Original Article

The Trend of Death Rate and Causes of Death Based on the ICD-10 among Young People in Iran within the Last Three Decades

*Mahdiyeh Heydari, Khadijeh Yarifard, *Maryam Tajvar*

Department of Health Management, Policy and Economics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

***Corresponding Author:** Email: mtajvar@tums.ac.ir*

Abstract

Background: Youth is undeniably the most important resource of any country. This study aimed to determine the trend of mortality rate and the cause of death, based on the ICD-10, among young people in Iran and examines significance of the changes in any cause during the last three decades.

Methods: The present study is a secondary analysis of data, which examines the trend of death rate and its causes among young adult, aged 15-24 yr, longitudinally during 1990-2019. The data source was the GBD website. Linear Regression analysis was used to measure the slope of changes in mortality rates and causes of death during the period, where "time" was the independent variable and "mortality rate" and "causes of mortality" were dependent variables.

Results: The death rate of young people declined by 56% during the period, equal to an average of 2.17 units per year. The most common cause of death has been injuries (69%), then NCDs (25%), and finally communicable diseases (6%). However, death due to injuries (except SUD), communicable diseases (except HIV), and NCDs (except musculoskeletal disorders) declined significantly by 1.43, 0.3, and 0.09 units per year, over 30 yr respectively.

Conclusion: Examining past trends in death rates and causes strengthens insights into the state and future trends in health and death-related indicators, which are crucial for policy-making, especially in developing countries with limited resources.

Keywords: Leading causes of death; Trend; Mortality; Young people

Introduction

Youth is undeniably the most important workforce and human resource of any country, to boost its socioeconomic development (1). Mortality rate among young people and identifying the leading causes of death in this age group is one of the fundamental priorities of any community and a part of the Millennium Development Goals (MDGs) (2). To report the cause of death, the framework of the International Classification of Diseases-10th Revision (ICD-10), developed by the World Health Organization (WHO), was used in this study. Based on the ICD-10, the causes of death have been categorised to three main groups including Injuries, Non-communicable diseases (NCDs), and Communicable diseases. Among young people aged 15–29,

based on Blum and Nelson-Nmari, there are five leading causes of death globally, including unintentional injuries, HIV/AIDS, other communicable diseases, violence, and suicide, with substantial regional variation in the number of deaths due to each cause (3).

The Islamic Republic of Iran, with 83 million inhabitants (4) is currently relatively a young country with a share of 14% of its population in the age group of 15-24 yr old (5). In the best of our knowledge, no study yet has conducted in Iran with regard to the trend of leading causes of death among young people longitudinally. There are only evidences from cross-sectional studies or unpublished governmental reports showing that the Cardiovascular Diseases (CVDs), cancers, and motor vehicle accidents are the major causes of death in the Iranian youth, with maximum years of life lost due to motor vehicle accidents, the CVDs and cancers, respectively (6). Moreover, 57% of all Years of Life Lost (YLL) is in the age group of 15 to 29 years old (7). The YLL due to Road Transport Injuries (RTI) in Iran is higher than the world and the Eastern Mediterranean Region (8).

The aim of this study was to conduct a trend analysis to pinpoint of movements and fluctuations in mortality rates, in addition to the leading causes of mortality among young people aged 15-24 yr in the last three decades. Analysis of data longitudinally using continuous or repeated measures, extend beyond a single point in time such as cross-sectional data, would help to follow specific events over long periods of time, often years or decades, which is useful for assessing the relationship between dependent and independent factors. In addition to be useful for detecting a sequence of events during times, trend analysis also allows to predict possible movements and changes of events in future (9). For planning for preventions, it is helpful to understand the trend of rate and main causes of death during the last decades, allowing for better prediction of future movements in the causes of mortalities in young adults.

Materials and Methods

This secondary analysis of data examines longitudinally the trends of mortality of young adult in Iran and their causes of death during the years 1990-2019, based on the availability of data in this period. The age group considered in this study is based on the definition of the WHO of young adult, which includes the age range of 15-24 yr old (10). The data for this study collected from the Global Burden of Disease (GBD) website, belonging to the Institute for Health Metrics and Evaluation (IHME), which is publicly available (11). Report of the causes of youth mortality in the GBD website is also available in the ICD-10 format, which divides the causes into 3 main categories including communicable, maternal, neonatal, and nutritional causes; NCDs; and injuries, as well as 21 sub-categories.

