

# Exploring nexus among diversity, stressful living environment and health outcomes: A global perspective

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## Abstract

**Background:** Diversity is one of the buzzwords of the early twenty-first century and became a concept that bears multiple meanings to different groups of people. Diversity is most often referred to as the variety of human groups, societies, or cultures in a specific region, or in the whole world. Stress is any change in the environment that requires your body to react and it is non-specific response of the body to any demand. The body reacts to these changes with physical, mental, and emotional responses. Diversity and stressful living environment generate discrimination, segregation and social unrest that escalate the pressure on world's population which led to inadequate physical and mental health.

**Objective:** This study aims to investigate the relationship between diversity, stressful living environment and health outcomes by using the secondary data of 187-countries of the world.

**Method:** This study has applied Generalized Method of Moments (GMM) technique for empirical analysis. Alesina's fractionalization index has been used for measurement of diversity on the basis of ethnic and religious groups. Index of stressful living environment has been constructed employing Principal Components Analysis (PCA) technique by combining seven equally weighed variables i.e. homicide rates, GDP per capita, income inequality, corruption perception, unemployment, urban air pollution and life expectancy. Index of health outcomes comprised by core health related indicators defined by the World Health Organization (WHO) such as health status, health related risk factors, health related coverage, and health system.

**Results:** The empirical findings revealed that diversity and stressful living environment both have negative and significant impact on health outcomes.

**Conclusion:** This study concludes that diversity and stressful living environment both have a negative standing with health outcomes. Despite the fact that diversity cannot be reduced due to ethnic and religious diversity is an inherent part of most societies in a globalised world. However, it is unlikely to be halted yet the unintended negative impacts of such increased diversity can be minimized by establishing cohesiveness in society, that allow people to live in a healthy and stress-free environment. [*Ethiop. J. Health Dev.* 2019; 33(4):212-218]

**Keywords:** Stressful Living Environment; Ethnic Diversity; Religious Diversity, Health Outcomes.

## Introduction

In this world, changing long term life style patterns is likely to involve deep restructuring of thoughts, feelings and behaviour [1, 2]. People may spin in confusion, anger, blame, sadness, frustration, or guilty. Life is about relationship [3] whether as a professional, friend, family member, or citizen; that is shaped by social lives. For better or worse, lives are shaped by and directed toward, inner and outer human connection. However, some places are more developed, happy, and healthier than others on the basis of economic, social, cultural and environmental factors. Humans are basically social animals and cannot live without groups otherwise they can become socially and mentally disturbed. So, people prefer to live where individuals have same characteristic, emotions and feelings (homogenous characteristics). In contrast to this, diversity defined by each individual is unique, and recognizes their individual differences. Haidt, Rosenberg [4] identified many kinds of diversities around the globe. Understandably, in broad sense, diversity includes many different attributes such as race, ethnicity, gender, sexual orientation, socio-economic status, age, physical abilities, religious believes, political believes, other ideologies [5] and many more characteristics which make people unique.

Today as a result of increasing density of world population, diversity and stressful living environment increase the chances to deteriorate health performance. Many social scientists believe that stress is a non

specific response and somehow difficult to define because it is a unique individual and subjective experience. Wadman, Durkin [6] defined stressful living environment as the feelings of discomfort or anxiety that individuals may experience in social situations, and the associated tendency to distrust, rejection, anger & depression, and it leads to health related problems.

Diversity and stressful living environments are complex, controversial, multidimensional phenomena [7, 8] found in almost all regions and continents of the world. These became the burning issues and are found in almost all regions and continents of the world [9]. It is truly hard to find any place or field where there is no existence of more than one ethnic or religious group. The flow of ethnic groups within totally different cultures and norms is increasing in volume every year [10-13] which is more challenging to local societies when people symbolize their emotional, cultural and religious identities.

Diversity and stressful living environment have a more socioeconomic cost that affects human health significantly [7, 14]. Mental stress is a unique situation that undergoes complex and radical changes and if pressure is excessive or far too long, it not only affects single individual's health but also effects surrounding environment. Environmental stressors cause both short term and long term health impacts on the body and mind. Long-term exposure to stress depresses the

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immune system and may affect our heart, metabolism, and mental health. Long-term exposure to stress can cause diabetes and heart related health issues. Actually when someone lives in a stressful living environment, negative emotions flourish like anger. In stress there is discharge of adrenaline that is a hormone of fight and flight & its continuous discharge leads to damaging effect on healthy body.

