

# Health Determinants: Using Secondary Data to Model Predictors of Well-being of Jamaicans

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## ABSTRACT

**Objective:** During 1880–1882, life expectancy for Jamaican males was 37.02 years and 39.80 for their female counterparts and 100 years later, the figures had increased to 69.03 for males and 72.37 for females. Despite the achievements in increased life expectancies of the general populace and the postponement of death, non-communicable diseases are on the rise. Hence, this means that prolonged life does not signify better quality life. Thus, this study seeks to examine the quality of life of Jamaicans by broadening the measure of well-being from the biomedical to the biopsychosocial and ecological model.

**Method:** Secondary data were used for this study. The sample was a nationally representative one collected by the Statistical Institute of Jamaica and the Planning Institute of Jamaica in 2002. The total sample is 25 018 respondents of which the model used 1147. Data were stored and analysed using the Statistical Packages for the Social Sciences (SPSS). Multivariate regression was used to test the general hypothesis that well-being is a function of psychosocial, biological, environmental and demographic variables.

**Results:** The model explains 39.3 percentage of the variance in well-being (adjusted  $r^2$ ). Among those 10, the 5 most significant determinants of well-being in descending order are average number of persons per room ( $\beta = -0.254$ ,  $p < 0.001$ ), area of residence (I=KMA) ( $\beta = -0.223$ ,  $p < 0.001$ ), area of residence [I = Other Towns] ( $\beta = -0.209$ ,  $p < 0.001$ ) and age of respondents ( $\beta = -0.207$ ,  $p < 0.001$ ). These five variables accounted for 27.2 percentage of the model, with average occupancy and area of residence (being KMA) accounting for 7 per cent each.

**Conclusion:** This study has shown that well-being is indeed a multidimensional concept involving psychosocial, environmental and demographic variables.

# Determinantes de la Salud: Uso de Datos Secundarios para Modelar los Predictores de Bienestar de los Jamaicanos

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## RESUMEN

**Objetivo:** Durante 1880–1882 la esperanza de vida para los varones jamaicanos fue de 37.02 años y 39.80 para sus contrapartes femeninas. Cien (100) años más tarde, las cifras han aumentado a 69.03 para los varones y 72.37 para las hembras. A pesar de los logros en relación con aumento de la esperanza de vida del pueblo en general, y la posposición de la muerte, las enfermedades no comunicables están en alza. Por tanto, esto significa que la prolongación de la vida no significa una mejoría de la calidad de la vida. Así, este estudio busca examinar la calidad de vida de los jamaicanos ampliando la medida del bienestar del modelo biomédico al modelo biopsicosocial y ecológico.

**Método:** Para este estudio se utilizaron datos secundarios. Se trata una muestra nacionalmente representativa recogida por el Instituto Estadístico de Jamaica y el Instituto de Planificación de Jamaica en 2002. La muestra total asciende a 25 018 encuestados, de los cuales el modelo usó 1147. Los datos fueron guardados y analizados usando el Paquete Estadístico para las Ciencias Sociales (SPSS). La regresión multivariante fue usada para probar la hipótesis general de que el bienestar es una función de las variables psicosociales, biológicas, medioambientales y demográficas.

**Resultados:** El modelo explica un porcentaje de 39.3 de la varianza en el bienestar ( $r^2$  ajustado). Entre esos 10, las 5 determinantes más significativas del bienestar en orden descendente son: el número promedio de personas por habitación ( $\beta = -0.254$   $\rho < 0.001$ ); el área de residencia ( $1 = KMA$ )<sup>1</sup>, ( $\beta = -0.223$   $\rho < 0.001$ ); el área de residencia ( $1 = \text{Otros pueblos}$ ), ( $\beta = -0.209$   $\rho < 0.001$ ), y por último la edad de los encuestados ( $\beta = -0.207$   $\rho < 0.001$ ). Esas cinco variables representan un porcentaje de 27.2 del modelo, con el promedio de ocupación y área de residencia (KMA) representando 7 porcentajes de cada uno.