However, in the GBD website, the death rate and its causes are available in 5-year age intervals, so that these data for the age groups of 15-19 yr and 20-24 yr are reported separately. Therefore, calculations were conducted to provide the mortality rate in a ten-year age range (15-24 yr).

Calculations of descriptive statistics and preparation of the Figures were performed using Excel software. In addition to descriptive analyses to show the trend of mortality rate and its causes over time in Iran, to examine whether the observed changes of deaths by cause have been statistically significant, Linear Regression analysis was used. In fact, this analysis was used to measure the slope of changes in mortality rates and causes of mortality in Iran, where "time" was the independent variable and "mortality rate" and "causes of mortality" were dependent variables. This similar analysis was performed in other studies(12-14). All Regression analyses were performed in Stata software, version 14. Significance level was considered as less than 0.05.

Results

The death rate of young people aged 15-24 in Iran during the 30-year period declined by 56%

and reached from 195 deaths per 100,000 population in 1990 to 85 deaths in 2019. The results showed a decline in mortality rates in the first year of the period (1990 to 1991) with a steep slope and then slightly downward slope until 2002, but increased sharply in 2003 from 155 deaths per 100,000 to 85 deaths per 100,000 and

finally a downward trend until 2019 (Fig. 1). Regression analysis showed the mortality rate of young people decreased significantly by an average of 2.17 units per year during the period, which was a faster decline rate among men than women (Coef. -2.9 vs. -1.44) (Table 1).

Table 1: Regression coefficient of changes in the trend of youth mortality rate aged 15-24 in Iran during the years 1990-2019

	Mortality Rate		*Coef.*	*95% CI*	*P*
	1990	2019			
Both sex	195.3	85.8	-2.17	-2.7 , -1.65	<0.001
Male	272.3	122.7	-2.9	-3.62 , -2.18	<0.001
Female	115.6	47.3	-1.44	-1.74 , -1.14	<0.001

However, as also shown in Fig. 1, although the mortality rate of men was higher than women was throughout the period, the gap between men and women were gradually narrowing, so that the difference reached from 157 deaths per 100,000 in 1990 to 75 deaths per 100,000 in 2019. Among

both men and women, the death rate in the age range of 20-24 yr was higher than the age range of 15-19 yr old. Moreover, in women aged 15-24, the mortality rate had an upward trend from 2009 to 2011, which was higher in the age group of 20-24 yr old.
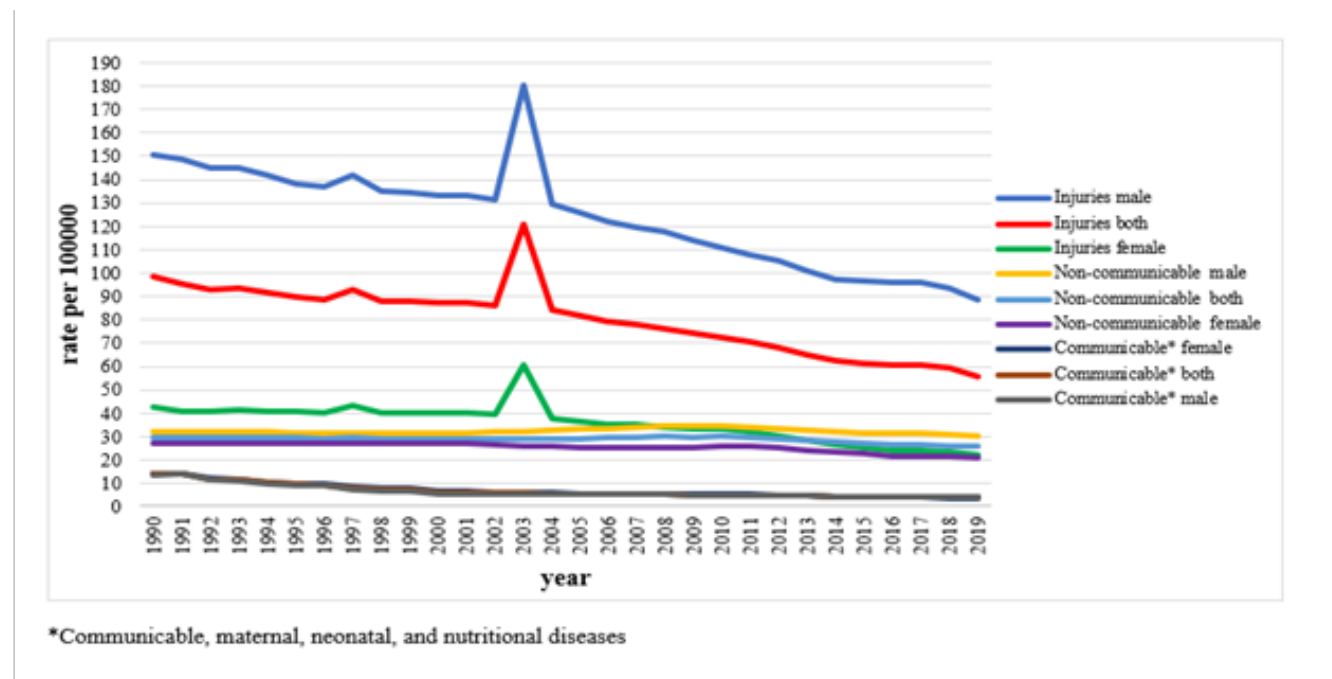