Selye [15] initially proposed a stress-response model and used the term stressor to designate the stimulus that provoked the stress response. Kline Leidy [16] presented the manifestations of chronic health problems such as expressions of chronic stress that evolved as a consequence of environmental stressors. Krohne [17] believed that coping processes were constantly shaping the endocrine response to stressors and that this response varied with the particular properties of the stimuli. However, consequences of stressful living environment includes long term depression [18], hate and aggressive behaviours [19]. The literature shows that the effect of ethnic diversity is an explanatory variable in determining variation in health outcomes [20]. Early literature also shows that ethnic diversity has a significant negative relationship with health outcomes such as infant mortality rate, [21] lower public health spending [22] life expectancy, public health spending [23] and corruption [24]. Eisenberger, Taylor [25] proposed an alternative mechanism linking ethnic diversity to health outcomes and argued that ethnic diversity alters perceptions of risk. In social science, the literature also focused on

determinates of health outcomes such as health related expenditure and investment [26, 27], income [28], education and socio-economic status [29, 30], infrastructure [31], physical activity participation [32] and democracy [33].

Stressful living environment refers to people have different personalities and therefore respond to stressors in different ways particularly those who have developed health problems [34]. Stressful living environment has been linked to various physical health problems, including metabolic syndrome, high cholesterol, elevated blood pressure, and cardiovascular disease [35]. Researchers have introduced multiple variables to the stress-as-transaction model, expanding and categorizing various factors to account for the complex systems involved in experiencing a stressor [36]. But there is still a gap which needs to identify how diversity and stressful living environment affect the health outcomes. This study is going to fill this gap in literature.

This study identified four core health related indicators as comprised by World Health Organization (WHO) such as: the health status, health risk factors, health related coverage and health system. By using the theoretical framework and empirical studies of Alesina, Devleeschauwer [21], this study analyse the direct effect of diversity and stressful living environment on health outcomes, through adopting the standard model of Taylor and Turner [37], Churchill, Ocloo [20] such as;

$$HO_{it} = \alpha + \beta_1 (SLE)_{it} + \beta_2 (ED)_{it} + \beta_3 (RD)_{it} + \beta_4 (X)_{it} + \varepsilon_{it}$$

Whereas, “HO” indicates health outcomes including indices of health status, risk factors, health service coverage and health system, “SLE” indicate stressful living environment “ED” shows the ethnic diversity, “RD” illustrate the religious diversity, “X” shows the other control variables such as GDP per capita, urbanization, education and health expenditure, population density, literacy rate, institutional quality and “ $\varepsilon_{it}$ ” is the error term.

### Methodology

The choice of appropriate estimation technique is important for obtaining robust estimates. This study used Generalized Method of Moments (GMM) technique for empirical findings because it considered as an efficient analytical method, and overcome problems (i.e. normality or skewness, endogeneity, serial correlation) with Ordinary Least Squares (OLS) technique [38]. Acemoglu, Johnson [39] conclude that traditional empirical literature generally carries problems like endogeneity, measurement errors and omitted variables bias. A popular method to tackle the problem of endogeneity is the Generalised Method of Moments (GMM).

GMM technique further managed under two-steps procedure. Following Arellano and Bover [40] in first-step GMM estimator, error items are assumed to be independent and homoscedastic over time and cross-

sectional, while in the second-step estimator, these assumptions are relaxed and the standard variance-covariance matrix is robust to autocorrelation and heteroscedasticity. In the second-step, the residuals of the first-step are used to construct the standard variance-covariance matrix. Simulation studies show that the two-steps procedure result in a small increase in efficiency while the standard deviations can be severely downward biased, especially in small and finite samples [41].

### Variables and Data Sources

Data all of the variables used in this paper collected through secondary sources and free to access. This study used panel dataset of 187-countries from 1995 to 2015 by taking time interval of 05-years (i.e. 1995, 2000, 2005, 2010 and 2015). For measurement of diversity, this study followed the same formula of Alesina, Devleeschauwer [21] such as;

$$FRACT_j = 1 - \sum_{i=1}^N S_{ij}^2$$

Whereas,  $S_{ij}$  is the proportion of group  $i$ , ( $i=1, \dots, N$ ) in the country  $j$ . The range of the result is between 0-1. Zero “0” means totally homogenous country and “1” shows total heterogeneous country. For construction of stressful living environment index, study used seven equally weighted variables (as considered by Bloomberg’s more stressed-out countries) which were

homicide rates [42], GDP per capita on a purchasing-power-parity basis [21, 43], income inequality [44], corruption [45], unemployment rates [46], urban air pollution [47] and life expectancy [20]. Health outcomes index is constructed by using Principal Components Analysis (PCA) of core health indicators

(as proxy to health performance) such as (i) health status, (ii) health related risk factors, (iii) health related coverage, and (iv) health system. The dataset of above mentioned indicators taken from various international sources including World Health Organization (WHO), United Nations Children's Fund (UNICEF) [43].

