Journal of
Information Technology & Software Engineering

Gururajan et al., J Inform Tech Softw Eng 2014, 4:1
DOI: 10.4172/2165-7866.1000125

Case Report Open Access

An Exploratory Case Study on Employee Health and Wellbeing: Indian Railways Case Study

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Abstract

In this paper, we are presenting initial case study results of employee health & wellbeing baseline measurement of Southern Railways. 122 employees from management cadre voluntarily participated in the study. The data collection involved three specific stages of health & wellbeing validation, based on lipid profiles, three month blood sugar level, kidney function, blood pressure, heart rate, self reported eating habit, self reported exercise routine and a bio-impedance measurement. The participants were given with a survey instrument to fill-in their daily intake of food pattern and this information was entered into a software application to compute nutritional levels. This was the first level of validation. The second level of validation was collecting blood samples and analysing the samples for various parameters such as lipids and sugar levels pathologically. The third level of validation included people categorised as non-diabetic tested for body composition of fat masses using a bio- impedance monitor. The analyses of data using these three combinations of data clearly indicated that majority of the participants are either suffering with excess fat masses or over the normal acceptable BMI levels for Indian population. Further, the data clearly indicated that the intake of calories is way above than what has been expended through physical activities. Over half the participants exhibited either symptoms of diabetes or hypertension or both. We present these results in this paper, and highlight a preliminary intervention program that has been instituted to these participants. We are also highlighting some of the adverse influences that can present to the organisation as a result of the health & wellbeing issues observed.

Keywords: Healthcare; Indian Railway; BMI; Healthy Communities; India

Introduction and Background

International organisations such as the World Health Organisation (WHO) stipulate the nutrient intake parameters for individuals. In 2004, a list was published on nutrient requirement for individuals and this guideline has been followed by India as a basis when determining nutrient intake for individuals. An expert groups of the Indian Council for Medal Research (ICMR), following the guidelines prescribed by the WHO, arrived at a base level of nutrient requirement for Indians and this has been followed since 2009 as a basic guide.

The guidelines prescribed in 2009 accommodate variations in recent social status of Indians, reduced physical activity, access to certain nutrients, life style aspects, and micro nutrition and under nutrition conditions affecting Indians. Based on these parameters, the expert group suggested requirements on nutrients contributing to energy, protein, calcium, fat and iron levels. The expert group also concluded that a BMI of 20.3 is a suitable measure for Indian men aged between 18 and 30, with height of 172 Cm and weight of 60 Kg, and for women with height 161 cm and weight 55 Kg, with a BMI level of 22.2 for the same age group.

In terms of other body composition, the ICMR expert group indicated that for men (sedentary), a total fat level of 20% is acceptable, with a visible fat percentage level of 10, equated to 25 g/p/d. Similarly protein is fixed at 60 g/kg/d. Required energy for men with sedentary work is 2369 kcal, calcium 600 m/g/d, zinc 12 m/g/d. These levels vary for women.

Based on the above guidelines, it is assumed that if an individual derives such components, then they are considered to be healthy. The healthy condition is also attributable to an individual's wellbeing status, and these will influence the organisational factors such as productivity, reduced sick leave and associated medical expenses etc. This prompted us to posit the research question:

What is the health & wellbeing status of individuals in an organisation?

The above question, while looks simple to posit, contains a complex nature of data collection as many organisations do not appear to capture the employee health & wellbeing status regularly, and then document the same into the employee records. While the working conditions, union influences and other external factors can be attributed to these, we felt that there is a lack of awareness in this domain, and this could be a main cause. This prompted us to approach Indian Railways (Southern Railways) to conduct a pilot study to assess the health & wellbeing of their employees so that awareness can be improved. We approached Southern Railways because we understood that a Master Health Check Up was conducted in one of their factories in 2009 – 2010 period, and the management was very keen to promote Health & Wellbeing initiatives among its employees.

