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THE APPLICATION OF THE HEALTHY STILT HOUSE CONCEPT BASED ON THE LOCAL WISDOM OF BAJO ETNIC AT WURING COASTAL SETTLEMENT IN MAUMERE TOWN

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ABSTRACT
The Wuring coastal settlement in Maumere City is inhabited by the Bajo community, characterized by traditional wooden stilt houses built over the sea and connected by plank and bamboo walkways, as well as several houses on land with concrete foundations and brick walls. However, increasingly complex environmental conditions and inadequate sanitation facilities have degraded the quality of the settlement. Frequently observed issues include the accumulation of plastic waste, household waste and sewage on the seabed during low tide. This research aims to examine the application of the healthy house concept based on Bajo local wisdom in the Wuring coastal area. The research employs a descriptive qualitative method with an ethnographic approach, utilizing comparative and empirical analysis through field observations, interviews and literature studies. The results indicate that aspects of Bajo local wisdom can be integrated with healthy house standards in spatial planning, facade openings, sanitation management and waste systems. The implementation of a healthy stilt house concept rooted in local wisdom can enhance the quality of the housing environment while preserving the cultural identity of the Bajo people.

KEYWORDS: coastal settlements, healthy stilt houses, local wisdom, the Bajo etnic, Wuring

Permukiman pesisir Wuring di Kota Maumere dihuni oleh masyarakat Suku Bajo, dengan karakteristik rumah panggung kayu tradisional dibangun dibangun di atas laut dan dihubungkan dengan jalan titian papan dan bambu, juga beberapa rumah di daratan dengan fondasi beton dan dinding bata. Namun, dengan kondisi lingkungan yang semakin kompleks dan fasilitas sanitasi yang tidak memadai telah menurunkan kualitas permukiman. Masalah yang sering terlihat yaitu di dasar laut yang surut terdapat sampah plastik yang menumpuk, sampah rumah tangga dan limbah toilet. Penelitian ini bertujuan untuk mengkaji penerapan konsep rumah sehat berbasis kearifan lokal Suku Bajo di wilayah pesisir Wuring. Metode penelitian ini adalah deskriptif kualitatif dengan pendekatan etnografis dan analisis masalah dilakukan secara komparatif dan empiris melalui observasi lapangan, wawancara, dan studi literatur. Hasil penelitian menunjukkan bahwa aspek kearifan lokal Suku Bajo dapat diintegrasikan dengan standar rumah sehat pada tata ruang rumah, bukaan fasad, pengelolaan sanitasi dan sistem persampahan. Penerapan konsep rumah panggung sehat yang berakar pada kearifan lokal dapat meningkatkan kualitas lingkungan perumahan sekaligus melestarikan identitas budaya Suku Bajo.

KATA KUNCI: *permukiman pesisir, rumah panggung sehat, kearifan lokal, Suku Bajo, Wuring*

INTRODUCTION

Coastal communities have developed social systems intertwined with maritime values and cultures that significantly influence settlement patterns (Kusnadi, 2009). Cultural aspects play a more pivotal role than physical factors in shaping these patterns, even as modernization continues to alter spatial functions. Diverse natural conditions, livelihoods, education and technology have resulted in varied settlement layouts across mountainous, coastal and littoral areas (Lautetu et al., 2019). In coastal regions, settlement patterns are inextricably linked to the sea, serving as the core of both economic and cultural identity.

A prominent example of such a settlement is the Bajo village in Wuring, East Nusa Tenggara, which is

constructed over the sea and connected to the mainland. This profound emotional and economic attachment to the marine environment enabled the Bajo people to survive the devastating 1992 earthquake and tsunami. Their traditional lifestyle is reflected in their houseboats, known as *sapau*, which historically served as both residences and primary means of livelihood. Transformations in Wuring demonstrate an adaptation to modern needs while maintaining a distinct maritime identity. This phenomenon creates a unique spatial configuration where houses built over the water stand adjacent to those on land, interconnected by bamboo or plank walkways.

Furthermore, the condition of a dwelling significantly impacts the health of its inhabitants. A home serves as a sanctuary essential for physical, mental and social well-being, fostering healthy, prosperous and harmonious familial relationships (Akib et al., 2025). For a residence to be considered habitable, it must be equipped with basic facilities such as clean water, latrines, drainage and waste disposal systems to prevent the transmission of diseases (Rosalina et al., 2023).

A clean home that meets health standards can mitigate the risk of environment-related diseases, including tuberculosis, dengue fever, influenza, diarrhea, polio and various skin infections (Azhar, 2022). A healthy dwelling should feature dry walls and floors, adequate ventilation, natural lighting and a safe geographical location (Kepmenkes RI No. 829/Menkes/SK/VII/1999). Psychologically, a residence must also provide a sense of security and comfort, both of which are vital to an individual's overall health (Ashadi & Anisa, 2017).

