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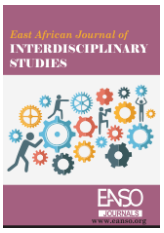

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Original Article

The Built Environment of Kamiti Maximum Security Prison, Nairobi: Implications for Rehabilitation and Psychological Well-being

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Built Environment, Inmate, Psychological Well-Being, Rehabilitation, Sensory Environment.

ABSTRACT

This article explores the built environment of Kamiti Maximum Security Prison in Nairobi, Kenya, analyzing its spatial layout, architectural features, and their impact on the psychological well-being of inmates. Building surveys, guided by a structured observation checklist were used to evaluate the physical characteristics of the built environment, while a semi-structured questionnaire was used to study inmates' perception of the built environment. 250 respondents, drawn from the inmates' population participated in the study. Descriptive correlational analysis was used to relate the in-mates' subjective views to the presiding physical characteristics of the built environment. The study findings identified the constructed environment as the sovereign contributor of psychological dis-tress, with significant variation with age, which added 0.016 variance, while length of imprison-ment and marital status had insignificant variation at 0.007 and 0.001 respectively. Both the inade-quate infrastructure and the deficient design of spatial layouts, ward sizes and design, outdoor open spaces, training facilities and sensory environment were identified as the specific attributes of the built environment with significant impact on psychological wellbeing, with significance coefficients of 0.86, 1.84, 0.94, 2.12 and 1.27 respectively. The study thus concludes that the built environment at Kamiti Maximum Prison is driven by colonial punitive principles rather than modern rehabilita-tive strategies. The study highlights the deficiencies in Kamiti's infrastructure and recommends a rehabilitative model that balances security and control; health and well-being; and rehabilitation and reintegration, thereby contributing to the growing discourse on therapeutic prison architecture.

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INTRODUCTION

The built environment plays a crucial role in shaping the experiences of prison inmates. Effective prison design should not only ensure security but also support rehabilitation, reintegration, and psychological well-being. Founded in the early 20th century under the British penal system of capital & corporal punishment and solitary confinement, originally as a detention facility, Kamiti Maximum Security Prison, faces several infrastructural challenges that hinder achievement of its set objectives. These include a lack of inclusive support infrastructure, rigidity against technological advancement and unresponsive design, which Kasau *et al*. (2024) notes retain the colonial aspects 60 years after independence and the establishment of the Kenya Prisons Act, chapters 90 and 92. The Act reviewed the British penal system of corporal punishment replacing it with rehabilitation while retaining solitary confinement. Consequently, Kamiti Prison changed from a detention facility to a Maximum-Security Prison, confining male adult prisoners convicted to more than 10 years of imprisonment sentences and capital remands charged with terrorism-related offences (Mutuko, 2022). Despite policy reforms, infrastructural limitations and high inmate populations continue to strain rehabilitation efforts. For instance, colonial architecture's spatial characteristics restrict the upgrading of vocational skills to accommodate technological advancements, the revised formal education curriculum, the evolving legal system, dynamic lifestyles, and user needs (Kasau *et al.,*2024). Being a colonial heritage, the prison was designed to host 700 inmates; however, it currently hosts approximately 2000 high-risk inmates at any given time. Recent initiatives in the prison emphasize vocational training, education, and mental health support, aligning with global rehabilitation trends. This article examines the spatial layout, indoor and outdoor environments, and psychosocial factors influencing inmates' well-being.

METHODOLOGY

Data on the features of architectural elements was gathered using visual surveys. On-site sketches and photographs were employed to record information regarding architectural design, external elements, internal elements and sensory design. The inventory was subsequently evaluated descriptively using spatial mapping and photographic drawings to identify patterns, constraints, opportunities, and potential design variables.

The study employed purposive sampling to choose Kamiti Maximum Prison due to its provision of long-term sentences to male adults, aspects linked to elevated rates of depression and suicide in controlled environments. It is the only maximum-security institution in Kenya that offers the death penalty. It also holds onto the punitive colonial architecture. The prison facility, at the time of data collection, had a prisoner population of 2600 inmates, comprising of convicted and remanded male adults. Access to remands was highly restricted as the institution classifies this group as a security threat. The convicted population of 1952 inmates formed the target population. The prison

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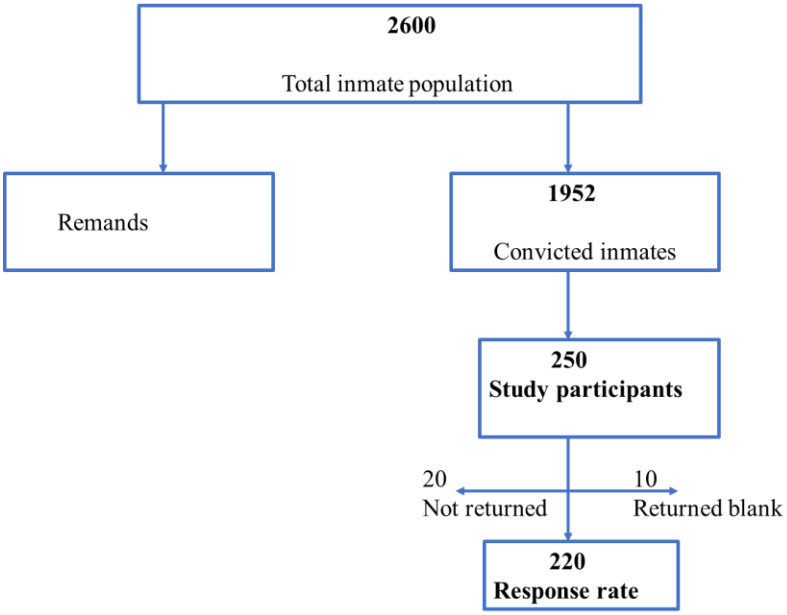
authority permitted 250 respondents to participate in the research, therefore forming the sample size. Simple random sampling was used to pick the permitted 250 inmates from across all the rehabilitation programs based on individual willingness to participate in the interviews, as depicted in Figure 1. Thus, every individual in the convicted population had an equal chance to participate. The parameters of the built environment studied were those occupied by the convicted population; thus, the wards, workshops and outdoor open spaces formed the sample size for the physical environment.

Figure 1: Flowchart of Sampling and Sample Size.



