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İstanbul Medipol Üniversitesi
Kavacık Kuzey Yerleşkesi
Kavacık Mahallesi, Ekinciler Caddesi
No: 19 34810 Beykoz/İSTANBUL
Tel: 0216 681 51 00
jhesp@medipol.edu.tr

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# Facing the Challenges of Aging Population in the Turkish Health System

Sabahattin Aydın[1]
Ömer Ataç[2]

**ABSTRACT**

Health systems are deeply affected from demographic change since the burden of diseases and health expenditures, and struggles in health care delivery system are very much related to age groups in a society. This study aims to analyze the composition of Turkish society's age structure compared to available global data, mainly focusing on elderly population. In the light of the aging population and future demographic assessments, the challenges of the health system and possible new policy requirements are discussed, accordingly.

**Keywords:** Demographic Changes, Elderly, Aging, Health Services, Health Policies

## INTRODUCTION

Demographic changes will have profound impacts for almost all organizations in a society, as well as health systems in the next decades. The global aging population with the dependency rate has a great impact on the shape and functions of many organizations. Public policy leaders need to look forward and prepare for the requirements of the changing structures of the future and understand the organizational changes this will bring.

Turkey has recently achieved a great progress in its health system. However,

1 İstanbul Medipol University

2 İstanbul Medipol University, School of Medicine, Department of Public Health

Corresponding author: Ö. ATAÇ, oatac@medipol.edu.tr

the population of Turkey is getting older, with significant impact on the health system priorities together with health professionals and organizations that fulfill the requirements. It is necessary to understand the previous demographic trends to estimate future size and characteristics of the older population as well as to forecast their demands for services. Analysis of demographic trends of the elderly population will also help identify the needed data to make informed policy decisions which are related to the health needs of the elderly population in the future.

## METHODOLOGY

To understand the trends, the past demographic structure of Turkish population and the future projections are obtained from the data of Turkish Statistics Institute (TSI). The growth rate of the population, life expectancy at birth, the ratio of different population groups, especially the young and elderly, and dependency rates are the main demographic indicators that help to estimate future trends and consequences. Population projections in Turkey were produced using the most recent population data obtained from Address Based Population Registration System (ABPRS), established according to Population Services Law 5490. National and regional population projections were adjusted by the results of Turkey Population and Health Survey realized by Hacettepe University Institute of Population Studies (Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2014).

Health data from United Nations World Population Prospects (UN WPP), European Statistical Office (EUROSTAT), and Organisation for Economic Co-operation and Development (OECD) provided a valuable opportunity for making a comparative analysis. Thus, the demographic trends of the Turkish population are more accurately compared with the trends of EU and OECD countries as well as the whole world population.

Population Division of United Nations Department of Economic and Social Affairs (UN DESA) prepares and conducts the UN WPP. It is mainly based on four different sources: Vital registers of countries, censuses, surveys which are conducted by National Institutes or different organizations, and adjustments, if needed (UN DESA, 2017).

EUROSTAT is the statistical office of European Union. Its main responsibil-

ity is to process and publish statistical information about both European Union and Member States and Norway as well. Year-based population projections are some of the works. These projections, based on statistical models, which are prepared by a working group and that includes Eurostat and National Statistical Institutes of Member States. Eurostat annually collects demographic and migration data to update the projections and Member States have a legal obligation to provide data to Eurostat (European Commission Eurostat, 2017).

OECD also carries out demographic projections. It collects data from different sources. For EU member states, it uses Eurostat information. For non-EU countries, the data is obtained from World Bank or National Institutes, but the data for these countries has country-specific methodological differences (OECD, 2019).

The actual and projected growth of the older population, old-age dependency ratio and total dependency ratio obtained from the data were compared with the available data from OECD and United Nations, European Union. OECD projections does not go further to 2060 and 2080, thus long-term comparison with these data was ignored.

## RESULTS AND DISCUSSION

According to TSI, the population of Turkey was 64.7 million in 2000, 67.2 million in 2003, 71.5 million in 2008, 76.5 million in 2013 and reached 80.1 million at the end of 2017 (TSI, 2018). It is expected to become 86.9 million in 2023 (TSI, 2018). While the rate of population growth was 1.14% from 2003 to 2013 it is expected to be 1.3% from 2013 to 2023. According to the projection of TSI, the population of Turkey will be 100.3 million in 2040 and 107.1 million in 2080 (TSI, 2018). Life expectancy at birth has also been increasing as it is expected, which means that our people now live longer. Furthermore, life expectancy at birth is expected to reach 80.2 years in 2023, which is already 78.0 (TSI, 2018). While the number of citizens aged under five in Turkey was 6.1 million in 2003, it remained at the same level until 2013 and reached up to 6.54 million by 2018. In 2023, it is estimated to become 6.59 million (TSI, 2018). If evaluated with the general population counts, it can be seen that the percentage of individuals under five decreased from 9.1% to 7.9% between 2003 and 2013 and it is expected to decrease further to 7.6% in five years (TSI,

2018). In other words, child population will relatively decrease.

On the other hand, elderly population rapidly increases as the population of over sixty-five years of age was 4.5 million in 2003, 5.89 million in 2013 and 6.89 million in 2017. It is expected to reach 8.87 million in 2023. If we estimate its proportion based on general population, elderly population formed 6.7% of the total population in 2003, 7.7% in 2013, and 8.5% in 2017. It is expected to increase up to 10.2% in 2023 (TSI, 2018).

As mentioned earlier, TSI, estimates the population of Turkey to be 100.3 million in 2040 and 107.1 million in 2080 (TSI, 2018). The population of individuals under five years of age is expected to be 6.3 million (6.2%) and 5.5 million (5.1%) in these periods, respectively (TSI, 2018). As it can be seen, in 2080, with the decreasing trend of our population, the ratio of child population continues to decrease as well. The population over sixty-five years of age will be 16.3 million (16.2%) in 2040 and 27.4 million (25.6%) in 2080 (TSI, 2018; TSI, 2018). It can be seen that aging is rapidly increasing while the growth rate of the population tends to decrease. It is understood that one quarter of our population will be elderly in the 2070s. Compared to other age groups, the elderly population has a higher growth rate than the other age groups. While the growth rate of the total population was 12.4 ‰ in 2017, the growth rate of the elderly population was 32.2 ‰ which is nearly three times faster (TSI, 2018; TSI, 2018).

According to the population projection of the United Nations, it is estimated that the proportion of elderly people in the world population which was 6.9% in 2000 will increase to 15.8 by 2050. While this proportion will change from 14.3% to 26.6% in developed countries, it will increase from 5.1% to 14% in developing countries (UN DESA, 2017). According to the projection of 2060, the proportion of elderly people in our country will be 22.6%, and Turkey will stand in between the developed and developing countries.

The ratio of the population over the age of 65, namely the elderly, within the population between the ages of 15-64 is called the elderly dependency ratio (Porta, 2014, p. 72). The social security systems now in place is on the edge of balancing between the size of the working population and the retired. This is vital for the sustainability of the pension system. The trends for people to live longer and the decline in the ratio of the active working population are dete-

riorating the balance by changing the shape of the elderly dependency ratio.

While the number of elderly people taken care of by the working population was 12.9 per 100 workers in 2017, it is estimated to increase to 15.1 in 2023 and 37.4 in 2060 (TSI, 2018; TSI, 2018). In other words, every three employees will take care of an old person. In addition to the significant increase in number of people over 65 years of age, which we define as the elderly population, the interior demographic change of this elderly population is also very important. The proportion of people who are 85 years and over and at much higher risk in terms of life limitation and burden of disease is only 9.2% at the moment, while the proportion of this population is expected to be 10.5% in 2040 and 15% in 2060. Eventually, it is expected to rise up to 19.7% in 2080 (TSI, 2018; TSI, 2018).

The total dependency ratio, the sum of the young and elderly ratios, is a crude index of the total burden on the working population of its support for both old and young dependents. The total dependency ratio in Turkey is 45.7 at the moment, at a point between the OECD (35.0) and EU average (54.5). It is expected to increase in the following decades, and reach 55.2 in 2040, 65.4 in 2060 and 70.3 in 2080 (TSI, 2018).

The actual and projected growth of the older population, old-age dependency ratio and total dependency ratio of available data from United Nations, European Union, OECD and Turkish Statistics are given in the table. The World, EU and Turkish indexes can easily be compared in the following figures. OECD projections did not go further to 2060 and 2080, thus long-term comparison with these data has been ignored.

**Table 1:** Actual and projected growth of the older population, 2018-2080 and the dependency ratios.

| | Year | World (UN) | EU | OECD | Turkey |
|---|---|---|---|---|---|
| Elderly population (>65) | 2018 | 8.9 | 11.8 | 17.2 | 8.7 |
| | 2025 | 10.4 | 22.1 | 19.6 | 10.2 |
| | 2040 | 14.1 | 27.0 | 23.8 | 16.3 |
| | 2060 | 17.8 | 29.0 | - | 22.6 |
| | 2080 | 20.1 | 29.1 | - | 25.6 |
| Total dependency ratio | 2018 | - | 54.5 | 35.0 | 47.5 |
| | 2025 | 54.0 | 56.6 | 58.2 | 48.7 |
| | 2040 | 56.9 | 68.7 | 66.3 | 55.2 |
| | 2060 | 61.9 | 75.1 | - | 65.4 |
| | 2080 | 64.0 | 76.4 | - | 70.3 |
| Old-age dependency ratio | 2018 | - | 30.5 | 26.5 | 12.9 |
| | 2025 | 16.0 | 34.5 | 31.0 | 15.1 |
| | 2040 | 22.1 | 45.6 | 39.7 | 25.3 |
| | 2060 | 28.8 | 50.7 | - | 37.4 |
| | 2080 | 32.9 | 51.4 | - | 43.6 |

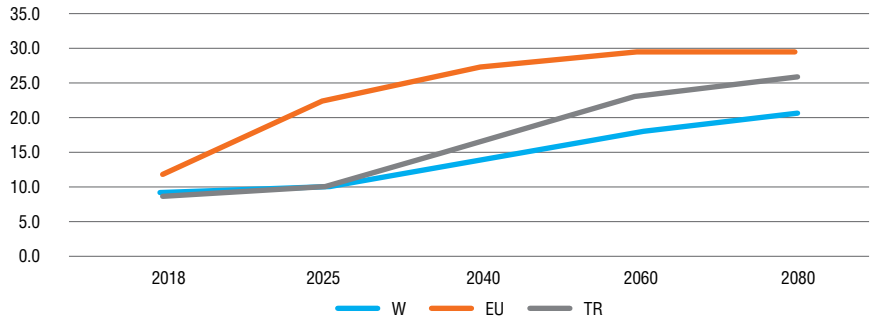


**Figure 1:** Elderly population (% of total), World average, EU average and Turkey

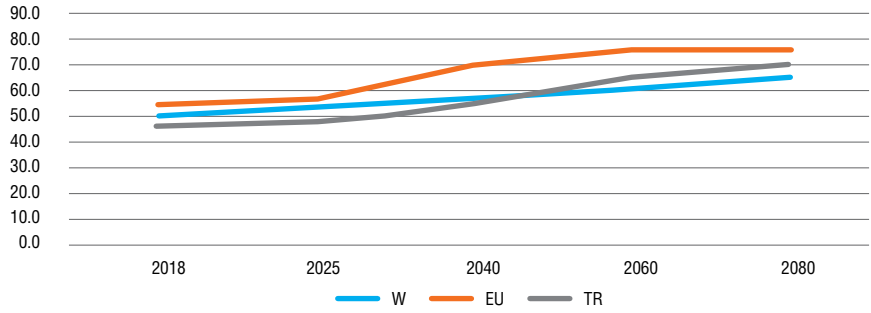


**Figure 2:** The share of dependent population, World average, EU average and Turkey

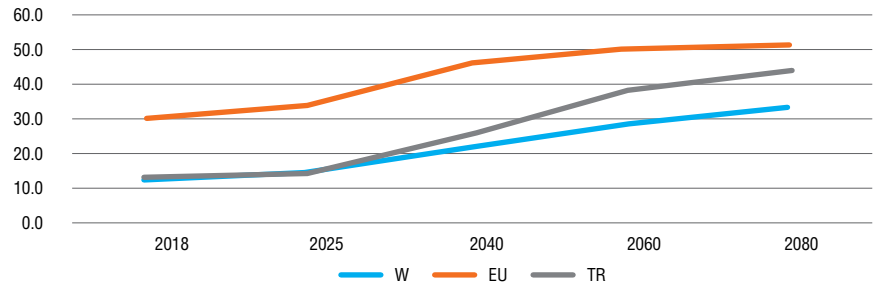


**Figure 3:** Old-age dependency ratio, World average, EU average and Turkey

As seen in the figures, the average figures of European Union are high in all indicators including the share of elderly population, total dependency ratio and old-age dependency ratio. According to the projections, the slope of the increase will decrease after 2040, but it will reach its highest level in 2060. Currently, Turkey's population structure, in terms of old population, total dependency ratio and old-age dependency ratio are very close to the world average. However, when we look at future projections, contrary to the low slopes of the curves of the world's population indexes, rapid increases of these indicators are observed in Turkish population. So, it can easily be observed that the demographic structure of Turkey, in terms of share of the elderly and dependent population, will approach to that of Europe and close the gap in a fast manner.

Although the elderly population and the old age dependency ratio of European countries are high at the moment and will continue to be higher in the projections up to year 2080, these countries have the chance for adaptation in a reasonable time. On the other hand, in spite of lower values in the figures, the slope of the aging rate of Turkey's population is very high, showing faster demographic changes compared to European countries as well as the world averages. The figures clearly demonstrate these structural diversities. That is to say, Turkey will not have the same chance as Europe, for adapting her systems to future demographic changes.

That is why special effort should be made to reorganize Turkey's health system as well as the social security system. It is extremely vital to take serious measures and make a series of reforms for strengthening her systems to respond to the emerging situations in terms of new forms of health care delivery, and sustainability.

**The Burden Of Elderly Population On The Health System**

The burden of disease in elderly people varies both in terms of violence and diversity. The major health problems of the elderly include depression, cancer, heart diseases, diabetes, fall-related injuries, hearing impairments, impaired vision, forgetfulness, severe influenza, osteoporosis, pneumonia, balance problems, Alzheimer's disease and Parkinson's disease (Detels and Gulliford, 2015). As a result, almost all of these diseases are chronic and generally require more examination and medical treatment. In addition, numbness, shortening of reaction time and other side effects can be observed due to the medicines which were taken at old ages. Therefore, falls and fractures are frequent and limitations of movement, newly appearing disability and special care needs constitute additional burdens. There isn't any definite limit to describe what day-to-day work can result from the loss of intellectual capacity and reflex reduction in the elderly. Activities such as using machinery, driving, lighting a fire and so on can sometimes cause not only to harm themselves but also to their environment (WHO, 2011; WHO, 2015).

**New System Requirements for the Future Population**

It is normal to see increasing interest in the fields of science related to life and health within the aging population. In this aspect, the character, diversity and even the job descriptions of the health professionals, who are struggling for the health of people, will change as well (WHO, 2015; Kuhlmann, 2006). It is obvious that addressing the old age only through physical or mental chronic diseases in medical sense is insufficient since aging is a natural process. A good understanding of this phenomenon will help to achieve healthy aging.

Gerontology is a discipline that examines the aging process. In the future, we should expect this discipline to become more prominent, and relevant studies to focus more on this area. In addition, geriatric medicine is a medical discipline that deals with the health of elder people. It aims to provide prevention and treatment of diseases and disabilities in this group (Halter et. al., 2017). Compared to other medical disciplines, it is very likely that geriatrics will also be a very important field since a high number of patients expected in the future. The importance of some medical disciplines such as cognitive neurology which focuses on diseases such as internal medicine, cardiology, rheumatolo-

gy, chest diseases, physical therapy and rehabilitation, oncology, Alzheimer, and Parkinson will also increase with the aging population. In the meantime, professions such as gerontologists, physiotherapists, elderly care workers, home care workers and occupational therapists will be more important in the future (Halter et. al., 2017; Simmers et. al., 2009).

It is not surprising to expect that drug research activities and a large economic sector of medical studies will focus on non-communicable diseases, especially cancers (Arensberg, 2017). The demands of elder people and the services for their needs are important in many aspects. Elderly care has also become a profession requiring special competencies like other professions such as child care which has transitioned from being a traditional maternity practice to a profession. This discipline will become more and more important as the proportion of the elderly population increases. In the course of elderly care services, we are going to meet with some concepts used in the West today such as assisted living, adult day care, short-term care, long-term care, nursing homes, home care, and hospice (Hui et. al., 2013).

Elder people cannot handle all of their needs on their own due to their disabilities. In their daily life, it is aimed to ensure that they are supported with human resources and technological tools to maintain their quality of life. This situation is called as supported life (Kleinberger et. al., 2017). As the nuclear family structure is spreading and almost all of young family members have a lifestyle outside of their home in which they live their active daily life, the elders are often alone. Even children who share the same house with their older family members are likely to accompany them at night, but they have to leave them alone during the daytime because of the intensive pace of daily life. Similar to the childcare service in which working parents leave their children during the daytime, the service area that appears to take care of the elderly person is called daytime adult care. Daytime rehabilitation centers, day care centers with dementia, psychiatric day care, and rehabilitation centers can also be some other examples. Sometimes, it can be a service type which aims to take care of an elderly or a disabled person temporarily in order to allow the household to rest or to do their timely work. Sometimes, this can be for longer-terms including full-time stays due to holidays, business travels or decisions of the family members not to share the same house. In this case, long-term care

is mentioned in the sense that it can be given as an example of a temporary and permanent retirement home.

Under the influence of contemporary social structure and ever-changing needs, an important issue waiting for elders who need enhanced care is the days spent in the last period of their lives. A growing number of people who live longer have non-communicable diseases which often become the causes of their death. We have increasing number of people whose treatments are limited to palliative care and are at the end of their lives. The fact that these patients spend their last days in health facilities is a serious burden and leads to loss of opportunities for other treatable patients. It is not possible for those patients to receive adequate service in their family environment where home care facilities are commonly scarce. The service provided in special care centers established to take care of such patients is called terminal patient care (Hui et. al., 2013; Poor and Poirrier, 2000).

Home in which they spend their daily lives is actually the most suitable care environment for people whether they are very old, or they have some kind of chronic diseases. It is more efficient for the sake of both economy and patient comfort. However, home care, which is a service model where the needs of life comfort and healthy life can be provided, requires special organization (Kim and Antonopoulos, 2011). This unique service style, which was initially practiced by local governments in our country. Later on, Ministry of Health tried to implement it as a national policy, whereas, the policy still needs to be developed as home care and home health care. Under the social security umbrella, there is a need for more comprehensive structuring. These concepts can also be transformed in accordance with the form of our own behavior and cultural structure. In particular, the existence of the family institution and the interdependencies between the family members require that certain services to be redefined and interpreted in their own capacity. While the nuclear family structure becomes more common in the society, the group of single living elderly people is becoming more and more prevalent. Even this is not the case generally, we are not able to save our old parents from their loneliness. Even though they might not be in the need of physical care, the development of related psychosocial problems is inevitable for them as our lifestyle that we embrace today also produces problems that were not common in the past. We have to foresee

that the problems of the growing old population will also grow with a higher velocity. It is necessary to develop social policies and health policies in order to prevent this situation and to define the responsibility of the public partners in these policies. More social activity fields for the elder population, creating more available occupations for social interaction and more cognitive exercises such as, travel, chatting, discussion, communication and prayer, or regular actions such as walking, shopping, voluntary service, and worship can be seen as the simplest protective precautions. For example, the elders in an Anatolian village or in a neighborhood environment who regularly go to the mosque to perform their prayers plays an important role in the construction of their daily lives. The positive effects of tea parties and camellia conversations with their peers who come to the mosque cannot be denied in terms of social integration. It is possible to find solutions that can facilitate their social integration by taking the intellectual, cultural, belief patterns and habits of the target audience into consideration. Although the traditional structures of small neighborhoods and villages in closed societies produced such solutions within themselves, the housing structure of the modern country life remains unresolved in this case primarily because of the traffic chaos and the intense working life in cities.

