Statistical data analysis of cancer incidences in insurgency affected states in Nigeria

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A B S T R A C T

This article provides details about the various cancer types recorded in Northeastern states of Nigeria currently being affected by insurgency in Nigeria. The dataset was described and chi-square test was used to determine the dependency of the variables under consideration on each other. Also, linear, logarithmic, inverse, quadratic, cubic, power, growth, exponential and logistic regression models were fitted to the dataset to show the relationship between them.

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Specifications Table

| Subject area                          | Medicine                                      |
|---------------------------------------|-----------------------------------------------|
| More specific subject area            | Oncology, Public health, Biostatistics        |
| Type of data                          | Table and text file                           |
| How data was acquired                 | Secondary data from University of Maiduguri Teaching Hospital. |
| Data format                           | Raw and partially analyzed (Descriptive and Inferential) |
| Experimental factors                  | Analysis of cancer incidences                 |

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Experimental features Observations on the age, gender and the topographical location of cancer on the body of affected patients

Data source location University of Maiduguri Teaching hospital, Maiduguri, Borno state, Northeast Nigeria.

Data accessibility All the data are available this article

Value of the data

- The data is useful in the study of epidemiology of cancer in the affected areas.
- The data is an indication of the public health crisis in insurgency affected region in Nigeria.
- The data can be useful in cancer awareness, management and treatment.
- The data could be used in oncologic studies.
- The data can be used to test the performance of statistical models.

1. Data

The data set represents the age, gender and topological (Top) location of cancer on the body of cancer patients in the University of Maiduguri Teaching hospital located in Maiduguri, the capital of Borno state, Nigeria.

The teaching hospital is the only tertiary health care facility in the state and often serves the other northeast states like Yobe, Taraba, Adamawa, Bauchi and Gombe.

A total of 1671 patients were considered between the period of study and SPSS version 20 was used to perform the analysis. The dataset is available as Supplementary data while a brief summary of the data is presented in Table 1.

It was observed from Table 1 that information about the gender of a patient was not available, hence the missing data of 1.

The frequency distribution of the gender of the patients is presented in Table 2.

The frequency distribution of the patients’ age is presented in Table 3.

The various parts of the body affected by cancer incidences and the number of people affected (frequencies) are indicated in Table 4.

Table 4 shows that the part of the body affected mostly is the prostate gland. This is represented graphically in Fig. 3.

Table 1
Brief summary of the data.

| Statistics          | Gender | Age       | Top    |
|---------------------|--------|-----------|--------|
|                     | Valid  | 1670      | 1671   |
|                     | Missing| 1         | 0      |
| Mean                | 53.5   | 50.06     | 37.59  |
| Mode                | 2      | 60        | 5      |
| Variance            | 0.249  | 281.086   | 816.431|
| Skewness            | −0.115 | −0.258    | −1.149 |
| Std. Error of Skewness| 0.060 | 0.060     | 0.060  |
| Kurtosis            | −1.989 | −0.220    | −1.149 |
| Std. Error of Kurtosis  | 0.120 | 0.120     | 0.120  |
| Minimum             | 1      | 3         | 1      |
| Maximum             | 2      | 95        | 117    |
| Sum                 | 2553   | 83,658    | 62,806 |
2. Experimental design, materials and methods

The data set was obtained from the patients’ records at the data center of the University of Maiduguri teaching hospital. The hospital as stated earlier serves a large population from the six Northeastern states of Nigeria and beyond. The Northeastern region in particular and the entire northern region of the country is in variance with their natural endowments such as vast fertile lands, rivers and lakes for irrigation, mineral resources and abundant sunshine for renewable energy. The weak social structure of the region has resulted to excruciating poverty which often manifest as homelessness and destitution, insurgency, violence and crime [1]. The region has high poverty index, low human development index, lack of portable drinking water, electoral violence, death of medical personnel, high mortality, low life expectancy, decayed infrastructure and also an epicenter for joblessness, under age and teenage pregnancy, female genital mutilation, epidemics, illiteracy, malnutrition and now terrorism which comes in form of coordinated attacks on military, police formations and remote villages, guerrilla attacks, kidnappings, regicide, suicide bombings, mass killings, abduction of school girls, extra-judicial killings and summary execution, hypnotizing and forced conscriptions, indoctrination and forceful conversion to Islam and so on. The decadence is assumed to be as a result of corruption, tribalism, military intervention in governance, inequality, misappropriation, financial recklessness, bankrupt of ideas and dearth of developmental agendas, reduction of allocation of capital due to shortfalls of Nigeria revenue as a result of decline in crude oil price. Globally, efforts towards improving the healthcare and reducing the incidence of cancer have yielded desired results except in some developing countries. Hence, cancer related deaths remain stubbornly high in those countries. Cancer awareness, screening, prevention, management, treatment strategies are very low in the region/area studied in this article. Regrettably, capital allocations to the health sector are inadequate and the available funds are often allegedly diverted by corrupt government officials.

