ESTOA **27** / pp. 193 - 208 / DOI: 10.18537/est.v014.n027.a12

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ARCHITECTURAL PROJECTS

**Research Article**
2025 January - June

# Penitentiary architecture: socio-spatial analysis condition of the Tungurahua Deprivation of Liberty Center Arquitectura carcelaria: análisis socioespacial del Centro de Privación de Libertad de Tungurahua

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**ABSTRACT** The study addresses the spatial-functional crisis of Ecuador's prisons, emphasizing the conditions at the Tungurahua Deprivation of Liberty Center, in a context marked by overpopulation, overcrowding, and poor living conditions. Using a qualitative methodology, the location, architectural program, spatial relations, and environmental conditions within the penitentiary center are explored to determine how these factors affect the rehabilitation process and reintegration of inmates into society. The findings indicate critical deficiencies in the spatial-functional configuration of the Tungurahua Detention Center, which contribute to a harmful prison environment, exacerbating problems such as the deterioration of the physical and psychological well-being of people deprived of liberty. Finally, the research highlights the need for a rethinking in the design of these spaces to effectively promote the rehabilitation and social reintegration of prisoners.

**RESUMEN** El estudio aborda la crisis espacio-funcional de las cárceles del Ecuador, haciendo énfasis en el Centro de Privación de Libertad de Tungurahua, en un contexto marcado por la sobrepoblación, el hacinamiento y condiciones de habitabilidad deficientes. Meditante una metodología cualitativa, se explora el emplazamiento, el programa arquitectónico, las relaciones espaciales, y las condiciones ambientales dentro del centro penitenciario, y cómo estas inciden en el proceso de rehabilitación y reinserción de las personas privadas de libertad a la sociedad. Los hallazgos indican deficiencias críticas en la configuración espacio-funcional del Centro de Privación de Libertad de Tungurahua, las cuales contribuyen a un entorno carcelario perjudicial, exacerbando problemas como el deterioro del bienestar físico y psicológico de las personas privadas de libertad. Finalmente, la investigación subraya la necesidad de un replanteamiento en el diseño de estos espacios para fomentar efectivamente la rehabilitación y la reinserción social de los reclusos.

**Received:** 15/03/2024
**Revised:** 15/06/2024
**Accepted:** 26/06/2024
**Published:** 31/01/2025

**KEYWORDS** prison crisis, prison architecture, habitability conditions, social rehabilitation, social reintegration

**PALABRAS CLAVE** crisis carcelaria, arquitectura carcelaria, condiciones de habitabilidad, rehabilitación social, reinserción social



**Cómo citar este artículo/How to cite this article:** Flores-Silva, K. y Sarzosa-Soto, R. (2025). Penitentiary architecture: socio-spatial analysis condition of the Tungurahua Deprivation of Liberty Center. *Estoa. Revista de la Facultad de Arquitectura y Urbanismo de la Universidad de Cuenca, 14*(27), 193-208. https://doi.org/10.18537/est.v014.n027.a12



e - ISSN: 1390 - 9274
ISSN: 1390 - 7263

## 1. Introduction

According to Cevallos et al. (2022), the space-functional crisis in the Ecuadorian deprivation of liberty centres (cpl) today does not lie in isolated events but has its roots in the past. Between 2007 and 2017, mega-prisons were erected as a measure to combat overcrowding, one of the most critical problems of the Ecuadorian prison system (Cevallos et al. 2022). Thus, by 2013, "Ecuador expanded its prison infrastructure with the aim of overcoming long-standing problems in the penitentiary system, characterized by issues of overcrowding, unsanitary conditions, and systematic human rights violations" (Pontón, 2022, p. 182). However, contradictorily, Kaleidos (2021) indicates that a reform was made to the Comprehensive Organic Criminal Code (COIP) where the severity and duration of prison sentences were increased. Aguirre et al. (2020) and Kaleidos (2021) point out that this reform is considered the main reason for overpopulation and overcrowding within Ecuadorian prisons.

According to Álvarez (2022), this situation is further compounded by the decrease in the allocation of financial resources destined for the prison system due to the Covid-19 health crisis. In this scenario, Álvarez (2022) asserts that between 2017 and 2021, the budget allocated to the prison system was reduced by about 55% during the year 2020, which worsened the situation of people deprived of liberty (ppl) by preventing them from having basic living conditions (Álvarez, 2022). Del Pozo et al. (2023) indicate that on a national scale, between 2019 and October 2021, prison overcrowding reached levels of 28.1%. Meanwhile, Arango and Maldonado (2024) state that these levels decreased by 2023, but the level of overcrowding remained high for people in pre-trial detention. In this context, the Tungurahua Deprivation of Liberty Centre[1] (CPLT) does not escape this problem, as it shows clear deficiencies in its living conditions, which has affected the rehabilitation processes of the inmates.

From a theoretical perspective, Serra (2012) states that the spatial-functional configuration of prison architecture directly influences the daily lives of inmates. In turn, Nuttall and Jurisic (2016) indicate that an appropriate design focused on rehabilitation processes can create a safe and conducive environment for the successful reintegration of people deprived of liberty (ppl) into the community. It should be noted that the architectural program of prisons must consider various aspects, from the distribution of spaces according to the prison population to the incorporation of dynamic movement flows and adequate environmental conditions (Serra, 2012; Ochoa, 2012). The importance of these factors lies in their ability to influence the feelings, moods, and behaviours of inmates, as well as their psychological impact on both inmates and prison staff (Briones and Plaza, 2012; Larrea, 2021). Additionally, Briones and Plaza (2012) suggest that just as a person can configure an environment, spaces also have the capacity to influence the development of ppl.

As García (2012) points out, the reciprocity between human behaviour and the environment lies in its bidirectionality. In this sense, since prisons are social systems, García (2012) indicates that aspects related to the architectural design of these spaces are a crucial matter. Thus, unfavourable environmental conditions, such as noise, extreme temperatures, lack of private spaces, or poor lighting, have adverse effects on the health and mental well-being of ppl (García, 2012). For García (2012), neglecting environmental conditions can worsen the psychological state of ppl, as well as impact their social development, deteriorating their interpersonal relationships, fostering unstable environments, creating situations of tension/stress, and provoking violent incidents. In the context of Ecuadorian prisons, Ayala et al. (2023) identify a deficit in the area of psychological care, as out of the 37 existing prison facilities, only two have a mental health program.

In the same theoretical vein, when examining the relationship between confinement and architecture, Briones and Plaza (2012) indicate that people feel fear at the idea of isolation, as total loneliness can lead to psychological disintegration effects. Additionally, the authors believe that contact with the outside environment—understood as the space where ppl can socialize and connect with the space and other individuals—is fundamental to the very existence of human beings. Therefore, it is strictly necessary to prevent confinement (Briones and Plaza, 2012). Consequently, prison architecture requires efforts to reduce the perception of confinement and oppression by fostering conditions that resemble life outside of incarceration (Serra, 2012). A careful design can significantly improve the quality of life within penitentiary institutions and, ultimately, reduce recidivism rates (Serra, 2012).