Semi-structured questionnaires, comprising standardized open-ended questions and statement format responses in Likert-type scales, were employed to collect data on inmates' perceptions of the built environment. The questionnaire was administered in group sessions. Responses were examined descriptively and presented narratively. Correlational analysis was employed to ascertain the association between these architectural features and the psychological well-being of inmates, followed by a regression analysis to determine the strength of the relationship. Ethical clearance, approved by the Kenyatta University Ethics Review Committee, was secured, and informed consent was read and elucidated to the study participants prior to the initiation of data collection.

RESULTS AND DISCUSSION OF THE BUILT ENVIRONMENT OF KAMITI PRISON

External Elements

Kamiti Prison follows a rectilinear campus-style layout, with hierarchical zoning from restricted to unrestricted areas as illustrated in Figure 2. The physical arrangement prioritizes surveillance and security but lacks rehabilitative considerations. Buildings are asymmetrically aligned, further disrupting the flow of movement and interaction.

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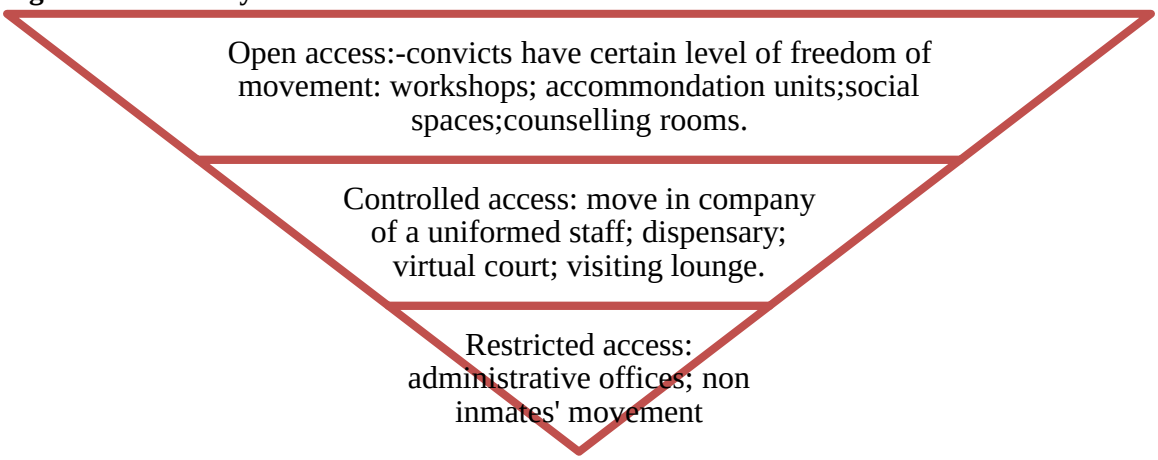
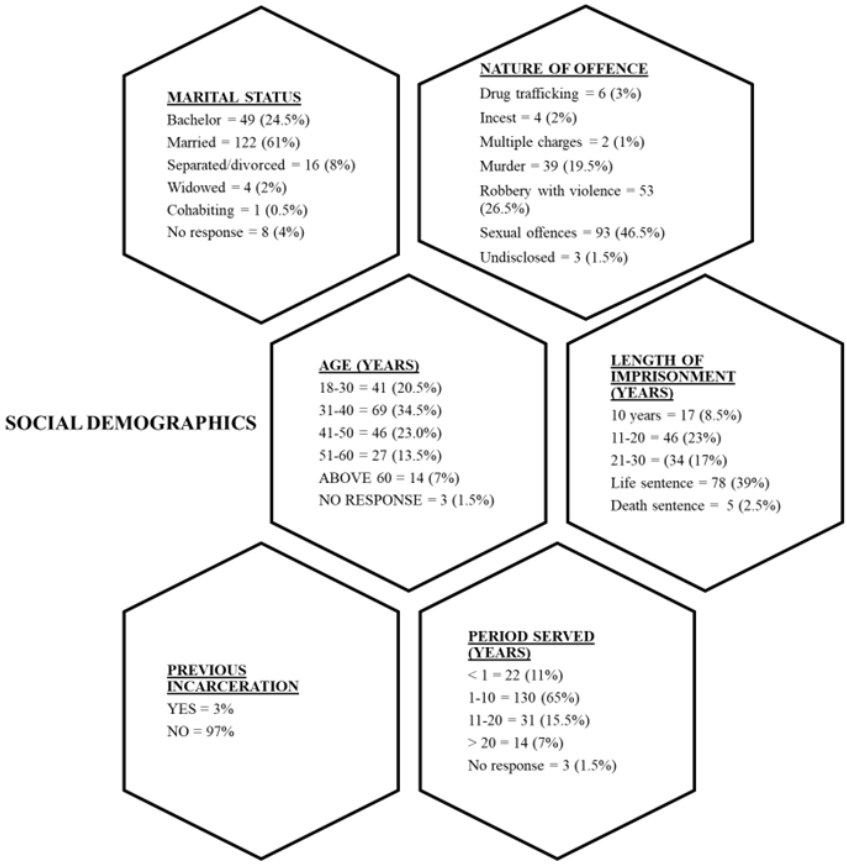
Figure 2: Hierarchy of Different Zones.



The linear layout arranges the elements asymmetrically, prioritising surveillance and security. However, this study found the arrangement to overlook rehabilitative consideration. The survey highlighted several elements that participants perceived as vital yet were lacking. 52.5% of the study participants were sexual and drug-related offenders, as shown in the social demographics chart in Figure 3. Kamiti Maximum Prison categorizes these types of detainees as requiring greater therapeutic interventions in combination with pharmacological treatment compared to other inmates; however, the prison was found not to have therapeutic spaces.