**Conclusión:** Este estudio ha mostrado que el bienestar es realmente un concepto multidimensional. Este trabajo ha probado que las determinantes de bienestar incluyen variables psicosociales, medioambientales y demográficas.

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## INTRODUCTION

Many scholars such as Erber (1), Brannon and Feist (2) have forwarded the idea that it is germane and timely for us to use a biopsychosocial construct for the measurement of quality of life. But neither Erber nor Brannon and Feist have proposed a mathematical model that can be used to evaluate this worded construct. This is also similar to and in keeping with the broad definition given by the WHO in 1946 (3) and later promulgated by Engel (4–8). However, in 1972, Grossman (9) filled this gap in the econometric analysis to formulate a measurement for health. This was later expanded by Smith and Kington (10, 11). Despite the premise set by Grossman, Smith and Kington used physical functioning in their definition of health, which again is a narrow approach to the concept of health and well-being. Grossman's model which was further enhanced by Smith and Kington did not provide the relative contribution of each of the determinants of well-being.

On the other hand, a study by Hambleton *et al* (12), in Barbados, decomposed the predictors of self-reported health conditions and found that 38.2% of the variation in health status can be explained by some predisposed variables. Of the variation explained, 'current health status' account for 24.5%, lifestyle risk factors, 5.8%, current socio-economic factors, 2.5% and historical conditions, 5.4%. The composition of the aforementioned groups were (i) historical indicators – education, occupation, childhood economic situation, childhood nutrition, childhood health, number of childhood diseases; (ii) current socio-economic indicators – income, household crowding, currently married, living alone; (iii) lifestyle risk factors – body mass index, waist circumference, categories of diseases, smoking, exercise and (iv) current disease indicators – number of illness, number of symptoms, geriatric depression, number of nights in hospitals, number of medical contacts in a 4-month period. The work of Hambleton *et al* provided explanations that determinants of well-being expand beyond 'current disease conditions' to lifestyle practices and socio-economic factors using 'physical functioning' (*ie* health conditions) in conceptualizing health. This is not in keeping with the WHO expanded definition (3). Such an approach focusses on the mechanistic result of the exposure to certain pathogens which result in 'disease-causing conditions'.

The WHO's definition has been widely criticized for being elusive and immeasurable because the concept is too broad (4). On the other hand, the traditional view of the Western culture is such that health means the 'absence of diseases' Rozensky (13). However, in the 1950, a psychiatrist, Engel (4–8), began promoting what he referred to as the biopsychosocial model. He believed that the treatment of mental health must be from the perspective of the body (*ie* biological conditions), mind (*ie* psychological) and sociological conditions. Engel believed that the psychological, biological and social factors are primarily responsible for human functioning. He forwarded the thought that these are inter-linked systems in healthcare and are comparable to the interconnectivity of the various parts of the human body. Engel believed that when a patient visits the doctor, for example, for a mental disorder, the problem is a symptom not only of actual sickness (biomedical) but also of the social and the psychological conditions. He, therefore, campaigned for years that physicians should use the biopsychosocial model for the treatment of patient's complaints, as there is an interrelationship among the mind, the body and the environment. He believed so much that the model would help in understanding sickness and provide healing that he introduced it to the curriculum of Rochester Medical School (14, 15). Medical psychology and psychopathology was the course that Engel introduced into the curriculum for first year medical students at the University of Rochester. This approach to the study and practice of medicine was an alternative paradigm to the biomedical that was popular in the 1980s and 1990s, and is still popular in Jamaica in 2007. In writing about wellness and well-being, there are no studies in Jamaica that can definitely state that these are the determinants of well-being or quality of life. Milbourn-Lynch (16) argued that wellness is "a balance among the physical, spiritual, social, cultural, intellectual, emotional and environmental aspects of life" but there is no research that put all of these conditions together, and show their relationship with well-being. As such, a model was constructed which will be in keeping with the concept of the biopsychological model. This study seeks to examine the quality of life of Jamaicans by broadening the measure of well-being and to ascertain possible factors that can be used to predict well-being from a biopsychosocial and environmental approach as against the

traditional biomedical model (*ie* biological conditions or the absence of pathogens).