In addition, maternal death is one area that is currently affected by the Boko haram insurgency in that region as reported by [2]. Moreover, other areas have been seriously affected; for example; food security and dynamics, under five malnutrition, child mortality, escalation of cholera outbreaks, infections, sexually transmitted diseases, unsafe birth practices and abortion, child prostitution, sex for food at the displaced persons camps, increase in polio cases, See [3–8] for details. Some related article can also be explored [9–31].

Next, we analyze the dataset collected using Chi-square test of independence and curve estimation.

2.1. Chi-square test of independence

Chi-square test of independence was used to investigate the relationship between the location of the cancer (top), gender and age of patients.

2.1.1. Test of independency between “Top” and gender of the patients

Hypothesis Testing I:

| Gender | Frequency | Percent | Cumulative Percent |
|--------|-----------|---------|-------------------|
| Valid  | Male      | 787     | 47.1              | 47.1              |
|        | Female    | 883     | 52.8              | 100.0             |
|        | Total     | 1670    | 99.9              |                   |
| Missing| System    | 1       | .1                |                   |
| Total  |           | 1671    | 100.0             |                   |

Remark: Table 2 indicates that there are more female patients with cancer diseases than males. This is represented in a pictorial form in Fig. 1.
Table 3
Frequency distribution of the patient’s age.

| Age (years) | Frequency | Percent | Cumulative Percent |
|-------------|-----------|---------|--------------------|
| 3           | 6         | 0.4     | 0.4                |
| 4           | 5         | 0.3     | 0.7                |
| 5           | 1         | 0.1     | 0.7                |
| 6           | 5         | 0.3     | 1.0                |
| 7           | 5         | 0.3     | 1.3                |
| 8           | 2         | 0.1     | 1.4                |
| 9           | 1         | 0.1     | 1.5                |
| 10          | 2         | 0.1     | 1.6                |
| 12          | 4         | 0.2     | 1.9                |
| 14          | 4         | 0.2     | 2.1                |
| 15          | 8         | 0.5     | 2.6                |
| 16          | 6         | 0.4     | 2.9                |
| 17          | 4         | 0.2     | 3.2                |
| 18          | 9         | 0.5     | 3.7                |
| 19          | 6         | 0.4     | 4.1                |
| 20          | 15        | 0.9     | 5.0                |
| 22          | 9         | 0.5     | 5.5                |
| 23          | 12        | 0.7     | 6.2                |
| 24          | 11        | 0.7     | 6.9                |
| 25          | 17        | 1.0     | 7.9                |
| 26          | 11        | 0.7     | 8.6                |
| 27          | 15        | 0.9     | 9.5                |
| 28          | 19        | 1.1     | 10.6               |
| 29          | 7         | 0.4     | 11.0               |
| 30          | 51        | 3.1     | 14.1               |
| 31          | 6         | 0.4     | 14.4               |
| 32          | 22        | 1.3     | 15.7               |
| 33          | 7         | 0.4     | 16.2               |
| 34          | 10        | 0.6     | 16.8               |
| 35          | 74        | 4.4     | 21.2               |
| 36          | 16        | 1.0     | 22.1               |
| 37          | 15        | 0.9     | 23.0               |
| 38          | 27        | 1.6     | 24.7               |
| 39          | 13        | 0.8     | 25.4               |
| 40          | 94        | 5.6     | 31.1               |
| 41          | 13        | 0.8     | 31.8               |
| 42          | 18        | 1.1     | 32.9               |
| 43          | 15        | 0.9     | 33.8               |
| 44          | 11        | 0.7     | 34.5               |
| 45          | 74        | 4.4     | 38.9               |
| 46          | 18        | 1.1     | 40.0               |
| 47          | 13        | 0.8     | 40.8               |
| 48          | 32        | 1.9     | 42.7               |
| 49          | 11        | 0.7     | 43.3               |
| 50          | 134       | 8.0     | 51.3               |
| 51          | 12        | 0.7     | 52.1               |
| 52          | 23        | 1.4     | 53.4               |
| 53          | 19        | 1.1     | 54.6               |
| 54          | 23        | 1.4     | 56.0               |
| 55          | 94        | 5.6     | 61.6               |
| 56          | 26        | 1.6     | 63.1               |
| 57          | 18        | 1.1     | 64.2               |
| 58          | 19        | 1.1     | 65.4               |
| 59          | 7         | 0.4     | 65.8               |
| 60          | 161       | 9.6     | 75.4               |
| 61          | 9         | 0.5     | 75.9               |
| 62          | 13        | 0.8     | 76.7               |
| 63          | 9         | 0.5     | 77.3               |
| 64          | 8         | 0.5     | 77.7               |
| 65          | 82        | 4.9     | 82.6               |
**Table 3 (continued)**

