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# Causes and Effects of Cancer in Tamil Nadu: A Path Analytic Approach

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**Abstract:- Introduction**: In recent decades, incident of cancer cases have been systematically and continuously registered all over the world. World Health Organization revealed that the cancer is a leading cause of death worldwide, accounting for 7.6 million deaths in 2008 and continues to rise to over 13.1 million in 2030. In India there is an increasing trend of cancer patients during the last few decades. In Tamil Nadu, cancer cases of males were 28,246 in 2001 and females were 30,283; in 2006 male 32,496 and female 35,298; in 2011 male 37,106 and female 40,737. Thus, the present research aims to study the causes and effects cancer in Tamil Nadu.

**Objectives**: 1) To analyse the determinants of cancer and 2) to evaluate whether all the measures fit the recommended value, indicating a good fit of the path model for the collected sample data.

**Sample:** This study based on scientifically tested deliberate/purposive random sampling procedure. The information was collected from 1000 registered cancer patients receiving healthcare from 10 multi-speciality hospitals in Tamil Nadu.

**Methodology:** Collected data were analyzed with the help of SPSS software package and analysis of moment structure (AMOS). Statistical technique like confirmatory factor analysis was used to evaluate the child status. In order to evaluate the association among the variables used in the model, Path Analysis with Structural equation modelling (SEM) was used for data analysis.

**Conclusion**: The findings of the research showed that, absolute fit indices suit with the sample data and reveal that the proposed model has the acceptable fit, by way of satisfying with the recommended values.

**Key Words**: Cancer, *Confirmatory factor analysis, Path way model, Structural equation modelling (SEM)*

## I. INTRODUCTION

The exploratory factor analysis (EFA) is investigating the principal dimensions that could have caused variance and correlation among the observed variables. Therefore, exploratory factor analysis deals with theory building. Accordingly, Acquired Disease, Working Environment, Life Style, Health Condition, Psychosomatic Condition, Abortion, Physical Changes after the Treatment and Expenses are the variables extracted by using factor analysis (FA) and confirmed that these measured variables determine the cancer patients in Tamil Nadu. Therefore, the confirmatory factor analysis (CFA) is used for testing the relationships among the observed variables consistent with the hypothesized factor structure for theory testing. Hence, this present study focuses on hypothesis testing by Path analysis with Structural Equation Modelling (SEM) using AMOS software. The findings of the present study showed that, absolute fit indices suit with the sample data and reveal that the proposed path model has the acceptable fit, by way of satisfying with the recommended value.

## II. LITERATURE REVIEW

Structural Equation Model (SEM) using AMOS (Analysis of Moment Structure) techniques are easily applied to analyses in the health field. Application of SEM techniques have contributed to research on illness (Roth, Wiebe, Fillingim, and Shay, 1989), on exercise (Duncan, T and McAuley, 1993; Duncan, T., Oman, & Duncan, S., 1994) and on substance use/abuse among adults (Curran, Harford, and Muthen, 1996) and adolescents (Curran, Stice, & Chassin, 1997; Duncan, T., Duncan, S., Alpert, Hops, Stoolmiller, & Muthen, 1997). The path analysis is used for observed or measured variables and health researchers investigated the effects of hardness, stress, fitness, and exercise on health problems (Roth, et al., 1989). Seriousness of Illness Rating Scale (Wyler, Masuda, & Holmes, 1968) is a self-report checklist of commonly recognized physical symptoms and diseases and provides a measure of current and recent physical health problems.

Few studies are found in literature relating to study the determinants of health care and utilization (Abu-Zeid HA, et al (1985), Basu A (1983), Ellis RP et al (1994), Marin BV et al (1983), Sack RA (1980) Sodani PR. (1999). SEM as a statistical technique has increased in popularity since it was first conceived by

Wright S. (1918), Wright S. (1934); a biometrician who developed the path analysis method to analyze genetic theory in biology. SEM enjoyed a renaissance in the early 1970s, particularly in sociology and econometrics (Goldberger and Duncan OD (1973) and later spread to other disciplines, such as psychology, political science, and education (Werts, CE and Linn, RL (1970). It was believed that the growth and popularity of SEM was attributed to a large part to the advancement of software development that have made SEM readily accessible to researchers who have found this method to be well-suited to addressing a variety of research questions (MacCallum, RC, and Austin, JT (2000)..

