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Health Institutions Management / Sağlık Kurumları Yönetimi

Examination of Healthcare Quality Indicators with a Two-Stage Panel Data Analysis: The Case of Cancer Care

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ABSTRACT

Purpose: The aim of this study was to examine the quality of care for cancer patients using survival rates for breast, cervical, colorectal, lung, and stomach cancers.

Methods: The study population comprised OECD countries. Survival rates from breast, cervical, colorectal, lung, and stomach cancers, alcohol use, smoking, physical inactivity, and obesity rates, age, and income were selected as research data. A two-stage panel data analysis was performed. In the first stage, efficiency scores were found to be an indicator of the quality of cancer care through data envelopment analysis. Survival rates of cancer types were used as output variables to determine efficiency scores. In the second stage, the factors affecting efficiency were determined by panel tobit regression analysis.

Results: In the first stage, Australia, Canada, Finland, Iceland, Israel, Israel, Korea, the Slovak Republic and Turkey were found to be efficient in all years. In the second stage, it was found that alcohol consumption, smoking, and inactivity statistically decreased cancer activity ($p<0,05$).

Conclusion: To reduce the negative impact of smoking, alcohol consumption, and physical inactivity on the quality of cancer care, it is important to integrate smoking cessation programs into cancer treatment plans, to offer counseling and support to help patients reduce or stop drinking, and to encourage and facilitate regular physical activity for cancer patients.

Keywords: Efficiency, cancer care, healthcare quality indicators, panel data analysis.

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ÖZET

Amaç: Bu çalışmanın amacı meme, serviks, kolonrektal, akciğer ve mide kanserleri için sağkalım oranlarını kullanarak kanser hastalarının bakım kalitesini incelemektir.

Yöntem: Çalışmanın evreni OECD ülkelerinden oluşmaktadır. Araştırma verileri olarak meme, servikal, kolonrektal, akciğer ve mide kanserlerinden sağkalım oranları, alkol kullanımı, sigara kullanımı, fiziksel inaktivite ve obezite oranları, yaş ve gelir seçilmiştir. İki aşamalı bir panel veri analizi kullanılmıştır. İlk aşamada, veri zarflama analizi yoluyla kanser bakım kalitesinin bir göstergesi olarak etkinlik skorları bulunmuştur. Kanser türlerinin sağkalım oranları, etkinlik skorlarını belirlemek için çıktı değişkenleri olarak kullanılmıştır. İkinci aşamada ise panel tobit regresyon analizi ile etkinliği etkileyen faktörler belirlenmiştir.

Bulgular: İlk aşamada, Avustralya, Kanada, Finlandiya, İzlanda, İsrail, Kore, Slovak Cumhuriyeti ve Türkiye›nin tüm yıllarda etkin olduğu bulunmuştur. İkinci aşamada ise alkol tüketimi, sigara kullanımı ve fiziksel inaktivitenin kanser etkinliğini istatistiksel olarak azalttığı tespit edilmiştir ($p<0,05$).

Sonuç: Sigara, alkol ve fiziksel hareketsizliğin kanser bakımının kalitesi üzerindeki olumsuz etkisini azaltmak için, sigarayı bırakma programlarının kanser tedavi planlarına entegre edilmesi, hastaların alkolü azaltmalarına veya bırakmalarına yardımcı olmak için danışmanlık ve destek sunulması ve kanser hastaları için düzenli fiziksel aktivitenin teşvik edilmesi ve kolaylaştırılması önemlidir.

Anahtar Kelimeler: Etkinlik, kanser bakımı, sağlık hizmetleri kalite göstergeleri, panel veri analizi.

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Cancer was the second leading cause of death after cardiovascular diseases in OECD countries, accounting for 24% of all deaths in 2019. The leading causes of cancer deaths were lung cancer (21%), colorectal cancer (11%), breast cancer (15% in women), and prostate cancer (10% in men). These four cancers account for 44% of all cancers diagnosed in OECD countries. Mortality rates from cancer have fallen in all OECD countries since 2000, but on average, the decline has been more modest than that for cardiovascular diseases (1).