| Age (years) | Frequency | Percent | Cumulative Percent |
|-------------|-----------|---------|--------------------|
| 66          | 6         | 0.4     | 83.0               |
| 67          | 10        | 0.6     | 83.6               |
| 68          | 16        | 1.0     | 84.6               |
| 69          | 2         | 0.1     | 84.7               |
| 70          | 128       | 7.7     | 92.3               |
| 71          | 5         | 0.3     | 92.6               |
| 72          | 8         | 0.5     | 93.1               |
| 73          | 4         | 0.2     | 93.4               |
| 74          | 3         | 0.2     | 93.5               |
| 75          | 26        | 1.6     | 95.1               |
| 76          | 5         | 0.3     | 95.4               |
| 77          | 5         | 0.3     | 95.7               |
| 78          | 6         | 0.4     | 96.1               |
| 79          | 2         | 0.1     | 96.2               |
| 80          | 36        | 2.2     | 98.3               |
| 81          | 1         | 0.1     | 98.4               |
| 82          | 1         | 0.1     | 98.4               |
| 83          | 1         | 0.1     | 98.5               |
| 84          | 2         | 0.1     | 98.6               |
| 85          | 13        | 0.8     | 99.4               |
| 86          | 2         | 0.1     | 99.5               |
| 90          | 6         | 0.4     | 99.9               |
| 93          | 1         | 0.1     | 99.9               |
| 95          | 1         | 0.1     | 100.0              |
| Total       | 1671      | 100.0   |                    |

**Remarks:** From Table 3, the lowest age captured is 3 years old while the oldest patient is 95 years old. The cancer diseases affected both young and old but particularly, the age of the patients with highest number of cancer incidence is 60 years old. This information is represented in Fig. 2.

H₀: There is no significant association between the topological location of cancer and the gender of the patients.
Versus.
H₁: There is a significant association between the topological location of cancer and the gender of the patients.

The result of the analysis is presented in Table 5.

The information about the correlation coefficient and its corresponding p-value is presented in Table 6.

### 2.1.2. Test of independency between “Top” and age of the patients

Hypothesis Testing II:
H₀: There is no significant association between topological location of cancer is not dependent on the age of the patients.
Versus.
H₁: There is a significant association between topological location of cancer is dependent on the age of the patients.

The result of the analysis is presented in Table 7.

Information about the correlation coefficient and its corresponding p-value is presented in Table 8.