*Communicable, maternal, neonatal, and nutritional diseases

Fig. 1: Youth mortality rate based on gender and age in Iran

The trend of causes of death by the three main categories, by gender over a period of 30 yr are shown in Fig. 2. Of the three main categories, the most common cause of death among young people has been injuries (69%), and then NCDs (25%) and finally communicable diseases (6%).
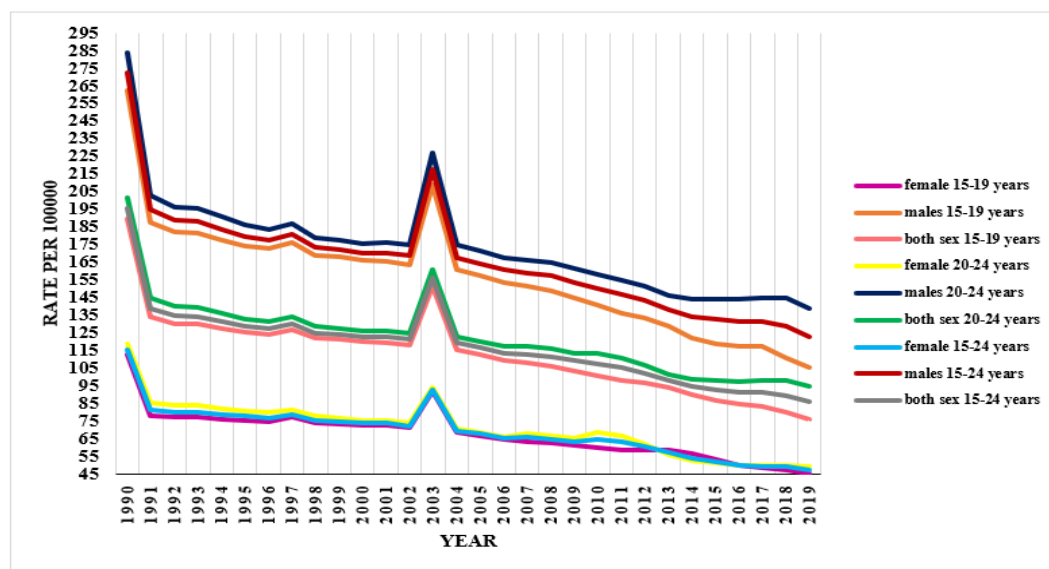

Fig. 2: The trend of the three main causes of death among youth adults in Iran by gender in 1990-2019

The mortality rate due to injuries has fallen from 98 in 1990 to 58 in 2019, picked up to 121 deaths in 2003 and then declined again. The mortality rate due to injuries was higher in young men than women was, although its downward slope was higher in women; during this period, death due to injuries decreased by 48% in women and 41% in men. With regard to the second cause, the NCDs, first it had a downward direction with a gentle slope for ten yr (from 1990 to 1999), then had an upward trend until 2013, and reached its highest rate at about 28 deaths per 100,000 in 2013. Then it had a downward trend again in 2019, reaching its lowest level at about 25 deaths per 100,000. Deaths by NCDs were also higher in men than women were. Death due to the communicable diseases also had a slightly declining trend; it decreased from about 14 deaths per 100,000 young people in 1990 to 4 deaths per 100,000 in 2019 (Fig. 2).