## Results

**Table 1 – Results of stressful living environment and diversity on core dimensions of health outcomes<sup>1</sup>**

Variables	Index of Health Status	Index of Risk Factors	Index of Health Service Coverage	Index of Health System
SLE	-0.314 <sup>+++</sup> (0.148)	-0.100 <sup>††</sup> (0.150)	-0.158 <sup>+++</sup> (0.253)	-0.442 <sup>+++</sup> (0.246)
Ethnic Group	-0.314 <sup>+++</sup> (0.148)	-0.100 <sup>††</sup> (0.150)	-0.154 <sup>+++</sup> (0.956)	-0.361 <sup>+++</sup> (0.234)
Religious Group	-0.116 <sup>††</sup> (0.019)	-0.127 <sup>†††</sup> (0.050)	-0.013 <sup>††</sup> (0.153)	-0.167 <sup>††</sup> (0.286)
GDP growth	0.002 <sup>†††</sup> (0.020)	0.047 <sup>†</sup> (0.049)	0.153 <sup>††</sup> (0.018)	0.294 <sup>††</sup> (0.197)
Urbanization	0.951 (0.603)	0.153 (0.377)	0.516 (0.260)	0.548 (0.366)
Edu. expenditure	0.190 <sup>†</sup> (0.100)	0.150 (0.368)	0.048 <sup>††</sup> (0.079)	0.675 <sup>††</sup> (0.261)
Pop. Density	-8.625 (2.694)	-1.252 (0.242)	10.082 (4.687)	2.489 (1.581)
Health expenditure	3.791 (4.382)	0.055 (0.166)	0.265 (0.186)	0.682 (0.361)
Literacy rate	2.238 (7.258)	1.653 <sup>†</sup> (0.272)	2.762 (5.480)	0.944 (0.670)
Institutional Quality	6.314 <sup>††</sup> (4.078)	0.011 <sup>†††</sup> (0.154)	0.154 <sup>††</sup> (2.952)	0.425 <sup>††</sup> (0.211)
Constant	0.111 <sup>†††</sup> (0.019)	0.027 <sup>†††</sup> (0.070)	0.019 <sup>†††</sup> (0.0143)	0.146 <sup>†††</sup> (0.086)
<b>R<sup>2</sup></b>	0.395	0.411	0.402	0.526
Observations	367	345	351	399
Countries	97	91	94	101
Arrelano-bond test for AR (1)	0.000	0.000	0.000	0.000
Arrelano-bond test for AR (2)	0.639	0.742	0.661	0.657
Hansen-test over identification	0.522	0.320	0.661	0.526

Notes: GMM technique is used for empirical findings by focusing the problem of endogeneity. Health outcomes divided into 04-categories as indicated by World Health Organization (WHO) such as health status, risk factors, health service coverage and health system. Each index is created by using Principal Component Analysis (PCA) technique. Values of standard errors are in parentheses (.). (<sup>†††</sup>) (<sup>††</sup>) (<sup>†</sup>) shows level of significance at 1%, 5% and 10% respectively.

<sup>1</sup> In order to check the relationship between diversity and health outcomes, WHO indicates four main dimensions such as health status, risk factors, health services coverage and health status. Each dimension is further divided into number of indicators, see appendix for more detail.

**Table 2 – Robustness results of stressful living environment and diversity on health outcomes<sup>2</sup>**

Variables	Index of Health Outcomes		
	(OLS)	(FE)	GMM
SLE	-0.256 <sup>†††</sup> (0.146)	-0.304 <sup>††</sup> (0.140)	-0.541 <sup>†††</sup> (0.564)
Ethnic Group	-0.368 <sup>††</sup> (0.196)	-0.264 <sup>††</sup> (0.156)	-0.352 <sup>†††</sup> (0.295)
Religious Group	-0.096 <sup>††</sup> (0.034)	-0.100 <sup>††</sup> (0.047)	-0.129 <sup>††</sup> (0.097)
GDP growth	0.948 <sup>†</sup> (0.440)	1.524 <sup>†</sup> (0.648)	1.553 <sup>††</sup> (0.694)
Urbanization	0.451 (0.267)	0.248 (0.167)	0.675 (0.457)
Edu. expenditure	0.159 <sup>†</sup> (0.104)	0.246 (0.211)	0.497 <sup>††</sup> (0.281)
Pop. Density	0.327 (0.015)	0.220 (0.013)	-0.312 (0.035)
Health expenditure	0.477 (0.102)	0.768 (0.248)	0.644 (0.485)
Literacy rate	1.647 (3.457)	1.224 <sup>†</sup> (0.468)	1.541 (2.615)
Institutional Quality	0.569 <sup>††</sup> (0.244)	0.348 <sup>†††</sup> (0.134)	0.851 <sup>††</sup> (0.548)
Constant	6.267 <sup>†††</sup> (2.348)	4.521 <sup>†††</sup> (2.425)	7.638 <sup>†††</sup> (3.625)
<b>R<sup>2</sup></b>	0.495	0.446	0.502
Observations	336	336	416
Countries	101	101	121
Arrelano-bond test for AR (1)	----	----	0.000
Arrelano-bond test for AR (2)	----	----	0.543
Hansen-test over identification	----	----	0.179

Notes: Health outcomes Index is also constructed by using PCA technique by comprised health status, risk factors, health service coverage and health system. Values of standard errors are in parentheses ( ). (†††) (††) (†) shows the level of significance at 1%, 5% and 10% respectively.