### 2.2. Curve estimation

Linear, logarithmic, inverse, quadratic, cubic, power, growth, exponential and logistic regression models were fitted to the dataset. “Top” is the dependent variable while Age is the independent variable. The summary of the variables used is presented in Table 9.
Table 4
Parts of the body affected by the various types of cancer.

| Topological (Top) location of cancer | Frequency | Percent | Cumulative Percent |
|-------------------------------------|-----------|---------|--------------------|
| Valid                               |           |         |                    |
| C77.9 Lymph node, NOS               | 9         | 0.5     | 0.5                |
| C26.9 Gastrointestinal tract, NOS   | 9         | 0.5     | 1.1                |
| C20.9 Rectum, NOS                   | 54        | 3.2     | 4.3                |
| C44.9 Skin, NOS                      | 47        | 2.8     | 7.1                |
| C61.9 Prostate gland                 | 253       | 15.1    | 22.3               |
| C63.9 Male genital organs, NOS       | 1         | 0.1     | 22.4               |
| C49.6 Soft tissues of trunk          | 5         | 0.3     | 22.6               |
| C50.9 Breast, NOS                    | 92        | 5.5     | 28.1               |
| C77.3 Lymph nodes of axilla or arm   | 2         | 0.1     | 28.2               |
| C57.9 Female genital tract, NOS      | 15        | 0.9     | 29.1               |
| C53.9 Cervix uteri                  | 76        | 4.5     | 33.7               |
| C22.0 Liver                         | 31        | 1.9     | 35.5               |
| C77.0 Lymph nodes of head, face and | 6         | 0.4     | 35.9               |
| C40.9 Bone of limb, NOS              | 4         | 0.2     | 36.1               |
| C53.8 Overl. lesion of cervix uteri | 1         | 0.1     | 36.2               |
| C49.2 Soft tissues of lower limb an | 7         | 0.4     | 36.6               |
| C49.9 Other soft tissues            | 18        | 1.1     | 37.7               |
| C67.9 Urinary bladder, NOS          | 32        | 1.9     | 39.6               |
| C56.9 Ovary                         | 60        | 3.6     | 43.2               |
| C40.2 Long bones of lower limb      | 1         | 0.1     | 43.3               |
| C44.2 External ear                  | 1         | 0.1     | 43.3               |
| C49.0 Soft tissues of head, face, & | 9         | 0.5     | 43.9               |
| C44.7 Skin of lower limb and hip    | 6         | 0.4     | 44.2               |
| C39.9 Ill-defined sites within resp | 15        | 0.9     | 45.1               |
| C49.1 Soft tissues of upper limb, s | 4         | 0.2     | 45.4               |
| C44.6 Skin of upper limb and shoulder | 3    | 0.2     | 45.5               |
| C19.9 Rectosigmoid junction         | 4         | 0.2     | 45.8               |
| C64.9 Kidney, NOS                   | 20        | 1.2     | 47.0               |
| C40.8 Overl. lesion of bones of lim | 1         | 0.1     | 47.0               |
| C41.0 Bones of skull and face       | 2         | 0.1     | 47.2               |
| C44.4 Skin of scalp and neck        | 6         | 0.4     | 47.5               |
| C16.3 Gastric antrum                | 6         | 0.4     | 47.9               |
| C18.0 Cecum                         | 20        | 1.2     | 49.1               |
| C16.9 Stomach, NOS                  | 7         | 0.4     | 49.5               |
| C49.5 Soft tissues of pelvis        | 3         | 0.2     | 49.7               |
| C04.9 Floor of mouth, NOS           | 2         | 0.1     | 49.8               |
| C73.9 Thyroid gland                 | 14        | 0.8     | 50.6               |
| C77.1 Intrathoracic lymph nodes     | 1         | 0.1     | 50.7               |
| C52.9 Vagina, NOS                   | 8         | 0.5     | 51.2               |
| C10.2 Lateral wall of oropharynx    | 1         | 0.1     | 51.2               |
| C44.5 Skin of trunk                 | 2         | 0.1     | 51.3               |
| C69.0 Conjunctiva                   | 14        | 0.8     | 52.2               |
| C21.8 Overl. lesion rectum, anal ca | 9         | 0.5     | 52.7               |
| C49.4 Soft tissues of abdomen       | 4         | 0.2     | 53.0               |
| C18.4 Transverse colon              | 1         | 0.1     | 53.0               |
| C41.9 Bone, NOS                     | 1         | 0.1     | 53.1               |
| C76.2 Abdomen, NOS                  | 1         | 0.1     | 53.1               |
| C76.5 Lower limb, NOS               | 1         | 0.1     | 53.2               |
| C69.6 Orbit, NOS                    | 1         | 0.1     | 53.3               |
| C49.3 Soft tissues of thorax        | 3         | 0.2     | 53.4               |
| C55.9 Uterus, NOS                   | 30        | 1.8     | 55.2               |
| C44.8 Overl. lesion of skin         | 1         | 0.1     | 55.3               |
| C51.9 Vulva, NOS                    | 1         | 0.1     | 55.4               |
| C10.9 Oopharynx, NOS                | 2         | 0.1     | 55.5               |
| C30.1 Middle ear                    | 1         | 0.1     | 55.5               |
| C62.9 Testis, NOS                   | 2         | 0.1     | 55.7               |
| C15.0 Cervical esophagus            | 12        | 0.7     | 56.4               |
| C18.7 Sigmoid colon                 | 1         | 0.1     | 56.4               |