According to Ortiz and López (2023), deprivation of liberty as a method of rehabilitation for incarcerated individuals fails to achieve its primary purpose, which is the reintegration and rehabilitation of these individuals into society. Therefore, its effectiveness in this regard is questioned, being seen as an ineffective and unfavourable measure for achieving the reintegration of ppl, as there is no solid certainty that they will not repeat criminal behaviours.

Therefore, to ensure the effectiveness of the rehabilitation and reintegration process, it is essential for penitentiary centres to offer programs and activities tailored to the individual needs of inmates, including labour, educational, and social aspects (Technical Organism Directory of the National Social Rehabilitation System, 2022). The omission of plans that facilitate the re-education, rehabilitation, and reintegration of ppl hinders the effective eradication of the problems afflicting the prison system (Coello and Zamora, 2024). These efforts not only contribute to ensuring security within prisons but also prepare individuals to reintegrate effectively into society, allowing the offender to regain the rights that were restricted by the judicial sentence

[1] The CPLT is a minimum-security deprivation of liberty centre located in zone 3 of Ecuador within the province of Tungurahua. All the provinces in zone 3 have a minimum-security CPLT, except for Cotopaxi, which houses a mega-prison (Suasnavas, 2023).

(Coello and Zamora, 2024). However, it is essential to consider the difficulties they face when reintegrating into society after serving a prison sentence, as well as the emotional and financial impact that detention can have on people associated with ppl, such as their partners or children (Hammond et al., 2024).

In light of the above, this article proposes to explore the location, architectural program, spatial relationships, and environmental conditions of the CPLT, and how these factors affect the rehabilitation and reintegration process of ppl. It is important to highlight that the research concluded in January 2024, collecting data up to that date. This temporal delimitation is crucial to provide context about the relevance and validity of the findings in relation to the time they were conducted, as specific circumstances could change over time.

## 2. Methods

A qualitative phenomenological research approach was established to understand the internal conditions of the CPLT. To this end, three visits were conducted with prior request and authorization from prison authorities and with the prior consent of the interviewees. During the first visit, a semi-structured interview was conducted with the deputy director of the CPLT, focusing on the analysis of prison architecture and its impact on the behaviours of ppl. In the second visit, an ethnographic approach was taken to explore the various spaces of the facility. Finally, the third visit cantered on understanding the perspective of ppl regarding their immediate environment through interviews and informal conversations with inmates to capture their experiences about the spaces they inhabit and the conditions they live in. It is important to note that the interviews conducted and their use for research purposes had the full consent of the ppl.

The tools used provided data that included visual, bibliographic, and testimonial information. Additionally, a qualitative evaluation form was employed for the analysis of the architectural program to determine minimum habitability parameters and analyse the spaces of the CPLT. This facilitated the identification of deficiencies in the layout and design of the spaces. Furthermore, a field diary was used to systematically document the process of observation and immediate experience throughout the information-gathering process. Manual sketches and diagrams were also created to zone the previously recognized spaces, aiding in the visual representation of the distribution and organization of the spaces within the prison facility.

The analysis of spatial relationships, flows, and movements was described within the field diary through the development of connection diagrams, which allowed for an understanding of the arrangement of spaces and the interactions between them. In this sense, direct and indirect relationships between the different spaces and the flow of people navigating them were identified. Additionally, an analysis of spatial quality was conducted. This evaluation was based on sketches and descriptions of the spaces.

To complement the characterization of the space, photographic and audiovisual material of the various areas of the penitentiary complex was included. These visual materials supported the observations made during the visits. Additionally, besides data collection through observations, interviews were conducted with two key stakeholders: the deputy director of the CPLT and twenty ppl. The latter, through brief narratives, illustrations, or diagrams, addressed essential issues to understand the spaces where ppl spend their daily activities (Table 1). These interviews provided diverse information and perspectives on prison architecture and its impact on the behaviour and well-being of ppl.

| | Individual experiences with penitentiary spaces | | |
|---|---|---|---|
| **How are the places where you spend most of your time within the facility?** | Women's Pavilion Cell  | The cells designated for women have areas ranging from 4 to 4.8 m². These cells accommodate 3 or 4 people, and in the case of mothers, they also house their children. They are equipped with a bunk bed with two beds and a table. Additionally, they have security measures, such as doors secured from the outside and windows with external safety nets. | Exterior view of the men's pavilion  |
| | Men's Pavilion Cell  | The cells for men have an area of 16 m² and house a larger number of individuals, accommodating up to 10 people in some cases. These cells are equipped with three bunk beds, each with three beds, and in some cases, small pieces of furniture. Like the women's cells, they have external security measures and larger windows. | Exterior view of the men's pavilion  |
| | Drivers' Pavilion Cell  | The cells designated for drivers offer a space of 13 m², making them more spacious and comfortable compared to other accommodation areas. These cells are equipped with three bunk beds, each with two beds, as well as various pieces of furniture for added comfort. However, only one of the rooms has a larger number of beds. | Large cell in the drivers' pavilion  |
| **How would you like these spaces to be in order to feel more comfortable or at ease?** | The cells should be more comfortable and ventilated, with a maximum of two people living together. Additionally, there should be a bathroom inside each one. | | |

Table 1: Graphical and written interpretation of ppl interview. (2024)

## 3. Results

The collected information provides various perspectives on the spatial-functional conditions of the CPLT. Three key actors were identified to assess the state of the institution: the deputy director of the CPLT, the ppl, and the observations of the research team.

Part of the interview with the deputy director of the CPLT provided general information about the prison: The institution is located in the rural parish of Pishilata, adjacent to the wholesale market of Ambato. It is highlighted that the Ambato prison is a minimum-security CPL, primarily conceived for detention, lacking spatial-functional aspects related to the social rehabilitation of ppl. The deputy director mentioned that over time, the institution has undergone modifications without a prior planning process; additionally, it has not had any maintenance since approximately 2010. The overcrowded conditions of the CPLT represent a significant challenge, as despite its maximum capacity being 450 ppl, by January 2024, it housed approximately 760 individuals, which represents an excess of around 50% of the maximum capacity. According to the deputy director, this has compromised the quality of life of the prison population due to overcrowded conditions.

The prison demographics of the CPLT include 55 women and approximately 700 men. It is noted that a high percentage of the ppl have final convictions for crimes, with illicit drug trafficking being the most common offense. Sexual offenses such as abuse, harassment, and rape are the next most frequent. Following these are crimes against life, and lastly, offenses related to vehicular contraventions.

This section is structured into four analytical components. First, the location is addressed, focusing on the geographical description of the institution and considering factors that may influence the effectiveness of the CPLT. Subsequently, the architectural program is examined, detailing the characteristics of each space included in the program. Additionally, the relationships between different spaces and the internal circulations of the facility are analysed. Finally, the environmental conditions of the spaces are evaluated to determine whether the CPLT meets the requirements for the rehabilitation and well-being of the inmates.