Moreover, the trend of 21 sub-causes of mortality, which are, in fact, subsets of the aforementioned three main causes, was also presented in Fig. 3. We combined the 13 less prevalent causes together in one group, to make the figure clearer. Additionally, Table 2 was created to show the result of regression analysis of the significance of the changes of the three main causes and the 21 sub-causes of mortality throughout the time period. Based on Table 2, the mortality rate of young people due to injuries significantly decreased, on average by 1.43 units per year during the period ($P<0.001$). Moreover, death due to the communicable diseases, had a declining trend by 0.3 units per year, over 30 yr ($P<0.001$). In addition, the average mortality rate due to the NCDs had a statistically significant decrease by 0.09 units per year during the period.
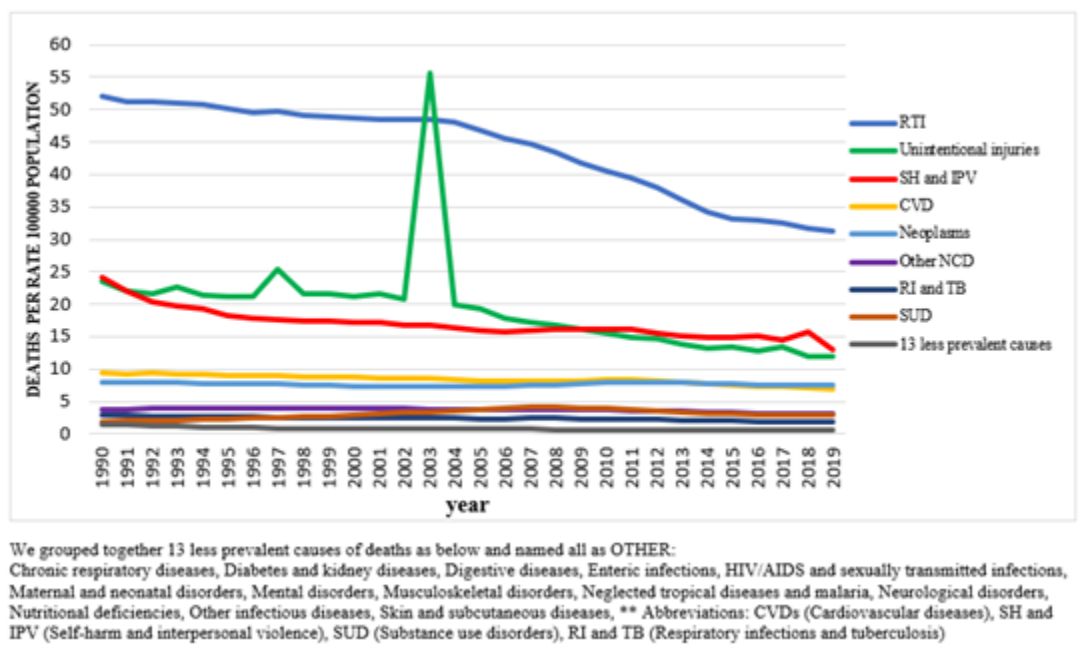
We grouped together 13 less prevalent causes of deaths as below and named all as OTHER:
Chronic respiratory diseases, Diabetes and kidney diseases, Digestive diseases, Enteric infections, HIV/AIDS and sexually transmitted infections, Maternal and neonatal disorders, Mental disorders, Musculoskeletal disorders, Neglected tropical diseases and malaria, Neurological disorders, Nutritional deficiencies, Other infectious diseases, Skin and subcutaneous diseases, ** Abbreviations: CVDs (Cardiovascular diseases), SH and IPV (Self-harm and interpersonal violence), SUD (Substance use disorders), RI and TB (Respiratory infections and tuberculosis)

Fig. 3: The trend of 21 causes of death in people aged 15-24 in Iran in 1990-2019

Table 2: Regression coefficient of changes in the trend of three main causes and 21 sub-causes of death based on the ICD-10 among people aged 15-24 in Iran during the years 1990-2019