| C80.9 Unknown primary site          | 200       | 12.0    | 68.4               |
| C77.2 Intra-abdominal lymph nodes   | 1         | 0.1     | 68.5               |
| Topological (Top) location of cancer | Frequency | Percent | Cumulative Percent |
|-----------------------------------|-----------|---------|--------------------|
| C11.9 Nasopharynx, NOS            | 3         | 0.2     | 68.6               |
| C50.0 Nipple                      | 168       | 10.1    | 78.7               |
| C53.0 Endocervix                  | 105       | 6.3     | 85.0               |
| C53.1 Exocervix                   | 1         | 0.1     | 85.0               |
| C67.4 Posterior wall of urinary bl | 8         | 0.5     | 85.5               |
| C16.0 Cardia, NOS                 | 33        | 2.0     | 87.5               |
| C21.0 Anus, NOS                   | 17        | 1.0     | 88.5               |
| C51.0 Labium majus                | 3         | 0.2     | 88.7               |
| C67.0 Trigone of urinary bladder  | 57        | 3.4     | 92.1               |
| C44.0 Skin of lip, NOS            | 15        | 0.9     | 93.0               |
| C11.0 Superior wall of nasopharynx| 16        | 1.0     | 94.0               |
| C08.0 Submandibular gland         | 3         | 0.2     | 94.1               |
| C14.0 Pharynx, NOS                | 5         | 0.3     | 94.4               |
| C26.0 Intestinal tract, NOS       | 7         | 0.4     | 94.9               |
| C65.9 Renal pelvis                | 4         | 0.2     | 95.1               |
| C10.0 Vallescula                  | 6         | 0.4     | 95.5               |
| C25.0 Head of pancreas            | 5         | 0.3     | 95.8               |
| C60.0 Prepuce                     | 4         | 0.2     | 96.0               |
| C21.2 Cloacogenic zone            | 4         | 0.2     | 96.2               |
| C18.6 Descending colon            | 1         | 0.1     | 96.3               |
| C66.9 Ureter                      | 1         | 0.1     | 96.3               |
| C50.1 Central portion of breast   | 1         | 0.1     | 96.4               |
| C34.0 Main bronchus               | 1         | 0.1     | 96.5               |
| C21.1 Anal canal                  | 3         | 0.2     | 96.6               |
| C18.9 Colon, NOS                  | 1         | 0.1     | 96.7               |
| C01.9 Base of tongue, NOS         | 3         | 0.2     | 96.9               |
| C62.0 Undescended testis          | 4         | 0.2     | 97.1               |
| C11.2 Lateral wall of nasopharynx | 1         | 0.1     | 97.2               |
| C50.6 Axillary tail of breast     | 1         | 0.1     | 97.2               |
| C54.1 Endometrium                 | 2         | 0.1     | 97.4               |
| C25.9 Pancreas, NOS               | 1         | 0.1     | 97.4               |
| C30.0 Nasal cavity                | 1         | 0.1     | 97.5               |
| C00.9 Lip, NOS                    | 1         | 0.1     | 97.5               |
| C54.2 Myometrium                  | 1         | 0.1     | 97.6               |
| C48.8 Overl. lesion of retroperiton| 1         | 0.1     | 97.7               |
| C76.7 Other ill-defined sites     | 1         | 0.1     | 97.7               |
| C03.0 Upper gum                   | 2         | 0.1     | 97.8               |
| C15.9 Oesophagus, NOS             | 1         | 0.1     | 97.9               |
| C69.9 Eye, NOS                    | 1         | 0.1     | 98.0               |
| C16.4 Pylorus                     | 1         | 0.1     | 98.0               |
| C07.9 Parotid gland               | 2         | 0.1     | 98.1               |
| C67.5 Bladder neck                | 1         | 0.1     | 98.2               |
| C57.4 Uterine adnexa              | 1         | 0.1     | 98.3               |
| C16.2 Body of stomach             | 1         | 0.1     | 98.3               |
| C13.0 Postcricoid region          | 7         | 0.4     | 98.7               |
| C37.9 Thymus                      | 1         | 0.1     | 98.8               |
| C17.0 Duodenum                    | 1         | 0.1     | 98.9               |
| C06.0 Cheek mucosa                | 1         | 0.1     | 98.9               |
| C04.0 Anterior floor of mouth     | 4         | 0.2     | 99.2               |
| C47.0 Per. nerves & A.N.S. of head, | 3         | 0.2     | 99.3               |
| C09.0 Tonsillar fossa             | 2         | 0.1     | 99.5               |
| C38.4 Pleura, NOS                 | 1         | 0.1     | 99.5               |
| C38.0 Heart                       | 4         | 0.2     | 99.8               |
| C67.1 Dome of urinary bladder     | 1         | 0.1     | 99.8               |
| C22.1 Intraperitoneal bile duct   | 1         | 0.1     | 99.9               |
| C76.0 Head, face or neck, NOS     | 1         | 0.1     | 99.9               |
| C23.9 Gallbladder                 | 1         | 0.1     | 100.0              |
| **Total**                         | 1671      | 100.0   |                    |
2.2.1. Simple linear regression
The summary of the simple linear regression model is presented in Table 10.
The corresponding analysis of variance (ANOVA) table testing for the fitness of the model is
presented in Table 11.
The linear regression model is significant at 0.05 level of significance and with R-square value of 3%.