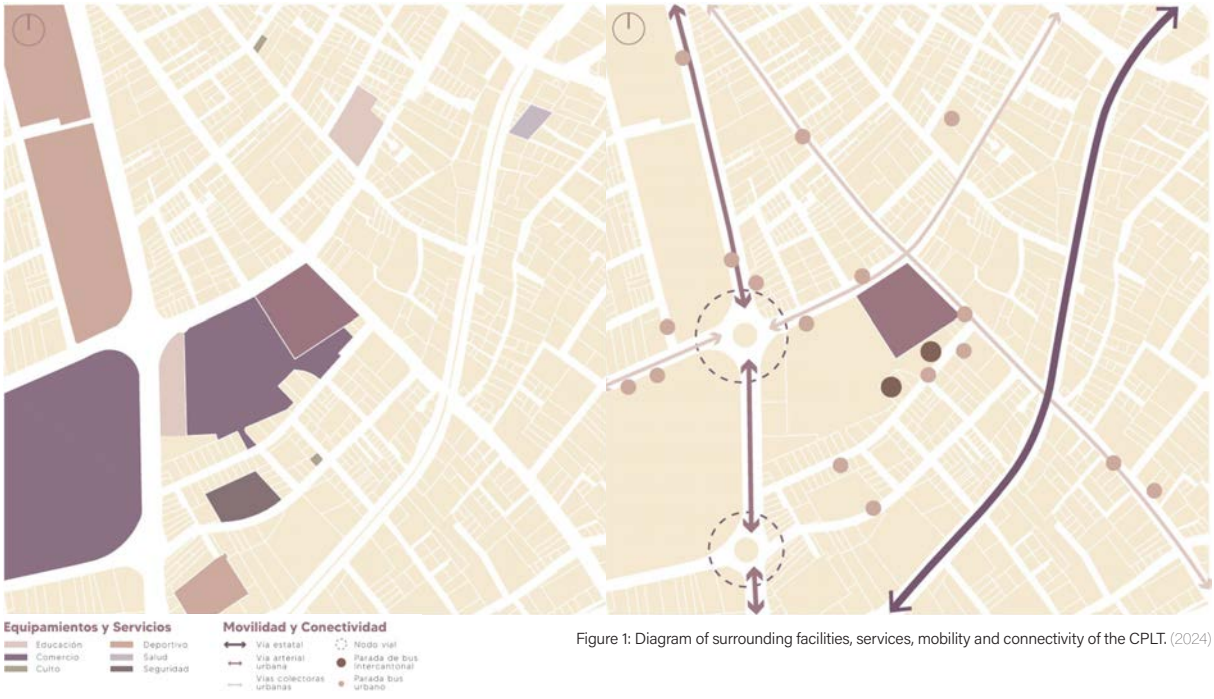


Figure 1: Diagram of surrounding facilities, services, mobility and connectivity of the CPLT. (2024)

## 3.1. Location

Regarding the location of CPL institutions, Altmann (1970) and Larrea (2021) establish a direct relationship between the placement of these facilities and critical factors such as security, crime rates, and accessibility based on their proximity to urban areas. As Larrea (2021) emphasizes, while proximity to urban areas can facilitate access to essential services for inmates and their families, it also creates limitations for the expansion of infrastructure and raises security concerns in the area. Carballo (2008) notes that this dynamic highlights the importance of balancing security with accessibility to resources necessary for rehabilitation programs.

In relation to the case study, it was identified that the location of the CPLT presents certain situational conditions. On one hand, the proximity to basic services and the ease of access via public and private transportation are factors that could influence the reintegration of the ppl into society. However, difficulties were identified in external traffic planning, which affects the management of visitor traffic and limits internal road dimensions (Figure 1). For authors like Larrea (2021), this type of scenario illustrates the complexity of ensuring a location that meets the needs of security, accessibility, and connection with the surrounding community. Table 2 analyses certain complementary criteria related to the observed and desirable aspects of the CPLT's location: lot shape, accessibility, routes, soil resistance, and land use.

## 3.2. Architectural program

Theory suggests that the design and planning of the functional and technical program of a penitentiary facility represent a crucial stage in the quest to provide a suitable environment for life within the institution (Larrea, 2021). According to Serra (2012), this program specifies the spatial-functionality of the architectural element, as well as the fundamental technical attributes that must be considered to effectively achieve the objectives of CPLS, which include the rehabilitation and social reintegration of ppl.

To achieve this, Serra (2012) argues that the sizing of spaces within prisons should be adjusted to the total number of inmates. Thus, areas related to labour activities, treatment, health, and education are sized according to the percentage of ppl who will use them, considering different schedules and vacant shifts (Serra, 2012). According to Novo et al. (2024), inmates' participation in rehabilitation programs is influenced by their perspective; in this sense, some ppl become involved in educational initiatives when they see opportunities for labour improvement after their release. On the other hand, for sizing areas designated for feeding, consideration is given to both the ppl and the prison staff, allowing for a more accurate estimation of the dimensions needed for these spaces (Serra, 2012).

In the planning and design of prison facilities, it is crucial to recognize the specific needs of those who will inhabit these institutions, especially considering that they are a vulnerable group with specific requirements for their rehabilitation treatment (Novo et al., 2024). In this

| | Site | |
|---|---|---|
| **Criteria for analysis** | **Observed** | **Desirable** |
| **Lot shape** | • Limitations for the expansion of the current infrastructure. | • Flat and expansive terrain to facilitate the implementation of a regular project. |
| **Accessibility** | • Proximity to basic services and essential facilities.<br>• Easy access via public and private transportation services. | • Access via private or public transportation that already has active routes to the site. Access to the public network of potable water, sewage, electricity, and access to the internet network via fiber optics. |
| **Routes** | • Difficulty in external road planning.<br>• Limited dimensions of internal roads. | • Road system that serves the constant internal and external traffic of light and heavy vehicles.<br>• Controlled and confined routes along their entire length. |
| **Soil resistance** | • Urban soil, not suitable for the establishment of a prison facility. | • Soil resistant enough for the implementation of the structure and suitable for agriculture. |
| **Land use** | • Located in a sector with residential land use designated for medium-density housing.<br>• Presence of high-density commercial areas.<br>• Does not comply with the land use of the sector. | • Compliance with municipal regulations on land use, setbacks, etc., according to the zone.<br>• Land suitable for rehabilitation activities such as agriculture, preferably rural land.<br>• Land located in an area with low housing density. |