Main causes	Sub-causes	Coef.	95% CI	P
Communicable, Maternal, Neonatal, and Nutritional Disease	1-004- Enteric infections	-0.36	-0.037, -0.035	<0.001
	1-020- HIV/AIDS and Sexually Transmitted Infections (STIs)	0.012	0.01, 0.013	<0.001
	1-005- Respiratory Infections and Tuberculosis (RI and TB)	-0.032	-0.036, -0.023	<0.001
	1-087- Maternal and neonatal disorders	-0.044	-0.047, -0.040	<0.001
	1-021- Neglected Tropical Diseases (NTDs) and malaria	-0.16	-0.21, -0.11	<0.001
	1-051- Nutritional deficiencies	-0.004	-0.005, -0.004	<0.001
	1-025- Other infectious diseases	-0.030	-0.034, -0.026	<0.001
	Total	-0.3	-0.357, -0.242	<0.001
Non-Communicable Disease (NCDs)	1-069- Cardiovascular Diseases (CVDs)	-0.077	-0.084, -0.07	<0.001
	1-054- Diabetes and kidney diseases	-0.001	-0.003, 0.001	0.14
	1-078- Digestive diseases	-0.017	-0.021, 0.013	<0.001
	1-055- Mental disorders	0.001	0.00, 0.001	<0.001
	1-083- Musculoskeletal Disorders (MSDs)	0.008	0.008, 0.009	<0.001
	1-026- Neoplasms	-0.003	-0.013, 0.007	0.5
	1-058- Neurological disorders	-0.011	-0.013, 0.010	<0.001
	1-077- Chronic Respiratory Diseases (CRDs)	-0.009	-0.012, 0.007	<0.001
	1-082- Skin and subcutaneous diseases	0.001	0.00, 0.00	<0.001
	1-094- Other NCDs	-0.027	-0.033, -0.022	<0.001
	Total	-0.091	-1.3 , -0.052	<0.001
Injuries	1-101- Self-Harm and Inter-Personal Violence (SH and IPV)	-0.23	-0.27, -0.18	<0.001
	1-056- Substance Use Disorders (SUD)	0.04	0.02, 0.07	<0.001
	1-096- Road Transport Injuries (RTI)	-0.76	-0.85, -0.67	<0.001
	1-103- Unintentional injuries	-0.44	-0.74, -0.14	0.005
	Total	-1.43	-2.28, -1.27	<0.001

Based on Fig. 3, death due to the RTI, under the "injuries" category, was the most common cause of death of young people. This cause, which led to about 52 deaths per 100,000 people in 1990 to 31 deaths per 100,000 in 2019. Death in this category has decreased, on average, by 0.76 units per year during the period, which was statistically a significant change (Table 2). "Unintentional injuries" and "self-harm and interpersonal violence" (SH and IPV) have been the second and third leading causes of death among young people, respectively. Deaths due to unintentional injuries were about 23 in 1990, had a downward trend until 2002, then the trend reversed until 2003 and reached to 55 deaths, after which it decreased again and reached its lowest level, at about 12 deaths in 2019. However, the trend, on average was declining by 0.44 units per year during the period, similar to the falling trends of mortality due to SH and IPV with an annual regression coefficient of 0.23. The mortality rate due to the SH and IPV overlapped from 2008 to 2010 and affected youth mortality to the same extent. Another cause of injuries is associated with "substance use disorders", which, had an upward trend of about 2 deaths since 1990, reached to 4 deaths in 2009 and then had a downward trend until 2019 and reached to about 3 deaths (Fig. 3). Analysis revealed that "substance use disorders", in contrast with other subsets of the Injury category, had a significant rising trend over time with a regression coefficient of 0.04 ($P<0.001$).

In the category of NCDs, 'CVDs' and 'neoplasm' have been main causes of death (Fig. 3). Youth mortality rate due to the CVDs was slightly higher than neoplasm from 1990 to 2012. After that, both causes had an equal impact on youth mortality from 2013 to 2019, which reached about 7 deaths in 2019. Regression analysis showed that CVDs had a significant downward trend of 0.077 units per year. Death from neoplasm had a downward trend with an annual regression coefficient of 0.003. Of other causes of death under the NCDs category, according to Table 2, "Mental disorders", "Musculoskeletal disorders" and "Skin and subcutaneous diseases" all had a statis-

tically significant rising trend during the last three decades.

Under the category of communicable diseases, according to Fig. 3, the mortality rate due to "respiratory infections and tuberculosis", was about 3 deaths in 1990, having a downward trend with a gentle slope, finally, decreased to about 2 deaths by 2019. On average, deaths due to this cause decreased by 0.032 units per year during the period. Overall, of the 7 subcategory causes of death under the main cause of communicable diseases, which were responsible for lower mortality rate among young people, compared to the other main causes, 6 causes showed a significant falling trend, while the deaths due to "HIV/AIDS and sexually transmitted infections" witnessed a significant rising trend (Table 2).