The Bajo people possess a unique tradition of constructing stilt houses that has been passed down through generations (Rubama et al., 2024). Distinctive characteristics of these stilt houses include:

1. A stilt design utilizing wooden poles embedded into the seabed or coastal soil, protecting the dwelling from tidal fluctuations and waves.
2. A simple spatial arrangement that separates public areas (such as the terrace and living room) from private quarters (bedrooms) and utility spaces (the kitchen and fishing equipment storage).
3. A direct connection to the sea, evidenced by the presence of ladders or small jetties attached to the houses for immediate boat access.

These cultural values influence the physical form of the buildings, as well as the patterns of social interaction and economic activities within the community (Salipu et al., 2022). While this local wisdom has proven resilient to coastal environments, certain technical aspects do not align with modern housing health standards. Increasingly complex environmental conditions and inadequate sanitation facilities have degraded the quality of the settlement. A prevalent issue is the accumulation of plastic, household and sewage waste on the seabed during low tide. This study aims to analyze local wisdom in social interaction and residential environmental planning and its influence on promoting a healthy lifestyle.

METHODS

This research adopts a social constructivist perspective, utilizing descriptive qualitative methods and an ethnographic approach (Nurislaminingsih, 2024). Qualitative methods aim to understand the underlying meaning of specific phenomena based on the perspectives of the Bajo people (Creswell, 2012). Ethnographic research seeks to comprehend and describe the culture and behavior of a social group from their own viewpoint, employing field observation, interviews and document analysis or literature studies. The process of understanding, investigating and conducting 'reality testing' on these phenomena within a real life context requires direct access to the Bajo community (Gunawan, 2013). Comprehensive physical and non-physical data serve as the foundation for the information required to formulate hypotheses for subsequent research. Such hypotheses can be developed into a healthy stilt house concept that integrates the local wisdom of the Bajo people.

This research examines the prevailing conditions within the Bajo community and explores the intricacies of their daily lives. Consequently, these facts are viewed as unique phenomena with specialized meanings that constitute the essence of social reality within the Bajo community.

Data Collection Methods

Data collection was conducted through observation, interviews, and a literature review (Jogiyanto, 2018). The research instruments included an interview guide concerning aspects of Bajo local wisdom and resident behavior within the domestic space, as well as tools for physical measurements. Measuring tapes were utilized to determine house area, interior dimensions, ceiling and roof heights, opening sizes (doors, windows, and ventilation) and stilt height. Other technical instruments included a Wet Bulb Globe Temperature (WBGT) Heat Stress Meter and a thermohygrometer to measure indoor temperature and humidity, a lux meter to assess natural lighting intensity and an anemometer to measure wind speed.

The research population comprised all stilt houses located both on land and over the sea. The sample consisted of four detached stilt houses: two located over the sea and two on land. These sample

houses reflect the characteristics of Bajo local wisdom across various aspects of life and demonstrate evolutions in spatial usage that impact resident health and the general environment.

Data Analysis Method

Data analysis was conducted qualitatively using a comparative and empirical problem solving approach. The process of data processing and analysis, performed through comparative and empirical means, is referred to as Qualitative Comparative Analysis (Ismayani, 2019). This method involves comparing empirical data gathered from observations, interviews and documentation regarding local wisdom, resident behavior and physical measurements of Bajo houses against theoretical frameworks, standards and healthy housing requirements to identify the distinctions and correlations between the two.

RESULTS AND DISCUSSION

History of the Bajo Tribe in Wuring Village

The Bajo people of Wuring possess a unique history within Nian Tana Sikka. Following the expansion of Islam in the 15th century, the Bajo migrated southward to Kalimantan, Sulawesi and Nusa Tenggara, eventually reaching Maumere. They established the village of Wuring and became integrated into the Sikka Kingdom during the reign of Don Thomas Ximenes da Silva, who granted them permission to settle and construct dwellings there (Gobang et al., 2017).

Wuring subsequently evolved into a center for trade and the propagation of Islam. Its commercial potential attracted various ethnic groups including the Butonese, Selayar, Javanese, Palue and Ende who followed the Bajo to the region for economic reasons.

Local Wisdom Values in Stilt Houses

The stilt house serves as a symbol of the culture and local wisdom of the Bajo people. The design of these dwellings is engineered to adapt to environmental conditions, particularly in areas subject to high tides. The floor is elevated on pillars ranging from 150 to 300 cm in height. When viewed orthogonally (vertically), a stilt house comprises several essential sections that support the occupants activities, including:

1. *Aje* (foot) serves as a protective foundation for the upper structure of the house and must be elevated to safeguard the life above it. The sub space supported by the aje is known as *diaruma*, which depending on the environment, may serve specific functions such as a berth for a boat (*bido*) or other spatial uses when located on land.
2. *Watang* (body) and *Ulu* (head) represent the core of life that must be protected and preserved to ensure that the guardians of the house, including ancestral spirits, remain content and continue to grant health and happiness to the residents. These two sections are collectively referred to as *ruma* or *rumak* (the body of the house, including the roof), serving as the primary living area for human habitation.