The 1980s and 1990s witnessed the development of many more computer programs and a rapid expansion of the use of Structural Equation Model (SEM) techniques in areas such as developmental psychology, behavioural genetics, sports medicine, education, and public health (Herschberger, 2003). General structural models are used by social scientists to test relationships among constructs measured with multiple items. Social science researchers use SEM to test theoretically derived relationships among concepts that are best measured with the variables. Among the articles reviewed by Guo and Lee (2007), the general SEM approach was used in studies related to aging, child welfare, health and mental health, school social work, and substance abuse. Crouch, Milner, and Thomsen (Crouch, Milner, & Thomsen, 2001), for example, examined the hypothesized relationships among childhood physical abuse, early support, social support in adulthood, and the risk of physically abusing a child in adulthood. The results increased the understanding of mechanisms of intergenerational child abuse and had tentative implications (for practice). Child health status was measured by the researchers (Glisson, Hemmelgarn, and Post, 2002) and examined the 48 items of observed items called the Short form Assessment for Children (SAC) as a measure of "overall mental health and psychosocial functioning". Bollen (1989) hypothesized that the parental care directly influencing children's behaviour necessitates a new equation for the specification of the structural model. The quantitative process (DeVellis (2003) may often be appropriate in social studies because it is studying with social problems for example, victims of intimate partner violence, the homeless, older adults with Alzheimer's, traumatized children, community capacity, and neighbourhood organization. Willett and Sayer (1996) analyzed with SEM model of change in reading and arithmetic skills at three ages 7, 11, and 16 years among samples of children who differed in health status (healthy, chronic asthma, seizure disorder). The researchers Wegmann, Thompson and Bowen (2011) assessed the home environment and children's home behaviours using SEM.

## III. STUDY AREA

Tamil Nadu is chosen as a primary unit of investigation to study about the ***"Cause and Effect of Cancer in Tamil Nadu: A Path Analytic Approach"***. Tamil Nadu lies in the southernmost part of the Indian Peninsula and is bordered by the union territory of Pondicherry and the states of Kerala, Karnataka, and Andhra Pradesh. It is bounded by the Eastern Ghats on the north, by the Nilgiri, the Anamalai Hills, and Kerala on the west, by the Bay of Bengal in the east, by the Gulf of Mannar and the Palk Strait on the southeast, and by the Indian Ocean on the south. Tamil Nadu is the eleventh largest state in India by area and the sixth most populous (72,138,958) state in India. The state is ranked sixth among states in India according to the Human Development Index in 2011.

**Objectives**

1) *To analyse the determinants of cancer and*
2) *To evaluate whether all the measures fit the recommended value, indicating a good fit of the path model for the collected sample data.*

## IV. METHODOLOGY

This study based on scientifically tested deliberate/purposive random sampling procedure. The information was collected from 1000 registered cancer patients receiving healthcare from 10 multi-speciality hospitals in Tamil Nadu. Collected data were analyzed with the help of SPSS software package and analysis of moment structure (AMOS). Statistical technique like confirmatory factor analysis was used to evaluate the cancer patients. In order to evaluate the association among the variables used in the model, Path Analysis with Structural equation modelling (SEM) was used for data analysis.

## V. EXPLORATORY FACTOR ANALYSIS

Factor analysis is used to identify a smaller number of factors underlying larger number of observed variables. The application of factor analysis for the present study is very useful in separating the major dimensions of cancer patients. Eight dimensions were extracted and contributing a total variance of 60.162 per cent. An Eigen value of 1.0 is taken as a cut-off point to determine the number of dimensions to be extracted. Correlation matrix revealed the presence of many coefficients of 0.5 and above. The Kaiser-Meyer-Oklin (KMO) measure of sampling adequacy value (MSA) is 0.692, exceeding the recommended value of 0.6 and the

Barlett's Test of Sphericity reached statistical significance (0.001), supporting the factorability of the correlation matrix. Principal components analysis revealed the presence of eight components with Eigen values exceeding 1.0.The correlations between the variable and factor values are shown as the rotated factor loadings in the following table-1. For a good factor solution, a particular variable should load high on one factor and low on all other factors in the rotated factor matrix (Ajai and Sanjaya, 2006). As per the table-1, it can be inferred that out of 116 of selected variables, 24 items have more than 0.50 factor loadings. These 24 items are loaded on eight components and taken for further confirmatory factor analysis (CFA).