**Future Health Policy Challenges**

With the aging population, our health policies will have to change too. In fact, it seems inevitable that public health services which prioritize maternal and child health will evolve into type of policies that prioritize the elderly population as the latter continues to develop a more fragile group. It will be necessary to broaden and even redefine the primary health services for the elderly population. After healthy growth and healthy motherhood, healthy aging should also be considered in public policy. If we differentiate elderly related policies under three different headings, such as direct health services, primary care services and social services, the systematics of the policies to be developed emerge as well. While the Ministry of Women, Family and Social Affairs will be responsible for social services towards the elderly, primary health care and health services will be undertaken both by the Ministry of Health and Social Security Institution. However, since the limits of these areas of responsibility cannot be as clear as they are supposed to be, these institutions need to work

together in order to determine the limits of responsibility, and to avoid gaps or duplications.

As usual, health services for the elder population can be categorized into two groups: inpatient and outpatient. Elderly people who are unable to take care of themselves and who cannot be cared for at home are hospitalized and treated. For this, various institutional organizations can be made, or solutions can be found within the common health institutions. However, the preferred action is to keep the elder population in their vicinity and home. The public healthcare services can be organized for this purpose. In our country, limited mobile home care services which were initiated partially by local administrations have started to take place at a limited level within the health system by the initiative of the Ministry of Health (Ministry of Health, 2010; Official Gazette, 2005). For instance, we can provide services such as home care, assisted living, home care and nursing service, and terminal patient care at home in order to meet the general needs of the elder population. In order to keep these services around the environments of the elder population easily and to make these services sustainable, specially designed centers, which take care of these people at day time and send them home at night hours, can be organized. Daytime rehabilitation centers, day care centers for dementia patients and psychiatric day care and rehabilitation centers can be some examples.

It is known that health expenditures per elder person are higher than the expenditures made for the rest of the population. According to different studies, per capita spending amount for elderly people over 65 years old is 2.7-4.8 times higher than other age groups. There are also great differences between the subgroups of the elderly population. It is estimated that the health expenditure per person in the age group 85 and over is 3 times higher than the 65-74 age group, and 2 times more than the 75-84 age group. According to a study comparing the Medicare health expenditures of the years 2001, 2006 and 2011, 96% of the population over 65 years of age received health care services resulted with health expenditure during this time. In a decade, healthcare spending for the elderly in America increased by more than $ 100 billion (2001: $ 304 billion, 2011: $ 414 billion) (Mirel and Carper, 2014). In addition, the rate of increase in per capita health expenditures for the elderly is higher than that of non-elderly people. For example, the ratio of elderly health expenditure per capita

in the US to the expenditure of non-elderly people was 3.0 in 1987 and 3.9 in the 1990s (Fuchs, 1998). In the analysis of Medicare expenditures in 1953-87, the annual increase in health expenditures per person for 1-64 age group was 4.5%, while this increase rate was found to be 8% over the age of 65 (Cutler and Meara, 1997). In short, the elderly population constitutes a bigger proportion in health expenditures per capita and the rate of increase in health expenditures is higher for this group as well.

It is not difficult to analyze the causes of elderly people's health expenditures. Aforementioned chronic diseases and additional care services for the elderly are the main reasons for this expenditure. In addition, due to the high drug consumption period, the new drug development studies of the pharmaceutical industry primarily focus on diseases related to the elderly, particularly cancer and cardiovascular diseases. R & D costs and market revenues in this area are attributed to health expenditures through the consumption of a large number of limited effective drugs by the elderly population. We have to keep in mind that the pharmaceutical industry producing drugs for chronic diseases creates increasingly significant power by managing an important source of finance and carries the risk of influencing the health system by means of drug consumption for its own interests.

In short, the dependence of the rapidly growing elderly population, the burden of chronic illness, and the service areas required for this population will cause a significant increase in health expenditures. Even if this source might be provided in some way, the higher rate of increase in health expenditure per capita of the elderly population still threatens the sustainability. The fact that the elderly dependency ratio will reach to 15.1 in 2023 and to 37.4 in 2060 shows how difficult it is to generate resources in this area. Given the fact that our population is rapidly aging, we cannot solve the problem of old age in the natural course of health financing. Since health expenses might be shifted towards elderly groups because of their urgent health service needs, this situation constitutes the risk of neglecting other age groups or making concessions in collateral packages as well. Therefore, an extra "age budget" should be established in health financing by estimating the additional burden of aging. This means the need for new resources. We need to plan these resources separately for public health policies directed to healthy aging, health care for the elderly, care and social support services for them.

**REFERENCES**

Arensberg, M. B. (2018). Population aging: opportunity for business expansion, an invitational paper presented at the Asia-Pasific Economic Cooperation (APEC). Journal of Health, Population and Nutrition, 37(7): https://doi.org/10.1186/s41043-018-0138-0

Cutler, D. M., Meara, E. (1997). The Medical Costs of the Young and Old: A Forty Year Perspective. Prepared by National Bureau of Economic Research. Retrieved from https://www.nber.org/papers/w6114.pdf

Detels, R., Gulliford, M., Karim Q. A. and Tan C. C. (Ed.). (2015). Oxford Textbook of Global Public Health (6th ed.). New York, NY: Oxford University Press.

Evde Bakım Hizmetleri Sunumu Hakkında Yönetmelik (2005). T.R. Official Gazette (25751, 10 March 2005).

European Commission Eurostat. (2017). Summary methodology of the 2015-based population projections Technical note, (March). Retrieved from http://ec.europa.eu/eurostat/data/database

Fuchs, V. (1998). Health Care for The Elderly: How Much? Who Will Pay for it? Prepared by National Bureau of Economic Research. Retrieved from https://www.nber.org/papers/w6755.pdf

Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü. (2014). Türkiye Nüfus ve Sağlık Araştırması 2013. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, T.C. Kalkınma Bakanlığı ve TÜBİTAK, Ankara, Türkiye.

Halter, J. B., Ouslander, J. G., Studenski, S., High, K. P., Asthana, S., Supiano, M. A., Ritchie, C. (Ed.). (2017). Hazzard's Geriatric Medicine and Gerontology (7th ed.). New York, NY: McGraw-Hill Education

Hui, D., De La Cruz, M., Mori, M., Parsons, H. A., Kwon, J. H., Torres-Vigil, I., Kim, S. H., Dev, R., Hutchins, R., Liem, C., Kang, D. H., Bruera, E. (2013). Concepts and definitions for "supportive care," "best supportive care," "palliative care," and "hospice care" in the published literature, dictionaries, and textbooks. *Supportive Care in Cancer*, *21*(3), 659-685. https://doi.org/10.1007/s00520-012-1564-y

Kim, K., Antonopoulos, R. (2011). Unpaid and Paid Care: The Effects of Child Care and Elder Care on the Standard of Living. Working Paper No. 691. Retrieved from http://www.levyinstitute.org/pubs/wp_691.pdf

Kleinberger T., Becker M., Ras E., Holzinger A., Müller P. (2007) Ambient Intelligence in Assisted Living: Enable Elderly People to Handle Future Interfaces. In: Stephanidis C. (eds) Universal Access in Human-Computer Interaction. Ambient Interaction. UAHCI 2007. Lecture Notes in Computer Science, vol 4555. Heidelberg, Berlin: Springer

Kuhlmann E. (2006). Modernising Health Care: Reinventing Professions, The State and The Public. Bristol: The Policy Press

Ministry of Health (2010). Sağlık Bakanlığınca Sunulan Evde Sağlık Hizmetlerinin Uygulama Usul ve Esasları Hakkında Yönerge

Mirel, L.B., and Carper, K. Trends in Health Care Expenditures for the Elderly, Age 65 and Over: 2001, 2006, and 2011. Statistical Brief #429. January 2014. Agency for Healthcare Research and Quality, Rockville, MD. Retrieved from https://meps.ahrq.gov/data_files/publications/st429/stat429.pdf

Poor, B., Poirrier G. P. (2000) End of Life Nursing Care. Sudbury, MA: Jones and Bartlett Publishers.

Porta, M. (Ed.). (2014) A Dictionary of epidemiology (6th ed.). New York, NY: Oxford University Press

Simmers, L., Nartker, K. S., Kobelak, S., S. (2009) Diversified Health Occupations (7th ed.). Delmar: Cengage Learning

Turkish Statistical Institute (2018). Elderly Statistics, 2017 [Press Release]. Retrieved from http://web.turkstat.gov.tr/PreHaberBultenleri.do?id=27595

Turkish Statistical Institute (2018) Life Tables, 2015-2017 [Press Release]. Retrieved from http://web.turkstat.gov.tr/PreHaberBultenleri.do?id=27591

Turkish Statistical Institute (2018). Population by years, age group and sex, 1935-2018. Retrieved from http://web.turkstat.gov.tr/UstMenu.do?metod=temelist

Turkish Statistical Institute (2018) Population Projections, 2018-2080 [Press Release]. Retrieved from http://web.turkstat.gov.tr/PreHaberBultenleri.do?id=30567

Turkish Statistical Institute (2018). Statistics on Child, 2017 [Press Release]. Retrieved from http://web.turkstat.gov.tr/PreHaberBultenleri.do?id=27596

Turkish Statistical Institute (2018) The Results of Address Based Population Registration System, 2017 [Press Release]. Retrieved from http://web.turkstat.gov.tr/PreHaberBultenleri.do?id=27587

United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, Key Findings and Advance Tables. Working Paper No. ESA/P/WP/248

World Health Organization (2011). Global Health and Aging Retrieved from https://www.who.int/ageing/publications/global_health/en/

World Health Organization (2015). World report on ageing and health. Retrieved from https://www.who.int/ageing/events/world-report-2015-launch/en/

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# The Correlation Analysis of Relative Values of Drugs and the Health Service Tariffs in Private Health Insurance System in Turkey

Gizem GENÇYÜREK[1]
İlker KÖSE[1]

**ABSTRACT**

Diagnostic Related Groups (DRG) is used to classify patients/cases that have similar services in the treatment as they have similar diagnoses. The costs of qDRG cases are represented by a numerical value called "relative value". Initially developed for grouping hospital costs on the basis of diagnosis, DRG started to be taken as reference widely by insurance companies in the case based payment model. The first study about the DRG in Turkey was initiated in 2005 with public-university cooperation and has carved an important role in the global budget implementation of Ministry of Health (MoH) since 2009 using the Australian DRG model. However, any work related to the DRG in the private health insurance sector in Turkey has not been conducted. The payments of private hospitals by the private insurance companies are based on the pay for service payment model and the service prices are calculated mostly considering the minimum wage tariffs of the Turkish Physicians Association (TPA). Although some arrangements have been done on the relative values by the MoH regarding the wages in the public sector; there has been no study of how the relative values are in line with the prices in private hospitals. This study aims to measure the correlation between the DRG relative values of Turkey and the health care service prices that private hospitals charge to private

1 İstanbul Medipol University, Beykoz, Istanbul, Turkey
Corresponding author: G. Gençyürek, ggencyurek@medipol.edu.tr

health insurance companies. The data set gathered by CompuGroup Medical in a TUBITAK project includes the damage files and their corresponding DRGs. The correlation between damage amounts and relative values of 2.144 files is measured as 0,41. Secondly, the correlation between the average damage amounts of 235 DRGs and the relative value was also measured as 0.43. Thus, the relationship between the health care service prices of the private hospitals charged to private insurance companies and the DRG relative values used by the MoH has been measured to be weak.

**Keywords:** Diagnosis Related Groups, Turkish Medical Association, relative value, correlation analysis.

## INTRODUCTION

From the first civilizations in the world, until this time, health services have always in existance. It has been observed that the services, which were previously focused on physicians and nurses, have been transformed since the second half of the twentieth century, gaining a size between sectors and professions ( İstanbulluoğlu, Güleç & Oğur, 2010).

Health financing can be defined as the creation of the resources necessary to meet the costs that result from health services (Uğurluoğlu, Özgen, 2008). The basic resources are used to meet the health costs; taxpayers, social health insurance premiums, private health insurance premiums, individual medical savings accounts, out-of-pocket payments, debts and donations (Cutler, Reber, 1998).

According to the reimbursement model in a country and the health insurance of the person receiving the service, payment is made from the service provider from appropriate sources.

Common and accepted payment models are (Lilford, Brown CA, Nicholl, 2007):

1.Fixed budget-based payment
2.Pay per transaction
3.Pay per person
4. Pay per case
5. Result-based payment

Deciding which health reimbursement models are used in a country is one

of the most important issues in managing the country's health budget. However, this decision is not merely a matter of financial management, but rather an element that affects the performance and quality of the service offered (Tatar, 2011).

**DRG Practice in the World**

Diagnosis Related Groups is a case-based payment model. Based on clinical and demographic data of the patients, they are grouped according to cost-based systems (Cesur, 2015).

The DRG System was first used in 1973 by Yale University researchers in the United States for hospital cost and quality control. Most of the developed countries have also been the main intermediaries of the hospital reimbursement system (Aktulay, 2009), (Busse, Schreyögg, Smıth, 2006), (Sarı, 2017). This system, which was initiated in 1973, used the updated version of ICD 9-CM because of the complexity of their health systems, although it was originated by US-Yale University.

Since the 1990s would be, other countries in this area have begun to come to the forefront. Scandinavian countries since the mid-1990s; Sweden, Norway, Denmark, Estonia, Latvia, Finland, Iceland have established Scandinavian patient classification system as "NordDRG". The first version was completed in 1996 and is updated every year.

Nord-DRG = (794 DRG GROUP).

Each country can use the DRG system for different purposes. These aims can be considered as the creation of hospital budgets, the calculation of costs, the development of health policies, the planning and researching, the improvement of service utilization, the increase of transparency level (Arık, 2016).

**DRG Practice in Turkey**

DRG work in Turkey at Hacettepe University Research Project (HUAP) started in 2005 as a sub-project (Akdağ, 2011).

The relative values of the 661 Diagnostic Related Group produced after the cost analysis study conducted in 81 hospitals in the pilot study carried out in Turkey DRG are taken into account (Tükel, 2010).

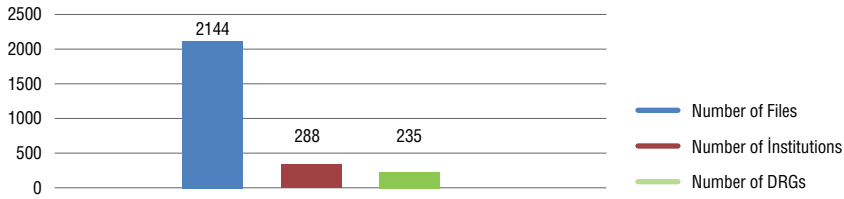
### The Health Service Tariff of Turkish Medical Association

Another wage scale used in Turkey was a published tariff used by the Turkish Medical Association (TMA), showing doctors's tariff charges and practice principles. This tariff, which is mainly used for physician services in private hospitals, is a basis for the payment of private health insurances and private hospitals. The wage is calculated by multiplying the general coefficient determined twice a year by the unit value determined for each medical procedure, separately for each province, and adding the 8% VAT (Turkish Medical Association Medical Practices Database, 2017). According to the agreement between the insurance company and the private hospital, this amount is multiplied by another coefficient to determine the final fee.

## METHODOLOGY

The total number of files in the study, the number of different DRGs and different hospitals are shown in the graph below:

**Number of files on DRG basis**




### Data Gathering

The data set in the study used the damage files that were transferred to the electronic centers of the insured who received the hospital treatment services for the underwriting of the patients under the TEYDEB project number 3110186 of CompuGroup Medical (CGM) (hereinafter referred to as Company). These files do not contain the identity information of the insured person, only the damage file information is included. The Company provides a wide range of private health insurance companies with the provision, compensation, risk assessment, etc. is a third-party service provider that offers services. For this reason, it can give provision of pharmacy and hospital provision, both through the call

center; and electronically as provision. Therefore it can manage this data. In this study, the data for 2012 were have been reviewed and the results were analyzed.

**Determination of DRG Code and Relative Value of Damage Files**

A total of 2,144 hospitalized treatment injury files were reviewed by a physician who was also a company employee, and the Ministry of Health's data set (diagnosis, procedures, length of stay, etc.) sent to the DRG system was determined. This data set was recorded in the Ministry's on-line DRG system and the Ministry of Health's DRG code for the relevant damage file was learned and the relative value of this TIG code and the MDC group that included this DRG were noted. At this point, the basic information of the damage file at hand can be added to the DRG code of the relevant file. The final set of data obtained is as follows:

1. Hospital Type (A, B)
2. Damage Date
3. Amount of Loss (TL)
4. MDC Code
5. DRG Code
6. Relative Value
7. Length of Stay (days)

**Creating a Summary Table**

From the data set obtained, the following indicators were calculated for each DRG group through the analysis screens developed with Qlikview™ Personal Edition:

1. Total Number of Files
2. Minimum Damage Amount (TL)
3. Maximum Damage Amount (TL)
4. Average Amount of Damage (TL)
5. Standard Deviation (Damage Amount, TL)
6. Total Damage Amount (TL)
7. Minimum Admission Time (Days)
8. Maximum Sleep Time (Days)
9. Average Sleep Time (Days)

**Correlation Analysis**

Correlation Analysis the measure of the relationship between the two variables and varies from -1 to +1 (Köse, 2018).

Regarding the strength of the correlation coefficient, the following definitions have been made;

0.01 - 0.25 Very weak relationship

0.26 - 0.49 Weak relationship

0.50 - 0.69 Intermediate relationship

0.70 - 0.89 High relationship

0.90 - 1.0 Very high correlation

Two different correlation analyses ere performed in our study. In the first place, a correlation analysis was conducted between the payment amounts of 2,144 claim files for which the hospital requested payment from the insurance company for the health services provided by the private hospitals by the private health insurance companies and the DRG values for which the same files correspond.

In this analysis, separate correlation analysis for a different number of damaged files per DRG is examined and how the correlation with the increase in the number of files is measured.

In the second analysis, the correlation between the mean values of the damage files corresponding to 235 different DRG groups and the relative values of these DRG groups was calculated.

Finally, a third analysis was carried out and a correlation analysis was performed between the relative values of a set of DRG heights corresponding to the MDC groups.

**RESULTS**

**Correlation Analysis between Claims Amount and Relative Value**

The correlation between the damage amount of 2,144 damage files in our datum and the corresponding values of the corresponding DRG group in the same file was found as 0,4135. This value shows us that the power of the correlation coefficient is “weak”.

