



## Cervical Cancer Incidence and Mortality in Tbilisi

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**ABSTRACT**

According to the GLOBOCAN/IARC (2013) estimated 530 000 cases of cervical cancer incidence and 275 000 cervical cancer related deaths were registered worldwide in 2008. Epidemiological study on clarification of the burden of cervical cancer in Tbilisi has been carried out at the University of Georgia. Primary data on 3773 cases of cervical cancer incidence during the years 1998-2010 was obtained from the National Center for Disease Control and Public Health (NCDC) and National Statistics Office of Georgia (GEOSTAT) provided data on 5440 cancer related death cases in female population in Tbilisi during the years 2003 - 2007.

Basing on descriptive data analyses, it was identified that the burden of cervical cancer in female population in Tbilisi, presents the important problem of medical and social character. Cervical cancer incidence rate in Tbilisi (ASR=37,0‰) corresponds to the average rate of incidence in the world developing countries and mortality rate caused by this disease (ASR=3,6‰) corresponds to the same level of the developed countries. Dynamics of the disease shows the increase of the cervical cancer incidence. During the study period, cervical cancer incidence rate has increased by 1.5 times (SRR) and 53.9 % (SIR). The peak level of cervical cancer incidence was registered in the age group 40-44. Cervical cancer was the sixth most common cause of death in the structure of cancer related deaths with the ratio 2.9% of all cases. Recommendations have been developed basing on the results of the study.

**KEYWORDS :** cervical cancer, incidence, mortality, disease burden, epidemiological study, descriptive indicators, Tbilisi.

**Problems Statement:**

In the modern world, the burden of diseases is significantly defined by the chronic non-communicable disease, with cancer on its leading position. It is widely recognized that cervical cancer has passed the frames of the healthcare sphere and gained the importance of social problem.

According to the GLOBOCAN/IARC (2013), 530 000 cases of cervical cancer incidence and 275 000 cervical cancer related deaths were registered worldwide in 2008. At the same time, more than 50 % of death cases caused by this site cancer is registered in India, China, Brazil, Bangladesh and Nigeria, Death rate marked its peak in Africa.

Barot S. (2012) has analyzed the WHO data on the variations in cervical cancer incidence and mortality rates in the world economically developing and developed countries. In 2008, 17,7 cases of cervical cancer incidence and 9,7 death cases caused by this disease were registered per 100,000 female population in developing countries and 9,1 and 3,1 cases correspondingly in developed countries. The author concludes that in comparison with world economically developed countries, the incidence of cervical cancer in developing countries is 2 times higher and the mortality rate is 3-times higher. This assumption is also shared by Sankaranarayanan R. (2006) and Gatune J.W. (2005).

According to Martin C.M. et al. (2009), cervical cancer is the second leading site in females after breast cancer in the world and the first leading cause in developing countries.

Ferlay J. et al. (2013) published the IARC (International Agency for Research on Cancer) 2012 data on the burden of cancer incidence and mortality. 84 % of all cervical cancer incidence cases were registered in the world less developed countries. The high level of cervical cancer incidence is notable in Africa, Latin America and Caribbean countries and the lowest level in USA, Canada and Pacific area. The peak of

cervical cancer incidence was registered in Malawi, with 75.9 females per 100 000 female population diagnosed to cervical cancer relatively to Age-Standardized Rate (ASR=75,9). High rate of disease incidence was also noted in Mozambique (ASR=65,0) and Comoros (ASR=61,3).

According to Ferlay J. et al. (2012), cervical cancer is the seventh leading site in the structure of cancer diseases worldwide. 527 000 new cases of this cancer were registered in 2012, that constitutes the 8% of cancer incidence.

The highest ASR of cervical cancer incidence was registered in East Africa and the lowest in West Asia.

According to Ferlay J. et al. (2008) data for 2008, the 5 years survival rate of females with diagnosed cervical cancer was 1,55 million in the world.

According to Gattoc L. et al. (2014) and Priore G. (2008), cervical cancer annually affects 500,000 females and 240,000 females die from this disease worldwide. At the same time, 80% of newly diagnosed cases are at late stages.

According to the data of American Cancer Society (ACS, 2014), 12,360 new cases of cervical cancer incidence and 4,020 death cases were registered in the United States in 2013. 20 % of the cancer cases were detected in the age group of 65 years.

According to the data of US Disease Control and Prevention (CDC, 2013), 11,818 cases of cervical cancer incidence and 3,939 death cases were registered in the United States in 2012. One of the highest levels of cervical cancer incidence in the United States was noted in Hispanic females, than in Afro-American, Indian and Asian female population of the United States. The highest death rate caused by cervical cancer was registered in Afro-American Females.

According to the data of American Cancer Society (ACS, 2013) and National Cancer Institute (NCI, 2010) cervical cancer is one of the main causes of death in female population of the United States. In particular, it stands on the third place in the structure of mortality caused by the gynecological cancers and the 14-th place in the structure of mortality caused by all other cancers.

According to Siegel R. et al. (2014), cervical cancer is the third main site of all gynecological cancer, causing the death in female population of the United States.

According to SEER (2013) basing on the data of the period 2008-2010, one female per 151 residing in the United States, has the lifetime risk to be diagnosed to cervical cancer. The average age of the disease is 49. The 5 years survival rate in females with early detected cervical cancer is 91 %, in case of regionally developed disease - 57 % and in advanced cases with far metastases - only 16 %. The number of females affected with cervical cancer in the United States by 2010 equaled to 250,000.

According to Frumovitz M. (2013), morphologically, two main types of cervical cancer are squamous cell carcinoma (69 % of cases) and adenocarcinoma (25%), other types of cervical cancer constitute 6 %. The same data is provided by Ries L.A.G. et al. (2007).

According to Ferlay J. et al. (2013), cervical cancer is on the sixth rank in the structure of cancer incidence in Europe. 58,400 new cervical cancer cases, constituting 4 % of all female cancer cases were registered in Europe, in 2012. According to the ASR, the peak of incidence was registered in Romania and the lowest level in Switzerland.

Basing on the data of National Cancer Registry, covering the period of 1982-2006 with information about 71,511 patients, Foley G. et al. (2011) concluded that cervical cancer is on the second rank place in the structures of cancer incidence in female population up to 35 years age group in England.

The same data are proved by the National Statistics Office of England (ONS, 2010), providing information, that in 2007, 8.0 per 100,000 females were diagnosed to cervical cancer, that is the second main site of cancer in female population up to 35 years age group in England.