## VI. CONFIRMATORY FACTOR ANALYSIS (CFA)

Confirmatory factor analysis is known as measurement model. The root mean square error of approximation enlightens us how the model would fit the population covariance matrix (Byrne, 1998). According to Kline (2005), CFI, RMSEA can be utilized along with Chi-Square test to calculate the measurement model fit. As an alternative to Chi-square test, goodness-of-fit statistic (GFI) formed by Joreskog and Sorbom, (1993) can calculate the proportion of variance (Tabachnick and Fidell, 2007).

Model can be evaluated with the help of Normated fit index by means of comparing the Chi-square value of the model with Chi-square of the null model (Bentler and Bonnet, 1980). CFI is important in all SEM programs because its measure is least affected by sample size (Fan et al., 1999). According to McDonald and Ho (2002), CFI, GFI, and the NFI are the most frequently used fit indices in structural equation modelling.

**Table 1: Rotated Component Matrix[a]**

| Name of the Factor | Variable Name | Component | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII |
| Acquired Disease | I do not follow physical exercise regularly that is why I have got this disease | .884 | | | | | | | |
| | As I am obese, I have got this disease | .862 | | | | | | | |
| | I do not follow diet control that is why I have got this disease | .686 | | | | | | | |
| Working Environment | Noisy environment | | .730 | | | | | | |
| | I have got cancer because of working in polluted environment | | .715 | | | | | | |
| | Dusty environment | | .673 | | | | | | |
| | Smoky environment | | .605 | | | | | | |
| | Occupation | | .505 | | | | | | |
| Lifestyle | How long have you been chewing tobacco? | | | .760 | | | | | |
| | Aging | | | .733 | | | | | |
| | I do wear tight dresses | | | .608 | | | | | |
| | I am unable to have food on time due to continuous and heavy work | | | .554 | | | | | |
| Health | Drowsiness | | | | .823 | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Condition | Breathing trouble | | | | .781 | | | | |
| | Because of taking pain killer I have got cancer | | | | .544 | | | | |
| Psychosomatic Condition | Because of this disease, I push pressure on my Family members. | | | | | .731 | | | |
| | I doubt of my recovery from the illness. | | | | | .644 | | | |
| | I regret for having spent lot of money for the treatment. | | | | | .546 | | | |
| Abortion | Since I have done abortion many time, I have got this disease | | | | | | .822 | | |
| | I used to take pills/tablets to avoid Pregnancy and so I have got this disease. | | | | | | .814 | | |
| Physical Changes after the Treatment | What kind of physical changes are noticed the after treatment? | | | | | | | .770 | |
| | How many days have I to wait yet for the complete treatment? | | | | | | | .764 | |
| Expenses | Have you sold any of your properties? | | | | | | | | .784 |
| | Where had you mostly had your food? | | | | | | | | .750 |
| **Eigen values** | | 2.331 | 2.305 | 2.063 | 1.780 | 1.643 | 1.607 | 1.400 | 1.310 |
| **Percentage of variance** | | 9.711 | 9.605 | 8.596 | 7.417 | 6.846 | 6.697 | 5.832 | 5.458 |
| **Cumulative Percentage** | | 9.711 | 19.316 | 27.912 | 35.329 | 42.175 | 48.872 | 54.704 | 60.162 |
| **Extraction Method**: *Principal Component Analysis.* **Rotation Method**: *Varimax with Kaiser Normalization.* | | | | | | | | | |
| **a.** *Rotation converged in 7 iterations.* | | | | | | | | | |

**Model fit assessment: Path Analysis with Structural equation modelling (SEM)**
**Scalar estimates (group number 1 - default model) Maximum likelihood estimates**

Path analysis with structural equation modelling was used to analyze the suitability of the model based upon the selected variables. As recommended by Anderson and Gerbing (1988), measurement model to test the reliability and validity of the survey instrument was analyzed first, and by using AMOS version 20 the path analysis model was analyzed. This path analysis with structural equation model (SEM) is the most useful while assessing the causal relationship between the variables as well as verifying the compatibility of the model used (Peter, 2011).

