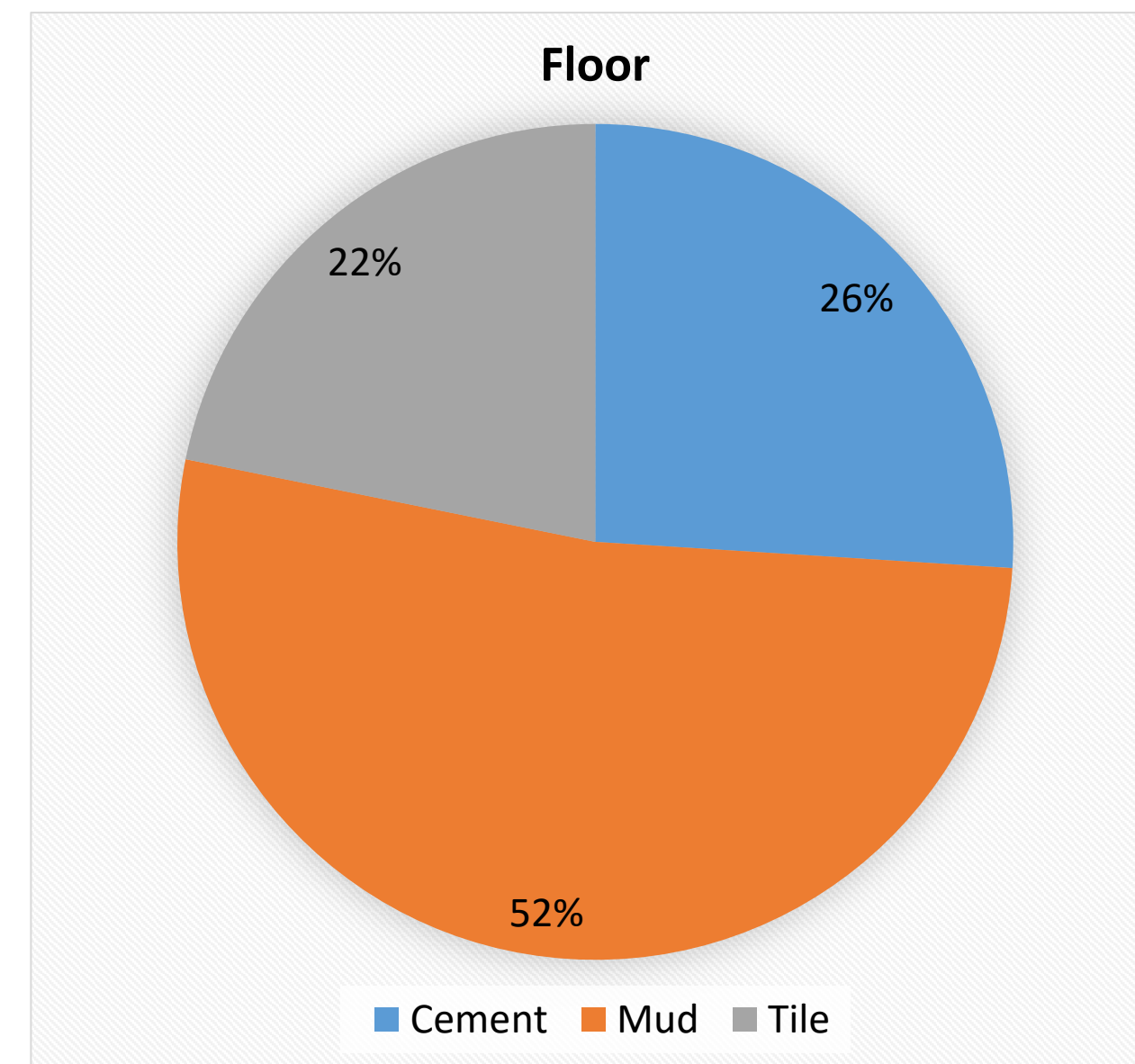
Windows



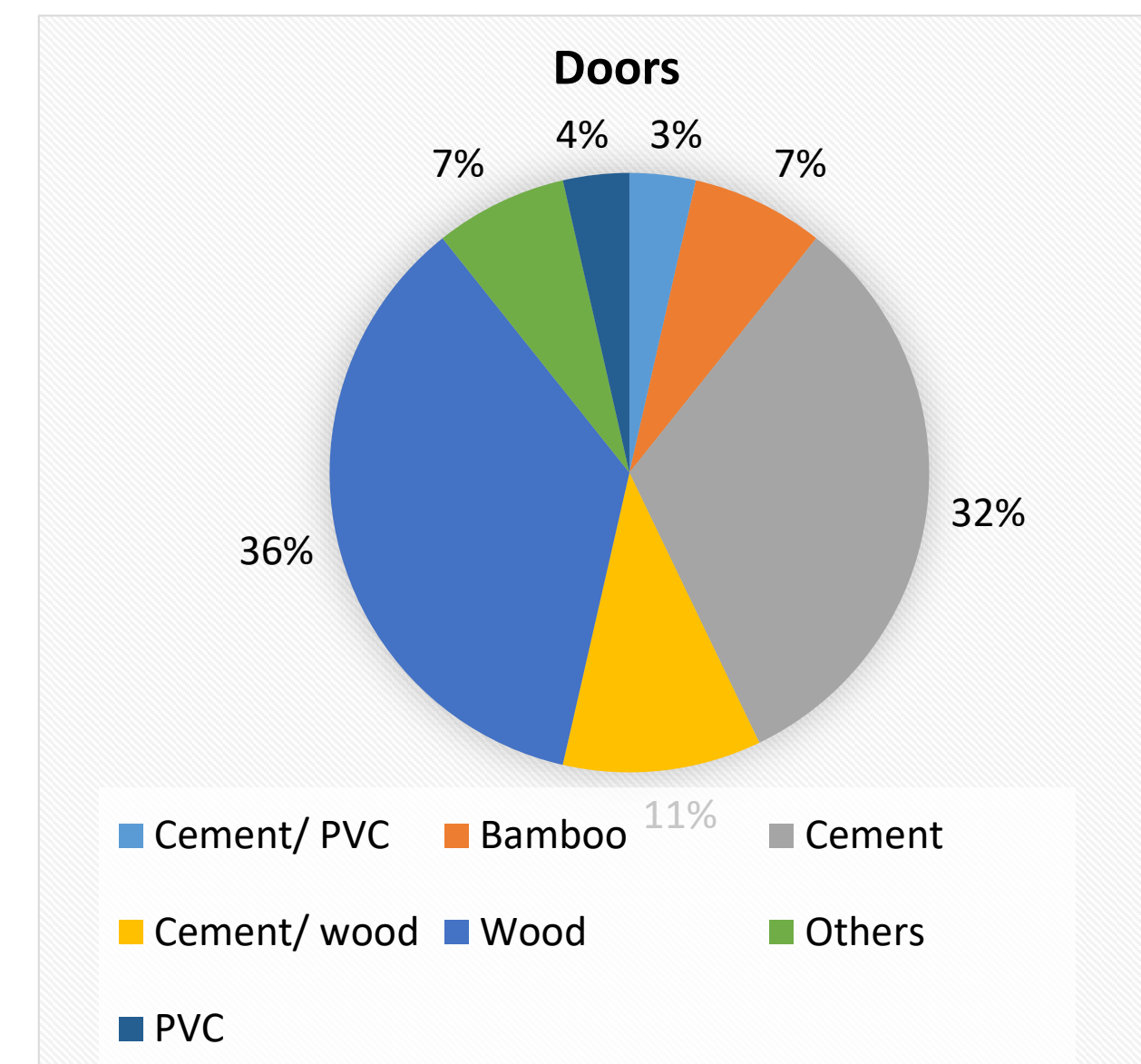
Walls



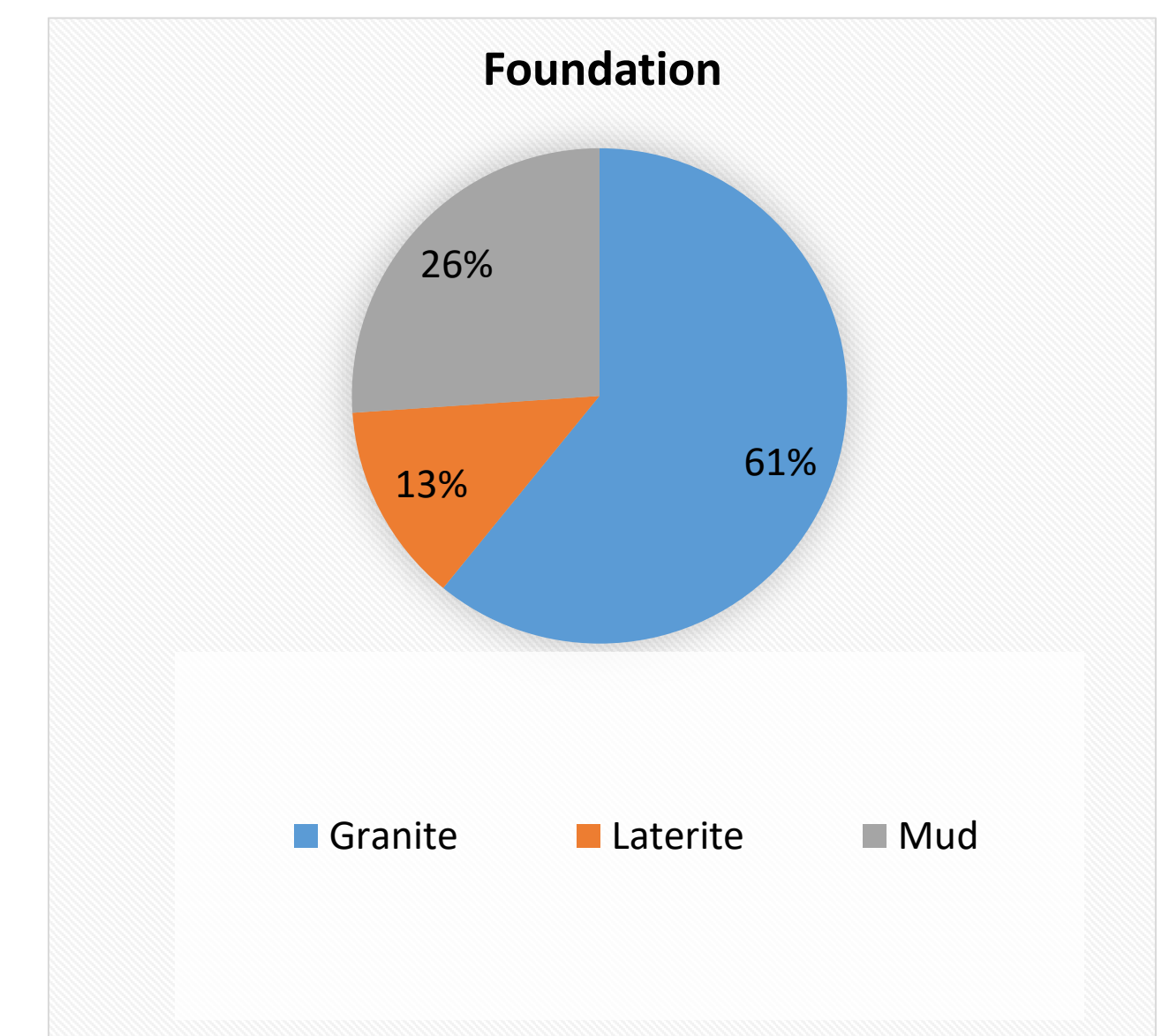
Floor



Doors



Foundation



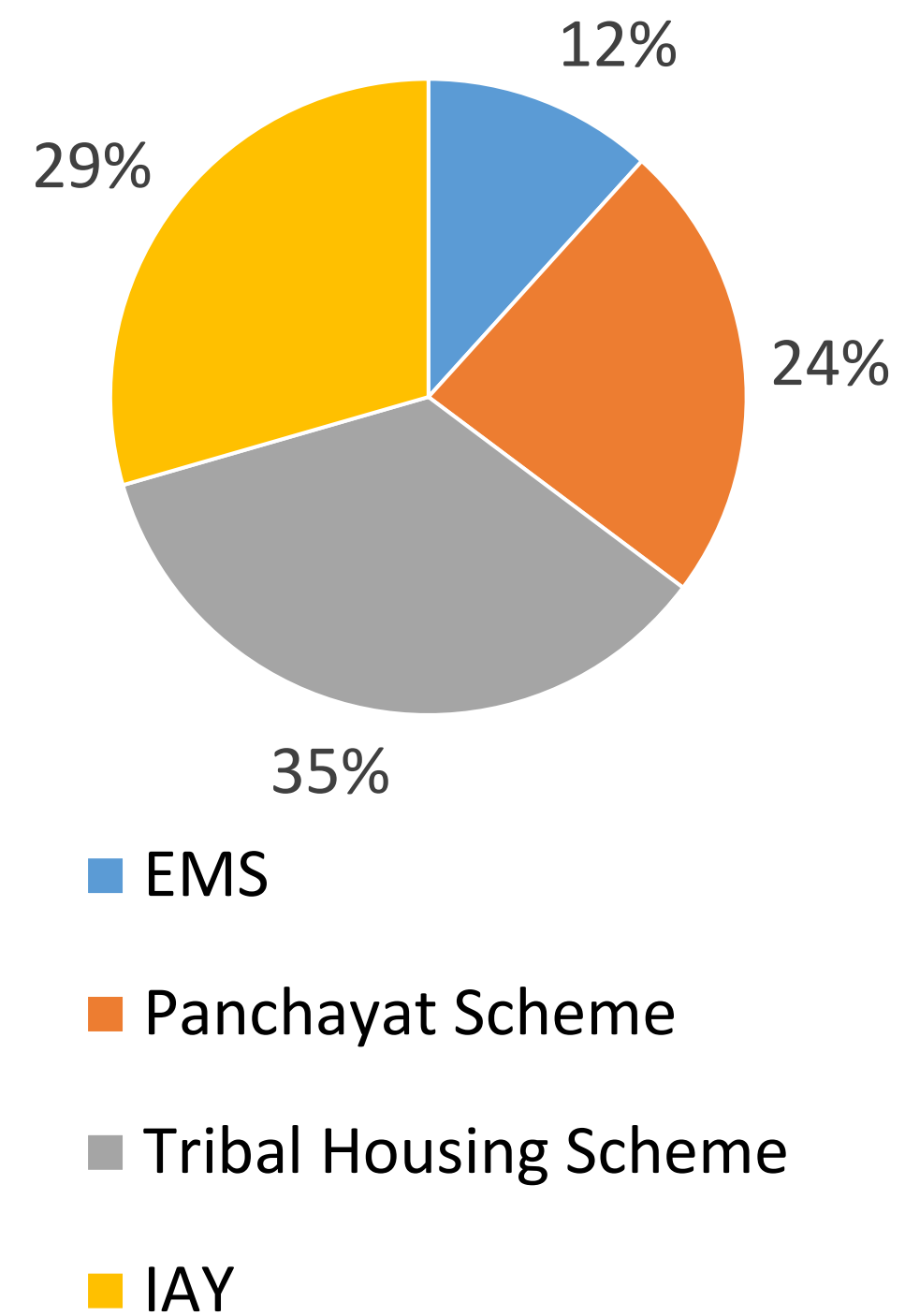


Adiya Community (Chaligadha Tribal Settlement , Mananthavadi)

Housing Pattern

- There are 52 households settled in 43 housing unit.
- Most of the houses are pucca or semi pucca in nature, but incomplete in many respects
- It consists of two halls , one bed room , kitchen and toilet.
- Toilet is accessed from outside the housing unit.