Discussion

This study tried to looks back on the trend of mortality of young people during the last decades and how the main causes of deaths, which classified based on the ICD-10 framework (13), have been changed during the same period. Examining past trends in death rates and causes strengthens insights into the state and future trends in health and death-related indicators, which are crucial for policy-making, especially in developing countries with limited resources.

Although the mortality rate reduced by 56% during the period, a surprising upward rate was observed in 2003 (Fig. 1). The cause of this sudden increase in mortality in 2003 might be attributed to the massive earthquake of Bam city on Dec 26, 2003, which killed about 25,514 people, including many young people (15). According to the findings, the mortality rate was higher among young men compared to women. In other studies, young men of all ages in the world has also higher death rates than women except in Africa and Southeast Asia, mostly attributed to maternity- related factors (16). The mortality rate in Iranian men were examined and showed ischemic heart disease, RTI and ischemic stroke were the

most common causes of death among Iranian adult men in 2016 (17).

The most common cause of mortality among Iranian youth has been "injuries" during the study period and the "RTI" was the most prevalent sub-cause. Globally, Injuries and specially RTI, responsible for 4.4 million death of young people in 2017, are one of the main causes of death and disability, putting a major strain on global health (18). According to literature, almost 90% of injuries occur in Low and Middle-Income Countries (LMICs) (19) and Iran have the highest rate compared to other LMICs (20). Based on the literature, in Iran the highest number of deaths due to RTI is among men and in the age group of 15-24 yr and 34-35 yr (42% of the total mortality) (21). A high percentage of deaths in this age group could be due to more involvement in road transport, greater tendency for high-risk activities, and less tendency to follow traffic rules(22). RTI in Iran are estimated to cause a loss of 2271 years of life each year, as well as financial loss of $ 6 billion (23).

During the last decades, after RTI, "unintentional injuries" have been the second frequent death cause and the SH and IPV have been responsible of most deaths as the third important causes of death. In Iran, the number of deaths due to attacks with firearms and sharp objects increased during the study period 1990-2015 (24). The trend of suicide attempt or SH is increasing in Iran (25). There is an evidence that the number of deaths due to IPV in the EMRO compared to global trend, have had a higher rise in recent years due to the recent widespread conflicts in this region (26). Findings of a systematic review in the EMRO showed that mortality due to "SH and IPV" increased among those aged 0-19 yr and tripled during the years 1990 to 2017, although death rate due to "RTI" and "other unintentional injuries" have been decreased during the same period (27). The global pattern of mortality in young people was examined and found SH and suicide were increased in young men and women and was the second most common cause of death in this age (16). The role of parental divorce, hormonal fluctuations that disrupt their

mental state and access to firearms are SH-related factors in this population (28). However, regression analyses indicated that all of the four sub-causes of "injuries", had a statistically significant downward trend, except death due to Substance Use Disorders (SUD), which had a significant upward trend during the last decades (Table 2). Thus, although the other three sub-causes of injuries, especially RTI, leads to considerably more deaths among young people, the SUD, on the other hand, needs special attention due to its increasing rate. Recent studies in Iran indicates an increasing rate of tendency to drug abuse such as Tramadol, Ritalin, Pethidine, and Morphine, especially among young people (29). SUDs are concurrence with other problems such as depression, mood disorders, anxiety disorders, and personality disorders that make the situation more difficult to resolve (30). Poverty, family problems, marital discord, inappropriate patterns of assimilation, unemployment, academic failure and psychological problems and underlying factors for the tendency towards addiction among young people (31). Restricting access to drug use, increasing awareness on high-risk age groups are recommended to combat with drug abuse (32).

The NCDs have been the second main causes of death of young people during the last three decades, and of its sub-causes, death due to the CVDs and neoplasm caused the highest mortality rate among people aged 15-24 years. Based on predictions, there is no change in diagnostic methods and the status of risk factors, the number of new cases of cancer in Iran will increase to 54% by 2035 (33). Therefore, increasing awareness of risk factors, signs and symptoms of cancers should be considered as a priority in cancer control planning, especially in younger female population, subject to be in higher risk of breast cancer (34). The NCDs is actually very important for considerations. Except death due to the CVDs, which was the only sub-category of the NCDs with a significant downward trend, the other sub-categories including 'Neoplasm', 'Diabetes and kidney diseases', 'Mental disorders', 'Musculoskeletal disorders', and 'Skin and subcu-

taneous diseases' all showed a growing trend, thus, needs highly special considerations.