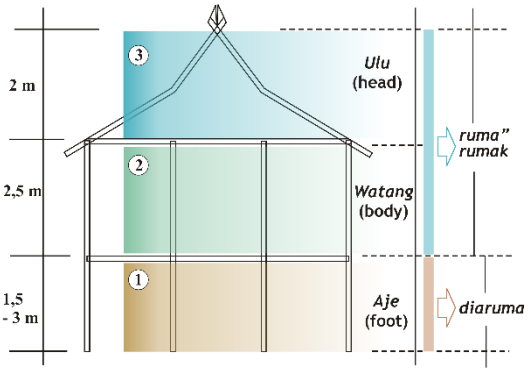

Figure 1. Illustration of an Orthogonal (vertical) Section of a Bajo Tribe Stilt House (Source: Author's Document, 2026)

Symmetrically, the horizontal layout of a stilt house comprises several spaces that support daily activities, including:

- *Paselo*, the front porch, serves as a semi private space that facilitates social interaction within the community.
- *Bundaang*, the front or living room, functions as the primary space for all family celebrations, often extending to the front porch. The *bundaang* is interpreted as a multifunctional central room, serving as a living area, family room and bedroom. Activities centered in this front portion of the house are known as *ma'bundaang*.
- *Tingnga*, the family bedroom. This room typically features a central pillar, often referred to as the "*raja pillar*" or "*pocci bola*" (the navel of the house).
- *Buliang*, a unique rear chamber, refers to the back area of the house, encompassing the family room, kitchen, back terrace and for houses on land the backyard. Activities centered in this rear space are known as *ma'buliang*.
- *Dapurang*, the kitchen area used for cooking.
- *Tatambe*, the terrace located at the rear of the house. The *tatambe* plays a crucial role as a supporting space for traditional ceremonies and maritime rituals. It is most notably used for the *Bantang* ritual, where infants are bathed in the sea during the birthing process. The *tatambe* is a vital component of the spatial structure of Bajo stilt houses, particularly those built over water. This space is often developed into a home for new family members, reflecting the profound values of kinship and solidarity within the Bajo family.

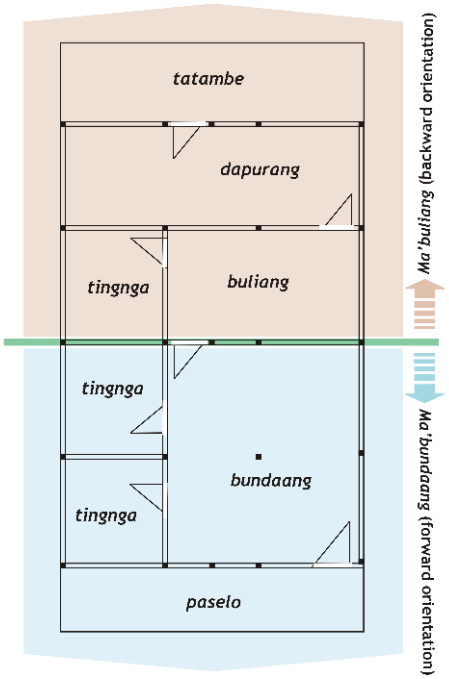

Figure 2. Illustration of the Symmetrical Floor Plan (horizontal) of the Bajo Tribe's Stilt House
(Source: Author's Document, 2026)

Physical Measurement of the Bajo Tribe's Stilt House

The measured aspects include structural safety and durability (maritime durability), activity space requirements, residential health standards, clean water provision and waste management.

1. Safety and Structural Resilience

Minimum safety and security standards for simple residential buildings relate directly to the foundations, walls and roof (Abdullah, 2023). Other components, such as ceilings, gutters and similar elements, focus more on the building's aesthetics. Survey results indicate that the primary structural types of these buildings can be described as follows:

- Foundation

Based on observations and interviews with residents, the buildings utilize a foundation of supporting poles driven into the seabed by shaking the timber until it is embedded at a depth of up to one meter. The seawater entering the pile holes facilitates the driving of these poles, a process that is most efficiently executed when the sea level is approximately 75 cm. A large house may require up to 16 supporting poles, while simple houses typically necessitate nine (Key Person interviews, 2025). Conversely, houses on land employ *Umpak* foundations, where house posts are placed upon stones and wooden columns are set directly on the ground as a foundation.

Figure 3. The Foundation Structure of the Bajo Tribe's Stilt House
(Source: Author's Document, 2026)

- Walls

The application of wall materials in these houses consists of wooden planks and plywood. Some dwellings do not meet established standards, particularly regarding material quality, minimum wall height and the dimensions of openings. However, several houses still comply with standards following renovations, especially those involving the installation of larger openings. The primary obstacle remains the habits or behavior of the homeowners, who seldom open their windows.

Figure 4. Condition of Openings in the Walls of the Bajo Tribe's Stilt Houses
(Source: Author's Document, 2026)

- Truss and Ceilings

Nearly all homes utilize wooden trusses with dimensions of 5/10 and 8/12, which comply with the design requirements and size standards for Simple Healthy Homes. However, some dwellings feature trusses positioned low to the floor, which can pose a safety risk to occupants. These low set trusses result in lower ceilings, creating a more cramped interior space and significantly reducing airflow.