Structural equation modelling evaluates whether the data fit a theoretical model. As per the result, Chi square statistics with $P = 0.365$ is greater than recommended value (p=>0.05). Therefore, it shows a good fit of the model. However, this model is considered for further interpretation in the goodness of fit measures. Common model-fit measures like chi-square/degree of freedom ($\chi^2$/df), the comparative fit index (CFI), root mean square error of approximation (RMSEA), the normated fit index (NFI), incremental fit index (IFI), and the Tucker Lewis index (TLI) were used to estimate the measurement model fit. Table-2 shows the estimates of the model fit indices from AMOS structural modelling.

**Table-2: Fit statistics of the Measurement model**

| | Fit statistic | Recommended | Obtained |
|---|---|---|---|
| 1 | Chi Square | - | 8.740 |
| 2 | df | - | 0.8 |
| 3 | Chi Square significance | $p$ = > 0.05 | 0.365 |
| 4 | Chi Square/df | ≤ 5.0 ( Hair et al., 1998) | 1.092 |
| 5 | Goodness of Fit Index (GFI) | 0.90 ( Hair et al. 2006) | 0.998 |
| 6 | Adjusted Goodness of Fit Index (AGFI) | 0.90 (Daire et al., 2008) | 0.989 |
| 7 | Normated Fit Index (NFI) | ≥ 0.90 (Hu and Bentler, 1999) | 0.978 |
| 8 | Relative Fit Index **(**RFI) | 0.90 Hu and Bentler, 1999 | 0.900 |
| 9 | Comparative Fit index (CFI) | 0.90 (Hu and Bentler, 1999) | 0.998 |
| 10 | Tucker Lewis Index (TLI) | ≥ 0.90 ( Hair et al., 1998) | 0.991 |
| 11 | Incremental Fit Index (IFI) | Approaches 1 | 0.998 |
| 12 | Root mean square error of approximation (RMSEA) | < 0.05 (Hair et al., 2006) | 0.010 |
| 13 | Root Mean Square Residual (RMR) | < 0.08 ( Hair et al. 2006) | 0.056 |
| 14 | Parsimony goodness-of-fit index (PGFI) | Within 5.0 (Mulaik et al., 1989) | 0.177 |

***AMOS-Output: Compiled by Author***

According to Gerbing and Anderson (1992), the criteria for an acceptable model are as follows: RMSEA of 0.08 or lower; CFI of 0.90 or higher; and NFI of 0.90 or higher. The fit between the data and the proposed measurement model can be tested with a chi-square goodness-to-fit (GFI) test where the probability is greater than or equal to 0.9 indicating a good fit (Hu and Bentler, 1999). The GFI of this study was 0.998 more than the recommended value of 0.90 the other measures fitted satisfactorily; AGFI=0.989, RFI=0.900, CFI=0.998, TLI=0.991, IFI=0.998, NFI=0.978 with $\chi^2$/df=1.092, RMSEA=0.010 (Bagozzi and Yi, 1988), RMR=0.056 and PGFI=0.177 indicate a good absolute fit of the model. Goodness of fit indices support the model fit and these emphasized indices indicate the acceptability of this structural model. For the purpose of testing the model fit null hypothesis and alternative hypothesis are framed.

**Hypothesis**

***Null hypothesis ($H_0$)***: The hypothesized model has a good fit.

***Alternate hypothesis ($H_1$)***: The hypothesized model does not have a good fit.

According to the Table-2, it clearly shows that values of all the items are above the suggested value of 0.5 (Hair et al., 2006). According to Bollen (1989a), the higher the probability associated with Chi-square, the closer the fit between the hypothesized model and the perfect fit. The test of our null hypothesis $H_0$ - is a eight-factor structure as shown in Figure-1and 2, giving a chi-square value of 8.740 with 8 degrees of freedom and the calculated P value 0.365 is greater than 0.05. As per the result, Chi square statistics with P = 0.365 is shows a good fit of the model. However, this model is considered for further interpretation in the goodness of fit measures. Hair et al. (1998) suggested the value for the fit statistic minimum discrepancy/degrees of freedom (CMIN/DF), otherwise chi-square/degrees of freedom as ≤ 5.0. As per the Table-2, the value for the chi-square/degrees of freedom is 1.092 which is less than the accepted cut off value of ≤ 5.0.