Table 2: CPLT site analysis criteria

| | Architectural program<br>Physical characteristics of the CPL | |
|---|---|---|
| **Criteria for analysis** | **Observed** | **Desirable** |
| **Spatial distribution** | • The total area of the site covers 13,526.8 m².<br>• Inmates are distributed across 8 pavilions classified by gender and security levels.<br>• Spaces are organized according to treatment axes: Health, administration, worship, service, housing, work, visits, education, and recreation zones. | • The center should be divided into 5 distinct sections, each with a specific purpose and a designated location within the site: administrative section, observation section, male section, female section, and drivers' section.<br>• Each section should have zones and areas that correspond to the activities carried out within it.<br>• The interrelationship between the sections should ensure the harmonious functioning of the center. |
| **Form and structure** | • Originally designed to accommodate 450 individuals, the current number of inmates has increased to 760.<br>• Insufficient space to accommodate this number of individuals. | • The sizing of the spaces should be adjusted to the total number of inmates. |
| **Planning and design** | • Lack of comprehensive planning.<br>• The spaces have been progressively adapted over 50 years since its inauguration.<br>• Restorations were carried out in an unsystematic and unplanned manner. | • The infrastructure should be adapted to the activities and functioning of the CPL, not the other way around.<br>• Planning should focus on the efficiency of activities, promoting accessibility and functionality in every space. |
| **Spatial quality** | • Buildings dominate the site, leaving a minimal portion for green areas. | • Safe environments that promote the rehabilitation of inmates should be provided.<br>• Access to green areas offers moments of distraction and helps reduce mental fatigue. |

Table 3: Criteria for analysing the architectural programme of the CPLT. (2024)

regard, the United Nations Office for Project Services (UNOPS) emphasizes the importance of understanding the operational and administrative processes of prisons before designing them, highlighting that the design should adapt to the functioning of the CPL, not the other way around (Nuttall and Jurisic, 2016). Ignoring this aspect not only reduces the effectiveness of the prison system but can also impact the violation of the human rights of ppl (Nuttall and Jurisic, 2016).

Regarding the benefits of suitable spaces for ppl, Grip et al. (2018) argue that visual exposure to natural spaces is associated with increased life satisfaction, as well as benefits in pain management for patients. Additionally, access to green areas provides moments of distraction and helps reduce mental fatigue, which is associated with emotions such as anger, aggressive behaviours, or irritability, as well as difficulties in reasoning and a decreased ability to regulate impulses (Grip et al., 2018).

Based on the above, and in relation to the case study, the reality of the CPLT reveals some issues. Built over 50 years ago without a clear perspective on rehabilitation, the gradual adaptation of spaces for activities related to this goal has been carried out in a non-systematic manner. This lack of structured planning has created difficulties, particularly in a context of overcrowding where the existing infrastructure is insufficient to accommodate the number of individuals at the CPLT.

The distribution of the population within the CPL reflects this reality, with eight pavilions classified by gender and security levels. In this sense, while efforts have been made to improve the infrastructure and provide comprehensive health, education, and training services, the limitation of space remains a challenge. Additionally, the predominance of built structures and recreational areas on the site leaves a minimal portion for green spaces.

Despite these challenges, the spaces are organized according to the treatment axes proposed by the National Comprehensive Care Service for People Deprived of Liberty and Adolescent Offenders (SNAI), which suggests an attempt to structure rehabilitation activities within the existing physical limitations (Figure 2). However, the lack of comprehensive planning from the outset has left the centre in a disadvantageous position to effectively address the rehabilitation and social reintegration needs of the inmates. Table 3

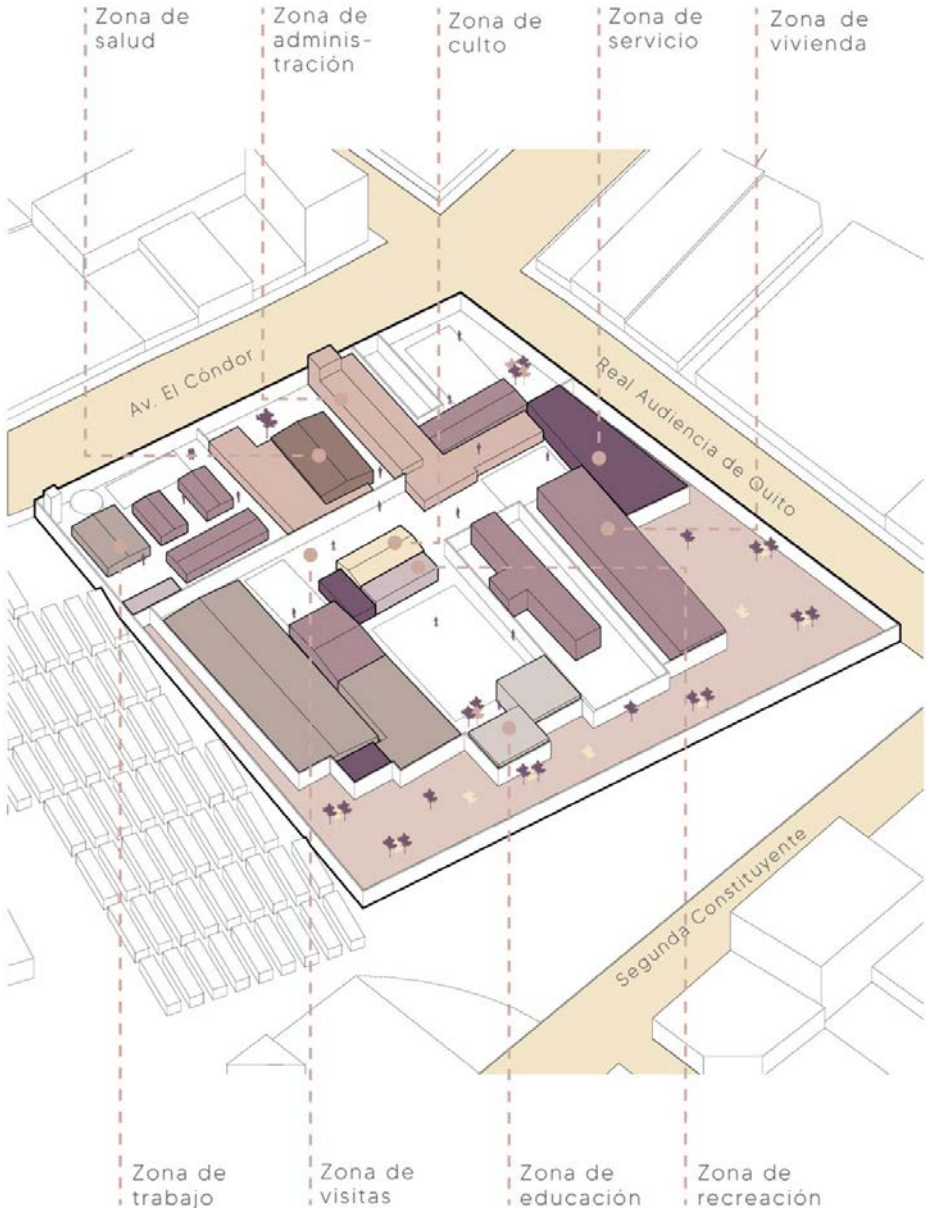


Figure 2: General axonometry of CPLT. Distribution of spaces in 9 zones. (2024)

analyses certain complementary criteria regarding the observed and desirable aspects of the CPLT's architectural program: spatial distribution, form and structure, planning and design, and spatial quality.