**Theoretical Framework**

The overarching theoretical framework that is adopted in this study is an econometric model that was developed by Grossman (9), quoted in Smith and Kington (10), which reads:

$$H_t = f (H_{t-1}, G_o, B_t, MC_t, ED) \dots\dots\dots (2)$$

In which the  $H_t$  – current health in time period t, stock of health ( $H_{t-1}$ ) in previous period,  $B_t$  – smoking and excessive drinking, and good personal health behaviours (including exercise –  $G_o$ ),  $MC_t$ , – use of medical care, education of each family member (ED), and all sources of household income [including current income] (Smith and Kington 1997, 159–160). Grossman’s model was expanded further by Smith and Kington to include socio-economic variables (Equation 3).

$$H_t = H^* (H_{t-1}, P_{mc}, P_o, ED, E_t, R_t, A_t, G_o) \dots\dots\dots (3)$$

Equation (Eq) 2 expresses current health status  $H_t$  as a function of stock of health ( $H_{t-1}$ ), price of medical care  $P_{mc}$ , the price of other inputs  $P_o$ , education of each family member (ED), all sources of household income ( $E_t$ ), family background or genetic endowments ( $G_o$ ), retirement related income ( $R_t$ ) and asset income ( $A_t$ ).

Among the limitations in the use of the biopsychology model that is used by Smith and Kington are psychological conditions and ecological variables. This study is equally limited by many of the variables used in Eq 2 because data from this study are based on the Jamaica Survey of Living Conditions (JSLC) and Labour Force Survey (LFS) which were not primarily intended for this purpose. The JSLC is a national cross-sectional study which collects data for general policy formulation and so we will not be able to track the individuals over time in order to establish a former health status (17). The updated JSLC and LFS do have information – such as preventative lifestyle behaviour – exercise, family background and not-smoking. The JSLC, on the other hand, collects data on crime and victimization, environmental conditions and household size, room occupancy, gender and age of respondents which were all important for this modified model from that use by Smith and Kington in Equation 3.

$$W = f (P_{mc}, E_D, A_i, E_n, G, M, A_R, P, N, O, H_t, T, V, S, H_S) \dots\dots\dots (4)$$

Well-being of Jamaicans (W), is the result of the cost of medical care ( $P_{mc}$ ), the educational level of the individual,  $E_D$ , age of the respondents, the environment ( $E_n$ ), gender of the respondents (G), marital status (M), area of residents ( $A_R$ ), positive affective conditions (P), negative affective conditions (N), average number of occupancy per room (O), home tenure, ( $H_t$ ), land ownership(proxy paying property taxes, (T), crime and victimization, (V), social support (S) seeking health services,  $H_S$ .

**METHODS**

This research used secondary data (JSLC, 2002) that was obtained from the Planning Institute of Jamaica (PIOJ) and the Statistical Institute of Jamaica (STATIN). The survey (JSLC) was carried out between June–October, 2002; it is a subset of the Labour Force Survey (*ie* ten per cent). Of a population of 9656 households, the sample size used for the JSLC was 6976 households (25 018 respondents). The instrument (*ie* questionnaire) was categorized based on demographic characteristics, household consumption, education, health, social welfare and related programmes, housing and criminal victimization.

The data were entered and retrieved using SPSS for Windows 15.0. Descriptive analysis was done on the sample in order to provide background information on the respondents; and the enter method in multiple regression was used to establish the final model. Using the principle of parsimony, the final model comprised of those variables that were statistically significant (*ie*  $\bar{n}$ -value < 0.05), at 95% confidence interval. To assess how well the model fit the data, the F test was used.