**Significance tests of individual parameters**

The above table-3 is demonstrating the unstandardized coefficients and associated test statistics. The amount of change in the dependent or mediating variable for each unit change in the variable predicting it is symbolized by the unstandardized regression coefficient. The Table-3 shows the unstandardized estimate, its standard error (abbreviated S.E.), and the estimate divided by the standard error (abbreviated C.R. for Critical Ratio). Under the column P, the probability value associated with the null hypothesis is zero as exhibited.

**Table-3: Regression Weights: (Group number 1 - Default model)**

| **Variables** | | | Unstandardized co-efficient | S.E. | Standardized co-efficient | Critical Ratio | P Value |
|---|---|---|---|---|---|---|---|
| Health Condition | <--- | Working Environment | 0.068 | 0.017 | 0.109 | 4.095 | <0.001** |
| Health Condition | <--- | Lifestyle | 0.021 | 0.005 | 0.118 | 4.330 | <0.001** |
| Health Condition | <--- | Psychosomatic Condition | -0.207 | 0.040 | -0.163 | -5.183 | <0.001** |
| Health Condition | <--- | Abortion | 0.270 | 0.080 | 0.103 | 3.382 | <0.001** |
| Acquired Disease | <--- | Lifestyle | 0.020 | 0.005 | 0.107 | 3.849 | <0.001** |
| Acquired Disease | <--- | Psychosomatic Condition | -0.192 | 0.038 | -0.145 | -5.067 | <0.001** |
| Acquired Disease | <--- | Health Condition | 0.133 | 0.029 | 0.127 | 4.501 | <0.001** |
| Causes of Cancer | <--- | Abortion | 4.166 | 0.583 | 0.340 | 7.151 | <0.001** |
| Causes of Cancer | <--- | Psychosomatic Condition | -0.996 | 0.399 | -0.167 | -2.492 | .013* |
| Causes of Cancer | <--- | Health Condition | -4.308 | 1.199 | -0.917 | -3.593 | <0.001** |
| Physical Changes after the Treatment | <--- | Acquired Disease | 0.874 | 0.191 | 0.641 | 4.569 | <0.001** |
| Expenses | <--- | Psychosomatic Condition | 0.011 | 0.004 | 0.177 | 2.709 | <.007** |
| Expenses | <--- | Cancer | 0.002 | 0.001 | 0.176 | 1.518 | .129 |
| Expenses | <--- | Physical Changes after the Treatment | 0.017 | 0.016 | 0.466 | 1.008 | .313 |

Note: ** denotes significant at 1% level
* denotes significant at 5% level

**Level of significance for regression weight**

The coefficient of ***Working Environment*** is 0.068 indicating the partial effect of ***Working Environment*** on cancer patient's ***Health Condition*** and holding the other variables as constant. The estimated positive sign implies that such effect is positive that, if the cancer patient's ***Working Environment*** goes up by one unit, cancer patient's ***Health Condition*** goes up by 0.068 and this coefficient value is significant at 1 per cent level. This is evidently proved that the variables of *working environment* namely '*noisy environment*, *I have got cancer because of working in polluted environment, dusty environment, smoky environment*, *and occupation'* are increasing with the *health condition* of respondent's drowsiness, breathing trouble and because of taking pain killers.

The coefficient of ***Life Style*** is 0.021 signifying the partial effect of ***Life Style*** on cancer patient's ***Health Condition*** and holding the other variables as stable. The estimated positive sign implies that such effect is positive that cancer patient's ***Life Style*** would increase by 0.021 for every unit increase in ***Health Condition*** and this coefficient value is significant at 1 per cent level. Therefore, this is undoubtedly proved that the increases of patient's *life style* variable specifically '*how long have you been using tobacco product?, aging, I do wear tight dresses and I am unable to have food on time due to continuous and heavy work'* with the increase of patient's *health condition* variables i.e. drowsiness, breathing trouble and *because of taking pain killer I have got cancer*.