We approached the Chief Medical Director Dr. Ram Prakash to explore the possibility of such a pilot study and this initiative resulted in this exploratory paper.

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Received November 14, 2013; **Accepted** December 26, 2013; **Published** January 06, 2014

Citation: Gururajan R, Baig AH, Chennakesav S, Thomas A, Prakash R, et al. (2014) An Exploratory Case Study on Employee Health and Wellbeing: Indian Railways Case Study. J Inform Tech Softw Eng 4: 125. doi:10.4172/2165-7866.1000125

Research Method

This study used a single organisation case study approach as the main method. The organisation is Indian Railways, and we chose the Southern Railway Headquarters for our sampling due to convenience.

We followed a case study approach for literature clearly supports data collection through case studies in specific organisational related issues [1,2]. Literature also supports case study approach as an appropriate approach in the exploration research study [3].

The case study approach we employed consisted of observation, individual discussions, formal individual interviews and group discussions.

This research study collected research data through three stages as indicated in the abstract section. The data collection involved individual interviews and filling in a survey form, blood samples and pathology testing, and finally body composition analyses using a bio-impedance monitor. These stages are explained below.

Nutritional data collection

The first stage of data collection involved a baseline assessment using a mixed method approach. Literature also supports qualitative research approach for theory-building stage to be able to develop appropriate questions to sort the real answers in this study [4-7]. The mixed method consisted of a qualitative approach followed by a quantitative approach. In order to produce evidence that the outcome of the research is properly validated, a new technique was used due to the exploratory nature of the research project [8-10]. The qualitative interviews involved understanding diet habits, and a professional dietician conducted the interviews. The interview questions covered a range of topics such as eating habits, quantity of food consumed, physical activity, family history etc. The data were recorded and then transcribed for analysis. The data collected was then transcribed into a nutritional software application to compute energy levels.

Blood sample data collection

The second stage of data collection pertained to pathological validation. Qualified medical professionals from the Railway Hospital collected Blood samples to assess fat level, diabetic condition, and other mineral levels. The blood samples were then analysed in the hospital pathology and results were entered into the nutritional software application.

Bio-Impedance data collection

The third and final level data collection involved assessment on body fat and fluid composition. A bio-impedance monitor was used for this purpose and due to time constraints, at the time of writing, only participants assessed as non-diabetic were subjected to this data collection.

Sampling

We received Institutional Ethics Approval from the Chief Medical Director of Southern Railways to conduct the study along the lines indicated above. Once the study protocol was approved, a formal invitation was sent to the 'office cadre' in the headquarters building in Chennai. The formal invitation provided background to the study and the data collection procedural aspects, and it was clearly stated that the participation was voluntary. The formal invitation was sent to about 400 staff. The study did not exercise any screening criteria.

In total 122 individual were involved in the data collection over a 10-week period. The sampling technique used was 'random', in that samples were drawn on the basis of voluntary participation. This was crucial in determining the direction of the study.

Data Analysis and Discussions

The samples were probed with a set of fundamental questions pertaining to their health & wellbeing aspects, mainly in terms of eating habits. The questions concentrated on the type of food being consumed, their frequency, sedentary and non- sedentary habits, alcohol consumption, family history of diseases, and other wellbeing conditions of individuals. The data collection instrument is provided as Appendix 1.

The data collection involved both qualitative and quantitative aspects. The data were transcribed in to a nutritional software application by a professional and verified for accuracy. The nutritional software application produced various nutrient levels based on food consumption. This data were then transformed into an SPSS application and analysed, leading to the tables produced in this paper. The data were masked for any personal information, as this was a fundamental undertaking given to staff while collecting data.

The data were not amended. Any potential bias was eliminated at the time of data analyses by removing potential statements of bias from the analysis. This assured that the outcomes projected in this report are independent, unbiased, and views expressed by employees as a result of their awareness on health & wellbeing aspects.

