National Cancer Mortality-to-Incidence Ratio in Iran

(2005-2014)
Introduction
Incidence, Mortality and Prevalence of cancers in 2020

**Incidence, both sexes**

- Africa (5.7%)
- Latin America and the Caribbean (7.6%)
- North America (13.3%)
- Europe (22.8%)
- Asia (49.3%)

**Mortality, both sexes**

- North America (7.1%)
- Africa (7.1%)
- Latin America and the Caribbean (7.2%)
- Europe (19.6%)
- Asia (58.3%)

**5-year prevalence, both sexes**

- Africa (4.3%)
- Latin America and the Caribbean (7.6%)
- North America (18.7%)
- Europe (26.7%)
- Asia (40.8%)
Cancer ranks as a leading cause of death

According to estimates from the World Health Organization (WHO) in 2019, cancer is the first or second leading cause of death before the age of 70 years in 112 of 183 countries and ranks third or fourth in a further 23 countries.

Cancer's rising prominence as a leading cause of death partly reflects marked declines in mortality rates of stroke and coronary heart disease, relative to cancer, in many countries.
Cancer death in different years

The number of cancer-related deaths in 2000 was about 6 million, in 2005 it was 7.6 million, and in 2007 it was 7.9 million, representing a 32% increase in the number from 2000 to 2007. In 2012, there were about 14 million new cases and 8.2 million deaths related cancer, 57% of which occurred in developing countries.
Estimated number of cancer new cases from 2020 to 2040
Estimated number of cancer death from 2020 to 2040
World population pyramid in 2020 and 2040

- **2020 Population:** 7,794,798,729
- **2040 Population:** 9,198,847,382
Factors affect burden of cancer

The burden of cancer incidence and mortality is rapidly growing worldwide; this reflects both aging (change in population age pyramid) and growth of the population as well as risk factors and harmful life style for cancer, several of which are associated with socioeconomic development.
Factors affect burden of cancer

• Changing in **fertility rate and life expectancy** are two main factors affecting population pyramid.

• Changing the view of cancers from **infection-related cancers** such as stomach, cervix, and liver to **life style-related cancers** such as breast and prostate.

• Incidence rate of most cancers is **twice to 3 times** higher with high or very high HDI regions.

• **Difference in mortality rate is low** (higher rate of cancer with low survival rate in the countries with low HDI)
Population pyramid of Iran (I.R.I)
Mortality / Incidence ratio

Mortality/Incidence ratio (MIR) is an index for evaluating the cancer burden and patient’s care. It was introduced as a simple and effective index for cancer control programs. It reveals the quality of health system and its relationship with cancer outcomes and represents the difference between the results of cancer management in countries.
Methods
Methods

• National cancer and death registry data (2005-2014) were used

• Duplicated data from 2010-2013 (adjusted based on name, family name, father name, and ICD-O code. In addition, the data were completed by adjusting the sex by cancer type and name of patients) were removed
Methods

• Statistical Center of Iran for data population. (For estimating indices such as incidence and mortality rates, we need population in each year and for standardizing these indices, we need population in 5 years’ age groups).

• Number of population in each year: Population in the base year plus growth percent rate in each year.

• Number of population for 5 years’ age groups (in this manner)
Methods

• To analyze the data, the frequency of new cases, incidence rate, age-specific incidence rate, and age-standardized incidence rate were calculated.

• To calculate the ASIR, world standard population in 18 age groups were used. All of these rates were reported in 100,000 population.

• After calculating standardized indices for each year, the plot for the trend of these indices in the 10 years was provided.
Methods

• Number of deaths each year, mortality rate and age-specific as well as standardized mortality rate, were estimated.

• Plot, showing the trend of the mortality changes during this time were provided.

• Mortality/ incidence ratio or MIR was calculated. (Age standardized mortality rate (ASMR) in numerator and age standardized incidence rate (ASIR) in denominator).
Methods

• For calculating the ranking of cancer in this period:
  • 10 years’ data of all cancers were merged
  • Ranked based on total number of new cases for 10 common cancers
  • Age distribution of total cases in 10 years’ for total patients and both sexes were estimated
Results
Results

• Almost 9% -10% of duplicated data were extracted each year.

• During 10 years, 836 436 new cancer cases were registered, which contained 455467 males (54.4%) and 380960 females (45.6%).