**RESULTS**

**Demographic characteristics**

Respondents’ background

The total sample was 25 018 of which there was 49.3% males (n = 12 332) compared to 50.7% females (12 675). The average age of the sample was 29 years ( $\pm$  21 years) with the median age being 24 years. Decomposing age by gender reveals that the average age for females (29  $\pm$  22 years.) was marginally greater than that of males (28  $\pm$  22 years). The mean overall well-being of Jamaicans is low (4 out of 14) with the mode being 4.5. Well-being is a composite variable constituting material resources (MR) and health conditions (H). It is calculated as follows:  $W = \frac{1}{2} \Sigma MR - \frac{1}{2} \Sigma H_t$ . Where higher values denote more well-being. The index ranges from a low of -1 to a high of 14. Scores from 0 to 3 denote very low, 4 to 6 indicates low; 7 to 10 is moderate and 11 to 14 means high well-being.

Furthermore, the majority of the sample was never married (67.3%, n = 10 813) followed by married (25.2%, n = 4,050), widowed (5.6%, n = 905), separated (1.2%, n = 185) and lastly those who are divorced (0.8%, n = 123). Marginally more males are in each group within the marital status category than females except in ‘widowed’ and separated (Table 1.1.1).

**Predisposed Factors in Well-being Model**

In this section of the paper, the General hypothesis will be tested:

$$W = f (P_{mc}, E_D, A_i, E_n, G, M, A_R, P, N, O, H_t, T, V, S, H_S) \dots\dots\dots (1)$$

Of the 14 predisposed factors that were tested (see Eqn. 1), 10 came out be predictors of well-being. Among those 10,

the 5 most significant determinants of well-being in descending order are average number of persons per room ( $\beta = -0.254, \rho < 0.001$ ), area of residence (1 = KMA), ( $\beta = -0.223, \rho < 0.001$ ), area of residence (1 = Other Towns), ( $\beta = -0.209, \rho < 0.001$ ) and lastly age of respondents ( $\beta = -0.207, \rho < 0.001$ ). (Table 1). Based on the signs associated with the un-

Table 1: Percentage and (count) of marital status by gender of respondents

Details	Gender of Respondents	
	Males	Females
Married	25.7 (2007)	24.7 (2043)
Never Married	69.4 (5421)	65.2 (5392)
Divorced	0.8 (64)	0.7 (59)
Separated	1.1 (85)	1.2 (100)
Widowed	3.0 (234)	8.1 (671)
Total	100 (7811)	100 (8235)

standardized coefficient, area of residence, positive affective conditions, individual’s educational attainment and marital status are positively associated with well-being, with the others being negatively related to well-being. Those that are not factors of well-being are as follows: (a) seeking health-care ( $\beta = 0.014, \rho > 0.05$ ), (b) gender ( $\beta = 0.015, \rho > 0.05$ ), (c) crime and victimization ( $\beta = 0.030, \rho > 0.05$ ) and (d) house tenure ( $\beta = -.003, \rho < 0.05$ ) (Table 2).

Table 1.1.2: A multivariate model of well-being of Jamaicans

Model		
Dependent variable: Well-being of Jamaicans		
Independent variables:	Unstandardized coefficient	Standardized coefficient
Constant	1.922	
Physical environment	-0.633*	-.167*
Positive affective conditions	.105*	.131*
Negative affective conditions	-.052*	-.085*
In-cost of medical (Health) care	0.197*	0.128*
Area of residence 2 (1 = KMA)	10.91*	.233*
Area of residence 3 (1 = Other Towns)	1.698*	.209*
Age	-0.022*	-0.207
In-average occupancy per room	-0.691*	-0.254*
marstatus 1 (1 = Divorced, separated, widowed)	0.341*	0.075*
marstatus 2 (1 = Married)	0.561*	0.141*
House tenure	-0.081	
Land ownership	0.606*	0.145*
Crime	0.008	
Edu_Level 2 (1 = Secondary)	0.240*	0.061*
Edu_Level 3 (1 = Tertiary)	1.700*	0.156*
Dummy gender (1 = male)	0.060	
Seeking health care	0.055	
Social support	0.210*	0.054*

n = 1146  
 R = 0.634  
 Adjusted R<sup>2</sup> = 0.393  
 Error term = 1.5  
 F statistics [18,1128] = 42.126  
 ANOVA = 0.001  
 \* significant p value < 0.05