Arbyn M. et al. (2009) studied the WHO data on mortality caused by cervical cancer in EU countries. In 2004, more than 16,000 females died because of this disease in EU countries. The death rate (ASR) in the dynamics has decreased significantly in EU old member countries (West and Central Europe) and insignificantly in Poland and Czech Republic, remains the same in Estonia and Slovakia and increased in Bulgaria, Lithuania, Latvia and Romania.

According to Dušek, L. et al. (2005), 1,000 females are affected by cervical cancer and 400 females die annually from this reason in Czech Republic. According to the data of Czech National Cancer Register (CNCR, 2014), 19 females per 100,000 females were affected by cervical cancer and 7 of them died in 2011.

According to the Cancer register of Finland (2014), 150 females are affected by cervical cancer and 50-70 females die annually from this reason in Finland. The cervical cancer incidence rate per 100 000 females is 4 cases and mortality rate is 1 case.

According to the joint data of Australian Institute of Healthcare and Social Welfare and The Australian Association of Cancer Registry (2012), 818 cases of cervical cancer incidence and 229 deaths caused by this disease were registered in Australia in 2011. After the initiation of the Screening Program in Australia from 1991, the mortality rate caused by cervical cancer has decreased by half.

O'Brien E. D. et al. (2000) studied the causes of death in Australian indigenous female population in the period of 1986-1997. As study revealed, cervical cancer was the first leading cause in the female mortality structure.

According to the Canadian Cancer Society (CCS, 2013), 610 cases of cervical cancer incidence and 150 death cases were registered in Ontario in 2013.

According to Fitzgerald D.W. (2014), one of the highest level of cervical cancer incidence in the world is noted in Haiti. 94 cases of cervical cancer per 100 000 female population is registered there, being the main reason of mortality among the female population. 1,500 females die from this disease annually.

Tay S.K. et al. (2008) provide the data on prevalence of cervical cancer incidence per 100 000 females: 10 in Hong-Kong and Singapore and about 20 cases in Malaysia, Philippines Thailand and Vietnam.

According to the data of Bingham A. et al. (2003) because of the low awareness and non-existence of the systems of preventive services in Sub-Saharan African Countries, the 80% of cervical cancer cases are detected at late stages of the disease.

Therefore, the burden of cervical cancer is the actual problem for most of the world countries. Considering the social importance of the problem, it is actual to study the burden of cervical cancer in Tbilisi female population.

### **Goals and objectives of the study:**

Considering the actuality and social importance of the problem, to get the clear picture on the burden of cervical cancer in Tbilisi, the descriptive study within the framework of the University research program with the main topic "Epidemiological Assessment of Breast and Cervical Cancer Screening Program in Tbilisi" was conducted basing at Health Science and Public Health School of Georgian University.

### **Objectives set up considering the design of the study:**

#### **Study of the cervical cancer incidence in Tbilisi;**

Establishment of the structure of cancer caused mortality and clarification of the ratio of frequency and burden of cervical cancer

### **Target groups and methodology of research:**

The data on 3838 cases of cervical cancer incidence during the years 1998 - 2012 was provided by the National Center for Disease Control (NCDC). It should be stated that during the period of 2008-2010, at average 543 new cases were registered annually, compared to 65 new cases registered in 2011-2012. The sharp decline in cervical cancer incidence (only 6% of all expected cases were registered) during these two years was caused by the malfunctioning of cancer registration system. Because of this reason, the data during the years 2011 - 2012 was taken out from the descriptive assessment and only 13 years data (1998-2010) was analyzed.

The data on 7927 death cases caused by cancer in female population during the years 2003 - 2012 was provided by the National Statistics Office of Georgia (GEOSTAT), according to the 5 years adjusted age groups. It should be stated that during the period of 2003-2007, at average 1088 deaths caused by cancer were registered annually compared to 497 cases registered in 2008-2012. The sharp decline in cervical cancer mortality (only 45.7 % of all expected cases were registered) was caused by the malfunctioning of cancer registration system. Because of this reason, the data during the years 2008 - 2012 was taken out from the descriptive assessment and only 5 years data (2003-2007) was analyzed.

Thus, the data on 3773 cases of cervical cancer incidence during the period of 1998 - 2010 in Tbilisi and 5440 cases of death caused by cancer in female population in Tbilisi during the period of 2003-2007 was analyzed within the framework of the research.

Descriptive epidemiological research was conducted by using the methodology recommended by the International Agency for Research on Cancer (IARC, Lyon), International Association of Cancer Registries (IACR, Lyon), European Network of Cancer Registries (ENCR, Lyon) and International Union Against Cancer (UICC, Geneva) and SEER Program. The databases were processed statistically.

Following statistical indicators were processed: Crude Rates, Age-Specific Rates, Age-Standardized Rates (ASR), 95% CI ASR, Truncated Age-Standardized Rates (TASR), 95% CI TASR, Age-Adjusted Rates (AAR), Standardized Rate Ratios (SRR), 95% CI SRR, Standardized Incidence Ratios (SIR), 95% CI SIR, Cumulative Risk (CR), 95% CI CR, Relative Frequency, Ratio Frequency of cancer incidence and mortality.

Descriptive indicators obtained in result of the survey and presented in the tables and charts were analyzed.

**Results of the research:**

The burden of cervical cancer incidence in Tbilisi:

According to the cruderates, 48,9females per 100, 000 female population were affected with cervical cancer (ICD-10-C53) annually, during the studied period (1998-2010). At the same time, according the crude rates, the dynamics of cervical cancer incidence during the periods of 2003–2007 and 2008-2010 have increased compared to the period of 1998-2002, from 39,7%000 up to 50,8%000 and 61,1%000 relatively.



**Chart # 1.Age Specific Rates of Cervical Cancer Incidence 100 000 Female Populations in Tbilisi, 2008-2010.**

It should be noted, that compared to the other periods, the drastic increase of cervical cancer incidence was noted in the age group 40-44, with the highest level (peak) of registered cervical cancer cases 255.8%000.

37,0females per 100,000 female population (95% CI ASR, 35,8-38,2) according to Age Standardized Rates(ASR), were annually affected with cervical cancer during the 13 years period (1998- 2010) in Tbilisi(see. Table # 1).