The low correlation between the damage amounts and the relative values of all the damage files made us think that it would be useful to do the same

correlation analysis for each MDC group as well. When we divide the data set for each MDC group in this framework into sub-clusters and re-analyze the correlation between the damage amounts and the relative values, the following tabular values are obtained:

**Table 1:** Correlation Analysis between Claims Amount and Relative Value

| MDC Group | Number of DRG | Number of Files | Correlation Value | Correlation Coefficient Power |
|---|---|---|---|---|
| MDC - 01 Nervous System Diseases | 13 | 45 | 0,78 | High relationship |
| MDC - 02 Eye Diseases | 14 | 84 | 0,30 | Weak relationship |
| MDC - 03 ENT and Mouth Disorders | 16 | 388 | 0,46 | Weak relationship |
| MDC – 04 Respiratory System Diseases | 16 | 221 | 0,44 | Weak relationship |
| MDC - 05 Circulatory System Diseases | 18 | 60 | 0,22 | Very weak relationship |
| MDC - 06 Digestive System Diseases | 28 | 271 | 0,37 | Weak relationship |
| MDC - 07 Hepatobiliary System and Pancreas Diseases | 11 | 59 | 0,09 | Very weak relationship |
| MDC - 08 Musculoskeletal and Connective Tissue Diseases | 29 | 184 | 0,46 | Weak relationship |
| MDC - 09 Skin, Subcutaneous (Subcutaneous) Tissue and Breast Diseases | 14 | 285 | 0,52 | Intermediate relationship |
| MDC - 10 Endocrine, Nutritional (Nutrition) and Metabolic Diseases | 9 | 51 | 0,67 | Intermediate relationship |
| MDC - 11 Kidney and Urinary Tracts (Urinary Tract) Diseases | 11 | 73 | 0,29 | Very weak relationship |
| MDC - 12 Male Reproductive Organs Diseases | 9 | 19 | 0,74 | High relationship |
| MDC - 13 Female Reproductive Organs Diseases | 10 | 139 | 0,41 | Weak relationship |
| MDC - 14 Pregnancy, Birth and Puerperium | 8 | 177 | 0,34 | Very weak relationship |
| MDC - 15 Newborn (and Other Neonates) | 3 | 21 | 0,15 | Very weak relationship |

| MDC Group | Number of DRG | Number of Files | Correlation Value | Correlation Coefficient Power |
|---|---|---|---|---|
| MDC - 16 Blood and Blood making Organs and Immune Diseases | 4 | 5 | -0,7 | High relationship in a negative direction |
| MDC - 17 Neoplastic diseases (Hematological and solid neoplasms) | 6 | 7 | 0,37 | Weak relationship |
| MDC - 18 Infectious and Parasitic Diseases | 7 | 30 | 0,36 | Weak relationship |
| MDC - 19 Mental Health Disorders | 1 | 1 | - | Correlation cannot be analyzed |
| MDC - 21 Injuries, Poisoning, and Toxic Drug Effects | 5 | 20 | 0,58 | Intermediate relationship |
| MDC - 22 Burns | 1 | 2 | - | Correlation cannot be analyzed |
| MDC - 23 Factors Affecting Health and Other Types of Contacts Established by Health Services | 1 | 1 | - | Correlation cannot be analyzed |
| Leading-Major Diagnostic Classes | 1 | 1 | - | Correlation cannot be analyzed |

### Correlation Analysis According to Damage Number of Files Per DRG

The number of damage files that are common to DRG groups in our data set varies. The higher the number of damaged files per DRG, the healthier the average damage corresponding to the DRG is. Therefore, the results were obtained when we do the correlation analysis by taking the data set which is more than 1, 2, 3, 4 and 5, and the number of damage files per DRG is given in Table 2.

| Data set | Number of DRG | Number of Files | Correlation Value | Correlation Coefficient Power |
|---|---|---|---|---|
| All files | 235 | 2.144 | 0,4331 | Weak relationship |
| Damages with more than 1 file per DRG | 157 | 2066 | 0,6328 | Intermediate relationship |
| Damages with more than 2 files per DRG | 126 | 2004 | 0,6635 | Intermediate relationship |
| Damages with more than 3 files per DRG | 107 | 1947 | 0,6888 | Intermediate relationship |
| Damages with more than 4 files per DRG | 92 | 1887 | 0,6753 | Intermediate relationship |
| Damages with more than 5 files per DRG | 80 | 1827 | 0,4763 | Weak relationship |

**Table 2:** Correlation Analysis According to Damage Number of Files per DRG

### Correlation Analysis between Average Damage Amounts and Relative Value in DRG Groups

An analysis of the correlation between the damage amount of each damage file and the corresponding value of the DRG corresponding to the damage file gave us important information. However, since there may be a large number of damage files for the same DRG group, it has been evaluated that it is useful to perform a correlation analysis between the average damage amount of the damage files and the corresponding value of the DRG corresponding to the damage files, as well as the damage amount of each of the files. In this case, a correlation analysis was performed between the average damage amount and the relative values for 235 different DRGs.

In the calculation made, the correlation coefficient was found 0.4135 for 2.144 separate files and calculated as 0.4331 for 235 different DRGs. Although there is a slight increase as seen, the strength of the correlation coefficient is still in the “weak” class.

**Table 3:** Correlation Analysis between Average Damage Amounts and Relative Value in DRG Groups

| MDC Group | Number of DRG | Number of Files | Correlation Value | Correlation Coefficient Power |
|---|---|---|---|---|
| MDC - 01 Nervous System Diseases | 13 | 45 | 0,84 | High relationship |
| MDC - 02 Eye Diseases | 14 | 84 | 0 | No relationship |
| MDC - 03 ENT and Mouth Disorders | 16 | 388 | 0,31 | Weak relationship |
| MDC – 04 Respiratory System Diseases | 16 | 221 | 0,85 | High relationship |
| MDC - 05 Circulatory System Diseases | 18 | 60 | 0,14 | Very weak relationship |
| MDC - 06 Digestive System Diseases | 28 | 271 | 0,25 | Very weak relationship |
| MDC - 07 Hepatobiliary System and Pancreas Diseases | 11 | 59 | 0,04 | Very weak relationship |
| MDC - 08 Musculoskeletal and Connective Tissue Diseases | 29 | 184 | 0,40 | Weak relationship |
| MDC - 09 Skin, Subcutaneous (Subcutaneous) Tissue and Breast Diseases | 14 | 285 | 0,73 | High relationship |
| MDC - 10 Endocrine, Nutritional (Nutrition) and Metabolic Diseases | 9 | 51 | 0,67 | Intermediate relationship |
| MDC - 11 Kidney and Urinary Tracts (Urinary Tract) Diseases | 11 | 73 | 0,38 | Weak relationship |
| MDC - 12 Male Reproductive Organs Diseases | 9 | 19 | 0,77 | High relationship |
| MDC - 13 Female Reproductive Organs Diseases | 10 | 139 | 0,38 | Weak relationship |
| MDC - 14 Pregnancy, Birth and Puerperium | 8 | 177 | 0,84 | High relationship |
| MDC - 15 Newborn (and Other Neonates) | 3 | 21 | 0,60 | Intermediate relationship |
| MDC - 16 Blood and Blood making Organs and Immune Diseases | 4 | 5 | -0,11 | Very weak relationship in the negative direction |

| MDC Group | Number of DRG | Number of Files | Correlation Value | Correlation Coefficient Power |
|---|---|---|---|---|
| MDC - 17 Neoplastic diseases (Hematological and solid neoplasms) | 6 | 7 | 0,33 | Weak relationship |
| MDC - 18 Infectious and Parasitic Diseases | 7 | 30 | 0,56 | Intermediate relationship |
| MDC - 19 Mental Health Disorders | 1 | 1 | - | Correlation cannot be analyzed |
| MDC - 21 Injuries, Poisoning, and Toxic Drug Effects | 5 | 20 | 0,72 | High relationship |
| MDC - 22 Burns | 1 | 2 | - | Correlation cannot be analyzed |
| MDC - 23 Factors Affecting Health and Other Types of Contacts Established by Health Services | 1 | 1 | - | Correlation cannot be analyzed |
| Leading-Major Diagnostic Classes | 1 | 1 | - | Correlation cannot be analyzed |

In our study, we found a correlation value of 0.4331 for the analysis of 2.144 files and 235 diagnostic related groups. From this, we can say that the correlation between the healthcare prices of private hospitals charged to private insurance companies and the DRG relative values that the Ministry of Health is using is low.

## DISCUSSIONS AND CONCLUSIONS

Two different correlation analyses were conducted in our study in which we aimed to analyze the relationship between the relative values of the DRGs and the health service prices of private hospitals charged to private health insurance companies, as below.

### In the first analysis;

The correlation between damage amounts and the relative value was analyzed and the correlation between the damage amounts of 2,144 distinct claim files in our data set and the corresponding relative values of DRG of this file was found as 0,4135. This value has shown us that the correlation is weak.

**In the second analysis;**

It is aimed to analyze the correlation between the average damage amounts and the relative value of DRG Groups. For this purpose, a correlation analysis was performed between the average damage amount and the relative value for 235 different DRGs. The correlation coefficient of this analysis is calculated as 0,4331. This value has also shown us that the correlation is weak.

Although there is a slight change in the results of the analysis by going out of this way, when analyzing the correlation analysis by both methods; it has been determined that the correlation between the relative values of the DRG and the health service amounts paid by private health insurance companies to private hospitals is weak.

However, when we look at the correlation between the payment amounts and the corresponding DRG relative values for each MDC groups; the correlation was only high for 2 out of 23 MDC groups. Similarly, when we look at the correlation between the average payment amounts and the corresponding DRG relative values for each MDC groups; 6 out of 23 MDC groups have a high correlation. The remaining correlation coefficients vary from moderate, weak, or very weak.

However, the determination of the DRG provisions for these cases in private hospitals has been rather troublesome as each damage file needs to be recorded in the on-line DRG system of the MoH. For this reason, the number of samples that our study is based on can cover up to 2,144 damage files and up to 235 DRG groups. Additionally, the 235 DRG groups we analyzed and the MDCs they were included had a very meaningful and useful result. The most valuable information for the decision makers on the relative values of the DRGs is that the result of the Damage Amount / Relative Value section in the current data set is the determination of the DRGs that are too high or too low than the data set average. Further studies covering more of the DRG groups in subsequent investigations will further advance the benefits obtained here.

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**REFERENCE**

Akdağ R., ve ark. (2011). TİG Uygulama Rehberi, Tedavi Hizmetleri Genel Müdürlüğü, Performans Yönetimi ve Kalite Geliştirme Daire Başkanlığı, Ankara, s:9.

Aktulay, G. (2009). Sağlık Bakımı Yönetiminde Vaka Karması ve Tanı İlişkili Gruplar (Diagnosis Related Groups - DRG) Yöntemi, Makro Bakış, Sayı:9.

Arık Ö. (2016). İleri Y.Y. Sağlık Hizmetlerinin Finansmanında Türkiye'de Yeni Yaklaşım; Teşhis İlişkili Gruplar, SDÜ Sağlık Bilimleri Enstitüsü Dergisi.

Busse, R., Schreyögg, J., Smıth, P.C. (2006). Hospital Case Payment Systems İn Europe, Health Care Manage Sci /9:211-213.

Cesur, C. (2015). TİG'de Temel Kavramlar, TİG Klinik Veri Validasyon Eğitimi Ders Notu, Ankara, s:3.

Cutler, D. M., & Reber, S. J. (1998). Paying For Health Insurance: The Trade-off Between Competition and Adverse Selection. The Quarterly Journal of Economics, 113(2), 433–466.

İstanbulluoğlu, H., Güleç, M., & Oğur, R. (2010). Sağlık Hizmetlerinin Finansman Yöntemleri. Dirim Tıp Gazetesi.

Köse K. Korelasyon ve Regresyon Analizi http://file.toraks.org.tr/TORAKSFD23NJKL4NJ4H3BG-3JH/mse-ppt-pdf/Kenan_KOSE3.pdf Erişim tarihi: 02.02.2018

Lilford RJ., Brown CA., and Nicholl J. (2007). Use of Process Measures to Monitor The Quality of Clinical Practice. BMJ; 335: 648-650.

Mehtap, Tatar (2011). Sağlık Hizmetlerinin Finansman Modelleri: Sosyal Sağlık Sigortasının Türkiye'de Gelişimi. Sosyal Güvenlik Dergisi.

Sarı, N. Teşhise Dayalı Ödeme Sistemlerinin Sağlık Sektör Reform Tartışmalarına Yansımaları. http://homepage.usask.ca/~sari/SariBookChapter.pdf Erişim Tarihi: 10.09.2017.

Tükel R. (2010). Sağlıkta Dönüşümde Son Aşamaya Doğru: Hastanelerin Yeniden Yapılandırılması ve Yeni Finansman Modeli,Toplum ve Hekim.

Türk Tabipleri Birliği Hekimlik Uygulamaları Veritabanı. http://huv.ttb.dr.tr/loginform.php Erişim Tarihi: 21.10.2017.

Uğurluoğlu, E., & Özgen, H. (2008). Sağlık Hizmetleri Finansmanı ve Hakkaniyet. Hacettepe Sağlık İdaresi Dergisi, 11(2), 133–159.

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# Innovative Methods and Learning Techniques Used to Improve the Quality of Education in Slovakia in Nursing

Gabriela Kuriplachová[1]
Anna Hudáková[1]
Dagmar Magurová[1]

**ABSTRACT**

The university education system in nursing is currently strengthened by the European directives, enhanced by the adoption of the Bologna Declaration and implemented into the curriculum of university institutions in Slovakia. In the process of learning in nursing, various methods and techniques are used to improve the quality of the education. The aim of the paper is to present the structure of selected innovative learning methods and techniques used at the Faculty of Health Care University of Presov in Presov. According to new accreditation of the nursing study programme, the followings are used in the 1st and 2nd degree of learning: Workshop, Educational plan, Nursing process, Managerial diary, Ishikawa diagram and SWOT analysis. In the 1st degree of learning, the Nursing Process and Educational Plan are often used, and in the 2nd degree of learning, the Managerial Diary is often used. Each method or technique represents a different workload for the student. This workload and the amount of work spent on the student is taken into account in the credit education system. In general, these methods improve the learning process in nursing in both degrees of education institution.

**Keywords:** Nursing, Innovative Methods, Learning Techniques, Student's Workload.

1 University of Presov, Faculty of Health Care in Presov, Slovakia
Corresponding author: G. Kuriplachová, gabriela.kuriplachova@unipo.sk

## INTRODUCTION

The current education in Slovakia in nursing is influenced by the criteria of European Directives and reinforced by the Bologna Declaration. The profile of the study is implemented in the curriculum of the university institutions.

An important document in the development of the curriculum has been Directive 2005/36/EC and the current European Parliament Directive 2013/55/EU, which is binding on all Member States of the European Union. The Directive defines minimum requirements for the start of nursing training, a standard length of study at a university which lasts for at least 3 years and contains at least 4 600 hours of theoretical and clinical training. The Directive also contains information on the system for the recognition of professional qualifications in the EU.

Its aim is to create a single European platform for nursing education as well as to integrate nursing education into higher education systems, provide more flexibility in the labor market, liberalize services, promote automatic recognition of qualifications in a given profession, labor mobility and facilitate administrative procedures (Directive 2005/36/EC of the European Parliament; Öhlén et al., 2010).

### Aim of the Paper

In order to improve the quality of education in the nursing, various methods and techniques of learning are used. The aim of paper is to present the structure of selected innovative learning methods and techniques used at the Faculty of Health Care University of Presov in Presov, which are used in the 1st and 2nd degree of nursing education.

## METHODOLOGY

When selecting learning methods and techniques, it is necessary to know and consider the student's workload required to achieve specific learning outcomes. The credit system reflects the total amount of work required to successfully finish the entire year of study.

**Nursing Study Programme of the University Education in Slovakia**

In the historical context, nursing education in Europe has been influenced by the Bologna Declaration, the Munich Declaration, the World Health Organization (WHO), the International Council of Nurses (ICN), the European Guidelines and many others that currently emphasize the benefits of nursing and nursing education (Hanzlíková, 2011).

Nursing is a study programme, administered by the Ministry of Education, Science, Research and Sports of the Slovak Republic through which the graduate of the study programme gains the professional ability/qualification to practice the profession or is prepared to continue in following university studies (Hudáková et al., 2016).

The nursing study programme is compiled according to competencies of the Government Regulation No. 296/2010 Coll., Decree of the Ministry of Health of the Slovak Republic No. 364/2005 Coll. (now Decree No. 95/2018 Coll.) is amended.

Persuant to Act No. 131/2002 Coll. on Higher Education the professionally oriented bachelor study programmes of the 1st degree of university study are focused on the acquirement of theoretical and practical knowledge in case of an occupation performance based on a current state of science and art with the possibility to continue in university study of the 2nd degree (Act No. 131/2002 Coll.; Hudáková et al., 2016). The standard length of the 1st degree (bachelor study) of nursing study is 3-4 academic years in full-time and 4 academic years in part-time. In relation to European Directive, the study programme consists of minimum 4 600 hours, half of which is practical education and minimum of one third is theoretical education.

Clause 1 §53 of the Act No. 131/2002 Coll. quotes that the study programme of the 2nd degree is focused on the acquirement of theoretical and practical knowledge based on the current state of science, technology or art, management and on development of skills of their creative application in the exercise of the profession. The standard length of the 2nd degree (master study) of nursing study is 2-3 academic years in full time and 3-4 academic years in part-time.

A graduate of the 2nd degree of higher education can continue their studies

at university according to doctoral nursing study programme of the 3rd degree (Act No. 131/2002 Coll.; Hudáková et al., 2016).

According to European Directives 2005/36/EC, 2013/55/EU and Decree of the Government of the Slovak Republic No. 614/2002 Coll. on the Credit System, the minimum requirements for the content of nursing education in Slovakia are divided into 2 sections: theoretical disciplines (nursing disciplines, basic medicine disciplines and social science disciplines) and practical disciplines. Subjects of the nursing study programme are divided into: compulsory (comprise 75-80% of study programme), compulsory optional (comprise 15-20% of study programme), and optional (comprise 5% of study programme). Prerequisite subjects are very important subjects due to their content and their connection to other subjects which allow students to continue in their studies (Kuriplachová et al., 2014; Decree of the Government No. 614/2002 Coll.).

Methodology for theoretical and practical education in nursing study programme (of the 1st and 2nd degree) includes: Workshop, Educational plan, Nursing process, Case studies, Seminars, Reviews, Quizzes, Online assessment, Managerial diary, Research papers focusing on student comprehension, Projects focusing on the development of student knowledge and skills, Ishikawa diagram, SWOT analysis and other (Hudáková et al., 2016). Some of them are being used at the Faculty of Health Care University of Presov in Presov in order to improve the educational process at the institution.

## The Credit System and Student's Workload in Nursing Study Programme at the Faculty of Health Care University of Presov in Presov

Completing the course, seminar, module, etc. the student gets a set number of ECTS credits. Each ECTS credit represents the amount of student's workload accomplished in that period of time. The Credit Hour System proposes that 1 credit corresponds to 25–30 hours of total student working. It has been used for measuring the student workload, faculty workload, tuition, costs of the programme and funding. It was originally developed by the Carnegie Institute in America. This formula states that one hour of teaching in a classroom per week, for a total of 15 weeks, is equal to one credit hour. It is a standard metric in academic institutions all over the world. All that the credit hour sys-

tem describes is the "time" spent by a teacher teaching in a "class room" or with the student during the learning activities. Although the American Credit Hour System includes student activities to some extent, it is not a measure of the actual effort exerted by learners during learning (ECTS, 2009; Nosair, Hamdy, 2017; Weingarten, 2018).

In Slovakia, alternative educational credit frameworks have been evolving as a replacement for the traditional model. Among these innovative credit hour systems is the European Credit Transfer System (ECTS), which is a numerical descriptive value of qualification expressed in terms of student workload (ECTS, 2009). ECTS is an important element of the Bologna process, meant to help international students make the most of their study abroad experience (Weingarten, 2018). It is defined as "the number of working hours typically required to complete the learning activities of course units in order to achieve their expected learning outcomes" (ECTS, 2009). In this system, the total student's workload comprises „contact hours" with teacher and „non-contact hours" spent by students in their own self-study, completing course assignments and preparing for all types of exams, etc.

The standard student's workload for one academic year is total 60 ECTS credits in full-time study. For three years of standard study in Slovakia, it equals to 180 ECTS credits. Some examples of ECTS credits assigned per a degree type are: 1 academic year is 60 ECTS credits in total, 3 academic years of bachelor's programme is 180 ECTS credits in total, 2 academic years of master's programme is 120 ECTS credits in total. Not all ECTS credits are created equally. This means that usually a module or course with 10 ECTS credits has approximately twice the workload of a course with 5 ECTS. Study hours (also known as work hours) are estimated because the student can spend much more time on courses that are not so familiar and perhaps less on another course, which is precisely in his field of interest and expertise. This means that one of the 5 student courses may involve more work than 10 courses, even if it is on the same programme, and in the same university (Weingarten, 2018).

Practical courses require a higher workload than a theoretical courses. The higher number of ECTS credits means higher student workload. Therefore, according to the European Directives, the Faculty of Health Care University of Presov in Presov established the following number of ECTS credits in the

nursing study programme: 1 ECTS represents 25 hours of the student's workload for theoretical learning in total, 1 ECTS credit represents 30 hours of the student's workload for practical learning in total.

Every study subject of the nursing study programme is defined by a code and a name. All important information of the subject, goals and content of education, recommended literature, number of ECTS credits and student's workload which is calculated according to contact and non-contact hours are stated into Information sheet of subject. The Information sheet is published on the public portal of the educational institution. The Bloom's Taxonomy was used to set goals and results of education.

## RESULTS

### Innovative Methods and Techniques of Learning in Nursing

In table 1, the authors describe innovative learning methods and techniques for improving the quality of education related to the student's workload.