Housing Schemes availed



Flood in 2018 & 2019

4 houses damaged in 2018  
Kabani – changed course  
17 houses damaged in 2019  
Eight - Inhabitable

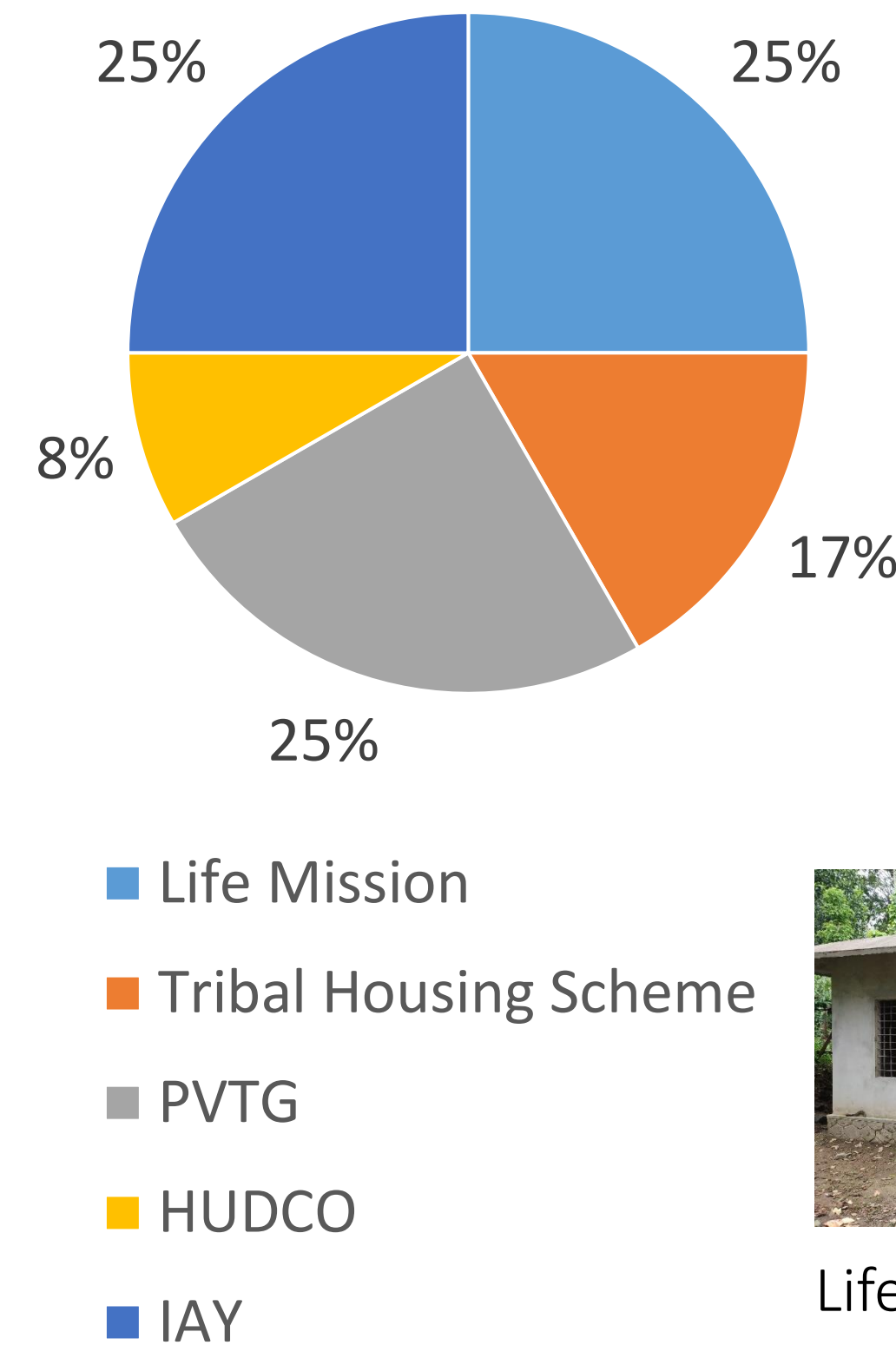


Kattunaika Community (Vattapady Tribal Settlement , Sulthan Bathery)

Housing Pattern

- There are 25 houses in the community. Many are built in the year 2014 – 15.
- The house units are basically pragmatic design.
- In design they provided ample space to sit outside
- Very few openings are provided.
- Majority of the houses have two rooms in addition to a living room and a kitchen.

Housing Schemes availed



Pattern Of Housing



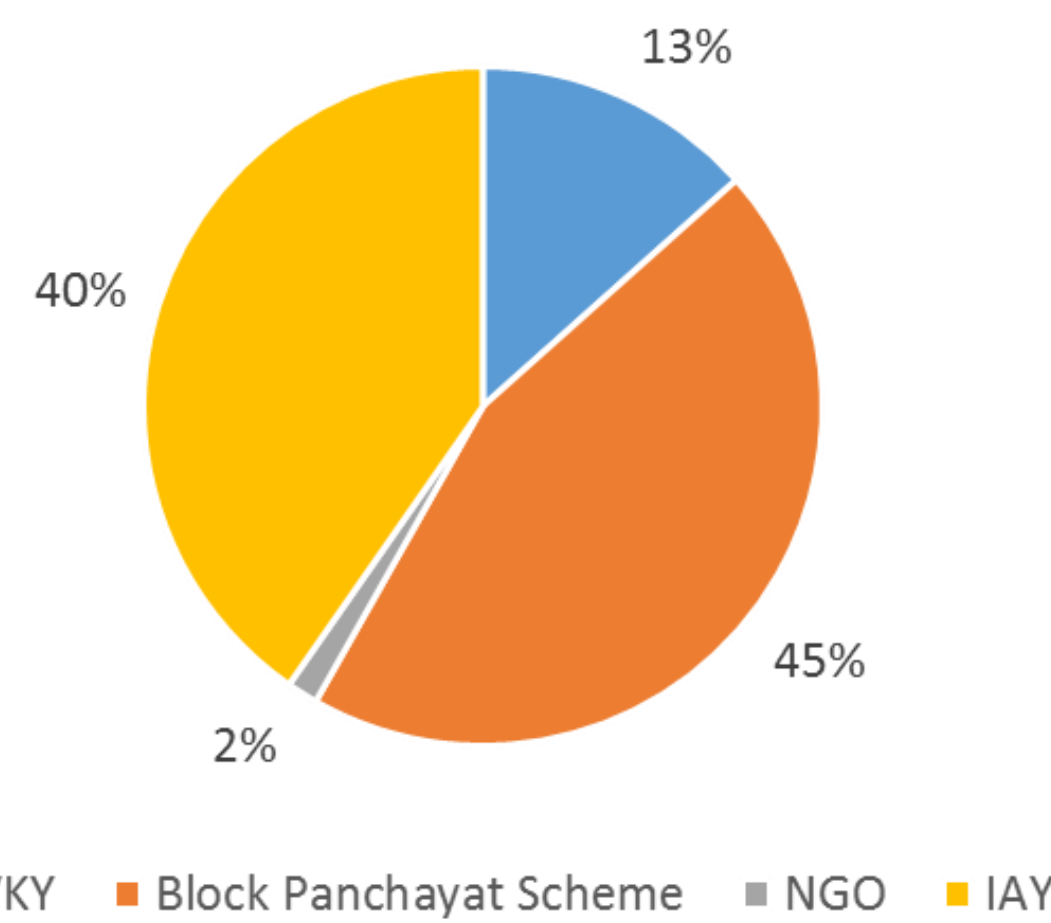


Paniya Community (Basthipoyil and Kolathara Tribal Settlement )

Housing Pattern

- The settlement is more than 80 years old
- There are 71 Household in 43 units
- Most of the houses are with two bedroom and hall as well as kitchen.
- Toilet is attached to the housing unit , but with access from outside.

Housing Schemes availed



IAY: 1996



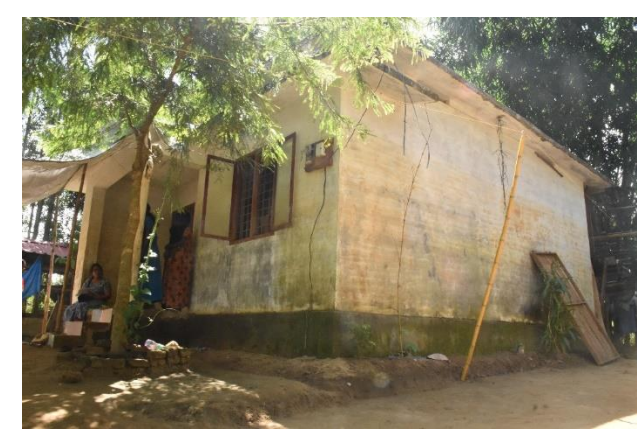
IAY: 2000



Tribal housing scheme : 2017-18



Block Panchayath scheme: 2016-17



Block Panchayath scheme: 2016-17



Block : 2016



VKY : 2018-19



VKY: 2017-18

Housing Pattern



Constructed during 2017-18 , but turned uninhabitable due to flooding.