**Table# 1.Dynamics of AgeStandardized Rates (ASR) of Cervical Cancer Incidence per 100 000 Females, 1998-2010. Tbilisi**

Period	ASR	SE	95% CIASR
1998-2002	29,9	0,9	28,2-31,6
2003-2007	38,8	1,0	36,8-40,8
2008-2010	45,7	1,4	43,0-48,5
1998-2010	37,0	0,6	35,8-38,2

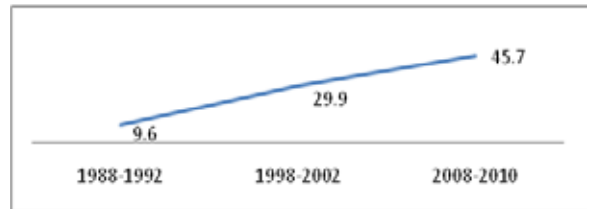
At the same time, the increase of cervical cancer incidence in the periods of 2003 -2007 and 2008-2010 was noted compared to the period of 1998-2002 in dynamics ofcervical cancer incidence by Age StandardizedRates(ASR)from 29,9%000(95% CI ASR, 28,2-31,6), up to 38,8%000 (95% CI ASR, 36,8-40,8) and 45,7%000(95% CI ASR, 43,0-48,5) relatively.

According to the data provided by KshelashviliV. (2007), relatively- to dynamics of cervical cancer incidence by Age StandardizedRates (ASR), 9.6 females per 100 000 female population (95% CI ASR, 8,8-10,4) were affected with cervical cancer in Tbilisi in 1988 – 1992.

Dynamics ofcervical cancer incidence by Age Standardized Rates(ASR), with 10-10 years intervals – two five years (1988-1992, 1998-2002) and one three years (2008-2010) periods is shown in the table #2 and chart #2.

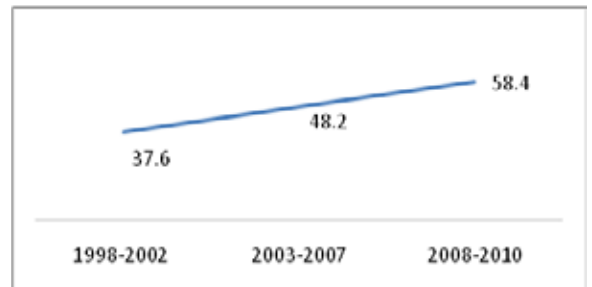
**Table# 2.Age StandardizedRates (ASR)of Cervical Cancer Incidence with 10 Years Intervals(1988-1992, 1998-2002, 2008-2010).**

Period	ASR	SE	95% CIASR
1988-1992	9,6	0,4	8,8-10,4
1998-2002	29,9	0,9	28,2-31,6
2008-2010	45,7	1,4	43,0-48,5



**Chart# 2.Age StandardizedRates (ASR)of Cervical Cancer Incidence, with 10 Years Intervals(1988-1992, 1998-2002, 2008-2010).**

Sharp increase of cervical cancer incidence was noted after comparing of the data from the period of 1988-1992 with 10 years intervals, (1988-1992: ASR=9,6; 95% CI=8,8-10,4; 1998-2002: ASR=29,9; 95% CI=28,2-31,6). The growth rate of cervical cancer incidence slowed down from the period of 1998-2002 and again, started from 2008-2010, the tendency of the growth continued (2008-2010: ASR=45,7; 95% CI=43,0-48,5).



**Chart#3.Dynamics of Cervical Cancer Incidence by Age-Adjusted Rates (AAR) (Tbilisi standard, 2002) per 100 000females, during the period of 1998- 2010, in Tbilisi.**

According to Age-adjusted Rates (AAR) of Cervical Cancer Incidence (Tbilisi standard, 2002), annually, 46.5 females per 100 000 females were affected with cervical cancer during 13 years period (1998-2010) in Tbilisi.

At the same time, the increase of cervical cancer incidence in the periods of 2003 -2007 and 2008-2010 was noted compared to the period of 1998-2002 in the dynamics of Age Adjusted Rates (ASR) from 37,6%000-up to 48,2%000 and 58,4%000relatively.(see:Chart#3).

**Table # 3.The Cumulative Risk(CR<sub>0-74</sub>) of Cervical Cancer Incidence in Tbilisi during the period of 1998-2010.**

Years	CR <sub>0-74</sub>	SE <sub>Cum.Rate</sub>	95% CI CR <sub>0-74</sub>
1998-2002	3,2	0,10	3,1-3,3
2003-2007	4,2	0,12	4,1-4,4
2008-2010	4,6	0,15	4,5-4,9
1998-2010	3,9	0,07	3,8-4,0

The Cumulative Risk (CR<sub>0-74</sub>) of cervical cancer incidence in female population in Tbilisi for 13 years period (998-2010) amounted to 3,9% (95% CI CR<sub>0-74</sub>=3,8-4,0).At the same time, the increase of cervical cancer cumulative risk in the periods of 2003 -2007 and 2008-2010 was notedin dynamics, compared to the period of 1998-2002 up to 4,2%(95% CI CR<sub>0-74</sub>=4,1-4,4), and 4,6% (95% CI CR<sub>0-74</sub>=4,5-4,9)relatively. (see. Table # 3).

Compared with 1988-1992 period,Standardized Rate Ratios (SRR) of cervical cancer incidence have increased by 3 times (SRR=3,1; 95% CI SRR =2,8-3,5)during the period of 1988 -2002 and by 4.8 times (SRR=4,8; 95% CI SRR=4,1-5,6)in 2008-2010 compared to 1988 -1992. This tendency remained unchanged in 2008-2010 compared to 1998-2002, though the growth rate of this site cancer has decreased (SRR=1,5; 95% CI SRR=1,4-1,6). (see. Table # 4)

**Table #4. Dynamics of Standardized Rate Ratios (SRR) of Cervical Cancer Incidence in Tbilisi**

Comparison of periods	SRR	$\chi^2$	95% CISRR
1998-2002/1988-1992	3,1	429,1	2,8-3,5
2008-2010/1998-2002	1,5	66,3	1,4-1,6
2008-2010/1988-1992	4,8	611,4	4,1-5,6

**Table #5. Dynamics of Standardized Incidence Ratios(SIR) of Cervical Cancer Incidence in Tbilisi**

Comparison of periods	SIR	SE	95% CI SIR
from 1998-2002 up to 2003-2007	127,9	3,3	121,5-134,4
from 2003-2007 up to 2008-2010-	120,3	4,0	113,2-127,7
from 1998-2002 up to 2008-2010	153,9	4,7	144,8-163,1

Compared to 1998-2002 period, Standardized Incidence Ratios (SIR) of cervical cancer incidence have increased by 27,9% (SIR =127,9; 95% CI SIR=121,5-134,4) in 2003-2007, and by 20.3% (SIR =120,3; 95% CI SIR=113,2-127,7) in 2008-2010 compared to 2003-2007. In total, during the 13 years period (1998-2010) the incidence of this site cancer has increased by 53.9% (SIR =153,9; 95% CI SIR=144,8-163,1)(see: Table #5).