**Table 1:** Examples of student's workload in nursing study programme

| Methodology | Definition and description of structure of methodology | Student's workload | Degree of study in nursing |
|---|---|---|---|
| **Workshop** | A workshop is a form of educational activity, whereby instructor / assistant prepares a topic, objective and programme. The student, through various techniques (brainstorming, feedback) and by using their own knowledge and experience, acquires skills that will be used in practice. Workshop contents this structure: introduction, the main topic of workshop and conclusion.<br>During the workshop the instructor / assistant organizes, supervises and helps students with the course.<br>The workshop is meant to deepen already acquired knowledge and skills. The output of the workshop is to fulfil the conditions of the specified topic and objective. The workshop does not have a theoretical component, it is assumed that the student has a theoretical basis and is able to transfer theoretical knowledge into practical skills and it therefore calls for active cooperation among the participants of the workshop.<br>A workshop can be prepared on the basis of various scientific or professional topics. It is recommended to be prepared for approximately 60 minutes (one topic) with an optimal number of 25 participants. | Preparation and realization of a workshop on a professional topic (15 hours of student´s workload).<br><br>Preparation and realization of a workshop on a scientific topic (30 hours of student´s workload). | 1st, 2nd |

| | | | |
|---|---|---|---|
| **Educational plan** | The educational plan is part of complex nursing care. Educational plan is planned by at least 2 participants - the student and patient. The goal of education is to set up an educational plan that will lead participants to acquire new information and skills related to treatment and nursing care.<br>The structure of the educational plan consists: introduction - short description of the patient's health problems, main part - educational process (1. assessment: finding the patient's field of learning, assessment of the patient's ability to learn, 2. diagnostics: determination of educational-knowledge diagnoses, 3. planning of the educational process: educational meetings (educational topic, goal and final criteria of educational meetings, curriculum, form and methods of education etc.), 4. realization of the educational process, 5. assessment of the knowledge of patient as the effectiveness of the educational plan), final - overall evaluation of individual meetings (evaluated by student and patient), list of used references (recommended to use the Harvard system), annex - contain the material used in the education process (Meško et al., 2005; Magurová, Majerníková, 2016). | Elaboration of the educational material (5 hours of student´s workload).<br><br>Elaboration of the educational plan (10 hours of student´s workload.<br><br>Visual presentation of the educational plan in Microsoft PowerPoint 12-14 slides (5 hours of student´s workload). | 1st, 2nd |
| **Nursing process** | The nursing process is a systematic and rational method of planning and providing nursing care. Its goal is to evaluate patients' health status, actual or potential health care issues, set out plans for needs assessment and provide specific nursing interventions to meet these needs.<br>The nursing process consists of a series of five steps - phases. The five-step process consists of: 1. assessment, 2. nursing diagnosis, 3. planning, 4. realization of process, 5. evaluation.<br>1st phase – Assessment - it includes data collection and validation and is necessary for the nursing diagnosis.<br>2nd phase – Nursing diagnostics – the diagnostic process is a process of analyzing and synthesizing the acquired knowledge, using a variety of thought processes, such as objectivity, critical thinking, decision making, inductive and deductive judgment.<br>3rd phase – Planning – the nursing planning is a process of setting out nursing strategies or interventions to prevent, reduce or eliminate patient health problems that have been identified and evaluated during the diagnostic phase.<br>4th phase – Implementation - implementation is focused on implementing or intervening and implementing nursing strategies recorded in nursing care plans.<br>5th phase – Evaluation -<br>Evaluating nursing means finding out if the goals have been achieved and to what extent. Evaluation is a very important aspect of the nursing process because its conclusions determine whether nursing interventions should be terminated, resumed, revised or changed (Kozierová et al., 2004; (Derňárová, Rybárová, 2008). | Elaboration of the 1st phase of the individual nursing care plan in the patient (10 hours of student´s workload).<br><br>Elaboration of the 1st-3nd phase of the individual nursing care in the patient (15 hours student´s workload).<br><br>Elaboration of the 1st-5th phase of the individual nursing care in the patient (20 hours of student´s workload). | 1st, 2nd |

| | | | |
|---|---|---|---|
| **Managerial diary** | The aim of the managerial diary is to demonstrate the students' knowledge in managing nursing teams at the individual levels of the manager. The requirements and level of the managerial log are determined and directed by the teacher.<br>The structure of the management diary consists: introduction – characteristics of management, functions and roles of manager, managerial skills, manager personality, main part – plan of the managerial diary: organization and work system of the department/ hospital, competencies of nurses by job classification, health documentation analysis, audit, standards, SWOT analysis of selected department, topics of nurses seminars, diagnosis of causes and consequences using the Ishikawa diagram and other, suggestions for improvement of work, conclusion - a brief assessment of clinical practice (benefit for the student, healthcare facility, etc., list of references and annex (Meško et al., 2005). | Development of a managerial diary using at least 2 references - domestic or foreign (10 hours of student´s workload).<br><br>Development of a managerial diary including the Ishikawa diagram, using at least 2 references - domestic or foreign (15 hours of student´s workload).<br><br>Development of the managerial diary including the Ishikawa diagram and SWOT analysis using at least 2 references - domestic and foreign (20 hours of student´s workload).<br><br>Visual presentation of the Microsoft PowerPoint 12-14 slides (5 hours of student´s workload).<br><br>Verbal presentation of the managerial diary by student (5 hours of student´s workload). | 2nd |

| | | | |
|---|---|---|---|
| **Ishikawa diagram** | The Ishikawa diagram is a technique for identifying causes or to solve problems. It was made by Kaoru Ishikawa (in Japan).<br>The purpose of this technique / tool is to enable graphically to visualize the connection between the problem and its causes or solutions. When defining the problem ("fishing head") it is possible to find its components, i.e., to identify the causes of the existing problem and to create the framework for further problem analysis (Vančíková, 2001; Turek, 2009). | Graphic processing of the Ishikawa diagram on a selected topic (5 hours of student´s workload). | 2nd |
| **SWOT analysis** | SWOT analysis is a comprehensive method of qualitative evaluation of the functioning of the organization (Turek, 2009; Zaujec, 2010).<br>The aim of this method is to achieve the classification and evaluation of factors affecting quality, divided into four basic groups: strengths (S) and weaknesses (W) aspects of the organization, opportunities (O) and threats (T) of the organization (Miláček, 2002; Turek, 2010). | Development of SWOT analysis based on selected topic (5 hours of student´s workload). | 2nd |

## DISCUSSIONS AND CONCLUSIONS

Nursing includes the promotion of health, prevention of illness, care of ill, disabled and dying people. Nursing provides nursing care to individuals of all ages, families, and communities. It requires professional access and professional education from nurses. The current system of nursing education is guided by European Union Directives and its valid legislation in Slovakia requires the use of innovative methods in education. In general, these training methods streamline and improve the education process at educational institutions.

**REFERENCES**

Act of the National Council of the Slovak Republic No. 131/2002 Coll. on Higher Education and on Amendments and Supplements to Certain Acts as amended by later regulations. (2002). doi: https://www.portalvs.sk/zz-2002-131-20160101.pdf.

Decree of the Government of the Slovak Republic No. 614/2002 Coll. on the Credit System. (2002). doi: https://minedu.sk.

Derňárová, Ľ, Rybárová, Ľ. (2008). Potreby človeka a ošetrovateľský proces II. ISBN 9788080688592.

Directive 2005/36/EC of the European Parliament and of the Council on the recognition of professional qualifications. (2005). doi:http://eur-lex.europa.eu/legalcontent/SK/TXT/PDF/?uri=CELEX:32005L0036&from=EN.

ECTS User's Guide. (2009). European Credit Transfer and Accumulation System. Office for Official Publications of the European Communities. Brussels, Luxembourg. doi: http://ec.europa.eu/education/tools/docs/ects-guide_en.pdf.

Hanzlíková, A. (2011). Profesionálne ošetrovateľstvo a jeho regulácia. ISBN 9788080633608.

Hudáková, A., Kuriplachová, G., Magurová, D., Rybárová, Ľ., Andraščíková, Š. (2016). Nursing study programme in Slovakia focusing on the first degree of university education. In Mefanet Journal. 4(2): 87-92.

Kozierová, B., Erbová, G., Olivieriová, R. (2004). Ošetrovateľstvo 1. ISBN 8021705280.

Kuriplachová, G., Magurová, D., Hloch, S., Chattopadhyaya, S. (2014). Effectiveness of education in nursing. Dhanbad (India). ISBN 9789352120000.

Magurová, D., Majerníková, Ľ. (2016). Teoretické východiská edukácie v zdravotníckej praxi. ISBN 9788089721139.

Meško, D., Katuščák, D., Findra, J. et al. (2005). Akademická príručka. ISBN 8080632006.

Miláček, M. (2002). SWOT analýza. In Stavební technologie. doi: http://www.stavebnitechnologie.cz/view.php?cisloclanku=2002041701.

Nosair, E., Hamdy, H. (2017). Total Student Workload: Implications of the European Credit Transfer and Accumulation System for an Integrated, Problem-Based Medical Curriculum. In Health Professions Aducation. 3(2):99-107. doi:https://www.sciencedirect.com/science/article/pii/S2452301116300323.

Öhlén, J. et. al. (2010). Impact of the Bologna process in Bachelor nursing programmes: The Swedish case. In Nurse Education Today. 31(2). doi: http://ezproxy.cvtisr.sk:2057/science/article/pii/S0260691710000900?np=y&npKey=e1552c4acd8087ae840384ec53b7f5cdaec1dda681ad40120ff382dce9c2112b.

Turek, I. (2009). Kvalita vzdelávania. ISBN 9788080782436.

Turek, I. (2010). Didaktika. ISBN 9788080783228.

Vančíková, Z. (2001). Výber nástrojov a metód zabezpečovania kvality. ISBN 8080554692.

Weingarten, J. (2018). All You Need to Know about the European Credit System ECTS. Where to study. doi: https://www.mastersportal.com/articles/388/all-you-need-to-know-about-the-european-credit-system-ects.html.

Zaujec, A. (2010). PDCA. doi: http://blog.ttsystems.sk/index.php/manazerske-metody/44-pdca.

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# Advantages and Disadvantages of E-learning in Nursing Teaching

Gabriela Kuriplachová[1]
Gabriela Kováčková[2]
Dagmar Magurová[1]
L'udmila Majerníková[1]
Lucia Kendrová[1]

**ABSTRACT**

The current education trend in the world confirms the meaningfulness and relevance of e-learning integration into the academic and professional environment. Studies focusing on this form of education point to many benefits in nursing training for the profession. The main objective of this survey is to highlight the advantages and disadvantages of e-learning education in the healthcare teaching process. The survey has a character of overview investigation. The source of gathered information were citations of database PubMed, Medline and BMS, whose investigation ran from November 2017 to January 2018. Total 32 scientific and professional articles were used in the survey from the period 2002-2017. The studied group were students and teachers involved in the learning process through e-learning. E-learning education allows students to be independent and flexible in studying, to develop technical skills, critical thinking and cognitive skills. It empowers teachers to personal and professional growth, development of technical skills. However, e-learning is more effective when it is combined with direct contact of student and teacher/tutor. E-learning is a suitable complementary method of traditional education that current pedagogical practice requires.

**Keywords:** Nursing, E-learning, Education, Advantages, Disadvantages.

1 University of Presov, Faculty of Health Care in Presov, Slovakia
2 University Hospital of Louis Pasteur in Kosice, Slovakia
Corresponding author: G. Kuriplachová, gabriela.kuriplachova@unipo.sk

## INTRODUCTION

Today's modern society has seen a significant progress in the use of multimedia technologies in lifelong learning (Kozík, 2006). E-learning education is an education through information multimedia technology, which utilizes technical and socio-psychological way of conducting the teaching process in teacher/tutor and student relationship (Čepelová et al., 2011). According to some authors, such education helps students with independence, responsibility, flexibility, self-control, efficiency of education and with increasing informative literacy. It allows students to learn anywhere and any time (Pišútová et al., 2009; Kanuka, 2008; Meyer, 2014; Song, 2014).

The current education trend in the world confirms the meaningfulness and relevance of e-learning integration into the academic and professional environment. E-instrumentation as one of the means of e-learning is an exciting way of developing the broad-spectrum competencies of students and educators who have the ambition to continuously improve their work and make it more efficient (Kanuka, 2008).

## METHODOLOGY

The main aim of the study is to highlight advatages and disadvantages of e-learning in healthcare teaching process.

The survey has a character of overview investigation containing results of specialized articles and scientific studies focusing on nursing e-learning. The main source of gathered information were citations of database PubMed, Medline and BMS. The investigation ran from November 2017 to January 2018. The total 124 scientific and professional articles and studies were found.

Total 32 articles for the period 2002-2017 were suited for this survey. Attention was focused on the impact of e-learning education on students' knowledge and abilities, on the effectiveness and quality of the learning process that bring benefits to this education. The results were transferred into a table form.

## RESULTS

E-learning is an implementation of information technologies in the development, distribution and management for education or teaching. It represents modern educational technologies when transfer of information is

realized through on-line distance courses. Distance learning nowadays uses the Internet and high-tech equipment for classrooms and workplace, allowing flexible, independent and effective learning (Nemcová et al., 2010).

For students, e-learning is a practical and convenient form of information acquisition and an effective learning management and quality management tool. Such learning enables students to have a better understanding of interpretive texts, to consolidate knowledge and to link them to practice (Meyer, 2014).

From the economic point of view, it saves time and finances (Černák, Mašek, 2007). Electronic education is directly proportional to the interconnection of pedagogical, psychological and technical legislations. Without the acceptance of distance learning rules, it is difficult to succeed. The content of learning in the learning process generally consists of a great extent of knowledge and skills that a student should acquire. It is determined by a number of factors such as a type and focus of the education, learning subjects and so on (Závodná, 2002). The content is specified in the curriculum, education program and specialized standards (Turek, 2010; Petlák, 2016). The advantage of e-learning compared to traditional methods is also the ability to continuously complete and improve textbooks. E-learning education can take place in two lines, ie: off-line study (learning resources are located on data carriers – CDs, DVDs, USB keys, etc.) and on-line learning (learning materials, special electronic textbooks can be obtained through network communication resources – internet, intranet, websites, etc.) (Kalaš et al., 2010; Bednářiková, 2010). This online form of education allows discussion forums, real-time interviews, faster interaction and feedback (Zlámalová, 2008). However, study requires connection to network administrators' using mobile computers or mobile phones. E-learning education can be used as an additional learning support (Blended Learning) or as a separate distance learning using LMS (Learning Management System) software. Blended Learning is a combination of traditional teacher-led or tutoring, online teaching and structured work-based training run by qualified staff (Bednářiková, 2010). The success of online learning depends on the possibility of stimulating the dynamics of the virtual class (Jusczyk, Spyrka, 2003). Other benefits of e-learning are a quick and overview of planned topics and learning activities, more space for self-study, national and

international exchange of teacher's experience. Assessing is fast, automatic and does not depend on the location and time of assessment. The advantage is the ability to quickly and easily translate into educational content, adding content and feedback to related subjects (Bednářiková, 2010). By combining various means, videos, computer simulations, multimedia textbooks, group discussions over the Internet and other learning methods that make the process attractive, physically disabled students have the opportunity to learn, develop their imagination, creativity, critical and logical thinking (Nemcová et al., 2010; Jusczyk, Spyrka, 2003; Kvizda, 2004; Liba, 2016). Within the quality of education, it is appropriate to combine this learning technology with the direct contact of participants in the learning process (Černák, Mašek 2007; Zahra et al., 2016). Teachers need to be professionally and technically trained for on-line education. There are not always sufficient supportive technical and organizational structures for the given course (Bednářiková, 2010). The course program can often be created based on author's point of view, rather than the learners', which may appear to be a disadvantage of such learning (Bednářiková, 2010). The advantages and disadvantages of e-learning education are shown in Tables 1-2.

**Table 1:** Overview of studies focusing on advantages of e-learning education in nursing

| Study | Aim of study | Description | Results |
|---|---|---|---|
| Green JK, Huntington AD, 2017 | Expectations from E-learning education in clinical conditions. | 6 target groups monitored for 16 months. | It improves student's knowledge and skills through different courses. Student contacting with a virtual patient will teach them to handle unexpected situations. An effective way to educate a student (beginner) in clinical conditions. Auxiliary supplement to the traditional education. |
| Jarošová, D, 2002 | Impact of e-learning education on level of students' knowledge. | Nursing students. | Effective self-study using high-quality multimedia materials. Study of a large number of people at once. Evaluating a level of student's knowledge during the learning process. |

| | | | |
|---|---|---|---|
| Hajžmanová, L, 2016 | The impact of e-learning on students' abilities. | Nursing students | Active access to information for students. Developing students' cognitive abilities (better memorizing and learning of theory). Better teamwork and effective communication between student-teacher in nursing. |
| Härkänen M, Voutilainen A, Turunen E, Vehviläinen-Julkunen K, 2016 | Quality and effectiveness of educational methods (simulations, presentations, posters, pamphlets) | 755 students tested in 14 simulation programs | Positive impact of all educational methods on developing students' abilities and skills. Blended Learning and Power Point presentation were the most effective. |
| Melba Sheila D´Souza, Subrahmanya Nairy Karkada, Ramir Castro, 2014 | Effectiveness of e-learning education in nursing | 50 teachers of year 1 at nursing university | Professional and personal development of a teacher. Developing technical skills and effeciently implemented teaching in nursing. Less time for a teacher to prepare for continuing education. |

Source: *authors*

**Table 2:** Overview of studies focusing on disadvantages of e-learning education in nursing

| **Study** | **Aim of study** | **Description** | **Results** |
|---|---|---|---|
| Jarošová, D, 2002 | The impact of e-learning education on level of student's knowledge | Nursing students | High financial costs at early stages of creating a course in nursing. |
| Ahmed, H. M. S., 2010 | Satisfaction of university students with online education. | 538 university students | Insufficient instructional characteristics. Required relevant selection of appropriate pedagogues for teaching. |
| Parker S, Mayner L, Michael Gillham D, 2015 | Impact of e-learning education on students' critical thinking. | Nursing students | Necessary consistent and structured leadership of students to critical thinking in regards to teachers in nursing. |

| | | | |
|---|---|---|---|
| Hajžmanová, L, 2016 | The impact of e-learning education on students' abilities. | Nursing students | The need to control technology and know how to use it effectively. |
| Melba Sheila D´Souza, Subrahmanya Nairy Karkada, Ramir Castro, 2014 | Impact of e-learning education in nursing | 50 teachers of year 1 at nursing university | Working overtime in the initial phase of creating an electronic course. The required technical skills of the teacher in the initial phase of the course |

**Universities Using E-learning Nursing Education**

Nowadays, e-learning education is becoming more and more popular in Slovakia and abroad. Studies focusing on this form of education point to many benefits, for example in the nursing training (Table 1). E-learning enables students to gain more formations and more insight into the issue through innovative methods of this learning process. Professional experience such as how to provide first aid for patients having myocardial attack or epileptic seizure, knowing how to respond appropriately in such situation help students gain that knowledge later during the practice. On-line discussions, blogs, wikis allow students to integrate into so called online community (Geraldine Macdonald, 2002). This type of education is commonly used abroad at University of Birmingham, aimed at educating future nurses. Simulation programs used for virtual student education at this university make a significant contribution towards expanding knowledge and manual skills of nursing students. The programs used are Virtual Case Creator, Virtuar and ComsLive. These programs include about 30 different interactive online simulations aimed at health of children, adults and seniors, prevention of chronic illness complications or falls of disabled patients, seniors and so on. Other world health universities using e-learning are located in Washington, Pittsburgh, Sydney etc. In Czech Republic it is the Silesian University of Opava and Ostrava University in Ostrava. In Slovakia there is Jessenius Medical Faculty in Martin, University of philosoph Constantine in Nitra, University of Joseph Safarik in Kosice and University of Presov. Distance study texts, ie. E-books, audiobooks, video recordings, online courses, videoconferencing, auto-corrective tests,

electronic link, virtual multimedia visualization and the like, increase student's work activity, autonomy, imagination and overall effectiveness of education (Bajtoš, 2013). E-learning courses are created by a group of programmers, graphic designers, pedagogues and other professionals that require students to have technical skills.

## DISCUSSIONS AND CONCLUSION

E-learning education provides students with an option of an individual pace of study, a space for exercise and feedback. It has a positive impact on the development of cognitive skills and the student's level of knowledge. E-learning provides students with an active approach to obtaining information and greater autonomy in a study that currently requires teaching practice. Nowadays, e-learning helps students to self-reflect, to be independent and allows them to be flexible in learning, learn anywhere and anytime (Kim et al., 2014). Using e-learning promotes student activity, creativity and autonomy (Beisetzer, 2006).

E-learning develops the broad-spectrum competence of students and educators who have the ambition to not only simplify their work, but also to improve it continuously. E-learning enhances information literacy and improves communication among participants, helping to move information faster (Lancková et al., 2011).