2.2.2. Logarithmic model
The summary of the logarithmic model is presented in Table 12.
Estimating the model parameter gives the result in Table 13.
The ANOVA table for the logarithmic model is presented in Table 14.
The logarithmic model is significant at 0.05 level of significance and with R-square value of 1.7%.

2.2.3. Inverse model
The summary of the inverse model is presented in Table 15.
The result for the estimation of parameters using the inverse model is presented in Table 16.
The corresponding ANOVA table is presented in Table 17.
The inverse model is not significant as its p-value is greater than the level of significance (0.05).

2.2.4. Quadratic model
The summary for the quadratic model is presented in Table 18.
The result for the estimation of parameter using the quadratic model is presented in Table 19.
The corresponding ANOVA table is presented in Table 20.
The quadratic model is significant at 0.05 level of significance and with R-square value of 3.8%.

2.2.5. Cubic model
The summary for the cubic model is presented in Table 21.
The result for the estimation of parameter for the cubic model is presented in Table 22.
The corresponding ANOVA table is presented in Table 23.

Fig. 1. Gender of the patients.
2.2.6. Power model

The summary for the power model is presented in Table 24. The result for the estimation of parameter for the power model is presented in Table 25. The corresponding ANOVA table is presented in Table 26.

The cubic model is significant and with $R$-square value of 3.9%.
The power model is significant at 0.05 level of significance and with R-square value of 2.5%.

2.2.7. Growth model
The model summary for the growth model is presented in Table 27.
The result for the estimation of parameter of the growth model is presented in Table 28.
The corresponding ANOVA table is presented in Table 29.
The growth model is significant at 0.05 level of significance and with R-square value of 4.7%.

2.2.8. Exponential model
The model summary for the exponential model is presented in Table 30.
The result for the estimation of parameter for the exponential model is presented in Table 31.
The corresponding ANOVA table is presented in Table 32.