Completed



Uncompleted Houses

General Issues and concerns on Housing Schemes

- Housing units constructed under various schemes are observed to be of short life, due to poor quality of construction.
- There is no centralized mechanism to implement the housing schemes available at various levels of govt and by other departments.
- Certain housing schemes have very strict rules that limit the area of construction and restrict any future expansion.
- Programmes like projects from Nirmithi Kendra directly go for implementation of the projects.
- Increase in the financial assistance in these schemes are not proportional to the increase in the cost of construction.
- Stringent conditions

- Many of these dwellers do not have a proper Patta for their land which makes it difficult for the processing of schemes
- Even though many schemes are available their implementation is mostly irregular due to various political interplays.
- For certain schemes, construction of the house has to reach a particular stage before the availing next installment.
- This is troublesome for most of the beneficiaries since most of them unable to bear the seed money.
- This results in incomplete houses being constructed.
- community's lack of knowledge, awareness and empowerment also results in the failure of most of the schemes.



Stage 3: Community consultation and appraisal

Vattappady settlement (Kattunaika)



Chaligadha settlement (Adiya)



Basthipoyilsettlement (Paniya)



Feedback

Elicited opinion on the following

1. Whether the community has adapted to the new housing style with modern materials and methods  
 → Yes, the community have adapted to the new construction methods and built environment, and are fine with using modern materials.
2. Whether the community is satisfied with the spatial organisations in the current housing typologies  
 → Yes, the community is satisfied with the new proposed spatial organisations and housing typologies.
3. Whether do they prefer more number of small size rooms or min number of spacious rooms  
 → They prefer spacious rooms even though they are less in number.
4. Whether do they prefer dedicated space in the housing unit for worship  
 → Most of them did not prefer a dedicated space except some female interviewees in Paniya community and Adiya community.
5. Willingness to get involved in the housing construction  
 → They are willing to participate in construction work, if given proper training, but they prefer to give the works to a trusted agency even more.
6. Local resources available and community preference on building materials  
 → Burnt mud blocks are available at a nearby site called Panamaram.



**Housing planning and design approach**

**Potential factors**

Household Composition

The present life style

Daily activity pattern

Current Housing Pattern

Existing topography of the settlement

Aspirations

External Conditions

**Category of Households**

- Single Persons / aged couple
- Parents + Adolescent Boy- Boys more than 15 years of age / Adolescent Girl -girls more than 12 years of age

**Service / Utility Core Unit**

- Sit out+ Kitchen + Toilet cum bathroom

**General features of the proposed housing units**

Every proposed unit basically has a Service core unit, consisting of a kitchen, bathroom and a sit out.

The size of the main hall room is adjusted in each unit type, according to the size of the household that was considered.

The hall can be converted to another bedroom or a study room according to the changes in purpose by providing a screen or even a wall.

The whole structure is constructed in an incremental manner so that in future expansions or alterations can be made.

The space under the staircase can be used as a storage space in case of rain.

The bathroom is provided along with the unit but with an entrance from outside.

**Housing typologies proposed**

Type	Type of Family	Facilities	Plinth Area (Sq. Ft)
A	Single Person/ Aged couple beyond reproductive age without children	S C U + Multipurpose Hall	345-395
B	Parents + Children less than 6 years of age	S C U + 2BR + Hall	395-489
C	Parents + School going Children		
D	Parents + Adolescent Children / ( Married Son / daughter)		

**Material Palette for normal housing units**

Sl No:	Item	Material used
1	Foundation	Normal rubble masonry
2	Walls	Interlocking mud blocks
3	Plastering	Cement mortar
4	Door frame	Concrete /wood
5	Door shutter	Pressed wood/ wood
6	Window frame	Concrete
7	Window panel	Glazed glass
8	Roof	RCC slab
9	Staircase	RCC

**Material palette for flood resilient housing unit (Ground floor)**

Sl No:	Item	Material used
1	Foundation	Normal rubble masonry
2	Walls	Cement blocks
3	Plastering	Cement mortar
4	Door frame	Wood
5	Door shutter	Pressed wood
6	Window frame	Aluminium
7	Window panel	Glazed glass
8	Staircase	Steel
9	Stilts	Concrete

**Material palette for flood resilient housing unit (First floor)**

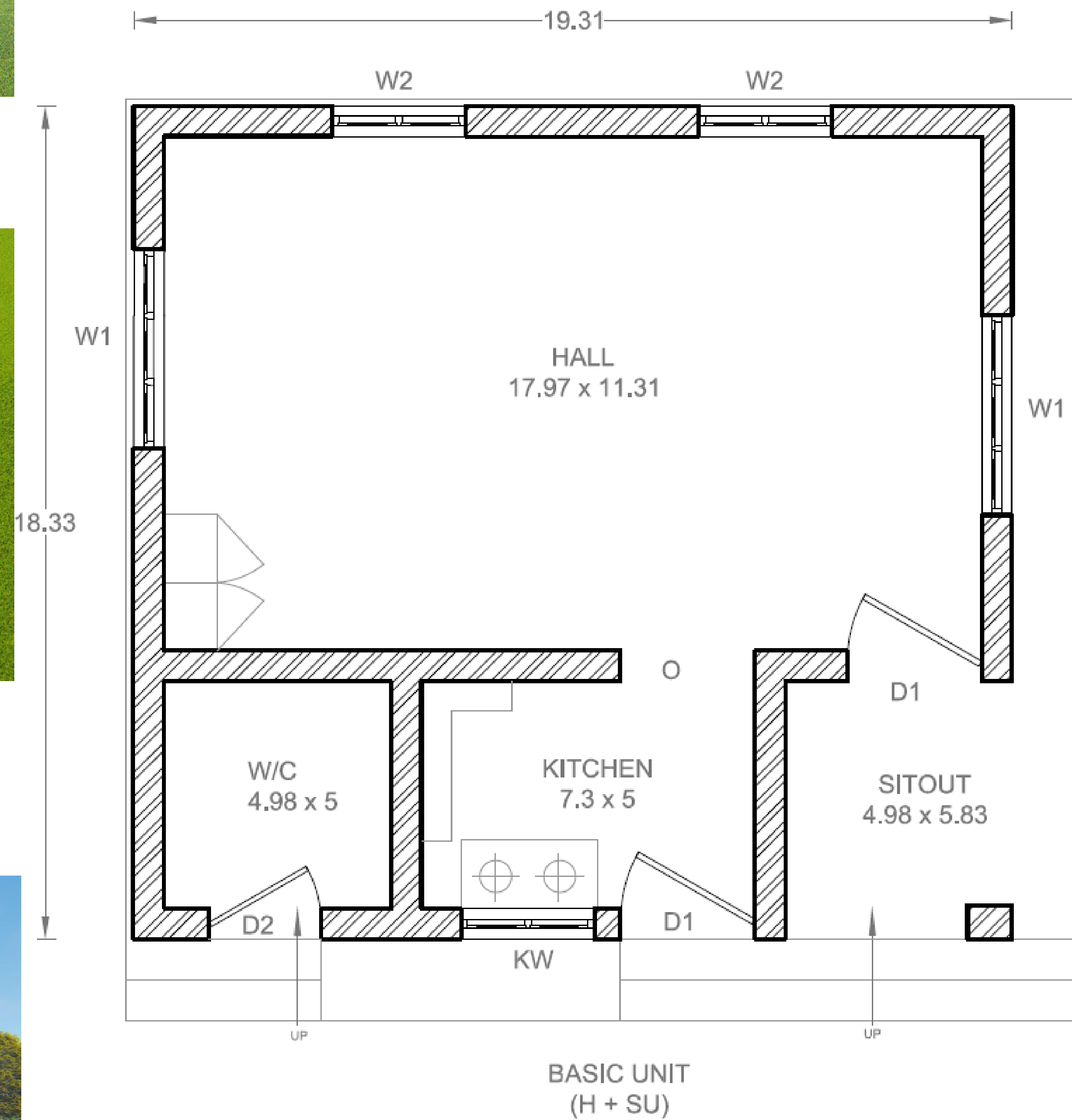
Sl No:	Item	Material used
2	Walls	Cement fiber boards/ V Panels
3	Plastering	NA
4	Door frame	Wood
5	Door shutter	Pressed wood
6	Window frame	Aluminium
7	Window panel	Glazed glass
8	Roof frame	Steel truss
9	Roof covering	Mangalore tiles

**Design Philosophy**

- Housing Typology based on basic family composition
- The design must ensure healthy living environment by providing potable water, adequate sanitary facilities and cooking facilities within the housing unit.
- The establishment of habitable, stable and socially and culturally adaptable residential environment.
- Permanent residential structures ensuring internal and external privacy and adequate safety .
- Scope for incremental development
- Disaster Resilient design and construction