The effectiveness of e-learning is also clarified by Liba (2016), who states that the form of such learning stimulates cognitive and affective learning. This kind of education influences the internal motivation of students and teachers, the occurrence of creative impulses, such as collaboration with a teacher, where the teacher is understood as an advisor. Self-sufficiency and a peaceful learning environment support students' efforts to learn. As an advantage, Jusczyk, Spyrka (2003) presents the flexibility and convenience, the disadvantage of lack of direct interactions and the technical shortcomings of this training.

Creating e-learning courses in vocational nursing training creates conditions for building national, respectively transnational cooperation with educational institutions.

## Recommendations for Teaching Practice and Education

E-learning recommendations should focus on making this type of modern education more effective. Although the initial financial and time costs for creating a learning module are higher, educational institutions should prefer this learning.

The savings in administration and production of learning module content in e-learning, savings on travel costs for students, production of printed material and textbooks, on teachers and other of them are greater than in traditional education.

In the e-learning educational process, feedback from students is very important (Mosharraf, Taghiyareh, 2012). If an educational institution is to carry out effective education, students need more detailed feedback (Straková, 2015).

It is necessary also to approach students individually as there are great differences in the pace of learning and in the logical thinking of students. Teachers should rationally consider the pace of work of students. It is advisable for the more skilled students to add the work in such a way that they do not get too heavy or discouraged from studying (Pasternáková, 2011). Information that is communicated to students needs to be structured to be effective. When creating e-learning materials, knowledge should be categorized and analyzed in order to make learning easier for the student. Undergraduate preparation of future teachers requires increased attention to the development of socio-psychological skills of teachers (Čepelová et al., 2011).

**REFERENCES**

Ahmed, H.M.S. (2010). Acceptance Model: Learner Perceptions. doi: http://onlinelibrary.wiley.com/doi/10.1111/j.1540-4609.2010.00259.x/full.

Bajtoš, J. (2013). Didaktika vysokej školy. ISBN 9788080786526.

Bednářiková, A. (2010). E-learning ako metóda vzdelávania na vysokých školách. ISBN 9788080846251.

Beisetzer, P. (2006). Inovácia samostatnej práce edukantov počítačom ako zdroj zvyšovania efektívnosti edukačného procesu. In Súčasné trendy elektronického vzdelávania (2013). ISBN 9788055507453.

Čepelová, S., Heretik, A. Košťálová, L. (2011). Informačné – komunikačné technológie. In Medzinárodná vedecká konferencia pre doktorantov, vedeckých pracovníkov a mladých vysokoškolských učiteľov. Conference Proceeding. Presov (Slovakia). doi:

http://www.pulib.sk/elpub2/FHPV/Istvan1/pdf_doc/Zbornik_finalna_verzia.pdf.

Černák, I., Mašek, E. (2007). Základy elektronického vzdelávania. ISBN 9788080841713.

Geraldine Macdonald, G. (2002). Transformative unlearning: safety, discernment and comunities of learning. doi: https://www.nebi.nlm.nih.gov/pubmed/12199881.

Green, JK, Huntington, AD. (2017). Online professional development for digitally differentiated nurses. doi: http://www.nurseeducationinpractice.com/article/S1471-5953(16)30237-2/abstract.

Hajžmanová, L. (2016). E-learning jako součást profesní přípravy všeobecné sestry v oblasti praktické výuky. In Ratislavová, K. Cesta poznávání a vzdělávání v ošetřovatelství VII.

Härkänen M, Voutilainen A, Turunen E, Vehviläinen-Julkunen K. (2016). Systematic review and meta-analysis of educational interventions designed to improve medication administration skills and safety of registered nurses. doi: https://www.ncbi.nlm.nih.gov/pubmed/27138480.

Jarošová, D. (2002). Trendy v ošetřovatelství. doi: http://dokumenty.osu.cz/lf/uom/uom-publikace/trendy-iv-2006.pdf.

Jusczyk, S., Spyrka, L. (2003). Distančné vzdelávanie: konštruktívny prístup.
ISBN 8096879731.

Kalaš, I. et al. (2010). Moderné digitálne technológie v edukačnom procese. Ďalšie vzdelávanie učiteľov základných škôl a stredných škôl v predmete informatika.
ISBN 9788081180194.

Kanuka, H. (2008). Understanding e-learning technologies in practice through philosophies in practice. In Andreson, T. The theory and practise of online learning. Edmonton: AU Press, Athabasca University, Edmonton.

Kim, J.H., Park, Y., Song, J. and Jo, I.H. (2014). Predicting student's learning achievement by using online learning patterns in blended learning environment: comparison of two cases on linear and non-linear model in Proceeding of the 7th International Conference of Educational Data Mining. London.

Kozík, T. (2006). Virtuálna kolaborácia a E-learning. ISBN 9788080940539.

Kvizda, M. (2004). Koncepce celoživotního vzdelávání v rámci virtuální fakulty "eSF". In Distanční vzdělávaní v České republice. III. národní konference. Conference Proceeding. Prague (Czech Republic).

Lancková, M., Michalčíková, J. (2011). Z elementárnej propedeutiky pre študentov translatológie. doi: file:///C:/Users/Toshiba/Downloads/Lanckova.pdf.

Liba, J. (2016). Výchova k zdraviu v školskej edukácií. ISBN 9788055516127.

D´Souza, M.S., Karkada, S.N., Castro, R. (2014). Exploring e-learning among nurse educators in undergraduate nursing. doi: http://sciedupress.com/journal/index.php/jnep/article/view/3955.

Meyer, KA. (2014). Student Engagement in Online Learning: What Works and Why. doi:

http://onlinelibrary.wiley.com/doi/10.1002/aehe.20018/abstract.

Mosharraf, M., Taghiyareh, F. (2012). Improving student success rates through a semi-personalized feedback system in Proceeding of the 11th European Conference on e-Learning: ECEL. Conference Proceeding. Prague (Czech Republic).

Nemcová, J., Hlinková, E. et al. (2010). Moderná edukácia v ošetrovateľstve. ISBN 9788080633219.

Parker, S., Mayner, L., Michael Gillham, D. (2015). E-learning for Critical Thinking: Using Nominal

Focus Group Method to Inform Software Content and Design. doi: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4733504/.

Pasternáková, L. (2011). Nové trendy pri zefektívňovaní výučby. doi:

http://www.unipo.sk/public/media/18250/Spr%C3%A1va%200o%20VVC%20za%20rok_%202013.pdf.

Petlák, E. (2016). Všeobecná didaktika. ISBN 9788081530647.

Pišútová, A., Gerber, K., Malovicová, J. (2009). Critical and Higher Order Thinking in Online Threaded Discussions in the Slovak Context. In The International Review of Research in Open and Distance Learning, North America. doi:

http://www.irrodl.org/index.php/irrodl/article/view/589/1174.

Straková, Z. (2015). Assesment in higher education. doi: http://www.tandfonline.com/doi/abs/10.1080/0969594X.2013.787970.

Turek, I. (2010). Didaktika. ISBN 9788080783228.

Zahra, A., Kanwal, F., Rehman, M., Bashir, K. (2016). An Empirical Investigation Of E-learning Adoption In Nursing Education Of Pakistan. doi: http://www.academia.edu/30927454/An_empirical_investigation_of_e-learning_adoption_in_nursing_education_of_Pakistan.

Závodná, V. (2002). Pedagogika v ošetrovateľstve. ISBN 8080631085.

Zlámalová, H. (2008). Distační vzdělávání a e-Learning. ISBN 9788086723563.

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# Home Health Care Patients and Their Caregivers' Requirements of Psychosocial and Spiritual Support for Better Health

Mehmet Akif SEZEROL[1]
Çağrı Emin ŞAHİN[1]
Mehmet Sait DEĞER[2]
Muhammed ATAK[3]

**ABSTRACT**

Home health care services must be integrative and aims to improve both the patients' and their relatives' health physically, socially and mentally. The aim of this study is to determine the psychological, sociological and spiritual support needs of the caregivers in home health care.

This is a cross-sectional study which was conducted in Istanbul between May and October 2016 among 139 caregivers with convenience sampling in 15 district. Caregivers were preferred instead of patients because of their health disadvantages. The survey was carried out face to face. Survey has two parts one of which is about patients and the other about caregivers. Survey was applied to 89 people who accepted the interview.

64.0% of patients receiving home health care are women. All patients except for one are covered by an insurance system. 61.8% of patients have their own income and assets. 93.3% of the patients do not receive disability salary. In addition, 80.7% of patients do not have a disability report. Neurological (31.9%) and cardiovascular system (24.9%) are the most common problems of home

1 General Directorate of Public Health, Health Threats Early Warning and Response Department, Ankara
2 Provincial Health Directorate, Central Community Health Center, Bingol
3 Provincial Health Directorate, Eyupsultan Central Community Health Center, Istanbul
Corresponding author: M. A. Sezerol, masezerol@gmail.com

health care patients. 84.3% of the caregivers are female. 61.8% of caregivers graduate primary school, 75.0% of them are married and 85.2% of them are unemployed. 92.1% of caregivers are first or second degree relatives of the patient. The duration of care doesn't exceed three years in 64.7% of individuals. Only 6,8% of caregivers receive the care fee provided by the government.
94.4% of caregivers were not trained in caregiving and 66.3% don't feel sufficient to give someone medical care. In addition, 56.2% of caregivers need psychological support and 23.6% need spiritual support.
It is observed that patients who receive home health services can't benefit from the social rights adequately provided by the government. Most of the caregivers need education in home health care. Also they need psychological, social and spiritual supports. Integrative home health care service models should be developed providing psychosocial and spiritual supports considering both patients and caregivers needs. Consequently, social workers, psychologists and spiritual support personels should be including more in home health care teams considering the social determinants of health.
**Keywords:** Home health care, psychosocial support, spiritual support

## INTRODUCTION

Health, as stated in the definition of the World Health Organization "is not the absence of disease or disability, but a state of physical, mental and social well-being". Health care plays an important role in ensuring and maintaining well-being. There are various approaches to addressing health care professionals in different dimensions. Presentation of holistic health care that the individual's physical, mental, emotional, social, cultural and spiritual dimensions are considered as a whole and each of these dimensions are related to each other is the most accepted approach (Baldacchino, 2015).

Home care is to provide health and social services to the patient in his / her own home or living environment by means of professional people in order to ensure the health of the individual, to improve the health level and to cure (Aslan, 2018). It can also be expressed as a care model that includes medical, psychosocial support and social services given by health and social service professionals or family members to elderly, physically disabled, bed-ridden, patients have chronic or malignant disease and need to long-term care. It also

provides rehabilitation of individuals in need of medical and social support in the environment they live helping them adapt to the community and live happily. Within the scope of home care services, preventive, treatment and rehabilitative health services should be provided effectively and continuously (Altuntaş, 2010).

The way in which the health care provider offers care services varies with home health services. Medical examination, treatment and rehabilitation services are offered by health professionals such as physicians, nurses, physiotherapists and psychologists. In this way, the need to stay in the health institution and the cost to the health institution is reduced and the healing process in the social life of the individual is accelerated (Öksüz, 2018). In a study conducted in Turkey, it was determined that 63.1% of the elderly prefer the health care at home. 86.5% of elderly people want to have health care while having families with them (Özer and Şantaş, 2012).

History of home care dates back to the ancient Roman period and began with the discussion of whether birth should be done at home or in the hospital. Home health services are perceived as social services, such as food and shelter, rather than medical, in order to prevent individuals from transmitting the disease to the society in the Middle Ages. As of the 19th century, home care services developed and spread in Western societies have reached the size of health assistance for those in need of care (Aksoy et al., 2015). Especially in the 20th century, the implementation of the concept of quality in health and the introduction of health services in the home have started. At the beginning of the century, home health services were limited to nursing services, it became quickly widespread with the introduction of American Medicare and Medicaid insurance systems in 1965 and including home care in their coverage (Ma et al., 2017). In Turkey, home health care services has started to be carried out in 2005 within the scope of "Regulation on Home Care Services Report". With this regulation, the responsibilities of private enterprises on this subject are determined. The Directive on the Implementation Procedures and Principles of Home Health Services presented by the Ministry of Health entered into force in 2010 and the system of home health care services was started systematically (Official Gazette, 2015).

Although the scope of home health services is mostly different from each

other, home health service is offered as for a short term or long term. Short-term home care services are usually limited to 30 days after medical service. Long-term home care is the case where both medical and social support and care services are provided to elderly, disabled and chronic patients for more than 6 months. The medical services of long-term patients are met with health units at home and their social care is provided by their family members. In the literature, home care services provided by experts or semi-experts from different professions are called formalcare, while home care services provided by family members or neighbors are called informal care (Dahlberg et al., 2017). Home care is part of public health services. However, long-term home care services are not provided by health professionals but mostly by non-professional family members. Conditions requiring long-term care such as chronic diseases, cancer and disability increase the physical and emotional needs of individuals. In addition, the social and spiritual needs of individuals in need of care are increasing. As spiritual needs are abstract and complex compared to physical ones, they are relatively difficult to measure. Defining the spiritual needs of the individual and providing appropriate care to meet this need is important for the peace and happiness of the individual (Burke et al., 2018). Research has shown that spiritual and psychosocial support are useful in preventing diseases, reducing pain and anxiety, fighting problems and improving quality of life. In a study on breast cancer, 88% of women with breast cancer stated that spiritual power/belief is important in combating disease (Daştan and Buzlu, 2010).

During the presentation of these services, some physical and psychological disturbances occur. Muscle skeletal system disorders occur in long-term caregiver families, in addition to some psychological disorders such as reduced capacity to deal with problems, anxiety, restlessness, loss of motivation and dissatisfaction. For this reason, it is important to provide spiritual and psychological support to those who receive or need home care and to their relatives who serve them. Although it is emphasized that spiritual and psychosocial care are important in holistic health care approach, current home care services are carried out mostly within the framework of medical services and they lack of the spiritual support. By providing the necessary spiritual support, both the family members who provide home care services and the care and home health

care services will be affected positively (Lawrence et al. 2016).

The aim of this study was to determine the need for social, psychological and spiritual support of caregivers of the patients who were given home health care services by Community Health Centers in Istanbul.

## METHODOLOGY

The study was conducted between 01.06.2016 and 30.10.2016 in Istanbul. Our research is a cross-sectional study. In May 2016, Community Health Centers provided services to 7.075 patients who were actively registered in 39 districts of Istanbul. The population of the research is composed of 7.075 citizens who are offered home health services by the Community Health Center. Within the scope of the research, convenience sampling method was used. Psychologists and social workers in Istanbul Health Directorate's home health coordination team were included in home health teams and visited 139 households in 15 districts. The caregivers of the patients were asked to be interviewed and could be allowed from 89 people.

A questionnaire form was prepared by the home health coordination team for psychologists and social workers before applying to the relatives of the patients. A total of 23 questions are included in the questionnaire. The first part of the questionnaire consists eight questions for patients receiving home health care. In the second part of the questionnaire, there are 15 questions for caregivers. In the first eight questions, the patient's sociodemographic characteristics and questions about the disease were included. The questions about caregivers were asked about sociodemographic conditions and caregiving.

The data in the questionnaires were entered into the excel database and evaluated with SPSS 21.0 programme. Since the questionnaires were implemented within the routine scope of service through the home health coordination center, no ethics committee permission was obtained. Informed consent was obtained from the relatives of the patients and permission was obtained from Istanbul Provincial Health Directorate for the use of the survey results. In descriptive statistics, categorical variables are expressed in numbers and percentages. Chi-square test was used for categorical variable analysis and statistical significance level was determined as $p < 0,05$.

## RESULTS

Caregivers of 139 patients who were visited within the scope of home health care services were interviewed. Permission was granted to conduct a questionnaire and 64% (n = 89) of the caregivers allowed face-to-face surveys. All questions about patients were answered by caregivers. The data of 89 people who agreed to participate in the study were examined.

Among the patients, 64.0% of them were female. When the social security coverage of the patients was examined, 93.2% of them have Social Security Institution (SGK), 5.6% have General Health Insurance (GSS) and 1.2% of them have not any social security. 61.8% of patients have their own income and assets. Persons with disabilities can benefit from the pensions provided under Law No. 2022 that "The Law on Monthly Salary to Need, Week and Ordeal Turkish Citizens above 65 years old". However, only 6.7% of patients benefit from this social support, called 2022 salary. The distribution of the sociodemographic characteristics of the patients and need of social support was given in Table 1.

**Table 1.** Distribution of patients according to some sociodemographic characteristics*

| **Gender** | **N** | **%** |
|---|---|---|
| Female | 57 | 64,0 |
| Male | 32 | 36,0 |
| **Social Security Status** | **N** | **%** |
| Social Security Institution | 83 | 93,2 |
| General Health Insurance | 5 | 5,6 |
| Have no insurance | 1 | 1,2 |
| **Own Income and Assets** | **N** | **%** |
| Have | 55 | 61,8 |
| Have not | 34 | 38,2 |
| **2022 Salary** | **N** | **%** |
| Have | 6 | 6,7 |
| Have not | 83 | 93,3 |
| **Total** | **89** | **100,0** |

* Questions were answered by caregivers.

The percentage of patients who do not have a disability report was 80.7% while the patients with disability reports was 19.3%. It couldn't be learned whether one patient had a disability report. 81.3% of those with disability reports have a disability rate of 70% and above. There are no patients with disability rate below 40%. The distribution of the patients according to their disability status and need of social support is shown in Table 2.

**Table 2.** Distribution of disability status of patients*

| **Disabled Report** | **N** | **%** |
|---|---|---|
| Have | 17 | 19,3 |
| Have not | 71 | 80,7 |
| **Disable Rate** | **N** | **%** |
| 40-69% | 3 | 18,7 |
| 70% and above | 13 | 81,3 |

* Questions were answered by caregivers.

Table 3 shows the distribution of people receiving home health care according to their diseases. Additional diseases associated with the main diseases (such as anemia, pressure wounds, visual and hearing problems) were included in the other category. Chronic illnesses were among the health problems of the service users. The most common causes of chronic diseases were neurological (31.9%) and cardiologic (24.9%) diseases.

**Table 3.** Disease distribution of people receiving care*

| Disease | N | % |
|---|---|---|
| Alzheimer's disease | 25 | 17,7 |
| Hypertension | 20 | 14,2 |
| Heart Failure | 15 | 10,7 |
| Diabetes Mellitus | 12 | 8,5 |
| Complete or partial stroke | 9 | 6,4 |
| Cancer | 9 | 6,4 |
| Parkinson's disease | 8 | 5,7 |
| Chronic Obstructive Pulmonary Disease (COPD) | 5 | 3,5 |
| Dementia | 3 | 2,1 |
| Muscular diseases | 2 | 1,4 |
| Osteoporosis | 2 | 1,4 |
| Other | 31 | 22,0 |
| **Total**** | **141** | **100,0** |

* Questions were answered by caregivers

** The respondents indicated more than one option.

The questions in the second part of the questionnaire were asked to caregivers. 84.3% of caregivers were female. 2.3% of caregivers aged 18-29, 18.3% between 30-41 years old, 28.8% between 42-53 years old, 36.8% between 54-65 years old, and 13.8% were over 65 years old. Age information of two people could not be obtained. 61.8% of caregivers were primary school graduates. The most common duration of care was between 0-3 years (64.8%). 74.2% of caregivers were married. In addition, 85.2% of the caregivers don't have any other job. 73.9% of the patients were the first degree relatives of the caregiver. The distribution of sociodemographic characteristics of caregivers is shown in Table 4.

**Table 4.** Distribution of sociodemographic characteristics of caregivers

| **Gender** | **N** | **%** |
|---|---|---|
| Female | 75 | 84,3 |
| Male | 14 | 15,7 |
| **Marital Status** | **N** | **%** |
| Married | 66 | 74,2 |
| Single | 23 | 25,8 |
| **Work Status** | **N** | **%** |
| Worker | 13 | 14,8 |
| Not worker | 75 | 85,2 |
| **Age** | **N** | **%** |
| 18-29 years | 2 | 2,3 |
| 30-41 years | 16 | 18,3 |
| 42-53 years | 25 | 28,8 |
| 54-65 years | 32 | 36,8 |
| >65 years | 12 | 13,8 |
| **Education status** | **N** | **%** |
| Not have literacy | 6 | 6,7 |
| Have literacy | 1 | 1,1 |
| Primary education | 55 | 61,8 |
| High school | 19 | 21,4 |
| University | 8 | 9,0 |
| **Proximity to Patient** | **N** | **%** |
| Parent | 3 | 3,4 |
| Partner | 19 | 21,6 |
| Children | 43 | 48,9 |
| Relative | 16 | 18,2 |
| Other | 7 | 7,9 |
| **Duration of Care Giving** | **N** | **%** |
| 0-3 years | 57 | 64,8 |
| 4-7 years | 11 | 12,5 |
| >8 years | 20 | 22,7 |

Social security status of caregivers, income per capita and home care fee that is received from Ministry of Family and Social Policies is shown in Table 5.