The model explains 39.3% (adjusted r<sup>2</sup>) of the variance in well-being. One may argue that the unexplained variation is significantly more than the explained variation and so the model is useless. But, the finding in this study is in keeping with Hambleton’s *et al’s* research which was conducted on elderly persons in Barbados in 2005 (Hambleton and his colleague 12). They found that 38.2% of the variance in predisposed variables can explain the variance in well-being of elderly Barbadians.

$$W = f (P_{mc}, E_D, A_i, E_n, G, M, A_R, P, N, O, H_i, T, V, S, H_S) \dots \dots \dots (1)$$

Hence from the equation [1] above, we derived a linear model with only the predisposed variables that are significant:

$$W = 1.922 + 0.197P_{mc} + 1.091A_R 2 + 1.698 A_R 3 - 0.633 E_n + 0.341 M1 + 0.560 M2 + 0.240 E_D 2 + 1.700 E_D3 + 0.210S - 0.691O + 0.606 T + 0.105P -0.052N -0.022 A_i + e_i$$

**Interpreting the linear model**

It follows that with all else being constant, the minimum well-being of a Jamaican is 2 (*ie* 1.922) which means that the overall well-being of this individual would be very low. With the referent group living in rural Jamaica, the coefficient of 1.091 for A<sub>R</sub> 2 denotes that people who dwell in the Kingston Metropolitan Area have a greater well-being by this coefficient. The interpretation for A<sub>R</sub> 3 is similar to that of A<sub>R</sub> 2, with the exception that those who reside in Other Town have a higher well-being when compared to those who live in rural Jamaica. Continuing, from the coefficient of area of residence, the highest well-being is experienced by those who dwell in Other Towns. The same reasoning is applicable to the individual’s educational attainment, 0.240 E<sub>D</sub> 2 + 1.700 E<sub>D</sub>3. It should be noted here that the well-being of someone who has tertiary level education is significantly more than that of individuals with primary and lower education and that this is substantially greater when compared to someone who has only attained secondary level education.

Based on the coefficient for E<sub>n</sub> (*ie* environment), an individual’s will decrease by 0.633 units from living in an environment with natural disaster and toxins. Hence, the same interpretation can be used for Age (*ie* A<sub>i</sub>), positive affective conditions (P), and negative affective conditions, (N), land ownership, (T), cost of healthcare, (P<sub>mc</sub>) and those who have social support (S). The difference in these cases would be based on a reduction or an increase, which is dependent on the sign of the coefficient (negative or positive respectively).

**Limitations to the Model**

This model  $W = f (P_{mc}, E_D, A_i, E_n, G, M, A_R, P, N, O, H_i, T, V, S, H_S) + e_i$  is a linear function

$$W = 1.922 + 0.197P_{mc} + 1.091A_R 2 + 1.698 A_R 3 - 0.633 E_n + 0.341 M1 + 0.560 M2 + 0.240 E_D 2 + 1.700 E_D3 + 0.210S - 0.691O + 0.606 T + 0.105P -0.052N -0.022 A_i + e_i$$

therefore we are unable to distinguish between the well-being of two individuals who have the same typology and well-being of an individual that may change over short time intervals that does not affect the age parameter. As such in attempting to add further tenets to this model in order that it is able to fashion a close approximation of reality, the following modifications are being recommended.