Figure 3: Social Demographics of the Study Area



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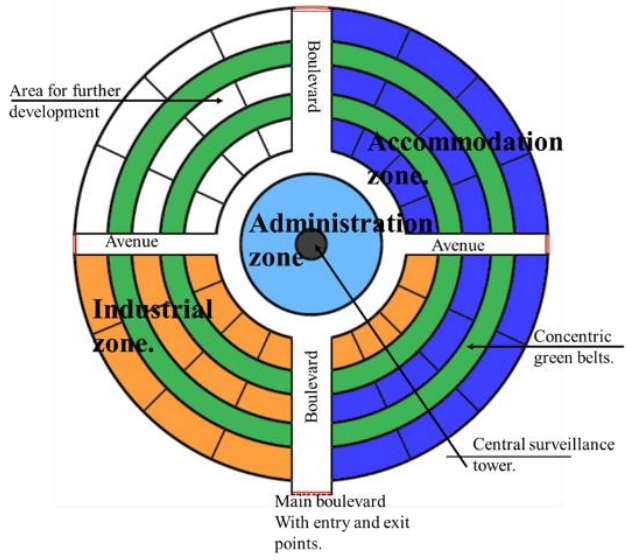
21% of the study participants were over 50 years old; however, no specific design or facilities have been allocated for this elderly population or for the physically impaired inmates who remain confined in the dispensary. The introduction of vocational training and a prison academy after independence, without altering the layout, was identified as a challenge facing prison design. No facilities were found for passive recreation in as much as it was rated among the prevalent coping mechanisms in the subsequent objectives. A multipurpose hall, chaplaincy, and mosque provide support for religious sessions, which are identified in the subsequent objectives as crucial coping mechanisms. The social welfare department organizes social interactive activities such as family visits, canteen purchases, virtual court hearings, and staff-inmate interactions; however, the study identified no suitable facilities to facilitate these psychosocial activities, which are crucial for promoting the well-being of inmates.

The rectangular building shapes are oriented to contradict the rectangular site organization, further distracting the free flow of the site plan as illustrated in Figure 4 below.

Figure 4: Buildings Orientation.

A radial site plan would perfectly balance overcrowding, a wide field of view and rehabilitation while maintaining all the existing activities, as illustrated in Figure 5.

Figure 5: Radial Site Layout.



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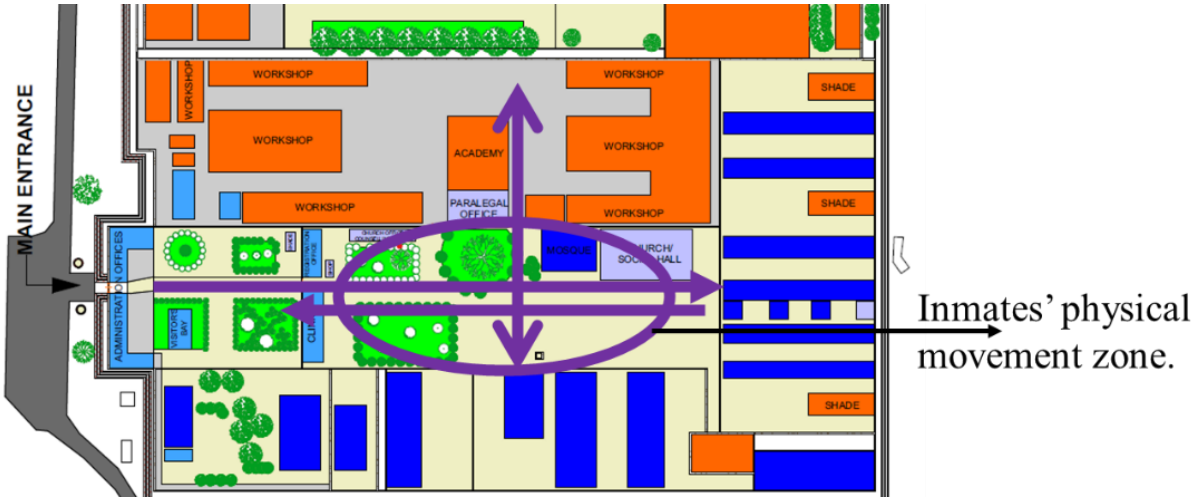
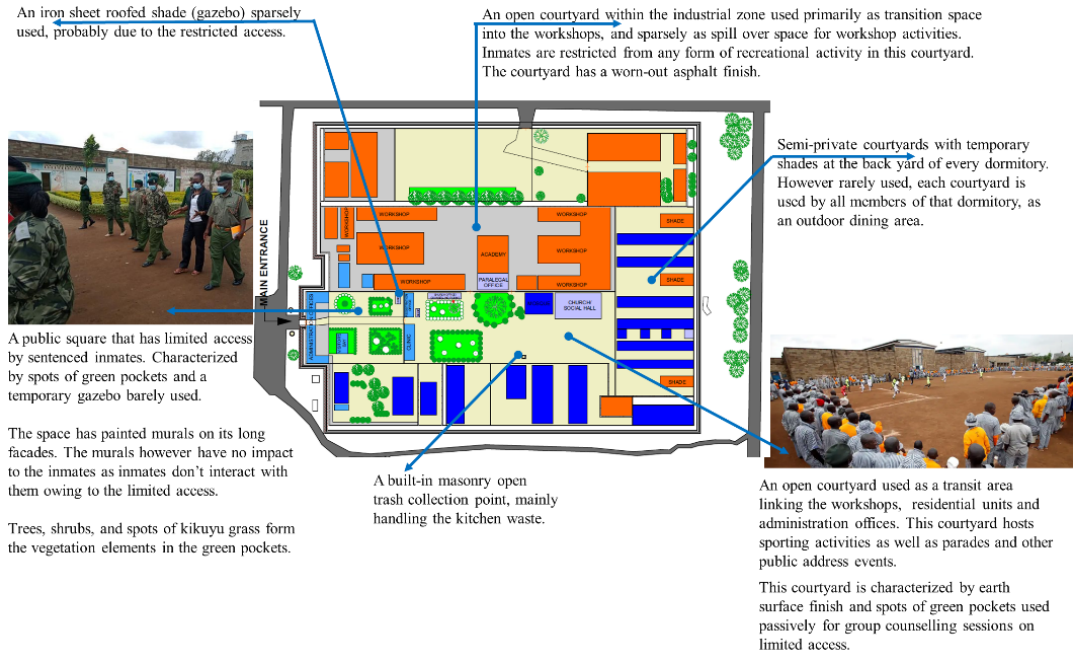
There is a clear sightline and physical line of movement from the main entrance to the accommodation units, as indicated in Figure 6. However, there are no designed circulation paths and movement patterns inside the courtyards. There is monotony, as no interesting spots were found along the daily routes.

Figure 6: Physical and Visual Line of Movement Between Zones.



The study identified the presence of outdoor open spaces in the form of courtyards spread across the jail facility, mainly in the inmates' open access zone, as shown in Figure 7.