# Final housing design

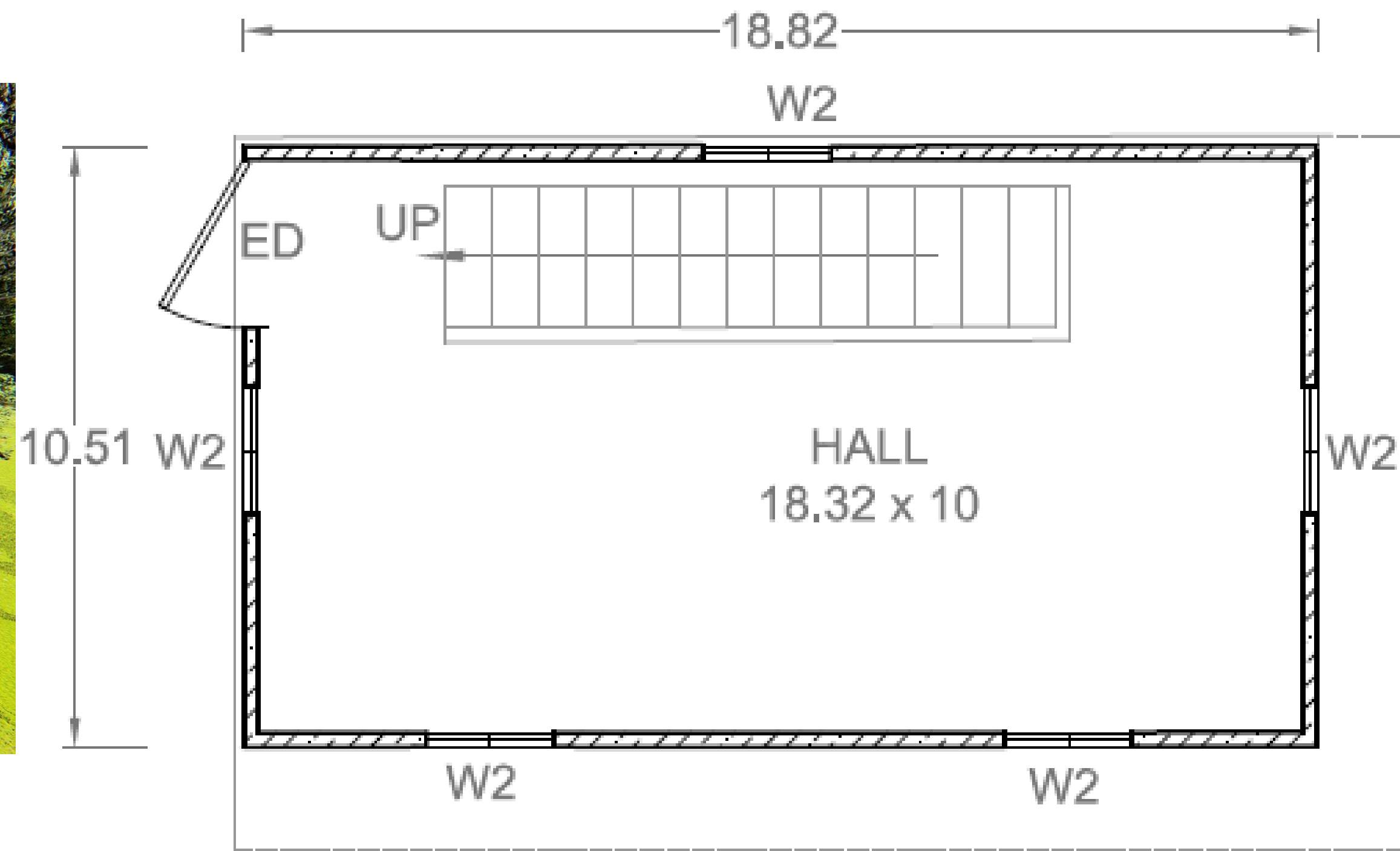
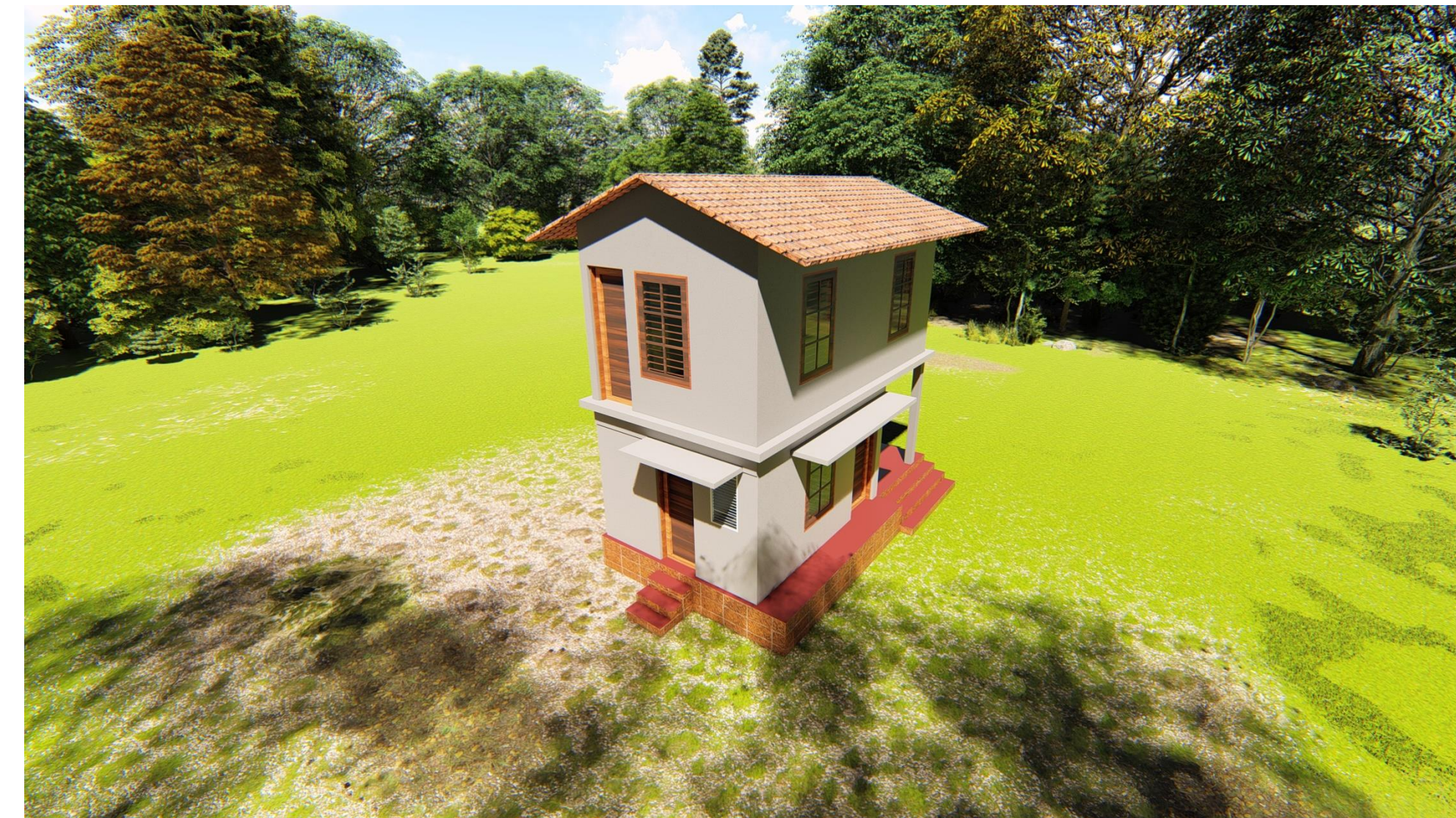