Reliability of the Data

We conducted a reliability test on the data using Cronbach Alpha method. The reliability was quite low. The low level could be attributed because the data were scattered and the total number of items was low to be able to get a true reflection of reliability. It should be noted that the reliability factor had no major impact on the analyses of data (Table 1).

We conducted standard descriptive tests on the data. The following tables provide the results of descriptive statistics (Table 2).

The mean of the age is only 50 years, with minimum age at 27 years, and maximum age at 68 years. The data indicates that the cohort is biased towards 50years and above (Table 3).

The participants were not equally distributed in terms of gender, with 60% of the participants were male and 40% female (Table 4).

Blood pressure of the cohort showed that 48% are considered within the normal blood pressure and 49% of the participants had high levels of blood pressure.

Cronbach's Alpha	N of Items
.314	51

Table 1: Reliability test.

		Age
N	Valid	120
	Missing	0
Mean		50.73
Median		53.00
Minimum		27
Maximum		68

Table 2: Age.

We ran descriptive statistics for other variables and found that 59% of participants had a normal family history indicating that there were no reported histories of heart disease. 58% of the participants indicated that one of the parents had diabetes.

44% of the participants reported a family history of hypertension, and 18% reported family history of cholesterol.

Among the participants, 8% reported smoking habit and 11% reported alcohol consumption.

The low reliability value of data prompted us to conduct a factor analysis. We used a varimax rotation and the factor table is presented below. The model returned five groups of factors as strong contributors to health & wellbeing of participants. We arbitrarily titled them as Nutrition, Morbidity, Sugar & Water intake, Family History Unknown and Diabetic (Table 5).

The participants exhibited strong levels of hypertension, cholesterol and hypothyroid. When the calorie levels were examined, the nutritional software indicated a high level of energy consumption (average 2100 calories) per day. The intake of sugar is also highly loaded (0.813) indicating that participants had a high level of sugar intake. The negative correlation value (0.707) on family diabetic history, and family history unknown factors (0.591), along with a fat (0.757) indicates strong factors of lack of health & wellbeing

We also conducted a bio-impedance test using a monitor. This test was conducted on 39 participants who were found to be non-diabetic. The average fat mass was 24.6 and the BMI was 26.7. When we split the data for male and female, we noticed that the males had a higher fat mass and higher BMI values than normal accepted level for Indian population (21 for fat mass and 23 for BMI).

In addition to the factor analysis, we also conducted a basic regression model. The model summary is shown in (Figure 1). The model indicates that the Family Diabetic History was returned as a strong predictor and the current levels of fat and protein are contributing to a trend in lack of health & wellbeing. We were able to find evidence in the nutrition software for this as the energy consumed is about 2100 calories per day and energy expended was about 60 calories, based on reported activities for the participants. Further, high levels of fat masses and cholesterol also indicate lack of 'burning' activities among the participants.

Inference

The data analyses and the interviews indicated that majority of the participants had a high intake of calories (about 1800 Kcal for Female and 1900 for male) and expended about 60 Kcal on a daily basis. We also noticed that participants had a high level of Cholesterol, BMI and free fat masses. In addition, we noticed that participants had high levels of hypertension (Table 6).

The data derived from the nutrition software application indicates that some minor adjustment to participants' diet would result in significant health benefits. For example, we noticed that the average diet consisted of Beans foogath, Chicken curry, Coconut chutney, Dhal fry gr., Idly (rice cake), normal Cow's Milk, Basmati Rice, Instant Snack, and Sugar.

The calorie generated from such a diet was calculated as 2560 Kcal. However, our interviews indicate that for a dietary habit such as this, there was not much of physical activity, leading a BMI calculation of 24.8. This average participant returned a fat mass of 19.74 and a fat mass percentage of 35.89. However, it appears that the standard is 11-18 for men and 21-28 for women. If we used the standard measure, the participant is assumed to contain excess fat mass.