The exponential model is significant at 0.05 level of significance and with $R$-square value of 4.7%.

2.2.9. Logistic model

The model summary for the logistic model is presented in Table 33.

The estimation of parameters for the logistic model is presented in Table 34.
The corresponding ANOVA table is presented in Table 35. The logistic model is also significant at 0.05 level of significance and with R-square value of 4.7%. Lastly, all the fitted models are illustrated in Fig. 4.
### Table 19
Parameter estimation for the quadratic model.

| Coefficients | Unstandardized Coefficients | Standardized Coefficients | t  | Sig. |
|--------------|-----------------------------|---------------------------|----|------|
|              | B                           | Std. Error                | Beta |      |
| Age          | 0.348                       | 0.183                     | 0.204 | 1.897 | 0.058 |
| Age ** 2     | −0.007                      | 0.002                     | −0.388 | −3.607 | 0.000 |
| (Constant)   | 38.929                      | 4.329                     | 8.992 | 0.000 |

### Table 20
ANOVA table for the quadratic model.

| ANOVA        | Sum of Squares | df | Mean Square | F    | Sig. |
|--------------|----------------|----|-------------|------|------|
| Regression   | 51674.289      | 2  | 25837.144   | 32.854 | 0.000 |
| Residual     | 1311765.138    | 1668 | 786.430     |      |      |
| Total        | 1363439.427    | 1670 |             |      |      |

The independent variable is age.

### Table 21
Summary for the cubic model.

| R            | R Square | Adjusted R Square | Std. Error of the Estimate |
|--------------|----------|-------------------|---------------------------|
| 0.197        | 0.039    | 0.037             | 28.036                     |

The independent variable is age.

### Table 22
Parameter estimation for the cubic model.

| Coefficients | Unstandardized Coefficients | Standardized Coefficients | t  | Sig. |
|--------------|-----------------------------|---------------------------|----|------|
|              | B                           | Std. Error                | Beta |      |
| Age          | 0.951                       | 0.477                     | 0.558 | 1.993 | 0.046 |
| Age ** 2     | −0.021                      | 0.011                     | −1.230 | −1.970 | 0.049 |
| Age ** 3     | 0.000                       | 0.000                     | 0.504 | 1.369 | 0.171 |
| (Constant)   | 32.108                      | 6.601                     | 4.864 | 0.000 |

### Table 23
ANOVA table for the cubic model.

| ANOVA        | Sum of Squares | df | Mean Square | F    | Sig. |
|--------------|----------------|----|-------------|------|------|
| Regression   | 53146.668      | 3  | 17715.556   | 22.538 | 0.000 |
| Residual     | 1310292.759    | 1667 | 786.018     |      |      |
| Total        | 1363439.427    | 1670 |             |      |      |

The independent variable is age.
Table 24  
Summary for the power model.

|          | $R$ | $R$ Square | Adjusted $R$ Square | Std. Error of the Estimate |
|----------|-----|------------|---------------------|----------------------------|
|          | 0.159 | 0.025 | 0.025 | 1.125 |

The independent variable is age.

Table 25  
Parameter estimation for the power model.

| Coefficients | Unstandardized Coefficients | Standardized Coefficients | $t$ | Sig. |
|--------------|-----------------------------|---------------------------|-----|------|
|              | $B$ | Std. Error | Beta |     |     |
| ln(Age)      | $-0.397$ | 0.060 | $-0.159$ | $-6.583$ | 0.000 |
| (Constant)   | 105.955 | 24.692 | 4.291 | 0.000 |

The dependent variable is ln(Top).

Table 26  
ANOVA table for the power model.

| ANOVA | Sum of Squares | df | Mean Square | $F$ | Sig. |
|-------|----------------|----|-------------|-----|------|
| Regression | 54.875 | 1 | 54.875 | 43.330 | 0.000 |
| Residual   | 2113.710 | 1669 | 1.266 |     |     |
| Total      | 2168.585 | 1670 |     |     |     |

The independent variable is age.