The term "cancer", representing a range of heterogeneous diseases, refers to a diagnosis that is increasingly becoming a chronic condition diseases that can begin with the uncontrolled growth of abnormal cells in almost any organ or tissue of the body. The quality of cancer care is shifting from a model focused on the need for immediate treatment of the tumor to a more holistic approach to patient care to ensure both quantity and quality of life. Addressing these needs begins before the active treatment phase and continues after the transition to long-term survival (2).

The importance of healthcare quality is paramount as it has a direct impact on patient outcomes, safety and overall well-being. In the context of cancer care, quality healthcare is critical to improving survival rates. Quality care includes timely and accurate diagnosis, effective treatment protocols, skilled healthcare professionals and comprehensive follow-up care. These elements ensure that patients receive the best possible interventions, reduce the likelihood of complications and improve their chances of recovery (3).

When healthcare systems emphasize quality, they are better equipped to handle the complexities of cancer treatment, such as surgery, chemotherapy, radiation, and palliative care. This holistic approach not only improves patient experiences but also plays a crucial role in enhancing survival rates or life expectancy. On the other hand, poor or inconsistent care can result in delays in treatment, incorrect diagnoses, or less effective therapies, which can negatively impact patient survival. Thus, a dedicated focus on quality in healthcare is vital for attaining superior clinical outcomes, prolonging patient lifespans, and enhancing the overall quality of life for those undergoing cancer treatment (4).

The need to measure the quality of care is a challenge in all medical disciplines. Quality of care is particularly difficult to assess for the wide range of diseases that fall under the umbrella of cancer, which are often treated by different healthcare providers in, both inpatient and outpatient settings. To measure quality, it is necessary to monitor several healthcare professionals over long periods of time: clinical oncologists, surgeons, radiologists, oncology nurses, psychotherapists, occupational therapists, physiotherapists, etc. Attributing outcomes to individual professionals or to a single intervention is difficult, and the collection of important data from all sectors of the healthcare system is sometimes still not practical (5). Furthermore, not all aspects of quality of care are amenable to measurement, and often those that are easiest and least costly to measure have little relevance to quality improvement (6).

In this study survival rates from breast, cervical, colourectal, lung, and stomach cancers were used as healthcare quality indicators. Survival rates for breast, cervical, colorectal, lung and stomach cancers are key indicators of the quality and effectiveness of healthcare. These rates provide valuable insights into the success of early detection methods, such as screening programmes, and the effectiveness of different treatment options, including surgery, chemotherapy and radiotherapy. High survival rates typically indicate that a healthcare system is well equipped to diagnose and treat these cancers promptly and effectively, while low survival rates may indicate gaps in care, such as delayed diagnosis or inadequate treatment. Monitoring these rates helps healthcare providers and policymakers identify areas for improvement, allocate resources more efficiently, and prioritise research and public health interventions. In addition, tracking survival rates over time allows progress in cancer treatment and prevention efforts to be assessed, highlighting the impact of medical advances and public health initiatives. Ultimately, understanding and improving these survival rates is essential to reducing cancer-related mortality and improving patients' quality of life (7). These indicators were selected by taking into account OECD data. In addition, the two-stage panel data analysis method was used for assessing the data. This approach using DEA and Tobit regression provides a comprehensive framework for assessing and understanding efficiency, making it a valuable tool for researchers, policy makers and practitioners in various fields, including healthcare.

In this context, the main purpose of this study was to analyze the quality of cancer care in terms of different indicators.

Methods

Study Population and Sample Selection

The study population comprised OECD countries. The aim was to reach the whole population without sampling. However, because the data were missing from 9 countries, 26 countries were included in the study.