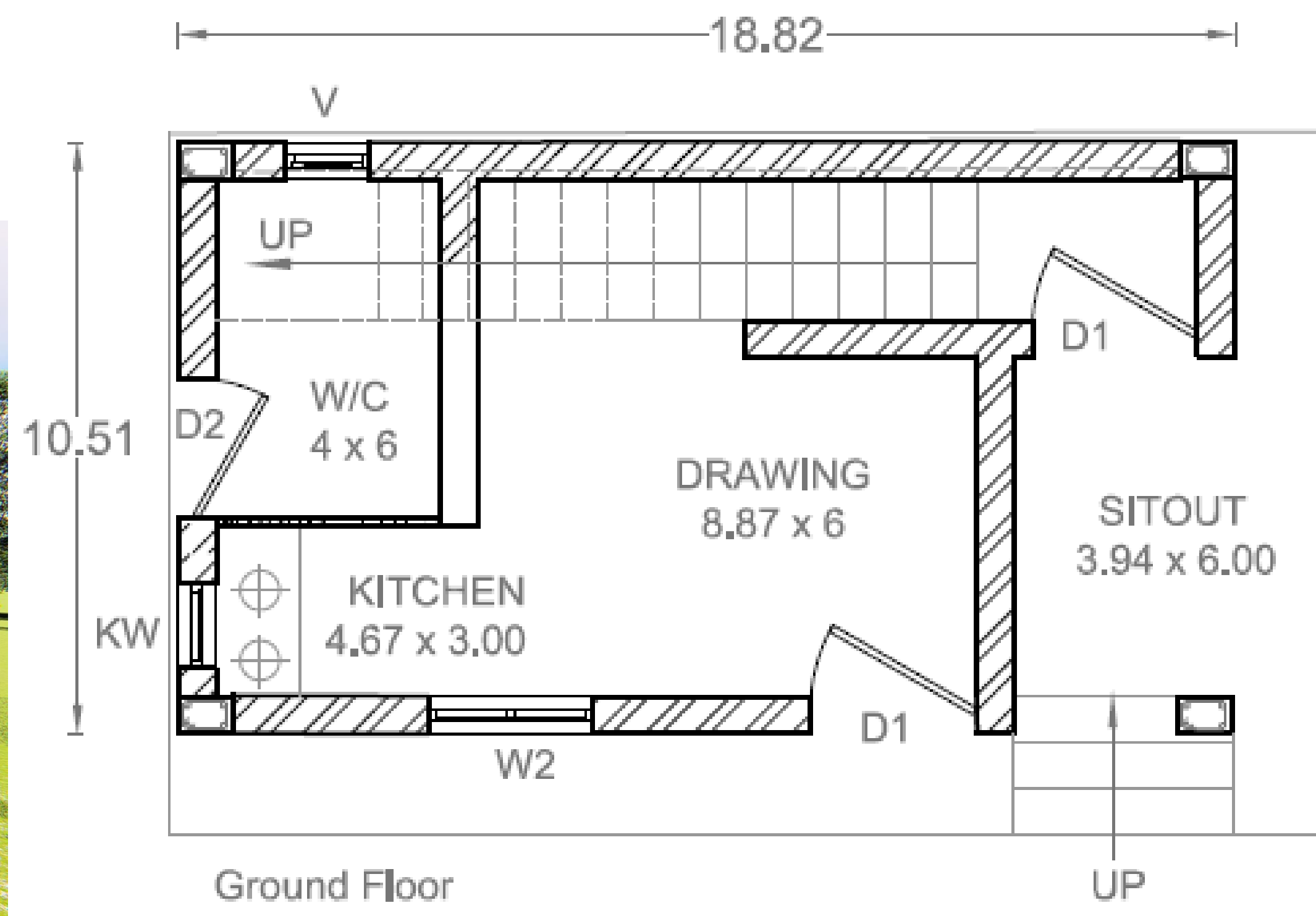




# Final housing design



First floor



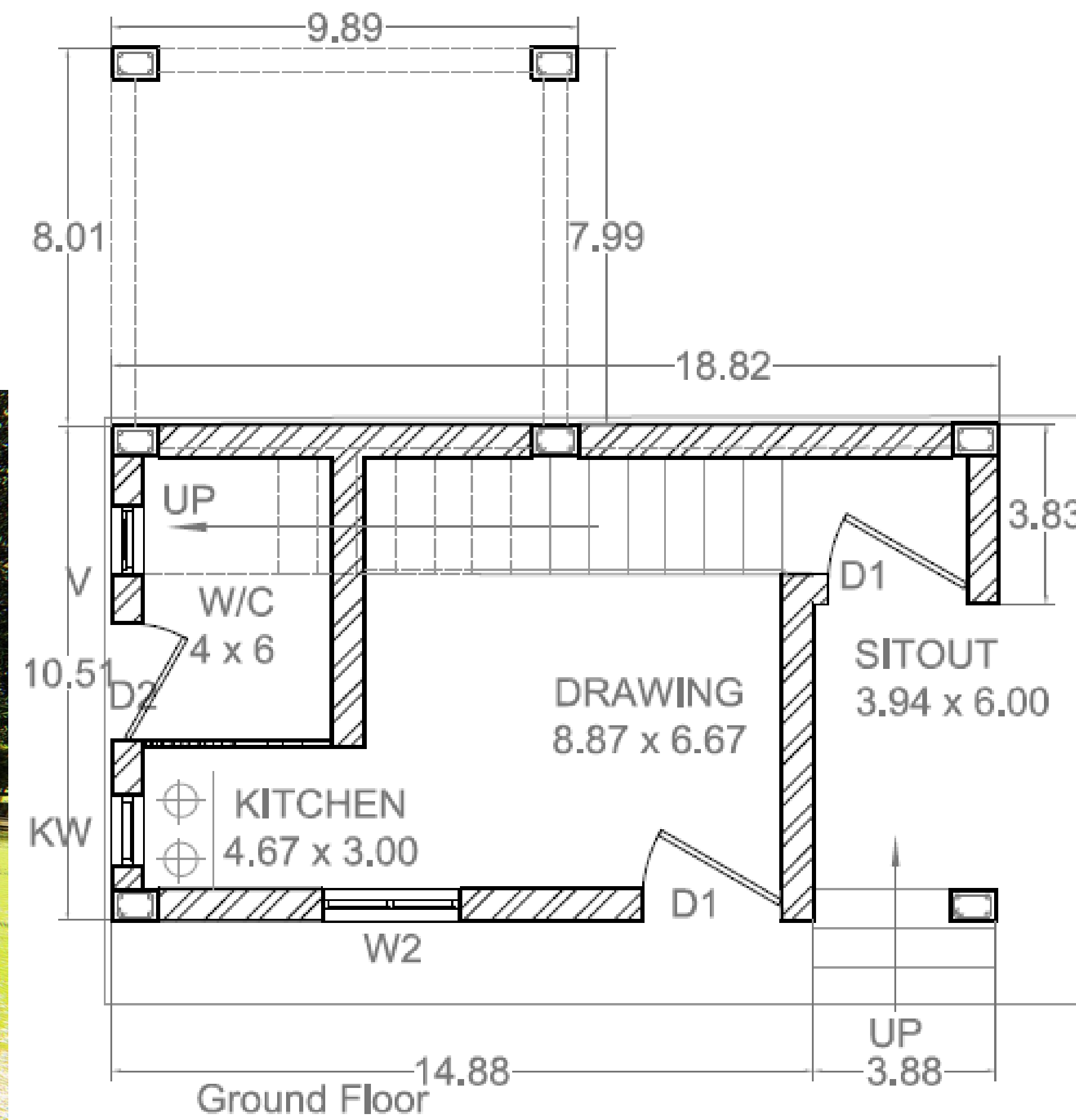
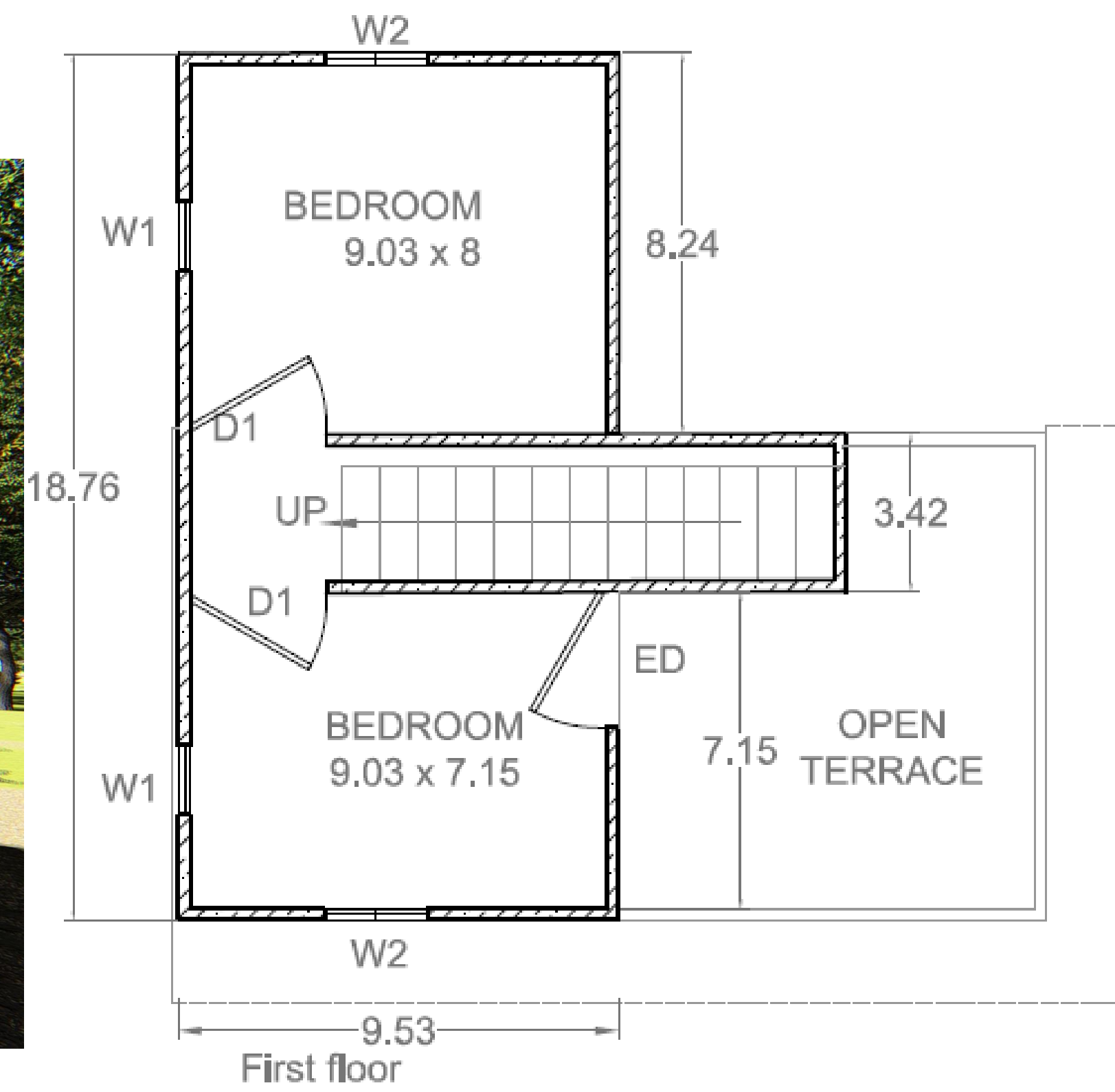
Ground Floor