• The Male/Female ratio was estimated as 1.19.
Trend of ASIR and population during 2005 to 2014

• Growing trend in ASIR for both sexes in all of the cancers
• Increasing trend was higher in incident cases than population growth
Trend of ASIR and ASMR based on sexes during 2005 to 2014

- ASIR was $158.41/10^5$ and $158.22/10^5$ as the highest item.

- This growing trend in ASIR was seen based on sex. Growing rate in ASIR was higher in male than female.

- The highest ASIR in males was $177.44/10^5$ in 2014 and $143.09/10^5$ for females in 2011.

- Decreasing trend in ASMR was seen based on sex.

- ASMR was higher in male diagram than female.
Trend of ASMR during 2005 to 2014

ASMR decreased from 2005 to 2014, being $81.72 \times 10^5$ in 2005 and $50.6 \times 10^5$ in 2014.
Dual bar of incidence and mortality in different years

Decreasing trend of death was seen from 2005 to 2014
ASMR/ASIR (MIR) during 2005-2014

Decreasing trend of MIR was seen from 2005 to 2014
Age distribution of cancer cases during 2005 to 2014 in total and both sexes

Age groups of 60 to 64 years and 55 to 59 years contain the highest number of cancers
Age distribution of cancer cases during 2005 to 2014 in total and both sexes

Age distribution in male and female were different in all age groups and in younger age the frequency was higher in females in 25 - 55 years and the rest are higher in males
Distribution of cancers

C

Distribution of Cancer in Both Sexes

A

Distribution of Cancer in Males

B

Distribution of Cancer in Females
Discussion
Discussion

• Assessment of cancer-specific mortality rate is an acceptable tool to evaluate secondary and tertiary prevention services; that is to be able to determine the early detection and quality of care.

• Cancer is more complicated compared with other NCDs, because of its natural biological status and heterogeneities, epidemiological indicators will be represented as the management of cancer in each country.
Discussion

• In the world, total fertility rate (TFR) is declined by 49.4% from 1950 to 2017 (4.7 live births in 1950 and 2.4 live births in 2017).

• In Iran, TFR is also declined through the last 40 years (from 4.2 to 1.8)

• The population growth rate is declined from 2.46 in 1991 to 1.24 in 2016
Discussion

- During the last 30 years, the population < 14 years is declined (45.5% to 24%) and the population >65 years old is rising up (5.5 in 1987 to 9.28 in 2017), and it is estimated to be 21% in 2051.

- Although TFR is declined, the population is increased each year with the average of 83.8 million from 1985 to 2017 in the world.

- In Iran, the population is increased from 40835000 in 1981 to 82377228 in 2019.

- Age standardized death rate per 100,000 in 2017 was 121.2, which is declined by 4.4% compared to 2007 and became 116.8.
Discussion

• Regarding increase in age standardized incidence rate of cancer cases, and decrease in the age standardized death rate, this feature is related to cancer in the world and it is similar to the features that may be find in Iran.

• Management of cancer in Iran is acceptable compared to the developed countries;
  ✓ Public awareness about requesting medical care.
  ✓ Increasing accessibility and availability of medical care facility including man power.
  ✓ Progression of team work for early diagnosis and better management through the country.
Discussion

• The growth rate of cancer at next 20 years (2020 to 2040):

  56.7% for world, 68% for Turkey (as a simple in the region), 59.2% for Asia, and 94.3% for Iran, which means the cancer cases in Iran will become about twice more during next 20 years.

• The rate of population >60 years in Iran about 10.3% in 2020, 12.5% in 2030, 20.3% in 2040 and 28.7% in 2050.
Discussion

• The TFR and life expectancy are important issues; population is getting older and it is notable reason for increasing cancer cases in Iran.

• The trend of population and cancer incidence during 10 years of study are not compatible and the incidence rate of cancer changed from 75 to 141 per 100000.
Discussion

• The trend of ASMR to ASIR, which is called MIR, is very interesting during 10 years of study from 2005 to 2014.

• It is changed from 0.79% to 0.32%, meaning that nowadays more than 70% of cancer cases will survive each year, and it is a good tool for the assessment of secondary and tertiary prevention of cancer in Iran.
Conclusion

• The population of Iran is steadily increasing
• The rate of aged people is increasing rapidly
• The incidence rate of cancer is rising up
• The mortality rate is going down
• The assessment of cancer management in Iran is acceptable compared to the developed countries.