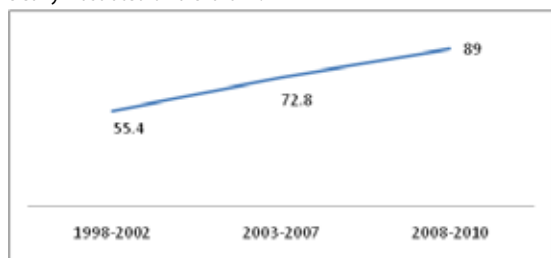
**Table#6. Dynamics of Cervical Cancer Incidence in Tbilisi, in 1998-2010, by Truncated Age-Standardized Rates (TASR).**

Years	TASR <sub>25-64</sub>	SE	95% CITASR <sub>25-64</sub>
1998-2002	55,4	0,8	53,7-57,0
2003-2007	72,8	0,9	70,5-74,1
2008-2010	89,0	1,3	86,5-91,5
1998-2010	69,0	0,6	68,0-70,1

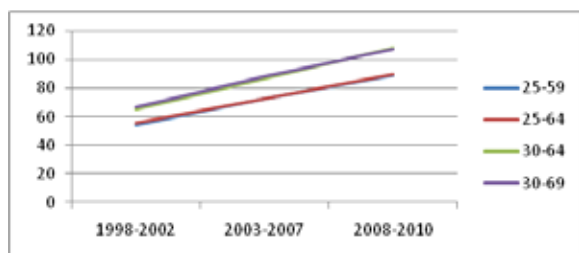
According to Truncated Age-Standardized Rates (TASR) of cervical cancer incidence 69,0 females per 100,000 females (95% CI TASR<sub>25-64</sub>=68,0-70,1) were affected with cervical cancer annually in the age group 25-64, during the 13 years period (1998-2010).

At the same time, the increase of cervical cancer incidence in the period of 2008 -2010 in the age group of 25-64, was noted compared to the period of 1998-2002 in the dynamics by Truncated Age-Standardized (TASR) Cervical Cancer Incidence Rates from 55,4%000(95% CI TASR<sub>25-64</sub>=53,7-57,0) up to 72,8 %000 (95% CI TASR<sub>25-64</sub> =70,5-74,1) and 89,0%000(95% CI TASR<sub>25-64</sub> =86,5-91,5).

The increase of cervical cancer incidence in the age group 25-64 is clearly illustrated on a chart #4.



**Chart #4. Dynamics of Cervical Cancer Incidence by Truncated Age-Standardized (TASR<sub>25-64</sub>) Rates in Tbilisi, in 1998-2010.**



**Chart # 5. Dynamics of Cervical Cancer Incidence by Differentiated Truncated Age-Standardized (TASR) Rates in**

**Tbilisi, during the period of 1998-2010.**

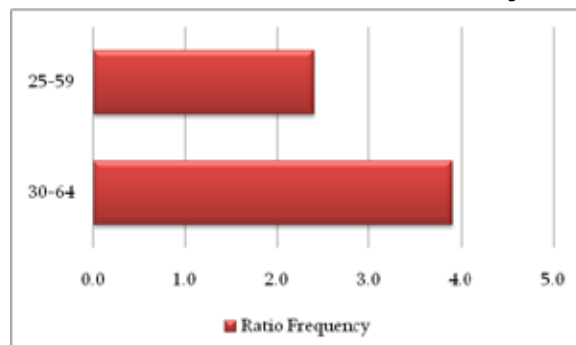
Comparative dynamics of Differentiated Truncated Age-Standardized (TASR) of Cervical Cancer Incidence for different age groups and time periods (1998-2010) in Tbilisi is shown on the chart #5.

The growing dynamics of cervical cancer incidence by Truncated Age-Standardized Rates (TASR) was noted in 1998-2010 in all age groups (25-59, 25-64, 30-64, 30-69) studied in Tbilisi. At the same time, the identical cervical cancer incidence rates were noted in 25-59 and 25-64, also in 30-64 and 30-69 age groups in all periods before 1988-2010, though compared to the age groups 25-59 and 25-64, the incidence rate increased in the age 30-64 and 30-69.

**Table #7. Comparison of Truncated Rate Ratios (TSRR) of Cervical Cancer Incidence in Tbilisi.**

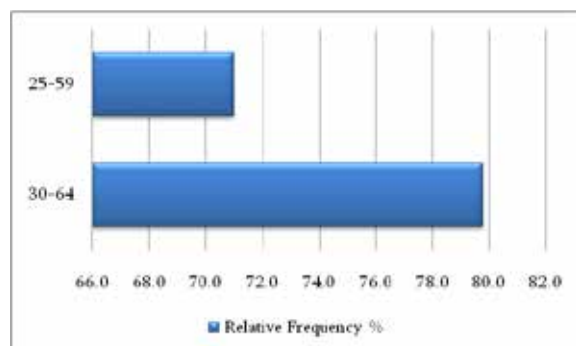
#	#	Comparison of age groups	SRR	$\chi^2$	95% CISRR
1	2008-2010	1.1 30-64/25-59	1,2	111,3	1,2-1,3
		1.2 30-69/25-59	1,2	90,8	1,1-1,3
2	1998-2010	2.1 30-64/25-59	1,2	296,1	1,2-1,2
		2.2 30-69/25-59	1,2	325,1	1,2-1,3

Truncated Rate Ratios (TSRR) of cervical cancer incidence during last 3 years as well as during the 13 years period (1998-2010) studied in the survey, was 1,2 times higher in the age groups 30-64 and 30-69 compared to the age group 25-59, while in the age groups 30-64 and 30-69, the identical rates of cervical cancer incidence were registered.



**Chart #6. Ratio Frequency of Cervical Cancer Incidence Truncated Age Specific Rates in 1998-2010 in Tbilisi**

Compared to the other age groups, cervical cancer incidence Ratio Frequency in 1998-2010 in Tbilisi was 2,4 times higher in the age group 25-59, while in age group 30-64 it was 3,9 times higher.(see. Chart # 6).