The third leading cause of death among young people is called as 'communicable, maternal, neonatal, and nutritional diseases', which has a lower mortality rate among young people than the other two main causes mentioned. Over the past decades, the prevalence of infectious diseases has decreased significantly. However, in this category, "HIV/AIDS and sexually transmitted infections" was the only sub-category witnessing a significant rising trend. The result of a recent study indicated that, of all causes of maternal mortality in Iran, HIV/AIDS have been the only one, making more deaths and have had a growing trend during the last three decades (13). Therefore, special attention should be paid to this cause by health authorities in Iran.

The findings of this study are highly reliable due to the use of accurate and complex statistical analysis and can provide a basis for researchers to perform many other studies. However, this study also has some limitations, the most important of which is the estimated data of the GBD, which is the basis of this study. Since the data related to the causes of death are not available anywhere else and these data are not complete and accurate even at the level of Ministry of Health of countries, and are also considered highly confidential and not available to researchers, the only solution is to use estimated international data sources such as the GBD.

Conclusion

Examining past trends in death rates and causes strengthens insights into the state and future trends in health and death-related indicators, which are crucial for policy-making, especially in developing countries with limited resources. Due to considering data from about three decades in this country and comparing it with EMRO countries and global in the same period, are of great importance, especially compared to cross-sectional or short-term studies and can be used by health policy makers in the country in predicting the causes of youth death in the future.

Journalism Ethics considerations

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Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Msigwa R, Kipesha EF (2013). Determinants of youth unemployment in developing countries: Evidences from Tanzania. *J Econ Sustain Dev*, 4(14):67-76.
2. Sachs JD (2012). From millennium development goals to sustainable development goals. *Lancet*, 379(9832):2206-11.
3. Blum RW, Nelson-Mmari K (2004). The health of young people in a global context. *J Adolesc Health*, 35(5):402-18.
4. "National Census Preliminary Results Released: Iran's Urban Population Up". https://financialtribune.com/
5. "Iran Demographics Profile 2019". Available from: https://www.indexmundi.com/iran/demographics_profile.html. Access date: 2020/5/23.
6. Mirhashemi AH, Motamedi K, Hossain M, Mirhashemi S, Taghipour H, Danial Z (2017).

Prevalent causes of mortality in the Iranian population. *Hosp Pract Res*, 2(3):93.

7. Caruana EJ, Roman M, Hernández-Sánchez J, Solli P(2015). Longitudinal studies. *J Thorac Dis*, 7(11):E537-40.

8. Naghavi M, Abolhassani F, Pourmalek F, et al (2009). The burden of disease and injury in Iran 2003. *Popul Health Metr*, 7:9.

9. Izadi N, Najafi Farid F, Khosravi A, Hashemi Nazari S, Salari A, Soori H (2014). Estimation of mortality and calculated yr of lost life from road traffic injuries. *J Mazandaran Univ Med Sci*, 24(112):51-8.

10. Currie C, Zanotti C, Morgan A, et al (2012). Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey . Health Policy for Children and Adolescents.

11. Global Burden of Disease(GBD). https://globalhealth.org/programs/2023ghb b/?gclid=Cj0KCQiAnfmsBhDfARIsAM7M Ki0dJkmSmNZttiOksj_MNIz-8yv93H_FEWaBODnyQBq6hKFWXtiHiS EaAt13EALw_wcB

12. YariFard K, Tajvar M, Heydari M(2022). Analysis of Trend of Death Rate and Leading Cause of Death among Young People in Eastern Mediterranean Countries during 1990-2019. *Iranian Journal of Epidemiology*, 18(1):79-90.

13. Tajvar M, Yaseri M, Mosadeghrad A, Zalvand R (2019). Trends in the Causes of Maternal Mortality in Iran and other Countries in the Region During the Years 1990–2016. *J Babol Univ Med Sci*, 21(1):390-7.

14. Zalvand R, Yaseri M, Mosadeghrad AM, Tajvar M (2019). Determinants of maternal mortality in Iran 1990-2015: a longitudinal study. *Tehran Univ Med J*, 77(2):82-91.