## 3.3. Spatial relationships

Theory indicates that the architecture of prison facilities encompasses not only physical aspects, such as form and structure, but also configures an environment that has a decisive influence on the behaviour and well-being of inmates (Serra, 2012). In response, Ochoa (2012) suggests that architecture should facilitate and integrate dynamic interactions through the spatial-functional relationships between users (ppl) and the architectural element (CPL). Moreover, Serra (2012) argues that the functional program of CPLs focuses on the management of functional links, highlighting the importance of considering how spaces are organized within the penitentiary institution.

Altmann (1970) indicates that the number of prisons using concrete walls around their entire perimeter is increasingly smaller. The author states that contemporary design criteria seek to employ this type of wall only around pavilions designated for maximum-security areas, as building walls with this arrangement is costly and negatively impacts the mental health of the ppl.

In relation to the case study, the architectural program of the CPLT is configured within a closed space delimited by walls that surround its perimeter. The security of the penitentiary complex begins from the external zone, with perimeter protection through high concrete walls and barbed wire that encircle the infrastructure. This way, the enclosing walls isolate the penitentiary centre from the surrounding environment, excluding it from its context.

Thus, the design of the CPLT organizes all program areas into five distinct sections (Figure 3a). Within these sections, security is not limited solely to the implementation of surveillance and control mechanisms but is intimately related to space-functional planning and distribution. Each section is separated by security walls that prevent interconnection and has specific access points that allow transition from one area to another. However, the openings in the walls do not facilitate visual communication between the sections, maintaining a strict physical and visual separation between them.

Furthermore, there is evidence of a lack of effective planning and regulation, leading to the creation of areas with poor habitability conditions. These areas were built with hard-to-access corners, hidden and poorly visible areas, and elements like columns or circulation ducts that obstruct the view and hinder the surveillance of the penitentiary centre, which contradicts the required characteristics for a secure space. Within the CPLT, this configuration has fostered the emergence of areas with space-functional deficiencies, contributing to an increasing perception of internal insecurity.

In turn, the access points from the exterior, both for pedestrians and vehicles, are defined by two openings in the wall facing Avenida del Cóndor. In both cases, these accesses are flush, meaning they maintain a continuous surface with the surrounding wall and integrate easily, going unnoticed without standing out visually. The main vehicular access facilitates entry to the loading and unloading zone, a yard with the capacity to accommodate up to two vehicles or a truck. This space is designated for the entry of supplies such as food and workshop materials, among others. On the other hand, the pedestrian entrance leads to a reception area where security personnel conduct the registration of entry and exit for each individual accessing the centre. Inside the centre, each section has distinct access points delineated by security walls that establish a clear separation between one section and another (Figure 3b).

Within the CPLT, what is considered private becomes public, as the ppl, subjected to the panoptic structure of the prison and the constant process of surveillance and control, are observed all the time, which could lead to a suppression of privacy. On the other hand, what is considered public becomes private, as the areas shared by all the ppl, such as the outdoor yards, are owned by everyone and no one simultaneously, with no individual acquiring exclusive rights over these spaces.

On the other hand, internal circulation within the CPLT focuses on pedestrian movements, allowing users to move freely within their respective sections. The configuration of routes within the CPLT shows diversity in its design. Some areas feature linear circulation, such as within the pavilions, while others adopt a composite circulation scheme characterized by differentiated routes and nodes in terms of scale, shape, length, and location. Table 4 analyses certain complementary criteria regarding the observed and desirable aspects related to the spatial relationships of the CPLT: security, access, circulation, and routes.

| Spatial Relations | | |
|---|---|---|
| Physical characteristics of the CPL | | |
| **Analysis criteria** | **Observed** | **Desirable** |
| **Security** | • The architectural program is configured within a closed space, delimited by perimeter walls.<br>• Security<br>• The watchtowers are not in the proper condition for their function, and their location is not strategic.<br>• Each section is separated by security walls that prevent their visual and physical interconnection.<br>• Areas with hard-to-reach corners, hidden and poorly visible areas for proper control.<br>• Perception of insecurity within the facilities. | • The security of the prison complex should be projected from the outside with concrete walls and barbed wire surrounding the infrastructure.<br>• Strategic location of the watchtowers.<br>• Items such as should be avoided<br>• columns or circulation ducts that obstruct the view and make surveillance difficult. |
| **Acceses** | • Access from outside does not have adequate security levels.<br>• There is only one entrance booth, without any differentiation | • Accesses should maintain a clear distinction between each access and rigorous control of who enters and leaves the CPL. |
| **Criculation and routes** | • The internal circulation of the CPL is focused on pedestrian movements.<br>• Some circulation spaces are enclosed and present lighting problems, unsafe characteristics, and discomforts.<br>• There is no separation or control of the different routes. Confidentiality of the areas is not maintained. | • It is necessary to establish safe and fluid routes, differentiating the currents of movement and<br>• reducing the intersection locations where<br>• situations of danger or conflict may arise<br>• among the inmates.<br>• Each ppl should only know the routes necessary to carry out their daily activities, the routes used by the staff<br>• penitentiary must remain restricted |

Table 4: CPLT spatial relations analysis criteria. (2024)

## 3.4. Environmental conditions

Theory suggests the importance of considering that the physical environment within correctional facilities has a psychological impact on both inmates and staff (Larrea, 2021). In this regard, inadequate environmental conditions significantly influence inmate behaviour; for example, excessive heat can cause thermal discomfort and irritability, which can, in turn, trigger violent situations (Larrea, 2021). Furthermore, regarding the ventilation of interior spaces in correctional facilities, Grip et al. (2018) indicate that a monotonous environment, combined with conditions where air lacks ventilation flow, negatively affects the well-being of inmates. Additionally, various studies argue that exposure to environments with natural lighting positively impacts emotional and physical health, as well as aids in the recovery process for inmates (Grip et al., 2018).

In relation to the case study, the deputy director of CPLT argues that environmental conditions play a crucial role in the mental and emotional well-being of the inmates. This statement highlights the need to pay attention not only to the material aspects of the prison infrastructure but also to its influence on the psychological and emotional state of those who live and work there. Inmates need spaces that promote their comprehensive development, which implies the provision of infrastructure that meets essential requirements.

In this regard, it is evident that CPLT provides minimal rather than optimal conditions. It is recognized that the physical state of the spaces affects individuals' ability to adapt to the place. In this sense, insufficient and inadequate areas are identified; moreover, it is noted that ventilation and lighting conditions impact space-functional overcrowding. The high concentration of individuals in a limited area creates conditions comparable to a mini sauna, which could increase the risk of disease spread due to inadequate ventilation. This problem could affect both the physical health and psychological well-being of the inmates.

Given the thermal conditions within CPLT, it is noted that in confined areas such as cells, high temperatures are recorded, exacerbated by overcrowding. This issue is also evident in the kitchens of the internal restaurants within the prison, where the lack of air circulation leads to elevated temperatures, affecting the quality of work by the inmates. Additionally, the air quality inside the CPLT facilities is compromised by various factors, such as drug use, inadequate sanitation facilities, poor hygiene among the inmates, and unfavourable climatic conditions, resulting in unpleasant odours and stagnant air. Furthermore, the humidity that accumulates on the walls due to insufficient ventilation promotes the growth of mould and dust mites.