**Chart#7. Relative Frequency of Cervical Cancer Incidence Age Specific Rates in 1998-2010 in Tbilisi**

According to Relative Frequency, 71,0% of cervical cancer incidence cases registered in Tbilisi in 1998-2010 were diagnosed in the age group 25 -59 and 79,8% in the age group 30-64 (see. Chart#7). In other

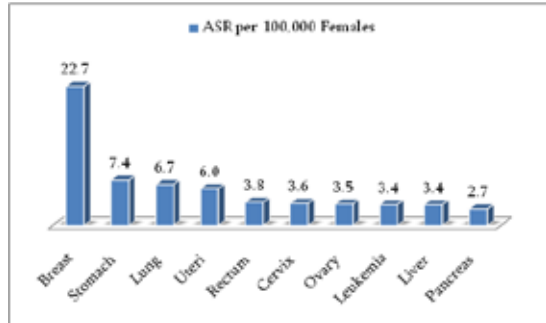
words, cervical cancer incidence relative frequency in the age group 30-64, exceeds the same rate of the age group 25-59 in 8,8 %.

Structure of Cancer Related Mortality in Female Population in Tbilisi.

10 main localizations have been verified in result of the analyses of 5440 cases of cancer related deaths in female population in Tbilisi, during the period of 2003-2007. (see. Table # 8 and Chart # 8).

**Table #8. The Structure of Cancer Related Mortality (10 main localizations) in Female Population in Tbilisi, during the period of 2003-2007. Age Standardized Rates (ASR) Calculation per 100,000 Females.**

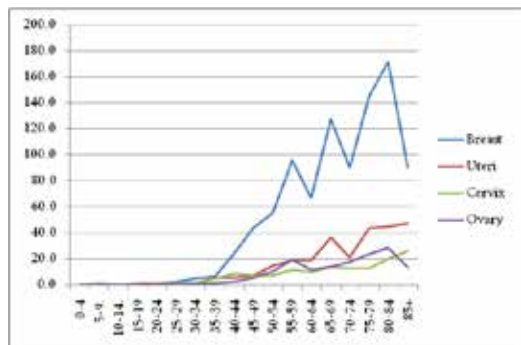
#	Cancer Site	ICD-10	ASR	SE <sub>ASR</sub>	95% CI ASR
1	Stomach	C16	7,4	0,4	6,6-8,2
2	Rectum	C20	3,8	0,3	3,2-4,4
3	Liver	C22	3,4	0,3	2,8-4,0
4	Pancreas	C25	2,7	0,3	2,1-3,2
5	Lung	C34	6,7	0,4	5,9-7,6
6	Breast	C50	22,7	0,8	21,2-24,3
7	Cervix	C53	3,6	0,3	3,0-4,2
8	Uterus	C54	6,0	0,4	5,2-6,8
9	Ovary	C56	3,5	0,3	2,9-4,1
10	Leukemia	C95	3,4	0,3	2,8-4,1
Total		C00-D48	123,6	1,9	120,0-127,3



**Chart#8. The Structure of Cancer Related Mortality (10 main sites) in female population in Tbilisi, during the period of 2003-2007. Age Standardized Rates (ASR) was calculated per 100,000 females.**

The structure of cancer related mortality in 2003-2007 has been defined according the Age Standardized Rates(ASR). 10 main sites have been identified, with frequencies per 100, 000 females and rank places: I – Breast (ASR=22,7%000); II- Stomach (ASR=7,4%000), III- Lung (ASR=6,7%000), IV- Uteri (ASR=6,0%000), V- Rectum (ASR=3,8%000), VI- Cervix (ASR=3,6%000), VII- Ovary (ASR=3,5%000), VIII- Leukemia (ASR=3,4%000), IX- Liver (ASR=3,4%000), X- Pancreas (ASR=2,7%000).

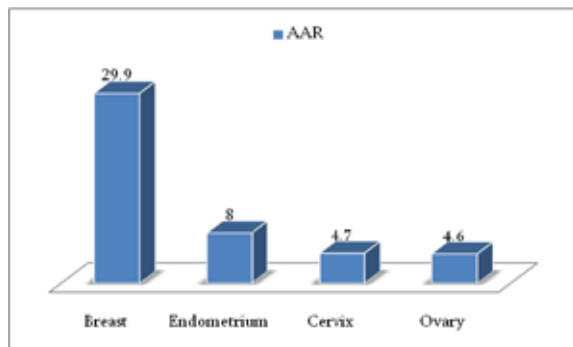
Age Specific Mortality Rates caused by female reproductive system cancer per 100, 000 of female population in Tbilisi during the period of 2003-2007 are shown on a chart #9.



**Chart #9. Age Specific Mortality Rates caused by female reproductive system cancer per 100, 000 of female pop-**

**ulation in Tbilisi during the period of 2003-2007**

Age Adjusted Mortality Rates (AAR) per 100,000 of female population in Tbilisi in 2003-2007, caused by: breast cancer – 29,9cases, cervical Cancer –4,7 cases, Uterus cancer -8,0 casesandOvarian cancer -4,6 cases (see. Chart # 10).



**Chart#10. Age Adjusted Mortality Rates caused by female reproductive system cancer per 100, 000 of female population in Tbilisi during the period of 2003-2007**

**Table #9. The Cumulative Risk (CR<sub>0-74</sub>) of Reproductive System Cancer Related Mortality in Female Population up ro age 75, in Tbilisi, During the Period of 1998-2010.**

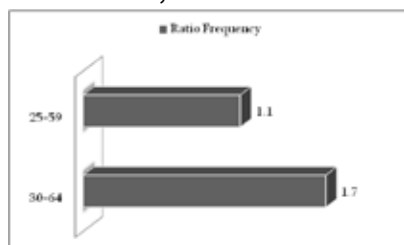
Cancer site	CR <sub>0-74</sub>	SE <sub>Cum.Rate</sub>	95% CI CR <sub>0-74</sub>
Breast	2,6	0,01	2,5-2,7
Cervix	0,4	0,04	0,4-0,5
Uterus	0,7	0,06	0,7-0,8
Ovary	0,4	0,02	0,4-0,4
Total	13,3	0,23	12,4-13,7

The Cumulative Risk (CR<sub>0-74</sub>) of reproductive system cancer related mortality in female population up to age 75, in Tbilisi, during the period of 2003-2007 was: breast cancer - 2,6% (95% CI CR<sub>0-74</sub>=2,5-2,7), cervical cancer - 0,4% (95% CI CR<sub>0-74</sub>=2,5-2,7), Uterus cancer- 0,7% (95% CI CR<sub>0-74</sub>=0,7-0,8) and Ovarian cancer - 0,4% (95% CI CR<sub>0-74</sub>=0,4-0,4).