**Table 5.** Distribution of socio-economic characteristics of caregivers

| **Social Security Status** | **N** | **%** |
|---|---|---|
| Social Security Institution | 83 | 94,3 |
| General Health Insurance | 1 | 1,1 |
| Have no insurance | 4 | 4,6 |
| **Total** | **88** | **100,0** |
| **Income per capita** | **N** | **%** |
| 0-784 Turkish Lira | 47 | 54,0 |
| 785-1.569 Turkish Lira | 36 | 41,4 |
| 1570-2.354 Turkish Lira | 3 | 3,5 |
| >2.355 Turkish Lira | 1 | 1,1 |
| **Total** | **87** | **100,0** |
| **Receiving a Home Care Fee** | **N** | **%** |
| Yes | 6 | 6,8 |
| No | 82 | 93,2 |
| **Total** | **88** | **100,0** |

66.3% of caregivers did not consider themselves self-sufficient in terms of providing medical care. 94.4% of the participants did not receive any education about home care. However, almost all of the caregivers (98.9%) were not in favor of giving their patient to any institution for care. The last two questions of the questionnaire includes questions about the need of psychological and spiritual support in binary Likert scale (yes, no). More than half of the participants (56.2%) stated that they needed psychological support and about one fourth (23.6%) needed spiritual support during the caregiving period. Table 6 shows the responses of caregivers.

**Table 6.** Distribution of needs of caregivers (n = 89)

| | **Yes** n (%) | **No** n (%) |
|---|---|---|
| Feeling Sufficient in Medical Care | 30 (%33,7) | 59 (%66,3) |
| Training for Caregiving | 5 (%5,6) | 84 (%94,4) |
| Training to Give a Patient Center for Care | 1 (%1,1) | 88 (%98,9) |
| Needing Psychological Support | 50 (%56,2) | 39 (%43,8) |
| Needing Spiritual Support | 21 (%23,6) | 68 (%76,4) |

The need for psychological support of caregivers was examined according to some sociodemographic aspects. In the analysis, a statistically significant difference was found between the duration of care and the need for psychological support. There was no statistically significant difference between other sociodemographic features and psychological support. The results of the analysis are shown in Table 7.

**Table 7.** Changing the status of requesting psychological support according to some sociodemographic characteristics

| | **Requests for Psychological Support** | | | | | |
|---|---|---|---|---|---|---|
| | **Yes** | | **No** | | **$x^2$** | **p** |
| **Work Status** | **n(49)** | **%** | **n(39)** | **%** | | |
| Worker | 6 | 40,0 | 9 | 60,0 | 1,802 | 0,179 |
| Not worker | 43 | 58,9 | 30 | 41,1 | | |
| **Duration of Caregiving** | **n(49)** | **%** | **n(39)** | **%** | | |
| 0-3 years | 26 | 45,6 | 31 | 54,4 | 6,661 | 0,035 |
| 4-7 years | 8 | 72,7 | 3 | 27,3 | | |
| > 8 years | 15 | 75,0 | 5 | 25,0 | | |
| **Receiving a Home Care Fee** | **n(49)** | **%** | **n(39)** | **%** | | |
| Yes | 2 | 33,3 | 4 | 66,7 | 1,303 | 0,253 |
| No | 47 | 57,3 | 35 | 42,7 | | |
| **Feeling Sufficient in Medical Care** | **n(49)** | **%** | **n(39)** | **%** | | |
| Yes | 14 | 46,7 | 16 | 53,3 | 1,499 | 0,220 |
| No | 35 | 60,3 | 23 | 39,7 | | |

| Training for Caregiving | n(49) | % | n(39) | % | | |
|---|---|---|---|---|---|---|
| Yes | 3 | 60,0 | 2 | 40,0 | 0,040 | 0,841 |
| No | 46 | 55,4 | 37 | 44,6 | | |

The need for spiritual support of caregivers was examined in terms of some sociodemographic aspects. In the analysis, a statistically significant difference was found between the need for self-sufficiency in medical care and the need for spiritual support. There was no statistically significant difference between other features. The results of the analysis are shown in Table 8.

**Table 8.** Changing the status of requesting spiritual support according to some sociodemographic characteristics

| | Requests for Spiritual Support | | | | | |
|---|---|---|---|---|---|---|
| | Yes | | No | | $x^2$ | p |
| **Work Status** | **n(21)** | **%** | **n(67)** | **%** | | |
| Worker | 4 | 26,7 | 11 | 73,3 | 0,078 | 0,779 |
| Not worker | 17 | 23,3 | 56 | 76,7 | | |
| **Duration of Caregiving** | **n(21)** | **%** | **n(67)** | **%** | | |
| 0-3 years | 16 | 28,1 | 41 | 71,9 | 5,418 | 0,066 |
| 4-7 years | 4 | 36,4 | 7 | 63,6 | | |
| > 8 years | 1 | 5,0 | 19 | 95,0 | | |
| **Receiving a Home Care Fee** | **n(21)** | **%** | **n(67)** | **%** | | |
| Yes | 1 | 16,7 | 5 | 83,3 | 0,183 | 0,668 |
| No | 20 | 24,4 | 62 | 75,6 | | |
| **Feeling Sufficient in Medical Care** | **n(21)** | **%** | **n(67)** | **%** | | |
| Yes | 2 | 6,7 | 28 | 93,3 | 7,408 | 0,006 |
| No | 19 | 32,8 | 39 | 67,2 | | |
| **Training for Caregiving** | **n(21)** | **%** | **n(67)** | **%** | | |
| Yes | 2 | 40,0 | 3 | 60,0 | 5,418 | 0,066 |
| No | 19 | 22,9 | 64 | 77,1 | | |

## DISCUSSIONS AND CONCLUSIONS

In our study, 80% of the patients receiving home health care services do not have a disability report. In addition, only 6,7% of them receive 2022 disabled salaries. It is clear that social services experts have three functions as consulting, resource management and education as stated in the article reported by Hasgul and named "Functions and Roles of Social Workers in Home Care Services". The necessity of social workers who will accompany visits to health personnel at regular intervals should be evaluated. In the light of these data, it is necessary to re-evaluate the methods used in the social evaluation of patients receiving home health care and in the efficient functioning of the support mechanisms (Hasgül, 2016). In spite of the difficulties of meeting the costs of treatment for home healthcare patients without social security, it is thought that their quality of life will be negatively affected by the fact that the caregiver is probably a relative. It is stated that this may be related to the decrease in quality of life as a result of the increase in stress and decrease in self-care besides economic losses (Akdemir et. al., 2011).

When home health care services are evaluated together within their scope, it can be expected that these patients are highly bedridden. Nearly half of the patients do not have their own income, however, very few are benefiting from economic support; may indicate the necessity of evaluating the health service offered in this area within the framework of care. (Çatak et. al. 2012). It is noteworthy for the target group to whom the service is offered that the patients are bedridden who suffer from chronic diseases rather than those requiring acute or temporary service. The fact that most of the caregivers have been doing this work for less than 3 years seems to be contradictory. However, it shows the importance of home health services as a service offered to individuals with chronic diseases who have concomitant chronic diseases in their final social care (Taşdelen and Ateş, 2012). In spite of the feeling insufficient while giving care, the desire of relatives to look at their patients at home supports this argument.

When the answers to the income questions were evaluated, 54% of the patients had a per capita income of 0-784 Turkish Liras. In the event that the income of the caregivers is within the specified range, the right to receive the patient care fee arises. However, only 6.8% of caregivers received a patient care fee from the Ministry of Family, Labor and Social Policies. This situation

shows that 87.4% of the people who are in need could not receive the aid. It is also known that it is important to support the caregivers financially. As stated in the systematic review of 26 articles in Sweden, steps are needed to increase the proportion of financial support given to relative of patients (Stoltz et. al., 2004).

Another result obtained in our study is that a large part of the caregivers (94.4%) did not receive any training from any institution for care delivery. In addition, even if the person is responsible for the care of the patient in the process, two-thirds of the caregivers cannot see themselves as self-sufficient in medical care. Considering the fact that most of the caregivers are relatives of the patients, their need for training is undeniable. In the literature, two basic methods have been followed in terms of educating caregivers. Group training is the first of these. The effectiveness of supporting caregivers by focusing on preparation, competence, meeting the needs of information and the operation of reward mechanisms has been demonstrated. The study also states that no significant difference was found in the results of group training in rural or urban areas (Ufer et. al., 2018).

One of the methods used for education is informing the patient at bedside. In this style, where more need-spesific training is provided; the proximity of the caregiver with the patient is more important, and the caregiver's sense of proficiency is also negatively associated with a job at work (Rowland and Kumagai 2018). Interventions on the basis of psychosocial support have been shown to decrease the anxiety of the relatives of the patients and increase their care satisfaction (Götze et al., 2018). Caregivers who stated that they need psychological support constitute more than half of the participants, one fourth which stated that they needed spiritual support. Since the study can't be generalized, saying something about rates isn't scientific; however, it is thought that caregivers in home health services need more psychosocial support and spiritual care than other members of society, as stated by Çatak and Öner and by Whitlatch and Jeras (Çatak and Öner, 2012; Whitlatch and Jeras, 2018).

## Conclusion

In our study, it was observed that patients who received home health care services could not benefit from the facilities such as disability report or disa-

bility salary at the expected level, and they were deprived of the social rights provided. Social workers can be included in the home health care teams to improve the scope of social support. Almost all of the caregivers of home health care patients were found to be family relatives. Despite the fact that caregivers are receiving home health care, they are deprived of the state's financial support for caregivers. Establishing a communication mechanism between the relevant ministry and the ministry of health will facilitate the identification of these caregivers. It was determined that caregivers considered themselves insufficient, accepted training deficiencies related to the care given, and needed patient or group training at the beginning of the patient. For every home care patient, it is recommended that caregivers should be given a basic training at the bedside and then be included in a group training led by guidelines.

Since our sample does not represent the population, our results cannot be generalized. More accurate estimates can be performed with simple random sampling method. It is about self awareness of the need for psychosocial support asked in our questionnaire, psychological tests and scales can be used to measure more evidence-based psychological conditions. In our survey, the percentage of unresponsiveness was high with 36% and the additional features to be able to form a group cannot be obtained.

Considering their own declarations of caregivers, they needed psychological support and spiritual support. While providing a very important service such as home health care, the importance of supporting the health, psychological and spiritual aspects of caregivers in maintaining a complete well-being should be recognized. Health workers should be supported by experts in these areas like psychologists, social workers and religious staff, and psychosocial evaluation of patients and caregivers should be seen as part of the service offered. Psychosocial and spiritual evaluation of patients and caregivers should be considered as an important part of the service offered.

Psychosocial and spiritual support services should be integrated into home health services. Besides the addition of health workers to their job descriptions as an additional workload; it will contribute complementary services as an appropriate model to Turkey's conditions which should be improved.

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### REFERENCES

Baldacchino, D. (2015). Spiritual Care Education of Health Care Professionals. Religions. 6(2), 594-613.

Aslan, Ş.,Uyar, S., Güzel, Ş. (2018). Evde Sağlık Hizmetleri Uygulamasında Türkiye. Sosyal Araştırmalar ve Yönetim Dergisi, 1(1), 44-55.

Altuntaş, M. (2010). Evde Sağlık Hizmeti ve Günümüzdeki Uygulama Şekilleri. Tepecik Eğitim ve Araştırma Hastanesi Dergisi, 20(3), 153-158.

Öksüz, H. (2018). Evde Sağlık Hizmetleri ve Hasta Memnuniyeti. T.C. Namık Kemal Üniversitesi Sosyal Bilimler Enstitüsü Sağlık Yönetimi Anabilim Dalı, Yüksek Lisans Tezi.

Özer, Ö., Şantaş, F. (2012). Kamunun Sunduğu Evde Bakım Hizmetleri ve Finansmanı. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi, 3(2), 96-103.

Aksoy, H., Kahveci, R., Şencan, İ. (2015). Evde Bakım Hizmetlerinin Tarihsel Gelişimi ve Uygulamaları. Türk Tıp Dergisi, 7(1), 118-123.

Ma, C., Shang, J., Miner, S., Lennox, L., Squires, A. (2017). The Prevalence, Reasons, and Risk Factors for Hospital Readmissions Among Home Health Care Patients: A Systematic Review. Home Health Care Management & Practice, 30(2), 83–92.

Resmi Gazete. (2015). Retrieved from (http://www.resmigazete.gov.tr/eskiler/2015/02/20150227-14.htm), on: (15.10.2017).

Dahlberg, L., Berndt, H., Lennartsson, C., Schön, P. ( 2017). Receipt of Formal and Informal Help with Specific Care Tasks Among Older People Living in Their Own Home. National Trends over Two Decades. Social Policy & Administration, 52(1), 91-110.

Burke C., Wight T., Chenoweth L. (2018). Supporting the Spiritual Needs of People with Dementia in Residential Aged Care, Journal of Religion, Spirituality & Aging, 30(3), 234-250.

Daştan, N. B., Buzlu, S. (2010). Meme Kanseri Hastalarında Maneviyatın Etkileri ve

Manevi Bakım. Maltepe Üniversitesi Hemşirelik Bilim ve Sanatı Dergisi, 3(1), 73-78.

Lawrence, V., Fossey, J., Ballard, C., Ferreira, N., Murray, J. (2016). Helping Staff to Implement Psychosocial Interventions in Care Homes: Augmenting Existing Practices and Meeting Needs for Support. International Journal of Geriatric Psychiatry, 31(3), 284-293.

Hasgül, E. (2016). Evde Bakım Hizmetlerinde Sosyal Hizmet Uzmanlarının İşlevleri ve Rolleri. Tıbbi Sosyal Hizmet Dergisi, 7, 14-21.

Akdemir, N., Bostanoğlu, H., Yurtsever, S., Kutlutürkan, S., Kapucu, S., Özer, Z.C. (2011). Yatağa Bağımlı Hastaların Evde Yaşadıkları Sağlık Sorunlarına Yönelik Evde Bakım Hizmet Gereksinimleri. Dicle Tıp Dergisi, 38(1), 57-65.

Çatak, B., Kılınç, A.S., Badıllıoğlu, O., Sütlü, S., Sofuoğlu, A.E., Aslan, D. (2012). Burdur'da Evde Sağlık Hizmeti Alan Yaşlı Hastaların Profili ve Evde Verilen Sağlık Hizmetleri. Turkish Journal of Public Health, 10(1), 13-21.

Taşdelen, P., Ateş, M. (2012). The Needs of Home Care Patients and the Burdens of Their Caregivers. Hemşirelikte Eğitim ve Araştırma Dergisi, 9(3), 22-29.

Stoltz, P., Udén, G., Willman, A. (2004). Support for Family Carers Who Care for An Elderly Person at Home – A Systematic Literature Review. Scandinavian Journal of Caring Sciences, 18, 111-119.

Ufer, L.G., Moore, J.A., Hawkins, K., Gembel, G., Entwistle, D., Hoffman, D. (2018). Care Coordination: Empowering Families, a Promising Practice to Facilitate Medical Home Use Among Children and Youth with Special Health Care Needs. Maternal and Child Health Journal, 22(5), 648-659.

Rowland, P., Kumagai, A.K. (2018). Dilemmas of Representation: Patient Engagement in Health Professions Education. Academic Medicine: Journal of the Association of American Medical Colleges, 93(6), 869-873.

Götze, H., Brähler, E., Gansera, L., Schnabel, A., Gottschalk-Fleischer, A., Köhler, N. (2018). Anxiety, Depression and Quality of Life in Family Caregivers of Palliative Cancer Patients During Home Care and After the Patient's Death. European Journal of Cancer Care, 27(2), 12606.

Çatak, B., Öner, C. (2012). Yaşlılara Evde Bakım Verenlerde Ruhsal Hastalık Belirtisi Sıklığı ve Etkileyen Faktörler. Kafkas Tıp Bilimleri Dergisi, 2(3), 105-108.

Whitlatch, J.C., Jeras, S.O. (2018). Meeting the Informational, Educational, and Psychosocial Support Needs of Persons Living With Dementia and Their Family Caregivers. The Gerontologist, 58(1), 58-73.

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# Examination of Malignant Neoplasm and Revealing Relationships with Cigarette Consumption

Özlem ŞENVAR[1]
İrem ÜNAL[1]

**ABSTRACT**

Tobacco smoking is overwhelmingly the most significant risk factor for cancer and across the board for chronic diseases. Cigarette smoking is causally related to several cancers with inconsistent associations. In this study, malignant neoplasms of larynx and trachea/bronchus/lung, liver and the intrahepatic bile ducts and cervix uteri, other parts of uterus, ovary, and prostate are examined according to their statistics of total death by gender. The aim of this study is to reveal the relationship between cigarette consumption and the number of deaths of malignant neoplasms. Moreover, forecasting for cigarette consumption is performed. According to the predicted values of cigarette consumption, the number of deaths of malignant neoplasms is predicted. Interpretations are provided based on statistical data analyses. This study can act as a guideline for healthcare decision makers for policy making to decrease the risk factors for cancer and other chronic diseases.

**Keywords**: Forecasting, Statistical data analyses, Regression, Trend projection

## INTRODUCTION

In 2010s' Turkey, approximately 20% of deaths are caused by neoplasms and malignant neoplasms constitute almost all of this percentile. There are several main reasons for carcinoma such as biological, environmental, behav-

1 Marmara University, Turkey.
Corresponding author: Ö. ŞENVAR, ozlem.senvar@marmara.edu.tr

ioural factors, etc. According to gender, age, hormones, genetic heritage, mutation of DNA, etc. are considered in biological factors. Environmental factors change with respect to living environment, lifestyle, working place. Behavioural factors depend on individuals' habits.

Tobacco smoking is overwhelmingly the most significant risk factor for cancer and across the board for chronic diseases. (Gelband and Sloan, 2007) Cigarette smoking is causally related to several cancers, particularly lung cancer, yet for some cancers, there are inconsistent associations. (Ray et al., 2010)

In this study, malignant neoplasms of larynx and trachea/bronchus/lung, liver, and the intrahepatic bile ducts and cervix uteri, other parts of uterus, ovary and prostate are examined according to their statistics of total death. These three groups of data are obtained from Turkish Statistical Institute (TUIK) years between 2009-2016. They are described with descriptive statistics like bar chart, pie chart, box plot, and line chart. Their similarities and dissimilarities are interpreted via these charts.

In the other section, these three groups of malignant neoplasms are analysed with trend projection and simple linear regression analysis. The aim of this part was to observe the relationship between cigarette consumption and the number of deaths of malignant neoplasms and to predict future values. Firstly, with the method of trend projection, the future values of cigarette consumption are predicted. Then, according to these future values cigarette consumptions, the number of deaths of malignant neoplasms is predicted, too. The strength of these associations is interpreted.

## Literature Review

Pesch et al. (2012) mentioned that maintaining gas exchange in the lung requires tight coordination of functional components, including neural regulation of breathing, plasticity, and permeability of the lung surface and protection from inhaled toxicants. This is reflected in a number of different cell populations that, in case of malignant transformation, can result in a variety of tumours as described in the WHO's histological classification of lung cancer. (World Health Organisation, 1999) Smoking is a strong risk factor for all forms of lung cancer, and among male smokers, squamous cell carcinoma (SqCC) is the predominant subtype. Smoking is also closely associated with small cell

lung carcinoma (SCLC) (Khuder et al, 1998). Adenocarcinoma (AdCa) is the most common subtype in never smokers and women, with increasing incidence rates over time.