Additionally, interior lighting at CPLT is constrained by the lack of openings to allow natural light, relying mostly on artificial lighting, which is inadequate and results in poorly lit areas. According to authors like Grip et al. (2018), such conditions can have adverse effects on health both in the short and long term, including deficiencies in essential vitamins for the

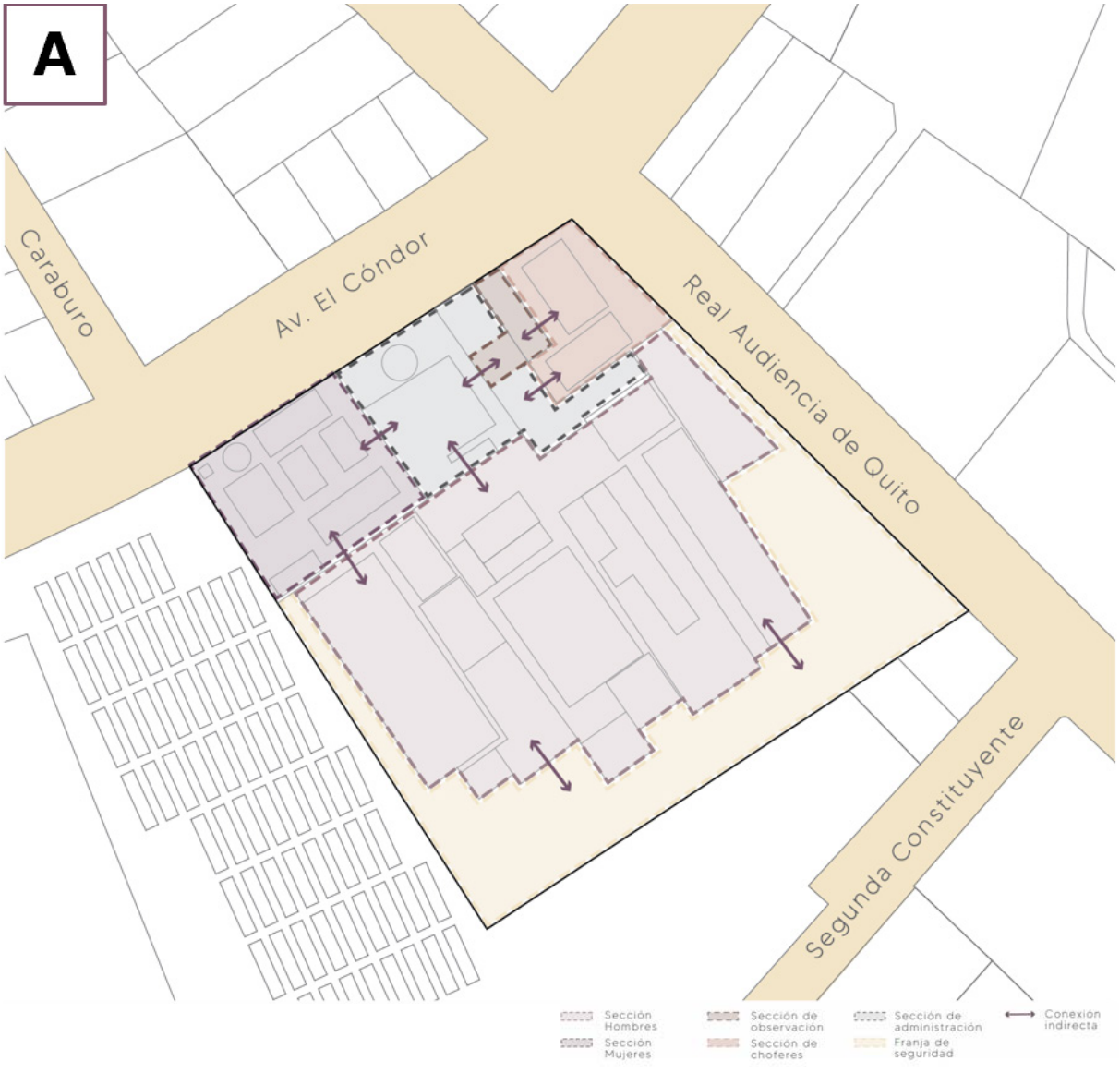


Figure 3: a) Connection of the CPLT sections. (2024)