**Table # 10. Truncated Standardized Rate Ratios (TSRR) of Cervical Cancer Related Mortality in Tbilisi, during the period of 1998-2010.**

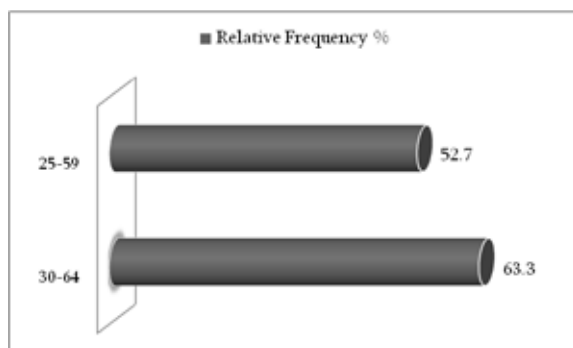
#	Truncated Age-Standardized Rates(TASR)	TSRR	χ <sup>2</sup>	95% CI SRR
1	TASR <sub>30-64</sub> / TASR <sub>25-59</sub>	1,3	0,03	0,1-25,2
2	TASR <sub>30-69</sub> / TASR <sub>25-59</sub>	1,4	0,05	0,1-27,0

Following tendency of Truncated Standardized Rate Ratios(TASR) was observed: compared to the age group 25 -59, cervical cancer related mortality rate is 1,3 and 1,4 times higher in the age groups of 30-64 and 30-69 relatively.



**Chart# 11. Ratio Frequency of Age Specific Cervical Cancer Related Mortality in Tbilisi during the period of 2003-2007**

Compared to the other age groups, cervical cancer related mortality Ratio Frequency during the period of 2003-2007 in Tbilisi was 1,1 times higher in the age group 25-59, while in age group 30-64 it was 1,7 times higher. (see. Table #11).



**Chart# 12. Relative Frequency of Age Specific Cervical Cancer Related Mortality in Tbilisi during the period of 2003-2007**

According to Relative Frequency, 52,7 % of cervical cancer related mortality cases were registered in the age group 25 -59 and 63,3% in the age group 30-64 in Tbilisi, during the period of 2003-2007. In other words, cervical cancer related mortality relative frequency in the age group 30-64, exceeds the same rate of the age group 25-59 in 10,6 %. (see. Table # 12)

#### Summary: Cervical Cancer Burden in Tbilisi

3773 cases of cervical cancer cases have been registered during the 13 years period (1998 – 2010) in Tbilisi,

According to the Crude rates, 48,9 females per 100, 000 female population were affected with cervical cancer (ICD-10-C53) annually, during the studied period (1998-2010). At the same time, according to the Crude rates, the dynamics of cervical cancer incidence during the periods of 2003–2007 and 2008-2010 have increased compared to the period of 1998-2002, from 39,7%000 up to 50,8%000 and 61,1%000 relatively.

It should be noted, that compared to the other periods, the drastic increase of cervical cancer incidence was noted in the age group 40-44, with the highest level (peak) of registered cervical cancer cases 255,8%000.

37,0 females per 100,000 female population (95% CI ASR, 35,8-38,2) according to Age Standardized Rates (ASR), were annually affected with cervical cancer during the 13 years period (1998- 2010) in Tbilisi.

At the same time, the increase of cervical cancer incidence in the periods of 2003 -2007 and 2008-2010 was noted compared to the period of 1998-2002 in dynamics of Age Standardized cervical cancer incidence Rates (ASR) from 29,9%000 (95% CI ASR, 28,2-31,6), up to 38,8%000 (95% CI ASR, 36,8-40,8) and 45,7%000 (95% CI ASR, 43,0-48,5) relatively.

Sharp increase of cervical cancer incidence was noted after comparing of the data from the period of 1988-1992 with 10 years intervals, (1988-1992: ASR=9,6; 95% CI=8,8-10,4; 1998-2002: ASR=29,9; 95% CI=28,2-31,6). The growth rate of cervical cancer incidence slowed down from the period of 1998-2002 and again, started from 2008-2010, the tendency of the growth continued (2008-2010: ASR=45,7; 95% CI=43,0-48,5).

According to Age-adjusted Rates (AAR) of Cervical Cancer Incidence (Tbilisi standard, 2002), 46,5 females per 100,000 female population were affected with cervical cancer during 13 years of the period 1998-2010.

At the same time, the increase of cervical cancer incidence in the periods of 2003 -2007 and 2008-2010 was noted compared to the period of 1998-2002 in the dynamics of Age Adjusted Rates (ASR) from 37,6%000-up to 48,2%000 and 58,4%000 relatively.

The Cumulative Risk ( $CR_{0-74}$ ) of cervical cancer incidence in female population in Tbilisi for 13 years period (1998-2010) amounted to 3,9% (95% CI  $CR_{0-74}$ =3,8-4,0). At the same time, the increase of cervical cancer cumulative risk in the periods of 2003 -2007 and 2008-2010 was noted in dynamics, compared to the period of 1998-2002 up to 4,2% (95% CI  $CR_{0-74}$ =4,1-4,4), and 4,6% (95% CI  $CR_{0-74}$ =4,5-4,9) relatively.

Compared with 1988-1992 period, Standardized Rate Ratios (SRR) cervical cancer incidence rate have increased by 3 times (SRR=3,1; 95% CI SRR =2,8-3,5) during the period of 1988 -2002 and by 4.8 times (SRR=4,8; 95% CI SRR=4,1-5,6) in 2008-2010 compared to 1988 -1992. This tendency remained unchanged in 2008-2010 compared to 1998-2002, though the growth rate of this site cancer has decreased (SRR=1,5; 95% CI SRR=1,4-1,6).

Standardized Rate Ratios (SRR) cervical cancer incidence rate have increased by 1,3 times (SRR=1,3; 95% CI SRR =1,3-1,3) in 2003-2007 and by 1,5 times (SRR=1,5; 95% CI SRR=1,4-1,6) in 2008-2010.

Compared to 1998-2002 period, Standardized Incidence Ratio (SIR) of cervical cancer incidence have increased by 27,9% (SIR =127,9; 95% CI SIR=121,5-134,4) in 2003-2007, and by 20,3% (SIR =120,3; 95% CI SIR=113,2-127,7) in 2008-2010 compared to 2003-2007. In total, during the 13 years period (2008-2010) the incidence of this site cancer has increased by 53,9% (SIR =153,9; 95% CI SIR=144,8-163,1) compared to the period of 1998-2002.

According to Truncated Age-Standardized (TASR) of Cervical Cancer Incidence, 69,0 females per 100,000 of female population (95% CI  $TASR_{25-64}$ =68,0-70,1) were affected with cervical cancer annually in the age group 25-64, during the 13 years period (1998-2010).

