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## Ergonomics of domestic building structure on occupants' health

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### Abstract

This research looks into the connection between building design and the health of its occupants. There is probable effect of noble or lowly building edifice on the comfort, aesthetic, psychology and euphoria of occupants in terms of topography, dimension, colour and temperature of the building. A careful inspection, application and adherence of various factors on ergonomics of domestic buildings will have a positive ripple effect on occupants' health and elongated lifespan. Building stakeholders are to enforce compliance to standards and ensure strict monitoring of domestic building through establishing of policies to as to achieve a comfortable and a healthier end user.

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*Keywords:* building; comfort; health; policies; temperature

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### 1. Introduction

Ergonomics is a design practice that takes human comfort into massive cognizance. Every designer intuitively factors ergonomics; however, they need the principle to get it achieved. Ergonomics and sustainable development are closely needed in every dimension of human endeavours. Ergonomics focuses on meeting present needs while sustainable development focuses on meeting both needs and preventing its damage to future generation (Radjiyev et al., 2015). Researchers pointed attention on the problem of selective ergonomics such as the neglect of construction workers who make the ergonomics of building works (Sass and Smallwood, 2015). The construction workers span well above 350 million people who are mainly manual labourers (Eaves et al., 2016) and are faced with health, financial and safety challenges (Biswas et al., 2016; Golabchi, 2018). Other challenge they face are unsafe act,

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unsafe working conditions, insufficient tools, poor safety know-how and poor work plan (RatriParida and RadipKumarRay, 2015; Okoye et al., 2016). The aim of this article is to advocate for adherence to standards in design of domestic building in harmony with the utmost health of occupants.

### ***1.1. Building design standard***

Building design is a key indicator of the mental, social and psychological wellbeing of a person and a nation. In its design, building experts consider building energy reduction in its plan (Ruparathna et al., 2016; Boeck et al., 2015; Roh et al., 2016). This approach can be incorporated from scratch or retrofitting an existing building (Trencher et al., 2016; Wu et al., 2016; Penna et al., 2015). Technological goal tends towards zero building energy consumption (Chastas et al., 2017; Cui et al., 2017) and reduction in emission in building sectors (Dirisu et al., 2017; Dirisu et al., 2018). To further actualize energy reduction, it is important to appraise the material make up of building materials before commencing the project through the process of life cycle assessment (Rashid and Yusoff, 2015; Dirisu et al., 2018; Oyekunle et al., 2018). Additional effort to accomplish this objective was presented by Iturriaga et al., (2018) through applying a programming model to track and curtail energy consumption at design decision making stage. Other expert included emergency exit in the design of buildings (Olander et al., 2017).

### ***1.2. Building Design Overview in Nigeria***

Developing countries are faced with the problem of implementing policies that are especially meant for the well-being of the masses due to human factor constraints (Akinlabi, 2016) and shortage of advanced instrument to achieve it. The problem this poses to end users is the use of substandard method and materials in building structures. kitchen is spotted as the often visited structure by female folks, as such its design should be comforting and should give inspiration when cooking. The head room is specified as not less than 2.2m from the ceiling. Other dimensions such as the area and width were not specified since it isn't considered as a habitable area (Nigerian Building Code, 2006). There should be serious consideration for kitchen dimension especially for female folks due to their constant visit to this section of the home in the update of the Nigerian building code. There were proposed tools designed to enable Nigerian Building code more feasible by Amasuomo et al. (2017). Akanni et al., (2015) proposed that the environmental factors have to be investigated when embarking on building projects such as undue interruption of the projects by miscreants which can in turn impair the technical dedication to the optimal efficiency of delivery of the building job. A look into the internal enclosure of the building, the available oxygen level will influence the health and performance of the occupants, especially at classrooms (Ogbona and Ji, 2017). The question of using pet bottles as wall structure in replacement of brick will be the comparison of oxygen availability since the former have insignificant pore size compared to the latter. Research work on the utilization of pet bottles for building structure are ongoing (Mokhtar et al., 2015).

There are recommendations for reduction in energy consumption of buildings by authors for Nigeria (Geissler et al., 2018; Kawuwa 2015; Akadiri 2015) which will include proper material selection, orientation of the building with respect to solar energy and employing energy saving measures in the design plan (Mohammed and Abbakyari, 2016).

## **2. History and health effect of poor domestic building construction**

Domestic building construction cannot take place without the consideration of various factors that might have harmful effect on the occupant's wellbeing (Macintyre, S., et al, 2002). Meanwhile, some owners due to profit, do not consider this fact. A case study is a residential building in Ota, Ogun State Lagos where the kitchen dimension is 1.11m x 1.55m as against 1.2m x 2.75m. This generates smoke and heat while cooking, reduces comfort in the entire building, minimized degree of freedom of the body, as well as promote health issues like fatigue, lethargy and irritability due to drop in oxygen level. Some adverse effect can also include asthma, autism and even cancer in children (Zhang, J., & Smith, K. R., 2003), see Fig. 1.



Fig. 1. Residential building in Ota

### 3. Ergonomics and Sustainability

The term sustainability has been well addressed by various authors and can be summarized as design that meet both present and future needs without distressing the ecosystem and the environment (Roger and Patrick, 2013). Moray (1995) and Moray (2000) projected in the mid 90s that there will be increased pollution with population explosion and declining social amenities, therefore the term global ergonomics which is referred to as sustainable development should be addressed rather than location specifics. Global ergonomics addresses global problems which in return solves local concern. It is a concerted effort made by various researchers and stakeholders in resolving human and ecosystem issues (Thatcher *et al.*, 2018; Street, 2018; Munguia, 2018 and Naeini 2019). In 2008, the International Ergonomics Association (IEA) authorized the formation of a Human Factors and Sustainable Development Technical Committee, envisioned to advance a global link of specialists in the fields of ergonomics and human factors and sustainability (Haslam and Waterson, 2013). The call for a sustainable future has become the caption of most international conference proceedings which is greatly commendable.

### 4. Recommendation

Local Government in Nigeria should be actively involved in enforcing building structure to standard since this arm of Government seem to be close to the populace. The enforcement will be more viable when policies are established and certified professionals are integrated into their Department. This principle is practiced in Israel (Goulden *et al.*, 2015).

A critical review of the dimension of kitchen in the Nigerian building code is paramount to the health of female folks who often spend more duration here in getting things done for the home.

### Conclusion

An updated standard material, the Nigerian Building Code, is necessary for the welfare of end user in buildings. Empowerment of regulatory bodies and firm penalties for defaulters of standard design procedures will curtail health issues in buildings. It is necessary to canvass for a sustainable ergonomics and compliance by designers and manufacturers should be entrenched so that end users are fulfilled health wise. This can be achieved by its awareness communications through international conferences, standard organizations and seminars.

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