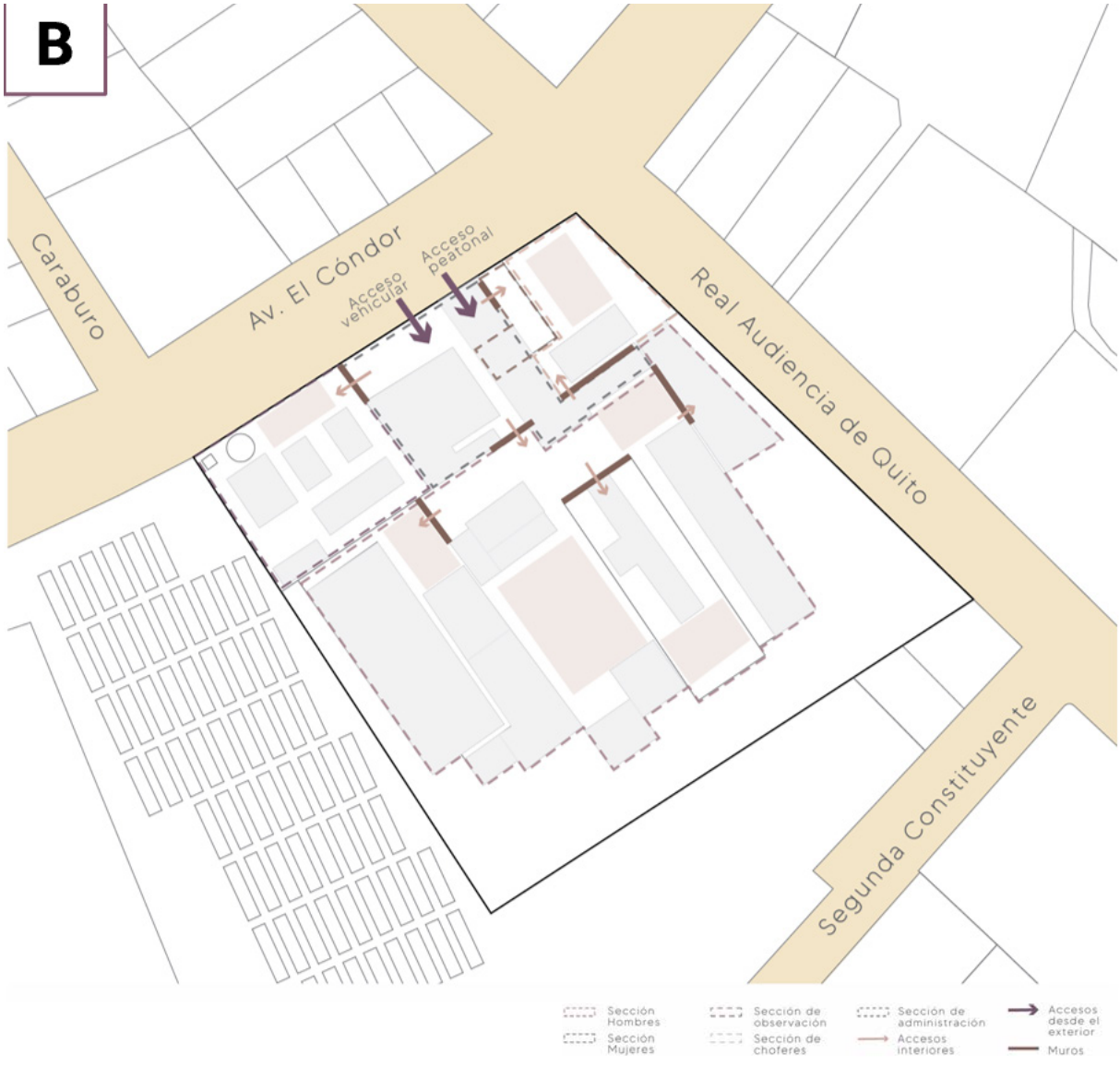


Figure 3: b) Diagram of external and internal accesses in the CPLT. (2024)

human body, as well as conditions like anxiety and depression.

The individuals at CPLT perceive various issues related to the environmental conditions of the spaces, particularly noting deficiencies in the cells and educational areas. Specifically, they focus on insufficient ventilation, which is attributed to the limited capacity relative to the number of people living there, and express displeasure with the penitentiary staff's habit of smoking inside these spaces. They also express a desire for larger physical areas and adequate lighting. Additionally, many people wish for green spaces such as gardens and trees for recreational use.

It is important to note that the lack of vegetation contributes to increased temperatures at CPLT, as green areas and vegetation play a crucial role in thermal regulation by providing shade, reducing heat absorption on surfaces, and allowing for greater water evaporation. Without this vegetative cover, the spaces at CPLT are directly exposed to solar radiation, which increases the heat absorption by the structures and the surrounding environment, resulting in a significant rise in temperature. This phenomenon not only affects the thermal comfort of the individuals but also exacerbates the climatic conditions inside the facility. Table 5 analyses certain complementary criteria related to the observed and desired environmental conditions of CPLT: temperature, ventilation, and lighting.

## 4. Discussion and conclusions

To explore the location, architectural program, spatial relationships, and environmental conditions of the CPLT, and how these have affected the rehabilitation and reintegration process of the inmates, a phenomenological qualitative research study was conducted through an ethnographic approach involving inmates, a correctional officer, and the built environment. In this context, it was timely to compare the results obtained through the qualitative methodology with findings from similar research in the Latin American context. Thus, two types of research were identified: a) those proposing a qualitative analysis of prison overcrowding based on interviews with experts (Arrias et al., 2020; Béjar, 2022; Zavaleta et al., 2022), and b) those proposing a qualitative analysis of prison infrastructure and its impact on inmates (Romero, 2020; Estrada and Huamani, 2022; Lazarinos and Tone, 2022; Suasnavas, 2023).

In this regard, there is a greater methodological alignment with research that proposes a qualitative analysis of prison infrastructure and its impact on inmates. These studies employ similar information-gathering resources to those used in the current research (interviews with inmates, documentary review, assessment forms, observation diaries). Thus, in contrast to other studies, the deficiencies in the CPLT reflect issues affecting several prison facilities in Latin America (Table 6). Other studies have documented similar problems of overcrowding, congestion, and deterioration of facilities, indicating a regional trend in difficulties maintaining adequate prison conditions. Comparisons show that, although contexts and specifics may vary, the fundamental problems are consistent across different geographies.

| Environmental conditions of prison space<br>Physical characteristics of the CPL | | |
|---|---|---|
| **Analysis criteria** | **Observed** | **Desirable** |
| **Temperature** | • High temperatures during the day in places that do not have adequate ventilation, especially in the kitchen and cells.<br>• Low temperatures at night, due to the materiality of the infrastructure. | • Well-oriented spaces should be created to maintain freshness.<br>• Shade spaces should be created in open areas to avoid thermal discomfort.<br>• Passive solar architecture should be applied, focused on capturing all solar radiation during the day, so that the thermal inertia of the concrete can accumulate heat and return it to the interior at night. |
| **Ventilation** | • Mass spread of disease due to lack of ventilation.<br>• Air stagnation due to the size of the spaces and the number of people living in them.<br>• Ventilation<br>• Presence of high walls that obstruct air flow in hard-to-reach areas.<br>• Bad smells in the cells.<br>• Moisture build-up on walls | • Cross ventilation should be implemented in spaces to ensure air flow.<br>• Sources of unpleasant odours should be avoided. |
| **Lightning** | • Natural lighting is restricted by the size of the windows.<br>• The artificial lighting is in poor condition.<br>• Areas with dark spots are generated.<br>• Inadequate orientation of spaces. | • The safe location of electrical wiring should be ensured to avoid potential hazards.<br>• derived from their manipulation. Artificial light should be correctly distributed in the spaces, considering the routine and the<br>• inmates' activities.<br>• Openings in walls should be properly planned to allow sunlight through. |

Table 5: CPLT's criteria for analysing environmental conditions. (2024)