At the same time, the increase of cervical cancer incidence in the period of 2008 -2010 in the age group of 25-64, was noted compared to the period of 1998-2002 according to the dynamics of Truncated Age-Standardized Rates (TASR) of Cervical Cancer Incidence from 55,4%000 (95% CI  $TASR_{25-64}$ =53,7-57,0) up to 72,8 %000 (95% CI  $TASR_{25-64}$ =70,5-74,1) and 89,0%000 (95% CI  $TASR_{25-64}$ =86,5-91,5).

The growing dynamics of Truncated Age-Standardized Rates (TASR) of cervical cancer incidence was noted in 1998-2010 in all age groups (25-59, 25-64, 30-64, 30-69) studied in Tbilisi. At the same time, the identical cervical cancer incidence rates were noted in 25-59 and 25-64, also in 30-64 and 30-69 age groups in all periods before 1988-2010, though compared to the age groups 25-59 and 25-64, the incidence rate increased in the age 30-64 and 30-69.

Standardized Rate Ratio (SRR) of cervical cancer incidence rates during last 3 years as well as during the 13 years period (1998-2010) studied in the survey, was 1,2 times higher in the age groups 30-64 and 30-69 compared to the age group 25-59, while in the age groups 30-64 and 30-69, the identical rates of cervical cancer incidence were registered.

Compared to the other age groups, Ratio Frequency of cervical cancer incidence in 1998-2010 in Tbilisi was 2,4 times higher in the age group 25-59, while in age group 30-64 it was 3,9 times higher.

According to Relative Frequency, 71,0% of cervical cancer incidence cases registered in Tbilisi in 1998-2010 were diagnosed in the age group 25 -59 and 79,8% in the age group 30-64. In other words, relative frequency of cervical cancer incidence in the age group 30-64, exceeds the same rate of the age group 25-59 in 8,8 %.

10 main sites have been verified in result of the analyses of 5440 cases of cancer related deaths in female population in Tbilisi, during the period of 2003-2007.

The structure of cancer related mortality in 2003-2007 has been defined according to Age Standardized Rates (ASR). 10 main sites have been identified, with frequencies per 100,000 females and categories: I – Breast (ASR=22,7%000); II- Stomach (ASR=7,4%000), III- Lung (ASR=6,7%000), IV- Uteri (ASR=6,0%000), V- Rectum (ASR=3,8%000), VI- Cervix (ASR=3,6%000), VII- Ovary (ASR=3,5%000), VIII- Leukemia (ASR=3,4%000), IX- Liver (ASR=3,4%000), X- Pancreas (ASR=2,7%000).

1/3 (29%) of all cancer related mortality cases in female population, residing in Tbilisi is caused by the cancer of reproductive system organs, among them: Breast- 18,4%, Uterus - 4,9%, Cervix - 2,9%, Ovary - 2,8%.

Age Adjusted Rates (AAR) of mortality per 100,000 of female population in Tbilisi in 2003-2007, caused by: breast cancer – 29,9 cases, cervical cancer – 4,7 cases, Uterus cancer - 8,0 cases and Ovarian cancer - 4,6 cases

The Cumulative Risk ( $CR_{0-64}$ ) of reproductive system cancer related mortality in female population up to age 65, in Tbilisi, during the period of 2003-2007 was: breast cancer - 1,5% (95% CI  $CR_{0-74}$ =1,5-1,6), cervical cancer - 0,3% (95% CI  $CR_{0-64}$ =0,3-0,3), Uterus cancer- 0,4% (95% CI  $CR_{0-64}$ =0,4-0,5) and Ovarian cancer - 0,2% (95% CI  $CR_{0-64}$ =0,2-0,3).

The Cumulative Risk ( $CR_{0-74}$ ) of reproductive system cancer related mortality in female population up to age 75, in Tbilisi, during the period of 2003-2007 was: breast cancer - 2,6% (95% CI  $CR_{0-74}$ =2,5-2,7), cervical cancer - 0,4% (95% CI  $CR_{0-74}$ =2,5-2,7), Uterus cancer- 0,7% (95% CI  $CR_{0-74}$ =0,7-0,8) and Ovarian cancer - 0,4% (95% CI  $CR_{0-74}$ =0,4-0,4).

Truncated Age-Standardized Rates (TASR) of cancer related mortality according to the cancer site per 100,000 of female population in Tbilisi, during the period of 2003-2007 are as follows:

Age group 25-29 ( $TASR_{25-29}$ ) – Breast 28,2 (95% CI  $TASR_{25-29}$ =27,0-29,3), Cervix -5,3 (95% CI  $TASR_{25-29}$ =4,8-5,8), Uterus- 6,7 (95% CI  $TASR_{25-29}$ =6,1-7,2), Ovary- 4,5 (95% CI  $TASR_{25-29}$ =4,0-5,0).

Age group 25-64 ( $TASR_{25-64}$ ) - Breast 31,6 (95% CI  $TASR_{25-64}$ =30,4-32,8), Cervix- 5,7 (95% CI  $TASR_{25-64}$ =5,1-6,2), Uterus 7,7 (95% CI  $TASR_{25-64}$ =7,1-8,3), Ovary - 5,1 (95% CI  $TASR_{25-64}$ =4,6-5,6).

Age group 30-64 ( $TASR_{30-64}$ ) – Breast - 37,9 (95% CI  $TASR_{30-64}$ =36,7-39,2), Cervix - 6,8 (95% CI  $TASR_{30-64}$ =6,3-7,3), Uterus- 9,3 (95% CI  $TASR_{30-64}$ =8,7-9,9), Ovary - 6,2 (95% CI  $TASR_{30-64}$ =5,7-6,7).

Age group 30-69 ( $TASR_{30-69}$ ) - Breast 44,6 (95% CI  $TASR_{30-69}$ =43,3-46,0), Cervix- 7,3 (95% CI  $TASR_{30-69}$ =6,8-7,8), Uterus- 11,4 (95% CI  $TASR_{30-69}$ =10,7-12,1), Ovary - 6,7 (95% CI  $TASR_{30-69}$ =6,2-7,3).

Following tendency of Truncated Age-Standardized Rates (TASR) was observed: compared to the age group 25-59, cervical cancer related mortality rate is 1,3 and 1,4 times higher in the age groups of 30-64 and 30-69 relatively.