Table 27  
Summary for the growth model.

|          | $R$ | $R$ Square | Adjusted $R$ Square | Std. Error of the Estimate |
|----------|-----|------------|---------------------|----------------------------|
|          | 0.216 | 0.047 | 0.046 | 1.113 |

The independent variable is age.

Table 28  
Parameter estimation for the growth model.

| Coefficients | Unstandardized Coefficients | Standardized Coefficients | $t$ | Sig. |
|--------------|-----------------------------|---------------------------|-----|------|
|              | $B$ | Std. Error | Beta |     |     |
| Age          | $-0.015$ | 0.002 | $-0.216$ | $-9.038$ | 0.000 |
| (Constant)   | 3.875 | 0.086 | 45.180 | 0.000 |

The dependent variable is ln(Top).
Table 29
ANOVA table for the growth model.

|                | Sum of Squares | df  | Mean Square | F      | Sig.  |
|----------------|----------------|-----|-------------|--------|-------|
| Regression     | 101.181        | 1   | 101.181     | 81.683 | 0.000 |
| Residual       | 2067.404       | 1669| 1.239       |        |       |
| Total          | 2168.585       | 1670|             |        |       |

The independent variable is age.

Table 30
Summary for the exponential model.

\[
\begin{array}{cccc}
R & R^2 & \text{Adjusted } R^2 & \text{Std. Error of the Estimate} \\
\hline
0.216 & 0.047 & 0.046 & 1.113 \\
\end{array}
\]

The independent variable is age.

Table 31
Parameter estimation for the exponential model.

| Coefficients | Unstandardized Coefficients | Standardized Coefficients | t     | Sig.  |
|--------------|----------------------------|---------------------------|-------|-------|
|              | B                          | Std. Error                | Beta  |       |
| Age          | $-0.015$                   | $0.002$                   | $-0.216$ | $-9.038$ | 0.000 |
| (Constant)   | $48.173$                   | $4.132$                   | $11.660$ | 0.000 |

The dependent variable is ln(Top).

Table 32
ANOVA table for the exponential model.

|                | Sum of Squares | df  | Mean Square | F      | Sig.  |
|----------------|----------------|-----|-------------|--------|-------|
| Regression     | 101.181        | 1   | 101.181     | 81.683 | 0.000 |
| Residual       | 2067.404       | 1669| 1.239       |        |       |
| Total          | 2168.585       | 1670|             |        |       |

The independent variable is age.

Table 33
Summary for the logistic model.

\[
\begin{array}{cccc}
R & R^2 & \text{Adjusted } R^2 & \text{Std. Error of the Estimate} \\
\hline
0.216 & 0.047 & 0.046 & 1.113 \\
\end{array}
\]

The independent variable is age.
Table 34
Parameter estimation for the logistic model.

| Coefficients | Unstandardized Coefficients | Standardized Coefficients | t     | Sig. |
|--------------|------------------------------|---------------------------|-------|------|
|              | B                            | Std. Error                | Beta  |      |
| Age          | 1.015                        | 0.002                     | 1.241 | 615.592 | 0.000 |
| (Constant)   | 0.021                        | 0.002                     | 11.660| 0.000 |

The dependent variable is ln(1 / Top).

Table 35
ANOVA table for the logistic model.

| ANOVA          | Sum of Squares | df | Mean Square | F    | Sig.  |
|----------------|----------------|----|-------------|------|-------|
| Regression     | 101.181        | 1  | 101.181     | 81.683 | 0.000 |
| Residual       | 2067.404       | 1669 | 1.239      |       |       |
| Total          | 2168.585       | 1670 |            |       |       |

The independent variable is age.

Fig. 4. The fitted model with respect to the data set.
Important points

- More females are infected with cancer than men.
- The age with the highest record (or incidence) of cancer is 60 years old.
- The part of the body that is mostly affected by cancer is the prostate gland (based on the data set collected).
- There is a significant association between the topological location of cancer and the gender of the patients.
- There is a significant association between the topological location of cancer and the age of the patients.
- All the models fitted to the data produced low $R$-square values; nevertheless, the models that best fit the data based on their $R$-square values are growth model, exponential model and logistic model.

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.04.135.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.04.135.

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