Figure 7: Distribution of Outdoor Open Spaces.



The usage of these open spaces by inmates is however restricted, other than for transition. There are consequently minimal recreational activities in these open spaces, as well as non-contact with nature, owing to the small proportion of vegetation in these spaces. The common form of active

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recreation is sporting, which this study found to be happening in a multipurpose ground, thus inadequate spaces for both passive and active recreation. The open outdoor spaces lack definite and purposeful design. Access to these spaces is also restricted.

The open spaces possess a comparatively low percentage of vegetation. Clusters of vegetation are localized in a specific location and consist of sparse individual small trees, ground-covering grass, and a 0.4-meter-high Duranta hedge. A research review on the biophilic characteristics of the Duranta plant species revealed no psychological attributes; instead, it is cultivated primarily for its ornamental advantages, while exercise contributes to the coping mechanism. One of the green spots contains a mature tree that functions as an outdoor venue for counselling sessions and group talks. No specific design was identified in the cultivation of these plants. No verdant area was located in proximity to the residences and workshops. None of the plants exhibited a dense canopy. Research has demonstrated that nature, encompassing trees, plants, flowers, birds, insects, and other wildlife, can help mitigate the sterile environment prevalent in correctional facilities (Jewkes, 2018).

Building Facades Characteristics

All external facades display the roughness of exposed stone, mixed with sections of smooth plaster and painted finishes. The prison's colour scheme comprises green, black, yellow, and red. However, this has not been executed in any of the convicts' zones. A study by Kaur (2020) examining the relationship between emotions and colour among undergraduate female students in India found that primary and neutral colours have substantial emotional effects: blue, yellow, and black were linked to happiness; green was associated with relaxation and comfort; grey induced sadness; while white and red were closely related to fear. Consequently, the prison's colour palette, when adeptly executed, can provide a hospitable message to both residents and guests.

Internal Elements

Convicts' accommodation is in rectangular-shaped shared wards, which this study established to be overcrowded, as indicated by the ward size versus the designated number of users. The occupancy was found to be at 1.3 square meters per inmate as opposed to the set minimum requirement of 3.7 square meters per inmate. The inmates in a ward share a common wash area, identified to also suffer from overcrowding in the ward, indicated by the ratio of users (inmates in the ward). The social densities in the washrooms were identified to compromise the sense of privacy, territoriality, and control. 32 inmates in a shared ward use a 3.3 square meters washroom. Meili *et al*. (2022) conducted a study evaluating indicators of sanitation quality in shared wash areas in low-income settlements of Kisumu, Kenya; Kumasi, Ghana; and Dhaka in Bangladesh. A regression analysis revealed that wash areas shared by two to three households, with an average of four people per household, are generally cleaner, safer, and have a perceived degree of privacy. Thus, the social densities in individual wards at Kamiti Maximum Prison suppress the perceived privacy and territoriality of wash areas.

The wards were found to heavily use hard surface materials, heavily relying using cement screed floor finish coated using red oxide. This was perceived to lack aesthetics. There was no purposeful interplay of colour, and the white colour painted on all internal walls was perceived to aggravate anxiety and fear. The wards were found to lack furniture. The rectilinear arrangement of rectangular-shaped wards restricts face-to-face interaction between inmates in different wards, ideally for solitary confinement, as shown in Figure 8. Furthermore, the provided openings on internal walls in between wards are above eye-level, further restraining visual interaction.

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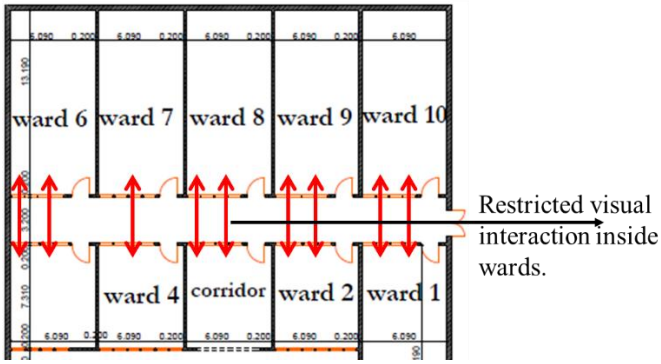
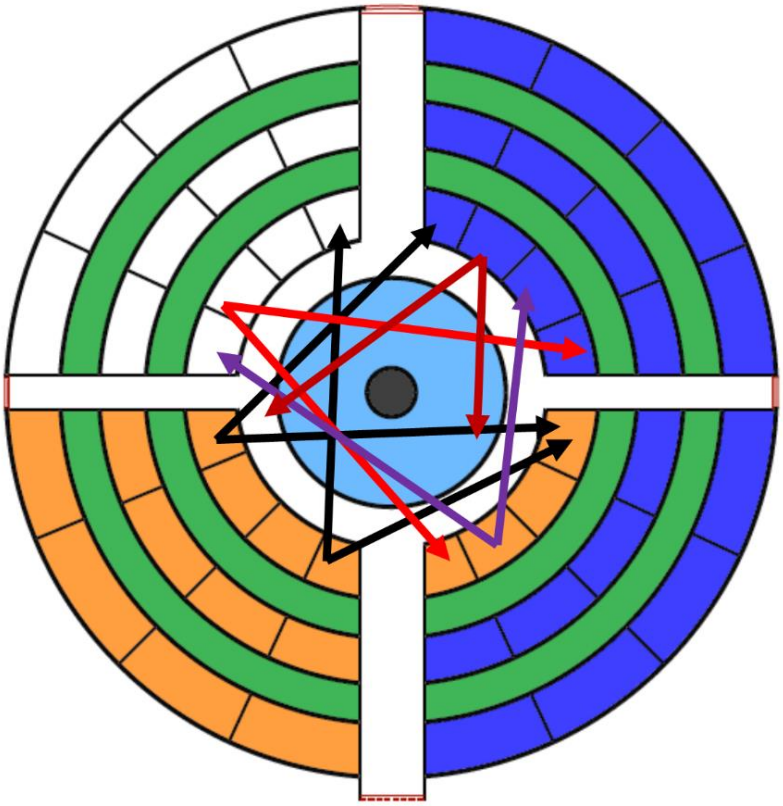
Figure 8: Linear Layout of Wards.