Compared to the other age groups, Ratio Frequency of cervical cancer related mortality during the period of 2003-2007 in Tbilisi was 1,1 times higher in the age group 25-59, while in age group 30-64 it was 1,7 times higher. According to Relative Frequency, 52,7 % of cervical cancer related mortality cases were registered in the age group 25-59 and 63,3% in the age group 30-64 in Tbilisi, during the period of 2003-2007. In other words, cervical cancer related mortality relative frequency in the age group 30-64, exceeds the same rate of the age group 25-59 in 10,6 %.

Thus, 150 cervical cancer related death cases were in totally registered during the period 2003-2007, meaning that according to the crude rates mortality per 100,000 females caused by this disease will be - 5,1 cases, by Age Standardized Rate (ASR) - 3,6 (95% CI ASR=3,0-4,2) and by Age Adjusted mortality Rate (AAR) (Tbilisi Standard) - 4,7 cases annually;

Cervical cancer was the six most common cause of death in the structure of cancer related deaths with the ratio 2,9 % of all cases.

The Cumulative Risk ( $CR_{0-64}$ ) of cervical cancer related mortality in female population of the age group 0-65, in Tbilisi, during the period of 2003-2007 was: 0,3% (95% CI  $CR_{0-64}$ =0,3-0,3) and 0,4% (95% CI  $CR_{0-74}$ =0,4-0,5) in the age group 0-75.

Truncated Age-Standardized Rates Ratio (SRR) of cervical cancer related mortality rate per 100,000 of female population was 5,3 females

(95% CI  $TASR_{25-59}$ =4,8-5,8) – for 25-59 age group; 5,7 females (95% CI  $TASR_{25-64}$ =5,1-6,2) - for 25-64 age group, 6,8 ქალი (95% CI  $TASR_{30-64}$ =6,3-7,3) females for 30-64 age group and 7,3 females (95% CI  $TASR_{30-69}$ =6,8-7,8) – for 30-69 age group.

Following tendency of Truncated Age-Standardized Rates Ratio (TSRR) was observed: compared to the age group 25-59, cervical cancer related mortality rate is 1,3 and 1,4 times higher in the age groups of 30-64 and 30-69 relatively.

Compared to the other age groups, Ratio Frequency of cervical cancer related mortality during the period of 2003-2007 in Tbilisi was 1,1 times higher in the age group 25-59, while in age group 30-64 it was 1,7 times higher.

According to Relative Frequency, 52,7 % of cervical cancer related mortality cases were registered in the age group 25-59 and 63,3% in the age group 30-64 in Tbilisi, during the period of 2003-2007. In other words, cervical cancer related mortality relative frequency in the age group 30-64, exceeds the same rate of the age group 25-59 in 10,6 %.

## CONCLUSIONS:

The Burden of cervical cancer in female population in Tbilisi presents the important problem of medical and social character.

Cervical cancer incidence rate in Tbilisi (ASR=37,0‰; AAR=46,5‰;  $CR_{0-74}$ =3,9%) corresponds to the average rate of incidence in the world developing countries and mortality rate caused by this disease (ASR=3,6‰; AAR=4,7‰;  $CR_{0-74}$ =0,4%) corresponds to the same indicator of the developed countries.

While comparative low rate of cervical cancer related mortality in the world developed countries is determined by high coverage screening programs of female population and the effective preventive programs, in Tbilisi, this circumstance is caused by the non-existence of comprehensive registration system of population health status and its poor performance especially in recent years.

The increase of Age Standardized (ASR), Age Adjusted (AAR) and Cumulative Risk ( $CR_{0-74}$ ) of cervical cancer incidence rates was noted in dynamics. Compared to the period of 1998-2002, Standardized Rate Ratios (SRR) Cervical Cancer Incidence Rates have increased by 1,3 times and in 2008-2010 by 1,5 times. Standardized Incidence Ratios (SIR) of cervical cancer incidence rate have increased by 27,9% 20,3% in the same periods relatively. In total, during the 13 years period, cervical cancer incidence has increased by 53,9%. The peak level (ASR =255,8‰) of incidence was registered in 2008-2010 in the age group of 40-44.

Standardized Rate Ratios (SRR) of cervical cancer incidence during last 3 years as well as during the 13 years period (1998-2010) studied in the survey, was 1,2 times higher in the age groups 30-64 and 30-69 compared to the age group 25-59, while in the age groups 30-64 and 30-69, the identical rates of cervical cancer incidence were registered.

Compared to the other age groups, Ratio Frequency of cervical cancer incidence in 1998-2010 in Tbilisi was 2,4 times higher in the age group 25-59, while in age group 30-64 it was 3,9 times higher.

According to Relative Frequency, 71,0% of cervical cancer incidence cases registered in Tbilisi in 1998-2010 were diagnosed in the age group 25-59 and 79,8% in the age group 30-64. In other words, cervical cancer incidence relative frequency in the age group 30-64, exceeds the same rate of the age group 25-59 in 8,8 %.

Cervical cancer was the sixth most common cause (ASR=3,6‰; AAR=4,7‰;  $CR_{0-74}$ =0,4%) of death in the structure of cancer related deaths with the ratio 2,9 % of all cases.

Following tendency of Truncated Age-Standardized Rates Ratio (TSRR) was observed: compared to the age group 25-59, cervical cancer related mortality rate is 1,3 and 1,4 times higher in the age groups of 30-64 and 30-69 relatively.

Compared to the other age groups, Ratio Frequency of cervical can-

cer related mortality during the period of 2003-2007 in Tbilisi was 1,1 times higher in the age group 25-59, while in age group 30-64 it was 1,7 times higher.

According to Relative Frequency, 52,7 % of cervical cancer related mortality cases were registered in the age group 25 -59 and 63,3% in the age group 30-64 in Tbilisi, during the period of 2003-2007. In other words, cervical cancer related mortality relative frequency in the age group 30-64, exceeds the same rate of the age group 25-59 in 10,6 %.

#### RECOMMENDATIONS:

To ensure comprehensive control of cervical cancer, the task of primary urgency is elaboration of the Population-based Cancer Registry considering the international requirements (IACR, Lyon; ENCR, Lyon) and the follow-up based collection of the patients' database, permanent updating of online databases, maintaining the descriptive analyzes and epidemiological supervising.

To increase the effectiveness of the screening program and decrease the burden of cervical cancer in Tbilisi, the assumption based on descriptive study results can be made that it will be beneficial to adjust the target age group, in particular, to study the age group 30-64, instead of the age group 25-59 as considered in the guideline. Before getting this final decision, it is recommended to carry out additional survey- comparative analyses of cervical cancer screening cost-effectiveness in 25-59 and 30-64 age groups.

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