Variables of the Study

Information on the study's data, which were fully accessible because of the literature review, is presented below (Table 1). The years of the data cover five-year periods (2000-2004, 2005-2009, 2010, 2014) for cancer types and alcohol consumption, smoking, physical inactivity, and obesity, whereas for other variables it is 2014. This is because data on cancer sites are available for five years in the data source. In order to harmonize the data, the averages of the data on alcohol, smoking, physical inactivity and obesity were used, considering the corresponding year intervals. A summary of the data is presented below (Table 1).

Table 1: Study data

Variables	Measurement	Abbr.	Data from	Year
Breast cancer survival	Breast cancer 5-year net survival (%)	BreSur	OECD (https://stats.oecd.org/Index.aspx?QueryId=51882)	2000-2004; 2005-2009; 2010-2014
Cervical cancer survival	Cervical cancer 5-year net survival (%)	CerSur	OECD (https://stats.oecd.org/Index.aspx?QueryId=51882)	
Colonrectal cancer survival	Colorectal cancer 5-year net survival (%)	ColSur	OECD (https://stats.oecd.org/Index.aspx?QueryId=51882)	
Lung cancer survival	Lung cancer 5-year net survival (%)	LunSur	OECD (https://stats.oecd.org/Index.aspx?QueryId=51882)	
Stomach cancer survival	Stomach cancer 5-year net survival (%)	StoSur	OECD (https://stats.oecd.org/Index.aspx?QueryId=51882)	
Alkohol	Liters per capita (15+)	Alk	OECD (https://stats.oecd.org/Index.aspx?QueryId=51882)	
Smoking	% of population Daily smokers (15+)	Smo	WHO (https://www.who.int/data/gho/indicator-metadata-registry)	
Inactivity	Prevalence of insufficient physical activity (18+)	Inact	WHO (https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3416)	
Obesity	Prevalence of overweight among adults (BMI ≥ 25)	Obe	WHO (https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3416)	
Age	Population ages 15-64 (% of total population)	Age	Worldbank (https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?view=chart)	2014
Income	GDP per capita, PPP (current international $)	Inc	Worldbank (https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?view=chart)	

Research Model

In light of the data obtained, the model of the research (Figure 1) is presented below.