Ulrich (2017) criticized the rectilinear arrangement for restricting face-to-face interaction in-between wards. Curvilinear and radial layouts would give a wide field of interaction as in Figure 9.

Figure 9: Visual Interaction in Between Wards in Curvilinear Layouts.



A 3.2m wide corridor tying the wards together, forms the internal communal spaces in every residential block. However, unlike the prison designs of the 19th and 20th centuries, where internal communal spaces were used to congregate during the day, these corridors are purely used for transition. Both the corridors and wards have a ceiling height of 3.1m accentuated with high-end fixed windows for ventilation (Figure 10).

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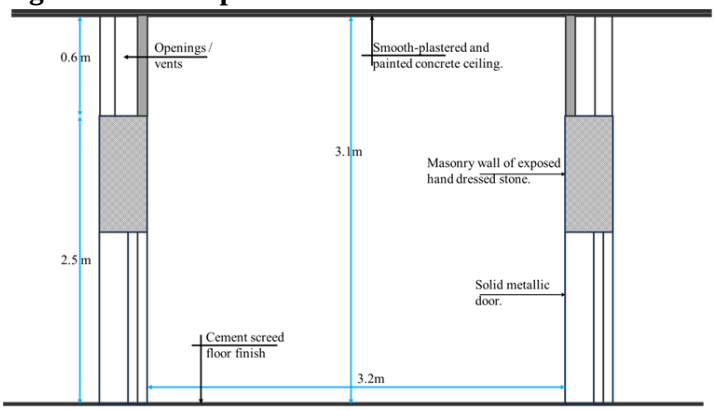
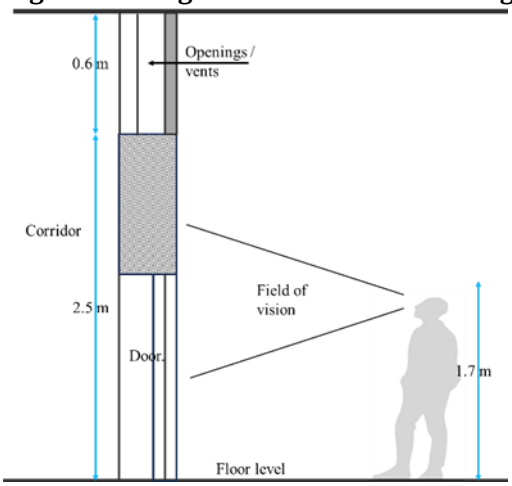
Figure 10: Description of Internal Corridor.



Sensory Environment

The building layouts do not provide for views to the outside, and the available openings face off the communal spaces, discouraging staff-inmate visual interaction. 3.8 m tall opaque walls designate the different zones within the institution, barring visual access outdoors and interaction in-between clusters and also controlling staff-inmate interaction. The openings are fixed at 2.5m above the floor level, as illustrated in Figure 11, while the average height of a man in Kenya, according to NCD Risk Factor Collaboration (2016), is 1.7m. They only get to see the outdoors when they move out of the buildings.

Figure 11: Angle of Vision for an Average Kenyan Man



45% of the respondents rated this lack of view of the outside as a positive to them in eradicating thoughts of what they are missing, while 55% said it causes thoughts of hopelessness. These findings are particularly similar to those of Wener (2012) who found that views of natural settings, through windows, help break down feelings of isolation by providing a connection to the rest of the world; can alleviate boredom and stress; while also providing mental respite, restoration, and recovery.

The buildings receive daylighting and natural ventilation through 600mm x 600mm permanent vents, fixed at 2.5 m above the finished ground level, purposely to restrict inmate's control over them, and sun-shaded using 600mm deep concrete overhung. Inmates perceived the lighting and ventilation in the dormitories as moderately sufficient, but they lacked control over these fixtures. Lack of personal control of building fixtures was perceived to cause discomfort. Engstrom & Ginneken (2022) suggest that giving

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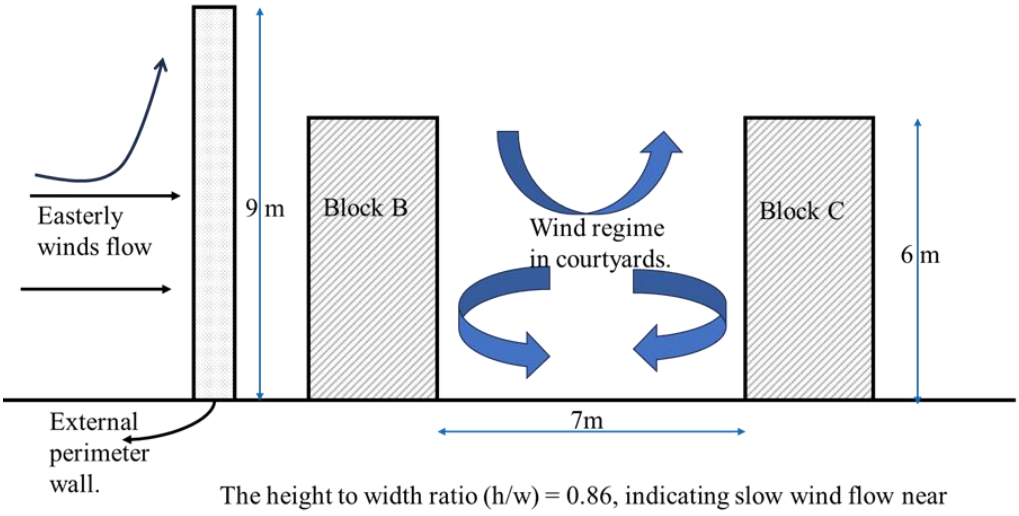
inmates control over their immediate environment, such as when to open and close windows, can enhance their autonomy. The absence of engaging and visually stimulating environs exacerbates feelings of isolation and distress.

The attempted cross-ventilation in the wards is restraint. Orienting openings away from a source of fresh air was found to be the reason for insufficient ventilation. The tall perimeter wall buffers the East and South Easterly winds from entering the unbuilt spaces, which would act as wind reservoirs, to supply fresh air into the adjacent buildings, as in Figure 12.

Figure 12: Air Movement Into the Buildings.



The height to width ratio (h/w) = 0.86, indicating slow wind flow near the ground level, hence minimal air circulation and supply into the adjacent buildings.