The coefficient of ***Psychosomatic Condition*** is -0.207 indicating the partial effect of ***Psychosomatic Condition*** on cancer patient's ***Health Condition*** and holding the other variables as constant. The estimated negative sign implies that when ***Psychosomatic Condition*** goes up by one unit, cancer patient's ***Health Condition*** goes down by 0.207 and this coefficient value is significant at 1 per cent level. As a result, the variables of *Psychosomatic Condition* particularly '*I push pressure on my family members, I doubt of my recovery from the illness and I regret for having spent lot of money for the treatment'* increases with the decrease of *health condition* variables drowsiness, breathing trouble and because of taking pain killer I have got cancer.

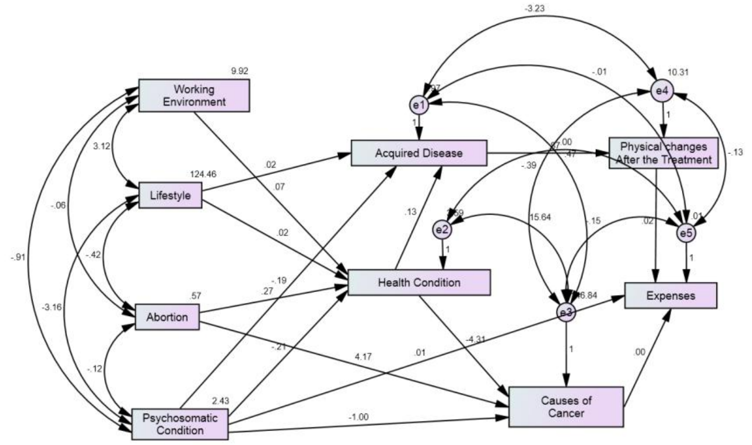


**Figure-1: Path Model on Causes and Effects of Cancer: Unstandardized Coefficients**

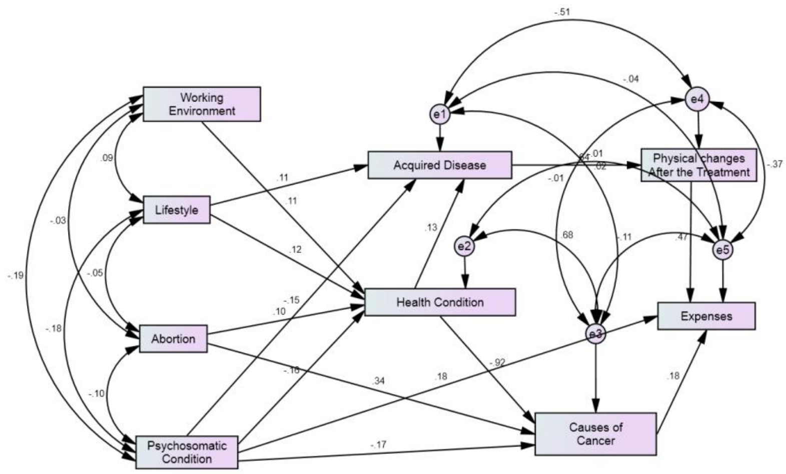


**Figure-1: Path Model on Causes and Effects of Cancer: Standardized Coefficients**

The coefficient of ***Abortion*** is 0.270 demonstrating the partial effect of ***Abortion*** on the women cancer patient's ***Health Condition*** and holding the other variables as constant. The estimated positive sign implies that such effect is positive that the women cancer patient's ***Health Condition*** would increase by 0.270 for every unit increase in ***Abortion*** and this coefficient value is significant at 1 per cent level. Thus, the variables of *abortion* are '*since I have done abortion many times, I have got this disease and I used to take pills/tablets to avoid Pregnancy and so I have got this disease'* are increases with the increase of *health condition* variables '*drowsiness, breathing trouble and because of taking pain killer I have got cancer'.*