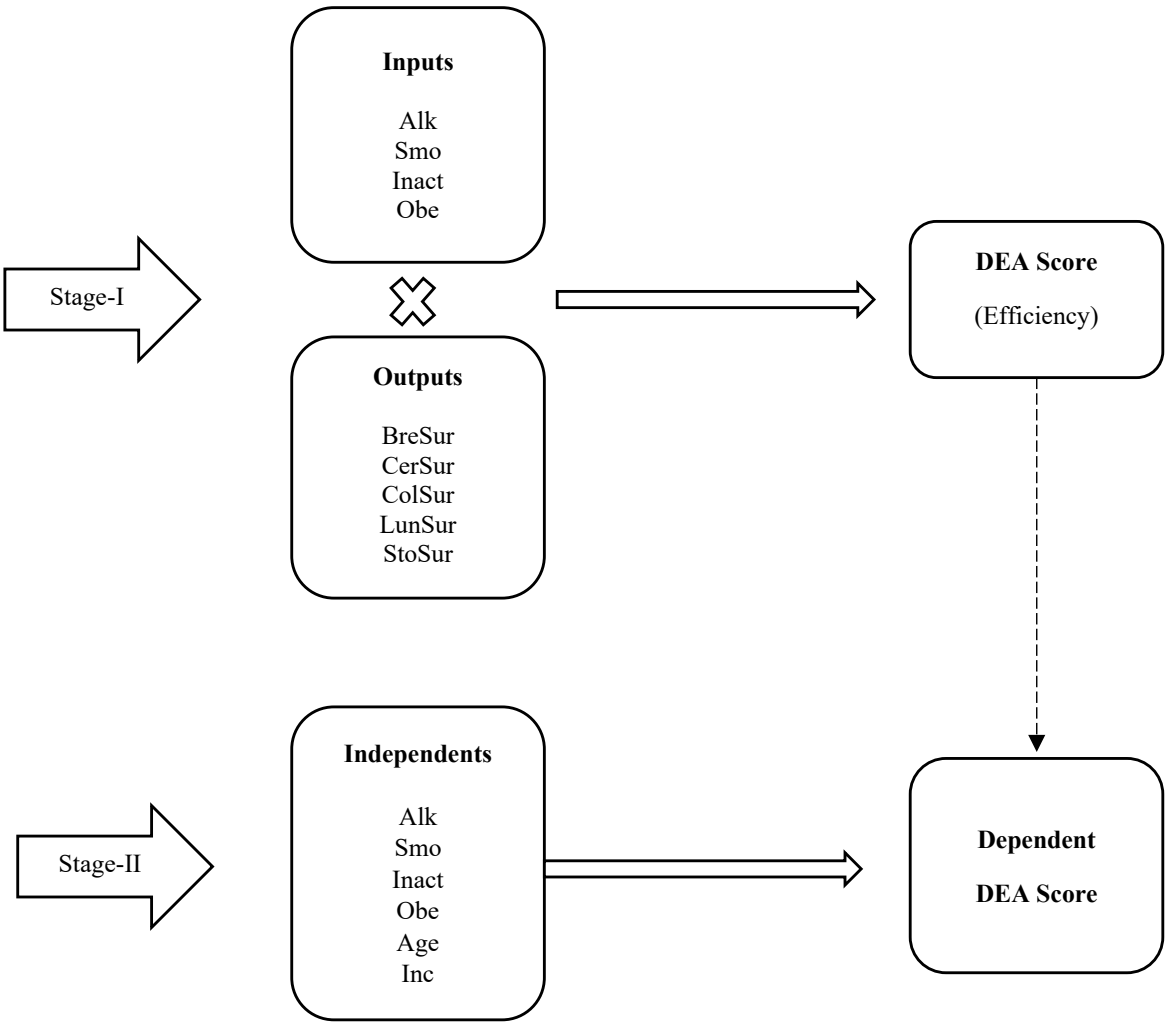

Figure 1: Research Model

Relationship between the Variables of the Study

The connection between alcohol consumption, smoking, physical inactivity, obesity, and cancer survival rates is intricate and substantial. Research has shown that these lifestyle choices can negatively impact cancer prognosis and survival chances. Both alcohol and smoking are established carcinogens, not only heightening the risk of developing various cancers but also exacerbating outcomes for individuals already diagnosed. Smoking, in particular, is linked to lower survival rates due to its role in cancer recurrence and additional complications. A sedentary lifestyle and obesity are also significant contributors, as they can cause metabolic and inflammatory issues that may impair the body's capacity to combat cancer. Obesity, in particular, is associated with lower survival rates across several cancer types, as it can interfere with treatment effectiveness and increase the risk of other health problems. Together, these lifestyle habits can compromise the immune system, reduce overall health, and weaken the body's resilience, leading to decreased survival rates for cancer patients. Therefore, addressing these factors is essential for enhancing cancer outcomes and survival. In addition, The relationship

between age, income and cancer survival is an important aspect of understanding cancer outcomes. In general, older age is associated with lower survival rates, as ageing often brings with it a higher likelihood of comorbidities and a reduced physiological reserve to withstand aggressive treatments. In addition, lower income levels can adversely affect cancer survival because they are often associated with reduced access to quality health care, timely screening and advanced treatments. Socioeconomic inequalities can also affect the ability to maintain a healthy lifestyle and access supportive care during and after treatment. As a result, both age and income are important factors that can influence the prognosis and overall survival of cancer patients. (8-10).