This hinders adequate flow of fresh air into the wards and in as much as the wards are clean, there is odour experienced as a result of inadequate ventilation.

60% of the respondents perceived the sound spectrum in the wards as positive, which they believed was necessary for mitigating meditation that was believed to cause hopelessness.

Psychological Impact of the Built Environment

The survey results revealed that most inmates are experiencing sadness, despair, a low level of self-consciousness, and fear. The findings show a significant prevalence of stress, sadness, and anxiety among convicts, which persists even after exposure to various mitigation programs. The leading negative feelings were recorded high across all the categories on length of imprisonment, with those windowed, married, and bachelors expressing the highest recording. These negative feelings were also prevalent among those aged above 60 years, followed by ages 18-30 years. Figure 13 depicts the variation trend across age groups.

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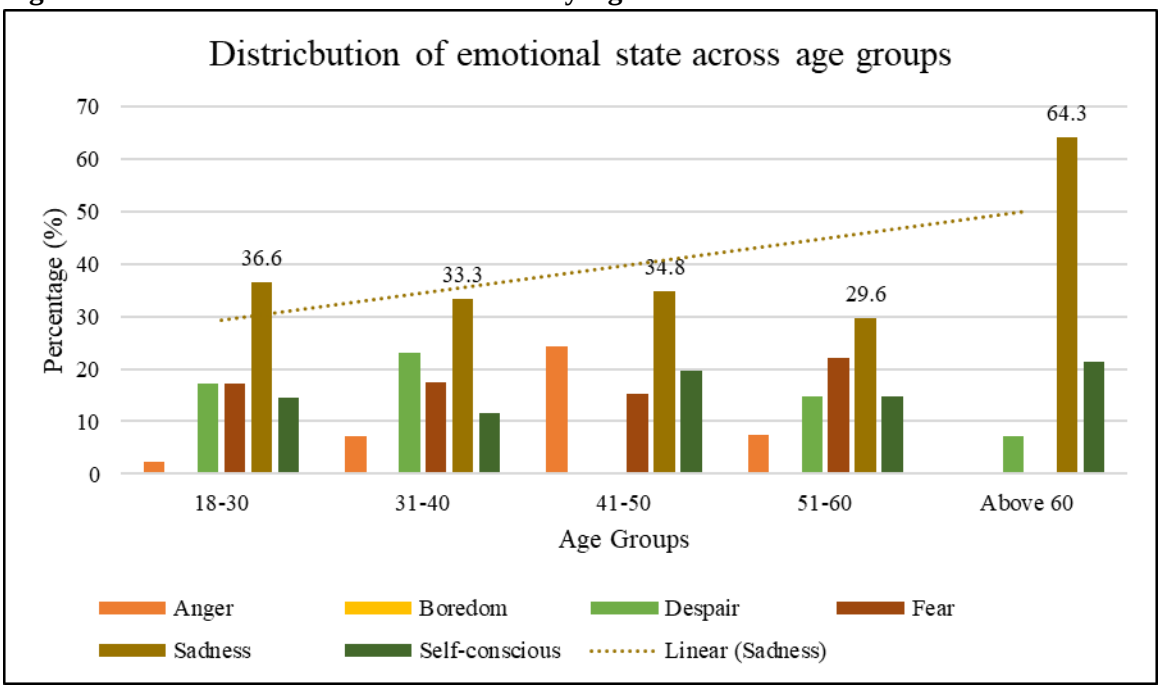
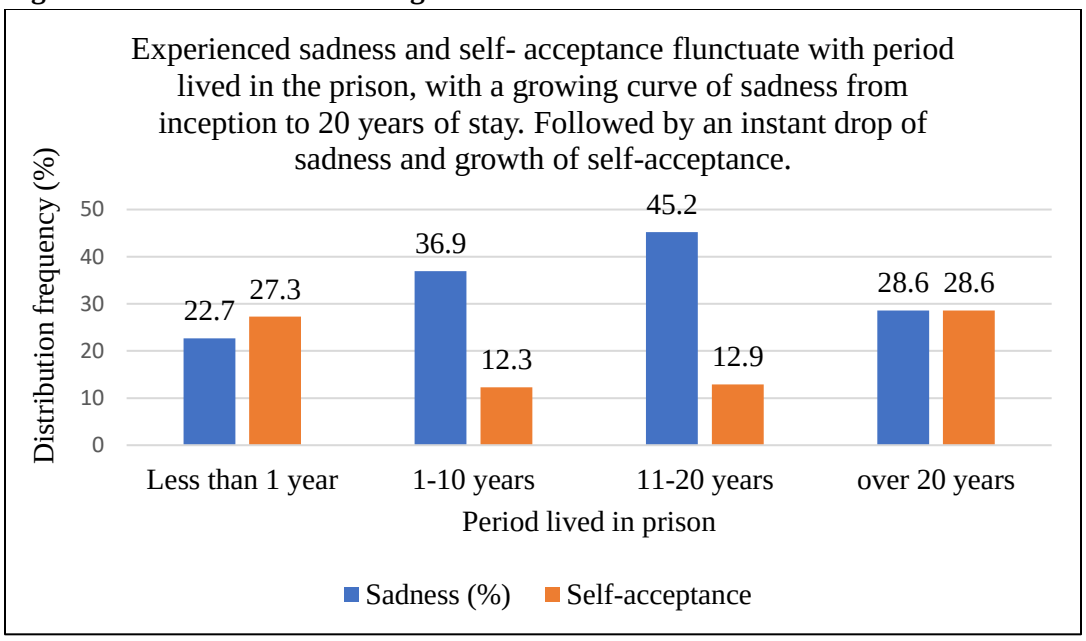
Figure 13: Distribution of Emotional State by Age.



The leading negative feelings were recorded high across all the categories on length of imprisonment, with those windowed, married, and bachelors expressing the highest recording, at 50%,39.3%, and 34.7% respectively.

Feelings of fear, despair and sadness were significantly high among ages 30 years and above, with sadness recorded high across all the life sentences and marital status; and decreasing among those who have stayed at Kamiti for less than one year as well as those that have stayed for 20 years and above as indicated in Figure 14. Inmates of 50 years and above scored high on self-consciousness, an indication of coping over time.

Figure 14: Fluctuation of Feelings Overtime.