2. Activity Space Requirements

To meet individual space requirements for domestic activities, an area of $9m^2$ per person with a ceiling height of 2.80m is required (Salipu, 2023). This standardization serves to assess the suitability of

housing for healthy living and the proper execution of daily activities. Data from sample houses show that while individual space requirements are generally met, some instances exceed capacity due to multifunctional rooms that increase overall room size. However, the quality of the living space fails to meet standards because low ceilings make the rooms feel cramped and uncomfortable, thus falling short of minimum spatial requirements. An overview of spatial usage for daily activities is as follows:

- Residents of stilt houses over the sea tend to utilize the *paselo* (front terrace) and *tatambe* (rear terrace) for activities, as these are open spaces that accommodate more people during both the day and night.
- Residents of stilt houses on land tend to utilize the *diaruma* (the space beneath the house) for activities, which similarly provides an open area for free social gathering during the day.
- Residents typically use the ruma/rumak space only for formal occasions, such as ritual ceremonies or receiving guests. This interior space remains largely formal and is rarely used due to a lack of environmental comfort.

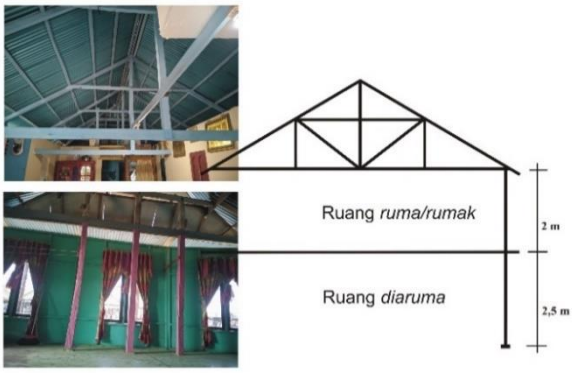

Figure 5. Structure of the Truss and Ceiling of the Bajo Tribe's Stilt House
(Source: Author's Document, 2026)

3. Home Health

According to the technical guidelines for Healthy Simple Homes, four primary aspects determine the health and comfort of a dwelling: lighting, wind speed, indoor air temperature and humidity (Keputusan Menteri Permukiman Dan Prasarana Wilayah Nomor : 403/KPTS/M/2002).

Measurements of the sample homes were recorded daily at three specific intervals. These measurements were conducted in June to account for the weather conditions typical of the dry season, which is considered the peak of summer. Data collection followed established measurement times and points within the sample homes, specifically covering the terrace, living room (including family areas and bedrooms) and kitchen. The recordings were taken over a five day period at 9:00 AM, 1:00 PM and 4:00 PM. The results were then compared against established thermal comfort standards for residential areas, including the specific requirements for lighting, ventilation, temperature and humidity within living spaces.

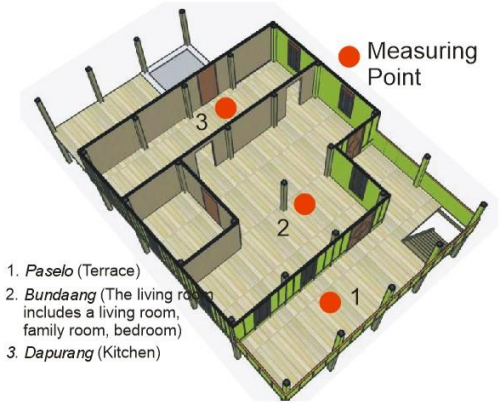

Figure 6. Measuring Points on Bajo Tribe's Stilt Houses
(Source: Author's Document, 2026)

The selection of research samples consisted of stilt houses located both on land and over the sea, specifically including detached stilt types in both environments and *diaruma* stilt types on land.

Figure 7. Measurement with Measuring Instruments
(Source: Author's Document, 2026)

The measurements of natural lighting, wind speed, air temperature and humidity were compared against existing standards and regulations. Lighting standards for residential homes vary based on the room's function and are measured in lux (SNI 03-6197-2000). For indoor wind speed, a range of 0.15 m/s to 0.25 m/s is generally considered comfortable and serves as an ideal ventilation rate for thermal comfort (SNI 03-6572-2001). This value is used as a benchmark for healthy building design. According to SNI 03-6572-2001, the ideal indoor temperature for residential homes is 22–26°C, with ideal humidity levels between 40% and 60%. Specifically, bedroom temperatures may be slightly cooler, approximately 18–22°C, to facilitate better sleep. Ultimately, a room is deemed comfortable if it aligns with normal human body temperature requirements.