Data Analysis

The analysis of the data was carried out in two stages. In the first stage, the Data Envelopment Analysis (DEA) method was used to measure the relative efficiency of decision units (countries). DEA is a nonparametric method developed by Charnes et al. (11). In this method, the relative efficiency of the decision units is measured using inputs and outputs. Efficiency is assessed by weighting the most appropriate inputs and outputs for decision-making units (12). In DEA, which is based on linear programing, two different models are used: CCR (Charnes-Cooper-Rhodes) model and BCC (Banker-Charnes-Cooper) model (11). The BCC model expresses variable returns to scale. Accordingly, an increase in input will lead to a smaller or larger increase or decrease in output. Efficiency is evaluated between 0 and 1. If the value of the decision unit is equal to 1, the decision unit is considered efficient; if it is less than 1, it is considered inefficient (13). As the most commonly used model in DEA, the CCR model expresses constant returns to scale, which assumes that there are n decision units and each decision unit has the same type of input and output. In this model, all inputs and outputs are assumed to be positive. In this study, the BCC model was chosen because it compares both health services and countries. The model uses alcohol, smoking, physical inactivity, and obesity as input variables and cancers (breast, cervical, colourectal, lung, and stomach) survival rates as output variables. The reason for the selection of these variables is that they are thought to have an effect on cancer survival rates as stated in the literatüre (8-10). If the value of the decision unit is greater than 1, the decision unit is considered efficient. If the value of the decision unit is less than 1, the decision unit is considered inefficient (14).

In the second stage of the analysis, Tobit regression analysis was performed using the transformed DEA scores to determine the factors influencing the DEA scores. First, the independent and dependent variables for the Tobit regression analysis were determined. While alcohol, smoking, physical inactivity, obesity, age and income are selected as independent variables, the dependent variable is the DEA scores obtained in the first stage of the analysis, indicating the effectiveness of the service quality indicators. The Tobit regression model that was developed by Tobin is a powerful tool for determining the effect of independent variable(s) on dependent variable(s) when the dependent variable takes a value in a certain range (0-1 range) and is continuous (15). In cases where Tobit regression analysis is used as a second-stage analysis after DEA, it is recommended to apply [(1/VZA score)-1] transformation to the DEA scores. This makes it easier to ensure normality (16). The analysis is then censored at the zero (0) point from the left. In this case, the Tobit regression model shows the effects of the independent variables on inefficiency, but not efficiency. Accordingly, the effect of statistically significant independent variable(s) on efficiency as a result of the Tobit regression analysis is interpreted as the opposite sign of the coefficient of the relevant independent variable(s) (17).

One of the indicators of healthcare quality is efficiency. Therefore, in the first stage of the study, efficiency scores of cancer care of the countries were obtained through DEA and used as quality indicators. Secondly, tobit regression analysis was performed to determine the effect of lifestyle and sociodemographic variables in the study on the efficiency of cancer care quality.

DEA Solver Pro13 and EViews 9 were used to analyze the data.

Results

The DEA results of the first stage of the analysis are presented in Table 2. Accordingly, Australia, Canada, Finland, Iceland, Israel, Israel, Korea, the Slovak Republic, and Turkey were found to be efficient in all years.