Asbestos exposure and cigarette smoking are recognized risk factors for lung cancer mortality, but the exact nature of the interaction between the two remains uncertain. Frost et al. (2011) examined the effect of smoking and smoking cessation among asbestos workers in Great Britain (GB) and investigated the interaction between asbestos exposure and smoking. They performed Poisson regression to estimate relative risks of lung cancer mortality associated with smoking habits of the asbestos workers and to assess whether these effects differed within various categories of asbestos exposure. Also, they estimated the proportion of lung cancers among smokers attributable to the interaction of asbestos and smoking. As a result, the risk of lung cancer mortality increased with packs smoked per day, smoking duration, and total smoke exposure (pack-years). For those asbestos workers who smoked, an estimated 26% (95% CI 14–38%) of lung cancer deaths were attributable to the interaction of asbestos and smoking.

Mihaela et al. (2012) performed artificial intelligence techniques to determine a multivariate model which is able to identify tumour stage and of the histopathological type for lung cancer patients based on predictive environmental and behavioural factors. They indicated that tobacco use and the environmental factors related to the workplace (e.g. metallurgical industry) are the best predictive risk factors for the incidence of lung cancer.

Smoking is the greatest risk factor for lung cancer, being the most probable cause for the great majority of lung cancers for both men and women. The patient working environment is also an important factor influencing the chances of developing lung cancer. (Peto et al., 1994)

According to Doll et al. (2005), a smoker would die from lung cancer with a probability 15 times higher than a non-smoking patient. They examined 50 years observations on British doctors for cancers liability to be caused by smoking showing the mortality rates in relation to smoking habits of 13 types of cancer in men. They inspected eight of the specified types of cancer and cancers of unspecified type but the most notably lung cancer were all clearly related to smoking, in that there were statistically significant positive trends in the mortality rates from lifelong non-smokers through light and moderate

cigarette smokers to heavy cigarette smokers and from non-smokers through ex-smokers to continuing smokers.

Cigarette smoking is causally related to several cancers, particularly lung cancer, yet for some cancers, there are inconsistent associations. Ray et al (2010) investigated the association of smoking with other cancers by correlating them with the regional incidence rates for lung cancer, which was used as a proxy for cigarette smoking.

## METHODOLOGY

### Descriptive Statistics

It is always beneficial to describe a problem or a model visually. This helps to focus on the important points of an entire system. Well-constructed data summaries and displays are essential to good statistical thinking because they can focus the engineer on important features of the data or provide insight about the type of model that should be used in solving the problem. (Montgomery and Runger, 2012: 190)

There are many types of descriptive statistics to display data. A researcher would choose which one is he going to use according to his data set and his points to consider. Box plot, bar chart, line chart and pie chart were more suitable with respect to data which was obtained from different sources for this study.

#### a. Box Plot

Exploratory data analysis involves the use of statistical techniques to identify patterns that may be hidden in a group of numbers. One of these techniques is the "box plot," which is used to visually summarize and compare groups of data. The box plot uses the median, the approximate quartiles, and the lowest and highest data points to convey the level, spread, and symmetry of a distribution of data values. It can also be easily refined to identify outlier data values and can be easily constructed by hand. We apply box plots to tabular data from two recently published articles to show how readers can use box plots to improve the interpretation of data in complex tables. The box plot, like other visual methods, is more than a substitute for a table: It is a tool that can improve our reasoning about quantitative information. We recommend that the box plot be used more frequently. (Williamson et al, 1989)

**b. Bar Chart**

A bar chart similarly looks like a histogram but what is different on a bar chart is, it is to display categorical data sets. Each column's height or length is proportional to categories. Usually, x-axis is for categories and y-axis is for the value of its category.

This is a very useful way to compare groups between each other. Peak areas, minimum and maximum values are able to be seen clearly.

One of the most important points for a bar chart is that it is for discrete variables and on the chart, the columns for each group should be separated from each of them.

**c. Line Chart**

When a quantitative variable is recorded over time at equally spaced intervals (such as daily, weekly, monthly, quarterly, or yearly), the data set forms a time series. Time series data are most effectively presented on a line chart with time as the horizontal axis. The idea is to try to discern a pattern or trend that will likely continue into the future, and then to use that pattern to make accurate predictions for the immediate future. (Mendenhall, 2012)

**d. Pie Chart**

Pie chart is a circular chart to represent one unit. All of its slices are proportional to this unit. It is easy to observe a category's percentile in a whole.

**Simple Linear Regression Analysis & Trend Projection**

Many problems in engineering and science involve exploring the relationships between two or more variables. Regression analysis is a statistical technique that is very useful for these types of problems. For example, in a chemical process, suppose that the yield of the product is related to the process-operating temperature. Regression analysis can be used to build a model to predict the yield at a given temperature level. This model can also be used for process optimization, such as finding the level of temperature that maximizes yield, or for process control purposes. (Montgomery and Runger, 2012: 373)

Regression analysis is used to predict the value of the dependent variable based on the value of at least one independent variable. Dependent variable(y)

is the variable we wish to explain. Independent variable(y) is the variable used to explain the dependent variable.

There are two types of regression analysis; simple linear regression and logistic regression. If there is only one independent variable in the analysis, it is simple linear regression but if there are more than one independent variable, then it is logistic regression analysis.

In simple linear regression model, there is only one independent variable. The model shows us the relationship between x and y which is described by a linear function. Changes in y variable are assumed to be caused by changes in x variable.

General formula for simple linear regression model is;

$$y = \beta_0 + \beta_1 x + \varepsilon \qquad (1)$$

$\beta_0$ represents the population y-intercept coefficient of this model. $\beta_1$ represents the population slope coefficient of this model's line. ε represents the random error term or residual. For the forecasting model, the equations become;

$$= b_0 + b_1 x \qquad (2)$$

$b_0$ and $b_1$ values are for predicted values of $\beta_0$ and $\beta_1$. Sample regression line provides prediction of population regression line.

There are several assumptions for linear regression. Error values (ε) are statistically independent and they are normally distributed for any given x value. The underlying relationship between x and y variables are linear. The probability distribution of errors is normal and it has constant variance.

To interpret $b_0$ and $b_1$, we can say that b0 is the predicted average value of y when the value of x is equal to zero and b1 is the predicted change in the average value of y as a result of one-unit change in x.

Trend projection is similar to simple linear regression but the difference is that its independent variable(t) is time. This analysis is to predict future values according to the time passed. Numerical data should be obtained at regular time intervals. Time intervals can be annual, quarterly, daily, hourly distributed. Trend projection can be summarized as predicting trend line using regression analysis. The general formula for trend projection is;

$$= b_0 + b_1 t \qquad (3)$$

**Correlation Analysis**

Correlation analysis is used to evaluate the strength of association between two variables. There may be a non-linear relationship between variables, but correlation analysis does not detect this. Also, this analysis is not related to the causal effect of these two variables.

Scatter plot is used to show the relationship between two variables. We can see the linearity from the shape of the distribution of dots on the plot.

The strength of this association is measured with a correlation coefficient. It is shown as r for sample, ρ for population. Sample correlation coefficient r is the estimate of population correlation coefficient ρ and is used to measure the strength of association in sample observations.

ρ or r is a unit free coefficient. Its range is between -1 and 1. If its value is closer to the -1, we can say there is a stronger negative linear relationship. If its value is closer to the 1, we can say there is a stronger positive linear relationship. If its value is closer to the 0, we can say there is a weaker linear relationship.

**RESULTS**

**Data Extraction**

Data of neoplasms of death is obtained from Turkish Statistical Institute (TUIK) years between 2009-2016. The data is extracted from the data of the distribution of causes of death by gender 2009-2016 that is published at TUIK.

Data for domestic sales for cigarette consumption is taken by years. Annual data on cigarette sales were obtained from the Tobacco and Alcohol Market Regulatory Authority (TAPDK). Data were available from 1925 until 2016. Cigarette sales numbers which they are the numbers to show domestic sales years between 1925-2016 were displayed as billion units. The data has obviously continuous variables.

**Descriptive Statistics**

When we look at the box plots that are given below, we can compare males and females in themselves basically. Male_1, Male_2, Male_3, and Male_4 represents the number of deaths because of malignant neoplasms of larynx and trachea/bronchus/lung, malignant neoplasms of liver and intrahepatic bile

ducts, malignant neoplasms of cervix uteri, other parts of uterus, ovary, and prostate and malignant neoplasms of others for males, respectively. Female_1, Female_2, Female_3, and Female_4 represents the number of deaths because of malignant neoplasms of larynx and trachea/bronchus/lung, malignant neoplasms of liver and intrahepatic bile ducts, malignant neoplasms of cervix uteri, other parts of uterus, ovary and prostate, and malignant neoplasms of others for females, respectively.

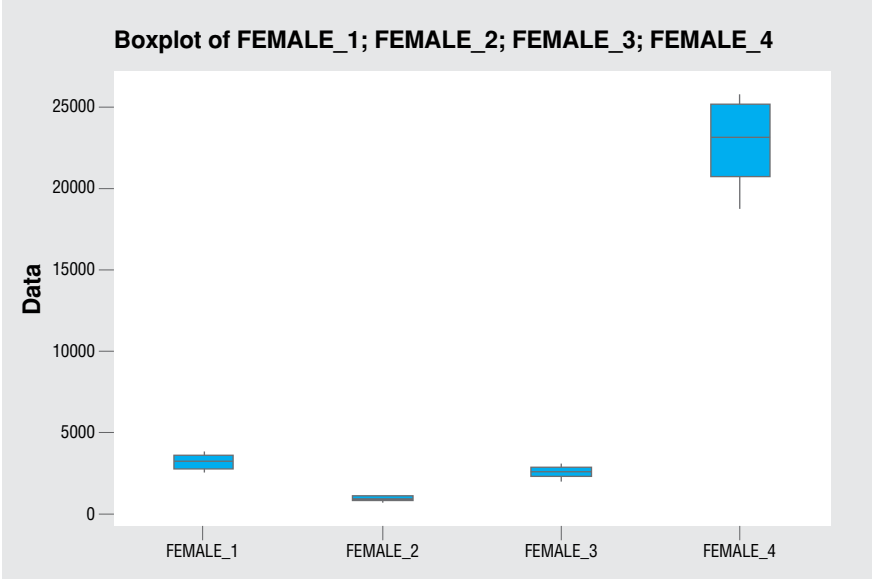


**Figure 1:** Boxplot of Females

As we can see from the figure 1, Female_1, Female_2 and Female_3's medians are close to each other and their variabilities are less than Female_4. Female_4 has higher median and larger variability.

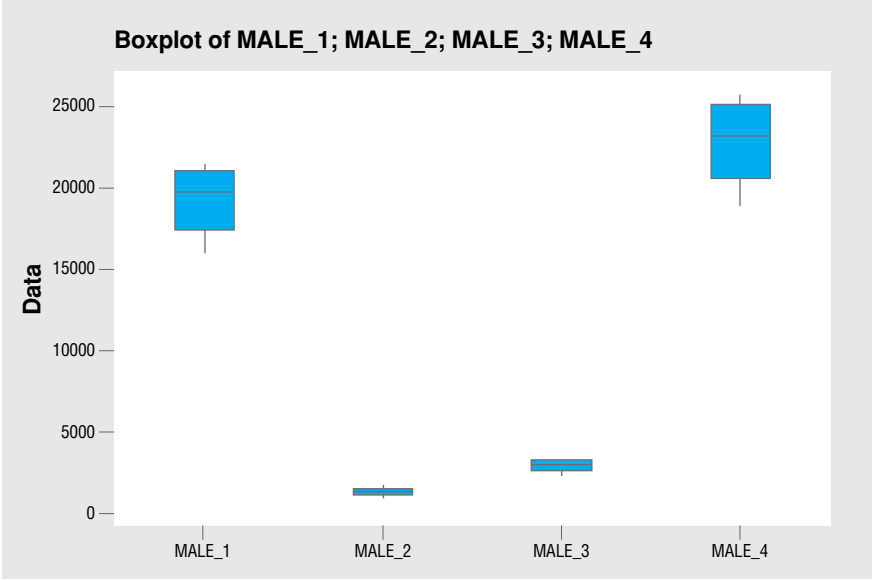


**Figure 2:** Boxplot of Males

In the figure 2, we can see that Male_2 has the smallest median when we compare to others and Male_4 has the largest median. Male_2 and Male_3 have smaller variabilities rather that Male_1 and Male_4. Male_1 and Male_4's plots are left skewed.

The biggest difference between boxplot for males and females is in the malignant neoplasms of larynx and trachea/bronchus/lung. There is a noticeable change between Male_1 and Female_1. We can conclude that males have bigger proportion rather than females. (Mihaela et al.,2012)

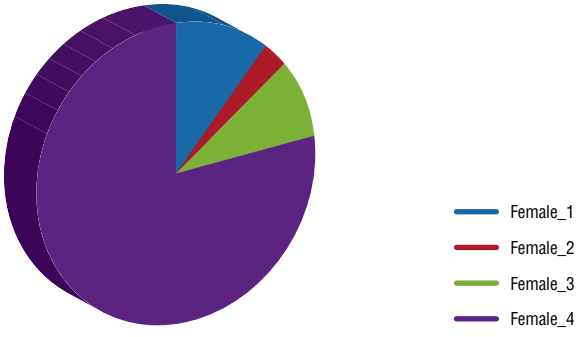


**Figure 3:** Pie Chart for Females

To interpret figure 3, except the malignant neoplasms of others, malignant neoplasms of larynx and trachea/bronchus/lung has greater percentile. Malignant neoplasms of liver and intrahepatic bile ducts have the smallest percentile in the total.

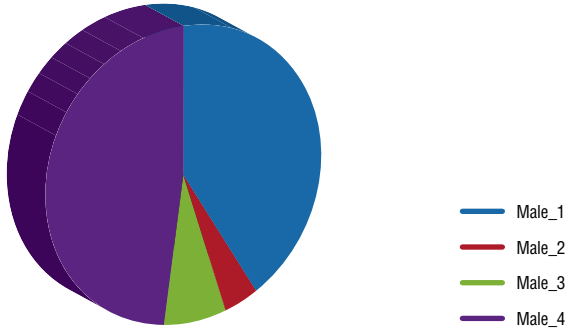


**Figure 4:** Pie Chart for Males

As we can see from the figure 4, malignant neoplasms of larynx and trachea/bronchus/lung have a great percentile rather than the malignant neoplasms of liver and intrahepatic bile ducts and malignant neoplasms of cervix uteri other parts of uterus, ovary, and prostate. Malignant neoplasms of liver and intrahepatic bile ducts have the smallest slice in the chart.

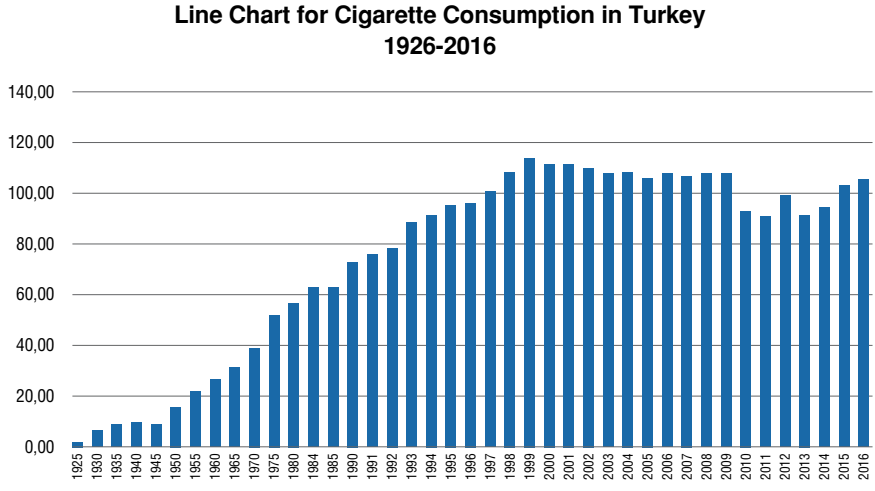


**Figure 5:** Line Chart of Cigarette Consumption in Turkey, 1925-2016

We can see from figure 5 that cigarette consumption is mainly increasing year after year. When we look at this graph carefully, we can face a strong slump after 2009. It is possible to comment on this slump that it caused by ban on smoking in the closed areas of the Turkish Republic Ministry of Health. This is the most probable reason for this situation. The other significant point is there is a peak area in 1999. We can interpret this peak is caused by the psychological influences of the earthquake and economic crisis in 1999.

**Regression Analysis & Trend Projection**

Trend projection model for cigarette consumption is;

$$\hat{y} = 96{,}29 + 0{,}45t \qquad (4)$$

Predictions until 2023 for cigarette consumption are given in Table 1.

**Table 1:** Computations for Trend Projection of Cigarette Consumption

| years | t=integer for years | y=cigarette consumption |
|---|---|---|
| 2017 | 9 | 100.33 |
| 2018 | 10 | 100.78 |
| 2019 | 11 | 101.23 |
| 2020 | 12 | 101.68 |
| 2021 | 13 | 102.13 |
| 2022 | 14 | 102.58 |
| 2023 | 15 | 103.03 |

Next future values for the types of malignant neoplasms will be predicted according to the predictions in Table 1.

Simple linear regression model for malignant neoplasms of larynx and trachea/bronchus/lung is;

$$\hat{y} = 20830.28 + 3.8x \qquad (5)$$

Predictions until 2023 for malignant neoplasms of larynx and trachea/bronchus/lung are given in Table 4.3.2.

**Table 2:** Computation for Simple Linear Regression Analysis of Malignant Neoplasms of Larynx and Trachea/Bronchus/Lung

| years | x=cigarette consumption | y=number of m.n. of larynx and trachea/bronchus/lung | y=cigarette consumption |
|---|---|---|---|
| 2017 | 100.33 | 21211 | 100.33 |
| 2018 | 100.78 | 21213 | 100.78 |
| 2019 | 101.23 | 21215 | 101.23 |
| 2020 | 101.68 | 21216 | 101.68 |
| 2021 | 102.13 | 21218 | 102.13 |
| 2022 | 102.58 | 21220 | 102.58 |
| 2023 | 103.03 | 21221 | 103.03 |

Simple linear regression model for malignant neoplasms of malignant neoplasms of liver and the intrahepatic bile ducts is;

$$\hat{y} = 2391.29 + 2.67x \quad (6)$$

Predictions until 2023 for malignant neoplasms of liver and the intrahepatic bile ducts are given in Table 3.

**Table 3:** Computation for Simple Linear Regression Analysis of Malignant Neoplasms of Liver and the Intrahepatic Bile Ducts

| years | x=cigarette consumption | y =number of m.n. of liver and the intrahepatic bile ducts |
|---|---|---|
| 2017 | 100.33 | 2660 |
| 2018 | 100.78 | 2661 |
| 2019 | 101.23 | 2662 |
| 2020 | 101.68 | 2663 |
| 2021 | 102.13 | 2664 |
| 2022 | 102.58 | 2666 |
| 2023 | 103.03 | 2667 |

Simple linear regression model for malignant neoplasms of Simple linear regression model for malignant neoplasms of cervix uteri, other parts of uterus, ovary & prostate is;

$$\hat{y} = 6788.38 - 10.557x \quad (7)$$

Predictions until 2023 for malignant neoplasms of cervix uteri, other parts of uterus, ovary & prostate are given in Table 4.

**Table 4:** Computation for Simple Linear Regression Analysis of Malignant Neoplasms of Cervix Uteri, Other Parts of Uterus, Ovary & Prostate

| years | x=cigarette consumption | y =number of m.n. of cervix uteri, other parts of uterus, ovary & prostate |
|---|---|---|
| 2017 | 100.33 | 5730 |
| 2018 | 100.78 | 5725 |
| 2019 | 101.23 | 5721 |
| 2020 | 101.68 | 5716 |
| 2021 | 102.13 | 5711 |
| 2022 | 102.58 | 5706 |
| 2023 | 103.03 | 5702 |

### Correlation Analysis

In the figure 6, there is scatter plot for regression model of malignant neoplasms of larynx and trachea/bronchus/lung.