15. Najafi I, Safari S, Sharifi A, et al (2009). Practical strategies to reduce morbidity and mortality of natural catastrophes: a retrospective study based on Bam earthquake experience. *Arch Iran Med*, 12(4):347-52

16. Patton GC, Coffey C, Sawyer SM, et al (2009). Global patterns of mortality in young people: a systematic analysis of population health data. *Lancet*, 374(9693):881-92.

17. Borumandnia N, Majd HA, Khadembashi N, Heidary S (2019). Clustering of the Deadliest Diseases among Iranian Men from 1990 to 2016: A Growth Mixture Model Approach. *J Res Health Sci*, 19(3):e00457.

18. Harikrishnan S, Jeemon P, Mini G, et al (2018). Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*, 392(10159):1736-1788.

19. World Health Organization (2014). Injuries and violence: the facts 2014. World Health Organization. https://apps.who.int/iris/handle/10665/149 798

20. Azami-Aghdash S, Sadeghi-Bazarghani H, Heydari M, et al (2018). Effectiveness of interventions for prevention of road traffic injuries in Iran and some methodological issues: a systematic review. *Bull Emerg Trauma*, 6(2):90-99.

21. Yadollahi M, Gholamzadeh S (2019). Five-Year Forecasting Deaths Caused by Traffic Accidents in Fars Province of Iran. *Bull Emerg Trauma*, 7(4):373-380.

22. Mahdian M, Sehat M, Fazel MR, Moraveji A, Mohammadzadeh M (2015). Epidemiology of urban traffic accident victims hospitalized more than 24 hours in a level III trauma center, Kashan county, Iran, during 2012-2013. *Arch Trauma Res*, 4(2): e28465.

23. Ayati E, Ghadirian F, Ahadi M (2008). Estimation of the cost of damage to vehicles in rural road accidents in Iran. *Journal of Transportation Research*, 5(1):1.

24. Amanat M, Naghdi K, Saeedi Moghaddam S, et al (2021). The trend of interpersonal violence mortality at national and provincial levels in Iran from 1990 to 2015. *J Interpers Violence*, 36(21-22): 10239-10266.

25. Rostami C, Daliri S, Sayehmiri K, et al (2016). The incidence of suicide attempt in Iran (2001-12): A meta-analysis. *J Kermanshah Univ Med Sci*, 19(7): e69752.

26. Mokdad AH, Moradi-Lakeh M, Charara R, et al (2018). Intentional injuries in the Eastern Mediterranean Region, 1990â 2015: findings from the Global Burden of Disease 2015 study. *Int J Public Health*, 63(Suppl 1):39-46.

27. Al-Hajj S, El Bcheraoui C, Daoud F, et al (2020). Child and adolescent injury burden in the eastern mediterranean region: Findings from the Global Burden of Disease 1990-2017. *BMC Public Health,* 20:433.

28. Cash SJ, Bridge JA (2009). Epidemiology of youth suicide and suicidal behavior. *Curr Opin Pediatr,* 21(5):613-9.

29. Dehghani K, Zare A, Dehghani H, et al (2010). Drug abuse prevalence and risk factors in students of Shaheed Sadoughi university of medical sciences, Yazd. *Journal of Shahid Sadoughi University of Medical Sciences,* 18(3):164-9.

30. Fletcher JB, Swendeman D, Reback CJ (2018). Mental health and substance use disorder comorbidity among methamphetamine-using men who have sex with men. *J Psychoactive Drugs,* 50(3):206-13.

31. Naroee m (2019). "Intervesting The Causes and Related Factors in Youth Trend in Drug Abuse (case study of Jolgeh Chah Hashem area)". *The Journal of New Advances in Behavioral Sciences,* 4(34):46-58 [In Persian].

32. Rostami M, Karamouzian M, Khosravi A, Rezaeian S (2018). Gender and geographical inequalities in fatal drug overdose in Iran: A province-level study in 2006 and 2011. *Spat Spatiotemporal Epidemiol,* 25:19-24.

33. Mohebbi E, Nahvijou A, Hadji M, et al (2018). Iran Cancer Statistics in 2012 and projection of cancer incidence by 2035. *Basic Clin Cancer Res,* 9(3):3-22.

34. DeSantis CE, Fedewa SA, Goding Sauer A, et al (2016). Breast cancer statistics, 2015: Convergence of incidence rates between black and white women. *CA Cancer J Clin,* 66(1):31-42.