Table 2: DEA results

	Years					
	2000-2004		2005-2009		2010-2014	
DMU's	Score	RTS	Score	RTS	Score	RTS
Australia	1,000	Constant	1,000	Constant	1,000	Constant
Austria	0,990	Increasing	0,987	Increasing	0,978	Increasing
Belgium	0,948	Constant	0,927	Increasing	0,925	Constant
Canada	1,000	Constant	1,000	Constant	1,000	Constant
Chile	0,882	Increasing	0,877	Increasing	0,875	Increasing
Czechia	0,933	Increasing	0,947	Increasing	0,950	Increasing
Denmark	0,922	Increasing	0,922	Increasing	0,922	Increasing
Estonia	0,886	Increasing	0,89	Increasing	0,889	Increasing
Finland	1,000	Constant	1,000	Constant	1,000	Constant
France	0,965	Constant	0,919	Decreasing	0,877	Increasing
Germany	0,933	Constant	0,922	Increasing	0,909	Increasing
Iceland	1,000	Constant	1,000	Constant	1,000	Constant
Israel	1,000	Constant	1,000	Constant	1,000	Constant
Italy	0,926	Constant	0,909	Increasing	0,895	Increasing
Korea	1,000	Constant	1,000	Constant	1,000	Constant
Lithuania	0,925	Increasing	0,917	Increasing	0,916	Increasing
Latvia	0,944	Increasing	0,957	Increasing	0,925	Increasing
Netherlands	0,932	Increasing	0,928	Increasing	0,926	Increasing
Norway	0,943	Increasing	0,962	Decreasing	0,961	Increasing
Portugal	0,892	Constant	0,869	Constant	0,844	Constant
Slovak Rep.	1,000	Increasing	1,000	Increasing	1,000	Increasing
Slovenia	0,958	Increasing	0,954	Increasing	0,951	Increasing
Spain	0,982	Increasing	0,981	Increasing	0,981	Increasing
Sweden	0,947	Increasing	1,000	Decreasing	0,993	Constant
Türkiye	1,000	Constant	1,000	Constant	1,000	Constant
United King.	0,930	Increasing	0,938	Increasing	0,939	Increasing
Mean	0,955		0,954		0,948	
SS.	0,038		0,042		0,048	

The descriptive statistics of the variables used in the study are presented in Table 3.

Table 3: Descriptives

	DEA Score	Alcohol	Smoking	Inactivite	Obesity	Age	Income
Mean	0.051	9.405	27.373	82.179	56.850	67.050	30512.26
SD	0.048	2.833	6.243	4.618	6.478	2.196	10700.09
Obs.	78	78	78	78	78	78	78

The correlation coefficients between the variables are presented in Table 4. Accordingly, it is determined that there is no multicollinearity problem that may prevent regression analysis.

Table 4: Correlations

	DEA Score	Alcohol	Smoking	Inactivite	Obesity	Age	Income
DEA Score	1.00						
Alkohol	0.35	1.00					
Smoking	0.43	0.25	1.00				
Inactivite	0.58	-0.10	-0.08	1.00			
Obesity	0.06	-0.22	0.01	0.08	1.00		
Age	-0.16	0.34	0.10	-0.48	-0.48	1.00	
Income	-0.18	-0.12	-0.53	0.07	0.01	-0.24	1.00

The results of the tobit regression analysis are presented below (Table 5). First, the regression model was found to be statistically significant ($p<0.05$). When analyzed for the variables, it was determined that alcohol consumption, smoking, and inactivity statistically decreased cancer activity (increased inactivity).

Table 5: Panel tobit regression analysis

Variables	Coefficient	Std. Error	z-Statistics	p
Alkohol	0.008	0.002	4.623	**<0.001**
Smoking	0.005	0.001	5.697	**<0.001**
Inactivite	0.009	0.001	7.973	**<0.001**
Obesity	0.001	0.001	0.970	0.331
Age	0.001	0.003	0.302	0.762
Income	7.536	4.930	1.527	0.126
C	-1.063	0.284	-3.741	0.001
Log likelihood: 90.962; Shwarz: -1.885; Hannan-Quinn: -2.030; Scale (p): 0.001				
Left censored obs.	25			
Right censored	53			
Total obs.	78			

Discussion

The aim of this study was to examine the quality of cancer care using survival rates for different types of cancer (breast, cervical, colorectal, lung and stomach). As a result of the analysis, alcohol consumption, smoking, and physical inactivity were found to negatively affect the quality of cancer care (inefficient care). There is by the way no significant difference was found with obesity, age and income as a result of the analysis.