Table 1. Measurement Results of Natural Lighting, Wind Speed, Air Temperature, and Humidity Measurements in Bajo Tribe Stilt Houses

Measurement Aspects	Standart	Measure Results
Natural Lighting	• The terrace requires approximately 60 lux, the living room 120–150 lux, the dining room 120–250 lux, the bedroom 120–150 lux, the workspace 120–250 lux, and the bathroom and kitchen each require 250 lux. • Requirements for sunlight as a natural lighting source include: clear weather conditions and uniform light distribution. • Luminous openings must cover at least 10% of the room's total floor area. • Rooms must receive direct sunlight for at least one hour daily between 9:00 AM and 4:00 PM. • Natural and/or artificial lighting, whether direct or indirect, must illuminate the entire room with an intensity of at least 60 lux without causing glare.	• Local lighting measurements were conducted on the terrace, living room, and kitchen between 9:00 AM and 4:00 PM under sunny conditions. These measurements were taken with a lux meter directed toward the light source at a height of 80 cm. • Lighting on the terrace was adequate, ranging from 70 to 325 lux, as the open structure allowed light to enter from all directions. • The diaruma stilt house (Mrs. Normi's residence) on land exhibited suboptimal indoor lighting, ranging from 35 to 55 lux; this was due to facade windows that no longer functioned properly and remained closed, serving merely as wall coverings. • Incoming light was further obstructed by the placement of furniture, room partitions, and laundry drying on the terrace. • Several other sample houses received sufficient daylight, yet the lighting remained ineffective because they failed to meet the minimum opening area requirements, despite the presence of alternative natural light sources such as wall vents, window screens, and roof monitors.
Wind velocity	• Comfortable indoor air speeds range from 0.1 to 0.25 m/s, with a healthy and ideal ventilation rate of 0.15 m/s to 0.25 m/s for thermal comfort. • Comfortable indoor air must satisfy the following requirements: a) Ventilation openings must comprise at least 5% of the room's floor area; b) The volume of incoming air must equal the volume of air exiting the room; c) Incoming air must not originate from kitchen smoke or odors from the bathroom or toilet.	• Wind speed measurements for natural ventilation indicate that several ventilation sources are not functioning optimally; windows are non-functional, and overall ventilation within the buildings is extremely limited. • This results in a lack of cross-ventilation, where the wind speed and the volume of incoming air are disproportionate to the air exiting the room, rendering indoor air conditions inconsistent with the "Simple Healthy Home" concept. • Measurements conducted with an anemometer showed varying results for each house. • The anemometer was positioned one meter from window and ventilation openings. Wind speeds were significantly higher than standard values, averaging 1.15 m/s for houses located over the sea and 0.65 m/s for houses on land, contributing to high humidity levels.
Air Temperature and Humidity	• The ideal indoor temperature for a home is 22–26°C, with humidity levels between 40% and 60%. A slightly cooler bedroom temperature, approximately 18–22°C, can help promote restful sleep. • Maintaining humidity within this range can improve comfort and respiratory health, while preventing the growth of mold and viruses.	• Air temperature and humidity values reveal distinct differences between houses located on land and those situated over the sea. • Average air temperatures are relatively uniform across both locations, ranging from 32°C to 35°C, which is considered high. • Humidity levels vary significantly; houses on land exhibit quite high humidity, ranging from 73% to 75%, whereas houses over the sea range from 54% to 68%.

The three aspects mentioned above are heavily influenced by the condition of the openings, specifically their type and dimensions within the stilt houses. While houses on land and those over the sea utilize nearly identical types of openings, their dimensions vary. Results from the measurements of both house types indicate that several factors namely wind speed, air temperature and humidity fail to meet healthy housing standards. Consequently, it can be concluded that the quality of indoor comfort is significantly influenced by the condition of the openings, the vertical and horizontal spatial arrangement, the position and layout of the house and the habits or behavior of the occupants regarding the use of these openings (Nugroho, 2019).

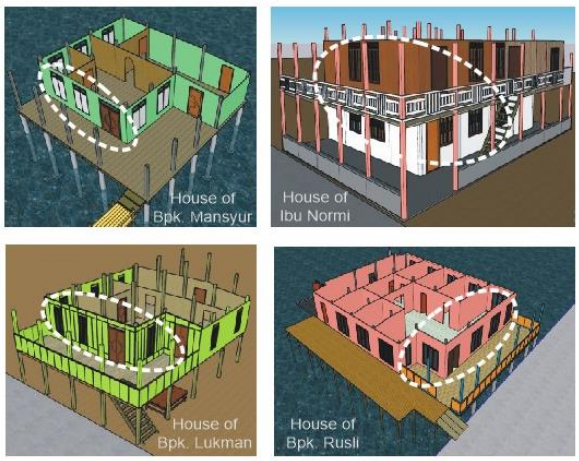

Figure 8. Types and Dimensions of Openings in the Bajo Tribe's Stilt Houses
(Source: Author's Document, 2026)

4. Provision of Clean Water and Waste Management

- Clean Water

  The Bajo people utilize clean water provided through PDAM (Regional Water Utility Company) piping installations. Clean water is supplied on a regular schedule, generally preventing significant issues; however, some installations do not function properly, leading to complaints regarding limited clean water access.

- Sanitation and Waste Management

  The sanitation situation regarding waste remains critical due to the continued reliance on direct disposal into the sea. Waste management in Wuring Village is an issue that requires serious attention; poor practices are evident in the residents' habit of dumping waste directly into the water and the lack of adequate communal receptacles on land. Consequently, the Wuring residential area appears unsanitary and neglected.