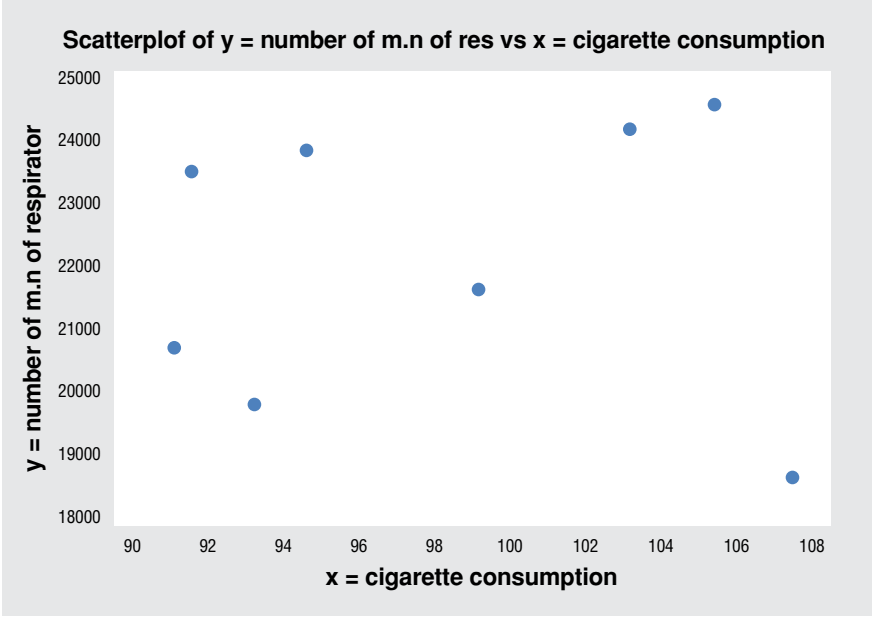


**Figure 6:** Scatter Plot for Malignant Neoplasms of Larynx and Trachea/Bronchus/Lung

In the figure 6, there is scatter plot for regression model of malignant neoplasms of liver and the intrahepatic bile ducts.

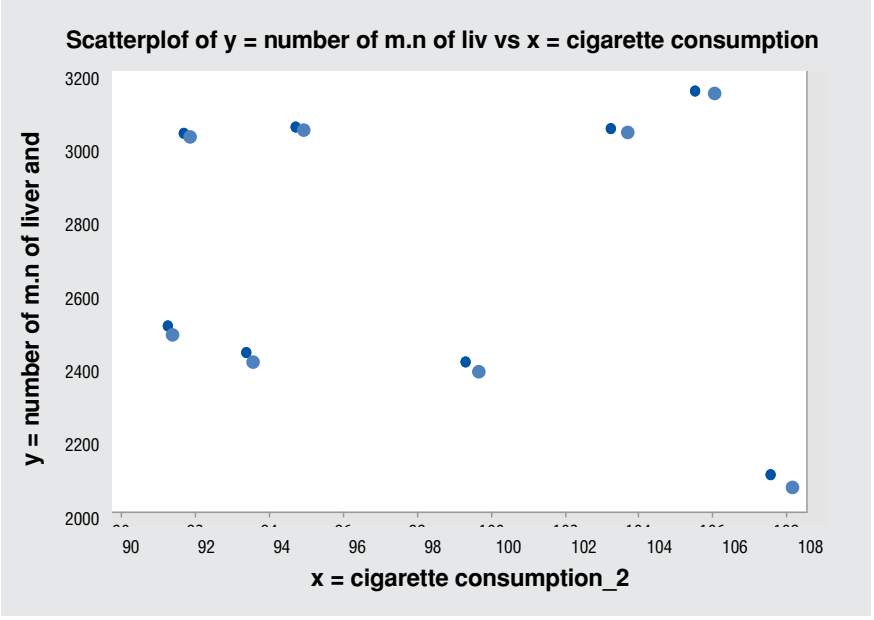


**Figure 7:** Scatter Plot for Malignant Neoplasms of Liver and the Intrahepatic Bile Ducts

In the figure 7, there is scatter plot for regression model of cervix uteri, other parts of uterus, ovary & prostate.

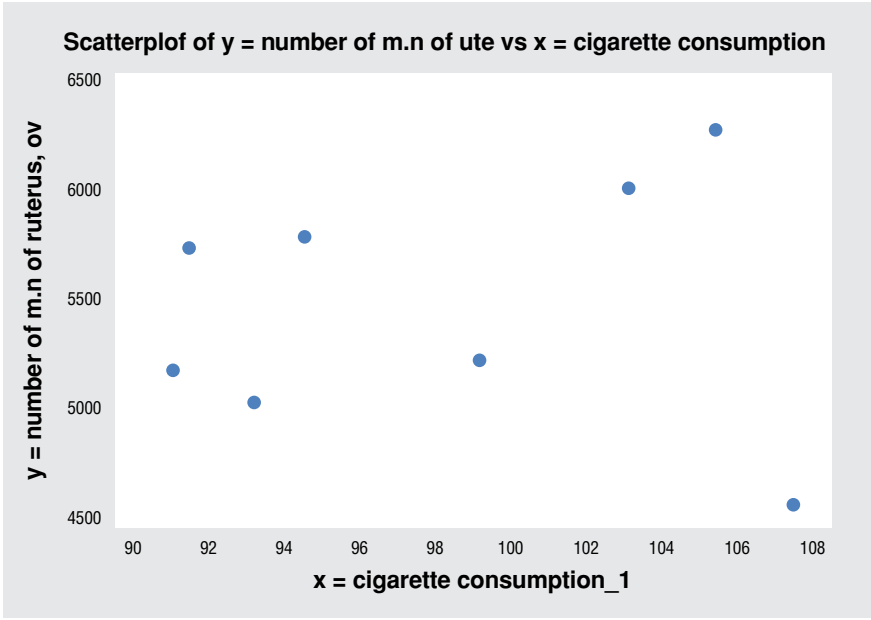


**Figure 8:** Scatter Plot for Malignant Neoplasms of Cervix Uteri, Other Parts of Uterus, Ovary & Prostate

**Table 4:** Values of r and R2 for Each Three Groups

| | r | $R^2$ |
|---|---|---|
| Malignant Neoplasms of Larynx and Trachea/Bronchus/Lung | 0.01 | 0.0001 |
| Malignant Neoplasms of Liver and the Intrahepatic Bile Duct | -0.09 | 0.009 |
| Malignant Neoplasms of Cervix Uteri, Other Parts of Uterus, Ovary & Prostate | 0.04 | 0.001 |

As it is shown in the Table 4.4.1, r values imply there are weak linear relationships between cigarette consumption and these three types of malignant neoplasms, R2 values implies that linear trend models cannot be fitted adequately for the data.

## DISCUSSION S AND CONCLUSION

In this study, the numbers of four groups of malignant neoplasms are examined. Their similarities and dissimilarities are identified. The aim of this study is to reveal the relationship between cigarette consumption and the number of deaths of malignant neoplasms and to predict future values. Firstly, with the method of trend projection, the future values of cigarette consumption are predicted. Then, according to these future values cigarette consumptions, the number of deaths of malignant neoplasms is predicted, too.

When we compare malignant neoplasms of larynx and trachea/bronchus/lung, malignant neoplasms of liver and intrahepatic bile ducts and malignant neoplasms of cervix uteri, other parts of uterus, ovary, and prostate in the female deaths, there is no significant difference between proportions of these types of neoplasms having the same median approximately.

When we look at the malignant neoplasms of larynx and trachea/bronchus/lung, malignant neoplasms of liver and intrahepatic bile ducts and malignant neoplasms of cervix uteri, other parts of uterus, ovary and prostate in the male deaths, malignant neoplasms of larynx and trachea/bronchus/lung have such a big slice, larger median and more variability rather than others.

Predicted values are obtained; the number of cigarette consumption is expected to reach 103.03 billion units in 2023. For malignant neoplasms of larynx and trachea/bronchus/lung, according to the predicted cigarette consumptions values, the number of deaths because of malignant neoplasms of larynx and trachea/bronchus/lung is increasing. For malignant neoplasms of liver and the intrahepatic bile ducts, according to the predicted cigarette consumptions values, the number of deaths because of malignant neoplasms of larynx and trachea/bronchus/lung is increasing. For malignant neoplasms of cervix uteri, other parts of uterus, ovary, and prostate, according to the predicted cigarette consumptions values, the number of deaths because of malignant neoplasms of larynx and trachea/bronchus/lung is decreasing. According to the examinations and comparisons that are given above, cigarette consumption affects malignant neoplasms of larynx and trachea/bronchus/lung more than the others. The coefficient of independent variable is the greatest in its model, which means a change in cigarette consumption effects more malignant neoplasms of larynx and trachea/bronchus/lung.

**REFERENCES**

Pesch, B., Kendzia, B., Gustavsson, P., Jöckel, K. H., Johnen, G., Pohlabeln, H., ... & Wichmann, H. E. (2012). Cigarette smoking and lung cancer—relative risk estimates for the major histological types from a pooled analysis of case–control studies. International journal of cancer, 131(5), 1210-1219.

Travis, W. D., Colby, T. V., Corrin, B., Shimosato, Y., & Brambilla, E. (1999). Definitions and Explanatory Notes. In Histological typing of lung and pleural tumours (pp. 25-66). Springer Berlin Heidelberg.

Khuder SA, Dayal HH, Mutgi AB, Willey JC, Dayal G. (1998) Effect of cigarette smoking on major histological types of lung cancer in men. Lung Cancer, 22:15–21.

Frost, G., Darnton, A., & Harding, A. H. (2011). The effect of smoking on the risk of lung cancer mortality for asbestos workers in Great Britain (1971–2005). Annals of occupational hygiene, 55(3), 239-247.

Mihaela, D., Mirela, P., Laura, R., & Dorel, F. (2012). Multiple regression predicting lung cancer based on risk factors–a case study for the industry. Journal of Engineering Studies and Research, 18(1).

Peto, R., Lopez, A.D., Boreham, J., Thun, M., Heath, Jr. C., Mortality from Smoking in Developed Countries 1950-2000. Oxford University Press, Oxford, 1994.

Doll, R., Peto, R., Boreham, J., & Sutherland, I. (2005). Mortality from cancer in relation to smoking: 50 years observations on British doctors. British journal of cancer, 92(3), 426.

Montgomery and Runger (2012) Applied Statistics and Probability for Engineers, John Wiley & Sons., USA

Williamson, D. F., Parker, R. A., & Kendrick, J. S. (1989). The box plot: a simple visual method to interpret data. Annals of internal medicine, 110(11), 916-921.

Mendenhall, W., Beaver, R. J., & Beaver, B. M. (2012). Introduction to probability and statistics. Cengage Learning.

Ray, G., Henson, D. E., & Schwartz, A. M. (2010). Cigarette smoking as a cause of cancers other than lung cancer: an exploratory study using the Surveillance, Epidemiology, and End Results Program. CHEST Journal, 138(3), 491-499.

Gelband, H., & Sloan, F. A. (Eds.). (2007). Cancer control opportunities in low-and middle-income countries. National Academies Press.

# Preparing the Manuscript

## General Considerations

Manuscripts should be kept to a minimum length. Authors should write in clear, concise English, employing an editing service if necessary. For professional assistance with improving the English, figures, or formatting in the manuscript before submission please contact the editorial office by e-mail for suggestions.

The responsibility for all aspects of manuscript preparation rests with the authors. Extensive changes or rewriting of the manuscript will not be undertaken by the Editors.

It is best to use the fonts “Times” and “Symbol.” Other fonts, particularly those that do not come bundled with the system software, may not translate properly. Ensure that all special characters (e.g., Greek characters, math symbols) are present in the body of the text as characters and not as graphic representations. Be sure that all characters are correctly represented throughout the manuscript—e.g., 1 (one) and I (letter I), 0 (zero) and O (letter o).

All text (including the title page, abstract, all sections of the body of the paper, figure captions, scheme or chart titles, and footnotes and references) and tables should be in one file. Graphics may be included with the text or uploaded as separate files. Manuscripts that do not adhere to the guidelines may be returned to authors for correction.

**Articles of all kind.** Use page size A4. Vertically orient all pages. Articles of all kind must be double-spaced including text, references, tables, and legends. This applies to figures, schemes, and tables as well as text. They do not have page limitations but should be kept to a minimum length. The experimental procedures for all of the experimental steps must be clearly and fully included in the experimental section of the manuscripts.

**Nomenclature.** It is the responsibility of the authors to provide correct nomenclature. It is acceptable to use semisynthetic or generic names for certain specialized classes of compounds, such as steroids, peptides, carbohydrates, etc. In such a case, the name should conform to the generally accepted nomenclature conventions for the compound class. Chemical names for drugs are preferred. If these are not practical, generic names, or names approved by the World Health Organization, may be used.

**Compound Code Numbers.** Compounds widely employed as research tools and recognized primarily by code numbers may be designated in the manuscript by code numbers. Their chemical name or structure should be provided. Editors have the discretion of determining which code numbers are considered widely employed.

**Trademark Names.** Trademark names for reagents or drugs must be used only in the experimental section. Do not use trademark or service mark symbols.

## Manuscript Organization

**Title Page.** Title: The title of the manuscript should reflect the purposes and findings of the work in order to provide maximum information in a computerized title search. Minimal use of nonfunctional words is encouraged. Only commonly employed abbreviations (e.g., DNA, RNA, ATP) are acceptable. Code numbers for compounds may be used in a manuscript title when placed in parentheses AFTER the chemical or descriptive name.

**Authors' Names and Affiliations:** The authors' full first names, middle initials, last names, and affiliations with addresses at the time of work completion should be listed.

**Abstract and keywords.** Articles of all types must have an abstract. The maximum length of the Abstract should be 400 words, organized in a findings-oriented format in which the most important results and conclusions are summarized. Code numbers may be used once in the abstract.

After the abstract, a section of Keywords has to be given. Be aware that the keywords, chosen according to the general concept, are very significant during searching and indexing of the manuscripts.

**Introduction.** The rationale and objectives of the research should be discussed in this section. The background material should be brief and relevant to the research described.

**Research articles should include the following:**

- Methodology
- Results
- Discussions and Conclusions

**Methodology.** Materials, synthetic, biological, demographic, statistical or experimental methods of the research should be given detailed in this section. The authors are free to subdivide this section in the logical flow of the study. For the experimental sections, authors should be as concise as possible in experimental descriptions. General reaction, isolation, preparation conditions should be given only once. The title of an experiment should include the chemical name and a bold Arabic identifier number; subsequently, only the bold Arabic number should be used. Experiments should be listed in numerical order. Molar equivalents of all reactants and percentage yields of products should be included. A general introductory section should include general procedures, standard techniques, and instruments employed (e.g., determination of purity, chromatography, NMR spectra, mass spectra, names of equipment) in the synthesis and characterization of compounds, isolates and preparations described subsequently in this section. Special attention should be called to hazardous reactions or toxic compounds. Provide analysis for known classes of assay interference compounds.

The preferred forms for some of the more commonly used abbreviations are mp, bp, $^{o}$C, K, min, h, mL, µL, g, mg, µg, cm, mm, nm, mol, mmol, µmol, ppm, TLC, GC, NMR, UV, and IR. Units are abbreviated in table column heads and when used with numbers, not otherwise.

**Results.** This section could include preparation, isolation, synthetic schemes and tables of data.

**Discussion and Conclusions.** The discussions should be descriptive. Authors should discuss the analysis of the data together with the significance of results and conclusions. An optional conclusions section is not required.

**Sections above (Methodology, Results, Discussion and Conclusions) are not required for review articles.**

**Ancillary Information.** Include pertinent information in the order listed immediately before the references.

*PDB ID Codes:* Include the PDB ID codes with assigned compound Arabic number. Include the statement "Authors will release the atomic coordinates and experimental data upon article publication."

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**Tables.** Tabulation of experimental results is encouraged when this leads to more effective presentation or to more economical use of space. Tables should be numbered consecutively in order of citation in the text with Arabic numerals. Footnotes in tables should be given italic lowercase letter designations and cited in the tables as superscripts. The sequence of letters should proceed by row rather than by column. If a reference is cited in both table and text, insert a lettered footnote in the table to refer to the numbered reference in the text. Each table must be provided with a descriptive title that, together with column headings, should make the table self-explanatory. Titles and footnotes should be on the same page as the table. Tables may be created using a word processor's text mode or table format feature. The table format feature is preferred. Ensure each data entry is in its own table cell. If the text mode is used, separate columns with a single tab and use a return at the end of each row. Tables may be inserted in the text where first mentioned or may be grouped after the references.

**Figures,** Schemes/Structures, and Charts. The use of illustrations to convey or clarify information is encouraged. Remove all color from illustrations, except for those you would like published in color. Illustrations may be inserted into the text where mentioned or may be consolidated at the end of the manuscript. If consolidated, legends should be grouped on a separate page(s). Include as part of the manuscript file.

To facilitate the publication process, please submit manuscript graphics using the following guidelines:

1. The preferred submission procedure is to embed graphic files in a Word document. It may help to print the manuscript on a laser printer to ensure all artwork is clear and legible.

2. Additional acceptable file formats are: TIFF, PDF, EPS (vector artwork) or CDX (ChemDraw file). If submitting individual graphic files in addition to them being embedded in a Word document, ensure the files are named based on graphic function (i.e. Scheme 1, Figure 2, Chart 3), not the scientific name. Labeling of all figure parts should be present and the parts should be assembled into a single graphic.

EPS files: Ensure that all fonts are converted to outlines or embedded in the graphic file. The document settings should be in RGB mode. **NOTE:** While EPS files are accepted, the vector-based graphics will be rasterized for production. Please see below for TIFF file production resolutions.

3. TIFF files (either embedded in a Word doc or submitted as individual files) should have the following resolution requirements:

- Black & White line art: 1200 dpi

- Grayscale art (a monochromatic image containing shades of gray): 600 dpi

- Color art (RGB color mode): 300 dpi

- The RGB and resolution requirements are essential for producing high-quality graphics within the published manuscript.

- Most graphic programs provide an option for changing the resolution when you are saving the image. Best practice is to save the graphic file at the final resolution and size using the program used to create the graphic.

4. Graphics should be sized at the final production size when possible. Single column graphics are preferred and can be sized up to 240 points wide (8.38 cm.). Double column graphics must be sized between 300 and 504 points (10.584 and 17.78 cm's). All graphics have a maximum depth of 660 points (23.28 cm.) including the caption (please allow 12 points for each line of caption text).

Consistently sizing letters and labels in graphics throughout your manuscript will help ensure consistent graphic presentation for publication.

**Image Manipulation.** Images should be free from misleading manipulation. Images included in an account of research performed or in the data collection as part of the research require an accurate description of how the images were generated and produced. Apply digital processing uniformly to images, with both samples and controls. Cropping must be reported in the figure legend. For gels and blots, use of positive and negative controls is highly recommended. Avoid high contrast settings to avoid overexposure of gels and blots. For microscopy, apply color adjustment to the entire image and note in the legend. When necessary, authors should include a section on equipment and settings to describe all image acquisition tools, techniques, and settings, and software used. All final images must have resolutions of 300 dpi or higher. Authors should retain unprocessed data in the event that the Editors request them.

## Specialized Data

**Biological Data.** Quantitative biological data are required for all tested compounds. Biological test methods must be referenced or described in sufficient detail to permit the experiments to be repeated by others. Detailed descriptions of biological methods should be placed in the experimental section. Standard compounds or established drugs should be tested in the same system for comparison. Data may be presented as numerical expressions or in graphical form; biological data for extensive series of compounds should be presented in tabular form.

Active compounds obtained from combinatorial syntheses should be resynthesized and retested to verify that the biology conforms to the initial observation. Statistical limits (statistical significance) for the biological data are usually required. If statistical limits cannot be provided, the number of determinations and some indication of the variability and reliability of the results should be given. References to statistical methods of calculation should be included.

Doses and concentrations should be expressed as molar quantities (e.g., mol/kg, μmol/kg, M, mM). The routes of administration of test compounds and vehicles used should be indicated, and any salt forms used (hydrochlorides, sulfates, etc.) should be noted. The physical state of the compound dosed (crystalline, amorphous; solution, suspension) and the formulation for dosing (micronized, jet-milled, nanoparticles) should be indicated. For those compounds found to be inactive, the highest concentration (in vitro) or dose level (in vivo) tested should be indicated.

If human cell lines are used, authors are strongly encouraged to include the following information in their manuscript:

- the cell line source, including when and from where it was obtained;

- whether the cell line has recently been authenticated and by what method;

- whether the cell line has recently been tested for mycoplasma contamination.

**Confirmation of Structure.** Adequate evidence to establish structural identity must accompany all new compounds that appear in the experimental section. Sufficient spectral data should be presented in the experimental section to allow for the identification of the same compound by comparison.

List only infrared absorptions that are diagnostic for key functional groups. If a series contains very closely related compounds, it may be appropriate merely to list the spectral data for a single representative member when they share a common major structural component that has identical or very similar spectral features.

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