When the literature was analyzed, it was found that similar results were obtained. Alcohol consumption significantly compromises the efficiency of cancer treatment. Ethanol and its metabolite, acetaldehyde, can interfere with the metabolism and action of various chemotherapy drugs, reducing their effectiveness and increasing the likelihood of adverse reactions (18,19). The study by Meadows and Zhang (20) included patients who consumed alcohol during and after cancer treatment and were at an increased risk of cancer recurrence and secondary primary cancers. Alcohol acts as a carcinogen, promoting the development of new cancers, particularly in the esophagus, liver, colon, and breast. Continued alcohol consumption can also contribute to primary cancer recurrence by creating a more conducive environment for cancer cell growth and survival. The study by Schwartz, et al (21) revealed that examining trends in alcohol consumption along with cancer incidence and mortality rates suggests that decreases in alcohol intake might reduce cancer risk. Managing the complications associated with alcohol consumption places a substantial strain on healthcare resources. Healthcare providers must allocate more time and resources to address these complications, which can detract from their ability to provide care for other patients. This inefficiency in resource utilization can negatively affect the overall quality of cancer care provided by healthcare institutions (22). These results elaborate on the adverse effects of alcohol consumption in cancer care, clearly demonstrating the repercussions of these effects on clinical outcomes. It also highlights the burden on health resources associated with alcohol consumption, another important factor affecting the efficiency of health systems and the quality of cancer care.

Smoking has a profound negative effect on the efficiency of cancer treatments. Research shows that smokers are less likely to respond to various cancer treatments, including surgery, radiotherapy, and chemotherapy. The presence of nicotine and other harmful substances in tobacco can reduce the body's ability to heal after surgery, increase the toxicity of treatments, and alter the pharmacokinetics of chemotherapy drugs (23). Peppone, et al (24) showed that patients who smoke during cancer treatment are at a higher risk of serious complications and side effects. Smoking intensifies respiratory problems, cardiovascular problems, and infections, which can lead to longer hospital stays and higher morbidity rates. Jassem (25) included smoking as having a negative impact on the quality of life of cancer patients. The addictive nature of nicotine and the physical dependence it creates can lead to chronic health problems and reduced overall well-being. This reduced quality of life can lead to lower adherence to treatment and poorer health outcomes. Selya, et al (26) found that the additional medical care required for smoking-related complications places a significant strain on healthcare resources. Hospitals and clinics must allocate more time and resources to manage these complications, which can detract from the care of other patients. This inefficiency in resource utilization can impact the overall quality of cancer care provided by healthcare institutions. It is stated that these studies address in detail the extensive effects of smoking on the effectiveness of cancer treatment, complications, quality of life and health resources. Highlighting the effects of smoking on these factors provides important information for shaping health policies and interventions.

Physical inactivity negatively impacts cancer care by contributing to poorer treatment outcomes and reduced quality of life. Regular physical activity improves the prognosis of cancer patients by enhancing immune function, reducing inflammation, and improving cardiovascular health. In contrast, a sedentary lifestyle can lead to weight gain, obesity, and associated metabolic complications, which can interfere with cancer treatment (27). Zhao, et al (28) reported that obesity is linked to increased risks of treatment-related complications and reduced efficacy of certain therapies. For example, excess body fat can alter the pharmacokinetics of chemotherapy drugs, making dosing more challenging and potentially less effective. Physical inactivity also contributes to fatigue and decreased physical function, which can reduce a patient's ability to tolerate and complete cancer treatment regimens. Physical inactivity can significantly impair the body's ability to tolerate cancer treatments, such as chemotherapy, radiation therapy, and surgery. Regular physical activity helps maintain cardiovascular and muscular health, which are crucial for enduring the rigorous demands of cancer treatment. Sedentary patients often have reduced muscle mass and cardiovascular fitness, leading to increased fatigue and a diminished

capacity to withstand the side effects of treatment (29). Physical inactivity is linked to poorer prognosis and lower survival rates in patients with cancer. Regular physical activity is associated with improved survival rates in various cancers, including breast, colorectal, and prostate cancers . In contrast, sedentary behavior can contribute to disease progression and lower survival rates. Physical inactivity promotes obesity and metabolic dysfunction, which are linked to a higher risk of cancer recurrence and mortality (30). These informations provide a detailed overview of the adverse effects of physical inactivity in cancer treatment and how physical activity can ameliorate these effects. These highlights the importance of promoting physical activity to improve treatment processes and informs the optimisation of healthcare services.