The coefficient of ***Life Style*** is 0.020 signifying the partial effect of ***Life Style*** on cancer patient's ***Acquired Disease*** and holding the other variables as stable. The estimated positive sign implies that such effect is positive that cancer patient's ***Life Style*** would increase by 0.020 for every unit increase in ***Acquired Disease*** and this coefficient value is significant at 1 per cent level. Hence, this is clearly proved that the increase of *life style* variables explicitly '*how long have you been using tobacco product?, aging, I do wear tight dresses and I am unable to have food on time due to continuous and heavy work'* increases with the variables of *acquired disease* especially *'I do not follow physical exercise regularly that is why I have got this disease, As I am obese, I have got this disease and I do not follow diet control that is why I have got this disease'.*

The coefficient of ***Psychosomatic Condition*** is -0.192 indicating the partial effect of ***Psychosomatic Condition*** on cancer patient's ***Acquired Disease*** and holding the other variables as unwavering. The estimated negative sign implies that when ***Psychosomatic Condition*** goes up by one unit, cancer patient's ***Acquired Disease*** goes down by 0.192 and this coefficient value is significant at 1 per cent level. As a result, this study proves that the variables of *Psychosomatic Condition* particularly '*I push pressure on my family members, I doubt of my recovery from the illness and I regret for having spent lot of money for the treatment'* are increasing with the decreasing variables of *acquired disease* especially '*I do not follow physical exercise regularly that is why I have got this disease, As I am obese, I have got this disease and I do not follow diet control that is why I have got this disease'*.The coefficient of ***Health Condition*** is 0.133 indicating the partial effect of ***Health Condition*** on cancer patient's ***Acquired Disease*** and holding the other variables as unwavering. The estimated positive sign entail that when ***Health Condition*** goes up by one unit, cancer patient's ***Acquired Disease*** would increase by 0.133 and this coefficient value is significant at 1 per cent level. Consequently, the increases of *health condition* variables specifically '*drowsiness, breathing trouble and because of taking pain killer I have got cancer'* increase with the variables of acquired disease namely '*I do not follow physical exercise regularly that is why I have got this disease, As I am obese, I have got this disease and I do not follow diet control that is why I have got this disease'*. The coefficient of ***Abortion*** is 4.166 indicating the partial effect of ***Abortion*** on cancer patient's ***Causes of Cancer*** and holding the other variables as constant. The estimated positive sign implies that when ***Abortion*** goes up by one unit, cancer patient's ***Cause of Cancer*** would increase by 4.166 and this coefficient value is significant at 1 per cent level. This is study clearly proves that the variables of *abortion* '*since I have done abortion many times, I have got this disease and I used to take pills/tablets to avoid pregnancy and so I have got this disease'* increases with the increase of factors which are responsible for the causes (all types) of cancer disease.

The coefficient of ***Psychosomatic Condition*** is -0.996 indicating the partial effect of ***Psychosomatic Condition*** on cancer patient's ***Causes of Cancer*** and holding the other variables as constant. The estimated negative sign implies that when ***Psychosomatic Condition*** goes up by one unit, cancer patient's ***Causes of Cancer*** goes down by 0.996 and this coefficient value is significant at 5 per cent level. Therefore, the variables of *Psychosomatic Condition* namely '*because of this disease, I push pressure on my family members, I doubt of my recovery from the illness and I regret for having spent lot of money for the treatment'* are increasing with the decrease of the factors which are accountable for the *causes of cancer* disease.

The coefficient of ***Health Condition*** is -4.308 indicating the partial effect of ***Health Condition*** on cancer patient's ***Causes of Cancer*** and holding the other variables as unwavering. The estimated negative sign entail that when ***Health Condition*** goes up by one unit, cancer patient's ***Causes of Cancer*** would decrease by 4.308 and this coefficient value is significant at 1 per cent level. Thus, the *(health condition)* variables '*drowsiness, breathing trouble and because of taking pain killer I have got cancer'* increases with the decrease of factors which are liable to the *causes of cancer* disease.