Health assessments are conducted based on the housing suitability index established by the Ministry of Public Works and Public Housing (PUPR) under Law No. 1 of 2011 concerning Housing and Settlement Areas, Government Regulation No. 14 of 2016 concerning the Implementation of Housing and Settlement Areas and Ministry of Health Decree No. 829/Menkes/SK/VII/1999 concerning Requirements for Healthy Homes.

A comprehensive analysis of the Bajo Tribe's housing in Wuring Village, evaluated against the technical concept of Healthy Simple Homes, reveals that most sampled houses fall into the following problem categories:

- Disorganized positioning, spatial patterns, and layouts within the residential area.
- Poor sanitation and waste management, resulting in an unsanitary environment.
- Structurally unsound or risky building conditions.
- Substandard housing health is characterized by a lack of natural lighting (dim or dark interiors during the day), inadequate ventilation (poor air circulation) and high temperature and humidity levels resulting from these lighting and ventilation deficiencies.

Integration of Healthy Concepts

1. Characteristics of Bajo Tribe Architecture and Health Issues in Wuring

The traditional architecture of the Bajo people in Wuring is rooted in the principles of physical and cultural adaptation. Vertically, the *Aje-Watang-Ulu* concept still governs the building layout, where the *Aje* (foot/substructure) serves as a mooring point for boats and a space for natural cooling. Horizontally, the division into semi public (*Ma'bundaang*) and semi-private (*Ma'buliang*) spaces reflects the Bajo cultural hierarchy of privacy. Furthermore, the *Sama Di Lao* philosophy remains the foundation of local wisdom for the Bajo people, who consistently live collectively in marine environments.

Field observations reveal critical health issues within the Wuring Village settlements; most houses situated over the sea still utilize "hanging" sanitation systems, disposing of human and domestic waste directly into the sea below. This practice significantly pollutes the water and contradicts Article 3 of Ministry of Health Regulation No. 82 of 2014 concerning Water Health Requirements, which emphasizes the necessity of healthy latrines. Additionally, inadequate opening dimensions result in restricted lighting, ventilation and air circulation within the dwellings. The use of modern materials, such as uninsulated zinc roofing and excessively low eaves, further leads to a significant increase in indoor temperatures during the day, reducing thermal comfort for occupants. Based on these identified issues, a management plan can be formulated within the context of the micro residential environment.

2. Application of the Healthy Concept to the Bajo Tribe's Micro-Housing on Stilts

The application of the healthy housing concept at the micro level pertains to the structure and construction of house foundations, horizontal and vertical spatial patterns and the design of opening elements, characterized by the following architectural features and health principles:

- Stilt House Foundation

  The structure and foundation construction of Bajo stilt houses utilize water resistant and pest resistant timber, such as ironwood (eusideroxylon zwageri). The timber joining system for house

foundations over the sea employs notches, pegs and lashings. Before being lashed, the posts and beams are notched or recessed and then secured with pegs, nails or nuts and bolts. These notches and pegs ensure the timber members are locked together, meaning the rope lashings typically made of manila or coconut fiber serve primarily as reinforcement to prevent shifting. The foundation system for stilt houses on land utilizes a pedestal (*umpak*) foundation, where the posts are not embedded in the soil but are instead placed upon river stones. This foundation is integral to the stilt structure, which typically rises 2 to 3 meters above the ground.

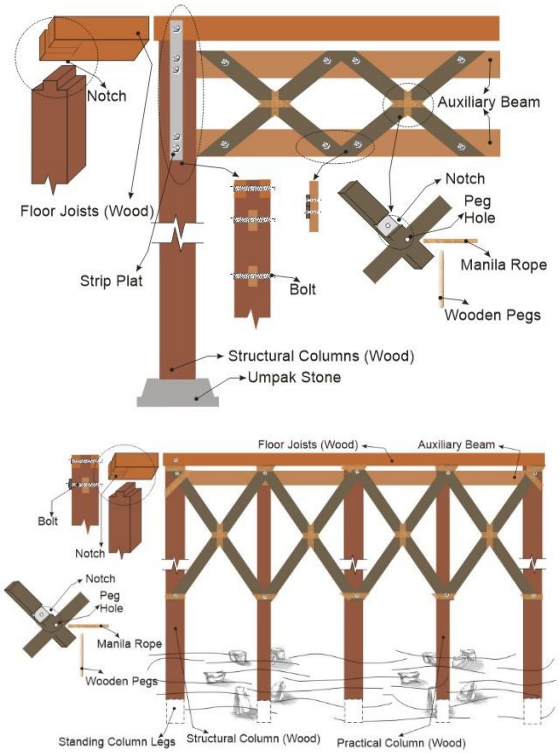

Figure 9. The concept of a stilt house foundation on land (top image) and above sea (bottom image) (Source: Author's Document, 2026)

- Horizontal Space Pattern

The layout includes a paselo, an open space similar to a terrace or pavilion, which serves as a venue for gatherings, entertaining guests and communal activities. This pavilion functions as a meeting point for the extended family, reflecting the Bajo culture's high regard for family bonds. The central area is a multi purpose space, as Bajo houses typically lack rigid spatial divisions. This area can serve as a bedroom, dining room and gathering space, effectively encompassing both the family room and sleeping quarters.