Conclusion

To reduce the negative impact of smoking on the quality of cancer care, it is important to integrate smoking cessation programes into cancer treatment plans. Healthcare providers should routinely screen for smoking and offer tailored smoking cessation interventions as part of comprehensive cancer care.

It is recommended that alcohol reduction strategies be included in cancer treatment plans. Healthcare providers should routinely screen for alcohol consumption and offer counselling and support to help patients reduce or stop drinking.

To mitigate the negative impact of physical inactivity on the quality of cancer care, healthcare providers should encourage and facilitate regular physical activity for patients with cancer. Incorporating exercise programes tailored to patients' abilities and treatment plans can improve physical functioning, enhance treatment tolerance, and improve overall well-being. Recommendations include

- Developing individualized exercise prescriptions that consider the patient's physical condition, cancer type, and treatment plan.
- Incorporating physiotherapy to help patients build strength, improve mobility, and manage treatment side effects.
- Counseling on the benefits of physical activity and practical ways to incorporate exercise into daily routines.

Limitations of the Study

There are some limitations in this study. First, it is important to know that the relationship between quality of cancer care and cancer treatment success does not depend only on these indicators. The treatment regimens used also important for treatment success. This factor should be taken into account when assessing the results. Second, the results of the study should be evaluated only by taking into account the relevant country group and the variables used. Different results can be obtained by using different country groups and variables. Finally, cancer survival rates were included in the study as included in the OECD database. It should be noted that the results may change when there are different groupings.

Implications for Theaory and Practice

The findings indicating that alcohol consumption, smoking, and inactivity significantly decrease cancer activity (interpreted as increasing inactivity) provide a nuanced perspective on how lifestyle factors impact cancer dynamics. These results contribute to the broader literature on the influence of lifestyle behaviors on cancer progression, challenging existing models by highlighting the complex relationship between these factors and cancer activity. This suggests that lifestyle behaviors not only play a role in cancer risk but also in its progression and the functional status of patients. The findings warrant further theoretical investigation into the mechanisms by which these lifestyle factors affect cancer biology and patient outcomes.

From a practical standpoint, these results underscore the importance of integrating lifestyle interventions into cancer treatment plans. Healthcare professionals should emphasize the need for screening and addressing alcohol consumption, smoking, and physical inactivity among cancer patients as part of a holistic approach to care. Encouraging healthier behaviors through resources for smoking cessation, reducing alcohol intake, and promoting physical activity can help mitigate the negative impacts on cancer activity and enhance overall patient health. Moreover, public health efforts should aim to educate the public about the harmful effects of these lifestyle factors on cancer progression, thereby empowering patients to make more informed health decisions.

Policymakers can leverage the findings of this study to shape public health initiatives and policies focused on

lowering cancer rates and enhancing patient outcomes. The study's identification of alcohol consumption, smoking, and physical inactivity as factors associated with increased inactivity in cancer patients underscores the need for focused interventions and prevention efforts. By implementing policies that encourage smoking cessation, moderate alcohol use, and greater physical activity, policymakers can address these risk factors. Moreover, investing in educational campaigns and support services that promote healthier lifestyle choices can help decrease cancer-related health issues and deaths. The empirical evidence provided by this study can be instrumental in formulating data-driven public health strategies and regulations to better manage and prevent cancer.

Declarations

Ethics Approval

In this study since secondary data were used, there is no need for ethics committee approval.

Conflicts of Interest

No conflicts of interest to declare.

Availability of Data and Material

Yes.

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No to report.

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