Another observation we noticed for this average participant was the prevalence of family history of diabetes and heart disease. When this is imposed in our calculation of risk, the participant is of high risk in terms of developing diabetes, heart disease and hypertension, unless some changes are made to their life style.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	48	40.0	40.0	40.0
	Male	72	60.0	60.0	100.0
	Total	120	100.0	100.0	

Table 3: Gender.

		Frequency	Percent	Valid	Cumulative
Valid		3	2.5	2.5	2.5
	High	49	40.8	40.8	43.3
	Low	10	8.3	8.3	51.7
	Normal	58	48.3	48.3	100.0
	Total	120	100.0	100.0	

Table 4: Blood Pressure.

	Nutrition	Morbidity	Component Sugar & Water Intake	Family History Unknown	Diabetic
Energy_KCAL	.976				
Protien_g	.925				
Fat_g	.757				
Carbohydrate_g	.878				
FH_Diabetic_Value					-.707
FH_Hypertensive_Value		.619			
FH_High_Cholestrol_Value		.667			
FH_Hypothyroid_Value		.620			
FH_DontKnow_Value				.620	
SugarTeaSpoon_Value			.813		
Water200ml_Value			.530		

Table 5: Five-component Factor Analysis.

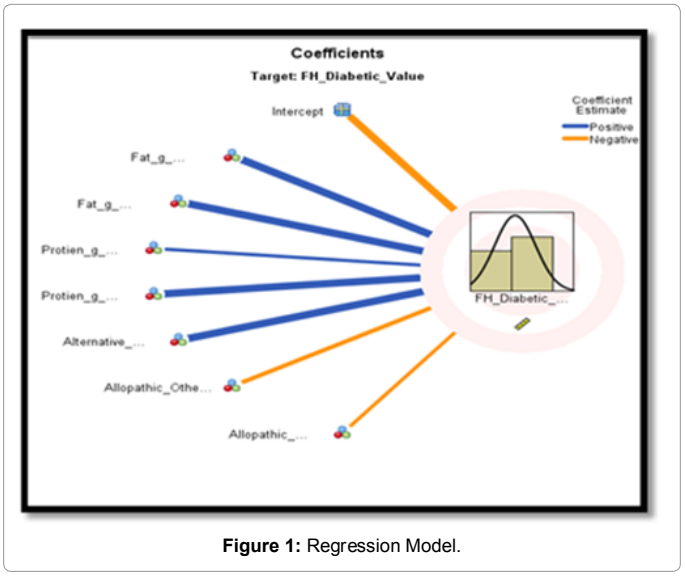

Figure 1: Regression Model.

Gender			Energy_KCAL	Protien_g	Fat_g	Carbo_g
Female	N	Valid	47	47	47	47
		Missing	0	0	0	0
	Mean		1830.74	58.68	47.81	292.00
	Median		1738.00	56.30	46.00	281.00
	N	Valid	71	71	71	71
		Missing	0	0	0	0
	Mean		1937.69	63.72	45.27	319.41
	Median		1990.00	61.60	44.00	321.00

Table 6: Nutrient levels of participants.

When the results are looked at an organisational point of view, there are potential productivity issues as the participant is ageing. The productivity risks may result in absent days due to health & wellbeing issues, as well as critical organisational knowledge not available in demand. In Railways case, this will also result in hospital expenditure incurred by the organisation either as a one-time expense or as an ongoing maintenance expense.

In terms of family issues, the risk of lack of health & wellbeing can result in sudden loss of family members, or the family member not able to perform their duties at a level expected, and this might result in work downgrade. Such an event might result in loss of income, or in specific cases additional pressure place don other family members.

The above risk events are likely in extreme cases, and we are not suggesting that these will occur. However, lack of health & wellbeing might result in unforeseen adverse effect on individuals and the organisation. The only way to combat this is by organising regular health checks, and instituting an intervention scheme based on health checks. The intervention can address dietary habits, physical activity, awareness programs and more importantly developing a culture that promotes a healthy lifestyle in and out of the organisation!

Correspondence

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