- Vertical Space Pattern

The structure consists of the *Ulu* (head), *Watang* (body), and *Aje* (foot). The *Aje* section serves different functions depending on whether the stilt house is located on land or over the sea. In stilt houses on land, the *Aje* serves as a socio economic and storage space. The underfloor area of houses on land is often converted into permanent functional spaces, such as shops (for economic activities), garages (for motorcycles or land vehicles), clothes-drying areas, or semi-public gathering spots. It can even function as a primary living area, encompassing bedrooms, kitchens and family rooms (as seen in Mrs. Normi's house). Under the healthy housing concept, the *diaruma* space in land based stilt houses is not recommended for residential use; instead it should remain open for small scale activities, such as resting or gathering while the rear section may be utilized for a permanent toilet facility.

- Utilization of the space under the stilt house

The *Aje* (understructure) of stilt houses over the sea serves as a docking area for boats and a space for marine activities. This underfloor area is used for mooring boats (*sopek* or *leppa*), storing sails and fishing gear and processing seafood during low tide. The space remains a purely open water area and functions as part of the maritime transportation route. In contrast, the *Aje* of stilt houses on land serves as a communal space for social interaction, providing a place for residents to gather and converse.

- Utilization of Rainwater

Install gutters and rainwater harvesting tanks. This water can be utilized for non consumptive purposes, such as laundry or watering plants.

- Door Opening Elements:

The door is the primary entry point into the house (*Watang*), symbolizing the essence of life. Doors must be sturdy and strategically positioned to ensure the safety and privacy of the occupants. The main door, which faces the front porch and the sea or a wooden walkway must be robust enough to protect the interior from extreme weather conditions, such as strong winds and driving rain. The design typically features single or double solid wood panel doors (depending on the size of the house), prioritizing structural strength over ornamentation. Materials consist of solid local timber planks, such as *Posi-Posi*, ironwood (*Ulin*) or other hardwoods. These hardwoods are treated with anti fungal and waterproof coatings to resist corrosion from salt spray and premature decay caused by high humidity and seawater exposure. Solid panel doors, constructed from tightly assembled planks must be sturdy and free of large gaps to completely seal off the room, thereby providing privacy and sound insulation from the outside environment.

- Window Opening Elements:

Wall mounted windows facilitate the entry of natural light and the circulation of air from the upper levels down through the living space. Window design must be adaptive to the hot and humid maritime climate, serving as a primary complement to doors in

ensuring a healthy and comfortable home. Medium to large window sizes are tailored to the specific needs of each room to maximize natural light and airflow, thereby reducing reliance on electric lighting during the day.

Frames are constructed from sturdy, moisture-resistant timber while shutters consist of glass and lightweight wood planks or in traditional houses, woven bamboo. The timber used does not retain heat, ensuring that indoor temperatures do not rise due to heat transfer from the walls or window frames.

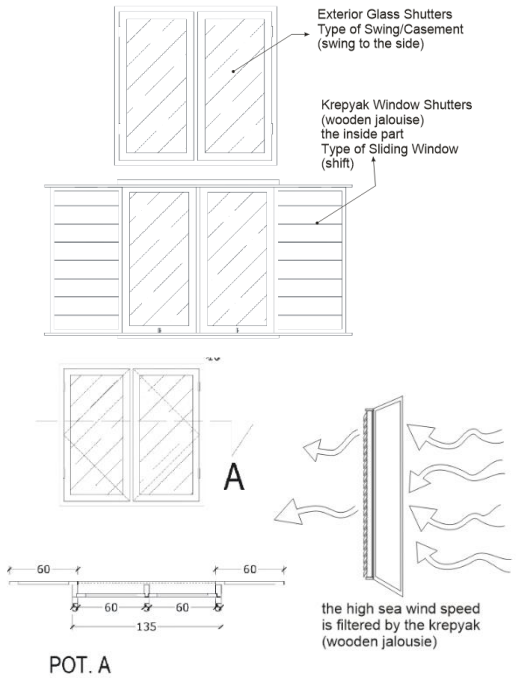

Figure 10. The Concept of Window Openings in Bajo Tribe's Stilt Houses
(Source: Author's Document, 2026)

The healthy concept for window types involves a combination of exterior casement windows and interior sliding louvered shutters. The shutters function as a means of both privacy and climate control. This window combination maximizes the entry of natural light and airflow into the room. The main window is made of clear glass mounted on a wooden frame and swings outward to provide maximum ventilation and unobstructed sea views. While closed, the glass ensures abundant natural light while protecting the interior from rain. Meanwhile, the wooden slats of the sliding louvered window allow for continuous air circulation (permanent ventilation) while providing privacy, filtering direct solar heat and reducing glare to maintain a comfortable indoor temperature.