<sup>2</sup> Health outcomes index has been created by using PCA of all four dimensions of WHO core health indicators.

## Discussion

Diversity is becoming a keyword in health care [20]. It's a fluid concept, one that evolves alongside society and changing ideologies. Traditionally, diversity referred to people of different racial and ethnic backgrounds, a term linked to phenotypic characteristics. Gender, too, has historically been included in the diversity umbrella. But now, diversity encompasses a much larger spectrum including life experiences, lifestyle choices and ideas, such as socioeconomic status and sexual orientation. It even takes into consideration the social determinants of health. In the healthcare sector, race, ethnicity and religion have become an immensely important factor in terms of healthy population due to an immensely diverse population [5].

The empirical findings in above table-1 show negative relationship exist between diversity, stressful living environment and core health indicators i.e. health status, risk factors, health services coverage and health system. However, table-2 also reveals robustness results which show that diversity and stressful living environment both deteriorate the health performance. As 1 percent increasing in stressful living environment and ethnic diversity, health outcome decreases by 0.54 and 0.35 percent respectively (as indicated by GMM technique). Results are supportive by theory and prominent indicators that denied the basic needs and direct negative effect on health related performance. Unorganized civil societies are a major cause of social segmentation, poverty and social exclusion, and have a negative effect on the quality of health [20, 54].

Diversity in form of social class, race, religious and ethnicity are more excluded individual equal opportunity of education, health, employment, basic needs and enjoyment of life. These individuals are mentally and physically frustrated and survive low level of healthy life. Stressful living environment is also associated with poor health outcomes, whereas substantial proportion of health related issues may be explained statistically through mental health disturbance. Act as chronic stressors and diversity caused of higher mistrust which over time are damaging to health. A series of studies have investigated why some communities were doing better than others by attraction to create better places to live in form of health, happiness and wellbeing. People live in societies with varying degrees of stress and discrimination. This posit that cultural, social or political processes that exclude/discriminate against whole sections of society result in low health status and less access to necessities of life [55-57].

## Conclusion

This study empirically elucidates the relationship between ethnic diversity, stressful living environment and health outcomes using panel data of 187-countries of the world and GMM technique. On the basis of findings, the study concludes that diversity (in form of ethnic and religious) and stressful environment both have a significant negative relationship with health outcomes. Literature indicates that stressful environment and diversity both have cause of socially

similar with literature where health performance deteriorated by the stressful living environment [48, 49], and heterogeneity/diverse society [20]. Becker [50] further illustrates theoretically that discrimination in society can create prejudice which could lead to a lower outcome and get worse health performance. Earlier literature on diversity and health disparities cluster addresses health related issues by diverse society and other vulnerable populations that result in disproportionate rates of illness and death. These social discrimination include persistent poverty; unemployment, education and housing; political disfranchisement; racial discrimination; and toxic living and working environments [48, 49].

Basically, stressful living environment encounters multiple stressors that are at risk for developing behavioral health issues. In the real sense, stressful living environment is not predictable and impact the normal physical and neurological development issues. Alternatively; non-stressful living environment is one of the controlled and safe with no potential risks to its occupants. Literature shows mechanisms by which people who has lived in stressful living environment have experience lower control and relative deficit of resources for health and well being [51, 52]. Appasamy, Guhan [53] indicate diversity and stressful living environment are the most unrest but if the fight is long term vulnerable it affects human's physical and mental health. Basically, stressful living environment and heterogeneous population have problematic for both developed and developing countries but consequences may be changed. Particularly, those countries where diversity and stressful living environment have more unorganized and untrained their health related issues are higher than then least stressful countries. However, those countries that have strong institutional quality the situation is less severe than other [58]. Diversity accompanied by weak institutions divides the society posing risks for religious and cultural confliction, civil wars, social tensions, political violence and unrest, corruption a recipe for underdevelopment [58-64].

Diversity and stressful living environment has adverse effects on society that leads to hindrance in manage/establish healthy population. Because both have deteriorated the societal development process by creating conflict at one hand and on other, poor health performance [65]. In this contemporary world, there are existences of multi-ethnic cultural states of different races, colour, language and religion. Hence, cohesive society and pleasant living environment have important implications to improve the social and mental health. The benefits of heterogeneity can prosper the economy by cohesiveness of society. This study suggests that in order to build health society need to create secure and peaceful society by shaping the economic life of a country in a variety of ways such as by promoting society towards more cohesiveness.

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