| | Author | Case study | Subject | Method | Results |
|---|---|---|---|---|---|
| Qualitative analysis of prison overcrowding: in-depth interviews with experts | **Arrias et al. (2020)** | Ecuador | Overcrowding, regulatory instruments | Analytical and descriptive research using the qualitative modality in relation to the interpretive paradigm, which addresses a documentary and bibliographic design. The hermeneutic method and in-depth interviews were used. | There is a systematic violation of the human rights of ppl due to prison overcrowding which exceeds installed capacity. |
| | **Béjar, J. (2022)** | Callao (Perú) | Overcrowding, investment in CPL infrastructure, PPL health | Basic qualitative research with a non-experimental design. In-depth interviews were conducted with 20 private lawyers in Peru. | There are violations of the right to health of the ppl because prison conditions prevent access to medical care. The lack of budget prevents investment in infrastructure, so the spread of diseases is unstoppable. |
| | **Zavaleta et al. (2022)** | Trujillo (Perú) | Overcrowding, people's health | Basic qualitative research, which sought to understand concepts, opinions and experiences based on in-depth interviews with experts. | A legislative decree, although temporary to prevent contagion during Covid-19, did not solve the problems of overcrowding. |
| Qualitative analysis of the prison infrastructure: architectural program, spatial relations, environmental conditions, location | **Romero, L. (2020)** | Huaráz (Perú) | Socio-spatial conditions of prison architecture | Qualitative, correlational research, which determined the influence of prison architecture on the social reintegration activities of ppl. In-depth interviews with ppl, documentary review, documentary records and an observation log were conducted. | Overcrowding is high and there are inadequate spaces. Regarding the coexistence of the ppl, it is concluded that the reintegration criteria are ambiguous and deficient. There are intramural and extramural programs, but they are not put into practice, since from the moment they enter the cpl, the ppl are not classified adequately. |
| | **Lazarinos, S., and Tone, S. (2022)** | Arequipa (Perú) | Socio-spatial conditions of prison architecture | Qualitative, phenomenological research. In-depth interviews were conducted with the administrative staff of the CPL and with specialist psychologists. | The need to intervene in the CPL was identified due to problems in the architectural program and environmental conditions. The need to expand and remodel the penitentiary infrastructure was concluded, considering design criteria to meet the needs of the ppl. |
| | **Estrada, K., and Huamani, G. (2022)** | Cuzco (Perú) | Socio-spatial conditions of prison architecture | Descriptive, observational and cross-sectional research using the qualitative modality. In-depth interviews were conducted with 21 ppl, and observation forms were also used. The information was validated by 3 experts. | Environmental conditioning is unsatisfactory, and the physical space insufficient. The prison context is inappropriate and functionality is severely compromised. Social reintegration programmes are inadequate, although equipped workshops are available, the education available is not free and there are no other activities for ppl. |
| | **Suasnavas, B. (2023)** | Ecuador | Prison Architecture: Location and Perception of Insecurity | Applied qualitative research, descriptive in scope. A documentary analysis was carried out (official statistical data and newspapers) that allowed the analysis of the problems generated by the geographic location of the CPLs in Ecuador and increases the perception of insecurity in the population. | The need to improve internal controls in police stations was identified in order to prevent violent demonstrations within these facilities, which affect public safety in the localities where they are located. |
| | **Present article (2024)** | Ecuador | Socio-spatial conditions of prison architecture | Qualitative phenomenological research based on an ethnographic approach with the ppl, a prison officer and the constructed space. | The findings indicate deficiencies in the spatial-functional configuration of the CPL, which contribute to a detrimental environment, exacerbating problems such as the deterioration of the physical and psychological well-being of the ppl. |

Table 6: Contrasting similar research linked to prison infrastructure in the Latin American context. (2024)

The analysis of the CPLT reveals issues in its spatial-functional configuration that impact the rehabilitation and reintegration process of inmates. The excess of approximately 50% beyond the maximum capacity of the CPLT reflects critical overcrowding, while the deterioration of facilities, combined with inadequate spaces for rehabilitation and education, has discouraged personal development and created a hostile prison environment. These issues have not only undermined the internal security of the CPLT but also impeded the effective rehabilitation of inmates. Table 7 outlines the socio-spatial, physiological, and psychological repercussions identified in the behaviour of inmates within the CPLT in relation to its location, architectural program, spatial relationships, and environmental conditions.

It should be noted that overcrowding in the CPLT has led to unsustainable conditions of congestion, increasing tension among inmates and complicating prison management. Spaces designed to accommodate a specific number of inmates are now supporting nearly double their capacity, resulting in improper use of common and recreational areas. This overcrowding has drastically reduced opportunities for positive social interaction and participation in rehabilitation programs, which are essential for social reintegration.

Another fundamental problem in the CPLT lies in the deterioration of its facilities. Inadequate maintenance and outdated infrastructure have created unsuitable living and safety conditions. The lack of regular upkeep has resulted in weakened infrastructure, increasing the risk of

accidents and affecting the morale of both inmates and prison staff. Furthermore, the absence of adequate spaces for educational, labour, and recreational activities has limited opportunities for effective and appropriate rehabilitation. In addition, the poor spatial distribution within the CPLT has exacerbated these issues. Areas with low visibility and difficult access have increased the perception of insecurity and hindered effective surveillance, exacerbating conditions of tension and conflict. These factors, combined with deficient environmental conditions, have fostered an adverse penitentiary environment with various repercussions (socio-spatial, physiological, and psychological), negatively impacting both inmates and the staff responsible for their supervision.

This analysis underscores the urgent need for structural and programmatic interventions in the CPLT and other similar facilities in Ecuador to achieve a substantial improvement in the effectiveness of the prison system. To this end, it is crucial to consider implementing architectural models that address the identified deficiencies. One model to consider could be the Spanish macro-prison, which, despite contextual differences with the Ecuadorian mega-prison, offers effective solutions to avoid overcrowding and improve rehabilitation conditions. This model emphasizes the creation of spacious and multifunctional areas that facilitate educational, labour, and recreational activities, promoting a safe and conducive environment for rehabilitation (Daunis, 2016).

The adoption of these approaches requires careful planning and inter-institutional commitment, involving architects, sociologists, psychologists, and rehabilitation specialists. Proposals must be feasible and aligned with available resources, prioritizing the construction of facilities that meet basic shelter needs and offer real opportunities for social reintegration and recidivism reduction. In conclusion, it is pertinent to consider that the planning of prison facilities like the CPLT needs to focus on developing infrastructures that not only address current problems but also promote a more humane and effective prison system, aligned with the principles of dignity and comprehensive rehabilitation of inmates. Implementing these improvements could significantly contribute to the development of prison environments that support security, rehabilitation, and social reintegration of inmates.

**Conflict of Interests.** The authors declare no conflict of interests.


| | Impact on PPLS behavior | | |
|---|---|---|---|
| | **Socio-spatial repercussions** | **Physiological repercussions** | **Psychological repercussions** |
| **Site** | • Access to knives and narcotics from outside due to its location in an urban area. | • Physical injuries, musculoskeletal trauma, addictions and overdoses. | • Easy access to the CPL allows for the fulfillment of the family bonding axis, which gives them emotional stability and motivation. |
| **Architectural program** | • Overcrowding.<br>• Violation of people's rights. | • Respiratory infections and diseases. | • Mental fatigue that generates emotions such as anger or aggressive behavior.<br>• Difficulty reasoning and a reduced ability to regulate impulses. |
| **Spatial relations** | • Hierarchies of power they do not allow free access and circulation in specific spaces.<br>• Distortion in the separation between what is considered public and private.<br>• Invisible borders. | • Sedentary lifestyle, cardiovascular problems, obesity, muscle atrophy due to limited access to common areas. | • Suppression of privacy due to constant surveillance and control due to the structure<br>• CPL panopticon. Ppls create psychological barriers that limit their stay in spaces. |
| **Environmental conditions** | • Poor environmental conditions can lead to violent situations. | • Excessive heat causes thermal discomfort.<br>• Inadequate exposure to light has short- and long-term health consequences, such as vitamin C and D deficiency.<br>• Stagnant air and an unchanging environment diminish vitality and generate<br>• respiratory diseases. | • High temperatures, lack ventilation and lighting generate irritability and stress in the ppls. |

Table 7: Impact of the analysis on the behaviour of the ppl. (2024)

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