Flood resilient Basic unit I





# Final housing design



Flood resilient Unit II



# Cluster View



**DEVELOPING APPROPRIATE HOUSE DESIGNS FOR TRIBAL COMMUNITIES IN WAYANAD, KERALA**

**Project Team:** Dr. Shyni Anilkumar  
Dr. Chithra K  
Dr. Deepthi Bendi  
Department of Architecture and Planning, National Institute of Technology Calicut



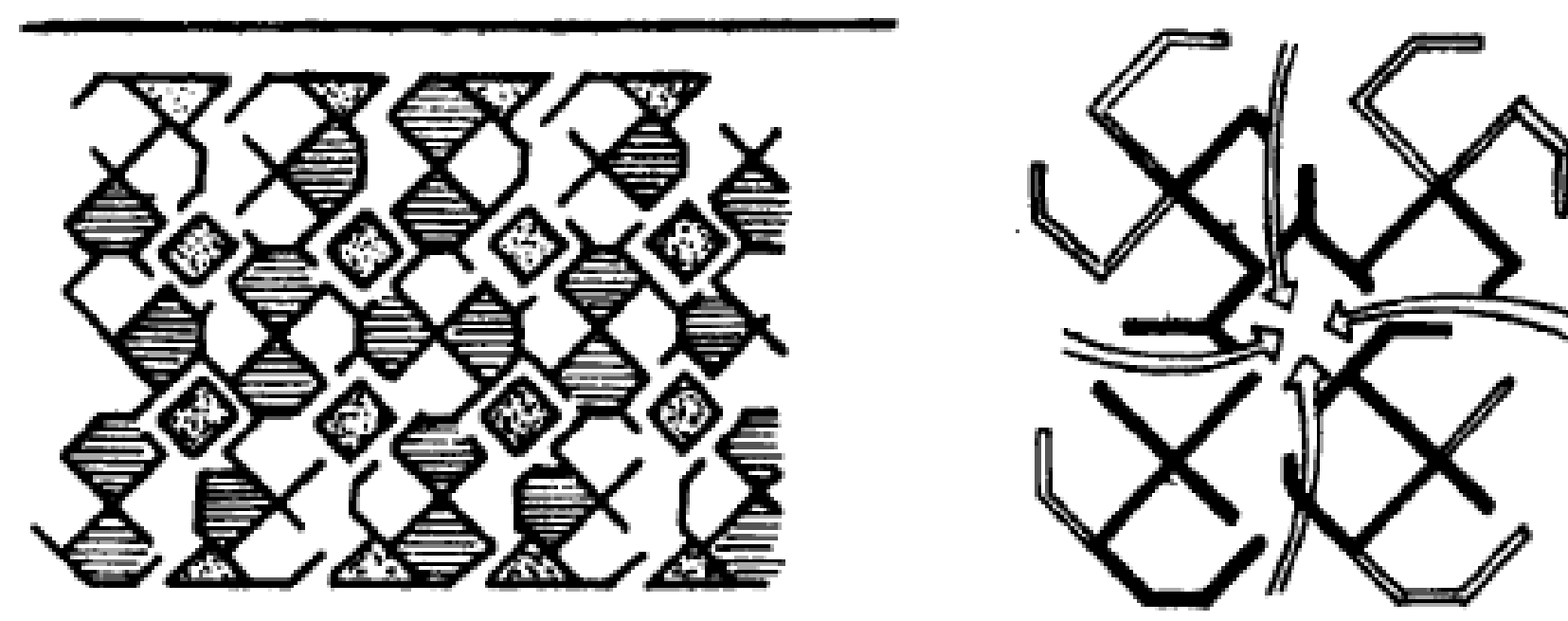
Empowered lives.  
Resilient nations.



The tribal community generally prefers to settle as self-contained groups along with their family or relatives. They also found to be highly bonded each other socially and culturally. Hence the settlement pattern must be promoting their community living as well as must be socially and culturally adaptable. The following sections highlight the approaches for planning settlements for tribal community followed by guidelines for flood resilient planning.

## Type of Housing Cluster

- A cluster is defined as Plots or dwelling units or housing grouped around an open space.
- Ideally housing cluster should not be very large. In ground and one storeyed structures not more than 20 houses should be grouped in a cluster. Clusters with more dwelling units will create problems in identity, encroachments and of maintenance.
- By considering the distinct socio-cultural characteristics of tribal community the study proposes “Interlocking Cluster” as an appropriate housing cluster as shown in figure below.
- Interlocking clusters are formed when the dwelling units are joined at back and on sides with at least one side of a cluster common and having some dwelling units opening onto or having access from the adjacent clusters. Dwelling units in such clusters should have at least two sides open to external open space. Houses in an interlocking cluster can have access, ventilation and light from the adjacent and cluster and also cater for future growth of the settlement.