The coefficient of ***Acquired Disease*** is 0.874 indicating the partial effect of ***Acquired Disease*** on cancer patient's ***Physical Change after the Treatment*** and holding the other variables as constant. The estimated positive sign implies that when ***Acquired Disease*** goes up by one unit, cancer patient's ***Physical Change after the Treatment*** would increase by 0.874 and this coefficient value is significant at 1 per cent level. Hence, the variables of factor *acquired disease* namely '*I do not follow physical exercise regularly that is why I have got this disease, As I am obese, I have got this disease and I do not follow diet control that is why I have got this disease'* are increasing with the increase of the variables of *Physical Change after the Treatment* that are '*what kind of physical changes are noticed the after treatment?, and how many days have I to wait yet for the complete treatment?'*.

The coefficient of ***Psychosomatic Condition*** is 0.011 indicating the partial effect of ***Psychosomatic Condition*** on cancer patient's ***Expenses*** and holding the other variables as constant. The estimated positive sign shows that when ***Psychosomatic Condition*** goes up by one unit, cancer patient's ***Expenses*** would increase by 0.011 and this coefficient value is significant at 1 per cent level. Thus, the variables of *Psychosomatic Condition (because of this disease, I push pressure on my family members, I doubt of my recovery from the illness and I regret for having spent lot of money for the treatment)* increases with the increase of factor *Expenses* variables (*how much of money have you spent so far?, and where had you mostly had your food?).*

The coefficient of ***Causes of Cancer*** is 0.002 demonstrating the partial effect of ***Causes of Cancer*** on cancer patient's ***Expenses*** and holding the other variables as constant. The estimated positive sign implies that such effect is positive that patient's ***Causes of Cancer*** would increase by 0.002 for every unit increase in ***Expense*** and this coefficient value is not significant at 5 per cent level. This clearly illustrates that increase in the factor *cause of cancer* increases with the variable *expenses* namely '*how much of money have you spent so far? And, where had you mostly had your food?'*

The coefficient of ***Physical Change after the Treatment*** is 0.017 demonstrating the partial effect of ***Physical Change after the Treatment*** of cancer patient's ***Expenses*** and holding the other variables as constant. The estimated positive sign implies that such effect is positive that patient's ***Physical Change after the Treatment*** would increase by 0.017 for every unit increase in ***Expense*** and this coefficient value is not significant at 5 per cent level. As a result, the variables of *physical change after the treatment* namely *'what kind of physical changes are noticed the after treatment? and how many days have I to wait yet for the complete treatment?'* increases with the increasing of variable *expenses* like '*how much of money have you spent so far?, and where had you mostly had your food?'*.

The table-3 is also illustrating the standardized estimates for the fitted model. Relative contributions of each predictor variable to each outcome variable can be evaluated by standardized estimates. Figure 1and 2 show the ***Causes and Effects of Cancer*** structural model. Out of 116 variables, 24variables were taken for confirmatory factor analysis. As per Figure 1 and 2, it is clear that the causes and effects of cancer and its determinant variables. Therefore, this study clearly proves that the factors- working environment, life style, abortion, psychosomatic condition are determining the health condition of cancer patient. The factors -life style, psychosomatic condition and health condition are the reasons for the acquirement of cancer disease. The factors- health condition, abortion and psychosomatic condition are the reasons for the causes of cancer and it leads to expenses. Further, after the acquirement of cancer disease some notable physical changes occurred and after the treatment it is shown in and out of physique.

## VII. CONCLUSION

The aim of this research is to carry out an empirical analysis of the factors determining the cancer patient's health settings. The eight factors *Acquired Disease, Working Environment, Life Style, Health Condition, Psychosomatic Condition, Abortion, and Physical Changes after the Treatment and Expenses* are pertaining to cancer patient's health status Path Model using with a structural equation modelling. This study establishes and builds up causes and effects in the framework of patient's health status and examines the relationship among the cancer patient's backgrounds. The proposed path model is then standardized using the data collected from cancer patients of Tamil Nadu in India. Based on the confirmatory factor analysis, it can be concluded that, the causes and effects of cancer identified in this study adequately fit into the collected data. This study concludes that the hypothesized eight-factor model fits the sample data. Based on the viability and statistical significance of necessary parameter estimates, the good fit of the eight-factor model represents an adequate description of causes and effects of cancer goodness of fit indices to support the model fit.

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