Each individual's well-being will be different even if that person's valuation for quality of life is the same as someone else who share similar characteristics. Hence, a variable  $P$  representing the individual should be introduced to this model in a parameter  $\alpha$  ( $p$ ). Secondly, the elderly's well-being may be different throughout the course of the year and so time is an important factor. Thus, we are proposing the inclusion of a time dependent parameter in the model. Therefore, the general proposition for further studies is that the linear function should incorporate  $\alpha$  ( $p$ ,  $t$ ) a parameter depending on the individual and time.

### SUMMARY

For this study, well-being is indeed a multidimensional concept. The paper has proven that the determinants of well-being include psychosocial, environmental and demographic variables, which is in keeping with the literature (3–12, 15, 18–20). This is a departure from the biomedical model that emphasizes 'dysfunction' or diseases and which assumes that the 'absence of diseases' means a healthy individual or a population. This implies that reduced quality of life is only associated with increased illnesses. As early as 1946, the WHO gave a definition of health which is an extensive one when this was compared to the traditional operational definition (3). Because some scholars argue that this definition was too broad, it may be the reason behind the Grossman's model in 1972 (9, 10). Grossman used econometric analysis to show some of the predisposed predictors of health. This was later expanded on by Smith and Kington in 1997 (10), and later applied in a study on the elderly in Barbados by Hambleton *et al* (1) between 1999 and 2000. All those operational definition of well-being used 'dysfunctions (or health conditions). The current study expanded on the operational definition of well-being, and provides a list of determinants of well-being along with their degree of influence.

Based on the results of the model in the Tables 2 and 3, we now have a model that guide public health practitioners and health professionals in their policy formulation and patient care.

In concluding, the general quality of life of Jamaicans is a function of: area of residence, cost of healthcare, psychological conditions – positive and negative affective conditions, educational level, marital status, age and average occupancy per room, property ownership and social support. Therefore, treating an individual for illnesses, injuries, degrees of injury is just a fraction of the components of those things that constitute their health and by extension their well-being. It would have been good to include among those

Table 3: Decomposing the 39.3% of the variance in well-being of Jamaicans, using the squared partial correlation coefficient

Variables	Percentage
Average occupancy per room	7.0
Area of residence (1 = KMA)	7.0
Area of residence (1 = other towns)	6.4
Individual's educational attainment (1 = tertiary)	3.4
Individual's educational attainment (1 = secondary)	0.5
Psychological state – positive affective conditions	2.4
– negative affective conditions	1.0
Age of respondents	3.4
Marital status – (1 = married)	1.0
– (1 = separated, widowed, divorced)	0.5
Physical environment	3.4
Cost of healthcare	2.4
Property ownership (excluding owning a house)	2.9
Social support	0.5

mentioned factors – religion and lifestyle practices such as smoking, alcohol consumption, exercise and diet within the general model but this a limitation of the dataset. However, what is presented here are some of the predisposed factors that determine the quality of life of a Jamaican. The elderly, despite enjoying the company of their grandchildren and other family members, are not satisfied with the invasion of their private spaces by large family size. This is further borne out by the fact that positive psychological condition was the fourth most important determinant of quality of life. Within this context, with the dearth of literature that has shown that biological ageing is directly associated with increasing frailty and physical ailments, it should come as no surprise that the cost of the healthcare was ranked third. The direct relationship between individual well-being and cost of healthcare (*ie*  $\beta = 0.184$ ) speaks to the literature that states that the 'good healthcare' can be bought. In that, the more wealth an individual has, the more he/she will be able to purchase better healthcare (*ie* medication, practitioners, skilled technicians, specialized care and long-term care and so on), a gift that is not made available to the poor. From Jamaica, the PIOJ and STATIN reports have provided information on Jamaicans that poverty has a geographic bias. In that, poverty is substantially a Rural Zone phenomenon and so it comes as no surprise that 'Area of Residence' happens to be the second most critical determinant of well-being. This means that the elderly who resides in KMA has a higher probability of having a higher quality of life than his/her counterpart who dwells in Other Towns and more so than those who live in Rural Areas.

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