- Ventilation Opening Elements

Cross ventilation: windows must be positioned on opposite walls to facilitate airflow. Bajo houses utilize permanent, concealed ventilation elements. Upper wall vents, in the form of wooden slats or simple apertures are permanently installed above windows or on walls near the ceiling just below the roofline. These vents play a critical role in releasing hot air. Since heat naturally rises these openings provide an escape for trapped air, drawing in cooler air through the windows below a key mechanism for maintaining optimal 24 hour air circulation.

Furthermore, floorboards are installed with narrow gaps to allow for subtle vertical air circulation and to ensure the floor dries rapidly after cleaning or exposure to water. A naturally dry environment prevents the growth of mold, thereby fostering a healthier living space. Underfloor ventilation is provided by the wide-open space above the sea or land (*Diarumak*), which allows wind to sweep beneath the structure. This helps maintain a cool floor temperature and prevents humidity from rising into the living areas above. This open underfloor design functions as a highly effective passive natural air conditioning system.

- Roof and Overskirt Elements

Other structural elements include a sloping roof (gable or pyramidal) with very wide overhangs. These wide overhangs act as a shield, ensuring that rainwater is shed away from the walls and floors while protecting the timber from direct splashes, which can lead to dampness, moss growth and accelerated weathering. Additionally, gutters are necessary for houses using zinc roofing or modern materials to effectively direct rainwater. It is recommended to install gutters to channel this water into large tanks or barrels (Rainwater Harvesting) as a secondary source of clean water for washing and other non consumptive purposes, thereby reducing dependence on limited water supplies.

- Distance between houses

The ideal distance between houses is set at a minimum of 2 meters to facilitate natural lighting and air circulation into the interior, thereby maintaining humidity levels within normal ranges.

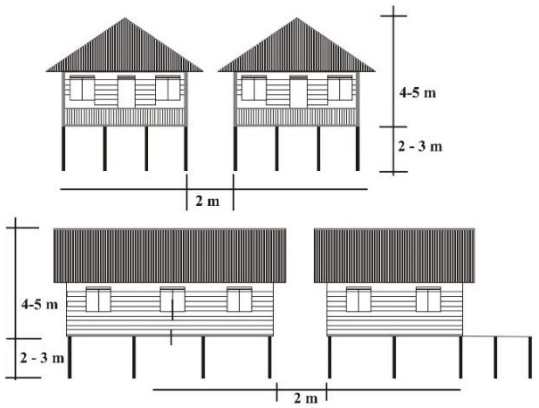

Figure 11. Distance Between Bajo Tribe Houses
(Source: Author's Document, 2026)

- House Position

Houses located over the sea are arranged along the road in a single row layout to allow unobstructed air circulation into the living spaces and ensure the quality of cross ventilation. The house design should facilitate direct interaction with the sea; ocean facing windows, steps leading to the water or a small private dock connected to the structure will support daily activities such as departing for sea or managing boats.

- Waste Management

The healthy waste concept focuses on transitioning from the habit of disposing of waste into the sea to a 3R system (Reduce, Reuse, Recycle) and centralized collection. This concept must be integrated into a community based waste management system. The waste separation strategy involves providing two bins for each household one for organic waste (food scraps, leaves) and another for inorganic waste (plastic, bottles, and cans) to encourage residents to sort their waste at the source. Communal waste collection points: each cluster of houses is provided with a shared collection point situated in an open area.

3. Occupant Behavior

Research results indicate that residents' window opening habits are not optimal, preventing sufficient sunlight from entering the home and causing increased indoor humidity. Furthermore, while general house cleaning habits are positive, waste disposal behavior requires significant improvement. Many residents dispose of waste in the sea or in an indiscriminate manner due to a lack of trash bins and inadequate access to collection services. Regular socialization is necessary for education and regulatory enforcement to ensure the success of the healthy housing concept through behavioral change. This includes continuous awareness programs regarding the impact of marine debris and the enforcement of fines for those polluting the sea, bolstered by the integration of local wisdom such as the motto "*Lao Denakangku*" which signifies that the ocean is a brother (Prasetio & Ronaboyd, 2022).

CONCLUSION

The stilt houses in Wuring serve as a symbol of local identity and wisdom, yet their current physical condition is fragile. Targeted interventions combining technical improvements, economic support and cultural preservation are essential to maintain a safe and healthy settlement. The concept of healthy stilt houses can be applied to the coastal settlements of Wuring, Sikka Regency by accounting for local conditions, Bajo culture and environmental health principles. Implementing this concept rooted in the local wisdom of the Bajo Tribe in Maumere, represents an integral effort to preserve culture while improving quality of life. The recommended design successfully synthesizes traditional values such as stilt architecture, the use of local materials like *posi-posi* wood and the *Ma'bundaang-Ma'buliang* spatial division with the requirements of modern health standards. Key innovations include replacing suspended sanitation systems with isolated, watertight septic tanks (biofilters), as well as refining architectural details like roof insulation and the combination of glass and louvered (*krepyak*) windows to achieve optimal thermal comfort and cross ventilation. This concept is expected to provide a concrete solution for coastal settlements to create healthy, sustainable housing while continuing to uphold the "*sama di lao*" identity of the Bajo Tribe.

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