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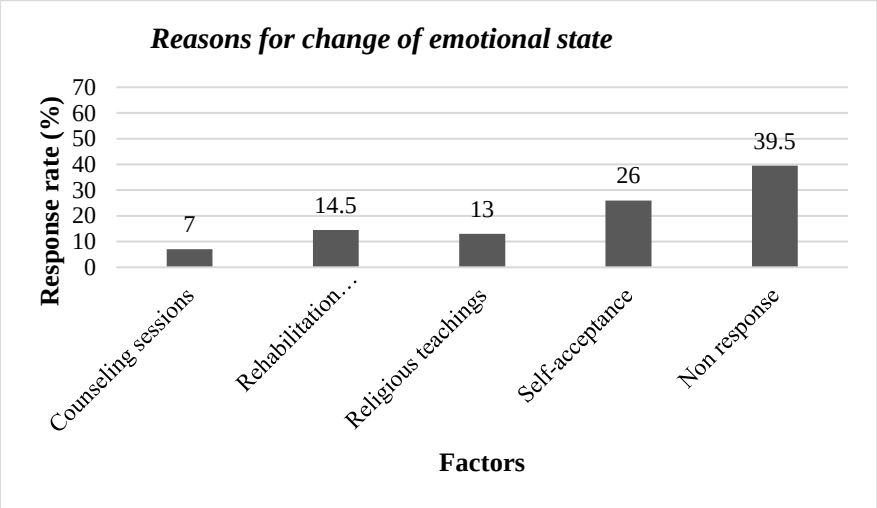
Perception of Factors Influencing Emotional State

Both correlation and regression analyses revealed that the prison environment, participation in rehabilitation programs, leisure activities, and socializing with friends and family interactions significantly contributed to the psychological well-being of inmates.

The findings established that the feelings change over time due to adaptation, self-acceptance, participation in rehabilitative programs, and religious teachings, as shown in Figure 15.

Figure 15: Reasons for Change of Emotional State.



Counselling had the least impact, with only 7% of the participants reporting positive changes from attending sessions; this could potentially be attributed to the low enrolment rate of 6% in counselling programs. The findings further revealed that 78% of the participants were enrolled in rehabilitation programs as coping mechanisms, in addition to passion and desire to acquire academic knowledge. 51% expressed the greatest desire for a formal education program. Social initiatives such as sports, music, group discussions with fellow inmates, and visits by relatives were also found to significantly aid in coping. However, family interactions through phone calls outweighed visits, probably due to a lack of support infrastructure.

Relationship Between Built Environment and Psychological Wellbeing

Spatial layout, ward size and design, indoor environment, outdoor open spaces, access to them, contact with nature, and availability of sufficient training facilities were identified as the elements of the built environment significantly influencing PWB.

62.5% of the participants expressed their vivid dissatisfaction with the tall, opaque walls, citing visual disconnect from adjacent neighbourhoods to trigger isolation and loneliness among inmates; however, 32% of their counterparts preferred the opaque walls, attributing them to the belief that observing the external world incites anger by reminding individuals of their circumstances. 75% of the participants felt the site plan to always send a message of *being under watch*, which triggered anxiety.

The findings established that the prison design is isolating in nature and negatively affects the well-being of inmates. There was a statistically significant negative correlation between how people felt about prison programs and how they saw the built environment ($r(198) = -.138$, $p < .05$), which means that the built environment was linked to negative feelings about the prison program. These

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findings corroborate Wildeman (2016), suggesting that the design and architecture of prisons, deteriorated physical environment and enforced social structure engender feelings of helplessness, sorrow, and disrupted social connections, as the environmental conditions perpetually signify a changed social status.

Correlation and regression analysis demonstrate that the built environment substantially influences inmates' psychological well-being. The external elements including prison site layout, outdoor open spaces, and the provision of educational and vocational spaces, were found to significantly impact the inmate's emotional state at coefficients of r (200) = .61, p < .05; r (200) = .52, p < .05; and r (200) = .69, p < .05, respectively. The internal elements had a significance coefficient of r (200) = .46, p < .05; While the sensory elements contributed to r (200) = .38, p < .05 significance.

Table 1: Correlation between PWB and Perception of Built Environment

Characteristics of Built Environment		PWB
Site Layout	Pearson Correlation	.61**
	Sig. (2-tailed)	.00
Open Spaces	Pearson Correlation	.52**
	Sig. (2-tailed)	.00
Ward size and Design	Pearson Correlation	.46**
	Sig. (2-tailed)	.00
Lighting and Ventilation	Pearson Correlation	.38**
	Sig. (2-tailed)	.00
Educational and Vocational Spaces	Pearson Correlation	.69**
	Sig. (2-tailed)	.00

N = 200 **. Correlation is significant at the 0.01 level (2-tailed).

A further multiple regression analysis was conducted to ascertain the extent of the influence of the architectural environment on the psychological well-being of inmates while moderating for demographic factors - age, marital status and length of imprisonment.

Table 2: Model Summary[b] on Built Environment and Psychological Well-being

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.57[a]	.327	.323	7.09	.327	96.07	1	198	.000
2	.585[b]	.342	.336	7.02	.016	4.68	1	197	.032
3	.586[c]	.343	.333	7.04	.001	.17	1	196	.682
4	.591[d]	.350	.336	7.02	.007	2.06	1	195	.153

a. Predictors: (Constant), PBE
b. Predictors: (Constant), PBE, Age
c. Predictors: (Constant), PBE, Age, Marital status
d. Predictors: (Constant), PBE, Age, Marital status, Length of imprisonment

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The multiple regression analysis was performed across four models to evaluate the influence of the built environment and additional characteristics on prisoners' psychological well-being. The initial model, incorporating solely the built environment as a predictor, accounts for 32.7% of the variance (R^2 = .327) in psychological well-being. The second model included age as a predictor, somewhat enhancing the explained variance to 34.2% (R^2 = .342), with a modest although significant impact (ΔR^2 = .016, p = .032). The third model includes married status, resulting in a minimal increase in explained variance to 34.3% (R^2 = .343), which is not statistically significant (p = .682). The final model incorporates the imprisonment term, elevating the explained variance to 35.0% (R^2 = .350), although this increase remains statistically insignificant (p = .153).

Regression analysis confirmed that the built environment was the most significant predictor of psychological well-being, with a little variance with age, while marital status and length of imprisonment had little additional impact.