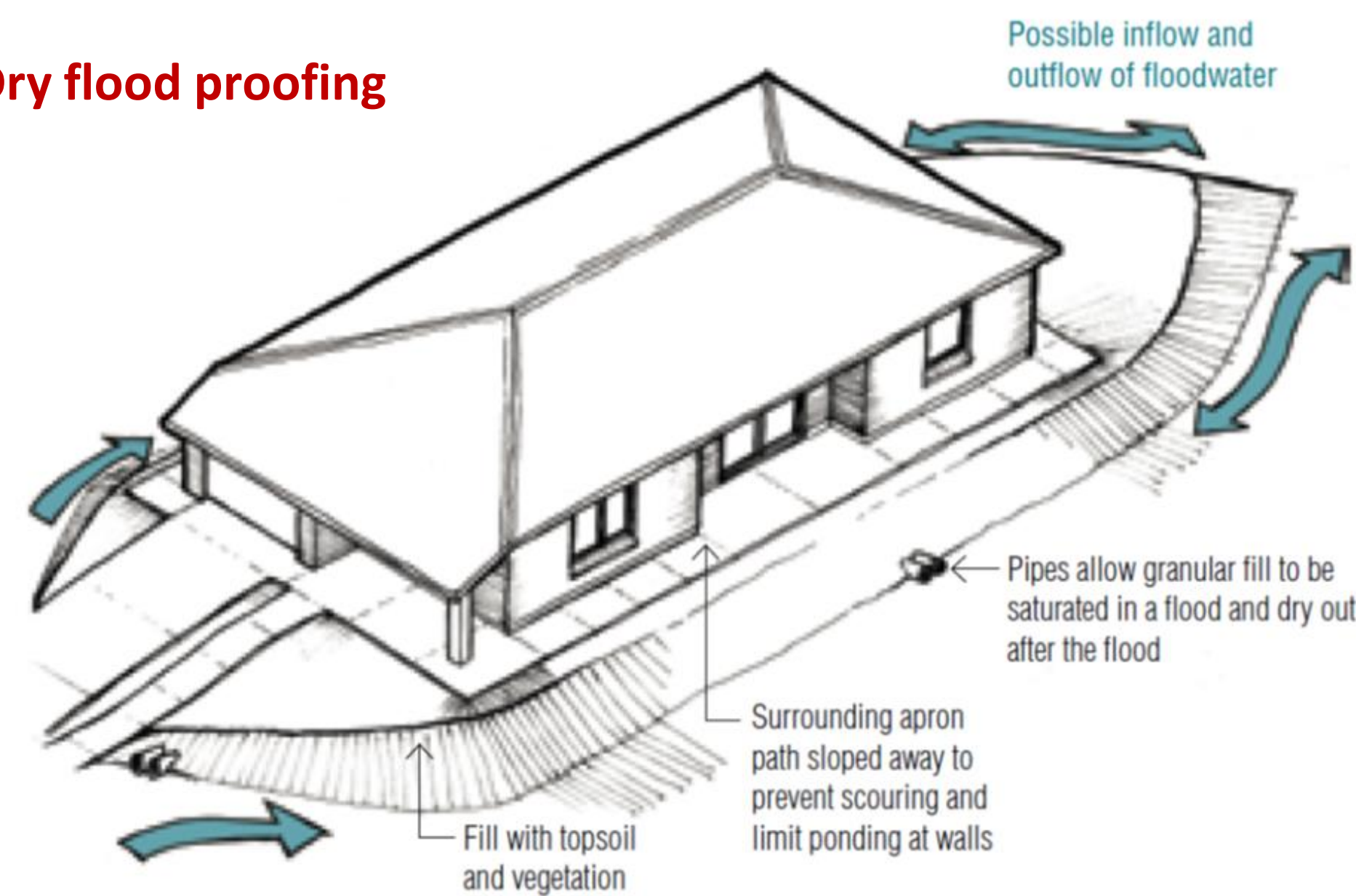


Typical cluster planning

## Guidelines for siting housing in flood prone areas

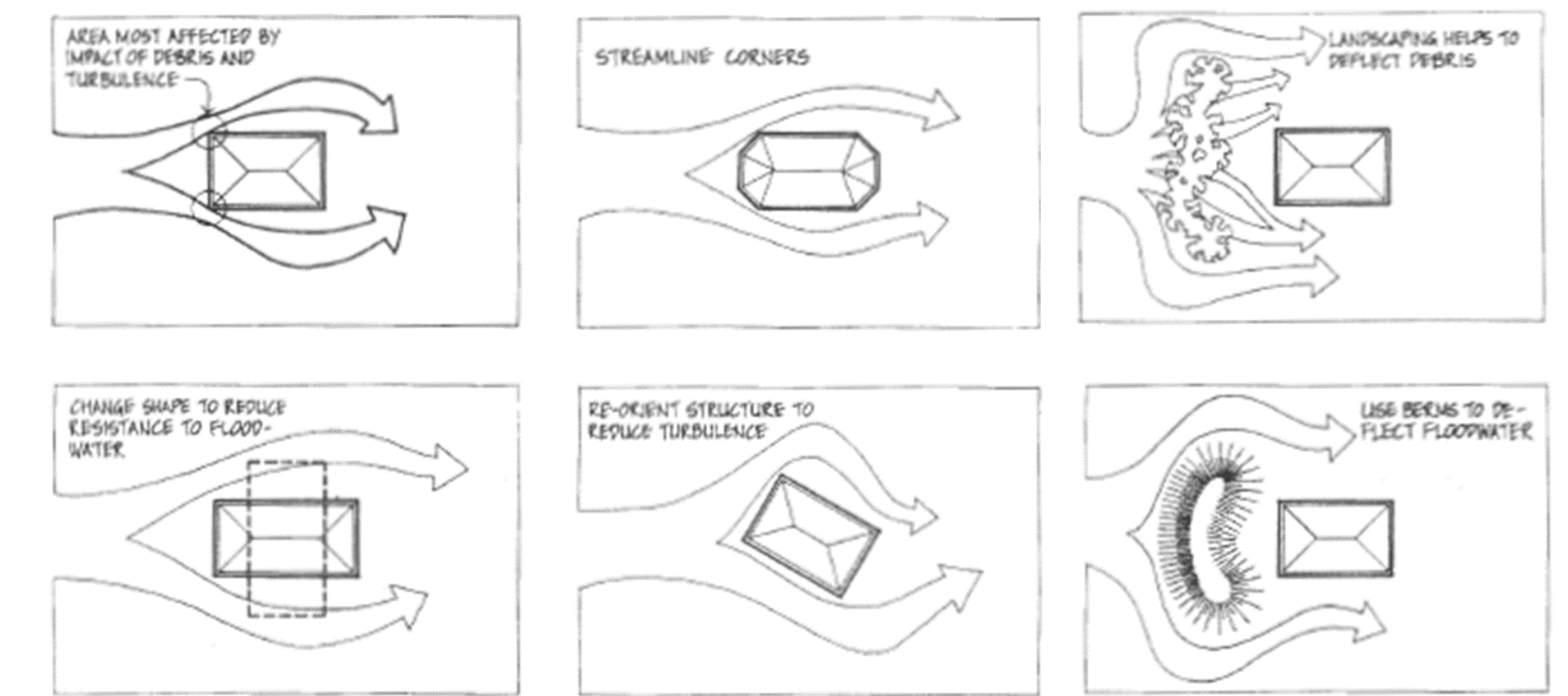
Kerala being a multi hazard prone state the infrastructure reconstruction must incorporate standards and design provisions, stipulated by various international and as well as national agencies for siting and design and construction of buildings and structures. However, in the wake of largescale damage due to flooding, housing in the flood prone areas need to be constructed following the flood resistant design provision as per the code for Flood Resistant Design and Construction, as well as National Disaster Management Guidelines-Management of Floods by National Disaster Management Authority, India. New construction and substantial improvements shall be designed and constructed, to resist flotation, collapse, or permanent lateral movement resulting from the action of hydrostatic, hydrodynamic, wind, and other loads during design flood. The basic approaches and guidelines for settlement planning in flood prone areas have ben explained below.

### Dry flood proofing



- Dry flood proofing is advised for the houses where depths of inundation is potentially high.
- Dry flood proofing uses levees, door seals and walls to stop water from entering the house as given in above figure. This can be achieved by raising the house on earthen fill or embankments as shown in the figure above.
- Fill can be shaped to optimise the flow of floodwater around the building In either case, earthworks or fill and the house building shape should be planned to divert floodwater away from buildings. ASCE 24 limits dry flood proofing to areas where flood velocities are less than or equal to 5 feet per second.

## Building Siting and Orientation



- Orientating the house across the flow can reduce the clearance between houses, which increases the local velocity around the house. Hence orientating the house as the shorter wall faces the water flow.
- It is always ideal to build houses according to the natural topography of the plot. It is also advised to streamline the corners, as these are likely to be mostly damaged due to impact of debris and turbulence.
- If the length of the house is more in one direction, then the house should be oriented in such a way that the shorter wall faces the direction of flow to minimize the damage.
- New houses should be constructed in such a manner that evacuation route is clear. Access roads to settlements should be designed in such a way that evacuation in case of flood events is easy.
- The houses should not be constructed along the path of drainage of flood water. In an area which is likely to be hit by floods, the land-use planning regulations should clearly define at what distance from riverbeds would it be safe to locate the settlement. The figure above explains the best possible ways of building orientation in flood prone areas.

### Layout of buildings

The layout of buildings in the settlement should be in such a way that, there is adequate spacing between the buildings. This is to ensure that the velocity of the water flowing between the buildings does not increase and thus cause more damage to the buildings. It is most ideal to construct square shaped buildings as they are proved to be more stable. It is ideal to construct circle shaped structures or houses with their sides inclined to the flow of water thus to reduce the damage due to flow of water.