These findings can elucidate that inmates over 50 years old experience greater psychological and physical impacts from imprisonment, as Enggist *et al.* (2014) suggest that this demographic is predisposed to developing chronic illnesses 10-15 years earlier than the general and younger populations. Hardy (2018) discovered that offenders reported a detrimental effect of incarceration on their mental well-being, exacerbated by longer periods in prisons.

CONCLUSION

This study has identified that the physical features of the built environment at Kamiti Maximum Prison exhibit a legacy of colonial punitive concepts rather than a focus on rehabilitation. These inherited architectural features have hindered its ability to align with modern correctional philosophies; intensify psychological anguish; and constrain rehabilitation prospects. The results highlight the necessity for a transformation in prison design from punitive confinement to therapeutic architecture. To attain this transformation, educated architectural interventions should look into rectifying the physical inadequacies of the prison's infrastructure, while renovating the constructed environment to foster security, rehabilitation, wellbeing and effective reintegration into the society.

The study identified the prison's physical environment as the primary cause of psychological discomfort. Inmates exhibited negative sentiments toward the existing attributes of the physical environment, substantially associating them with feelings of depression, loneliness, isolation, and diminished motivation. Rehabilitation can be attained by implementing informed architectural elements in prisons, encompassing spatial concepts and designs, accommodation blocks, prison content and functionality to include areas for mental health, education, and vocational training; the provision of inmate-controlled amenities such as lighting and ventilation; and access to social outdoor spaces.

Recommendations for Prison Design Improvement

To create a rehabilitative prison environment, this study proposes a model incorporating three key approaches:

- **Security and Control:** Achieving a balance between critical safety features and an environment that allows prisoners to control their surroundings is crucial. Introduce aesthetics inwards, such as painting internal walls using a prison colour palette of black, yellow, and green; coloured wall artworks; and landscape paintings—to boost perceived contact with nature while maintaining security.
- **Health & Well-being:** Incorporating user expectations, directly gathered from inmates, to improve sensory design for physical and psychological health needs. This study has identified user control of building fittings and inclusive access to recreational areas as

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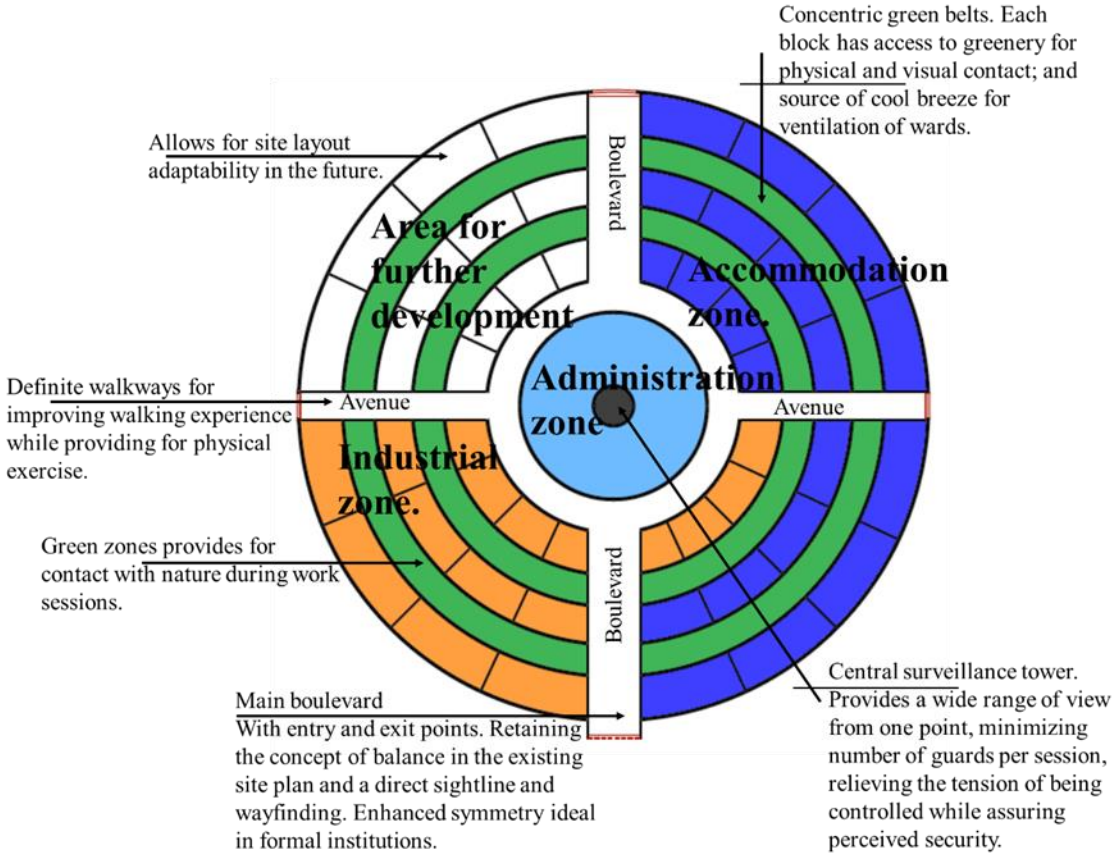
architectural aspects conducive to enhancing psychological and physical well-being. Redesign dormitory backyards, with green belts for natural ventilation, to introduce group outdoor eateries and physical activity.

Expand site layout to enhance physical and visual contact with nature; incorporate therapeutic spaces; spaces for recreation offering a diversity of activities to choose from; and spaces for special needs, as proposed in Figure 16.

Figure 16: Recommended Site Plan.



3) **Rehabilitation and Reintegration:** Expand formal education training spaces to align with the quality in the general society and to provide performance standards that meet professional requirements in the free population. This will facilitate more efficient and effective reintegration in society.

The study juxtaposes these proposed recommendations with the clients' brief to validate the proposed approach. The brief outlined a need for the provision of a gym, especially for those not attached to any vocational training program and the elderly; self-contained cells; a therapeutic space for mentally suppressed prisoners and staff; CBC-compliant classrooms and laboratory and accommodation for visiting spouses. The brief also outlined the need for segregation blocks to provide mandatory psychosocial services upon admission and before offloading into the rest of the inmate population. This is to prevent a prisoner from recruiting others into his offence. Provision of turf on sports fields.

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